

WALTER WARNER (CA. 1557-1643) AND HIS NOTES ON
ANIMAL ORGANISMS

**WALTER WARNER (ca.1557-1643) AND HIS
NOTES ON ANIMAL ORGANISMS**

**WALTER WARNER (ca. 1557-1643) EN ZIJN
AANTEKENINGEN OVER DIERLIJKE ORGANISMEN**

(met een samenvatting in het Nederlands)

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To F. M. B.

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abbreviations

DNB : Dictionary of National Biography.

HMC: Historical Manuscripts Commission.

AT : Oeuvres de Descartes. Publiées par C. Adam & P. Tannery.

(See for the explanation of abbreviations referring to Hobbes' works Chapter 9, note 1.)

notice concerning the quotations from Warner's mss

For the benefit of readability and/or intelligibility the punctuation has occasionally been adapted and very long sentences have been broken up into shorter ones. Furthermore, the reader will come across four types of brackets: (), [], < >, and { }. The () are from Warner himself. Words or phrases between [] are crossed out in the MS. Words or phrases between < > were added later to the notes. Words or phrases between { } were added by me.

General Introduction

Until a few years ago the name Walter Warner (ca.1557-1643) meant little to most people other than that it was the name of a man who was suggested to have played a substantial role as a mathematician and natural philosopher in the intellectual life of the early 17th century in England. These suggestions gave the impression that Warner was a man to be reckoned with but left us without a clear picture of what exactly his contribution had been especially in the area of natural philosophy. Only his work in the field of mathematics and that of optics was fairly well documented and it was as an optical scientist that he aroused my interest when I investigated the sources of Hobbes' optical theories.

Like no other philosopher Thomas Hobbes (1588-1679) seems to have been intent upon covering up his sources and on giving the impression that all his ideas and theories were entirely his own. His development as a natural philosopher took place in the early 17th century, a period when, in England, interest in the sciences regarding the causal explanation of the physical world, i.e. natural philosophy seemed barely able to survive.¹ It is true that from the 1580s the subject had received more attention at the universities than had been the case for a long time previous to that but instruction was still modest, traditional and superficial. The growing interest among the rising middle classes focussed mainly on the applied sciences.² It is also true that there were individuals and even small groups that devoted themselves, sometimes at a very high level, to the study of theoretical problems and to fundamental research, but generally the results of these efforts were not published. They were not widely debated and there was no manifest cooperation between these individuals or groups. Nicholas Hill's (1570-1610/20) *Philosophia epicurea* (1601) apparently was not read, or if it was, attracted only ridicule. The mathematician Thomas Harriot (1560-1621),

¹ Cf. Fr. Bacon: '...the time amongst the Grecians in which natural philosophy seemed most to flourish, was but a short space...since which time, natural philosophy was never any profession, nor never possessed any whole man, except perchance some monk in a cloister, or some gentleman in the country, and that very rarely; but became a science of passage, to season a little young and unripe wits, and to serve for an introduction to other arts, specially physic and the practical mathematics.' (Unless stated otherwise Bacon's works will be quoted from the Spedding edition. They will be referred to as *The works*, followed by two numbers indicating the volume and page respectively. *The works*, Vol. 3, 499)

² See Heninger (1968-9).

afraid of reprisals from the public authorities, hesitated to give publicity to his work. Many people still associated natural philosophy and mathematics with black magic. The Church, whose interests were closely allied to those of the State, kept careful watch to see that no theories conflicting with the official doctrine were advanced. Francis Bacon (1561-1626) presented a new scenario for the scientific enterprise but at that time, so it seems, his work was hardly read.³ William Harvey (1578-1657) had to wait years before his theory of the circulation of the blood, published in 1628, was taken seriously. Considering the foregoing, it is easy to understand why we are so ill-informed regarding Hobbes' first steps along the path of natural philosophy, and about the people or books that guided him. Moreover most Hobbes-researchers show more interest in the systematic aspects of his philosophy than in the problem of his sources and development.

Jean Jacquot constitutes one of the few exceptions. In the 1950s he published a long article on the 'Cavendish Circle', a group of intellectuals round William Cavendish, the Earl of Newcastle, and his brother Sir Charles Cavendish (1591-1654) sharing a strong interest in physics, mathematics and allied sciences. It was in this group that Thomas Hobbes began his career as a natural philosopher in the early 1630s.⁴ In this article Jacquot dwells on the part Walter Warner played in this group as an optical scientist and on his correspondence on optics with Sir Charles Cavendish and Robert Payne, another member of the 'Cavendish Circle'.

Approximately ten years later Kargon published a book about the rise of atomism during the 17th century in England in which he, guided by a collection of notes, supposedly written by Warner, on space, time, matter and force, presented the same as an out and out atomist and as a member of the 'Northumberland Circle'. This was a group comparable with and directly preceding the 'Cavendish Circle', pivoted around Warner's patron, Henry Percy (1564-1632), the ninth Earl of Northumberland.⁵ His membership seemed to give plausibility to the idea that, still earlier, Warner would have associated with scientists, poets and explorers around Walter Raleigh (c. 1552-1618), a good friend of Henry Percy.⁶ Assuming there was a quasi invisible, progressive natural philosophical tradition in England during the late 16th

³ See Simon (1966), 394.

⁴ See Jacquot, J. "Sir Charles Cavendish and his learned friends." *Annals of science*. Vol. 8, 1952b: 13-27; 175-191.

⁵ See Kargon, R.H. *Atomism in England from Harriot to Newton*. Oxford 1966.

⁶ See Taylor, E.G. R. *The original writings and correspondence of the two Richard Hakluyts*. 2 vols., London 1935, Vol. 1, 25; Bakeless, J. *The tragicall history of Christopher Marlowe*. Cambridge Mass. 1942, vol. 1, 140; Bradbrooke, M. *The school of night*. Cambridge 1936.

and early 17th, century and that Warner had been active within three successive centres of this scientific avant-garde he seems to offer the best starting-point for a closer investigation of this tradition. Accordingly it was bound to happen that Jacquot, inspired perhaps by Kargon's presentation of Warner and from his interest in the natural philosophical developments at that time in England as well as in the 'Northumberland Circle', wrote a sequel to his article about the 'Cavendish Circle'. In a contribution to a book on Harriot as Renaissance scientist he describes Warner as a representative of the new philosophy, i.e. Copernicanism and atomism.⁷ This time Jacquot did not restrict himself to Warner's optical theories but dealt extensively with the notes on the elements of physics, discussed by Kargon and, more importantly, connected these speculations to another, voluminous collection of notes, also attributed to Warner, on the physiological and psychological functions, referred to by Warner as the *brute* or *natural* and *moral* or *voluntary faculties*., of animal organisms. On the basis of a global survey of this second group of notes Jacquot concludes that Warner had tried to integrate the different fields of natural philosophy into a unified system inspired by atomism. Moreover, especially in his notes on the *moral faculties* of animal organisms Warner would have expressed ideas remarkably similar to the corresponding theories of Hobbes. According to Jacquot Hobbes was conversant with Warner's views which probably had a substantial influence on him. The investigation described in this dissertation was directly actuated by that suggestion. I wanted to test Jacquot's claim as to Warner's influence on Hobbes and thus expected to learn simultaneously more about the history of natural philosophy in general at that time in England. In view of the fact that most of the research concerning Warner until now had been focussed on his notes on the elements of physics and, considering his physiological speculations less relevant to philosophy, I decided initially to restrict myself to a transcription and analysis of Warner's notes on the psychological functions of animal organisms and to publish them with a commentary, including a test of Jacquot's hypothesis regarding their influence on Hobbes.

One visit to the British Museum was enough to convince me that the task I had set myself would not prove that simple. To begin with, the legacy, collected into three volumes under the title 'Warner's Mathematical

⁷ See Jacquot, J. "Harriot, Hill, Warner and the new philosophy." In: *Thomas Harriot Renaissance scientist*. Ed. J. W. Shirley. Clarendon Press (Oxford 1974), 107-28. About a year after I began this investigation I learnt from the program of the Hobbes Fourth Centenary Conference in Oxford (1988) that Warner's influence on Hobbes had also been investigated by John Henry. Professor Henry kindly sent me the text of his lecture, held at that conference, about the influence of Patrizi's cosmology on Warner and on Hobbes' debt to Warner. Henry's views will be discussed in the Chapters 1 and 9. (See Henry, 1988.)

Collections', turned out to consist of a multicolored, very large number of notes on widely divergent topics piled together and more confusingly appearing to have been executed by several different hands. Moreover the notes on physics were not only steeped in different kinds of corpuscularism instead of an unambiguous atomism, but were also written in a theoretical vein totally different from that of the notes on animal organisms. In addition it turned out to be very difficult, at least *prima facie*, to discern clear main lines in the notes, not to mention a consistent theory. Though the notes were evidently fragments of a coherent tract there did not appear to be a specific theme running through them which would link them as a unified whole. Moreover, determining Warner's place in his intellectual milieu on the basis of these notes was complicated by the fact that despite his broaching numerous traditional topics his approach to them was rather idiosyncratic. Before investigating his notes on the *moral faculties* it was imperative that I ascertain if the collection as a whole was the work of one man, and if that man was Warner. If the answer to that question was affirmative the next step was to date at least the notes on physics and those on animal organisms in order to find out when Warner had been working on the different subjects, what his aims were and to get a clearer picture of his development as a natural philosopher. Finally for the sake of clarity his notes on animal organisms had to be restructured and, by contrasting them with corresponding views of contemporaries and of the authorities at that time, set in a framework in which they could become the object of specific, goal-directed research. It was evident that I had to abandon my initial plan and reformulate my strategy. To be specific I had to:

- 1) Make a detailed inventory and description of the complete collection of notes ascribed to Warner.
 - 2) Collect, transcribe, separate the pertinent material from the mass and, if necessary, put in subject order all notes concerning physics as well as those on the faculties of animal organisms.
 - 3) Compare the different groups of notes with regard to handwriting and style in order to determine whether they were attributed justly to one and the same person.
 - 4) Determine on the basis of biographical data and graphological as well as stylistic characteristics of the manuscripts whether Warner was or might have been the author of these notes.
 - 5) Date the notes as closely as possible.
 - 6) Determine the relationship between the views on the principles of nature and those on the *brute* and *moral faculties* of animal organisms on the basis of a detailed analysis and interpretation of the notes in question.
- 7) Place Warner as the writer of the notes on animal organisms in his time by a full comparison of the views at issue with the corresponding ideas of (near)contemporaries.

As with point four this latter problem also required gathering as much information as possible on Warner's life, contacts, interests, goals and methods. In view of the scarcity of direct biographical information it was necessary to rely on the manuscripts themselves and especially on the secondary literature concerning the people Warner was said to have known, the groups in which he would have participated and on the literature pertaining to his lifetime in general. Only after these problems were solved and after succeeding in reconstructing Warner's theories concerning animal organisms and more especially about the *moral faculties* would I be able to return to the question concerning the possible influence of Warner on Hobbes.

Almost every aspect of this theme was problematical. Because of the interwoven nature of the problems regarding the arrangement and interpretation of the material and of placing Warner in his intellectual milieu, which problems in their turn were linked to the dating of the papers and consequently also to Warner's biography, most of these questions could not be dealt with sequentially. Instead several groups of questions had to be worked on simultaneously switching from one group to another and back again. All this was done without the assistance of a general picture of Warner and his work since what was presented as such in the secondary literature was debatable, and in fact the real picture did not emerge until the end of the investigation.

A detailed comparative analysis of the notes on animal organisms convinced me that Warner in these notes tried to explain how in healthy animal organisms conscious behaviour, focussed on self-conservation, is perfectly attuned to the corresponding bodily processes which are proceeding unconsciously. Ultimately that behaviour and these processes, in Warner's view, can be reduced to the nature and operation of so-called 'animal' or 'animated spirits', an active, material substance endowed with mental powers. Warner's doctrine of this spirit and its faculties functions as the pivot of his speculations on animal organisms. His notes on the *brute faculties*, i.e. his physiological speculations contain most statements about this spirit. Accordingly these notes were indispensable in getting a clear picture of Warner's approach to animal organisms in general and of his explanation of the *moral faculties*, i.e. the psychological functions in particular. Apart from that they also appeared to contain information helpful in dating the notes on animal organisms and relevant to the determination of Warner's sources as well as his relationship to contemporaries. The same held true for his notes on

physics. They not only informed me about Warner as a natural philosopher in general, about his sources, his development and about his place as a natural philosopher among

contemporaries but they also led to a clarification of the idea of ‘force’ implied in his notion of ‘animal spirits’.

In view of the large amount and especially the nature of the material at issue I decided to abandon the initial plan of an original text edition. Though the notes are undoubtedly fragments of what was meant as a coherent tract they do not constitute a well ordered, completed text ready to be sent to the printer. That, anyway, probably was not what Warner had in mind when he wrote them. The numerous hesitations, changes, corrections, sudden ideas, laborious and often incomplete unravelling of problems, the asides and compact, cryptic jottings rather suggest that Warner wrote these notes for his own use and that the papers in question have to be read as ‘Forschungsmanuskripte’. The notes are snapshots of his attempts to formulate a consistent theory. This impression is reinforced, especially in case of the notes on animal organisms, by the many tacit presuppositions on which they seem to be based as well as by the large amounts of foreknowledge the reader apparently is assumed to have. If he had written these notes only for himself then naturally he had no need to explain these presuppositions or presumed foreknowledge. Hence, in my view only the presentation of a selection of these notes, arranged in a logical order and set in a clarifying context of other contemporary opinions, as is done in this dissertation, may result in further, fruitful research into Warner’s views, their sources and influence.⁸

Accordingly, in this dissertation I present a reconstruction and commentary of Warner’s view of the functioning of animal organisms in general and of his explanations of the development and operation of the *moral faculties* in particular. The reconstruction is based on the assumption that the notes at issue, marked by a kind of rational hylozoism instead of atomism, are fragments of a treatise on the animal spirit and its faculties, i.e. the active part of animal organisms conceived as ‘machinations naturall’. The description and analysis of Warner’s theories about the *moral faculties*, covering chapters 3 to 8, is preceded in chapter 1 by a critical consideration of the ideas concerning Warner since the 17th century, and a description of his legacy including an assesment of the reseach done into it and by a description and characterization of the notes on animal organisms in general in chapter 2.

The reconstruction itself is followed in chapter 9 by an investigation of Warner’s influence on Hobbes. This includes a description of Hobbes’ initial natural

⁸ I made transcriptions of all manuscripts concerning the functions of animal organisms as well as Warner’s ideas about the principles of nature. Anyone wishing to verify my statements about Warner and his views or to continue this line of research will be given the opportunity to inspect or consult these transcriptions with due observance of the copy-rights.

philosophical views in general, as well as his ideas about the functioning of animal organisms in the years that he associated with Warner, the changes in these views and ideas since the 1640s and a detailed comparison of his earlier as well as his later views, with those of Warner. The investigation is finished with a few general conclusions in chapter 10. With the reconstruction I hope to have presented Warner's views on the subjects in question as completely and clearly as possible. With my comments I hope to have clarified what were Warner's main sources, where he stood compared to his contemporaries and up to what point the notes on animal organisms justify the idea of Warner as a materialist c.q. mechanist.

The image of Warner emerging from this investigation in some respects is rather vague. He seems hard to pin down to a specific, unambiguous view of the functioning of animal organisms, especially with regard to details. However, this work presents the sharpest and most detailed picture of Warner and his writings ever presented by his contemporaries or in the secondary literature. As appears from his notes Warner was not a man of sweeping generalizations. They show him rather as a not too clear-thinking, minor philosopher who was primarily interested in details and apparently unconscious of the fact that in some respects he had strayed widely from the trodden paths of tradition. He hesitatingly tried to find his way out of the confusing labyrinth of explanations of the functioning of animal organisms current in the Renaissance. As for his relationship to Hobbes the investigation on the one hand confirms Jacquot's suggestion that already in an early phase of his development Hobbes may have been buoyed up in his unorthodox view of reality by the presence in England of kindred spirits like Warner. On the other it allows the conclusion that further investigation of the influence of Warner's notes on animal organisms on Hobbes will not be worthwhile.

Generally speaking the results of this investigation do not compel a substantial rewriting of history in the period at issue or to an essentially different view of Hobbes. Apart from exposing the mystifications about Warner in general and vitiating some promising suggestions concerning his work, they do however add to our knowledge of the hidden philosophical activity during the early years of the 17th century that prepared the rise of the new philosophy in England.

Chapter One

Warner's life and legacy

1.1. Fragments of a Biography

Walter Warner would conceivably have been forgotten by now had he not been associated with Thomas Harriot (1560-1621) and a member of the 'Cavendish Circle'. Within the compass of the research done since the late 1940s into Harriot's mathematical and scientific work and also into the natural philosophical theories of Thomas Hobbes, Warner's legacy, especially his notes regarding the principles of nature, also received occasional attention. These notes, a part of which is characterised by atomism, and his assumed membership of a supposedly liberal company of scholars gathered around Henry Percy, ninth Earl of Northumberland (1564-1632)¹ have earned him the reputation of being an important representative of the scientific avant-garde in early 17th century England. Towards the end of that century he was primarily seen as a mathematician.² In this capacity he enjoyed a certain fame as the editor of the *Artis Analyticae Praxis*, a treatise written by Thomas Harriot on the resolution of algebraic equations³ and as the author of a large table of antilogarithms.⁴ By then he had also earned a measure of fame as an

¹ '...that famous Mathematician, Mr. Hariot...[who] at one time, together with Mr. Hughes, who wrote of the Globes, Mr. Warner, and Mr. Turperley, the Noble Earle of Northumberland, the favourer of all good learning, and Mecaenas of learned men, maintained while he was in the Tower, for their worth and various literature...' (The chirurgicall lectures of tumors and ulcers. Delivered on tuesdays...in the chirurgians hall these three yeares last past...by Alexander Read, London 1635, 307. Quoted by Shirley (1983), 361-2.); Cf. John Wallis: 'Erat...Honoratissimus ille Comes Matheseos peritus & sedulus promotor; atque in eum finem (praeter *Harriotum* nostrum) alebat etiam domi suae & pensionibus annuis donavit duos alios Mathematicos, *Walterum Warner*, & *Robertum Hues*; & paulo post *Nicolaum Torperley*, quasi *Gymnasium Mathematicum* in suis aedibus...' (*Opera*, Vol. 2, Praefatio ad Lectorem, b2)

² Among the mathematicians employed by Henry Percy, according to Wallis, '...eminebat *Harriotus*, & post eum *Warnerus*, caeterique non incelebres erant Mathematici...' (Wallis, loc. cit.)

³ *Thomas Harriot, Artis analyticae praxis ad aequationes algebraicas nova, expedita, et generali methodo, resoluendas, Londini...anno 1631.*

⁴ 'Mr. Walter Warner made an Inverted Logarithmicall Table, i.e. whereas Brigg's table fills his margin with numbers encreasing by unites, and over-against them setts their logarithms, which because of incommensurability must needs <be> either abundant or deficient; Mr. Warner (like a dictionary of the Latine before the English) fills the margin with logarithmes encreasing by unites, and setts to every one of them so many continuall meane proportionalls between 1 and 10, and they for the same reason must also have the last figure incompleat.' (Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 292.)

chapter one . 2

optical scientist. Besides this a persistent rumour circulated according to which he had written a tract in two volumes on the circulation of the blood that was said either to have been published by William Harvey (1578-1657) as his own work or that had at least assisted him in forming his theory in *De motu cordis* (1628).⁵

Our main sources on Warner's life are John Aubrey⁶ and Anthony Wood⁷. Apart from the fact that they tell us little, their picture of Warner is based on recollections, often more than forty years old, of a few people who knew Warner directly or indirectly during only the last ten to fifteen years of his life. Aubrey, probably Wood's main source⁸, composed his 'life' of Warner out of the memories of Izaak Walton (1593-1683)⁹, Seth Ward (1617-1689)¹⁰ and notably from the mathematician John Pell (1611-1685)¹¹, Warner's one and only dedicated fan.¹²

Practically nothing is known for certain about the first sixty years of Warner's life. The only established fact is that in the early 1590s he was employed by the 9th Earl of Northumberland and stayed in the Earl's service until 1617 after which he received a pension up to the Earl's death in 1631.¹³

⁵ C. 1645 an anonymous wrote: 'Henry the Earle of Northumberland...was kept in the Tower of London a long time...where for better passing his time he got severall Learned persons to Live and Converse with him. One of them was Mr. Heriot...Another was Mr. Warrener, the Inventor probably of the circulation of the blood, of which subject he made a treatise consisting of two books which he sent to Dr. Harvey, who Epitomized them and printed them in his owne name: he usually said that Dr Harvey did not understand the motions of the heart which was a perfect Hydraulic.' (Bodleian MS Rawlinson B 158, 152-3. Quoted in Shirley (1983), 362. 'Memorandum: - Dr. Pell sayes that Mr. Warner rationated demonstratively by beates of the pulses that there must be a circulation of the blood.' (Aubrey, *Brief Lives* (ed. Dick), 315) See for a scheme, probably bearing on that demonstration Jacquot (1974), 128, note 62. See also Bayon (1939a), 711.)

⁶ Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 291-93.

⁷ Wood, *Ath. Ox* (1691-2), Vol. I, 391-2, 744 (Fasti Oxonienses: 1578), and (reprint 1969), Vol. II, 301-3, 463.

⁸ As other sources Wood also mentions John Pell and George Morley. (See Wood, op. cit., 302.) See on Morley DNB, Vol. 39, 75-78.

⁹ See on Walton DNB, Vol. 59, 273-277.

¹⁰ See on Ward Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 283-290.

¹¹ See on Pell Aubrey, op. cit., 121-31; DNB, Vol. 44, 261-263; on his contribution to mathematics Tanner (1967a), Part II, 277-80; Wallis (1967), 139-48.

¹² He puts him on one line with the mathematician William Oughtred and qualifies him as a man 'proficient in all'. (See Tanner (1974), 99.)

¹³ 'An entry in the accounts of John Mortymer records an item 'to Mr. Warner by his lordship's commandement when he went to London the xxijth of November 1590', and the 'Breevinge Booke' (a detailed accounting of the food and drink of the household and a list of the diners) 'Begun the xxiiij of ffebruary 1590' lists Warner with one servant as a regular member of the Earle's household.' (Shirley (1983), 367; see also p. 372.) See for a detailed and lively description of Warner's place and work in Northumberland's household Shirley (1983), 358-379. Shirley portrays Warner as a kind of confidant of Henry Percy. Though, in view of his high salary and pension afterwards this may have been the case there are no other facts to substantiate this assumption. To his eldest son Percy spoke slightly and unfavourable about servants in general. (see Percy, *Advice*, 177). In a draft will of Percy Warner's name is not mentioned and he also seems not to have sponsored Warner's edition of the *Artis analyticae praxis*.

Warner's life and legacy . 3

His main employ seems to have been that of literary assistant '...engaged in handling most of his affairs dealing with books and writing, maps, scholarly apparatus, and library activities.'¹⁴ His other activities can only be surmised. Seth Ward thought Warner had studied at Cambridge, but according to Pell he had no university schooling whatsoever. Nowadays it is assumed that he was a student at Merton College in Oxford and received his B.A. June 28, 1578.¹⁵ Since the beginning of Elizabeth's reign the B.A. had required four years¹⁶ so Warner would probably have matriculated in 1574. Assuming that, like most young men in those days, he began his university studies when he was approximately 17 years of age, his birthdate can be set at c.1557. Nothing at all is known about his student days. Certainly the archives of Merton College contain no information about undergraduates prior to the 18th century and in consequence nothing about Warner is recorded.¹⁷ Neither is his name mentioned in the annals of Merton College.¹⁸ The statutes give little information about the curriculum in those days¹⁹ and very little is known about the nature of his schooling. Opinions about the quality of the university education at that time, as well as the attention given at the universities to the

Anyway, Warner passed the last years of his life in poverty. To Harriot Percy was much more generous. (See Batho (1962).)

¹⁴ John W. Shirley (1983), 369.

¹⁵ See Tanner (1967a), Part II, 265. Warner's name is mentioned in the *Fasti Oxonienses* among the students that graduated as Bach. of arts in 1578. This group included, among others, Mathew Gwinne and Robert Hues. (See Wood, op. cit., Vol. 2, 208.) Gwinne (c. 1558-1627), a physician, was nominated in 1597 the first professor of physic at Gresham College. He probably also was one of the few friends Giordano Bruno had in England. Anyway, he figures in the second dialogue of Bruno's *La Cena de le Ceneri* and probably the figure Armesso in *De la causa, principio e uno* was modelled after him. (See DNB, Vol. 23, 399-400; Yates (1934), 103.) Hues (c. 1560-1632) was to become tutor to Henry Percy's two sons. (See Shirley (1983), 375-77.) According to Foster Warner received his B.A. January 1578. In fact he confuses him with the poet William Warner. (See Foster (1968).)

¹⁶ See Clark (1887), 13.

¹⁷ Written communication (6 April 1990) from Steven Gunn, archivist of Merton College.

¹⁸ See Fletcher (1976).

¹⁹ See Clark (1887), 2; Feingold (1984), 24-25, 34; Fletcher (1961), Vol. 2, 56.

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recent developments in science, especially in the fields of mathematics and physics are divided. According to some the university training was narrow and superficial. Thus in Warner's day it was common among students '...preparing for inception in arts to read only two of Aristotle's logical works, and one work on natural philosophy'.²⁰ There were at the universities no official professorial chairs in the typically scientific subjects. The Savilian chairs of geometry and astronomy in Oxford date from 1619; the Sedleian Professorship of natural philosophy from 1621 and the Tomlin's readership in anatomy from 1624. It would have been the function of the universities '...to produce clerics for the state Church, and to give a veneer of polite learning to young gentlemen, few of whom had any intention of taking a degree.'²¹ Until c. 1640 the upper classes were scarcely interested in the sciences.²² There was more concern for the morals, social activities and physical appearance of the student, than there was for his intellectual stimulation.²³ As opposed to the academics at the university showing a disregard for science the rising middle classes, i.e. artisans and merchants developed a growing interest in applied mathematics, physics, modern languages and other disciplines. This development did not occur in Oxford and Cambridge but in London, already called the third university of England by William Harrison in 1587.²⁴ By the 1580s most of the major works of classical literature, including educational writings, were available in English.²⁵ This rise of scientific interest would not have passed by Warner unnoticed. Already before Percy's incarceration in the Tower for his suspected involvement in the 'Gunpowder plot'²⁶ Warner probably spent most of the time in London as Percy usually stayed at Russell House, St. Martins-in-the-Fields near Charing Cross. Yet, apart from that Warner's interest in sciences like mathematics and physics may also have been aroused at the university and his tutors may well have inspired him to a critical assimilation of the Scholastic tradition.²⁷ After all, Merton College had an incomparably large library in which a natural philosopher like John Dee (1525?-1608) would, it seems, have found much to his taste.²⁸ In the years Warner studied there he may have heard Henry

²⁰ Schmitt (1983), 43.

²¹ Hill (1965), appendix, 301-14. See also Simon (1966), 358.

²² See Houghton (1942), 71.

²³ Shirley (1983), 45.

²⁴ See Simon (1966), 388. See also Hill (1965), 62.

²⁵ See Simon (1966), 383-93; Hill (1965), 62-3; Stearns (1943), 293-300; Johnson (1940).

²⁶ See Shirley (1983), 327-329.

²⁷ See for a less unfavourable image of the universities Curtis (1965) and Feingold (1984).

²⁸ C. 1550 the library of Merton College contained the maximum it could contain, more than 500 books. Generally speaking till c. 1585 the purchase of books in Oxford lagged behind the rapid developments in learning and in book-production. See for more information Ker (1957-'61).

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Savile (1549-1622), famous for his knowledge of Greek and mathematics, who had been lecturing on astronomy since 1570. Possibly at that time there were already lectures on mathematics²⁹ and Warner may conceivably have had a tutor informing him about current developments in science.³⁰ Since the second half of the 16th century at Merton Masters of Arts of two years standing publicly defended anti-aristotelian theses.³¹ We may surmise that Warner attended these performances.

A letter from the merchant and explorer John Newbery to the geographer Richard Hakluyt (1552-1616)³² dated 28 May 1583, suggests that Warner in the early 1580s belonged to the group of sailors, explorers and merchants that Hakluyt had gathered around himself in Oxford.³³ Warner's association with these people could explain his interest in nautical matters.³⁴ It is natural to assume that he was also conversant with the many records of travel published in those days by Hakluyt and others. Anyway, there is a note among his papers on the lack of vegetation in the Arctic reminiscent of a question posed in Gerrit De Veer's '*Waerachtige Beschrijvinge*' (1598) of Willem Barents' expedition to Nova Zembla (1594 -1596): '...in the Countrey, lying under 80. degrees, which we esteeme to be Greenland) there is both Leaves and Grasse to be seene...whereas to the contrary in Nova Zembla, there groweth neither

²⁹ Sir Henry Savile, in de 1580s warden of Merton College, stipulated that 'all scholars after the completion of the second year from their arrival at the university, down to the first year of their bachelorship completed, shall be assigned to hear the professor of geometry.' (Feingold (1984), 28.)

³⁰ See Curtis (1965), 107-14, 130; Feingold (1984), 54-5, 61-8.

³¹ See Feingold (1984), 103. The writer gives examples from 1573, 1594 and later. During Warner's years of study these theses, though interesting, were not that controversial. In 1575 magister Thomas Tatamin disputed, among other things, the thesis that 'Mundus ortum habuit et interitum habebit'. (J. Fletcher (1976), 71.) A year later magister Ledsham discussed the thesis that 'Visus fit extra mittendo'. (Op. cit., 85.) In 1578 magister Gervaise debated the thesis that 'Voluptas est summum bonum'. (Op. cit., 108.)

³² See on Hakluyt *The original writings* (1935); Bruner Parks (1928); D.B. and A.M. Quinn (1974).

³³ John Newbery wrote to Hakluyt: '...make my hearty commendations to master Peter Guillame, and master Philip Jones, and to M. Walter warner, and to all the rest of our friends.' (Hakluyt, *The principal navigations*, 453.) Newbery, merchant and explorer, vanished without a trace in 1585 during a voyage to India in the service of the Levant Company. (See DNB. Vol. 19, 77-79.) Nothing is known about 'Guillame'. Jones translated Albertus Meierus' *Methodus describendi regiones* (Helmstadt 1587). In Oxford Hakluyt was the centre of a group consisting of people working for the Russia Company, Sir Francis Drake, Michael Lok (merchant and traveller), his stepson Sir Julius caesar, Edwin Sandys, Philip Sidney, Sir Francis Walshingham, Edward Dyer and the earl of Cumberland. (See Bruner Parks (1928), 65-7.)

³⁴ See p. 24 ff.

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Leaves nor Grasse... although Nova Zembla lyeth 4.5. and 6. degrees more Southerly from the Pole, then the other Land aforesaid.³⁵ In 1598 an English translation of this record was entered in the Stationer's Register by William Phillip.³⁶ Warner writes: 'The delation of the materialls ad partes materiandas seu nutriendas in the generation of vegetalls to be caused per fugam vacui .. the evaporation of the menstrue deferent effected by the heat of the sunne ut fit in ventosis or cupping glasses to be considered. The sterility of the arctik or polar region doth perhaps attest hereto which though they have the heat of the sunne of strength &c and continuance sufficient <for vegetation> yet the same being continuate without alternation of heat and cold which is necessary for the causing of attraction this way that may be the reson of their sterility. That they are sterill doth appere by the experience of the Hollanders in that fl. where they wintred in 77. or 78. degree where they found no vegetall at all growing.'³⁷ According to Taylor, Hakluyt may have had Warner in mind when he launched the plan to establish a professorial chair in mathematics on behalf of navigators.³⁸ Between 1583 and 1589 Hakluyt was in close contact with Walter Raleigh (c. 1552-1618).³⁹ Raleigh, in the 1580s, would have been the pivot of the 'The School of Night', a group of sceptical, atheistic free-thinkers, a scientific avant-garde, consisting of disciples of Giordano Bruno and early followers of Copernicus amongst whom were Thomas Harriot, the 9th Earl of Northumberland, the Earl of Derby, as well as the poets and playwrights Christopher Marlowe, George Chapman, and Matthew Roydon.⁴⁰ Warner, too, is supposed to have been a member of that group. However, even if we are to assume that there ever was such a company⁴¹ the assertion that Warner belonged to it can hardly be substantiated. It is based only on the mention of a certain Warner in a letter from the writer Thomas Kyd (c.1557-c.1595) in which he tries to convince Sir John Puckering that he is not an atheist and from which cannot be inferred that he indeed refers to Walter Warner.⁴² But even if Warner ever associated with these people, they did not

³⁵ Purchas, *Hakluytus Posthumus*, 36, 38.

³⁶ See D. B. and A. M. Quinn (1974), Vol. 1, 311.

³⁷ BL Add. MS 4394, f. 175r.

³⁸ Taylor. *The original writings*, 25.

³⁹ See D. B. and A. M. Quinn (1974), Vol. 1, 134.

⁴⁰ See Bradbrooke (1936); Yates (1936), 89-101.

⁴¹ The existence of such a group is contested by Shirley (1949). Some even doubt whether Raleigh knew Chris. Marlowe, considered as the main pace-maker within that group. (See Boas (1931), 84.)

⁴² '...for more assurance that I was not of that vile opinion, lett it but please your Lordship to enquire of such as he <Marlowe> conversed with all, that is, (as I am geven to understand) with Harriot, Warner, Royden, and some stationers in Paules Churchyard.' (BL Add. MS Harley 6849, ff. 218-19.) Maybe there is a confusion of names in the case. According to the article on Roydon in DNB, Vol. 49, 374-5, Kyd means the poet William Warner (c. 1558-1609). Others contest that. (See Bakeless (1942), Vol. 1, 140). See for more information on Kyd DNB, 349-352.

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noticeably influence his views as expressed in the papers still extant. He is the opposite of a sceptic and rarely refers to theological or religious questions. Nothing in his papers indicates that he shared the keen interest in literature of Raleigh and his friends.⁴³ Nor do his psychological theories show any significant similarity to the psychological views attributed to Raleigh.⁴⁴ Moreover, in contrast to Warner, Raleigh was strongly inspired by hermetism, cabalism and occultism⁴⁵ while he rejected atomism - the doctrine with which Warner's notes on the principles of nature are saturated.⁴⁶

The myth of the 'School of Night' was continued in that of the 'Wizard Earl', Henry Percy and his 'Three Magi', to wit Thomas Harriot, Robert Hues and Walter Warner.⁴⁷ Percy earned that nickname because of his alembics, speculative glasses and reputed knowledge of the occult. In the early seventeenth century they would together have formed the nucleus of a closely cooperating group of intellectuals, the 'Northumberland Circle', among whom were Nathaniel Torporley (1564-1632)⁴⁸, Nicholas Hill (1570-1610/20)⁴⁹, Thomas Allen (1542-1632)⁵⁰, Walter Raleigh and a number of other nobles and men of letters. They would have waged a common war against Aristotelianism using as their main weapons atomism and Copernicanism.⁵¹

⁴³ Not all experts accept the image of Raleigh as sceptic and atheist. (See Lefranc (1968), 66-7.)

⁴⁴ The psychological theories in *A Treatise of the Soule* are basically Aristotelian while the ones in *The History of the World* are Platonic. Lefranc deems the attribution of the former to Raleigh questionable. (See Lefranc (1968), 57.)

⁴⁵ See Lefranc (1968), 459-60. In *The History of the World* Raleigh also refers to Lullus als a good natural philosopher (see op. cit., 437) while in Warner's notes Lullism is principaly rejected: 'In all alterations the termes or extremes are ether contrary or contradictory and not a quolibet ad quid libet as from non existence to motion and such like which is to be observed in all comparisons and application for every thing is not to be applied or compared to every thing for many termes are inapplicable incomparable irracionall incorrespondent and betwene which there is no reference which being applied or compared never so much will bring forth no conclusion of use or verity for the progresse and augmentation of science but multiply infinitely idle [or false] propositions which is the imperfection and fault of Lullius art.' (See BL Add. MS 4395, f. 194.)

⁴⁶ See Lefranc (1968), 468, note 262.

⁴⁷ 'Northumberland was known as the Wizard Earl...Harriot with Walter Warner and Robert Hughes were known as the Earl's Three Magi...' (See Bradbrooke (1936), 7-10. See also note 1.)

⁴⁸ See DNB Vol. 57, 61.

⁴⁹ See McColley (1939), 390-405.

⁵⁰ See DNB Vol. 1, 312-13.

⁵¹ See Aubrey, *Brief Lives* (ed. Clark), Vol. 1, 285; Kargon (1966), 6-7.

However, there may never have been such a group. The three ‘magi’ only came together c.1615 and not until c.1617 a group was formed. Hill’s participation in that group can not be substantiated. In 1618 Raleigh was executed and Harriot died three years later. Henry Percy was released in that year, 1621, from the Tower where he had been incarcerated for fifteen years. He retired to Petworth in Sussex. Warner probably stayed in London.⁵² All this does not diminish the fact that Henry Percy surrounded himself with mathematicians, astronomers, natural philosophers, physicians, and alchemists, who despite the fact that they did not explicitly cooperate, and that there never was such a thing as the philosophy of the ‘Northumberland Circle’, shared a common background as well as anti-aristotelianism and a materialistic view of the world inspired by the Italian natural philosophers from the final quarter of the 16th century.⁵³

In common with Raleigh Henry Percy had from his youth taken a keen interest in science.⁵⁴ Initially he occupied himself mainly with astrology and alchemy about which he would regularly have contacted John Dee with whom he would also have completed numerous astrological as well as other kinds of experiments. In the 1590s he became involved in architecture, archeology, horticulture, geography, military and political science, astronomy and other sciences. Special agents scanned continental book-markets in search of new acquisitions for his large library. He spent some fifty pounds on books annually.⁵⁵ His library managed apparently by Warner, contained at his death between 1500 and 2000 volumes the average collection in those days being scarcely in excess of a few score volumes.⁵⁶ Though especially interested in medicine⁵⁷, alchemy⁵⁸ and mathematics⁵⁹

⁵² See Shirley (1949), 66; (1983), 358-379.

⁵³ See Kargon (1966), 5-42; Jacquot (1974), 107-28.

⁵⁴ My main source on the life of Henry Percy is Brenan. See also Shirley (1983), 207-8; Bradbrooke (1936).

⁵⁵ See Batho (1960) 256. According to Brenan Percy during his imprisonment in the Tower yearly spent an average of about 200 pounds on books.

⁵⁶ See Batho (1960), 251; Stone (1965), 794; Shirley (1949), 64-6, and Ker (1957-’61) about the size of college libraries.

⁵⁷ The Earl informed himself thoroughly about the different movements within this discipline. Thus his library contains not only many works of Paracelsus and his followers like the *Idea medicinae philosophicae fundamenta...* authore Petro Severino Dano...Basileae MDLXXI or *Ad veritatem hermeticae medicinae...*(Lutetiae Parisiorum 1604) from Joseph du Chesne but also the *Disputationum de medicina Nova Paracelsi pars prima* (Basle, 1572), of the antiparacelsist Erastus. Further it contains the complete works of the galenist André du Laurens as well as the *Vivae Imagines Partium Corporis Humani* (Antwerp 1566), that is, the epitome of Andreas Vesalius’ *De humani corporis fabrica libri septem* (Basle 1543) with the indices of Juan de Valverde.

⁵⁸ His library contained, among others, *Syntagma selectorum...alchymiae arcanorum* (Frankfurt 1611) by Andreas Libavius; *Lexicon alchemiae sive dictionarium alchemisticum...*auctore Martino Rulando (Frankfurt MDCXII).

⁵⁹ His library contained Alsted’s *Elementale mathematicum* (Frankfurt 1611); Alexandrinus Diophantus’s *Rerum arithmeticarum libri sex* (Basle 1575).

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Percy's library also contained books on military science (fortification), architecture, philosophy⁶⁰, religion, geography, history, works of classical authors such as Xenophon, Caesar and Vergilius, and a variety of reference books. The library contains a remarkably large number of works by Giordano Bruno⁶¹. However, contemporary English literature is conspicuously absent.⁶²

Prior to c. 1640 the upper classes generally speaking were only interested in science as a kind of entertainment but did not really care for the natural sciences as such.⁶³ Therefore individuals like Raleigh and especially Northumberland were exceptional. The latter was considered the '...favourer of all good learning, and Maecenas of learned men'. He supported writers, geographers, physicians, colleges and schools while most foreign intellectuals who came to London visited him. Many works were dedicated to him.⁶⁴ Francis Bacon (1561-1626) considered him to be one of the people who might realize his 'Great Instauration'.⁶⁵ On August 30, 1605 the University of Oxford conferred an honorary M.A. upon Henry Percy.⁶⁶

⁶⁰ For example, Aristotle, *Operum, quotquot extant, Latina editio* (Frankfurt 1593) 11 vols. plus numerous separate editions of Aristotle's writings on the soul, physics, logic, ethics, etc.; Cardinal F. Toletus, *Introductio in Dialecticam Aristotelis* (Coloniae Agrippinae 1575); Pedro da Fonseca, *Institutionum dialecticarum liber octavus.*; Plato, *La république*, tr. L. Le Roy (Paris 1600); Cicero, *Opera* (Paris 1555), 4 vols.; Plutarch, *Les Oeuvres Morales et Meslees* (Lyons 1587); Boethius, *Opera Omnia* (Basle 1570).

⁶¹ See note 302 and Sturlese (1987). The library contains no work of Bruno's contemporary and landsman Bernardino Telesio nor Francesco Patrizi's *Nova de universis philosophia* (Ferrariae MDXCI). (Written communication (November 27, 1989) from prof. Batho.)

⁶² Nicholas Hill's *Philosophia Epicurea* (1601) for example, one of the supposed members of the 'Northumberland Circle', is absent from the library. (See Lefranc (1968), 348, note 67.) The same holds true for the work of Francis Bacon.

⁶³ The nobility '...rather study the Mathematicall Arts, to content and satisfy their affections, in the speculation of such admirable experiments, as are extracted from them, than in hope of gaine to fill their Purses.' it is said in the dedication of the english translation of Lereuchon's *Récréation Mathématique* (1633). (Houghton (1942), 71.)

⁶⁴ See Batho (1960), 249.

⁶⁵ *The works*, Vol. 11, 63.

⁶⁶ Brenan (1902), 98.

Percy's most famous protégé was undoubtedly the mathematician and scientist Thomas Harriot who, having worked for about ten years for Raleigh in the early 1590s entered the service of Northumberland and remained there till his death in 1621.⁶⁷ During that period he probably shared Syon House in London with Warner for some time. As previously stated, Kyd's letter to Puckering suggests that Warner and Harriot moved in the same literary circles in the early 1590s.⁶⁸ Percy's householdpapers record payments to Harriot, the first one in 1593, conducted by Warner.⁶⁹ In 1595 Harriot interceded on behalf of Warner in a trial.⁷⁰ That is about the sum of information we have concerning their relationship. Shirley found only one reference of Warner to observations of Harriot in a record by Pell of his conversations with Warner: 'Mr. Warner says he had of Mr. Hariot this proportion as the sine of one angle of incidence to the sine of its refracted angle, found by experience so the sine of any angle of incidence upon the same superficies to the sine of its refracted angle, to be found by supputation. but he never saw him demonstrate it. "But", said he, "upon some occasion I did thoroughly demonstrate this proportion, but it was a long process".'⁷¹ In fact Warner's papers in the British Library contain at least two other references, one about the proportion of the weight of water to that of quicksilver⁷² and one concerning the specific gravity of several substances.⁷³ Still, this is not enough to justify the assertion that they were close friends cooperating as scientists. Harriot only once refers to Warner as a scientist, a mathematician to be more precise, naming him in his will, together with Robert Hues⁷⁴, as an expert on his notation.⁷⁵ As said before, in 1631 Warner published part of Harriot's mathematical work anonymously.⁷⁶

⁶⁷ My main source on Harriot's life is Shirley (1983).

⁶⁸ However, a letter to Harriot from c. 1610 by Raleigh's nephew, the poet Sir Arthur Gorges (d. 1625) wherein he asks him to call Mr. Carleton and Mr. Warner as gossips at the baptism of one of his works seems to suggest that there was no direct contact between Warner and Harriot's literary acquaintances. (See Gorges, *The poems*, xxv; Lefranc (1968), 350.)

⁶⁹ See Shirley (1974), 25.

⁷⁰ See Shirley (1983), 226-7.

⁷¹ BL MS 4407, f. 183a quoted in Shirley (1951), 508.

⁷² BL Add. MS 4394, f. 381r.

⁷³ Op. cit., f. 391r.

⁷⁴ Warner may have known him very well. They received their Bachelors Degree at Oxford in the same year, both belonged to the Hakluyt Circle, and from c. 1615 to his death in 1632 Hues too was in the service of Henry Percy as, among other things, tutor to Percy's sons Algernon and Henry Percy jr. Hues was very interested in mathematics, geography, navigation and astronomy. With his *Tractatus de Globis et eorum usu* (London 1594) he popularized Emery Molineux's globes. (See Taylor (1970), 332.)

⁷⁵ 'I ordayne and Constitute...Nathaniell Thorperley first to be Overseer of my Mathematicall Writings...And if it happen that some manner of Notacions or writings of the said papers shall not be understood by him then my desire is that it will please him to Conferre with Mr. Warner or Mr. Hughes...concerning the aforesaid doubttes.' (Shirley (1983), 469.) Like Warner Harriot took a keen interest in Napier's logarithms. (See Lohne (1965).)

⁷⁶ *Thomas Harriot, Artis analyticae praxis ad aequationes algebraicas nova, expedita, et generali methodo, resoluendas, Londini...anno 1631.* See also Tanner (1967a), Part II, 268-283.

Though Percy may have appreciated Warner as a trusted representative⁷⁷ he however, does not seem to have considered him as a scientist. He probably only reckoned him among what he called in his *Advice to his son* the better sort of servant: ‘...of the better sort, especially of your chief instruments there are few, and they in very deed if you understand them well, not properly so fit to direct the greatest business as to execute the greatest business, and to direct the smaller, the prime direction being ever the master’s work...The meaner are only to execute the smaller business and to do so as they are bid.’⁷⁸ At the same time he advised his son to let his servants always know ‘...that ye nede them nott, and that yf one be gonne to-day, you can make an other do your Business as well to-morrow.’ All in all Percy considered servants as ‘...wanton wasters of their master’s substance. They are very jealous of their privileges, and demand them even when they have no need to do so.’ They rather give them to the dogs than to loose them ‘...with a proverb that the "Lord payeth for all".’⁷⁹ There is nothing to support the idea that he ever made an appeal to Warner in a capacity other than that of servant. If he had taken him seriously as a scientist, one also would have expected him to have financially supported Warner’s edition of the *Artis Analyticae Praxis* more than he seems to have done. Warner, in his old age, was obliged to live on the charity of others.⁸⁰

The available evidence suggests that as far as Warner is concerned there was no scientific cooperation whatsoever until the 1620s and that up to that point he had kept his speculations to himself. Despite this his work for Northumberland as ‘literary assistant’, and his contact with the Earl’s scientific protégés were probably important sources of inspiration to him. He shared many interests with his patron such as the development of a scientific

⁷⁷ See Shirley (1983), 369.

⁷⁸ Percy, 74-7.

⁷⁹ Brenan (1902), 177.

⁸⁰ Warner in that respect was an exception. According to Batho ‘Few of the Earl’s officers died in poverty..’ Not because the Earl was so generous but because ‘...most...were not wholly dependent upon the Percy family for their income.’ (See Batho (1962), xxv.) Wood ‘s assertion that after Henry Percy’s death Warner’s pension was continued by Percy’s eldest son Algernon cannot be substantiated. (See *Ath. Ox.* (1691), Vol. I, 392.)

language, mechanics, optics, and psychology ‘...being the end and scope of all the former speculations (i.e. logic, grammar universal, metaphysics, the doctrine of motion, optics, astronomy, the doctrine of generation and corruption, and cosmography), and without this ends satisfaction were due as a recompense, to all the former labours, frivolous I should hold the pains taken as it is the end of all speculative meditations, so it is the beginning of all practical directions that are to be well acted and the properest use...’⁸¹ Apart from his writings on animal organisms and on monetary matters (see section 1.2. of this chapter), Warner also closely followed Harriot in his interests. Not only were both mathematicians but they also shared an interest in optics⁸², the doctrine of burning-glasses,⁸³ hydrostatics⁸⁴, gunnery⁸⁵, fortification⁸⁶, alchemy⁸⁷, the theory of collision⁸⁸ and in navigation.⁸⁹ Of greatest significance is their shared interest in atomism. Generally speaking, Warner’s criticism of the Scholastic tradition as well as the materialistic component of his natural philosophy identify him undeniably as a member of Percy’s intellectual coterie.

Warner probably stayed in the service of Northumberland till 1617. In that year his salary was replaced by a pension and maybe then he also moved from Syon House to ‘...one Morgan’s house, the hall of the Woolstable in Westminster’.⁹⁰ It may be assumed that from that year onwards he had more time to follow his own interests and to do the research with which he knew how to attract attention.⁹¹

⁸¹ Percy, *Advice*, 70-71.

⁸² See Shirley (1983), 226. Harriot already in 1597 occupied himself with optics.

⁸³ Harriot knew Roger Bacon’s work on burning-glasses. He spent a lot of time calculating the maximum heat to be generated optically by simple lenses. (Op. cit., 150, note 123.)

⁸⁴ About 1612 and incidentally already c. 1600 Harriot studied hydraulic problems. (See op. cit., 380.)

⁸⁵ In the years 1590-5 Harriot studied ballistics. (See op. cit., 251-64.)

⁸⁶ Op. cit., 117, note 59.

⁸⁷ Op. cit., 392, note 34. By the turn of the century Harriot did chemical experiments.

⁸⁸ See Lohne (1981) and Pepper (1976).

⁸⁹ Harriot worked on nautical problems in the early 1580s and between 1594 and 1614. See for more information Shirley (1983), 83-104.

⁹⁰ This house-move is suggested by the beginning of a letter, dated 13 June 1619, from Harriot living then at at Syon House, to Northumberland: ‘Sir: when Master Warner & Master Hues were last at Syon, it happened that I was perfecting my auntient...notes of the doctrin of reflections of bodyes.’ (BL Harley MS 6002, f. 21. Quoted by Shirley(1983), 451.) The second adress is also mentioned by Shirley (Op. cit., 372).

⁹¹ According to Lohne Warner after 1632 entered the service of Northumberland’s son in law, Robert Sidney (1595-1677), the second Earl of Leicester. (See Lohne (1981), 215.) I do not know Lohne’s sources. Anyway, Pell states in a letter from 24 January 1640 to Mersenne that Sidney, by then ambassador in France, knew Warner. (See Mersenne, *Correspondance*, Vol. 10, 62.)

One of the first people to show an interest in his scientific activities was Sir Thomas Aylesbury (1580-1657). This noble was greatly interested in mathematics and became acquainted with Harriot as well as with his friends and pupils c. 1610.⁹² By the late 1620s he was probably on familiar terms with Warner. Between 1630 and 1640 he accommodated him during the summer in Cranborne Lodge. Together in 1627 they replicated Harriot's measurements of refraction. Maybe Aylesbury encouraged Warner to the editing of the *Artis analyticae praxis*. He urged him to publish other writings of Harriot and for that purpose unsuccessfully requested financial assistance from Northumberland. He is also believed to have asked Warner to write a treatise on the alloy of metals and coins.⁹³ As for Warner's supposed tract about the circulation of the blood according to an anonymous contemporary Aylesbury '...told me that he had Warrener's book and that I should have it, but coming to London he found his Library, wherein were many rare and curious books, plundered and amongst the rest taken away.'⁹⁴

Harriot had stipulated in his will that Nathaniel Torporley (1564-1632)⁹⁵ should select from his legacy the papers fit for publication and edit them. Ultimately it was not completed. For some reason or another he refrained from publication.⁹⁶ Warner, maybe under pressure from Aylesbury, one of the executors of Harriot's will, now assumed this task. Initially he was advised by Torporley.⁹⁷ It is not known whether they had already known each other before that. Some years after Warner's graduation, Torporley matriculated in Oxford and he probably already associated with Harriot by then, i.e. the 1580s.

⁹² Harriot chose Aylesbury as one of the executors of his testament. See for more information on Aylesbury Shirley (1983), 414-16; DNB, Vol. 2, 277.

⁹³ From c.1625 to 1642 Aylesbury was Master of Requests and from c.1635 tot 1642 co-master of the Mint. (See Aylmer (1961), 77.) See BL Harley MS 6754, ff. 2-74; 6755, ff. 15-18.

⁹⁴ Bodleian, Rawlinson Collection (B. 158), pp. 152-3. Quoted in Bayon (1939a), 711.

⁹⁵ Nathaniel Torporley, divine, mathematician and astronomer received in 1584 his B.A. at Christ Church in Oxford and seven years later his M.A. Shortly after 1591 he went to live in London. Meanwhile he had become secretary to the French mathematician François Viète. (See DNB, Vol. 57, 61; Wood, *Ath. Ox.* (1st ed.), Vol. 1, 485.) He probably already knew Harriot c.1586. Anyway in the late 1580s Harriot taught him mathematics. (See about the relationship between Harriot and Torporley Pepper (1967); Shirley (1983), passim) He was interested in nautical instruments and devised a new type of 'semicircle' to replace the quadrant, a sundial and an eternal calendar. In 1602 he published *Dioclides coelometricae, seu valvae astronomiae universales*, a treatise about that 'semicircle'.

⁹⁶ In 1625 Henry Briggs wrote to Kepler that the English mathematicians anxiously awaited the publication of Harriot's papers. (See Lohne (1981), 215.)

⁹⁷ See BL Add. MS 4395, f. 92. That cooperation seems to explain the presence of a few papers of Warner among Torporley's papers and vice versa. See Sion College: Arc. L 40. 2/ E 10, f. 88 and BL Add. MS 4395, ff. 89-90, 92.

It is possible that he could not reach an agreement with Warner on what should be included in the edition of Harriot's mathematical work, and how it should be done for the *Artis Analyticae praxis* (1631) came as a shock to Torporley. He not only criticized the way Harriot's solutions were presented but in his view the edition also attested to a lack of understanding of Harriot's theories as well as of his notation.⁹⁸

Possibly through the *Artis analyticae praxis* Warner came into contact with the brothers Cavendish and their learned friends. Robert Payne (c.1596-1652), employed by William Cavendish as chaplain and alchemist, received a copy of this book from Charles Cavendish shortly after its publication.⁹⁹ He was deeply interested in mathematics, mechanics¹⁰⁰, hydrostatics¹⁰¹ and alchemy.¹⁰² In the 1630s he corresponded with Warner on optics.¹⁰³ Payne too is said to have seen Warner's tract on the circulation of the blood.¹⁰⁴

There is scant information about the contacts between Warner and Sir Charles Cavendish (1591-1654).¹⁰⁵ Cavendish, possibly through Payne, became acquainted with Warner about 1635. They corresponded for a few years.¹⁰⁶ Cavendish respected him as mathematician and as an optical scientist. He showed a lively interest in Warner's work on the table of antilogarithms.¹⁰⁷ In the British Library there are a few notes, attributed to Charles Cavendish, on the circulation of the blood which suggests that he

⁹⁸ See Shirley (1983), 5; Tanner (1967b) and (1967a), 265-9; Lohne (1963); Cajori in his booklet on Oughtred (1916, p. 57-8) also passes a negative judgement on the *Artis analyticae praxis*. As pupils of Harriot he only mentions Torporley, Lower and Protheroe.

⁹⁹ See Feingold (1984), 75; Shirley (1983), 10-11; see about Payne and Cavendish Jeacquot (1952), 21-22. In een memorandum of John Wallis (march 27. 1677) Payne is mentioned as an acquaintance of Northumberland. (See Shirley (1983), 10-11.) However, there are no other data to substantiate the idea that he knew Henry Percy.

¹⁰⁰ In 1636 he translated Galileo's *Della scienza mecanica : Of the Profitt which is drawn from the Art Mechanique and its Instruments*. Raptim ex Italico in Anglicum sermonem transfusum. (BL Add. MS Harleian 6796, ff. 317-30.)

¹⁰¹ See Payne's *Geometricall demonstrations of the mesure of running waters by Benedetto Castelli*. Rome 1628. (BL Add. MS Harl. 6796, ff. 309-16.)

¹⁰² According to Feingold Payne's notebooks, composed during his graduate study, '...indicate an avid interest in the writings of Roger Bacon.' (Feingold (1984), loc. cit.)

¹⁰³ See Halliwell (1965), 65-9.

¹⁰⁴ 'Dr. Pain that very Ingenious and Learned Canon of Christ Church, told me he had seen & pervied this book of Warreners.' (Bodleian, Rawlinson Collection (B. 158), pp. 152-3. Quoted in Bayon (1939a), 711.)

¹⁰⁵ See on Charles Cavendish DNB, Supplement Vol. 1, 399-400; Aubrey, *Brief Lives* (ed. Clark), Vol. 1, 153-4.

¹⁰⁶ See Halliwell (1965), 66-7.

¹⁰⁷ June 26. 1641 he wrote to Pell 'I desire to knowe if Mr. Warners analogicall worck goe on or not.' (Halliwell, 73.); about three years later, July 26. 1644, 'I praye you let me knowe whether Mr. Warner's Analogicks be printed.' (Op. cit., 78.)

studied the matter thoroughly.¹⁰⁸ So, he too might have seen Warner's tract on that subject. He occasionally supported Warner financially.

In a letter from 17 October 1634 to Payne Warner wrote: 'Good Mr. Payne, - For the problem of refractions, which you write of, I pray you by any meanes send it to Mr. Hobbes, together with my most hartly love and service, or whatsoever els you shall receive from me that may be thought worth the communicating, yf it please you to impart it to him, you shall do me a pleasure. For I have found him free with me, and I will not be reserved with him, yf it please God I may live to see him again.'¹⁰⁹ Apparently Warner was already on good terms with Hobbes, the most prominent member of the Cavendish Circle, by then.¹¹⁰ Hobbes, like the other members of that group, showed a lively interest in Warner's optical speculations. He assisted Mersenne with the publication in 1644 of Warner's demonstration of the sinus law of refraction.¹¹¹ Though he praised Warner as an optical scientist and as a 'psychologist' Hobbes generally spoke rather slightly of Warner. In 1636, for example, he wrote to the Earl of Newcastle: 'For the optiques I know Mr. Warner and Mr. Mydorge are as able men as any in Europe, but they do not well to call their writings, demonstrations, for the grounds and suppositions they use, so many of them as concerne light, are uncertayne and many of them not true.'¹¹² August 1635 he wrote to the same: 'For the soule I knowe he has nothinge to give your Lordship any satisfaction. I would he could give good reasons for the facultyes and passions of the soule, such as may be expressed in playne English, *if* he can; he is the first - that I ever heard of - could speak sense in that subject. If he cannot I hope to be the first.'¹¹³ In that same letter he also comments patronizingly on Warner's speculations about magnifying glasses and burning glasses, as well as on his attempt to solve a certain optical problem '...the old way by beames and reflection, and refraction...', that is, treating it as a purely geometrical problem, as Warner usually did, in his letter to Newcastle from 1636.¹¹⁴ That attitude is also conveyed in his reaction to Seth Ward's accusation that he had copied his

¹⁰⁸ See BL Harleian MS 6083, f. 104r-v. Dr. Stuart Brown was so kind as to check in the British Library the material in question and to send me a detailed report.

¹⁰⁹ Halliwell (1965), 65.

¹¹⁰ Among Warner's papers there is a list of books, probably written c. 1636, containing among other titles 'Mr. Hobbes de mirabilibus Pecci' (BL Add. MS 4395, f. 89). See on the 'Cavendish Circle' Jacquot (1952b).

¹¹¹ Problema ad tabulas refractionum (ex observatis construendas sequenti processu apodictico solvendum) - Gualteri Wernerii. In: Mersenne, *Cogitata physico-mathematica* (1644), 549-566.

¹¹² HMC (1893), 128.

¹¹³ Ibid., 126.

¹¹⁴ Op. cit., 126, 129.

explanation of sensory perception in terms of motion from Warner's papers.¹¹⁵ Hobbes not only denies ever having seen any more of Warner on optics than a tract about *Vision by Refraction*, but also states that it was from him that Warner '...first heard it mentioned that light and colour were but fancy...'¹¹⁶

Warner's most important contact in the last decade of his life was that with the mathematician John Pell.¹¹⁷ He probably became acquainted with Warner c. 1632 having drawn the latter's attention with a *Description and use of the quadrant* (1628), a treatise he wrote while still a student at Trinity College, Cambridge.¹¹⁸ He spoke highly of Warner's work 'in Physicis et omni fere Mathesi' to Mersenne.¹¹⁹ Actually he was one of the first to present Warner as an interesting and important scientist. He assisted him with the construction of the table of antilogarithms, probably until Warner's death.¹²⁰

Warner supposedly died March 1643, aged c. 86, in London '...at the Woolstable near the waters-side, not far from Northumberland-house...'¹²¹ Anyway, march 28, 1643 there a certain Mr. Walter Warner was buried.¹²² That year also corresponds to Aubrey's statement that Warner '...dyed in the time of the parliament of 1640...', i.e. the Long Parliament (3 November 1640 - 16 March 1660).¹²³ Moreover it links up nicely with the fact that Warner, attesting to the correspondence between Pell and Charles Cavendish in June

¹¹⁵ *Vindiciae Academicarum*, 247. John Wilkins (1614-72) in his preface to Ward's book carried the accusation even further stating that, despite Hobbes' claim to owe nothing to Warner's manuscripts, '...those amongst us who have seen and perused them must for many things give him the honour of precedence before Mr. Hobbs.' (Op. cit., 201.) See further Chapter 9, section 9.1.

¹¹⁶ EW, Vol. 7, 342. Warner's name is not mentioned in the *amicorum elenchus* appended to the *Vitae Hobbianae Auctarium*. (See OL, Vol. 1, lxii-lxv.) Nor does he figure in Aubrey's long catalogue of Hobbes' 'learned familiar friends and acquaintances'. (see *Brief Lives* (ed. Clark), Vol. 1, 365-72.) See about Warner's influence on Hobbes also Chapter 9.

¹¹⁷ See notes 11 and 12.

¹¹⁸ See Taylor (1970), 215.

¹¹⁹ 'Habet idem Warnerus quamplurima affecta, quae quò citius lucem videant, in hâc praesertim indies ingravescente ac pene decrepitâ ejus senecta, operam ipsi meam quàm dilligentissimè offerre non desisto, quâ si uti voluerit, quamplurima recondita et plane nova in Physicis et omni fere Mathesi ab interitu me vindicatorum spero.' (Mersenne, *Correspondance*, Vol. 9, 63)

¹²⁰ The 'proportionalls' in Warner's 'Inverted Logarithmicall Table' '...before Mr. John Pell grew acquainted with Mr. Warner, were ten thousand, and at Mr. Warner's request were by Mr. Pell's hands, or direction, made a hundred thousand.' (Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 292-3.)

¹²¹ See Wood, *Ath. Ox.* (reprint 1969), 302.

¹²² See Burke (1914), 604.

¹²³ Aubrey, *Brief Lives*, (ed. Dick), 316.

1641, was still alive, but dead by July 1644.¹²⁴ In 1652 Pell, at the request of Herbert Thorndike, into whose keeping Warner's papers had been entrusted, checked which papers dealing with the antilogarithms could be published. The result was negative. By then the papers at issue already showed too many gaps.¹²⁵

1.2. *The literary Remains*

1.2.1. From Warner to the British Library

John Pell told Aubrey that Warner's estate '...came to a middle brother, a lame man'.¹²⁶ In his letter from August 7. 1644 to Charles Cavendish Pell refers to this man as 'a merchant in London' who shortly after Warner's death went bankrupt which lead Pell to the melancholy reflection that Warner's papers now might very well be '...seized upon, and most unmathematically divided between the sequestrators and creditors, who...will, no doubt, determine once in their lives to become figure-casters, and so vote them all to be thrown into the fire, if some good body doe not reprieve them for pye-bottoms...'¹²⁷ Though things did not turn out as badly as that during their long wanderings, many of Warner's papers must undoubtedly have been lost. There seem to have been, for example, 'certain definitions of the planisphere' by Warner in the library of Sion College. These probably were destroyed in a fire.¹²⁸ Possibly there were papers of Warner between those of Charles Cavendish and Thomas Aylesbury but the greater part of their legacy was lost too. Perhaps manuscripts of Warner, through the estate of John Collins, passed into the hands of the mathematician William Jones (1675-1749)¹²⁹ to be added, after his death, to the the Macclesfield collection at Shirburn Castle, Tetsworth, Oxfordshire. That way manuscripts also might have vanished without leaving a trace for according to Charles Hutton the greater part of the manuscripts collected by Jones '...after his death...were dispersed, and fell into different persons hands...' among which the hands of Hutton himself.¹³⁰ Finally, there might be papers of Warner between those of Harriot and Pell, two large collections, the greater part of which is still unexplored.

¹²⁴ See Halliwell (1965), 73 and 80. Accordingly Wood's statement that he died at the end of 1640 has to be rejected. (See Wood, *Ibid.*) See further Tanner (1967a), 265-66.

¹²⁵ See Halliwell (1965), 94.

¹²⁶ Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 291.

¹²⁷ Halliwell (1965), 80.

¹²⁸ See Wood, *Ath. Ox.* (1st ed.), Vol. 1, 485; Rolleston (1884), Vol. 2, 729-768.

¹²⁹ See on Jones DNB, Vol. 30, 173-4.

¹³⁰ See Hutton, *Dictionary*, Vol. 1, 643-44.

After his death his papers first came into the possession of Nathaniel Tovey (1597-1658), husband of a niece of Warner.¹³¹ In 1652 Tovey handed them over to Herbert Thorndike (1598-1672) who probably kept them carefully till his death in 1672.¹³² According to his friend Seth Ward this Anglican divine, trained in theology and oriental languages, was also one of the best mathematicians of his age.¹³³ Whether this is true or not he showed a lively interest in Warner's mathematical papers. He went to great lengths to get Warner's work on the antilogarithms published¹³⁴ and brought his mathematical work in general to the attention of others through the mathematician John Collins (1625-1683), styled the 'English Mersennus'.¹³⁵ After Thorndike's death in 1672 Warner's papers ended up in the hands of Richard Busby (1606-1695), the dreaded headmaster of Westminster School.¹³⁶ More than a hundred years later they were acquired by the historian, biographer and secretary to the Royal Society, Thomas Birch (1705-1766) together with an assortment of papers from Pell and Busby himself, through the Librarian of the church of St. Peter's Westminster.¹³⁷ Birch bequeathed

¹³¹ See for more information about this tutor of John Milton Fletcher (1961), Vol. 2: 33, 312 and 398; Wood, *Ath. Ox.* (reprint 1969), 301.

¹³² See about Thorndike DNB, Vol. 56, 290-292; Halliwell (1965), 94. Feingold's assertion that Tovey and Thorndike were engaged as editors of Warner's papers seems to be without any foundation. (See Feingold (1984), 81.) Samuel Hartlib tells another story. According to his information around 1652 Warner's papers were in the hands of Sir Justinian Isham, who it was said: 'hath gotten all the MS. Mathematical of Warner and... shewed them Mr. Pell' (*Ephemerides* 1653, 28/2/49A. Quoted by Clucas (1991), 54.) He also suggests that papers of Warner, together with those of Harriot, through John Protheroe, 'fell into divers hands as Sir Robert Na[u]nton, Sir Thomas Aylesbury etc.' (See Clucas, *op. cit.*, 45.)

¹³³ See Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 257.

¹³⁴ 'I have...sent you whatsoever I can conceive to concerne the canon...And my request to you is, first that you will take your own time to peruse them, in order to a resolution of publishing them, which upon perusing them, I hope you will declare...' (letter from Thorndike to John Pell, december 23rd, 1652. In: Halliwell (1965), 94.) As was said this plan had to be dropped.

¹³⁵ See on Collins DNB, Vol. 11, 368-9. As appears from the letters Collins wrote on behalf of Oldenburg and from his correspondence with Isaac Barrow and James Gregory he was very interested in Warner's mathematical notes. (See Rigaud (1965), Vol. 1, 215-16, 247-8; Vol. 2, 175, 218-9.) According to Aubrey Collins had a copy of a tract by Warner on 'Coynes in relation to mint affaires' (Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 293).

¹³⁶ See on Busby DNB, Vol. 7, 29-31.

¹³⁷ 'John Pell...was interred by the charity of Dr. Richard Busby...Besides those of his papers {those of John Pell}, which were left by him at Brereton in Cheshire...a great quantity of the rest came after his death into the hands of Dr. Busby...they continued buried under dust, and mixed with the papers and pamphlets of Dr. Busby in four large boxes, till june 1755, when the writer of this history procured them for the Society...The collection contains not only Dr. Pell's mathematical papers, letters to him, and copies of those from him, etc. but likewise several manuscripts of Mr. Walter Warner, the philosopher and mathematician, who lived in the reigns of the Kings James I. and Charles I.' (*The History*, 4. vols. (London 1756-57), Vol. 4, 446-7.) See on Birch DNB, Vol 5, 68-70; Wood, *Ath. Ox.*, (Reprint 1969), 463.

them together with the remainder of his books and manuscripts, to the British Museum.¹³⁸

1.2.2. The Contents of the Papers

Warner's legacy amounts to c. 657 folios, that is, about 1300 pages¹³⁹ running into c. 765 folios, that is, more than c. 1500 pages if complemented with the copies, not of his own hand, of five tracts he most probably wrote but that are no longer extant.¹⁴⁰ The autographical part of Warner's legacy consists of a large collection of disparate often unfinished notes, varying in length from a few words to a couple of folios, fragments of longer treatises, mathematical problems, calculations and tables plus a handful of letters. It is not always clear whether they express Warner's own ideas or have to be read as mere extracts or quotations. The papers cover many disciplines: mathematics (c. 31%), physics (c. 7%), physiology and psychology (c. 27%), optics (c. 11%), monetary matters (c. 13%)¹⁴¹, plus a few notes on a variety of subjects including military matters, nautics, waterworks, etc. (c. 11%).

Thus the greater part of Warner's legacy is mathematical. About a quarter of these mathematical notes relates to geometry, the rest to algebra and nearly half of these notes on algebra deals with logarithms.¹⁴² Warner composed

antilogarithmic tables, i.e. inverse logarithmic tables.¹⁴³ Pell told John Wallis that Warner started to compose his table between 1631 and 1635, perhaps continuing

¹³⁸ BL Add. MS 4101-4478. The greater part of Warner's papers is collected in Add. MS 4394-96. They were bundled, interspersed with papers of other people. Apart from many papers of John Pell the bundles also contain papers of Thomas Hobbes (see BL Add. MS 4395, ff. 131, 133), John Wallis (See BL Add. MS 4394, ff. 30-1: *Animadversions...in Thomas Hobbes's De principiis et ratiocinatione geometrarum*, 1666, in form of a letter), Nath. Torporley (See f.e. BL Add. MS 4395, ff. 89-90, 92) and even the beginning of a translation of Malebranche's *De La recherche de la Vérité* by a certain H.O. (see BL Add. MS 4395, ff. 185-212: *Of the Search of Truth - wherein is treated of the nature of the mind of man, and of the use to be made thereof for avoyding error in sciences - Englished out of French by H.O.* Printed by [...] for Moses Pitt At the Angel in St. Paul's Churchyard [...] 1675. It is a fragment of a translation of the first chapter of Vol. 1.)

¹³⁹ BL Add. MS 4394, ff. 115-403; 4395, ff. 1-130, 132, 134-184, 191-212; 4396, ff. 1-82, 85-145; 4425, ff. 3-4; 4391, ff. 39-49, 52-62; 4279, f. 307; Sion College: Arc. L 40. 2/ E 10, f. 88.

¹⁴⁰ BL Add. MS Harley, 6754, ff. 2-74: notes, not in Warner's hand, on money and exchange; 6755, ff. 3-14: *De tactionibus*; 6756, ff. 1-4: *Radij optici definitiones, pro triplici visionis diffria*; ff. 5-23: *De loco imaginis in visione a speculo spherico concave reflexa*; ff. 24-6: *De loco imaginis in visione a speculo cylindrico concavo reflexâ*.

¹⁴¹ See BL Add. MS 4394, ff. 85-90.

¹⁴² In 1614 Napier's *Mirifici Logarithmorum descriptio* was published in Edinburgh. Thanks to Henry Briggs' (1561-1631) *Logarithmorum Chilias Prima* (1617) this work soon became very popular. In 1619 Brigg published Napier's works as well as Edward Wright's english translation of Napier's book on logarithms. In 1619 John Speidall published *New Logarithmes* of which appeared six editions in five years. Aaron Rathborne advocated in *Surveyor* (1616) the use of logarithms for surveying. Brigg's work on logarithms was continued by, among others, Edmund Gunther (1581-1626), and Henry Gellibrand (1597-1637) who completed Brigg's work on logarithmic trigonometry tables. (See Hill (1965), 40-1.)

something first started by Harriot. From c.1639 to 1643 Pell assisted him.¹⁴⁴ Through Birch, the table seems to have come into the possession of the Royal Society. Since then it has disappeared. This does not have to imply that it was without any influence. Some suggest that the mathematician James Dodson (d. 1757), elected a fellow of the Royal Society in 1755, i.e. in the year the society acquired Warner's papers, knew this table and published it in 1742 as his own.¹⁴⁵ Whatever is the case, Warner's table has never been published and the existence of not more than a hundred or so disparate folios on the subject in the British Library justifies the conclusion that much if not most of it was lost. The investigation of this part of Warner's legacy calls for a mathematically trained historian.

The notes on physics can be divided into three groups. The largest group relates to a derivation and specification of the principles of nature, viz. time¹⁴⁶, space¹⁴⁷, matter¹⁴⁸

¹⁴³ That in all probability was done for the first time by Jobst Bürgi (1552-1632). Only after the publication of Napier's *Mirifici Logarithmorum descriptio* Bürgi published his *Arithmetische und geometrische Progress Tabulen* (Prag 1620). That publication stayed unnoticed and Bürgi remained unknown. (See Smith (1958), Vol. 1, p. 433.) See also note 4.

¹⁴⁴ C. 1638 Pell moved from Chichester (Sussex) to London. Sir Charles Cavendish writes in a letter from 26 juni 1641 to Pell: 'I desire to know if Mr. Warner's analogicall worck goe on or not.' According to Aubrey Warner's logarithms '...before Mr. John Pell grew acquainted with Mr. Warner, were ten thousand, and at Mr. Warner's request were by Mr. Pell's hands, or direction, made a hundred thousand.' (Halliwell (1965), 292-3.) Cf. Pell's statement: *Huius operis Warneri-Pelliani capita 12 Warnerus designavit*. (BL Add. MS 4279, ff. 275-8. Quoted by Jacquot (1974), 126, note 40. See also Pell's letter from August 7, 1644 to Ch. Cavendish. (Halliwell (1965), 80; and Clucas (1991), 44.)

¹⁴⁵ 'The Anti-Logarithmic Canon.' See on Dodson DNB, Vol. 15, 174-75.

¹⁴⁶ 'Time is in two sorts applied to things ether in respect of duration [or] & continuance or in respect of number. In mesuring [the] continuance it is principally accomodated to the being of things whether in quiet or in motion as how long such a thing doth last or [be] exist, or how long such a thing is in motion and this Aristotle [calleth] and Proclus call[eth] Primum tempus being nether gretter nor lesse than his subiect but beginning when it begins and ending when it ends. It is also applied in an other sort as when we aske [ho] when such a thing ether was or will be and in this case it seemeth to mesure the not being of things and this is that which Aristotle maketh the predicament of quando...' (BL Add. MS 4395, f. 203)

¹⁴⁷ '...space seemeth to be the prime subiect of all things it self subiect to nothing but time.' (BL Add. 4394, f. 401v); 'Space is corporeall or spherically infinit that is according to all dimensions and all locall respects. It is absolutely continuall throughout his whole

infinitenes and all his parts. It is absolutely eternall both in his infinitnes considered or in part thereof ether finite or infinite. It is absolutely immoveable but is the base and fundamentum of all motion...It is absolutely simple...It is merely époion, without any positive quality at all both in whole and parts and therefore absolutely homogeneall and uniforme. It is absolutely penetrable, cessible, capable or

and force¹⁴⁹. Of each of these principles Warner describes the properties and states (being and not-being, plenum and vacuum, rest and motion, etc.), their mutual relationships and the way they can be recognised. In that connection he also dwells on the concepts of place, unity and plurality, part and whole, the discrete and continuous as well as on the nature of causal relationships. Warner considers these principles as distinct, objectively existing, entities.¹⁵⁰ They constitute the cosmos, i.e. an infinite space filled

without...antitypia or resistance, and that in all his parts because homogeneous. It is merely impotent without force efficacy or activity, to speak properly neither active nor passive...Space may be defined out of the former properties. An infinite eternal nothing, but the universal vessel or receptacle of things.' (BL Add. MS 4395, f. 205.)

¹⁴⁸ 'Matter in respect of his inward substance is homogeneous and simple one part not differing from another and therefore in that respect is said to be one through the whole universe, for although things do infinitely differ according to the infinite variety of forms and magnitudes and other properties of these resulting (diversity of things being in deed nothing else but diverse forms or magnitudes of several parts or portions of matter postea) yet matter itself abstractly conceived that is as it is only matter without regard of any accident but with his own essential conditions of continuity & resistibility & hath no diversity in it at all...' (BL Add. MS 4394, f. 398v); 'The very quiddity and proper essence of matter is corporeity or resistibility (or antitypia or hardness) for in that it is continually or hath the three corporal dimensions of longitude, latitude and profundity it agrees with space to which that condition doth properly or at least primarily belong and likewise with vis radiativa for that is also quanta or local though in another sort.' (BL Add. MS 4395, f. 212)

¹⁴⁹ 'For as much as the species and forms of things and all varieties of distances and positions may very well be conceived to exist without motion and consequently without the admittance of any other thing besides time space and matter it [followeth] seemeth that the existence of the phenomena of that kind doth not enforce the introduction of any fourth nature; but it is to be noted that those phenomena as they are existent only are no phenomena but they are called phenomena quatenus apparent et sensibus nostris obijcuntur non autem quatenus sunt...and for as much as sensation is alteration and no alteration can be without local motion (as shall be hereafter shewed) moreover for as much as...there are divers other phenomena of motions alterations and effects (but in summe both that of sensation and these other are all reduced to local motion) and for as much as none of these that are cum motu (as all are) can possibly be saved by the solitary existence of matter we must of necessity acknowledge a fourth thing as a cause of motion which may therefore well be termed vis or power [what] by the quality of his office what soever his substance or quiddity be...' (BL Add. MS 4394, f. 389r-v)

¹⁵⁰ 'Both time and space are entia realia and have their several essences not only depending of the concept but in rebus ipsis extra intellectum and therefore some kind of

being they must needs be understood to have...' (Op. cit., f. 400v); 'Yf unto time and space be ascribed any kind of being whether real or only conceptual (or analogical for that which is conceptual is in some sort also real) it is certain they are in respect of being more prime than materia and vis and

with matter composed of atoms enclosed by a radiating force setting these atoms in motion.¹⁵¹ While space diversifies and specifies the states of things, time, the absolutely first principle¹⁵², measures and determines the duration and frequency of states of things, i.e. configurations of atoms.¹⁵³ In these notes Warner understands by atoms simple, continuous, principally divisible and substantially identical particles, differing and changeable only in figure and size.¹⁵⁴

The second group of notes mainly deals with the properties and sphere of action of the ‘fiery spirit’, the cause of sublunar, i.e. elementary heat and combustion. Warner, in that connection also discusses phenomena like evaporation, ‘spiritualization’ and consolidation. In these notes too Warner reveals himself to be an atomist albeit of another kind. Here he distinguishes between ‘prime elements or simples, atomos seu prima elementa’ in the sense of smallest particles of simple substances and ‘elementata seu composita sive minima specialia sive plus quam minima’, that is, fragments of compounded substances.¹⁵⁵ In fact, in these notes Warner is not dealing with Democritean or Lucretian atoms but with the peripatetic minima naturalia, i.e. smallest particles differing not only in figure and size but also substantially, particles that cannot be divided further without loss of their natural properties.¹⁵⁶

though not tempore yet natura, and time more prime then space because time is applicable to space by way of predication and not econtra.’ (Ibid.); ‘Space and time have debilem entitatem yf they have any positive being or existence at all; that reality which they have extra intellectum [is] seemes to be nothing but quantity but in different or contrary maners for time is quantum primo et per se, fluens, sive in transacto sive in potentia; space is quantum primo et per se stans vel permanens actu; time with relation, space without or absolutè.’ (BL Add. MS 4395, f. 205)

¹⁵¹ ‘...the cheef condition of this vis in generall is to cause locall motion (and that of matter for there is nothing els that can be so much as imagined to be properly moved...’ (BL Add. MS 4394, f. 389v)

¹⁵² ‘...time being the more prime ens doth rather mesure and contayne space then space time...’ (BL Add. MS 4395, f. 196). See also note 150, second quotation.

¹⁵³ ‘Time is the mensurant and determinant of states place the continuant and distinguent...’ (BL Add. MS 4394, f. 399v) ‘States of things are modified or diversified or specified by space but mesured and determined by time’ (Op. cit., f. 400r)

¹⁵⁴ See op. cit., ff. 396r-399v.

¹⁵⁵ See BL Add. MS 4395, ff. 63, 66, 68. Warner here also talks of ‘the secondary elements’, ‘grosse elements’, ‘grosse atoms’. (See op. cit., f. 63)

¹⁵⁶ See Hooykaas (1947), deel II: 86-108; van Melsen (1962), 82-102; Dijksterhuis (1989), 225-27, 305-7.

Finally there are a few notes on the relationship between the act of motion, moving bodies and velocity.¹⁵⁷

The notes on the spontaneous and voluntary functions of animals, i.e. on the animal physiology and psychology open with the statement that the cause of the generation of the earth '...is manifest...the principium activum being agentia mundana and the passivum gravitas humidi seu menstrui deferentis...In the generation of vegetalls the delation of the materialls hath ben...alredy concluded in the former papers to be...caused by rarefaction...There rests to be considered the <causall> principium of the delation of the materialls alimentary of animalls...' ¹⁵⁸ Apparently these notes constitute the remains of a comprehensive treatise about the generation, structure and operation of the earth (i.e. stones, metals, minerals, etc.), plants and animals.¹⁵⁹ They are fragments of a theory pertaining to the faculties enabling an animal to gather food, to transform that food into energy as well as building-materials, and to diffuse it as such through the organism to restore its body. In fact these powers are faculties of an animal spirit, a subtle, warm, active substance that in its operations is impelled by the urge to self-conservation and uses the body as its instrument. The acquisition of food requires locomotion, i.e. voluntary movements. These constitute the end of a causal chain going from sensory perception and the affections evoked by that, through the appetite to the will as the direct principle of locomotion. Warner describes extensively the way these powers develop and are, as it were, mutually attuned in order to be able to function properly.¹⁶⁰ After the animal has consumed its food it is turned into chyle and after that into blood. That blood is propelled by the heart and distributed through the body to restore the sanguinous, carneous or red parts of the body. The nutrients in the blood, going to the brain and the spinal marrow, are transformed there into spermatic matter of which, in the end, a coagular plasmatic matter is separated out for the restauration of the white, nervous parts of the body.¹⁶¹ These processes are not voluntary but proceed naturally or spontaneously, guided unconsciously, as it were, by the said animal spirit. In the notes at

¹⁵⁷ See op. cit., ff. 95, 199.

¹⁵⁸ BL Add. MS 4394, f. 132r.

¹⁵⁹ Cf. 'The maners of the three generation{s} of mineralls, vegetalls and animalls do differ toto genere and can not have one name but by analogy or rather equivocè cum habent rationem generi diversam.' (Op. cit., f. 175r.) Cf. Sennert: 'In globo inferiore tres insignes differentiae generationum occurrunt, animalium, vegetabilium, & mineralium...' (*Opera*, 226); Power: '...Nature at first created this aetherial substance...the main...Agent in all natures three Kingdoms Mineral, Vegetal, and Animal.' (*Experimental philosophy*, 61.)

¹⁶⁰ See Chapter 2.

¹⁶¹ See Op. cit., ff. 177r-209v and 218v-210v.

issue these processes and especially the part played by the spirit are described in detail. Warner dwells long on the question of what causes the motion of the heart in particular.

Half of the notes on optics relate to dioptrics, c. 35 % to catoptrics and the rest cover topics like the cone of radiation, the visual angle, burning-glasses, etc. As a whole these notes suggest that Warner, as an optical scientist, restricted himself to geometrical optics.

In the notes on monetary matters, Warner broaches a variety of subjects such as the rates of change, bookkeeping, annuities, political economy, the minting of money, prices of land, etc. There are about ten folios of notes on gunnery, marksmanship, fortification and other military matters. Warner's legacy also attests to a lively interest in nautical problems. It contains 1) *Notes for sea matters*¹⁶², 2) *Observations of the variation of the compas*¹⁶³, 3) *Problematis de longitudine inveniendâ processus*¹⁶⁴. Further, among the MSS and papers of Hobbes in the Devonshire Collections there seems to be a text in Warner's hand 4) *Ad architecturam nauticam problema*¹⁶⁵ and according to Wood the collection of Torporley's papers in Sion College once included a text of Warner entitled 5) *Certain definitions of the planisphere*.¹⁶⁶ Nr.3 is written in the hand of an old man. Nr.1 and nr.2 are written in a much firmer hand. Nr. 4 was not seen by me. Number 5 seems to have been destroyed in a fire. As appears from the differences in handwriting nautical science was one of Warner's lifelong interests. Looking at the circles in which he moved this does not come as a surprise. He shared that interest with Walter Raleigh, Thomas Harriot, Robert Hues, Nathaniel Torporley, Charles Cavendish, John Pell and probably with many other people from his surroundings.¹⁶⁷ The Northumberland family possessed many manuscripts on this subject and April 13. 1636 Henry Percy's oldest son, Algernon, became Lord High Admiral in the Navy.¹⁶⁸ No. 1 consists of 49 elementary notes made when he was still a pupil himself or as 'aides memoires' while teaching others. More than half of them relate to construction, masts, rigging, anchors and crew of ships, a quarter of them to navigation, a third to gunnery and the rest to nautical instruments. Nr.2 contains nine observations made at different locations of the variation of the compass, probably copied by Warner from other writings on the subject. In 1635 there appeared a treatise by Henry

¹⁶² Op. cit., ff. 122r-v-23r.

¹⁶³ BL Add. MS 4395, f. 87.

¹⁶⁴ BL Add. MS 4394, f. 122r.

¹⁶⁵ Royal Commission on Historical Manuscripts, 9.

¹⁶⁶ See Wood, *Ath. Ox.* (1st ed.), Vol. 1, 485.

¹⁶⁷ See Waters (1958).

¹⁶⁸ See HMC (1877), 303.

Gellibrand on the variation of the compass on which, in that same year a commentary was written by John Pell, to wit, *Exercitatio de diminutate variationis*.¹⁶⁹ The variation of the compass, by the way, needs not necessarily have been the principal or the only problem at stake in collecting these data. Maybe Warner, just like Dee, Digges, Harriot and Anth. Linton at that time still believed he could solve the problem of the longitude that way.¹⁷⁰ Nr.3 presents a solution to the problem of finding the longitude based on the movements of the satellites of Jupiter. In his edition of Tapp's *Seaman's Kalender* of 1648 Henry Bond (c. 1600-78) rejected that type of solution. Charles Cavendish seems to have been one of the few people paying attention to Bond's own solution. In a letter from 13 November 1648 to Pell he claimed to have found 'a way for longitude by lodestone' like Bond basing his solution on the magnetical poles.¹⁷¹ It is not known whether Cavendish was already interested in that problem in the 1630s and discussed it with Warner. Finally there is a fragment of a tract concerning 'Certain axioms or principles pertayning to the conducting of waters in rivers or open aqueducts.'¹⁷² It is not clear in what connection and on whose behalf Warner worked on those kinds of problem. He is also said to have devised an 'instrument for the making of ponds'.¹⁷³ I have found nothing to substantiate that claim.

1.2.3. The Authorship and Dating of the Papers

John Collins borrowed Warner's papers from Thorndike and made an inventory, dated December 14, 1667¹⁷⁴:

An inventorie of the papers of Mr. Warner.

1. A tract of exchanges in folio, containing eleven leaves, Anglice.¹⁷⁵
2. Varronis sententia de tympanis illustrata, tribus foliis.¹⁷⁶
3. A treatise of coines.¹⁷⁷

¹⁶⁹ See Taylor (1970), 350-1.

¹⁷⁰ See op. cit., 44.

¹⁷¹ See op. cit., 90-1, 208, 354-5.

¹⁷² See BL Add. MS 4394, 131r.

¹⁷³ See Rukeyser (1971), 205.

¹⁷⁴ BL Add. MS 4394, f. 106. Printed in Halliwell (1965), 95.

¹⁷⁵ BL Add. MS 4396 contains 5 fols. (ff. 85r-89v) on this subject.

¹⁷⁶ See BL Add. MS 4396, f. 124-5: 'si duae vires tympano...' (See on Marcus Terentius Varro (116 B.C.-27 B.C.) *Dictionary of Scientific Biography*. New York 1976. Vol. 13: 588-9.)

¹⁷⁷ Cf. BL Add. MS 6754, Harley, ff. 1-74: tracts, ascribed to Warner though not in his hand, on the alloying of metals for minting coins, 'The causes of diminution of the Riches of a Kingdom meaning thereby the masse of Gold...', 'The necessity of money for commutation', the manufacture of money, prices of land, rates of change, etc.

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4. Another of the same.
 5. A tract about ingotts.¹⁷⁸
 6. Another of the same.
 7. Opus Saturninum.¹⁷⁹
 8. A bundle containing thirty papers intituled "Opus Joviale".¹⁸⁰
 9. A small bundle intituled "Observationes Westmonasterienses".¹⁸¹
 10. A bundle intituled "Monetary".¹⁸²
 11. A bundle intituled "Generall rules of Warre and Fortification observed by the experience of Prichard Hansard".¹⁸³
 12. Six tracts sewed together intituled "Tabularia".¹⁸⁴
 13. The faire copy of a canon of 100.000 logarithmes.¹⁸⁵
 14. Canones analogici originalis.¹⁸⁶
 15. Schedae miscellaneae.¹⁸⁷
16. A bundle intituled "Analogicks".¹⁸⁸

¹⁷⁸ Cf. BL Add. MS 6755, Harley, ff. 15-18: 'Mr. Warner's Tract of the commixture of metallis for the mint'. In fact a sloppily written pot-pourri of ten problems and three propositions. The handwriting looks like that of the notes on matter, space, time, etc. If this is written by Warner then we can surmise a date somewhere between c. 1620 and c. 1630. See also BL Add. MS 4391, ff. 39-49: propositions, problems and consecutaries on the mixture of metals. Probably written in the 1630s. See also notes 140 and 177.

¹⁷⁹ Probably a text on alchemy. In the alchemical literature 'Saturn' stood for lead and as such was coupled to the element 'earth'. (See Shirley (1983), 270, 285 and note 180.)

¹⁸⁰ Cf. BL Add. MS 4391, ff. 52-62: Operis Iovialis processus duabus partibus consistens, corporis scil. praeparatione et medicinae perficientis compositione. Followed by 'Processus mercurialis pars prima.' That is, 'Veneris pur[a]lgatio. Vitrioli confectio. Mercurij purgatio. Mercurij sublimatio. Marcharitae sublimatio...' Etc. Accordingly no. 8 refers to an alchemical treatise. It probably was written in the 1630s.

¹⁸¹ See BL Add. MS 4395, f. 99: 'Ex observationibus diligentissimis Tho: Aylesbury & Walt. Warner; Westmonasterii. mense Julio: 1627. apparent'. A table of refractions 'Ab Aëre ad Vitrum'. See also f. 96 (table of refraction from air to glass), ff. 100-3 ('Ex Lydiati calculo supposita maxima solis refractione 6^o. 45' et observationis loco sub latitudine 45.0...), f. 110 ('In altero visionis refracta casu a radiori ad densius, radius opticus est corpus radiosus truncatus duabus partibus...'), f. 113 (computations), ff. 120-121 (tables of refraction from air to glass 'cum flamma lampadis').

¹⁸² See note 178.

¹⁸³ See BL Add. MS 4396, ff. 63-83: notes on targetshooting, gunnery in general, encampment, etc. Probably written somewhere between 1610 and 1630. Nothing could be found on Prichard Hansard.

¹⁸⁴ See BL Add. MS 4396, ff. 1-39: fragments concerning the table of antilogarithms (De structura et qualitate canonis analogici ...(f. 1), Axiomata ex canonis generi analogorum...(f. 2), definitions concerning 'analogies' (f. 3-17)...Canones analogici originalis ex numeris proportionalibus 10.000 compositi...(ff. 30-39).

¹⁸⁵ See note 184.

¹⁸⁶ Idem.

¹⁸⁷ Maybe these included the notes on physics and those on animal physiology and psychology.

17. De monetarum homonimicarum aequivalentia.¹⁸⁹
18. De resectione spatii.¹⁹⁰
19. A treatise sic incipiens "Any ratio being given".¹⁹¹
20. A treatise thus beginning "Of that columnne".
21. A bundle "de refractione definitiones".¹⁹²
22. A bundle intituled "Mr. Protheroe".¹⁹³
23. A bundle intituled "Sir William Beccher".¹⁹⁴

In the manuscript all items, except for the nos. 1, 3, 4, 5, 6, and 17, all about monetary matters, are crossed out. As appears from this inventory Collins did not, as someone suggested in a review of Rigaud's *Correspondence of Scientific Men*, receive only the 'table of antilogarithms' from Thorndike but probably all of Warner's papers. There also is no reason to suppose that these papers stayed in his possession.¹⁹⁵ He received the papers in 1667 on the promise to restore them on demand. Apparently he did do so for in some of the letters he wrote in the 1670s he refers to that table as in the possession of Dr. Thorndike.¹⁹⁶

Thanks to this inventory we can be sure that most of the manuscripts bundled in the British Library as 'Warner's Mathematical Collection' (BL Add. MS 4394-96) are justly attributed to Warner and that the tracts in BL Harley MS 6754-56 are indeed copies of treatises written by Warner.

On the other hand philosophically the most interesting parts of the collection in the British Library, i.e. the notes on the principles of physics and those on

the faculties of animal organisms are not mentioned by Collins. Perhaps they are included in the 'Schedae miscellanae' (item 15) or in the bundle entitled 'Sir William

¹⁸⁸ See note 144.

¹⁸⁹ See notes 178.

¹⁹⁰ See BL Add. MS 4396, f. 40-62: Problems 'De resectione spacii, de minimo spacio, de rectangulo et spacio maximo...' etc.

¹⁹¹ See BL Add. MS 4394, ff. 272-343: Problems on numerical ratios.

¹⁹² See BL Add. MS 4395, ff. 132-154. See also note 140.

¹⁹³ Perhaps John Protheroe (c. 1582-c. 1624), since 1615 solicitor in Wales for the 9th Earl of Northumberland and close friend of Thomas Harriot who deemed him an able mathematician (See Shirley (1983), 412-14). According to Aubrey Protheroe knew about Warner's discovery of the circulation of the blood (see Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 291). That tract probably is not at issue here for in that case one would have expected Collins to have mentioned it explicitly. In all probability it was a bundle of mathematical notes.

¹⁹⁴ Perhaps the same as the Sir William Beecher mentioned by Wood (*Ath. Ox.*, 1st ed., Vol. 1, 398) who until 1641 was secretary to the Irish Committee of the Privy Council (see Aylmer (1961), 178).

¹⁹⁵ See *The Atheneum*. No. 1825, oct. 18, 1862: 489-491 and Feingold (1984), 81.

¹⁹⁶ These references can be found in a letter, from March 3. 1671, to James Gregory (see Rigaud (1965), Vol. 2, 218-19) and in one, written september 30th 1675, on behalf of H. Oldenburg to Tschirnhaus, (See op. cit., Vol. 1, 215.)

Beccher' (item 23), but it is unlikely that we will ever know. Moreover, while Warner's writings on mathematics, optics, metallurgy and monetary matters are all referred to by Aubrey¹⁹⁷ and Wood¹⁹⁸ as well as mentioned in letters and other writings of contemporaries. Hobbes, for example, in his *Six Lessons to the Professors of the Mathematics* (1656) only mentions Warner's tract on refraction '...and another treatise of the proportions of alloy in gold and silver coin...'¹⁹⁹. Nobody, with the exception perhaps of Pell, seems to have known about these notes on physics, or those on the functions of animal organisms. Nobody refers to them, which, in view of their often unorthodox contents, is remarkable. Assuming that both groups of notes are justly attributed to Warner we will have to explain the differences in handwriting and also the fact that the notes on physics are undoubtedly written by an atomist while the notes on animal organisms are marked by the kind of eclectic Aristotelianism that since the 1580s, due to the work of John Case (1575-1650) and under the influence of Protestant as well as Catholic Scholastic literature, gained a firm foothold at the English universities.²⁰⁰ This revival of Aristotelianism was carried by a stream of Aristotelian textbooks that, since the end of the 16th century flooded England. It began with small, introductory compendia like J.L. Hauvenreuter. *Compendium librorum physicorum Aristotelis* (1594); J. Velcurio. *Libri IV in universam Aristotelis physicen* (1588); Sebastianus Verro. *Physicorum Libri X* (1581); Andreas Hyperius. *Compendium physices*. (1583) Adolphus Scribonius. *Physics*. (Transl. plus notes by Thim. Bright, 1584). Soon these were followed by voluminous natural philosophical encyclopedias written by Protestant and Catholic Scholastics from the continent²⁰¹ and similar works from native soil

like John Case's *Lapis philosophicus*...Oxford (1599). Warner may well have been acquainted with this literature. It was richly represented in Henry Percy's library

¹⁹⁷ 'Mr. Walter Warner made an Inverted Logarithmicall Table...he wrote a Treatise of Coynes in relation to mint affaires...The sixth booke of Optiques in Merçennus is expressly his...' (Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 292-3).

¹⁹⁸ Apart from the works mentioned by Aubrey Wood also refers to a manuscript in which 'He...did make it appear...that the blood in a body did circulate...' (Wood, *Ath. Ox.* (reprint 1969), 302).

¹⁹⁹ EW, Vol. 7, 342. The latter is also mentioned in a letter from 1648 to Mersenne: 'Ce que Mons^r Warner a fait touchant la monnoye, est en Anglois, et fort long et mal aisé a lire...' (Tönnies (1975), 134.) See about Collins' references note 135. Hartlib also only mentions papers on mathematics, optics, the circulation of the blood, monetary matters and on hydraulics. (See Clucas (1991), 44-5, 53.)

²⁰⁰ See Schmitt (1983), 37, 68, 223.

²⁰¹ For example, Johannes Magirus. *Physiologia peripatetica ex Aristotele eiusque interpretibus collecta*...Frankfurt (1597); Bartholomaeus Keckermann. *Systema physicum*. Gdansk (1610); Eustachius a S. Paulo. *Summa philosophiae*...Paris (1609).

containing ‘...editions of Aristotle’s works...and scholarly commentaries by Toletus, Case, Zabarella, Crellius, Pacius, Canapitius, Crippa, Cheyney, Perionio, Aquarius, Montecatini, Scanius, Fonseca, Lambini, Septalius and others.’²⁰²

There are, in my view, good reasons to assume that the notes in question are justly attributed to Warner. To begin with the theme as well as the approach of the notes on physics strongly suggest that they were written by a member of the ‘Northumberland Circle’. That idea is reinforced by the presence of notes from Torporley among those ascribed to Warner²⁰³ and by the three references in these notes to Harriot’s work.²⁰⁴ The idea that the notes on animal organisms too are from Warner links up nicely with the rumour that he wrote a tract on the circulation of the blood before Harvey, and with Hobbes’ praise of Warner’s psychological views. In view of the style it is reasonable to assume at least, that both groups of notes were written by one and the same person. In both groups we find long enumerations, digressions, long-windedness, alternating use of English and Latin, slips of the pen (using a word too early, changing synonyms, negation instead of an intended affirmation), and recurring expressions like ‘hereafter to be considered’, ‘so e converso’, etc.

My main argument in attributing these notes to Warner is graphological. Naturally in the course of Warner’s life his handwriting changed. Thanks to three documents it is possible to reconstruct the development of Warner’s handwriting. Henry Percy’s household papers contain a number of dated receipts for Board Wages, etc. that not only are signed by Warner but, considering the strong similarity in handwriting with, for example, the notes on monetary matters (See Fig. 1), were probably also written by him.²⁰⁵ They were written in the middle years of the first decade of the 17th century. His handwriting at that time was relatively large, round, regular and sloping to the right. In the next 20 to 25 years his handwriting became progressively smaller, more angular, less sloping and less regular as appears from the handwritten version of an announcement ‘Ad Mathematices Studiosos’ printed in Warner’s edition of the *Artis Analyticae Praxis* (London 1631). (See Fig. 5.) Assumedly Warner wrote this text, accompanied by comments in

Torporley’s hand, in the late 1620s.²⁰⁶ Finally there are some drafts of letters from Warner to Charles Cavendish and Robert Payne written in the 1630s from which appears that the briefly traced development continued and resulted in the unsteady hand

²⁰² Clucas (1990), 4.

²⁰³ See BL Add. MS 4395, ff. 89-90, 92.

²⁰⁴ See p. 10.

²⁰⁵ See MSS of Northumberland: U. 1. 10., ff. 32, 36, 212.

²⁰⁶ See op. cit., f. 92: Ad Mathematices Studiosos. See also *Artis analyticae praxis*. Londini 1631, 180.

of an old man.²⁰⁷ (See Fig. 6.) The handwriting of the notes about the functions of animal organisms (See Fig. 2) does not differ substantially from that of the short letters in Northumberland's household papers while the handwriting of the notes on physics (See Figs. 3 and 4) stands midway between the latter and that of the text entitled 'Ad Mathematices Studiosos'. Apart from that, the handwriting in its several stages also makes clear that the notes definitely were not written by Percy, Harriot, Torporley, Payne or by Charles Cavendish.

The gradual changes of Warner's handwriting enable us to date large parts of his legacy. The notes on the principles of nature, on fire and combustion, and those concerning motion were probably written in the second half of the 1620s.²⁰⁸ In that period, preparing the edition of the *Artis analyticae praxis*, Warner had access to the papers of Harriot and perhaps they inspired him to his atomistic view of nature.²⁰⁹

The notes on the functions of animal organisms are the oldest. They could have been written some time between the 1590s and late 1610s.²¹⁰ These dates are mainly arrived at from the physiological part of the notes in question, where Warner refers to Bauhinus' 'chapter de medulla spinali'²¹¹ There is a chapter on that subject in Bauhin's *Theatrum Anatomicum* (Frankfurt, 1605) but he could well have seen it in one of Bauhin's many other medical writings dating from the 1590s.²¹² Apart from Bauhin,

²⁰⁷ See BL Add. MS 4279, f. 307: Warner's letter from 17 October 1634 to Robert Payne; BL Add. MS 4395, ff. 116r-118r, 112r.

²⁰⁸ Clucas' suggestion that the notes on fire and combustion were written 'some time between 1610 and 1620' is irreconcilable with the fact that the handwriting differs markedly from that of the notes on animal organisms which most likely were written in precisely that period. (See Clucas (1990), 10.)

²⁰⁹ If this dating is correct it is all the more remarkable that these notes are never mentioned in connection with Warner by the other members of the Cavendish Circle or by other contemporaries.

²¹⁰ According to Rolleston the part of the notes on animal organisms concerning physiological processes dates from c.1610. (See Rolleston (1884), 753) Bayon's suggestion of 1635 has to be rejected. (See Bayon (1939), 42) As appears from Warner's letter to Payne his handwriting in those days differed toto genere from that of the notes in question.

²¹¹ BL Add. MS 4394, f. 201r.

²¹² Caspar Bauhinus (1550-1624), taught anatomy as professor in Basel and later became town-physician and principal. Till the 1630s his work set the tone in anatomy. (See Poynter (1967).) Apart from the *Institutiones anatomicae* (Francofurti 1616/ 1st ed. 1604) based on *De corporis humani fabrica* (Basel 1590) and having no separate chapter on the spinal marrow I only saw his *Theatrum Anatomicum*. Different sources tell us different stories about the number of his anatomical writings and the dates of their publication. According to the *Allgemeine Deutsche Biographie*. Zweiter Band. Leipzig 1875 (p. 152) Bauhinus first wrote separately *De corporis humani partibus externis* (1588), *Anatomes Liber II. partium spermaticarum* (1591), and *Anatomia corporis virilis et muliebris* (1597). Later these treatises were collected and published entitled *De corporis humani fabrica* (Basel, 1600), *Institutiones anatomicae* (1604 and 1609), and *Theatrum anatomicum* (Francofurti 1605 and 1621). The *Dictionnaire Historique de la Médecine* (Eloy (1973), Tome premier, 288) only mentions the first edition and the second one, entitled *Theatrum anatomicum infinitis locis auctum*. According to the *Handbuch der Geschichte der Medizin* (Neuburger/Pagel (1903), 483) there appeared a *Theatrum anatomicum infinitis locis auctum ad morbos accomodatum* in 1592 (Basel) and in 1621 (Francof.). That would mean that there must have

if one have bought the inheritance of a parcel of ³²⁶
 land of the value of 60^l per ann. for 1200^l. that if
 at 20 years purchase, and would let the same
 for the years referring a rent of 25^l. a year for
 those years, the value this lease that is this 25^l.
 a year for 20 years precisely after the rate of
 his purchase so as he may neither gain nor lose
 thereby there are 2. conditions to be obs^d.

Fig. 1: BL Add. MS 4394, f. 326r (By permission of the British Library)

Respondeo gradus sensus ad sensus acquiruntur
 quibus nos may have present sorrow for a brief
 time, it is argued not, quia impossibile est sentire
 et fantasiam idem simul et eodem actu et eodem
 of the pain be visible and the fantasiam thereof
 though it is possible the fantasiam be about the
 sense may have the operation for a time. While the
 sense is suppressed ~~in figure~~ and so eodem
 alternatory acts but rightly or eodem actu not possi-
 bly; neither is such alternation in case of behemint
 or intense pain scarce possible.

Fig. 2: BL Add. MS 4395, f. 17 (By permission of the British Library)

If into time and space be ascribed any kind of being whether real
 or only conceptual (or analogical for that it is conceptual is in
 some sorte also real) it is certain they are in respect of
 being more trivial than materia and by though not tempo-
 rally actum, and time more prior than space because time
 is applicable to space by way of predicatio and not e contra.

Fig. 3: BL Add. MS 4394, f. 400v (By permission of the British Library)

Although space may be abstractly considered w^out matter, as w^out the
 mathematicians consider quantity or space w^out respect of matter
 yet matter can not be abstracted from quantity or space
 asquith for whether rest or be moved it can not be ^{space abstractly} continued
 but tanqua in globo, or sub specie quantitate is all one because
 it is impossible to be actually other wise. whereas space may be

Fig. 4: BL Add. MS 4395, f. 206 (By permission of the British Library)

*Ad Mathematicos
studiosos.*

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E variis

*Ex omnibus Thomae Harrioti scriptis Mathematicis, quod
opus hoc Analyticum primum in publicum emissum sit, haud
inconsulto factum est. Nam, quoniam reliqua eius opera,
quae quidem numero plurima sunt, ^{multiplici plurima} ~~et parva~~ ^{multorum} ~~librorum~~
nobilitate excellentia, eodem omnino quo tractatus iste
(Logisticus speciosa praecipis et exemplis omnimodis totus
compositus) scilicet Logistico, hactenus inedito, conscripta
sunt; ea erit ratione fit, ut prodromus hic tractatus,
ultra proprium ipsius inestimabilem usum, reliquis
Harrioti scriptis, de quorum fortuna editione iam serio
(cogitatur) cum typographis agitur, pro necessario prepara-
mento siue introductorio opportune inseruire possit.
De qua quidem accessoria operis huius utilitate rerum
Mathematicarum studiosos paucis hisce praemonuisse
operae precium esse duximus.*

Fig. 5: BL Add. MS 4395, f. 92 (By permission of the British Library)

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*The doubt ^{tho} you have proposed in your letter preta-
ning ^{to} the question de loco imaginis. ^{tho} Mr. Pagan
hath also ~~not~~ particularly set down in his I must
confesse, is so rationally and pertinently objected
as it is not possibly to be solved, without introduc-
ing and constituting 2. or 3. new optic prin-
ciples in the doctrine and those also paradoxall
For it is true that that the optic membrane
is the prime recipient of the visible species from
whence it is continually transferred by the
visive spirits in the nerve optic to the phantasy
or last recipient. ^{tho} is the whole act of, ^{vision} ~~real~~
^{reception} rightly understood.*

Fig. 6: BL Add. MS 4395, f. 116 (By permission of the British Library)

Warner mentions as sources, among others, Archangelo Piccolomini, Laurentius, and Valverde. These names and the striking similarities with works like *Microcosmographia. Description of the Body of Man* (London 1615) by Helkiah Crooke or Harvey's *Lectures on the Whole of Anatomy* (1616) reinforce the conjecture that these notes date from the first decades of the 17th century. The year 1620 is based on the story that William Harvey published Warner's theory of the circulation of the blood as his own discovery after having been set on the right track after a visit to the home of the Earl of Leicester where he met with John Protheroe, who was said to have been acquainted with that theory: 'Mr. Warner did tell Dr. Pell, that when Dr. Harvey came out with his Circulation of the Blood, he did wonder whence Dr. Harvey had it: but coming one day to the earl of Leicester, he found Dr. Harvey in the hall, talking very familiarly with Mr. Prothero...to whom Mr. Warner had discoursed concerning this exercitation of his *De Circulatione Sanguinis*, and made no question but Dr. Harvey had his *hint* from Prothero.'²¹³ Since 1615 Protheroe had been solicitor for Northumberland in Wales. As he died in 1624 the 'earl of leicester' must have been Robert Sidney, viscount Lisle, the 1st Earl of Leicester since 1618. His son, Robert Sidney junior, married in 1616 a daughter of Northumberland and succeeded his father as the 2nd Earl of Leicester only in 1626.²¹⁴ Protheroe must have informed Harvey about Warner's theory between 1618 and 1624, for example

in 1620 when Harvey conducted a post mortem on the body of Lady Philippa Sidney.²¹⁵ In that case Warner would have to have written his tract on the circulation of the blood before 1620 and if that were so it would seem reasonable to assume that the same holds true for the rest of his notes on the functions of animal organisms. Whether this is true or not, they could not have been written much later for in the 1620s not only did

been an earlier edition of the *Theatrum anatomicum*. Apart from that edition of 1592 Garrison (1917) also mentions an *Anatomica Historia* from 1597 (p. 216).

²¹³ Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 291. Aubrey had his information from Pell and from Izaak Walton (1593-1683) who told him that, according to George Morley (1597-1648), bishop of Winchester, '...he {i.e. Warner} first fownd out the cerulation of the blood, and discover'd it to Do^r Harvie (who said that 'twas he (himselfe) that found it) for which he is so memorably famose.' (Aubrey, *Brief Lives* (ed. Dick), 315.) See on Walton DNB, Vol. 59, 273-77 and on Morley Vol. 39, 74-8. Wood repeats the stories of Pell and Morley. (See Wood, *Ath. Ox.* (1691), 391 and (reprint 1969), 302.)

²¹⁴ See on Sidney sr. and jr. DNB, Vol. 52, 236-39.

²¹⁵ See Keynes (1966), 124-5.

Warner's handwriting change but he also turned from an eclectic Aristotelian into an atomist.

Furthermore there are discrepancies between the papers on optics in the British Library and those mentioned in Collin's inventory of Warner's papers. The collections in the Library contain fragments of the bundle of definitions relating to refraction mentioned by Collins (item 21) but also fragments of the tracts on the ray of light and on the place of the image after reflection, copied by H. Smithson and not figuring in Collins' inventory.²¹⁶ Collins does not mention a tract on burning-glasses fragments of which can be found in the collections in the Library.²¹⁷ The treatise on the telescope referred to by Payne in a letter from October 3rd, 1636 is neither to be found in the British Library nor reported by Collins.²¹⁸ The handwriting of the greater part of these notes on optics as well as of Warner's correspondence with members of the 'Cavendish Circle' suggests that they were written in the late 1620s and early 1630s.

Examination of the hand the notes on monetary matters are written in suggests that these partly were written in the same period as the notes on animal organisms and partly in the late 1620s.²¹⁹ Accordingly, this subject already engaged Warner's attention before Thomas Aylesbury, from 1625 to 1642 Master of Requests and since c. 1635 co-master of the Mint, asked him to write a tract 'on coins and coinage'.²²⁰ The notes on military matters seem to be written in the late 1610s or in the early 1620s, while those on the conducting of waters were undoubtedly written in the 1630s or early 1640s. Finally, the handwriting of the nautical notes suggests that they were written in different periods of his life. Some fragments, for example Nrs. 1 and 2, probably were written in the first decade of the 17th century. This is not only suggested by the handwriting but also by an entry in No. 1 like: 'That the knowledge of the longitude were not so beneficiall as it is taken for though as

precisely knowen as the latitude.'²²¹ Many Elizabethan and Jacobean navigators used astronomy, arithmetic and a bit of geometry. They hardly knew any trigonometry and '...could neither measure, plot nor calculate longitude accurately...' Hence, most navigators '...practised plane sailing', that is, determined their position on the basis of

²¹⁶ See note 140.

²¹⁷ See BL Add. MS 4395, f. 103.

²¹⁸ See Halliwell (1965), 68.

²¹⁹ See BL Add. MS 4396, ff. 85-90. See also notes 140 and 178.

²²⁰ See DNB, Vol. 2, 277.

²²¹ BL Add. MS 4394, f. 122r.

the latitude.²²² The handwriting of other notes on nautical matters, for example Nr. 3, strongly suggests that these were written in the 1630s.

1.2.4. The Investigation of Warner's Papers

In his lifetime Warner already enjoyed a certain fame as optical scientist and mathematician. His optical writings were taken seriously and studied by Sir Charles Cavendish, Robert Payne and Thomas Hobbes. Shortly after his death Mersenne published Warner's demonstration of the sinus law of refraction.²²³

The publication of his antilogarithmic table was eagerly awaited.²²⁴ John Collins mentioned it several times in his letters and presented Warner's solution of certain mathematical problems to other mathematicians.²²⁵ After Thorndike's death Warner's papers faded into oblivion. In 1755 Birch shed light upon them again but did nothing else.

In the 19th century the interest revived. One wondered what had become of Warner's table of antilogarithms²²⁶ and in the 1870s, for the first time, his notes on the physiological functions of animals, especially those bearing on the motion of the heart and blood, were investigated. The earliest known document stating that Warner anticipated Harvey dates from c. 1645 (see note 5) In 1663 Robert Boyle mentions Warner together with Colombo, Caesalpinus, and Padre Paulo as one of the four people that '...are supposed by some to have had some notion of the circulation...' before Harvey.²²⁷ In 1685 Isaac Vossius (1618-1689) wrote that '...Sarpi,...convinced a certain Englishman, Anglo quidem, who wrote it down in two books, which he later suppressed, for they met with no approval...some years afterwards, Harvey treated the same argument with more success.'²²⁸ Vossius may well have had Warner in mind. In a biography of Harvey preceding the English translation of Harvey's work, Willis mentions Warner together with Paulus Venetus, Mr.

Prothero, Honoratus Faber and others, considered, without any foundation in Willis' view, as discoverers of the circulation of the blood. The suggestion that Harvey had his idea from Venetus, according to Willis, is conclusively refuted in George Ent's *Apologia de circulatione sanguinis* (Londini 1641). Willis deems the idea that Harvey

²²² See Waters (1958), 340.

²²³ See note 111.

²²⁴ See Aubrey, *Brief Lives* (ed. Clark), Vol. 2, 292-3; Halliwell (1965), 80. John Wallis also refers to that table. (See *Opera*, Vol. 2, 63.)

²²⁵ See Rigaud (1965), Vol. 1: 215, 247-8; Vol. 2: 53, 175, 197, 218-9.

²²⁶ See *Athenaeum*, 491.

²²⁷ *The works*, Vol. 2, 22. See for the numerous names of other people supposed to have anticipated Harvey Bayon (1939a) and (1939b).

²²⁸ Bayon (1939a), 713.

took his theory from any of the other people named too ridiculous to be given serious consideration.²²⁹

Less than thirty years after the publication of Willis' translation George Rolleston discovered Warner's notes on animal organisms in the British Museum.²³⁰ In these notes the diffusion of the blood through the body is only obliquely discussed. They deal primarily with the cause of the motion of the heart and of the vital heat as well as with the production and consumption of spirits. However, there also is a passage describing how the blood, propelled by the heart, 'propter fugam vacui', is taken from the veins and next, 'propter fugam penetrationis', driven into the arteries. Part of the blood is said to go to the brain for the production of animal spirits while the rest would be dispersed through the body for the fabrication and nutrition of the organs. The spirits, separated from the blood in the choroid plexuses, would go back to the heart '...ad motum spontaneum pulsationis ciendum.'²³¹ On the basis of this passage Rolleston rejects the suggestion that Harvey borrowed his theory from Warner. Harvey fiercely rejected the explanations, current in the contemporary medical and biological literature, in terms of 'spirits' conceived as separate substances.²³² As opposed to Warner he also disconnected the circulation of the blood and the process of nutrition: '...by the pulsation of the heart the blood is continuously and incessantly transferred out of the vena cava into the arteries in so great a quantity that it cannot be provided by the food we eat...the blood...enters into every member and part of the body in far greater quantity than is necessary for nutrition or can be supplied by the total amount of the blood.'²³³ Apart from this their views on blood and spirits differ significantly. By blood Warner understands a compounded substance distinct from spirits, conceived as a separate substance, and functioning as a mere building-material.²³⁴ Blood and spirits relate to each other as body and soul. Harvey on the other hand conceives blood as being an homogeneous, instrumental part of the body that he almost identifies with the soul itself:

'...blood acts above the powers of the elements and is endowed with...notable virtues and is also the instrument of the omnipotent Creator...In the soul first and principally resides, and that not the vegetative soul only, but the sensitive and motive also...if it is taken away, the soul is immediatly gone, so that the blood

²²⁹ See Willis (1965). Willis, by the way, extensively discusses the claims that Harvey was preceded by Servetus, Columbus, Caesalpinus and even by Shakespeare.

²³⁰ See p. 23.

²³¹ See BL Add. MS 4394, ff. 137v-138r.

²³² See Chapter 3, section 3.1.

²³³ *The movement*, 78.)

²³⁴ See BL Add. MS 4394, ff. 150r, 173v, 193v. See also Chapter 2, section 2.1.

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seems to differ nothing from the soul, or at least ought to be counted that substance whose act the soul is...And therefore it comes all to the same thing, whether we say that the soul and the blood, or the blood with the soul, or the soul with the blood, accomplishes all things in an animal...²³⁵

Conceived as a natural body blood in Harvey's view

'...is heterogeneous or dissimilar, and is compounded out of those humours or parts. But in so far as it lives and is the chief part of an animal and consists of those humours mixed together, it is a homogeneous animate part, compounded out of soul and body.'²³⁶

It is endowed with the faculties of sense and motion²³⁷ and essentially hot, i.e. spirituous.²³⁸ Blood and spirit '...make one body (like...heat and water in hot water)' and consequently are inseparable.²³⁹ As opposed to Warner, Harvey also rejects the traditional distinction between venous and arterial blood.²⁴⁰ While Warner explains all animal functions as the effects of operations of the spirits, Harvey rejects such pneumatological theories and in fact attributes to the blood itself the faculties ascribed by Warner to the spirits.²⁴¹

Rolleston makes the intriguing suggestion that Harvey may have read Warner's supposed tract on the circulation of the blood and that this reading might explain many of his critical remarks concerning traditional views in *De motu cordis* and other writings. In certain respects Warner's physiological ideas show a stronger affinity indeed to those of 16th century physicians than to Harvey's theories. It is not the circulation of the blood that is paramount in Warner's speculations but the problem of the cause of the motion of the heart and the part played in that connection by the spirits and heat, i.e. questions

hotly debated by his more traditional contemporaries and predecessors.²⁴² Harvey's booklet on the motion of the heart resulted in heated discussions on questions like

²³⁵ *The generation of animals*, 382.

²³⁶ *Op. cit.*, 254. See also Davis (1973), 220.

²³⁷ '...sensation as well as movement is inherent in the blood...' (*Op. cit.*, 248)

²³⁸ '...blood alone is the true innate heat...nor are those spirits which some men distinguish from blood anywhere to be found apart from blood, and blood itself without spirit or heat is no longer to be called blood but gore.' (*Op. cit.*, 374)

²³⁹ *Op. cit.*, 13-4.

²⁴⁰ See BL Add. MS 4394, f. 212v. Cf. Harvey: '...the arteries contain the same blood as the veins, and nothing but the same blood.' (*The movement*, 13) As opposed to Warner Harvey, of course, also denies the '...existence of anastomoses in the Galenic sense, that is the conjunction of veins and arteries by wide-mouthed osculations in their contiguous sides through which arterial and venous blood could pass indifferently in either direction...' (Whitteridge (1971), 187) Cf. Warner BL Add. MS 4394, f. 194r and MS 4395, f. 10.

²⁴¹ See for a detailed discussion of this subject Chapter 3.

²⁴² See Bylebyl (1985).

whether there are anastomoses in the Galenic sense, whether there is a difference between arterial and venous blood, whether the heart is able to reattract previously dispersed blood, whether it is possible to determine exactly how much blood flows through the arteries or how blood moves in the veins, and what would be the use of a circulation of the blood. Warner poses none of these questions. He asks whether the passive cause of the motion of the heart is located in the blood or in the heart, and what kind of spirit functions, therefore, as the active cause. That first question is paramount in the medical literature of the 16th century. The second one corresponds to the typically 16th century question of by what kind of soul the heart is moved, and consequently what kind of spirit is involved if that motion is not natural.²⁴³

Bayon, instead of building on Rolleston's work only clouds the issue.²⁴⁴ To begin with he suggests that the collection of Warner's papers in the British Library contains a coherent treatise on physiology of 416 folios.²⁴⁵ In fact the bundle at issue, Add. MS 4394, counts 479 folios covered with notes on all kinds of subjects of which only about 80 folios, ff. 132r-212v, bear on physiology. Further, according to Bayon 'the problem of the circulation is approached...' after '...a spun out discourse in which the formation of the world or macrocosmos is discussed.'²⁴⁶ The material on physiology in Add. MS 4394 that I saw does begin with a reference to notes dealing with the generation of the earth indeed but these no longer seem to be extant. Bayon also unjustly states that 36 folios in that bundle deal with the 'circulation or reciprocation of the blood' and wrongly concludes that he has in his hands the remains of the bipartite tract on the circulation of the blood that Warner is said to have written.²⁴⁷ As was said in the foregoing these notes deal with other topics. Eager to undermine Warner's supposed claim Bayon dates the notes in question c. 1635, i.e. seven years after the publication of Harvey's *De motu*

cordis (1628). Rolleston, believing that Harvey formulated the idea of the circulation of the blood already in his lectures on anatomy from 1616, may have thought he gave Warner a fair chance by dating the notes in question c. 1610. That date probably is more

²⁴³ See, for example, Case: 'Non parva contentio est de motu cordis. Alij enim somniant moveri illud quidem à divina intelligentia aliqua, alij ab innato calore, alij à vitalibus spiritibus, alij ab ipsa anima, alij denique à facultate animae motrici agitari putant.' According to Case the heart '...ab anima remotè, proximè à potentia animae motrice agitur.' (*Lapis philosophicus*, 701; see also pp. 4-5) Cf. Piccolomini: 'Cordis motus non est à natura, nec ab anima vegetativa, sed à sensitiva.' (*Anatomicae praelectiones*, 213). See for an extensive discussion of the question in what sense the motion of the heart is natural and consequently flows 'à facultate vitali' Laurentius, *Historia*, 353-4.

²⁴⁴ See Bayon (1939b), 371 and (1939a) 711-12.

²⁴⁵ See (1939a), 712.

²⁴⁶ Ibid.

²⁴⁷ Op. cit., 711-12.

or less correct; his belief concerning Harvey, however, is less likely to be so.²⁴⁸ Anybody studying Warner's handwriting and informing himself about Warner's activities and contacts in the 1630s will reach the conclusion that Bayon was wrong. He tries to make us believe that Warner in the notes at issue develops a theory on the motion of the blood through the body according to which '...the blood circulates by the pulsifick innate heat of the heart, the valves helping to stop a movement in the contrary direction.'²⁴⁹ In fact there is no mention in these notes of a 'pulsifick innate heat', let alone, of an innate heat belonging to the heart and the only 'valves' referred to in Warner's notes are 'some stops or interclusions' in 'the nerveous fibres of the hart'.²⁵⁰ Nevertheless, most historians of medicine, if they show any interest at all in the matter, follow Rolleston in his rejection of the supposition that Harvey had his theory from Warner.²⁵¹

All this does not detract from the fact that there also are some striking similarities between their views. Both, Warner and Harvey conceive the cardiovascular structure as an hydraulic system and consider the heart as the main instrument of vital functions.²⁵² Both also stress the physiological interaction between mind and heart.²⁵³ According to Charles Webster Warner's speculations about the circulation of the blood were inspired by the experiences of hydraulic engineers and inventors like Salomon de Caus and Cornelius Drebbel. Though not claiming that Harvey had his theory from Warner they were, in Webster's view, definitely thinking along the same lines. By applying hydraulic principles to the phenomenon of the circulation

of the blood Warner would, as far as the motion of the heart is concerned, like Harvey have come to the conclusion that 1) blood is not the direct cause of its own motion, 2) the heart, in view of its muscular structure, has to be deemed responsible for the circulation, 3) the systole, conceived as a contraction of the fibres of the heart, serves

²⁴⁸ See Frank (1972), 193-5. See also note 210.

²⁴⁹ Bayon (1939a), 712.

²⁵⁰ '...the transmission of the animall spirits from the hed and the influx thereof into the hart is done continuatim and receves that forme of alternation or interpolation only in the canallets of the nerveous fibres of the hart by some stops or interclusions in the fabrication thereof...' (BL Add. MS 4394, f. 137r.)

²⁵¹ See, for example, Keynes (1966), 175.

²⁵² Warner describes the heart as the '...prime and principall instrument...of all the vital operations of the animall...' (BL Add. MS 4394, f. 207r). Cf. Harvey: '...the heart is the first principle of life and the sun of the microcosm...' (Op. cit., 76); '...the heart like the Prince in the Commonwealth in whose person lies the first and supreme power, governs all things everywhere, and from it as from its origin and foundation in the living creature all power derives and on it does depend.' (Op. cit., 130)

²⁵³ See Warner BL Add. MS 4394, f. 135v. Cf. Harvey: '...every passion of the mind which troubles men's spirits, either with grief, joy, hope, or anxiety, and gets access to the heart, there makes it to change from its naturall constitution, by distemperature, pulsation, and the rest...' Op. cit., 110.)

the expulsion of blood from the heart into the arteries as the diastole serves the suction of blood into the heart from the veins, 4) an excised heart keeps pulsating, and 5) the idea that the arteries are not actively involved in the pulse.²⁵⁴ However, apart from the first conclusion these similarities do not prove Webster's point. The second and the fourth conclusions can already be found in the writings of some of Warner's 16th century predecessors.²⁵⁵ The third conclusion is ambiguous in so far as the notes in question do not make clear whether Warner conceived, correctly, the systole as the active and the diastole as the passive phase of the movement of the heart. But even if he did do so, he could in fact have learned that already from Realdo Colombo's *De re anatomica libri XV*, Venice 1559.²⁵⁶ The fifth with Warner is not a conclusion but a mere possibility to be considered.²⁵⁷

The passage quoted by Rolleston suggests that in Warner's view the blood does not circulate through the body but flows partly from the veins to the arteries and from there to organs to feed and restore them, and partly to the brain for the manufacture of spirits. In fact things are more complicated. The

'...restauration...of the...carneous supplements of the body...is effected by the <continuall> affusion and aggeneration of the sanguinous or grumous parts of the blood upon the decayed parts...and with this affusion and aggeneration...is necessarily concomitant...a continuall excretion and separation of the serous or aqueous parts thereof.'²⁵⁸

These waste-matters have to be drained off. Now,

'...the mayne and naturall way of evacuation of those serosities is necessarily by some internall derivation wherof there can be no possibility but by the reattraction or circulation of them <into the vaines>

after they are effused...'²⁵⁹ '...and so to be reconfused and redigested with the masse of the blood.'²⁶⁰

²⁵⁴ See Webster (1979).

²⁵⁵ See for the second conclusion Piccolomini, *Anatomicae praelectiones*, 212D. He did not yet know about the circulation of the blood but did conceive the heart as a muscle indeed. Galen already refers to the phenomenon that an excised heart does not directly stop pulsating. (Warner, like most of his contemporaries, probably read Galen in a latin translation. Accordingly, Galen's works will be quoted from the latin edition in 1549 by J. Cornarius (H. Froben, Basel) referred to as *Opera*, followed by the number of the volume and the page. All references to this edition are followed by references to the corresponding passages in Kühn's edition of Galen's collected works.) See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera (1549)*, Vol. 1, 562. (Kühn, Vol. 3, 439.) See also Kenelm Digby, *Two treatises*, 234.

²⁵⁶ See Whitteridge (1971), 70-2.

²⁵⁷ BL Add. MS 4394, f. 174v.

²⁵⁸ Op. cit., f. 190v.

²⁵⁹ Op. cit., f. 194r.

²⁶⁰ Op. cit., f. 195r. Cf. Harvey: '...in all likelihood it happens in the body that by the movement of the blood all the parts are fed and nourished...that on the other hand in the parts the blood becomes cold and

Not only the serous part circulates but also the blood in specie through the parts of the arteries and veins connected to each other: '...as there are...some part of the ramulets of the arteries <that have their points> laterally inserted or inosculated into the sides of the ramulets of the vaines so reciprocally there are some part of the ramulets of the vaines that have their points inosculated into the sides of the ramulets of the arteries and both for the continuate circulation of the blood in specie without effusion thereof...' ²⁶¹ Harvey denied the existence of venarterial anastomoses. ²⁶² Most of Warner's other contemporaries denied at least anastomoses between the pulmonary vessels. ²⁶³ That denial usually went with a rejection of the idea of the pulmonary transit of the blood. According to Realdo Colombo

'...the blood is carried to the lung through the pulmonary artery and in the lung it is refined, and then together with the air it is brought through the pulmonary vein to the left ventricle of the heart. This up to now no one has either observed or recorded in writing, although it was most meet to be observed by all....The Anatomists, little prudent in this matter...write

of these veins that their use is to carry the altered air from the lungs which like a fan make a breeze around the heart and cool it...' ²⁶⁴

Warner too was of the opinion that blood through the lungs streams from the right to the left ventricle of the heart: '...the <dispersion &> distribution of the branches of the asperous artery thorough the whole body of the lungs exactly accompanying the the

coagulated and as it were enfeebled, whence it returns to its beginnings, the heart...to recover its perfection. There again by natural heat, powerful and vehement...it is again made liquid and is dispensed again from thence through the body, fraught with spirits, as with balm, and these things depend upon the motion and pulsation of the heart' (*The movement*, 76.)

²⁶¹ Op. cit., f. 194r. Cf. Galen: 'In toto corpore mutua est anastomvsis atque oscillorum apertio arterijs simul & venis, transumuntque ex sese pariter sanguinem & spiritum per invisibiles, quasdam atque angustas plane vias.' (Op. cit., 568.) (Kühn, Vol. 3, 455.) In his notes on the the cause of locomotion Warner also refers to 'venarteriall transosculations circulatory in all the carneous parts' (see BL Add. MS 4395, f. 10)

²⁶² See note 240. The same holds good for Fernel, Laurentius, Vesalius, Piccolomini and Bauhin. (See Pagel/Bylebyl (1986).)

²⁶³ A majority accepted the idea of anastomoses in the liver.: 'Huius veneae portae radices, per substantiam partis inferioris & cavae iecoris effusae excurrunt, coitionem facientes cum radicibus venae cavae.' (Piccolomini, *Anatomicae praelectiones*, 94). Cf. Laurentius: 'Sunt...admirandae earum radicum anastomoses à paucis animadversae; extrema enim radicum venae portae, in medias venae cavae radices infiguntur, & venae cavae extrema, in medias portae radices coeunt, ut à porta in cavam & à cava in portam facilè meet remeetque sanguis.' (*Opera*, 88). See further for a discussion of proponents and opponents of the idea of anastomoses in the liver Pagel (1967), 185-6.

²⁶⁴ *De re anatomica*. Venice 1559, 177-178. Quoted in Whitteridge (1971), 49-50. Already by the end of the 16th century Colombo's theory of the pulmonary circulation was ardently defended in England by John Banister. (See *The historie*, f. 91r.)

venous branches of the venous artery and of the arterious vaine to the very capillar points of them...doth manifestly argue the intention of nature to be...the commixtion of the aire with the bloud and by way of such commixtion the conduction thereof into the left ventricle of the hart...'²⁶⁵ Most medical writers at that time continued to accept Galen's theory according to which nutritious blood flows through the pulmonary artery from the right ventricle of the heart to the lungs while the pulmonary vein transports air from the lungs to the left ventricle of the heart in order to maintain the vital heat in the heart, and as material for the production of vital spirit. The part of the venous blood in the right ventricle of the heart that is not transported to the lungs is supposed to pass through pores in the intraventricular septum of the heart to its left ventricle.²⁶⁶

In the fragment of Warner's manuscripts on which Rolleston and Bayon base their judgement the word 'circulation' is often used. However, Warner neither uses that expression in the sense of a physiological circulation nor with relation to blood. In fact he only uses it in connection with the motion of the heart and the operation of the spirits. In both cases the word 'circulation' refers to circular or reciprocal processes, i.e. processes caused, in a way, by their own effect. On the one hand the pneumato-hydraulic motion of the heart is caused by the spirits in the brain and the nervous system. On the other hand blood mixed with spirits is transported to the brain where the spirits are separated from that blood thanks to the motion of the heart. Those two processes are reciprocal, that is, mutually dependent and circular in as much as their end and beginning coincide. The same holds true for the actions of the spirit. On one hand they consume themselves in their operations, on the other, the processes thus effected in the body guarantee the production of new spirits.

Bayon thinks that Warner actually is not talking about a circulation of the blood through the whole body, but about the so-called 'chemical circulation', i.e. cyclical heating and evaporation followed by refrigeration and

condensation. In that process venous blood passes through the lungs from the right to the left ventricle of the heart and this 'chemical circulation' would be the cause of the motion of the blood.²⁶⁷ Caesalpinus (1524-1603) for example formulates just such a theory and compares in that connection the brain to the receiver of a still used to distil 'aqua ardentem' from wine. Similar ideas can be found with Quercetanus (1544-1609), Caspar Hofmann (1572-1648), Robert Fludd (1574-1637), van Helmont (1579-1644)

²⁶⁵ BL Add. MS 4394, f. 134r.

²⁶⁶ See Rotschuh (1973), 18-20.

²⁶⁷ '...the Walter Warren MS. contains a lengthy discussion of the "chemical circulation of the blood" or, in other words, an alternating to-and-fro movement due to the heat of the heart...' ((1939a), 271.)

and with De la Boe (Sylvius) (1614-1672). This theory, incidentally, also plays an important part in the work of Harvey²⁶⁸, Descartes, and their followers.²⁶⁹ Warner, indeed refers three times to a 'chemical circulation' to explain the motion of the blood, i.e. motions based on '...that property of rarefactibility by heat and recondensability by cold or refrigeration...', to wit 1) heating and expansion of the nutritious juices in the chyle by which the blood is propelled to the heart, 2) heating and expansion of the blood in the veins following on recondensation in the arteries thanks to air, and 3) heating and expansion of the blood in the heart followed by condensation and expansion in the veins and arteries. These, however, are presented as mere hypotheses that, moreover, are rejected by Warner in favour of the idea that at least the passive cause of the motion of the blood has to be sought in the heart itself.²⁷⁰ In fact Warner's legacy permits no conclusions to be drawn as to what other role the idea of a 'chemical circulation' might have played in his physiological theories. It is also clear that his ideas on the motion of the blood are not, as Webster suggests, to be bracketed with those of Robert Fludd.²⁷¹

Since the Second World-War attention has been focussed on Warner's notes on physics, not because of their intrinsic value but within the compass of the investigation into the history of atomism in England, of Thomas Harriot and in connection with the Hobbes-research. As early as 1952 Jacquot, as was stated in the introduction, drew attention to Warner as an optical scientist, and

to his role in that capacity within the 'Cavendish Circle'.²⁷² About fifteen years later Kargon, in his history of atomism in England, dwells on Northumberland and the scientists around him. As far as Warner is concerned Kargon gave his fantasy free play. He presents him as a pupil of, and the scientific personality closest to Thomas Harriot.²⁷³ Warner, according to Kargon, was an ardent atomist who developed a clear, well-thought out natural philosophy to be considered as a bridge between Harriot's atomism, and the corpuscularism of Hobbes and Descartes. He considers Warner's speculations

²⁶⁸ See the quotation in note 260.

²⁶⁹ See on this subject Pagel (1967), 188-95.

²⁷⁰ See BL Add. MS 4394, ff. 132v-133r. Cf. Davis according to whom Warner '...describes a fermentation of the spiritus in the blood in the veins as the instigating motion of the heart...close analysis and dating of this manuscript [that is, BL. Birch Collection. Add. MS 4394, ff. 132r-170r.] appears worthwhile.' (Davis (1973, 249).

²⁷¹ According to Webster Warner's notes are too vague about the cardiovascular structure to determine whether his 'circulatory device' differs more than marginally of that of Fludd. (See pp. 37-8) This is a strange suggestion in view of the fact that with Fludd's explanation of the motion of the blood magic and mysticism, absolutely absent from Warner's speculations, are essential ingredients. See on Fludd Pagel (1967), 113-19 and Debus (1961).

²⁷² Jacquot (1952b), 19-21.

²⁷³ Kargon (1966), 35-40.

as forshadowing the early mechanistic investigations of Hobbes and of the revival of atomism by Pierre Gassendi. At the same time he deems it possible that Warner in his manuscripts simply repeated the lessons of his master, Harriot, instead of formulating his own theories. Strictly, as far as their atomism is concerned this does not hold good.²⁷⁴ As was previously stated Warner shared many interests with Harriot. However, there is no evidence that they had a pupil-teacher relationship; let alone that they were close friends. Warner certainly developed into a committed atomist but in what sense exactly is hard to say for his papers contain at least two different doctrines. In his notes on time, space, matter and force he understands atoms to be simple, continuous particles of matter that are alterable and divisible. They differ only in figure and magnitude. They are not spherical and all are made of the same substance.²⁷⁵ In his notes on heat, fire and combustion he talks about atoms differing not only in figure and size but also in substance. Apart from fire-atoms there are ‘...atoms of some other kinde ether ayry or saline or terrene...aqueous...’²⁷⁶ Now there also appear to be round atoms (air) as well as atoms tending to rotundity (fire).²⁷⁷ Further, as stated earlier, Warner in these notes distinguishes between the ‘prime elements or simples’²⁷⁸ and the ‘secondary elements’ or ‘grosse atoms’, i.e. the smallest particles of simple and compound substances respectively.²⁷⁹ Finally Warner in that context also recognizes the existence of interstitial vacua, while in the

notes about the principles of nature the universe is said to be a plenum.²⁸⁰ Kargon bases his description of Warner’s atomism only on these latter notes. The suggestion that he simply repeated Harriot’s lessons there contradicts the fact that the notion of atoms presented in that connection differs substantially from the kind of atomism attributed to Harriot. The latter presumably understood atoms to be indestructible, hard, continuous, indivisible and immutable particles. Moreover, Harriot does not clearly distinguish between mathematical atoms, i.e. points, and physical atoms or solid particles. Warner, in the notes at issue, understands atoms to be indestructible, three-dimensional,

²⁷⁴ See for Harriot’s atomism Kargon (1966), 18-30; Jacquot (1952a) and Henry (1982).

²⁷⁵ See note 148.

²⁷⁶ BL Add. MS 4395, f. 60. As opposed to the monism in his notes on the principles of nature here Warner distinguishes between the sub- and supralunar in so far as he stresses not to be talking about ‘calore aethereo seu coelesti’ but ‘de terrestri seu elementari’. (op. cit., f. 49) See for his doubts about such a distinction BL Add. MS 4394, f. 399v.

²⁷⁷ See BL Add. MS 4395, ff. 51, 55.

²⁷⁸ Op. cit., f. 63. The smallest particles of material substances are also referred to as ‘atomos seu prima elementa’, ‘prime elements or simple atoms’. (See op. cit., f. 68.)

²⁷⁹ Op. cit., f. 63. See also p. 22 and note 155.

²⁸⁰ ‘...of the simple atoms the grettest that are in nature are to be understood of that degree of parvity or subtilty as is such under the prime mesure of consolidability that is that the spaces or intervalls of their accumulation are exclusive of the aire...’ (BL Add. MS 4395, f. 68.) Cf.: ‘Matter and virtue radiative do fill the universall space.’ (Add. MS 4394, f. 386r.) See also BL Add. MS 4395, f. 206.

divisible, mutable particles only differing, in form and size. Hardness, colour, weight, taste, etc. are not considered as objective properties of these particles. Nowhere does Warner identify the physical and mathematical atom. Moreover, according to these notes, the cosmic space is completely filled with matter and force, while according to Torporley, Harriot's universe is composed of atoms with void space interposed.²⁸¹ It would probably be hard if not impossible to prove that, as Kargon suggests, Hobbes' corpuscularism is actually linked to Harriot's atomism through Warner. This is not to deny that to my knowledge in the 1630s Warner was the only contemporary Englishman combining, like Hobbes, a corpuscular view of matter with the idea that sensory qualities are nothing but motions in the perceiving subject. This alone would justify a closer investigation of the relationship between Hobbes' theory of matter and that of the few other corpuscularists in England at that time besides Warner, viz. Kenelm Digby, Thomas Harriot and Nicholas Hill.

Jacquot, building on Kargon, presents Warner, together with Nicholas Hill and Thomas Harriot as one of the early representatives in England of the new philosophy, i.e. Copernicanism and a kind of atomism deriving from Giordano Bruno.²⁸² He stresses the relationship between Warner's views and those of Harriot with whom, according to Jacquot, he would have cooperated over a long period of time.²⁸³ Jacquot too puts Warner's atomism on a level with that of Harriot. Their natural philosophical views would unquestionably be stamped by Giordano Bruno's notion of the universe as eternal and infinite. Warner's notion of 'vis' or 'virtue radiative' (see notes 149 and 151) to Jacquot

seems to have much in common with Bruno's world-soul, a divine force animating the whole of nature.²⁸⁴ Jacquot even goes as far as to suggest that perhaps Hobbes, through Warner, was influenced by the theories of Giordano Bruno and Thomas Harriot.²⁸⁵ Now, if Warner's notes on the principles of nature date from the 1620s indeed, it is only reasonable to suppose that Warner discussed these views in the 1630s with Hobbes and other members of the Cavendish Circle. Thus Harriot's views indirectly may have been of influence within this group. There are, however, no hard facts to substantiate the claim that Bruno's doctrines too were of a substantial and lasting influence in England.²⁸⁶

²⁸¹ See Jacquot (1952a), 184.

²⁸² See Jacquot (1974), 116-125.

²⁸³ See op. cit., 116, 120.

²⁸⁴ See op. cit., 120.

²⁸⁵ See op. cit., 125.

²⁸⁶ See McColley (1936), 406-15; Bruno, *The ash wednesday supper*, introduction, 32-7. See for the opposite view Singer (1950) and Massa (1977). See about his influence in general Kristeller (1978), 138.

Ten years later Gatti elaborated Jacquot's suggestion of Bruno's work as one of the main sources of the 'Northumberland Circle'.²⁸⁷ Especially Bruno's *De triplici minimo en De immenso* would have had a decisive influence on the members of this group.²⁸⁸ As far as Warner is concerned that influence would be especially evident in his view of the universe as infinite and in his notion of a 'virtue radiative' filling up that universe.²⁸⁹ Warner indeed is of the opinion that 'Space is...corporeall or spherically infinit that is according to all dimensions and all locall respects.'²⁹⁰ Bruno held a similar view²⁹¹ but so indeed did other writers like Thomas Digges (c. 1543-1595)²⁹², William

Gilbert (1540-1603)²⁹³ and David Gorlaeus²⁹⁴, to mention only a few, from which Warner may have taken this idea. The supposed relationship between Warner's notion of a universal radiating force explaining all change and motion, and Bruno's idea of the atom as a centre of life is based on a misunderstanding. Warner's atoms, in contrast with those of Bruno, are only set in motion from outside.²⁹⁵ Warner does not, like Bruno, distinguish

See on the relationship between Bruno's and Harriot's atomism Jacquot (1952a), 182-3 and Henry (1982), 271-81; on the influence of Bruno's work on Hobbes see Schuhmann (1990), 339.

²⁸⁷ See Gatti (1983) and Ricci (1985).

²⁸⁸ See Gatti (1983), 152, 160.

²⁸⁹ See Gatti (1983) 148-9, 157.

²⁹⁰ BL Add. MS 4395, f. 205. See also note 147.

²⁹¹ 'Est...spacium, quantitas quaedam continua physica triplici dimensione constans, in qua corporum magnitudo capiatur natura ante omnia corpora, et citra omnia corpora consistens, indifferenter omnia recipiens, citra actionis passionisque conditiones, immiscibile, impenetrabile, non formabile, illocabile extra et omnia corpora comprehendens, et incomprehensibiliter intus omnia continens...extra omnia comprehendens, quia quando finem omnia habuerint atque figuram, ultra ea minime non poterimus intelligere spacium comprehendens' (*Opera* I, 1, 231-2) Cf. Hill's idea about the infinity of space: 'Nulla essentia est infinita...nec enim essentia aliud est quam illa rei conditio ut unum sit & non aliud, infinitas autem attribuitur rei cum comparatione ad aliud, ita ut nec tempus, nec spatium sit in se infinitum, sed habito respectu ad intellectum nostrum, & ad seinvicem.' (*Philosophia*, aph. 353)

²⁹² Thomas Digges was the first and undoubtedly one of the most influential proponents in England of the idea of an infinite universe. (See *A Perfit Description of the Caelestiall Orbes according to the most ancienne doctrine of the Pythagoreans lately revived by Copernicus and by Geometricall Demonstrations approved*. Added to his edition in 1576 of his father's, i.e. Leonard Digges' *A Prognostication of right good effect*. There followed six other editions. According to McColley (1936) Digges might have been simply digesting Copernicus without subscribing himself to the idea of an infinite universe. (p. 409)

²⁹³ Gilbert followed Copernicus in his idea of an infinite eighth sphere or universe. (See McColley, op. cit., 410.)

²⁹⁴ See on Gorlaeus' concepts of place and space in his *Exercitationes philosophicae* (1620) Grant (1981), 392, note 182. See also Lucretius, *De rerum natura*, I. 951-1007 and Cusanus, *De docta ignorantia*, lib. II, cap. 1, 96, p. 10.

²⁹⁵ Gatti would have been right if he had substituted Nicholas Hill for Warner. According to Hill God is not identical with but operative in matter as the first, physical, necessary and sufficient cause. (See *Philosophia*, Obiicienti, p. 5. Cf. Bruno: '...natura...aut est Deus ipse, aut divina virtus in rebus ipsis manifestata...' *Opera*, I, 4, p. 101; 'Mens super omnia Deus est. Mens insita omnibus natura.' *Opera*, I, 3,

between principles operating from the inside and essentially connected to the things they are the principles of on the one hand, and causes, operating, like all accidental agents, only from outside on the other.²⁹⁶ Nor does he make the corresponding distinction between a natural and artificial production of things.²⁹⁷ His notion of 'vis' or 'virtue radiative' shows more affinity with Bruno's concept of 'ether' as the unifying principle and environment of all things.²⁹⁸ However, this notion too can be found in the

p. 136) Accordingly God should be studied and honored '...in naturae intemerabili lege, in bene ad eandem legem instituti animi religione, in rerum specie, in mundi vultu, in animalium innumerabilitate.' (aph. 291). Cf. Bruno: 'Ad ipsius cognitionem ascendimus per creaturarum et effectuum ipsius vestigia contententes...' (*Opera* I, 4, p. 84), 'Ipse et pater est omnis ordinis...Per hunc eundem ordinem ad illius contemplationem pervenimus.' (Op. cit., 86-7) The divine essence, according to Hill, is infinitely and utterly simple. (aph. 363. Bruno describes God as '...ipsa simplicitas, unitas et absolutio...' (*Opera* I, 4, pp. 96-7.) It is devoid of diversity, inequality and oppositions. (Ibid. Cf. Bruno: 'Illi nihil est contrarium...In ipso...nulla est distinctio...in illo nihil esse diversum...neque differentia...' (*Opera* I, 4, pp. 83, 88 and 89.) In God's nature 'Modum essendi modus possendi sequitur. Modum possendi modus operandi sequitur.' (aph. 363. Cf. Bruno: '...il primo principio assoluto...è tutto quel che può essere...La potestà sí assoluta...è...quel che è ogni cosa e quel che può essere ogni cosa: potenza di tutte le potenze, atto di tutti gli atti, vita di tutte le vite, anima di tutte le anime, essere de tutto l'essere...' *Dialoghi*, 283-5). God is perfect, the best, omnipresent and, in a way, identical to matter. (aph. 454. Cf. Bruno, *Opera* III, 695-6) He communicates himself in the 'omniformitas' of matter, in its capacity to receive all forms. (aph. 464. Cf. Bruno: '...la materia...prima che sia sotto qualsivoglia di...forme, avè in facultà tutte quelle dimensioni, cossí come ha potenza di ricevere tutte quelle forme.' *Dialoghi*, 306) God is the efficient cause of all things. (aph. 110. Cf. Bruno: 'Causa omnium caussarum efficiens, per quam et propter quam, in qua et sub qua omnia caussant.' *Opera* I, 4, p. 75.) In fact that divine power is nature itself and thus the stable order of all created things. (aph. 158. Cf. Bruno, op. cit., 86-7.) Being the primary agent in God liberty and necessity coincide. (aph. 363; Cf. Bruno: 'Eius voluntas est ipsa necessitas et necessitas est ipsa divina voluntas, in qua necessitate non praeiudicatur libertati, quandoquidem necessitas et libertas unum sunt...' *Opera* I, 4, p. 95.) Being essentially infinite he expresses himself in an infinite operation. (aph. 123; Cf. Bruno: 'Actio illius, ut consequitur essentiam atque potentiam, est infinita et subiectum requirit infinitum, quam quidem esse necesse est.' *Opera* I, 4, p. 79.)

²⁹⁶ '...principio sia quello che intrinsecamente concorre alla costituzione della cosa e rimane nell'effetto, come dicono la materia e forma...Causa chiama quella che concorre alla produzione delle cose esteriormente, ed ha l'essere fuor de la composizione, come è l'efficiente e il fine, al qual è ordinata la cosa prodotta.' (*Dialoghi*, 230-1.)

²⁹⁷ Cf. Bruno: '...della materia naturale si fanno tutte cose naturali, che della artificiale le artificiali, perché l'arte della materia suscita le forme o per sottrazione...ma la natura de la sua materia fa tutto per modo de separazione, di parto, di effusione...' (*Dialoghi*, 311.)

²⁹⁸ 'Oltre gli quattro elementi che vengono in composizione di questi, è una eterea regione...immensa, nella qual si muove, vive e vegeta il tutto. Questo è l'etere che contiene e penetra ogni cosa; il quale, in quanto che si trova dentro la composizione...è comunmente nomato aria...in quanto poi che è puro, e non si fa parte di composto, ma luogo e continente per cui quello si muove e discorre, si noma propriamente

writings of many other natural philosophers from the late 16th and early 17th century.²⁹⁹ Only Hill's atomism unambiguously attests to a Brunian influence.³⁰⁰ The library of Sion

College, Torporley's one time residence, possessed one of Bruno's works.³⁰¹ Northumberland's library contained at least eight works by Bruno.³⁰² Yet, during his incarceration in the Tower (1605-21), considered as the hey-day of the 'Northumberland Circle', Percy apparently did not read Bruno's cosmological writings, but only one of his works on the art of memory.³⁰³ Apart from all that, generally speaking Bruno, like Nicholas Hill was probably not taken seriously as a scientist.³⁰⁴

etere, che dal corso prende denominazione...si chiama aria quello circostante a noi; ma, come in certo modo fia parte di noi o pur concorrente nella nostra composizione, ritrovato nel pulmone, nelle arterie ed altre cavitadi e pori, si chiama spirito.' (*Dialoghi*, 528-9); '...spirito si trove in tutte le cose, e non è minimo corpusculo che non contegna cotal porzione in sé che non inanimi.' (*Dialoghi*, 242)

²⁹⁹ Cf. Gilbert: '...we deem the whole world animate, and all globes, all stars, and this glorious earth too, we hold to be from the beginning by their own destinate souls governed and from them also to have the impulse of self-preservation.' (*De magnete*, 309). If the 'bodies of the globes' did not have a soul '...there were neither life, nor prime act, nor movement, nor unition, nor order, nor coherence, nor *conactus*, nor *sympathia*, nor any generation, nor alternation of seasons, and no propagation; but all were in confusion and the entire world lapse into chaos and, in fine, the earth were void and dead and without any use.' (Op. cit., 310-11). Kepler: '...ut quemadmodum lux...species est immateriata ignis illius, qui est in corpore Solis: ita virtus haec, Planetarum corpora complexa et vehens, sit species immateriata eius virtutis quae in ipso sole residet, inaestimabilis vigoris, adeoque actus primus omnis motus mundani.' (*Werke*, Vol. 3, 240.) See further Gregory (1964), 57-62 and Chapter 3 in this study.

³⁰⁰ Both make a distinction between atoms conceived as material, mathematical, privative and negative minima and distinguish atoms from limits. (See Hill, *Philosophia*, aph. 140 and aph. 400. Cf. Bruno, *Opera*, Vol. 1, 3, pp. 139-40, 209-11; 284-85). Both also believe that there actually exist minima and that explanations of natural phenomena have to be derived from intelligible minima, to be distinguished, by the way, from the much smaller sensible minima. (See Hill, op. cit., aph. 209, aph. 284 and aph. 357. Cf. Bruno, *Opera*, Vol. 1, 3, pp. 149, 153, 169) Both consider atoms as a kind of dynamic or vital centres through which God acts in nature and that, coeternal with God, constitute an ensouled matter. (See Hill, op. cit., aph. 116 and aph. 200. Cf. Bruno, *Opera* III, 695.) They are supposed to be kept together by an 'ether'. (See Hill, op. cit., aph. 428. Cf. Bruno, *Opera*, I, 3, p. 140) See also Horne (1962), 722 and Massa (1977), 228-40.

³⁰¹ Joh. Brun. Nolanus, *De triplici minimo*. Francofurti 1591 (See Sion College: Arc. L 40.2/E.4: Catalogus librorum Bibliothecae collegii sionensis. John Spencer 1632, f. 145r.)

³⁰² *De Gl'heroici furori* (1585), *De progressu et lampade venatoria logicorum* (1587), *De specierum scrutinio et lampade combinatoria Raymundi Lulli* (1588), *De triplici minimo et mensura* (1591), *De monade numero et figura liber consequens quinque de minimo magno & mensura. Item de innumerabilibus, immenso, & infigurabili; seu De universo & mundis* (1591), *De imaginum, signorum, & idearum compositione* (1591). (See Gatti (1983), 74-5).

³⁰³ *De specierum scrutinio et lampade Raymundi Lulli* (Prague 1588). (See Henry (1982), 275 and 292, note 46). Northumberland's friend and kindred spirit Raleigh is not known to have had any of Bruno's works. (See op. cit., 292, note 48.)

³⁰⁴ Francis Bacon calls Bruno a fabulist. (See *The works*, Vol. 2, 13.) Hill is ridiculed for his atomism by Ben Jonson. (See Kargon (1966), 14.)

Warner's concept of force reveals more affinity with the tradition of light metaphysics, i.e. a body of doctrines that, among other tenets, share the explanation of natural phenomena in terms of the behaviour of light considered as the active principle par excellence and universal cause of local motion and qualitative change. Typical representatives are Robert Grosseteste (c. 1175-1253), Marsilio Ficino (1433-1464) and Francesco Patrizi (1529-1597).³⁰⁵ The latter is of especial interest in connection with Jacquot's suggestion that Warner was influenced by Hill.³⁰⁶ Patrizi was not unknown in England. Henri Savile knew Patrizi's criticism of Bernardino Telesio (1509-1588).³⁰⁷ Thomas Blundeville (fl. 1561) translated and edited Patrizi's *Della historia dieci dialoghi*. (Venice 1560).³⁰⁸ William Gilbert criticized certain opinions of Patrizi.³⁰⁹ So did Bacon and perhaps his rejection of explanations of nature in

terms of light '...as if it were a thing halfway between things divine and things natural' was also addressed to Patrizi's light-metaphysics.³¹⁰ At the same time he mentions Patrizi as one who '...sublimated the fumes of the Platonists.'³¹¹ The libraries of Sion College, John Dee (1527-1608), Raleigh, Henry Percy and Kenelm Digby (1603-1665) contained works of Patrizi.³¹² John Webster attributes the revival of the philosophy of Philolaos, Empedocles and Parmenides to Patrizi.³¹³ John Collins saw Patrizi's *Magia Philosophica* (1593).³¹⁴ Henry More (1614-1687) as a youngster read Patrizi's

³⁰⁵ See on this tradition Baeumker (1908), 357-467; Baur (1917), 76-109; and Lindberg (1976), 94-103. See also Chapter 3, section 3.3., pp. 107-8.

³⁰⁶ Jacquot (1974), 114.

³⁰⁷ See de Franco (1989), 135-6.

³⁰⁸ *The true order and methode of wryting and reading Hystories according to the Precepts of Francisco Patritio and Accontio Tridentino...* London 1574.

³⁰⁹ Gilbert criticized Patrizi's notion of a primeval heat (see *De mundo*, 86), his idea that all bodies are fluid or made out of fluids (op. cit., 127), his theory of the generation of the earth (cit., 128-9), and his idea that '...astra spiritu proprio vehi, animo moveri, intellectu, ordine regi.' (Op. cit., 151) See also Zilsel (1960), 228-9.

³¹⁰ *The works*, Vol. 4, 403.

³¹¹ Op. cit., 359.

³¹² A catalogue from 1632 of the library of Sion College contains the entry 'Fr. Patricius. *Magia philosophica*. Hamb. 1593' (Sion College: Arc. L40.2/E.4, f. 155v), i.e. *Magia philosophica: hoc est...Zoroaster et eius 320 oracula chaldaica; asclepii dialogus et philosophia magna; Hermetis Trismegisti Poemander...et alia miscellanea*. See in connection with Dee French (1972), 51. Raleigh praises Patrizi for his collection and translation of Zoroaster's oracles. (See Lefranc (1968), 436, 438.) Percy's library contains two works of Patrizi, to wit, *La militia romana* (Ferrara 1583) and *Paralleli militari* (Rome 1594) (see Batho (1960), 260) but, so prof. Batho kindly wrote me (27 november 1989), there is no copy of Patrizi's *Nova de universis philosophia* (1591). Digby did have a copy of that latter work which, at the auction of his library in 1680, realized one of the highest prices. (See Henry (1979).)

³¹³ See Webster, *Academiarum Examen*, 188.

³¹⁴ He mentions it in an undated letter to a certain John Templer. (See Rigaud (1965), Vol. 1, 125)

Panaugia, Liber Primus de Luce.³¹⁵ In England he was especially acclaimed as a critic of Aristotelianism and as a representative of Hermetism. His theory of space undoubtedly was very influential.³¹⁶ Though this probably also holds true for his light-metaphysics the influence of that doctrine is harder to substantiate. Nicholas Hill does not mention him but his *Philosophia epicurea* (1601) is clearly marked by Patrizi's philosophy of light. Like Patrizi Hill based his cosmology on four principles: God, time, space and matter.³¹⁷ Patrizi's influence concerns the first principle. Hill understands God to be the universal active principle and source of energy.³¹⁸ This principle manifests itself in light. Hill distinguishes between an immaterial, intelligible splendour (*fulgor*), light in a luminous source (*lux*), and propagated light (*lumen*). By *lux* he understands the image and expression of *fulgor*.³¹⁹ It is the first-born light that by emanation gives individual things their concrete

form.³²⁰ It penetrates the material parts of the world and moulds them.³²¹ This *lux*, inborn in all things, radiates from heaven and from the eyes, sparkles in the intellect and imagination and, in fact is nothing but God's mark upon the intellect.³²² *Lux*, being incorporeal, has no dimensions and is indivisible. This indivisibility does not mean that it exists as a point or points for these can only exist in space. *Lux*, however, exists absolutely by and in itself.³²³ Its lack of dimensions also implies that, as such, it is

³¹⁵ See Hutin (1966), 113-4, 125.

³¹⁶ See Henry (1979); Grant (1981), 206-7, 227, 237, 242ff and Schuhmann (1986).

³¹⁷ 'Non est unum in natura primum, sed Deus, materia, spatium, tempus, Tetrarchae sunt.' (Op. cit., aph. 352.)

³¹⁸ See note 295 and 300.

³¹⁹ Op. cit., aph. 284.

³²⁰ Op. cit., aph. 136.

³²¹ '...materialibus mundi partibus se insinuans omnia format...' (Op. cit., aph. 299) Cf. Patrizi: 'Omnia permeando format, & efficit.' (*Nova de universis philosophia*, 1v.)

³²² Op. cit., aph. 245. Cf. Patrizi: 'Philosophia...lucis, luminis, admirationis, contemplationis proles est verissima...A luce...& lumine...exordium sumamus. A luce inquam, quae Dei ipsius, eiusque bonitatis est imago. Quae omnem supramundanam, omnem circummundanam, omnemque mundanam, illustrat regionem. Quae se se per omnia extendit. Per omnia se fundit.' (Loc. cit. See also op. cit., 20v-21r)

³²³ 'Indivisibilitas animarum, mentium, Angelorum, Dei, & lucis incorporeae primariae non est punctualis existentia illorum, sed nullius fulcimenti indiga hypostasis...' (Op. cit., aph. 333) Cf. Patrizi: 'Incorporea...appellamus ea, quae ut sint nullis omnino egent corporibus. Talia autem sunt, quae essentia sua nullam habent dimensionem, suntque prorsus indivisibilia. Non quidem ut punctus, qui spatio eget in quo sit, sed modo alio indivisibilia dicuntur, quia ad id quod nullas habeant partes, & dividi nequeant, nulla, ut sint, re alia egent quàm seipsis, & in se consistunt, & per se constant, & in se subsistunt, & se se sustinent. Huiusmodi vero ea sunt, quae nomine communi divina nuncupantur...Itaque luces, luminaque corporea & divisibilia cum per se consistere nequeant, neque a se sint, aliunde originem habuisse est necesse. Ab uno nimirum atque incorporeo.' (Op. cit., 20r)

imperceptible for something can only be perceived if it has a certain quantity.³²⁴ *Lumen* is the image³²⁵ and shadow or weaker version of *lux*.³²⁶ Like *lux* it is incorporeal and therefore imperceptible in itself.³²⁷ It can only be seen if it is reflected from three-dimensional objects as only than it assumes the collected form of *lux*.³²⁸ Hill shares Patrizi's view of the role of light and vision in the acquisition of scientific knowledge: 'Lumen visum actuat, visus admirationem movet, admiratio contemplationem urget, contemplatio cognitionem perficit, ita ut philosophia sit lucis, luminis, visus, admirationis, contemplationis proles...' ³²⁹

The second part of Patrizi's *Nova de universis philosophia* is called *Panarchia* and deals with the principles of the universe or rather with the hierarchically ordered levels of being in the universe. Hill too distinguishes a *Panarchica*, also called *Pamphysica*, as the one and only science '...quae subiectum habet adaequatum Ens transcendentissimè acceptum. Cuius fundamenta sunt passiones primorum, Dei, temporis, spacij, materiae...' ³³⁰

Many of Hill's aphorisms show a strong similarity to Warner's views on the principles of nature in general and on the 'vis radiativa' in particular.³³¹ Like Hill Warner is of the opinion that all of nature can be reduced to four principles with only this difference that what Hill calls 'God' is called 'vis' or 'lumen' by Warner. The most striking similarity between Hill and Warner is their combination of tenets from the tradition of light-metaphysics with atomism. The implied resemblance between Warner's ideas about the principles of nature, and those of Patrizi also suggests that an investigation of the influence of Patrizi in England in general and on members of the 'Northumberland Circle' in particular might be more fruitfull than speculations about the supposed influence of Giordano Bruno.

At the *Hobbes Fourth Centenary Conference*, held at Hertford College, Oxford in 1988 John Henry gave a lecture on Warner's contribution to the rise of the 'mechanical philosophy' in England and his influence on Thomas Hobbes in which he presented a

³²⁴ Op. cit., aph. 56.

³²⁵ Op. cit., aph. 58. Cf. Patrizi: '...lumen...est quasi visibile quoddam numen, Deique simulacrum.' (Op. cit., 11r)

³²⁶ Op. cit., aph. 302.

³²⁷ Op. cit., aph. 334.

³²⁸ Op. cit., aph. 312.

³²⁹ Op. cit., aph. 300. Cf. Patrizi: 'Cognitio omnis, a mente primam originem: a sensibus exordium habet primum. Inter sensus...visus est primarius. Visui prima, & primo cognita, sunt lux, & lumen...Per haec, prisci homines, sublimia, & media, & ima conspexerunt. Conspecta, sunt admirati. Admirando, sunt contemplati. Contemplando, sunt philosophati. Philosophia ergo, lucis, luminis, admirationis, contemplationis proles est verissima.' (Op. cit., 1r-v.)

³³⁰ Op. cit., aph. 175.

³³¹ See Chapter 3, section 3.3., pp. 107-8.

stronger version of similar views.³³² According to Henry ‘With the exception of time, Warner’s metaphysical principles are exactly equivalent to Patrizi’s. Warner’s arguments about the nature of space, matter and vis are all prefigured in Patrizi’s *Nova de Universis Philosophia*.’³³³ As we saw Warner, in his notes on the principles of nature, combines the traditional idea of light as a universal active principle with an atomical view of matter or even, as Henry says, with ‘mechanist ways of thinking’ explaining all change as an effect of matter in motion.³³⁴ Like the writers on Warner preceding him, Henry considers Warner’s notes on animal organisms as attempts at an explanation of animal functions on the basis of the principles exposed in his notes on time, space, matter and force. Consequently, in Henry’s view the combination at issue characterizes not only the latter but also the former. This conviction set the tone for his test of

Seth Ward’s claim that Hobbes plagiarized Warner³³⁵ comparing the latter’s ideas about the active principle in nature as well as his explanation of locomotion with corresponding theories in the *Short Tract*, a manuscript considered by most Hobbes-researchers as one of Hobbes’ earliest attempts at a systematic account of his natural philosophy.³³⁶ The results of that comparison made Henry conclude that the *Short Tract*, like Warner’s notes, was also characterized by that peculiar combination of elements from the tradition of light-metaphysics and mechanicism. Looking at the fundamental similarities between Warner’s views and this tract, Henry assumed that its writer ‘...may well have been beholding to Mr. Warner’s Manuscripts.’ He even suggested considering the manuscript as an extract of Warner’s notes.³³⁷ As will appear from the following chapters my own analysis of the material in question leads to other conclusions.³³⁸

³³² Henry (1988)

³³³ Op. cit., 20. Cf.: ‘It is perfectly clear...that Warner is drawing upon the neo-Platonic tradition of what is known as “light metaphysics” to provide him with his active principle or “cause of motion”’. (Op. cit., 18)

³³⁴ Op. cit., 23.

³³⁵ See Chapter 9, p. 236. According to Henry ‘John Wilkins and Seth Ward...insisted that Hobbes’s *Little Treatise* was a work of plagiarism.’ (Henry (1988), 4.) In fact Ward wrote his criticism in reaction to Hobbes’ claims as formulated in the *Leviathan*. To my best knowledge there is nothing to substantiate the idea that any of Hobbes’ contemporaries knew the *Little treatise*, i.e. the *Short Tract*.

³³⁶ See on this manuscript and on the polemic about its authorship Chapter 9, note 27. Henry tends to side with a minority denying or at least doubting seriously whether this manuscript is justly ascribed to Hobbes.

³³⁷ ‘The striking thing about the *Little treatise* is its starkly brief, often very elliptical, outlining of a complete system of philosophy. It has every appearance of having been boiled down from a much more extensive exposition. Warner’s papers, however, are extremely discursive; each point being fully developed before proceeding to the next. It seems hardly conceivable that Warner was doing this as an extended gloss on Hobbes’s *Little treatise*, while it does seem to me, as it did to Wilkins, that Hobbes may well have been beholding to Mr. Warner’s Manuscripts.’ (Op. cit., 14)

³³⁸ Hobbes’ debt to Warner is extensively dealt with in Chapter 9.

The most recent research into Warner's natural philosophical views is that of Stephen Clucas concerning the nature and sources of Warner's fire-atomism.³³⁹ His exposition of Warner's atomism is much more differentiated than that of Kargon. In the notes concerned Warner describes how heat is generated in a chemical process consisting of three stages. First combustible material is resolved into *minima speciei* which results in smoke. Next this smoke is resolved in fiery spirits, i.e. a flame without smoke leading to combustion after which heat is generated by the resolution of these spirits into separate particles.³⁴⁰ Clucas presents an interesting analysis of these notes in which he shows how Warner, using the terms of traditional Aristotelian mechanics, tries to explain this process purely in terms of matter in motion. Yet, Clucas too unjustly brackets Warner's ideas regarding atoms in

the notes on the principles of nature with those in the notes at issue here on fire, flame and combustion as if there were no difference between substantially identical particles and *minima naturalia*. Clucas also suggests that Warner followed Harriot '...his friend and colleague in applying mathematical methods to satisfy the philosophical demands of an atomist position.'³⁴¹ However, apart from the fact that there is no substantial evidence for the idea that they were related as 'friends and colleagues' this suggestion seems incompatible with Warner's hesitation to use the mathematical notion of 'point' in physics:

'...it is to be examined how this punctuall...principium is to be used in physics or applied where there is question de rebus being a thing merely doctrinall and mathematicall for in instanti idem est moveri et quiescere, principium magnitudinis non est magnitudo, principium numeri non est numerus, principium motus non est motus, understanding principium in this sense.'³⁴²

His comment, finally, that Warner, because of his attempt to combine atomism with the idea of fire as a spiritual substance, partly failed, is based on the misunderstanding that by spirits Warner understood immaterial substances.³⁴³ By 'virtual resolution' Warner in fact means that the particles involved are not changed as far as their substance is

³³⁹ See Clucas (1990).

³⁴⁰ See BL Add. MS 4395, ff. 56-8.

³⁴¹ Clucas (1990), 7.

³⁴² BL Add. MS 4395, f. 199.

³⁴³ 'While he is happy to refer to the singularity, discontinuity, and solidity of the igneous particles...ultimately he recoils from giving them full material status. The resolution into singles, he says, is only "virtuall and not materiall...the singles that were before in the state of spirituality remaine the same unaltred". This conception of immaterial particles, which are still subject to impacts and are to be conceived as solid polygons is extremely contradictory. What is perhaps behind it is an unwillingness to accept...that fire and soul are merely evanescent forms of matter...' (Clucas (1990), 12.)

concerned, i.e. not materially but only qua state, i.e. they lose their spirituality and consequently their active power. Thus he states that

‘...the sphere of activity of the igneous spirit doth extend usque ad cessationem motus individuorum ab originali ignario emissorum vel usque ad tantam eorum rarescentiam ut ob raritatem seu singularizationem vim omnem amiserint. Nam quo magis ab originali elongantur eo rariora evadunt et tandem penitus singularizantur et quod ad naturam spiritus attinet evanescent. Singularitas enim est spirituositatis destructio.’³⁴⁴

Apart from these reservations I agree with Clucas’ conclusion that Warner, at least in these notes, presents an eclectic atomism showing traces of ancient atomism, Aristotelianism, the doctrine of the *minima naturalia*, and of

Paracelsism as well as with Clucas’ clarification of its syncretic character by linking it to the eclectic Aristotelian tastes, current in the Renaissance, of Henry Percy.³⁴⁵

Up to this point I have mainly dealt with Warner’s notes on physics, the part of his legacy which until now has drawn most attention. Jacquot also presents a detailed synopsis of Warner’s notes on the functions of animal organisms. In his opinion Warner tried to integrate the several parts of natural philosophy into a unified system.³⁴⁶ Accordingly, Jacquot considered Warner’s notes on the principles of nature and those on the functions of the animal organism as fragments of one comprehensive whole. In fact they are fragments of two separate tracts based on mutually incompatible principles. Besides, in view of the differences in handwriting, these two groups of notes were written in widely separated periods of time. The notes on space, time, matter and force are saturated with atomism. Accordingly, in these notes Warner considers sensible qualities not as objective realities but as subjective experiences and explains sensory perception, like all phenomena, as an effect of matter in motion caused by an immaterial radiating force enclosing the atomic particles of matter and identified with light.³⁴⁷ In the notes on animal organisms, on the other hand, Warner explicitly characterizes sensible qualities as objectively existing realities, to wit, ‘assisting forms’, i.e. active principles of material things. These are said to cause local motion as well as qualitative changes. All phenomena are explained as the results of interactions between matter and form

³⁴⁴ Op. cit., f.50. See on Warner’s notion of spirit Chapter 3.

³⁴⁵ ‘Warner’s treatise reveals the common source of all four "corpuscularan" theories in a blend of ancient atomism, and the "chemical atomism" of Daniel Sennert, Sebastiano Basso, Angelus Sala and others. The Neoplatonic "seminalism" of Paracelsus, Sendivogius and Van Helmont, and the Scholastic tradition of *minima naturalia* also seem to have played their part - as did the rehearsal of atomistic theories in Aristotle’s writings, and later in those of his commentators.’ (Clucas (1990), 14.)

³⁴⁶ See Jacquot (1974), 118.

³⁴⁷ See Chapter 3, pp. 107-8.

resulting in the actuation of certain powers.³⁴⁸ The 'assisting form' in animals seems to be nothing but the animal spirit that, like a soul, guides and controls the organism. It is said to possess all the powers ascribed by most of his contemporaries to the rational or human soul alone. Consequently, in these notes Warner does not eschew the idea of final causes, and formulates, unlike an ardent atomist, many teleological explanations.

³⁴⁸ See Chapter 3, pp. 102-4.

1.3. *The Theme of this Study*

John Aubrey and Anthony Wood presented Warner, fifty years after his death, as a ‘philosopher and eminent mathematician’. This image is only partly confirmed by the few things known about his life and by the fragmentary remains of his legacy. From these Warner emerges as hardly more than a shadowy figure in the back-ground and as the subject of a few rumours. His fame as mathematician is mainly based on the edition of the *Artis Analyticae Praxis* and on his table of antilogarithms. The former got a bad press and the latter, apart from its not being original, was for the greater part lost. Warner’s optical work won no more praise than the comment that it was not inferior to what other competent optical scientists had accomplished in that field. His supposed tract about the circulation of the blood has never been recovered.

As appears from the foregoing the investigation of Warner’s papers is still in its infancy. Now, at first view, this legacy hardly invites a closer investigation. Apart from the fact that the folios of a number of fragments are bundled in the wrong order and quite a few folios, belonging together are haphazardly dispersed through the three bundles in the British Library the greater part of Warner’s notes are dry and long-winded. They are also riddled with digressions, so that often it is hard to determine what exactly the writer wants to say and what he is trying to prove. Also Warner frequently formulates incompatible views about things without clearly indicating his own point of view. He poses more questions than he answers. Many of his answers are provisional and only hold good under restriction. Most of his notes attest to a wide reading and undoubtedly were written by someone who knew his subject well. All the more confusing is that sometimes he asks questions or expresses opinions that, being rather characteristic of the interested but not very well informed amateur, seem to belie this impression.³⁴⁹ Yet, as may appear from the following chapters, a closer investigation of part of these papers is worth the effort.

³⁴⁹ For example the statement that ‘One condition there is of the animall spirits which hath not ben hitherto noted that they are universally actually hot...’ (BL Add. MS 4394, f. 171r) As if Warner had not read the leading medical writers of his day and did not know that many of them even identified the spirit with the vital, innate heat. (See, for example, Argenterius, *Opera*, 2090D; Riolan sr., *Opera*, 21, 162; Doni, *De natura hominis*, F. 40.) Or the statement in a draft letter to Charles Cavendish that ‘...the notice that we have of the externall apparition and location of the image must of necessity be ascribed to the function and operation of some other sense or cognitive faculty or facultyes besides and different from that of vision...’ presented as a new hypothesis. (BL Add. MS 4395, f. 112.) As if Warner did not know the optical writings of Alhazen, Witelo and numerous others in which he could have found that idea. (See Risner, *Opticae Thesaurus*, 31-5; 69-70; 112; 114-115.)

On the one hand Warner's legacy shows him as a product of his time. Like many of his contemporaries he had a wide range of interests and was especially interested in sciences like mathematics, optics, nautical science and alchemy.³⁵⁰ He was also conversant with the kind of critical, eclectic Aristotelianism as propagated in England primarily by John Case, and, like most of his colleagues outside the universities, he wrote by preference in English. On the other hand in several respects his papers are also atypical. Atypical, for example, is the fact that Warner, as is suggested by the notes still extant, does not seem to have occupied himself with theological or religious questions in '...an age in which religious beliefs - regardless of their orientation - were accepted as the highest of man's priorities...'.³⁵¹ Bacon, apart from carefully demarcating science and religion, contends that religion can profit from science. Some scientists tried to adopt a middle course between Hermetism and classical paganism.³⁵² Most of Warner's contemporaries adapted their scientific views to the prevailing religion, or went out of their way to show that their ideas were not incompatible with it.³⁵³ Some even considered condemnation or neglect of the natural sciences as a form of blasphemy.³⁵⁴ In Warner's legacy, God and religion are conspicuous by their absence. Maybe he was intentionally silent on these subjects. Politics, religion and morals were intertwined in Warner's day. Since the 1550s the government tried to suppress with violence any convictions contrary to Anglicanism as they were usually associated with political dissidence. In the second half of the 16th century hundreds of people (Catholics, Protestants, 'atheists') were accused of heresy and put to death. The tension between Anglicans and Puritans had been growing since the 1590s.³⁵⁵ Henry Percy was suspected of favouring Catholics.³⁵⁶ In the early 1590s Raleigh and Harriot had to stand up to the accusation of atheism.³⁵⁷ Warner's conviction that the world was not created, and his idea of the soul in general as a material and therefore mortal substance would have been enough to make him suffer a similar if not worse fate if these convictions had come to the ears of the

³⁵⁰ See Shirley (1983) and Hill (1965), 39.

³⁵¹ Feingold (1984), 170.

³⁵² See Rattansi (1972), 31.

³⁵³ See Kocher (1969), 3-28.

³⁵⁴ Cf. Hill: 'Abstracta primi efficientis consideratio est blasphemata, Deum enim actio ne spoliatur...' (Op. cit., aph. 291); 'Abstracta Dei consideratio...illius gloriam non promovet...Deum enim actione spoliatur, & gestorum illustrissimorum laudem illi aufert...' (Op. cit., aph. 368)

³⁵⁵ See Hill (1986), 224.

³⁵⁶ See Jacquot (1952a), 167.

³⁵⁷ See Jacquot (1952a) and Shirley (1983), 86, 87, 191, 193, 194, 197.

authorities.³⁵⁸ His interest in alchemy and mathematics, at that time still associated by most people with black magic and heresy, only heightened that risk.³⁵⁹ Maybe this also explains why Warner never seems to have spoken of his theories with others and never published them.³⁶⁰ Atypical also is Warner's interest in pure science and especially in fundamental research. In those days, i.e. the first decades of the 17th century, in England the tone was set by the scientifically interested members of the middle class. They considered science not as a matter of speculation but as a product of observation and experiment and they were primarily interested in applied science. The same holds true, *mutatis mutandis*, for his physiological and psychological speculations. There appeared, it is true, many publications on these two subjects, far more popular than physics, but, unlike Warner, most of the writers in question simply repeated or summarized the then leading literature.³⁶¹ As will be shown Warner, in his psychological speculations not only discards some traditional principles but he also poses a number of uncommon questions. Though in his physiological speculations he relies heavily on the medical authorities of those days he goes much further in his 'mechanical' view of vital functions than most of his contemporaries.³⁶²

Warner's mathematical notes, the largest part of his legacy in the British Library, still awaits adequately trained historians. As far as I can judge, they are too fragmentary to reconstruct his activities in that field and to determine his qualities as a mathematician. That, anyway, holds good for his notes on optics. His monetary tracts, to my knowledge, also have never drawn the attention of historians. Not having read them I do not know whether it would have been worthwhile to investigate them. His notes on nautical matters certainly, in my view, deserve more attention than they have received thus far. I did not read Warner's notes on military matters.

³⁵⁸ '...both matter and vis though they may be both affirmed and conceived not to exist; yet they can not really not exist their existence having ben ab aeterno must necessarily aeternally continue.' (BL Add. MS 4394, f. 129v); 'That matter is aeternall it is true...in respect of beginning and end...' (Op. cit., f. 382r) See for his notion of the soul Chapter 3, section 3.6.

³⁵⁹ See Hill (1965), 149.

³⁶⁰ In that respect Warner was in good company. John Dee '...was essentially a secretive man... (French (1972), 81.) Harriot wrote to Kepler '...ita se res habent apud nos, ut non liceat mihi adhuc libere philosophari.' (Jacquot (1952a), 167, note 11) Also from his will appears that he was troubled about the publication of his scientific work. (See Tanner (1967b).)

³⁶¹ Cf. John Davies (*Nosce Teipsum*), Helkaiah Croke (*Microcosmographia*), and Robert Burton (*The Anatomy of Melancholy*).

³⁶² In England physicians did start to play the role of researcher and innovator not until c. 1635. The main exception was Harvey beginning his research in the 1610s. (See Frank (1979).)

Most of the research done since the end of the 19th century into Warner's papers is focussed on his notes about the principles of nature. The greater part is purely descriptive and global. It shows that Warner had an even wider range of interests than his acquaintances were aware of or than they told Aubrey and Wood. It also suggests that on the one hand Warner's speculations fall within the compass of the eclectic Aristotelian tradition that from the 1580s onwards took hold of England while on the other hand they attest to the rise of the materialism and mechanicism that was to play such an important role in England later that century. In this respect Warner could be considered as a precursor of the 'experimental philosophers' first gathered in the 'Invisible College'.

This study is devoted to his notes on animal organisms and especially to the part concerning the psychological functions. In a detailed exposition and close analysis of these notes I will show how Warner worked on a doctrine of the operation of animal organisms that is no longer dominated by the distinctions between the rational and the irrational, the material and the immaterial, or between products of nature and artefacts; a doctrine moreover in which Warner does not restrict himself to the usual enumeration and description of the powers of the soul but in which he focusses on the way these faculties are acquired, i.e. on learning processes, as well as on their mutual attunement. In this doctrine psychology no longer functions as an ancillary science to ethics and theology but is, in combination with physiology, dealt with as a part of biology. Guided by that analysis and on the basis of an investigation of Warner's possible sources as well as of his relationship with a number of contemporaries, I will try to recapture Warner's intellectual milieu as well as to answer the question as to what role materialism and mechanicism play in his physiological and psychological speculations. Jacquot was the first to point out the strong resemblance between Warner's ideas about pleasure, pain, joy, sorrow, sensation, intellection and volition and those of Thomas Hobbes. He suggested, as was stated in the introduction, that Hobbes knew these ideas and that they probably had a stimulating influence on him.³⁶³ Following Jacquot's lead, I will try to determine in the 9th chapter of this study to what extent Hobbes' views on the physiological and the psychological functions of man are indebted to those of Warner.

³⁶³ See Jacquot (1974), 123-5.

Chapter Two

The Notes on Animal Organisms

2.1. Introduction

The collection of Warner's papers in the British Library contains a number of fragments on the generation and operations of animal organisms. These fragments, covering c. 207 folios, constitute a large collection of notes dealing with the processes that make animals live and especially on the faculties enabling them to stay alive. They concern the voluntary, animal faculties that enable animals to gather food and the involuntary, vital or natural faculties enabling animal organisms to consume food, digest it, spread it through the body and make it assimilate to the parts of the body to be restored. Judging by their handwriting they were written sometime between the 1590s or 1600 and c. 1620. That is also apparent from the crucial part played in these speculations by the notion of spirits as active principle, to be dealt with in the next chapter, as well as from the traditional treatment of respiration. In the introduction to his treatise on the motion of the heart and blood Harvey reproaches his Galenic colleagues for believing that the pulse and respiration have the same function, differing only in so far as the pulse would be dependent on an 'animal faculty' and respiration on a 'vital power'. Initially Harvey subscribed to Aristotle's idea that respiration serves refrigeration. Later he dropped that idea without, however, presenting a better alternative. According to Galen respiration primarily serves the refrigeration of the heart¹ and secondarily the supply of fresh air to feed the psychic pneuma². Besides inspired air was supposed to be needed for voice production³. Warner also struggled with the problem of the role of respiration and, like Harvey was unable to solve it. To him it is an established fact that air is not inspired for its substance but because of a quality.⁴ He leaves undecided what quality that is. It is also evident in his

¹ See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera (1549)*, Vol. 1, 592. (Kühn, Vol. 3, 528.)

² See op. cit., 597-8. (Kühn, Vol. 3, 544.)

³ See op. cit., 554. (Kühn, Vol. 3, 412-13.)

⁴ BL Add. MS 4395, f. 13; Cf. Galen: 'Ad quaestionem igitur an ipsius aëris substantiae, an alicujus qualitatis inopia, animalia suffocata, moriantur ? jam responsum ac evidenter indicatum est, alterum impossibile esse: relinquitur itaque alterum, nimirum ob penuriam qualitatis alicujus animalia in respirationis cohibitione suffocari. Quae sit igitur ista qualitas inquirendum venit.' (*De utilitate respirationis liber unus, Iano Cornario medico interprete*. In: *Opera (1549)*, Vol. 1, 855.) (Kühn, Vol. 4, 484.)

view that nature is oriented to the mixing of air and blood as well as to the transportation of that air to the left ventricle of the heart.⁵ That inspired air, in any case, serves the refrigeration of the blood⁶. Further respiration serves the pneumato-hydraulic motion of the heart⁷ and voice production⁸. The latter cannot be its only function for in that case respiration would be voluntary instead of continuous and its obstruction would not result in suffocation and death⁹. Warner wonders in this connection whether the respiratory spirits and organs are subservient to the pulsative spirits and organs or as such, i.e. as far as their power and activity go, of vital importance themselves and serve, as Galen states, the replenishment of animal spirits. On the one hand, as far as their active principle and way of operation go, they are related to the spirits controlling voluntary motions of organs but on the other to the pulsative spirits that manage the spontaneous, alternating, necessarily continuous motions.¹⁰ From its role with relation to the 'faculty vocall' Warner gathers that respiration and its organs do not belong to animals as such but in so far as they are social beings. Respiration enables them namely to communicate their thoughts vocally.¹¹ Finally he also wonders whether respiration serves smell.¹² Galen considers the perception of odours as a by-product of inspiration contributing to respiration in so far as it informs us about the presence of noxious vapours to be evaded; moreover, by in- and expiration the olfactory passages are cleansed and kept open.¹³ In Aristotle's view, too, smell is linked to respiration.¹⁴ Interesting in this connection is Warner's question as to whether fish can smell.¹⁵ Aristotle thinks they can albeit having no lungs, not through respiration, but by way of their gills.¹⁶ According to Galen fish inhale air and vapours through their gills. Though he does not say so explicitly, in view of the fact that vapours serve as a medium to smell, this implies that in

⁵ BL Add. MS 4394, f. 134r.

⁶ Op. cit., ff. 137v and 213v.

⁷ Op. cit., f. 210v.

⁸ Op. cit., f. 175v.

⁹ Op. cit., f. 173v.

¹⁰ Op. cit., f. 173r; Cf. Laurentius' view of respiration as less necessary and less noble than the pulse in so far as the operation of the heart is necessary to the whole body while respiration is only necessary 'secundum quid & per aliud'. (See *Historia*, 372).

¹¹ Op. cit., f. 175v.

¹² Op. cit., f. 173r.

¹³ See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera* (1549), Vol. 1, 634. (Kühn, Vol. 3, 654-5.)

¹⁴ See *Parva Naturalia*, 444a-25.

¹⁵ Op. cit., f. 172v.

¹⁶ See *Parts of Animals*, 659b15-20 and *Parva Naturalia*, 443a3-5.

Galen's opinion too fish can smell. The only difference with Aristotle is that Galen considers the supply of air through the gills as a kind of respiration.¹⁷ Warner's question suggests that he approached this problem from an Aristotelian point of view. Most of his questions on the subject are traditional¹⁸ and he was still far removed from the kind of investigation, starting in the second half of the 17th century, into the nature of air and its role in respiration.

The unorthodox yet vague statements about the composition of the blood also suggest that these notes were written before the rise of the 'chemical anatomy' and circulation physiology in the late 1640s. According to Warner blood '...is a mere physico-chimicall extraction.'¹⁹ It is '...nothing but a mere decoction of the parts of vegetalls and animalls in humido.'²⁰ Now

'...in all decoctions of the parts not only vegetalls as of the seeds, frutes, floures, leaves, rootes, stalks but also of animalls the menstrue doth draw forth together with the tinctures and salts or whatsoever are dissoluble in humido the spirits whatsoever they be or els the active spirits of those things being incorporate and potentially containd in those tinctures or salts or other dissolutions by some digestion in time are drawn into act and do insinuate themselvs into the menstrue...'²¹

Warner concludes from this that blood '...is impregned with saline <or sulfureous and calefactive> or active and mechanicall spirituositie and not only flegmatik...'²² This characterization of blood as a purely material, heterogeneous substance was far from traditional. Yet, only in the second half of the 17th century were its ingredients more precisely determined.²³

Thanks to the many internal references to topics already discussed or still to be discussed, and to the fact that some of the fragments are marked with letters, it is possible to put these notes into the order in which they were probably written and have to be read. They can be divided into two groups. The first group consists of five fragments concerning a number of physiological phenomena. Anatomy is touched upon only incidentally to explain specific functions like the pulmonary circulation²⁴, the

¹⁷ See op. cit., 443-4.

¹⁸ See for an overall picture of this approach Harvey, *Lectures*, 206.

¹⁹ Op. cit., 173v.

²⁰ Op. cit., f. 150r.

²¹ Ibid.

²² Op. cit., f. 149v.

²³ See for more information on these developments Davis (1973) and King (1970).

²⁴ '...the non-apparence of any notable and distinct conduct directed to the hart & accomodate for the intromission of aire into the substance or fibres of the hart but the apparence of the contrary...which doth manifestly argue the intention of nature to be...the commixtion of the aire with the bloud and by

production of spirits in the heart²⁵, the function of certain structures in the head²⁶, or the drainage of waste-matters in utero²⁷ as well as in the head and bloodvessels of fully grown organisms.²⁸ The second group consists of six fragments about a number of psychological questions. The notes are problem-oriented and for the greater part very detailed.

2.2. *Physiology*

The first group contains three fragments marked each by another letter of the alphabet, viz. DDD, HHH and LLL plus two unmarked fragments. Fragment

way of such commixtion the conduction thereof into the left ventricle of the hart...' (BL Add. MS 4394, ff. 133v-134r). See also Chapter 1, pp. 39-40.

²⁵ '...the forge and organs of this spirito-faction to be rather attributed to the hart then to the plexus choroides, seing the subsequent transmission thereof to the organs of spiritomotion in the hed may be sufficiently saved by way of the nerveous connex of the hart to the pericardium mediastinum, pleuritik membrane and successively to the medulla spinalis and not by the nervulets of the sixt conjugation which appere very insufficient as well for this transmission as for conduction of animall spirit from the hed to the hart ad pulsationem ciendam, there being required in both of them passage for spirit <in gretter copie> then those <small> nervulets can admit. (Op. cit., f. 135r).

²⁶ 'That the choroid implexures are for restauration is argued by this that they are terminated upon such parts of the braines to which no other sanguiducts are applied. But the maner of their finall insertion into the braines is further to be examined then is by the anatomists expressed...' (op. cit., f. 212v); 'That they {i.e. 'the vas varicosum and choroid contextures'} are ordayned only as an organ for excretion of pituosities is impossible...first for that amongst all the anatomists...there is not one that hath observed or mentioned any issues out of the choroid implexures into the ventricles for the excretion of those pituosities...' (Op. cit., f. 177r).

²⁷ '...the want of issue ad extra in the vas uraction is the point that doth argue the canall thereof to be continued or inosculated into that of the umbilicall vaine of the mother...' (Op. cit., f. 194v);

²⁸ '...the anatomists seeme to understand that those thyn membranes that invest and enwrap the nervs and spiritall from their originall in the braines to their extremes of every rivulet are the continuations or productions of the same thyn membranes or menynges that enwrap the braines and are insinuated into all the gyres and anfracts thereof as the nervs and spiritalls themselvs are the continuations or productions of the substance of the braines...yf there be that continuation...without any discontinuity or apertures for the elapsion of...pituitous humidities, it is not to be conceived how they being inwardly excreted can be any way evacuated...' (Op. cit., f. 180v); 'The necessity of solitary <or patent> osculets in the arteries may be demonstrated out of the necessity of restauration and the maner thereof, the like necessity for solitary osculets in the vaines...there is no other possible way for the evacuation of the serosities but by circulation nor no circulation but by the solitary osculets of the vaines...' (Op. cit., f. 194r-v); '...seeing it is apparent that the pituitosities are de facto evacuated the nudity of the braines is thereby necessarily concluded, besides it is also a phenomene in anatomy that those superficial parts of the braines that lie over the ventricles and the infundible are for the most part bare and destitute of their membrane apparantly of purpose for the admittance and giving way to the pituitosities...' (Op. cit., f. 198v)

DDD²⁹ answers the following questions: What sets the heart in motion and makes nutritious blood stream through the body ?, What is the origin and role of vital heat ?, What is the function of the spirits and how do they, operating, consume themselves? The notes in fragment HHH³⁰ mainly concern the production of chyle, blood, sperm and plasma, on the way blood and plasma are assimilated to the body, on the drainage of waste-matters and on the function of the brain in feeding and restoration. In fragment LLL³¹ Warner explains in detail how locomotion is caused by the sense of hunger and thirst. The two unmarked fragments³² each consist of a number of disparate notes on a variety of subjects like the composition of blood, sperm, urine, and plasma, the generation of plasmatic spirit as well as other matters bearing on spirits, anatomical questions, physiological aspects of generation and restoration, the restorative role of blood, and the effects of heat. Apart from these physiological notes they also contain a few notes on a variety of subjects like botany, ethics, psychology, science in general, language and on the use of natural histories. Warner probably drew on these two groups of notes when he wrote DDD, HHH and LLL. Presumably there once were also parts marked A to C, E to G and I to K. These are no longer extant and their contents can only be surmised. Looking at the references in DDD we can assume Warner discussed the generation, operation and decay of minerals, plants and animals in the three preceding sections. In view of these references Warner in these parts at any rate discussed the active and passive principle of the pneumato-hydraulic motion in animals³³, the rarefaction of blood in the ventricle of the heart and its recondensation in the veins and arteries³⁴, the causes of the permanent consumption of spirits and the wear and tear of organs.³⁵ The latter probably were paramount in the three sections following on DDD. In EEE Warner at any rate treated the 'imperfection or deprivation of the organs' in animal organisms.³⁶ In view of the topics referred to in DDD for later discussion as well as of references in HHH to former discussions, Warner in EEE, as well as in FFF and GGG, apart from that, probably would also have dealt with the precise relationship between 'pulse' and 'respiration',³⁷ the properties and operations of the spirits as well as their transportation

²⁹ BL Add. MS 4394, ff. 132r-170r.

³⁰ Op. cit., ff. 177r-209v.

³¹ BL Add. MS 4395, ff. 1-17.

³² BL Add. MS 4394, ff. 175v-170v; op. cit., ff. 218v-210v.

³³ See Add. MS 4394, f. 132r.

³⁴ Op. cit., ff. 132v-133r.

³⁵ Op. cit., f. 166v.

³⁶ Op. cit., f. 170r.

³⁷ Op. cit., f. 133v.

through the body³⁸, the role of heat thrown out by chyle and by other substances in the intestines³⁹, digestion⁴⁰, the transformation of blood into building-material for the body⁴¹, the drainage of waste-matters within the body⁴², the destruction of organs⁴³, and with the regimens of distribution over and operation in the body of blood and spirits suited to self-preservation⁴⁴. Fragment HHH ends with the announcement that now, after the treatment of the substance of the several organs 'There rests something to be said concerning the continuity of the spirit...and so to come to the division and sorting of the other parts of the animall namely the instrumentalls corporeall in respect of their functions for that the former division of them into their substantiall kindes...was but occasionary for the better determination of the question of the spirituall part: That which is further to be said thereof is continued in the next papers marked thus III.'⁴⁵ Yet, looking at the topics mentioned in HHH to be discussed later the speculations about the nutrition and restoration of the animal organism were probably also continued in the fragments marked III, JJJ and KKK. Maybe in these notes Warner focussed on the role, in this connection, of the brain⁴⁶ and of the venarterial circulation.⁴⁷ A reference in LLL suggests that in one of these three foregoing fragments Warner also discussed the nature of the locomotive power.⁴⁸

From the two unmarked fragments the contents of the first one⁴⁹ suggest that it was written before DDD for it contains at least eight statements on topics dealt with in or before that fragment. There are, for example, statements about the different kinds of generation (f. 175r), the haematogogik function of the spirits (f. 174v), decay and restauration (f. 173v), the nature of blood (f. 173v, f. 171r), the effects of heat in the body (f. 171v), the pulsative faculty (Ibid.), and about the consumption of the spirits (f. 170v). The second fragment⁵⁰ contains

³⁸ Op. cit., ff. 134r, 136v, 159v, 160r, 160v, 167r, 183r and 188r.

³⁹ Op. cit., f. 157v.

⁴⁰ Op. cit., f. 196r.

⁴¹ Op. cit., f. 179v.

⁴² Op. cit., ff. 177v, 182v.

⁴³ Op. cit., f. 169r.

⁴⁴ Ibid.

⁴⁵ Op. cit., f. 209v.

⁴⁶ See op. cit., ff. 197v-198r, 200r, 203v.

⁴⁷ See op. cit., ff. 194r, 195r.

⁴⁸ 'That the loco-motive faculty is not naturall or spontaneall that is to say that the principium by which it is actuated is not connaturall with it or so <internally> coniunct or connected unto it or dependent on it that it must necessarily and perpetually and invariably move <or that the motions or acts thereof be causalls> hath ben sufficiently in the former discussions proved...' (BL Add. MS 4395, f. 1.)

⁴⁹ BL Add. MS 4394, ff. 175v-170v.

⁵⁰ See op. cit., ff. 218v-210v.

at least four references to subjects already discussed like the classification of the faculties of the spirits (f. 213r), the generation and nature of the plasmatic spirit (ff. 218v-r), a description of the ‘explicated and contracted’ structures in the brain situated in the thin membranes and linked as conduit-pipes to the ventricles of the brain (f. 215r), and the properties of the phlegm remaining after restoration of the body (f. 211v). Likewise there is mention of topics to be discussed later among which the process of spermification (f. 214v), the function of the preexistent plasmatic spirit (ff. 214r-213v), the way the choroid implexures are planted in the brain (f. 212v), and the role of the brain with augmentation and restoration (f. 210v) all of which are dealt with in fragment HHH. In view of these references we may assume that this second fragment was written after DDD and probably before HHH.

In all these notes Warner gives a lot of attention to the reciprocal relationship between all kinds of physiological processes like the motion of the heart and the production of spirits⁵¹, the operation and consumption of spirits⁵², the fluidity of blood and the generation of heat⁵³, and to the reciprocity between the need for food and the appetite.⁵⁴ As appears from the supposed interactions in the organism between operation and consumption Warner’s physiological speculations are based on the assumption that ‘...the life of animals or state of animality is status fluens a state in continual flux and mutation and in continuo fieri, as is that of fire or flame and of the sea and the earth and in deed of the whole univers.’⁵⁵ He is in search of an explanation of the fact that in healthy organisms, conceived as a kind of self-regulating mechanisms, consumption and repair, supply and demand, are perfectly attuned.

2.3. Psychology

The second group of notes consists of six fragments of which only two are marked by letters, to wit, MMM⁵⁶ and NNN⁵⁷. Both have bearing on the question as to what notions and faculties animals ‘in statu plasmatico’ can

⁵¹ Op. cit., ff. 137v-140r.

⁵² Op. cit., f. 161r-v.

⁵³ Op. cit., f. 160r.

⁵⁴ BL Add. MS 4395, f. 4.

⁵⁵ BL Add. MS 4394, f. 161v. Cf. Telesio: ‘...interna et propria corporis substantia assidue cum materia, cui insidet, corrumpitur, assidueque alia in corruptae locum succedit; quin ipsa partium singularum corporisque universi forma naturaque, proprius nimirum illarum hujusque calor, assidue et singulas illas et universum hoc immutat in aliudque assidue agit ens.’ (*De rerum natura*, 250); Bruno: ‘Naturalia omnia...continue alterantur, trepidant, moventur, exagitantur...’ (*Opera*, I, 3, p. 199). Paracelsus was of the same opinion. (See Rothschild (1973), 58.)

⁵⁶ Op. cit., f. 219r.

acquire. The other fragments consist of stray notes on a variety of subjects all relating to the training of faculties enabling animals ‘in statu perfecto animalitatis’ to gather food, i.e., to be more precise, the faculties preceding the power to move from place to place. These include the ‘faculty sensitive’ covering sensation, imagination, memory and the sense of pain or pleasure, the ‘faculty intellective’ covering appetite, reason, several passions, in particular hope and fear, and the will. The notes at issue bear on the question of where and how these faculties are situated in the body and ‘...how they are acquired and perfected ab pura seu mera aptitudine seu dispositione seu potentia naturali into faculties by way of habituation...’⁵⁸ Following the Scholastic tradition Warner distinguishes the several faculties in terms of the objects by which they are actuated.⁵⁹ Hence, the closer determination of each of these faculties comes down to a meticulous identification and differentiation of their corresponding objects. Initially these faculties are only present in rudimentary form, i.e. as aptitudes requiring exercise to be transformed into actual skills. Warner extensively discusses these learning processes which result in the formation of habits. Finally, he also dwells on the problems concerning the coupling and mutual integration of these powers. For example the problems involved in the transition from the gathering of information to its analysis and assessment leading to an act of will, instigating in its turn goal-directed behaviour.⁶⁰ Thus Warner broached a problem deemed to be beyond human comprehension by the then leading authorities.⁶¹

2.4. *Traditionalism and Originality*

As his notes on fire and heat show Warner as a transitional figure⁶² his notes on animal organism too unmistakably are greatly influenced by Renaissance philosophy while at the same time in these notes Warner seems to anticipate the changes philosophy was to undergo in the course of the 17th century with the work of philosophers like Descartes, Gassendi and Hobbes.

⁵⁷ Op. cit., ff. 265r-267v.

⁵⁸ Op. cit., f. 254r.

⁵⁹ Cf. Aquinas (1950): ‘...oportet rationem potentiae accipi ex actu ad quem ordinatur: et per consequens oportet quod ratio potentiae diversificetur, ut diversificatur ratio actus. Ratio autem actus diversificatur secundum diversam rationem obiecti.’ (*Summa* I, q. 77, a. 3.); Suarez: ‘...potentias desumere ex objectis distinctionem specificam...’ (*Opera*, Vol. 3, 579).

⁶⁰ Op. cit., ff. 234r-233v.

⁶¹ Cf. Burton: ‘How these... principal faculties are distinguished and connected, ...humano ingenio inaccessum videtur...as Taurellus, Philip, Flavius and others suppose.’ (*The Anatomy*, Vol. 1, 155.)

⁶² See Chapter 1, p. 51-3.

Warner's purely rational, speculative approach and the authorities adduced to back-up his physiological points of view in particular are traditional. He is mainly guided by the theories of Claudius Galenus (129-200)⁶³ and his 16th century followers like Archangelo Piccolomini (1525-c.1605)⁶⁴, Varolius (1543-1575)⁶⁵ and Bauhinus (1560-1624)⁶⁶. The 16th century began with a strong revival of the interest in Greek medicine, especially in the work of Galen and Hippocrates as an alternative to the Scholastic-Arabic medicine. Started in Italy this revival, by the middle of the 16th century, communicated itself to England. According to John Caius (1510-1573) 'Except for certain trivial matters, nothing was overlooked by [Galen], and everything that recent authors consider important could have been learned solely from Galen.'⁶⁷ In those days the 'London College of Physicians' constituted a true 'Galenical stronghold'. At the same time the criticism of Galenism, initiated by Vesalius (*De humani corporis fabrica*. 1543), and especially of Galenic anatomy rose. In the course of the second half of that century there appeared a number of works in which, to be sure Galenism was not outright rejected but which presented new interpretations of known facts and unorthodox views within a Galenic frame.⁶⁸ That same critical reception of Galenism can be found in Warner's writings.

⁶³ He mentions Galen only once. (See op. cit., f. 135v) See on Galen Rothschild (1973), 14-22; Temkin (1973) and Siegel (1968, 1973).

⁶⁴ See op. cit., ff. 194r, 197r, 200v, 201r, 210v. Archangelo Piccolomini was professor of anatomy in Rome. He took a keen interest in Galen and wrote, among other things, *Anatomicae Praelectiones* (Rome 1586). He was the first to describe the 'linea alba abdominis'. (See Neuburger/Pagel (1903), 237.) According to Riolan he was rather a philosopher than an anatomist and Haller conjectured that, looked at the poor figures in the *Praelectiones*, he probably hardly ever anatomized. (See Eloy (1973), Vol. 3, 557.)

⁶⁵ See op. cit., ff. 177r, 194v, 200r, 212v. Constanzio Varolio discovered the crura cerebri, commissura and the pons. He subscribed to the, then modern, idea of a pulmonary circulation of the blood and wrote, among other things, *De resolutione corporis humani* (Frankfurt 1591). Whitteridge's assertion that Varolius was not taken seriously by his colleagues (1971, p. 65) is untrue. John Bulwer presents him as one of the medical authorities in *Anthropometamorphosis* (1650), George Ent mentions him in his *Apologia de circulatione sanguinis* (Londini, 1641) (pp. 56 and 69), William Harvey refers six times to Varolio in his *Lectures* (1661) (ff. 57v, 93r, 94r, 94v, 96v, 97r), Helkiah Crooke mentions him as an authority in his *Microcosmographia* (1615), and Bauhin too regularly refers to Varolio in the *Theatrum anatomicum* (1605).

⁶⁶ See op. cit., f. 201r. See on Bauhin Chapter 1, note 212.

⁶⁷ Quoted by O'Malley (1970), 93. Bullein refers to Galen as the 'Prince of Physicians'. Illustrative also is Thomas Vicary's, *Profitable treatise of the Anatomie of man's body* (London 1577), the first handbook of chirurgy in English. (See Jones (1975), 135-6.)

⁶⁸ See, for example, Leonhard Fuchs. *Opera didactica*. Francofurti 1604; Fernelius. *Universa Medicina*. Francofurti 1593 and John Banister. *The historie of man*. (London 1578).

Warner shares with Galen a teleological, deductive explanation of anatomical and physiological facts, a specific notion of 'nature'⁶⁹ and, like Galen he explains all physiological and psychological operations of the organism in terms of heat and spirits.⁷⁰

However, these similarities in generalities are far outnumbered by the differences in particulars. While, for example, according to Galen, nerves, apart from a little compression and therefore also a little hardening, for the sake of protection, are substantially identical with the brain⁷¹ in Warner's view

'...the substance of the braines whether it be understood of the mayne part of them contayned in the hed or of that part of them that proceedeth from them into the cavity of the spine and from that againe branched and distributed into the nervs and nerveous spiritalls is absolutely distinct from the nerveous substances wherein they are contayned and to which they are adiacent; that is to say that they are nowhere continue to the nerveous kinde but only contiguous and adiacent...'⁷²

Accordingly, in his opinion, the nervs cannot be considered as mere continuations of the brain differing only from it in so far as they are not as fluid and as humid as the cerebral substance is. Warner describes the nervous parts of animal organisms as '...compounded and contexted of fibres or filaments one close by another continue indirectum, transversum, obliquum, and those filaments incaved or perterebrated with canallets or capillar pipes as it were <artificially> of purpose for the enclosure and discursion of spirit...'⁷³. According to Galen only the optic nerves were hollow.⁷⁴

⁶⁹ See *On the usefulness*, Vol. 1, Introduction, 9-12.

⁷⁰ See about the role of heat in Galens system of physiology *On the usefulness*, Vol. 1, Introduction, 52-3; see on Warner's ideas about the physiological role of heat and spirits Chapter 3.

⁷¹ See *De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati*. In: *Opera (1549)*, Vol. 1, 1042. (Kühn, Vol. 5, 621.)

⁷² BL Add. MS 4394, ff. 201v-202r. See also Chapter 9, p. 253.

⁷³ See op. cit., f. 208r.

⁷⁴ 'nervi optici meatus etiam habent sensibiles.' (*De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera (1549)*, Vol. 1, 819. (Kühn, Vol. 4, 275.) See also *De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati*. In: *Opera (1549)*, Vol. 1, 1042. (Kühn, Vol. 5, 622-3.)

Physiological processes in the brain leave behind waste products. While according to Galen these are drained away to the nose⁷⁵ in Warner's opinion they are carried off to the stomach and recycled.⁷⁶

To Warner the heart is '...a mere muscle very <strongly and> artificially woven and contrived with omnimodall nerveous fibres direct, transverse and oblike as it were of purpose for dilatation and contraction according to the fashion of other muscles that are ordayned for voluntary dilatation and contraction but more substantially and artificially.'⁷⁷ According to Galen and his followers, i.e. most of Warner's contemporary colleagues, the heart could not be a muscle as muscles serve voluntary motion while that of the heart is involuntary. Besides the heart, just because it is made out of different kinds of fibres, instead of only one kind like muscles are, can make more than just one kind of motion.⁷⁸ In contrast with Galen Warner also believes that the heart of the foetus does not move presenting this idea as an empirical fact⁷⁹ while from the fact that the bloodstream of mother and child are controlled by separate mechanisms Galen comes to the opposite conclusion.⁸⁰

In Galen's view animal organisms are controlled by three, equally important, principles:

'Demonstratum est geniti animalis à tribus principijs fieri dispensationem, quorum unum in capite collocatum id habet munus in se quidem, ut imaginationem, memoriam, intellectionem, cogitationemque causet. In relatione vero ad aliud, ut sentientibus animalis membris sensus, ijsque quae per appetitionem moventur, motus originem praestet, alterum in corde situm est, cuius opera in se sunt animae firmitas, quem tonon dicunt, & in ijs quae ratio iusserit, invicta constantia. eiusdem in perturbationibus est quasi fervor quidam insiti caloris, cum anima vindictam sumere de eo cupit qui videtur offendisse. quae ira appellatur. In relatione vero ad aliud id efficit, ut membris sigillatim omnibus calorem, arterijsque illam micationis pulsusque agitationem suppeditet. reliqua facultas in iecore sedem obtinet, universamque in animali nutricationem procurat, cuius maxima pars & nobis, & sanguineis omnibus sanguinis est procreatio. ad eandem hanc

⁷⁵ See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera* (1549), Vol. 1, 645. (Kühn, Vol. 3, 686-7.)

⁷⁶ See op. cit., ff. 177r, 178v, 183v, and 195v. Cf. Caesalpinus: '...infants in the whomb are found to have phlegm in their stomachs...phlegm of that kind is derived from the head...' (*Artis medicae liber VII* (1603), 9-11. Quoted in Bylebyl (1972), p. 50, note 17.)

⁷⁷ BL Add. MS 4394, ff. 133r-v.

⁷⁸ See op. cit., 562-3. (Kühn, Vol. 3, 437-41.)

⁷⁹ See op. cit., f. 133v.

⁸⁰ See Siegel (1968), 62.

pertinet iucundarum rerum fruitio, in qua cum vehementius quam par est movetur, incontinentiam, intemperantiamque efficit.’⁸¹

Warner considers nothing but the heart as the ‘...prime and principall instrument...of all the vitall operations of the animall...’.⁸² As opposed to Galen Warner also believes that all animal functions are controlled by just one spirit.⁸³

According to Warner ‘...the exsuctory vaines in animalls are analogate to the radically succoducts of vegetalls’ and that is exactly what Galen says.⁸⁴ However, elsewhere Warner writes that animals have their ‘radix in capite’ meaning that animals draw food from their head as plants draw food from the earth through their roots.⁸⁵ In opposition to Galen he also believes that the feeling of hunger is not only or mainly situated in the upper orifice of the stomach but is extended all over the digestive tract.⁸⁶

As appears from his views about the place and function of the heart, the role of the brain in nutrition, and the distinction he makes between restorative and

⁸¹ *De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati.* In: *Opera* (1549), Vol. 1, 1035-6. (Kühn, Vol. 5, 600-1.) Yet, in Galen’s view too the heart, conceived as the source of the innate heat by which the animal is governed, is primarily focussed on the preservation of life: ‘Cum igitur cor caloris nativi, quo animal regitur, quasi fons quidam ac domicilium sit, omnis eo modo ipsius pars principatum teneat: at magis hae, quarum utilitas toti animali vitam conservat.’ (*De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete.* In: *Opera* (1549), Vol. 1, 561.) (Kühn, Vol. 3, 436.)

⁸² Op. cit., f. 207r.

⁸³ See Chapter 3. See on Galen’s pneumatology also *On the usefulness*, Vol. 1, Introduction, 46-8; Temkin (1951), 180-9. See on other differences between Galen and Warner also p. 58 and Chapter 5, note 121.

⁸⁴ Op. cit., f. 132v. Cf. Galen: ‘...quemadmodum è plantarum radicatione radices deorsum aguntur, & stirps sursum oritur: eodem pacto è corde arteriae altera in pulmones, altera in totum corpus animalis disperguntur. è iecinore item venae altera in ventrem, altera in corpus universum distribuuntur. atque illae radicibus persimiles sunt venae, quae in ventrem pertingunt. Quod etiam idem Hippocr. declarat, ita scribens. Qud arboribus est terra, id animalibus venter est.’ (*De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati.* In: *Opera* (1549), Vol. 1, 1010.) (Kühn, Vol. 5, 532.)

⁸⁵ See op. cit., f. 210v. Cf. Caesalpinus: ‘...quemadmodum in animalibus cerebri medulla in capite est, unde spinalis medulla exoritur in totam spinæ longitudinem diducta, sic in plantis cerebrum in radice tamquam in capite sedens per totum caulem quasi per spinam dorsali medullam deducit ad vitalem humorem ramis & extremis surculis distribuendum.’ (*De plantis*, 3)

⁸⁶ See BL Add. MS 4395, f. 7. See on Galen’s opinion *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete.* In: *Opera* (1549), Vol. 1, 658. (Kühn, Vol. 3, 727-8.)

generative nourishment⁸⁷ instead of that between crude blood and blood mixed with spirits Warner opted for Aristotelianism when he disagreed with Galen.⁸⁸

Though Warner's physiological views are clearly marked by Aristotelianism and Galenism, many of the questions he asks are far from traditional. He is not, like his colleagues from the Renaissance and the Middle Ages focussed on the results of processes but on these processes themselves.⁸⁹ He is, in other words, not primarily interested in the static aspects of an organism, i.e. anatomy, but in its dynamics, i.e. physiology.⁹⁰ Traditionally the distinction between anatomy and physiology was linked to that between body and soul. Thus according to Alsted

'Materia hominis est vel prima, ut limus terrae: vel secunda, eaque tum mediata, ut elementa, sanguis, & semen prolificum: tum immediata, ut corpus organicum, variarum partium apparatu instructum. *Hujus doctrina usitatè dicitur Somatologia, & Anatomia corporis humani...* Forma hominis est vel communis, ut anima partim vegetans, partim sentiens: vel propria, quae dicitur specifica, ut est anima rationalis, quae est actus primus hominis quatenus est homo. *Hujus doctrina usitatè dicitur Psychologia.*'⁹¹

Warner treats all functions in terms of the material body and, in that connection, even refers to organisms as machines. He compares, for example, the operation of the spirits in the supply of food with '...a wheele set in motion by the hand of one assisting continually by it and continued by the same hand by continuall reviving the motion whensoever it begins to faile...'⁹²

⁸⁷ See BL Add. MS 4394, f. 158v. Cf. Caesalpinus' distinction between 'alimentum...auctivum & nutritivum'. (*Peripateticarum Quaestionum*, 100b, 104b). Warner also seems to share Caesalpinus' view of the arterial instead of the venous blood as the perfect nourishment. (See op. cit., f. 138r and Bylebyl (1972), 44.)

⁸⁸ However, as opposed to Aristotle Warner does not consider the heart as the source of spirits and animal heat, in his view, is not of a celestial nature but elementary.

⁸⁹ See Rothschild (1973), 47-111.

⁹⁰ See Pagel (1986).

⁹¹ *Encyclopaedia*, Band 2, 753-4. Cf. Arch. Piccolomini: 'Duo sunt rerum genera, ad cor spectantium. Aliae namque sunt, quae sensu notantur, observantur, atque percipiuntur... {i.e. the fabric and substance of the heart}...aliae,...quae solo animo lustrantur, ac apprehenduntur quales sunt facultas vitalis, facultas pulsifica irascibilis & res ijs finitimae...An ea pars quae formam pyramidis refert, assiduis motionibus se ciens, sensu percepta, cor vulgo vocata, sit cor, nec ne? Nequaquam, verè & propriè. Nam verè & propriè unumquodque est id, quod est praestantissimum in eo...hominem esse ipsam mentem, non autem, hanc corpoream molem, cum mens sit id, quod est praestantissimum in homine vocato. Atqui in corde vocato, praestantissimum est facultas vitalis, & facultas pulsifica, igitur cor propriè erit ipsa vitalis facultas...facultates vitalis, & pulsifica sunt facultates animae, & non corporis' (*Anatomicae praelectiones*, 223B-224C.)

⁹² Op. cit., f. 145r.

Likewise the operation of the spirits in the digestion and diffusion of nourishment through the body is compared with

‘...a mill continually driven by water and ether occasioning the supply of his owne materialls which it is to grinde or where upon it <is> to work by some stroke or agitation necessarily proceeding from it self, or having the same continually supplied when there is need by the arbitrary ministration of some assistent.’⁹³

As ‘machinations naturall’ animals also are comparable to ‘artificiall machinations’ in as far as the way of organization or incorporation of their active principle is concerned

‘...as it is in these artificiaall spiritalls or pneumaticall machinations, the effects or operations whereof do depend or are grounded on the force of some enclosed spirit. Where it is not <their owne spirit that is> the elementary spirit of their solid substance but the alien or airy spirit enclosed in their vacuities made for that purpose that is to be understood the agent or principall medium of the action. The like is to be understood of this machination of the animall’.⁹⁴

Further they are comparable in so far as

‘In most artificiaall machinations that have their function consisting in motion the principall parts can not be amended whiles they are actually in their motion as in a mill the wheelles or the stones (what for a ship) so as they can not be perpetuated without dying for the time; the like is to be considered in machinations naturall that is in animalls which because once dying they can not be revived their perpetuation is impossible.’⁹⁵

Apart from this machine-analogy alchemy also plays a major part in Warner’s physiological explanations.⁹⁶ He frequently compares physiological

⁹³ Op. cit., f. 145r-v.

⁹⁴ Op. cit., f. 208r.

⁹⁵ Op. cit., f. 173v. Cf. Henry Percy: ‘The Doctrine of Motion delivereth elements certainly demonstrative, for all other parts of natural philosophy, as well speculative, that tendeth to the discovery of natural motions merely, as such that layeth open the structure of all organical engines artificial, whether they be by weight, springs, fire, air, wind, water, vacuity, rariety, density...’ (*Advice*, 69.)

⁹⁶ In his notes on the principles of nature Warner once refers to ‘...the doctrine of elements and seedes and generation and corruption and resolution and some chymicall groundes’. (Op. cit., f.396v) There is mention of ‘principia physica seu chimica’ (Op. cit., f.177v) and he refers explicitly to the iatrochemists (Op. cit., f. 212r). Cf. Percy: ‘The Doctrine of Generation and Corruption unfoldeth to our understandings the method general of all atomical combinations possible in homogeneal substances, together with the ways possible of generating of the same substance, as by semination, vegetation, putrefaction, congelation, concoction, etc., with all the accidents and qualities rising from those generated substances, as hardness, softness, heaviness, lightness, tenacity, frangibility, fusibility, ductibility, sound, colour, taste, smell, etc....which part of philosophy the practice of Alchemy does much further, and in itself is incredibly enlarged, being a mere mechanical broiling trade without this philosophical project.’ (*Advice*, 70)

processes with procedures from the laboratory of the alchemist. For example, in connection with the transformation of fluid nutrients into bones, nerves, flesh, etc. Warner states that the ‘... phenomenes as well of art as of nature to this purpose as fixations, indurations siccations concretions coagulations &c in humido vel clauso are to be speculated and examined.’⁹⁷ The pulsating motion of the animal spirits in the fibres of the heart ‘...is more exactly to be speculated tam ex phenomenis physicis eiusdem generis vel similis conditionis quam ex pneumaticis artificiosis...’⁹⁸ The idea that the heat of the blood is caused by its motion

‘...is most resonable, and agreable to the effects of nature in other things; for it is found by comon experience that motion is generative of heat and that in divers maners, and not only of heat but also of fire and flame in materia arida et combustibile by violent <continued> contrition of two solid combustibile bodies and by collision of some hard bodies though not combustibile and divers other wais...’⁹⁹

However, he also compares that process with artifacts like the phenomenon that

‘...divers liquors especially <some> distilled spirits standing quiet in their glasses are actually as cold as comon water but being stirred or agitated do become so hot and affect the glasses wherein they are contayned with such an actuall heat that the hand is not able to endure it and in some the effect of such agitation hath ben so strange that by sodaine heat and rarefaction they have broken the glasse and flyen out with gret violence...’¹⁰⁰

In a long note on metabolic processes and on the difference between the cerebral substance and that of the nervous system he makes an explanatory comparison with ‘...the coagulation of mercury by the corporall apposition thereof unto lead or tynne...’¹⁰¹ and with ‘the artifice of cheese’.¹⁰²

Many physiological phenomena, in Warner’s view, not only can be compared to laboratory procedures but actually are of a chemical nature. This

⁹⁷ Op. cit., f. 160r.

⁹⁸ Op. cit., f. 137r.

⁹⁹ Op. cit., f. 148v.

¹⁰⁰ Op. cit., f. 149r. Cf. Thruston (ab. 1644) attributing to venal blood the tendency ‘...to become ebullient and overheated owing to its richness in particles and its brisk mixture with lymph when entering the lungs’. That same mechanism is said to be used by chemists mixing fluids ‘...and let them effervesce, often causing the vessel to break.’ (See Pagel (1967), 194.) Th. Willis and N. Henshaw make the same comparison. (See Mendelsohn (1964). pp. 45, 48.)

¹⁰¹ See op. cit., f. 186r.

¹⁰² See op. cit., ff. 202v-203r and 204v.

appears especially from his ideas about blood and about the nature of metabolic processes. By blood Warner understands, as we saw, ‘...a mere decoction of the parts of vegetalls and animalls in humido¹⁰³ ... impregnated with saline <or sulfureous and calefactive> or active and mechanicall spirituosities...’¹⁰⁴ Thanks to these spirituous particles blood, once set in motion by the heart, can easily be heated. Apart from that heat the blood through the arteries diffuses nutriment through the body for the restoration of the parts of the body. The red or carneous parts are fed by the sanguinous, grumous parts of the blood, and the white or nervous parts by its spermatic parts, i.e. by ‘...bloud...altered and digested in substantiam spermaticam...’¹⁰⁵ In both cases the actual assimilation of nourishment in the parts to be restored requires ‘...resolution or coagulation...from homogeneity into...two heterogeneall parts...the one of solid consistence and restauratory the other of humid consistence and excrementitious.’¹⁰⁶ These processes of assimilation are ‘...effected by fermentation that is by the specificall spirituall action of some portion of the matter preexistent into which the assimilation is to be made upon the matter that is to be assimilated...’¹⁰⁷

Thus Warner explained these processes chemically and seemed to consider the body as one big chemical laboratory. Already in the beginning of the 17th century Francis Bacon propagated the explanation of processes like concoction not in terms of inborn heat but as the effect of the interaction between chemical substances in the fluids and organs of the body. Most of his

¹⁰³ Op. cit., f. 150r.

¹⁰⁴ Op. cit., f. 149v. Cf. Telesio’s view of the blood as not simple and homogeneous but as composed of different ingredients that turn into the substance of the bodily parts they touch (See *De rerum natura*, 230.). The paracelcist physician Quercetanus believed that blood was composed of sulphur, earth, salt, mercury and water. (See Debus (1965), 90.) In the second half of the 17th century many physicians in England among which Walter Charleton, Francis Glisson, and Thomas Willis were of the same opinion. (See Davis (1973), 73, 82.) According to Malachiae Thruston ‘...sanguinem...humorem esse vâlde heterogeneum sive dissimilarem...’ It would consist of parts of water, oil and ‘tartar’ (‘hoc est salino-terreae’) (See *De respirationis usu*, 13) According to Sennert blood was not composed of paracelsist elements but of bilious {i.e. hot and dry}, pituitous {i.e. cold and wet}, and of melancholic {i.e. cold and dry} particles. (See *Opera*, Tomus Primus, 84). See for Harvey’s view Chapter 1, p. 35.

¹⁰⁵ Op. cit., f. 178v.

¹⁰⁶ Op. cit., f. 195v. See also f. 186r.

¹⁰⁷ Op. cit., f. 185v. Warner is rather vague about the precise nature of that process. He probably would have agreed with Willis’ description of fermentation as ‘...whatsoever Effervency or Turgency, that is raised up in a Natural Body, by particles of that Body variously agitated.’ (*Diatribae duae medico-philosophicae* (London 1659), 1. Quoted in Isler (1968), 46.); and with Glisson’s definition as ‘...calor intus exoriens, ob luctam inter spiritus & partes crassiores...’ (*De hepatis* (1654), 439-40. Quoted in Davis (1973), 83, note 41.) See further Foster (1924), 150-3.

contemporaries rejected such chemical explanations of physiological processes. They considered chemistry just like anatomy as nothing but a science auxiliary to medicine. The proponents of anatomy and chemistry stressed the importance of, and similarity between the identification of structural components of the body, anatomy, on the one hand and that of fluids in the body, chemical analysis, on the other. First of all they were thinking of a closer determination of the elements or principles of the blood. They wanted to combine anatomy and chemical analysis in physiological research and no longer occupied themselves with supposed attractions between organs and fluids but explained the production, motion and deposition of body fluids like blood in terms of arrangements of components and of chemical changes caused by fermentation.¹⁰⁸ A typical representative of this approach is Henry Power (1623/26-1668) striving for ‘...the Spagyricall Anatomy of the chyle, blood and flesh, the Mechanicall demonstration of the three great Concoctions, Chylification, Sanguification and Assimilation: the which standeth upon sensible and apparant foundations, and not upon figments and Qualities of the Humorists...by these sensible Analogyes the three great Concoctions of Nature...are most excellently illustrated...all the operations of nature within us are - re practised by the chemists, without us, and therefore the great and mysterious works of concoction, chylification, sanguification, assimilation, etc. are the most powerfully demonstrated by chemicall Analogy. For nature the Protochymist Acts in this internall Laboratory of Man (the Body) as the Hermeticall Practitioners doe formally in their furnaces...’¹⁰⁹ Power, in other words, wants to describe and explain internal bodily functions like digestion and the production of blood in terms of chemical changes and uses to that purpose as well the idea of material spirits as that of chemical elements in a Paracelsist sense. Between c. 1660 and 1700, i.e. only after Harvey’s doctrine of the circulation of the blood had been generally accepted, these ideas won through on a large scale.

Warner did not join in the battle, raging especially on the continent, between Paracelsists and Galenists about the nature and status of the elements, principles and the four bodily humors (blood, black bile, yellow bile, and phlegm). Neither does he formulate an alchemically inspired, mystical cosmology.¹¹⁰ His alchemical opinions stay within the limits of the

¹⁰⁸ See Davis (1973), 23-4.

¹⁰⁹ *Analogia Physico Chymia*. May 1, 1657. Quoted by Davis (1973), 22-3.

¹¹⁰ Cf. ‘...*the spirit of God moved upon the water*...that spiritual motion of the first mover, God, hath inspired all the creatures of this universal world, with that spirit of Life (which may be truly called the spirit of the world) which naturally moveth, and secretly acteth in all creatures, giving them existence in three, to wit, salt, sulphure and mercury, in one Hypostasis...Therefore this divine *Halchymie*, through the operation of the spirit was the beginning of *Time*, & of Terrestrial existence...’ (Duchesne, *The practice*, The epistle dedicatory - T. Timme.)

compromise reached during the first half of the 17th century by the Paracelsists, Galenists, and Aristotelians in England.¹¹¹ Warner seems to anticipate his chemiatic colleagues from the second half of the 17th century with his interest in the transformation and circulation of fluids in the body.

Warner's notes on the psychological functions of animal organisms contrast sharply with the contemporary writings on psychology from his fellow-countrymen. Elizabethan psychology was, to quote Kocher, '...a wild medley of...medical and religious attitudes...' ¹¹² that blurred the distinction between psychology and ethics. Most writers were, as might be expected, members of the clergy. ¹¹³ Their writings are focused on a precise determination of the nature, origin and destination of man, composed of a material, mortal body and an immaterial, immortal soul, as well as on his relationship to the rest of the world and above all to God. This implies that as a psychologist one was primarily interested in the passions as such, i.e. faculties of the sensitive soul shared with animals and tied to the body as well as in their relationship to reason, a power not originating from or dependent on the body and distinguishing man from animals. ¹¹⁴ Their views are based on reading, not on observation. Most of them restrict themselves to an, often, disorderly and hardly consistent compilation of traditional ideas without adding much of their own making. ¹¹⁵

Warner's psychological ideas have to be viewed against the back-drop of the Renaissance writings on the soul from the continent. ¹¹⁶ Though on the continent too philosophers, had to be careful not to contradict religion's teaching and though ethics too often played an important role in psychological considerations, continental philosophical psychology was on a higher level than it was in England until the late 17th century. The psychological literature was mainly inspired by Aristotle's *De anima*, the *Parva naturalia* and by his biological works together with their Greek, Arabic and Latin commentaries, summaries and paraphrases. This tradition was not

¹¹¹ See Debus (1965). Webster contests that already before c. 1640 there existed such a compromise. (See Webster (1975), 274.)

¹¹² Kocher (1969), 288.

¹¹³ Authors of psychological tracts like Timothy Bright, Robert Burton and Thomas Walkington were clergymen; Edward Reynoldes was Bishop of Norwich and Thomas Wright probably was a Jesuit. (See Kocher (1969), 288.)

¹¹⁴ See Babb (1948).

¹¹⁵ See Babb (1948) and Dowden (1920).

¹¹⁶ The following is based on Schmitt (1988), Section IX Psychology, chapters 13 to 15, written by Katharine Park and Eckhard Kessler respectively, 453-534. In these chapters the English Renaissance writings on the soul are not considered.

slavishly followed by the Renaissance philosophers but was critically assimilated and combined with elements from other traditions like Neoplatonism, Stoicism and Galenic medicine. Like Aristotle and his commentators they conceived the soul, that is, at least in man, as an immaterial and immortal substance of divine origin and as the internal cause of or the active principle behind all faculties and operations of living beings.¹¹⁷ Following that tradition they also distinguished between a vegetative, a sensitive and an intellectual soul. The vegetative soul would regulate nutrition, growth and reproduction. The sensitive soul was supposed to control not only these vegetative functions but also perception and all processes relating to motion. The intellectual soul was also responsible for the powers of the vegetative and sensitive soul as well as for the intellect and the will. Plants have only a vegetative soul, animals a sensitive soul and only man possesses a rational soul. The main difference between the sensitive and vegetative soul, also called the organic soul, and the intellectual soul is that the organic soul can only do its work using the body as its instrument while the intellectual soul exists and works independently of the body. As the science of the vital principle of living beings psychology constituted a part of natural philosophy. In fact it was considered as the culminating-point of the *scientia naturalis* linking this science to medicine and ethics.¹¹⁸

The investigation of the intellectual soul was still determined by the traditional distinction between the material body and the immaterial soul, the sublunar region and the heavens, the particular and the universal as well as by the problem of how to bridge the gap between these essentially different components of reality. One investigated the differences and resemblances

¹¹⁷ Cf. Suarez' two definitions of the soul '...adducitur ex Aristotele...una est, *Anima est actus primus substantialis corporis physice organici potentia vitam habentis. Alia est, Anima est id, quo vivimus, sentimus, loco movemur et intelligimus.*' (*Opera*, Vol. 3, 467). Charron presents exactly the same definitions. (See *Oeuvres*, 22.) Bartholomeus Anglicus describes the soul as a '...substantia vivens, simplex, & incorporea, corporeis oculis, secundum propriam naturam, invisibilis & immortalis, rationalis, intellectualis, infigurabilis, organico utens corpore, & huic, scilicet corpori vitae augmentationis sensus & generationis tributiva, non alium habens praeter seipsam intellectum, sed, partem suiipsius purissimam. Sicut etenim oculus in corpore ita est anima intellectus arbitrio libera & voluntatis & operativa, voluntate vertibilis, quoniam creabilis.' (*De rerum proprietatibus*, 48) According to Henry Bullinger 'The soul is a spiritual substance, poured of God into man's body, that, being joined thereunto, it might quicken and direct the same; but being dissevered from the body, it should not die but live immortal forever.' (Quoted in Kocher (1969), 229.)

¹¹⁸ Psychology, Melanchthon writes, '...aditum patefacit ad medicorum artem, cum naturam complexionum & membrorum describit...' and that '...incipia hic sunt philosophia moralis.' (Melanchthon (1540), 2.) See for Henry Percy's characterization of psychology Chapter 1, p. 12.

between the intellective soul and the senses as well as those between the active and the possible intellect, the ontological status of the intellective soul and principally the problem of the immortality of the soul.

The investigation of the organic soul was primarily of a physiological nature. Guided by the idea of the organism as a simple hydraulic machine composed of organs, fluids and spirits one was in search of adequate descriptions of psychological and psychophysiological processes, especially those bearing on sensation, in terms of causes and effects. One studied not only the soul itself including its faculties but also the corresponding organs and their operations: 'Frustra...de potencijs dicitur, nisi & organa monstrantur, quod cum faciemus, propemodum tota corporis humani descriptio inserenda erit. Prius igitur totum hominem depingo, ut quae postea de potencijs & actionibus dicentur, intelligi queant.'¹¹⁹

In the explanation of phenomena like sensory perception, memory imagination, emotion, etc one always combined, in other words, the psychological and biological aspects. Experience played a prominent part in these explanations but there was no experimentation. The strong interest in, especially the physiological aspect of the operations of the soul instead of in its nature led to two far-reaching changes in the traditional notion of the soul. Firstly, more and more writers began to identify the faculties, the ontological status of which was subject to debate, with the soul itself.¹²⁰ Secondly the attention gradually shifted from these faculties to the organs which ultimately resulted in the materialization of the organic soul, in so far as it came to be identified simply with the material spirit until then considered as nothing but the bodily instrument of the organic soul.¹²¹ Thus Telesio explained not only all functions traditionally ascribed to the organic soul but also the will, and all cognitive processes relating to the sensible world in terms of a spirit conceived as a material substance educed from seed and identified with the soul.¹²² Only man was supposed to have, apart from that spirit, an immaterial, immortal soul, infused by God, that would enable him to acquire knowledge of his supernatural salvation and beatitude.

As will appear from the following chapters Warner's notes on the psychological functions of animals show the same intriguing combination of traditionalism and originality that characterizes many of the continental

¹¹⁹ Melanchthon, *Commentarius*, 20v-21. Cf. Casmann: 'Anthropologia est doctrina humanae naturae. Humana natura est geminae naturae mundanae, spiritualis & corporeae in unum hypostameno unitae, particeps essentia.' (*Psychologia*, 1.)

¹²⁰ See Schmitt (1988), 479-81.

¹²¹ See op. cit., 483-4.

¹²² See *De rerum natura*, 177. Cf. Doni, *De natura hominis*, cap. I t/m IV. See for more information Chapter 3.

Renaissance writings on the soul. On one hand his purely speculative approach as well as his explanations of psychological processes in terms of matter, form, act, potency, faculties and their objects attest to his dependence on the Aristotelian and Scholastic tradition. On the other hand his rationalism as well as the blurred distinction in his speculations between bodily and mental processes suggest an influence of Italian natural philosophy from the last quarter of the 16th century, i.e. a number of comprehensive systems developed in reaction to Aristotelianism and based on the idea of the universe as an autonomous whole in the sense of a 'cosmic organism' or 'ensouled mechanism'.

Warner dissociates himself from the Scholastic tradition to the extent that he, in his ideas about the soul, pushes an unorthodox doctrine like that of Telesio to its extremes, anticipating developments to come later in the 17th century. He no longer struggles with the problem of the nature and origin of the soul or with the question of how and where the soul is located in the body, how it is related to its faculties and how, exercising these powers, it can use the body as its instrument. No longer distinguishing between the material and immaterial or between the irrational and rational as essentially different components of reality Warner can answer these questions easily. Accordingly, he also no longer distinguishes between an organic and a rational soul which implies, moreover, among other things, that in his view there is no essential difference between men and animals.¹²³ Animal organisms consist of structures and fluids made out of coarse matter, the passive component, and a very subtle material substance, the animal spirit that functions as the active component. Thanks to a number of active qualities, i.e. faculties, this spirit regulates all functions traditionally ascribed to the vegetative, sensitive, and rational soul. There is no mention in Warner's notes of a separate, immortal intellect by which we would be able to know the truth in general, or to acquire knowledge of God and our salvation in particular. As appears from several references to the animal spirit or parts of it as a soul or as souls Warner apparently conceived the soul as a material entity of which all operations can be reduced to local motion.¹²⁴ Animals, men included, are in his view nothing but self-regulating machines. As in his notes on the natural functions of animal organisms he develops a theory about circular or reciprocal processes to explain the fact that nature, if not hindered, does

¹²³ Yet he also wrote '...in irrationalibus there can be no volunty distinct from their appetite...' (BL Add. MS 4394, f. 268v) and elsewhere, contrasting the will with the appetite as a faculty requiring the intervention of reason, he brackets animals explicitly with fools and furious people as irrational beings. (See BL Add. MS 4395, f. 47 and Chapter 7, p. 206)

¹²⁴ See BL Add. MS 4394, ff. 208v, 226v; BL Add. MS 4395, f. 35.

exactly what its preservation requires, so in the notes concerning the voluntary or animal functions Warner, guided by the idea of reason as the emulator of nature, is after an analogous explanation of goal-directed behaviour.¹²⁵

2.5. *Nature and Reason*

Warner divides the faculties of animal organisms in two groups: the brute, i.e. ‘naturall’ or ‘spontaneall’ faculties and the ‘cognoscitive’ or ‘voluntary’ faculties.¹²⁶ Sensation, digestion and the assimilation of food are taken care of by the brute faculties, i.e. by ‘nature’. Cognition and locomotion, required for the gathering of food, are controlled by the voluntary faculties, i.e. by ‘reason’.

He makes a corresponding distinction between natural acts and acts that are ‘...morall or consuetudinary or acquisita per habituationem...’¹²⁷ Thus, for example, while ‘...the originall acts of our locomotions...are...naturall and spontaneall...the succeeding acts are...understood to be ex habitu and voluntary.’¹²⁸ Accordingly, natural operations are characterized by the fact that they do not require training. They also are invisible like the ‘pulsificall faculty of the spirit’ that is ‘...spontaneally and nobis non percipientibus derived to the hart...’.¹²⁹ Further they are activated spontaneously, i.e. driven by natural necessity. Thus ‘...the first acts of...our simple voluntary motions may be understood and accounted spontaneall or necessary or naturall...’¹³⁰ and ‘...of all...reall phenomenes...there is naturally and necessarily, scilicet non arbitrio sentientis seu intelligentis sed spontaneò seu necessaria naturae ordinatione, a true or iust (analogate) record or notion taken...’.¹³¹ Consequently, natural faculties are continuously in operation. This implies that these faculties are ‘...actuuated without cognition...’¹³² Their performance

¹²⁵ ‘...ratio aemula naturae...for as nature generates destroys, makes alternations, produces differences changes, transposes the things themselves <in campo physico> and qualifies and actuates them for object [un]to the faculties sensitive so the faculty syllogistik or reason compounds, divides, <abstracts>,...presents the past or futur or econtra applies, compares the fantasms of the sensitive in campo phantastico...’ (Op. cit., f. 20.) Cf. Fr. Bacon, *The works*, Vol. 1, 496.

¹²⁶ See Chapter 3, note 179.

¹²⁷ BL Add. MS 4394, f. 240r.

¹²⁸ BL Add. MS 4395, f. 42.

¹²⁹ BL Add. MS 4394, f. 139v. See also op. cit., f. 175v. In a note about the faculties of the animal organism in utero it is said that its ‘...media of the privation of dolor...depend partly on the arbitrary <and overt> operation of the parent and partly on the spontaneall <and secret> operation of nature...’ (Op. cit., f. 265r) See also Chapter 6, section 6.2.

¹³⁰ BL Add. MS 4395, f. 43.

¹³¹ BL Add. MS 4394, ff. 240r-239v. See also op. cit., ff. 166r, 167r.

¹³² BL Add. MS 4395, f. 41.

does not, like that of the voluntary faculties, require conscious deliberation.¹³³ As ‘...natura quantum fieri potest agat per pauciora; hoc est non per duo cum idem fieri possit per unum...’ natural faculties also never do more nor less than is required.¹³⁴ As long as they are not hindered and the organism is healthy they operate faultlessly and with absolute certainty. This does not mean that nature is a blindly operating mechanism. Natural processes are controlled by causal necessity indeed but to the extent that nature has arranged ‘...a sure and infallible way for the conservation of her worke...’ she can be said to be provident.¹³⁵ She is provided with a providence ‘not arbitrary but of necessity’ which ‘...is to be noted herein that quod necessitate materiae evenit melioris gratia fieri videtur.’¹³⁶ All this means that nature’s operations are goal-directed. Accordingly, Warner discusses all kinds of phenomena as if they were the results of natural intentions. The ramification of the trachea in the lungs, for example, argues ‘...the intention of nature to be...the commixtion of the aire with the bloud...’¹³⁷ or thirst ‘...is originally and ex intento naturae the sense of distemper or incrassation of the bloud.’¹³⁸ Consequently, natural faculties and operations, in Warner’s view, are ‘...as apprehensive (yf that terme may be proprely used) and as provident and appetent of their conservation as...faculties and operations cognoscitive...’¹³⁹ The sense of taste, for example,

‘...being ordained by nature merely to take the assay of those materialls that were ingested into the mouth and thereby to distinguish and iudge which were apt for nutrition and to be taken and which unapt or noxious and to be reiected or eschewed the senses approbation of those that are pleasing unto it doth seeme to be the sentence of nature wherein she doth pronounce, these materialls do hold incorporated in them an active spirit that being congruent to the animall spirits is apt to become plasmatik and successively animall spirit and therefore to be taken for the restauration thereof...’¹⁴⁰

The operation of animal powers, dependent on cognition, requires training. There is, for example,

¹³³ ‘...the pulsatory motion being perpetuall without intermission or discontinuation hath no need of any notions or concepts to be retayned...for the voluntary reactivation thereof...’ (Op. cit., f. 43) See also op. cit., f. 42.

¹³⁴ BL Add. MS 4394, f. 136r. Nature ‘...non impedita nec occasionata nihil agit non necessarium...’ (Op. cit., f. 166r).

¹³⁵ BL Add. MS 4395, f. 4.

¹³⁶ BL Add. MS 4394, f. 161r.

¹³⁷ Op. cit., ff. 133v-134r.

¹³⁸ BL Add. MS 4395, f. 9.

¹³⁹ BL Add. MS 4394, f. 163v.

¹⁴⁰ Op. cit., f. 188r.

‘...in all our locall motions whether simple or compounded...this community that as their organs are gradually perfected and habituated by consuetudinary practise and exercise of them or by frequentation of their acts so the notions or concepts of them in campo phantastico are in like proportion gradually fixed and habituated so as the notionall habit of our motions is allwais analogate to their habit reall and organicall...’¹⁴¹

They also do not operate necessarily and spontaneously but require deliberation and a conscious choice. They always grow, in other words, ‘...ex praecedente consilio, seu ratione seu argumentatione seu syllogismo vel explicito vel implicito...’¹⁴² Hence, rational powers do not operate continuously but only if the organism for some reason or another chooses to exercise these powers. As opposed to natural operations rational operations are voluntary in the sense that they can only be executed after an imagined performance of the operation in question. Thus while animals start moving spontaneously their

‘...succeeding motions, the phantasy being preinformed with analogate impressions or ideas of the like can not be acted without recognition or refantasiation of those impressions, that is to say that the faculty motive ether can not or doth never execute his function without ether tacit or apparant consultation with the cognoscitive or without speculating the preexistent fantasms...’¹⁴³

As opposed to the operations of nature which are simple those of ‘reason’ are intricate¹⁴⁴ and while ‘nature’ operates perfectly ‘reason’, being nothing but an imperfect imitation of ‘nature’¹⁴⁵, ‘...may easely erre doing more then is necessary...’¹⁴⁶

Both, nature and reason, in their operation are rational and goal-directed.¹⁴⁷ Nature even is said to perform its operations sometimes, like reason,

¹⁴¹ BL Add. MS 4395, f. 43.

¹⁴² BL Add. MS 4394, f. 143v.

¹⁴³ BL Add. MS 4395, ff. 42-41.

¹⁴⁴ ‘...plesure and paine...caused...by the [simple] action of things externall in campo physico ioy and sorow caused...actuated and presented by the intricate operation of reson...’ (Op. cit., f. 22)

¹⁴⁵ ‘...natura non decipitur, ratio multu et sepe’ (BL Add. MS 4394, f. 166r) Cf. Gilbert: ‘...these movements in nature’s founts are not produced by thoughts or reasonings or conjectures, like human acts, which are contingent, imperfect and indeterminate, but connate in them are reason, knowledge, science, judgement, whence proceed acts positive and definite from the very foundations and beginnings of the world.’ (*De magnetes*, 311-12.)

¹⁴⁶ BL Add. MS 4394, f. 166r.

¹⁴⁷ Accordingly, Warner’s opposition of nature and reason does not coincide with Bacon’s distinction between material and efficient causes as the objects of ‘Physic’ on one hand and formal and final causes as the objects of ‘Metaphysic’ on the other. (See *The works*, Vol. 4, 346.)

organically or artificially, i.e. to use instruments. While, for example, the spontaneous distribution of nutrients through the body is effected ‘organically’ the formation of bodily organs ‘...is spontaneall but inorganicall that is to say merely naturall as they terme it...So...the action of the one is in a maner artificiall by a certaine artifice of nature and that of the other merely naturall.’¹⁴⁸ There are only two essential differences. While natural processes do not require training and proceed without self-consciousness, i.e. without a preliminary imagination of the operation in question and therefore involuntarily ‘faculties cognoscitive’ have to be trained and can only be exercised voluntarily, i.e. instigated by a choice on the basis of a mental performance of the operation in question. All other differences between ‘nature’ and ‘reason’ are gradual. In relation to ‘nature’ animals are passive and suffer the operations of ‘nature’; in relation to ‘reason’ they are active, i.e. initiate the operations themselves.

Warner’s distinction between ‘nature’ and ‘reason’ points to Aristotle. By ‘nature’ Aristotle understands something that is simultaneously controlled by necessity and goal-directed¹⁴⁹, that, as opposed to the mind, i.e. the calculative faculty, always operates unconsciously and without deliberation¹⁵⁰, efficiently and economically¹⁵¹, something that functions faultless and is absolutely reliable.¹⁵² Warner’s notion of nature also is marked by Galenism. Galen talks about nature as a skilful, wise and just demiurge.¹⁵³ She never attempts the impossible. She is provident¹⁵⁴, always just, and gives everything exactly what it needs.¹⁵⁵ Nature always does right and hardly ever makes mistakes.¹⁵⁶ She does nothing in vain¹⁵⁷, and never abruptly changes from one opposite to the other.¹⁵⁸ Limited by necessity, she always provides the best possible solution.¹⁵⁹

¹⁴⁸ Op. cit., f. 173v.

¹⁴⁹ See Aristotle, *The Physics*, II, ii; *Parts of Animals*, 641b10. The suitability of nature also implies that she is beautiful for purposes fall under the head of beautiful things. (Op. cit., 645a25) Cf. Warner’s view that in nature you will find ‘...nihil foedum vel turpe.’ (BL Add. MS 4394, f. 198r.)

¹⁵⁰ See *On the soul*, 432b26. Cf. Aristotle’s distinction between *αυτόματων* and *τύχη*. (*The Physics*, 198a6-14).

¹⁵¹ See Aristotle, *Generation of Animals*, 739b20, 744b20.

¹⁵² See Aristotle, *Progression of animals*, 711a5.

¹⁵³ See *On the usefulness*. Introduction, 10-11.

¹⁵⁴ Ibid.

¹⁵⁵ See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera* (1549), Vol. 1, 444 and 699. (Kühn, Vol. 3, 83-4, and 846.)

¹⁵⁶ See op. cit., 711. (Kühn, Vol. 3, 885.)

¹⁵⁷ See op. cit., 765, 804, 807. (Kühn, Vol. 4, 112, 228-9, 240.)

¹⁵⁸ See op. cit., 797. (Kühn, Vol. 4, 208.) Cf. Warner: ‘...natura non facit saltum.’ (BL Add. MS 4395, f. 59.)

¹⁵⁹ ‘...homines in utilis delectu saepe falluntur, cum id, quod hac in re utile sibi fore putarant, in alijs nescio quo pacto incommodi plus adferre experiuntur. At natura contra nunquam ne in uno quidem suorum operum inconsiderate aut socorditer magna incommoda ob minus bonum eligit, sed exacta

Trying always to be useful and functional she is also beautiful.¹⁶⁰ Sometimes Galen identifies ‘nature’ with the soul¹⁶¹ but also with innate heat, a ‘substance self-moving and ever-moving’ and, elsewhere in his work, said to function as the primary instrument of nature as well as of the soul.¹⁶²

2.6. *Mechanicism and Hylozoism*

The chemical explanations of physiological processes and the comparison of living beings with machines run like continuous threads through Warner’s notes on animal organisms. The mechanical view of organisms was one of the leading paradigms in 17th century science. Descartes, comparing the body with moving statues, clocks, fountains and with other mechanisms supposes

‘...que le Corps n’est autre chose q’une statuë ou machine de terre, que Dieu forme tout exprés, pour la rendre la plus semblable à nous qu’il est possible...Nous voyons des horloges, des fontaines artificielles, des moulins, & autres semblables machines, qui n’estant faites que par des hommes, ne laissent pas d’avoir la force de se mouvoir d’elle-mesmes en plusieurs diverses façons; et il me semble que je ne sçaurois imaginer tant de sortes de mouvemens en celle-cy, que je suppose estre faite des mains de Dieu, ny luy attribuer tant d’artifice, que vous n’ayez sujet de penser, qu’il y en peut avoir encore davantage.’¹⁶³

Sir Kenelm Digby compares living beings with a machine he saw in Segovia for the striking of coins:

‘For in them, though every part and member, be as it were a complete thing of it selfe, yet every one, requireth to be directed and putt on in its motion by an other; and they must all of them (though of very different natures and kindes of motion) conspire together to effect any thing that may be, for the use and service of the whole. And thus we find in them

mensura quantitatem in singulis iudicans, infinitis partibus ipsum utile, eo quod noxium est, amplius semper efficit.’ (Op. cit., 534.) (Kühn, Vol. 3, 354.)

¹⁶⁰ See op. cit., 716. (Kühn, Vol. 3, 899.)

¹⁶¹ ‘Utrum autem naturam, an nutritiam animam nominare oporteat, iis investigandum relinquo, qui in nominibus tantummodo sunt ingeniosi, in hisque omne vitae suae tempus conterunt, perinde ac si non possent utiliora quamplura requirere, aut non res ipsa per utramque dictionem satis indicetur.’ (Op. cit., 519.) (Kühn, Vol. 3, 309).

¹⁶² ‘Sicut...homo animal est omnium perfectissimum, ita in eo ipso rursus vir muliere est perfectior; cujus perfectionis causa est caloris exuperantia. Hic enim primum est naturae instrumentum.’ (Op. cit., 782.) (Kühn, Vol. 4, 161.) See also *On the usefulness*, Vol. 1, Introduction, 52.

¹⁶³ AT, Vol. 11, 120.

perfectly the nature of a mover and a moveable; each of them moving differently from one another, and framing to themselves their own motions...And now because these partes (the movers and the moved) are partes of one whole; we call the entire thing *Automatum* or *se movens*; or a living creature.’¹⁶⁴

Gassendi propagates the study of nature as if it were an artifact.¹⁶⁵ According to Boyle nature is nothing but an ‘...admirably contrived automaton’.¹⁶⁶ These philosophers did not use the machine-model as a metaphor but actually believed that living bodies were nothing but intricate automata the operations of which could be explained purely in terms of matter and motion.¹⁶⁷ At the same time they restricted this mechanistic approach to material bodies conceiving matter as something dead, passive and devoid of psychological properties or powers. These belong exclusively to the soul, a substance, says Descartes, ‘...qui, pour estre, n’a besoin d’aucun lieu, ny ne depend d’aucune chose materielle.’¹⁶⁸ The soul, in other words, was conceived to be completely distinct from the body and as such was supposed to be beyond the domain of mechanics.

Descartes and his kindred spirits were not the first to use this machine-model in their explanations. In fact it has a long tradition stretching back at least to Aristotle who compares the sequence of embryonic transformations with processes in automatic puppets.¹⁶⁹ Actually Aristotle rarely opposes the organism to the mechanism.¹⁷¹ Galen, following Aristotle, compares the respiratory apparatus with mechanical bellows and the bloodstreams with a

¹⁶⁴ *Two treatises*, 208. Cf. Power: ‘...the Brain, Spinal Marrow, and Nerves, Membranes, and Fibers, which are as it were the Cords, Sayls, and Tackling, to move this Engine or Vessel we call the Body.’ (Power (1666), 66.)

¹⁶⁵ ‘Etenim tametsi ipsi nos non fimus, qui nostrâ industriâ res huiusmodi adoperemur, nihilominus, quia sive Naturam, sive Naturae Opificem pro illarum causa habeamus, philosophamur de iis instar rerum, quarum ipsi Authores sumus (imò & ex iis, qui mundum infectum putârunt, non defuere, qui ipsum tanquam factum supponerent, ut de eius structura, seu compagine concinnius philosopharentur) idèd circa ipsas non absimili procedimus modo.’ (*Opera*, Vol. 1, 122-3.)

¹⁶⁶ See Rattansi (1972), 21. According to Dr. Richard Mead (1673-1754) near the end of the 17th century it was generally recognized that the human body is ‘...a hydraulic machine contrived with the most exquisite art, in which there are numberless tubes properly adjusted and disposed for the conveyance of fluids of different kinds. Upon the whole health consists of regular motions of the fluids, together with a proper state of the solids, and diseases are their aberrations.’ (Quoted in Westfall (1971), 96.)

¹⁶⁷ See Brown (1969).

¹⁶⁸ AT, Vol. 6 (Paris 1973), 32-33. See also *Traité des passions*, art. 3 and 4. (AT, Vol. 11, 329) Cf. Digby (1644), 402.

¹⁶⁹ See *Generation of Animals*, 734b10, 741b7.

¹⁷⁰ See *Generation of Animals*, 734b10, 741b7.

¹⁷¹ Aristotle uses the term ἔργον often in the sense of ‘machine’. (See Bonitz (1955), 521-2.)

system of waterworks and canals like a garden water-supply.¹⁷² Aquinas, in connection with the acumen of animals, guided by appetite and instinct, states that ‘...idem apparet in motibus horologiorum, et omnium ingeniorum humanorum quae arte fiunt...Et propter hoc etiam quaedam animalia dicuntur prudentia vel sagacia: non quod in eis sit aliqua ratio vel electio.’¹⁷³

In all these cases we are dealing with global comparisons in which the ‘machine’ is used only as a metaphor. Such global, metaphorical comparisons were still often used in Warner’s day to explain the operation of organisms. John Davies, for example, talks about the heart as ‘...that clocke within our breasts we beare...’¹⁷⁴ According to John Case

‘Ut...toto horologio quiescente & loco suo affixo, rotae in circulum moventur & optimè designant horam: ita toto homine quiescente, cor quod est veluti horologium vitae, pulmones & spiritus qui sunt veluti rotae, agitantur, & agitatione sanitatem firmiorem reddunt.’¹⁷⁵

In the course of the 16th century these comparisons undergo a subtle change. They become more detailed and slowly but surely change from metaphors into factual descriptions. Thus when Fabricius of Aquapendente explains the function of the valves in the veins by a comparison with water-mills that is more than just a figure of speech in so far as there is a real similarity involved.¹⁷⁶ The same holds true for Timothy Bright’s comparison of the soul with a clock to explain the fact that, though it has but one undivided power, it is able to bring about a diversity of effects

‘We see it evident in automaticall instruments, as clockes, watches and larums, how one right and straight motion, through the aptnes of the first wheele, not only causeth circular motion in the same, but in divers others also: and not only so, but distinct in pace, and time of motion: some wheeles passing swifter then other some,

¹⁷² ‘Canales multi per omnes partes sparsi, sanguinem his veluti in hortulo quandam rigationem, adducunt...’ (*De facultatibus naturalibus. Libri tres, Thoma Linacro interprete. In: Opera (1549), Vol. 1, 1181.*) (Kühn, Vol. 2, 210-11.) According to Siegel Galen compares the arteries also with the pipelines of a Roman space heater. (Siegel (1968), 87).

¹⁷³ *Summa*, Ia sec., q. XIII, art. 2, 68.

¹⁷⁴ *Nosce Teipsum*, 49.

¹⁷⁵ *Lapis philosophicus*, 85.

¹⁷⁶ ‘Similem sane industriam hîc natura machinata, atque in molendinarum machinis ars molitur, in quibus artifices, ut aqua multa detineatur, ac pro molendinarum, ac machinarum usu reservetur, obstacula nonnulla, quae latine septa, & claustra, vulgo autem clausas, & rostas vocant, apponunt in quibus maxima aquae copia, atque in summa ea, quae necessaria est, veluti in apto ventre colligitur...Aeque profecto natura in venis ipsis, quae veluti fluviorum canales sunt per ostiola...’ (*De venarum ostiolis.* (1603) In: *Opera*, 151.) Cf. Jean Riolan: ‘The circulation of the blood is as necessary for the continued movement of the hart as in mills is the stream of water which flows over the wheels and drives their revolution...’ (*Encheiridium anatomicum et pathologicum*, Leyden 1649. Quoted in Whitteridge (1971), 182; Cf. Descartes, AT Vol. 11, 30 ff.

by divers rases: now to these devises, some other instrument added, as hammer and bell, not only another right motion springeth thereof, as the stroke of the hammer, but sound also oft repetead, & delivered at certain times by equall pauses, and that either larum or houres according as the parts of the clocke are framed...So many actions diverse in kinde rise from one simple first motion, by reason of variety of ioynts in one engine...Now if this be brought to passe in artificiall practises, & the variety of action infer not so many faculties, but meere dispositons of the instruments: let the similitude serve to illustrat that unto you, wherto the reasons before alleadged, may with more force of proof induce you.’¹⁷⁷

To Bright this comparison does not mean that the soul is a machine and the body a toy of purely mechanical forces. It does not operate ‘...as ingens, by a force voyd of skill and cunning in it self, & by a motion given by devise of the mechenist: but far otherwise indued with science, & possessed of the mover...’¹⁷⁸ Thus living bodies to Bright are not identical with but show certain similarities to machines. At the same time there is an essential difference in so far as machines, dead constructions, are driven from outside while organisms carry their active principle within themselves.

Considering the rise of ‘chemical philosophy’ in England since the 1580s, not to mention Henry Percy’s keen interest in alchemy Warner’s chemical analogies and chemical explanations of organic processes should not come as a surprise. Perhaps he read Timme’s translation of Quercetanus’ exposition of ‘hermetic medicine’ and knew his characterization of creation as the product of a ‘divine Halchymie’. He probably also would have agreed with Henry Power’s comparison of the soul and of nature in general with a chemist.¹⁷⁹ His use of the machine-model seems closer to that of Fabricius of Aquapendente or Bright than to the radical mechanistical approach of Descartes or Boyle. When he describes animals as machines Warner does not mean to say that they are dead, blind, irrational mechanisms. ‘Nature’, just like ‘reason’, is a living force, driven by the urge for self-preservation and procured with all mental powers required to achieve that end. Warner seems to share with Renaissance philosophers an animistic, hylozoistic world-picture. He seems, in other words, to conceive this world not as a dead mechanism but as a living, animated organism. To get a better view of what he does mean when

¹⁷⁷ *A treatise*, 66-67. See for more information on this topic Berthier (1914 and 1920/21).

¹⁷⁸ *Op. cit.*, 61.

¹⁷⁹ See on Timme note 110. Cf. Power: ‘...the Soul...(like an excellent Chymist)...does...by...several Physico-Chymical operations...strive...to unfix, exalt , and volatilize the Spirits contained in our nutriment, that so they may be transmitted to the Brain...’ (*Experimental philosophy*, 65.)

talking about living beings as if they were machines, we will have to scrutinize his ideas about the nature and operation of the active principle in animal organisms, i.e. about the animal spirit and its faculties.

Chapter Three

The Doctrine of The Spirit and its Faculties

The Spirit

3.1. History and Sources

William Harvey (1578-1657) was one of the few, if not the only one in his day, to oppose the doctrine of the medical spirits, i.e. a very subtle, active substance, linking body and soul, that was supposed to account for the action of the immaterial soul in the material body.¹ He did not reject the notion of spirits as such, but the idea of blood as an elementary, purely material mixture used by the spirit, conceived as a separate substance, to wit, ‘...a body...most simple, subtle, fine, mobile, swift, lucid, and ethereal and that partakes of the five essences.’² In fact, as for these spirits

‘...what they are, and of what consistence, and how they are in the body, whether they be apart and distinct from the solid parts, or mix’d with them, there are so many and so diverse opinions that it is no wonder if Spirits, whose nature is left so doubtfull, do serve for a common escape to ignorance...none of these we have found by dissection...and those who make corporeal Spirits, sometimes say, that the blood or thinnest part of the blood, is the conjunction of the soul with the body; sometimes they say, that the Spirits are contained in the blood (as flame in smoke) and sustain’d by the perpetuall flux of it; sometimes they distinguish them from the blood.’³

If there is such a thing indeed why, Harvey wonders, can its proponents not reach agreement on its nature, kinds and its mode of existence? With this criticism Harvey does not imply that there is not something in organisms that makes them grow and move. However, according to Harvey, that something cannot be separated from the blood for ‘...blood and spirit make one body (like

¹ Cf. Crooke: ‘...the distance is not so great betweene the highest heaven and the lowest Earth, as is the difference betwixt the Soule and the Bodye. It was therefore very necessarie that a spirite should be created, by whose intermediate nature, as it were by a strong though not indissoluble bonde the Divine soule might bee tyed to the bodie of the Earth.’ (*Microcosmographia*, 173-4.) See further Walker (1984).

² *Disputations*, Chap. 71, 375.

³ Quoted from Harvey’s letters to Jean Riolan jr. in Whitteridge (1971), 191. See also Pagel (1967), 252-55.

wey and butter in milk, or heat and water in hot water)...'.⁴ Already in the 1610s, long before his classic on the circulation of the blood appeared, Harvey was of this opinion.⁵ As we saw in the first chapter Rolleston suggested that Harvey formulated his criticism and developed his own theory in reaction to Warner's doctrine.⁶ Though this might have been the case Harvey actually voices his criticism in a debate with Riolan jr. and adduces J. C. Scaliger and Fernel as typical representatives of the doctrine he opposes. He could have referred to almost anyone of his colleagues. Most of them adhered to a doctrine based on Aristotle's theory of the 'connate pneuma' and/or Galen's pneumatology. Aristotle understood by Σύμφυτον Πνεύμα the carrier of the soul as well as of the motions through which it operates. This spirit is present in each animal from its conception to its death. Though it is material it is not made of air. In fact, like vital heat, it is related to ether and therefore ungenerated, indestructible and divine.⁷ According to Galen inspired air is refined in the lungs. From there together with blood it goes to the heart, where mixed with some extra blood, it is transformed by a further purification into vital spirit. Galen identifies that kind of spirit with the inborn pneuma. Together with blood it is diffused by the arteries through the whole body. Through the carotid arteries it enters the rete mirabile (retiform plexus) where it is still further refined, enters the brain and is transformed into psychic pneuma or animal spirit which, therefore, is nothing else but modified air fed by arterial blood. From the brain it is dispersed through the nerves enabling the organism to move and to perceive.⁸ In the pseudo Galenic *Medical Definitions* there is also mention of a natural spirit from the liver controlling the vegetative functions. In fact Galen considers the possibility that there is indeed such a spirit.⁹ However, in his own theories it hardly plays a role. His followers were less troubled with doubts in that regard and claimed straightforwardly not only, that apart from the vital and animal spirit, there is

⁴ *The movement*, 13-4. See further Whitteridge (1971), 224 and Pagel (1967).

⁵ '...spirit and blood [are] one thing, as serum and wey in milk...' (*Lectures*, 85v/203. See also 92r/218.)

⁶ See Chapter 1, p. 35.

⁷ See Peck (1953). In fact Harvey attributes to the blood what Aristotle calls 'connate pneuma'. It is related to the supra elementary ether, a divine instrument corresponding to the essence of the stars. (See *Disputations*, Chap. 71, 377-8.)

⁸ See *On the usefulness*, Vol. 1, Introduction, 46-7. See also Temkin (1951).

⁹ '...animalis spiritus cerebru veluti fontem esse, clare ostendimus, qui partim ex inspirando, partim ex eo quod reticularis plexus suppeditat, irrigatur atque alitur. Vitalis spiritus non aeque evidens demonstratio erat. Sed tamen in corde eum & arterijs contineri existimare, alienum à ratione non est: eundemque nutritum maxime quidem ex inspirando: sed tamen & ex sanguine. Quòd si naturalis quoque aliquis spiritus est, utique is quoque in iecinore & venis continebitur.'" (*Galen de medendi methodo libri xiiij. Thoma Linacro interprete. In: Opera (1549), Vol. 6, 300.)* (Kühn, Vol. 10, 839.)

a natural spirit generated in the liver but also, that there is a threefold innate spirit. According to Archangelo Piccolomini, for example, the first spirit connects the animal faculty with the substance, the second the vital, and the third the natural faculty. Looking at that function they have to differ in kind. After all, the corresponding psychic powers also differ in nobility.¹⁰ He adduces eight reasons for the existence of a natural spirit.¹¹ Laurentius, too, states that since there are three groups of psychic powers, three corresponding principles (brain, heart and liver) and three auxiliary organs (veins, arteries and nerves) there also must be three essentially different kinds of spirit.¹² Moreover many physicians identified the innate spirit with inborn heat.¹³

In the course of the 16th century Aristotelianism entered into competition with the 'Galenic' doctrine of three spirits. Argenterius (1514-1572) contests the idea that there can be several substantially different spirits. There is no reason, in his view, to assume the existence of a special animal spirit for the part of the body in which that, according to Galen, would be produced, the plexus mirabilis', does not exist in man and even if it did the brain is far too cold to be able to generate such a kind of spirit.¹⁴ Argenterius accepts only one kind of spirit conceived as a nebulous substance evaporating from the blood in the heart that, depending on the part of the body in which it operates, accomplishes different functions.¹⁵ It is not of a celestial, ethereal origin¹⁶ but consists mainly of air, water and fire.¹⁷ It is not transported through the nerves but through the arteries.¹⁸ In fact it is nothing but the inborn heat itself.¹⁹ It neither transports nor is provided with faculties itself but actuates the different parts of the body by generating heat in them with its own heat.²⁰ Caesalpinus

¹⁰ See *Anatomicae praelectiones*, 121.

¹¹ See op. cit., 120-122.

¹² *Opera*, 402. See also Crooke, op. cit., 528.

¹³ '...quidam à primis natalib. singulis partibus affixus, omnium naturalium functionum minister, à calore influente sola differens ratione.' (Riolan (Sr.), *Opera*, 162.) See also Chapter 1, note 349, Sennert, *Opera*, 423 and Doni, *De natura hominis*, F. 65 .

¹⁴ *Opera*, 2081-82, 2093B.

¹⁵ Op. cit., 2076D. 'Spiritus est exhalatio quaedam ex benigno sanguine et humore viventibus proprio assurgens.' (Op. cit., 272E.)

¹⁶ Op. cit., 2076D.

¹⁷ '...spiritus ille, qui immittitur aliunde, & autor est omnium operationum, & vehiculum caloris, à corde omnino nascitur, effluitque per arterias in universum corpus...gignitur autem in ipso corde, ex universis quidem humoribus, quos sanguinis nomine nuncupamus, sed tamen plurimam sui portionem accipit ille ex aerea, aquea, & ignea materia.' (Op. cit., 2090B.)

¹⁸ Op. cit., 2094A.

¹⁹ Op. cit., 2090D.

²⁰ Op. cit., 2092A-B. See for a comparable criticism of the Galenic pneumatology Schegk. *Tractationum*, 210-25, 253-69.

(1524-1603) rejects Galen's idea that air enters the left ventricle of the heart. In his view the windpipe and blood-vessels in the lungs do not communicate. Besides a spirit can only be generated by a heated fluid. Vital heat as well as animal spirit are products of nourishment received through the veins from the stomach.²¹ Zabarella (1533-1589) opposes Galen's idea of the spirit as the seat of the soul. It is only an instrument. Moreover there are not several spirits. There is just one vital spirit generated in the heart from where, by the arteries, it is diffused through the body operating all functions of the organism.²² Servetus (1511-1553) too states explicitly that there is only one, albeit multifunctional, spirit stemming from the inborn, divine spirit in the blood.²³ Timothy Bright (1551?-1615) presents a similar theory. Man consists of a 'bodie of earth' and a 'soul inspired from God' connected to each other by a spirit functioning, as it were, as '...a true love knot, to couple heaven & earth together...'²⁴ It is '...an effectuall, & pregnant substance, bred in all things...' when the spirit of the Lord hatched all living things from the bodily chaos and procured them with their own spirit.²⁵ Though stemming from a 'divine influence of life' this spirit, in so far as it is nourished by 'earthlie creatures', is 'corporall and earthly'.²⁶ This implies that the spirit has a beginning and end, and that, depending on the alimentionation, there can be a shortage as well as a surplus of spirits.²⁷ Thanks to this spirit as its chief and direct instrument, an instrument '...of substance, & nature most quick, rare and subtile...', the soul can act on the body. Using its several organs the soul, through this one spirit, takes care of all organic functions.²⁸

The Galenic pneumatology was also attacked by 16th century anti-Aristotelians like Agostino Doni and Bernardino Telesio.²⁹ Doni rejects the distinction between natural, vital and animal spirits. His main contention is that it is impossible to produce such spirits and that, if they could be made, this certainly could not be done in the liver, heart

²¹ Calidum...& spiritus animalis non ex aere sed ex alimento per venas affluente ex ventriculo fit.' (*Peripateticarum quaestionum*, f. 108r.)

²² '...omnem calorem esse eiusdem speciei...ita spiritus omnes in toto animalis corpore eiusdem esse speciei, & vitales vocandos, & in solo corde generari...' (*In Aristotelis libros de anima*, 307F.) See for his criticism on Galen *De rebus naturalibus*, 748-52.

²³ See Servetus. *A translation*, 204.

²⁴ *A treatise*, 34.

²⁵ Op. cit., 44.

²⁶ Op. cit., 35-6.

²⁷ Op. cit., 45.

²⁸ Op. cit., 65.

²⁹ Usually Doni is unjustly presented as a pupil of Telesio and as a divulgator of Telesianism. In fact he not only is more radical in his materialism than Telesio but his tract on the nature of man was also published before Telesio's writings on man appeared. See on their relationship Fiorentino. (1872), 323-41; Garin (1971), 199-204.

and brain. In fact there is only one kind of spirit.³⁰ Telesio's criticism is focussed on Galen's distinction between operations originating from the soul and functions controlled by nature.³¹ He rejects, in other words, Galen's distinction between actions that, being guided by the soul, are based on a conscious choice and, like, for example, talking, can be stopped or started at will and involuntary processes like digestion ruled by nature. According to Telesio all operations of an organism proceed from the soul, meaning that they are effects of one and the same living, sentient and cognizant, i.e. consciously operating substance.³² From the mere fact that the several parts of a healthy body in their operations are perfectly attuned it appears that an animal is controlled by *unica animae substantia*.³³

Towards the end of the 16th century the debate about kind and number of spirits seemed to subside. In the course of the 17th century the attention shifted to the question of whether spirits are self-subsistent and whether the operations of an organism can be explained purely mechanically at all. Perhaps inspired by Melanchthon in particular, a growing number of writers reverted to Galen's doctrine of the vital and animal spirit.³⁴ Another alternative was offered by Paracelsus and his followers.³⁵ The theories discussed thus far are all based on the traditional doctrine of the elements and on the idea that spirits partake in the elementary qualities. According to Paracelsus all natural things consist of a pattern of invisible, spiritual forces covered by visible, coarse matter. These forces manifest themselves most clearly in earth, water, air, fire, sulphur, mercury and salt. In Paracelsus' view not these substances, but the enclosed forces constitute the true principles and elements. They are not purely immaterial but consist of a mixture of the finest corporality and spirituality. As the seeds of all things they give them their nature and properties. These seeds are hatched in water, earth, fire and air. The latter, in

³⁰ 'Non recte constituisset Galenum tria principia separata in animali diversarum facultatum, neque earum facultatum illa esse principia, neque esse omnino principia. Neque spiritum animale a cerebro gigni aut efformari, neque a corde vitalem, neque a iecore naturalem; non liquere qui ij gerant facultates. Spiritum vitalem naturalem videri et animale; naturalem vitalem; animale vitalem.' (*De natura hominis*, F. 40. See also F. 50-1.)

³¹ "Quod animal universum ab unica animae substantia gubernatur. Contra Galenum." In: *Varii de naturalibus rebus libelli*, 191.

³² Op. cit., 209, 221.

³³ Op. cit., 267.

³⁴ See Melanchthon. *Commentarius*, 76v, 103r, 105r, 107v, 134r, and 135v. Cf. Descartes, AT, Vol. 11, 129-30 en 6, 49-56, 111; Hobbes, OL, Vol. 1, 328-29 and the AW, 327. By the way, according to Hobbes animal spirits are not generated in the brain but in the medulla oblongata.

³⁵ The following sketch of paracelsism is mainly based on Pagel (1958), 82-104. See also Hooykaas (1933) (Especially chapt. VIII "De school van Paracelsus").

their turn, are rooted in sulphur, salt and mercury i.e. the three principles. Paracelsus considers them as the constituents of the seeds, the principles that give material things their proper nature. Mercury is the principle of activity, sulphur of structure, and salt is the principle of solidity. According to Joseph du Chesne (1546-1609), better known as Quercetanus, a widely read Paracelsist in England in Warner's day, man consists of spirit, soul and body expressed in mercury, sulphur and salt. These three, in their turn, generate three kinds of spirits plus the corresponding powers, viz. understanding, motions of life, reproduction and nutrition. Mercury functions as the '...inset and natural spirit of every part and member, the next instrument of the soule...maintayning and conseruing the animall life, as being the very same.'³⁶ Though in Warner's day more and more writers conceived spirits as purely material ('elementary') substances there still are quite a few people, Paracelsists to begin with, attributing to spirits also an ethereal, divine component thanks to which, they being receptive to astral influences, not only function as an instrument of the soul and carrier of its faculties, but also, to say it with Bright's words, as 'a true love knot, to couple heaven & earth together'. Such a notion of spirits might explain the interaction between body and soul or heaven and earth. However, it also seems to justify the introduction of astral magic into science, blurring the distinction between natural philosophy and theology. On the other hand, those who consider spirits a purely elementary substance are criticized for not being able to explain how these instruments of the immaterial soul know where to go in the body and how to act according to the commands of that soul.³⁷

Italian natural philosophers like Doni and Telesio evade such problems. They conceive the spirit as a material, yet very subtle, naturally mobile and luminous substance.³⁸ Doni stresses its earthly character pointing out that its

³⁶ See Duchesne, *The practice*, Book I, chap. IV and XV.

³⁷ Joseph Glanvill, for example, recognizes that the body is set in motion by 'finely material spirits' but considers what controls and directs them an enigma. Maybe the action of spirits, through the nerves, on muscles can be explained mechanically but the 'first determination' has to come from the soul and '...all the philosophy in the world cannot make it out to be purely mechanicall.' (See King (1970), 162.) Cf. Marcello Malpighi (1628-94): 'I know that the way whereby the soul makes use of the body to operate is ineffable; however in the operations of vegetation, sensibility, and motion the soul is necessarily determined to operate according to the machine to which it is applied.' (Quoted in Duchesneau (1975), 116.)

³⁸ Doni: '...quaesitam substantiam esse calidam, tenuem, mobilem...levis erit...lucida vel omnino pellucida...per se natura calida...' (*De natura hominis*, F. 65-6)...praeter quam quod spiritus materia est flos sanguinis, halitus et vapor, mistus etiam est aër...' (Op. cit., F. 72.), '...unus est...spiritus, una natura; qui spiritus ut unus est sic omnibus partibus sui secum continuatus est toto corpore per media quaevis.' (Op. cit., F. 116). Cf. Telesio: '...quae in animali sentit, substantia corporea quidem, at longe tenuissima sibi que ipsi continua, et ab una omnino sui ipsius portione reliquae derivent omnes et sua natura mobilis lucidaque sit oportet.' (*De rerum natura*, 188)

main property, heat, is purely elementary. Telesio even denies that there is a substantial difference between celestial (ethereal) and earthly (elementary) heat.³⁹ It is located in the cerebral ventricles and from there, by the nerves, dispersed through the body in which it, guided by the urge for self-preservation and using the body as its instrument, perceives, records, reasons, judges and performs all other organic functions.⁴⁰ It is one, continuous substance operating differently depending on its whereabouts in the body. Doni and Telesio consider this spirit, in other words, not as an instrument of the soul but as the soul itself.⁴¹ Moreover, they no longer conceive it as the link

³⁹ Doni: 'Quod si nullo modo elementarem esse animalium calorem velit Aristoteles, quintam qualitatem atque adeo quintam substantiam elementi afferat oportet in constitutione corporum viventium, quod nusquam ad ipso traditum est, nec vero fieri iuxta ipsius placita potuit. Elementarem autem esse calorem animalium extra alterationem doceat eius consumptio...' (Op. cit., F. 39). Cf. Telesio: '...igneum calorem ab animalium solisque calore diversum non esse.' Op. cit., 253.)

⁴⁰ Doni: 'Habebimus...eum partitum in binas copias, quarum alterae erunt eae, quas ante dixi ire in cerebri cellas et inde extendi per ductus nerveos; alterae eae, quae prodeunt in reliqua corporis...prios vocabimus inclusas, posteriores vagas...' (Op. cit., F. 83), 'Omnia ille sentit facere se, omnia vult quae facit; qui enim substantia usque sibi attentissima suique studiosissima, quae tanta arte, providentia, diligentia, studio ponit et tuetur statum suum in hoc corpore, sub quo agit et movet, potest iam suos ulos non nosse motus?' (Op. cit., F. 116--7), 'Spiritus solius esse hanc vitam, et eius solius operationes omnes, quae fiunt in vita.' (Op. cit., F. 73), 'Substantia enim haec nostra superans et vivens movensque et sentiens...non tantum movet et sentit, sed videtur alia quoque posse...videlicet imaginatur, recordatur intelligit, ratiocinatur, memoria tenet. Postremo...videtur nosse et velle facere, quaedam nec nosse, nec velle...' (Op. cit., F. 82). Cf. Telesio: 'Is nimirum sit spiritus, qui e semine educi (rebusque, e semine constitutis, albis scilicet exsanguibusque, unis exceptis ossibus ossibusque similibus rebus, reliquis inexistit omnibus)...videtur...' (Op. cit., 177), 'Is nimirum spiritus, qui nervoso in genere universo et cujus princeps portio in cerebri ventriculis inhabitare visus est, vel nihil usquam conspectus, indendus illi universo foret.' (Op. cit., 190), '...se ipsum conservandi gratia spiritum ea donatum esse, et supremum omnino bonum, quod ea appetit sectaturque, spiritus conservationum esse, liquido patet.' (Op. cit., 361), 'Spiritus modo passiones operationesque aperiendae essent; modus scilicet, quo rerum, quae...in spiritum agunt, speciem naturamque et motus percipit, quod sentire dicitur; tum et quo earum...quod ignotum est percipit, quod intelligere dicitur; postremo et modus, quo ab iis, quae sentit et quae intelligit, cupiditatibus odiisve et aliis hujusmodi afficitur passionibus, et juxta eas ad operationes commovetur...' (Op. cit., 275; see also 362).

⁴¹ Doni: 'Quod si instrumentum animae esse eum spiritum dicat <Aristotle> adhuc et quae de eo dixit, ut de instrumento dixisse omnia; rogo, ut accipi dignus est, ubi inquit omnia animae plena esse, si vult instrumenti animae? Sed si ita res habet natura, ut ubi instrumentum est movens quoque statim adsit, aio: cum nullum, spiritum movens, appareat, cur philosophus naturalis non statuatur eum ipsum esse animam eius naturae, quae a se possit movere?' (Op. cit., 37). Cf. Telesio: '...animal, quantum ad animam e semine eductam pertinet, spiritum esse corpori ut proprio tegumento proprioque inclusum organo...' (Op. cit., 275), 'Spiritus...animalium animae, e semine eductae, substantiam esse...' (Op. cit., 278).

between body and soul, between the material and immaterial, but as the principle of a centralized system of operations.⁴² Apart from these similarities there also are differences. For example, as opposed to Telesio Doni does not consider all operations of the spirit as forms of locomotion (expansion and contraction). He reduces perception to alteration.⁴³ According to both the spirit consumes itself in its operations and accordingly has to be replenished regularly. In Doni's view the spirit is replenished by transforming substances it contacts in the body into its own material.⁴⁴ In Telesio's opinion the spirit is replenished by transformation of inspired air, evaporations from the stomach and belly, and especially by evaporations from blood in the plexus retiformis.⁴⁵ The main difference is that Doni mentions only one, material soul, i.e. spirit while according to Telesio, man in contrast with animals, is also endowed with an immaterial, immortal soul infused by God.⁴⁶

If it was not for Francis Bacon these doctrines would most likely already have been forgotten by the early 17th century.⁴⁷ He undeniably was influenced by their doctrines on the spirit:

‘...the sensible soul - the soul of brutes - must clearly be regarded as a corporeal substance, attenuated and made invisible by heat...clothed with the body, and in perfect animals residing chiefly in the head, running along the nerves, and refreshed and repaired by the spirituous blood of the arteries; as Bernardinus Telesius and his pupil Augustinus Donius have in part not altogether unprofitably maintained.’⁴⁸

⁴² See Walker (1972), Vol. 2, 124.

⁴³ See op. cit., F. 73-4, 112. Cf. Telesio, op. cit., 278-9.

⁴⁴ See op. cit., F. 84-6, 93.

⁴⁵ See op. cit., 193.

⁴⁶ See Telesio, op. cit., 332-4.

⁴⁷ Tommaso Campanella (1568-1639) was one of the few other professed Telesians in the 17th century: ‘Eundem spiritum esse animam cognoscentem irascibilem, & concupscibilem, & motricem, contra Galenum.’ (*De sensu rerum et magia*. Francofurti 1620. In: *Opera Latina*, I, 70), ‘...unica est anima; unus scilicet spiritus in toto corpore, in variis vasibus, habitans et operans...’ (Op. cit., 72), ‘Anima...est ipse spiritus tenuis & calidus ingeneratus in humore intra crassam molem.’ (Op. cit., 55), ‘...anima spiritus est; quae vapore nutritur, reficiturque & augetur...anima res mobilis est, quae nervos intercurrit, & sensum motumque statuae communicat...’ (Op. cit., 64), ‘Omnis... motus ad constrictionem et dilatationem reducitur.’ (Op. cit., 68). ‘...spiritum corporeum esse animam sentientem...’ (*De homine*. In *Inediti theologicorum liber IV*, 28.), ‘...memoria, phantasia et aestimatio seu discursus sensitivus omnes sunt eadem spiritus operationes.’ (Ibid.)

⁴⁸ *The works*, Vol. 4, 398. See on the role of Telesio's views in Bacon's work in general Assenza (1980).

A spirit, says Bacon, is ‘...nothing else but a *Naturall Body*, rarefied to a Proportion, and included in the *Tangible Parts of Bodies*, as an Integument...’⁴⁹ In fact in his opinion animate bodies contain two kinds of spirits, a lifeless and a living spirit. Though the spirits of ‘...*Animate Bodies*, are all in some degree, (more or lesse), kindled and inflamed; and have a *Commixture of Flame*, and an Aerial Substance’ lifeless spirits consist mainly of air.⁵⁰ They are ‘...diffused in the substance of every part of the human body, as the flesh, bones, membranes, organs and the like...’⁵¹ They are not hot, discontinuous, parasitize on their material surroundings, want to multiply themselves and they tend to escape their bodily envelope. Vital spirits, on the other hand, consist mainly of fire. Though distributed over the cerebral ventricles and the nervous system they constitute a continuum. They are warm, yet more gentle than the weakest flame. They do not want to leave their bodily cover.⁵² As opposed to the lifeless spirits vital spirits are self-subsisting. They function as ‘...the agents and workmen that produce all the effects in the body’, i.e. all physiological processes in the body.⁵³ Bacon identifies this spirit with the earthly, irrational, sensible soul shared by men and animals. The rational

⁴⁹ Quoted in Hall (1969), Vol. 1, 234. Cf.: ‘Illud vero <ponendum est> tanquam postulati loco vel sumendum potius, cum nihil sit certius, omne ens <tangibile>...habere et in se percontinere <perpetua ex subactione et concoctione solis et coelestium> spiritum <commistum et inclusum>.’ (Quoted in Rees & Upton (1984), 130.)

⁵⁰ Hall (1969), Vol. 1, 236. Cf.: ‘Neque vero iste spiritus vis est quaedam, aut energia, aut nugae, sed plane corpus tenue partibus rei crassioribus obductum et obsessum...’ It neither is air, entered from outside ‘...sed plane tenue innatum et ab aere diversum...’ (Rees & Upton (1984), 130.), ‘...alii {i.e. spirits} magis consubstantialis aeri, alii magis consubstantiales flammae. Omnis enim spiritus rerum est aura conflata ex substantia aerea et flammae.’ (Op. cit., 132-4.)

⁵¹ *The works*, Vol. 5, 323.

⁵² See *The works*, Vol. 4, 361 and Vol. 5, 322-25. Cf. ‘Differentia autem primaria et plurimi ad omnia momenti ea est: spiritus entis aut intermistus <est>, aut ramosus, aut cellulatus sive cum universitate. Spiritus intermistus ille est qui a se per partes rei crassiores penitus abscissus est...Atque iste spiritus invenitur in omni ente tangibili inanimato, et in mole et partibus tangibilibus omnis entis viventis. Spiritus ramosus sibi continuus est per poros <et meatus> suos, sed <ista continuatio datur tantum> per lineas exiles et canales minutos...’ (Rees & Upton (1984), 130.) Cf. Bacon’s distinction between lifeless and living spirits with that of Doni between ‘copias vagas’ and ‘copias inclusas’ (see note 40).

⁵³ *The works*, Vol. 5, 268. Cf. ‘...omne vegetabile et sensibile etiam organicum est propter cohaerentiam et integralitatem spiritus qui faber rei est...illa corpora invisibilia pertentent <omnia> et percillant <ita ut> actiones <ipsae> rerum et virtutes quas vocant nil aliud sint quam eorum ipsorum clandestini impetus et motus quos, nisi quis probe et distincte novit, nemo speret sermone perducere ad opera.’ (Rees & Upton (1984), 132.)

faculties belong to a separate, incorporeal soul of divine origin which uses the material soul as an instrument for its own operations.⁵⁴

Though undeniably related to Doni's and Telesio's doctrine of the spirits, Bacon's ideas, in several respects, are substantially different. He too makes a distinction between two kinds of souls. However, as opposed to Telesio Bacon does not conceive these souls as two principles oriented to the divine and earthly respectively but, traditionally, as the immaterial, rational and the material, sensible, i.e. irrational soul.⁵⁵ Accordingly Bacon considers voluntary and involuntary motion as two substantially different processes. While voluntary motions are guided by the will as a rational principle involuntary motions proceed from the appetite, i.e. from an irrational principle. As we saw Telesio forcefully opposes such a distinction. In Bacon's doctrine of the spirits the material spirit plays a prominent part. Yet his ideas about its functions differ strongly from those of Telesio. Bacon does not restrict himself to one spirit but makes a distinction between lifeless and vital spirits. The latter, in substance related to heaven, functions only as material instrument of the rational soul. Bacon considers that substance not as the carrier of bodily and mental powers, but only as a means to activate those powers. In fact the operation and properties of this vital spirit do not differ substantially from those of the natural, vital and animal spirits of the Galenists. Despite the Telesian influence Bacon's doctrine of the spirits remains, in other words, saturated with the traditional oppositions of the bodily and the mental, the irrational and the rational. In that respect his views not only differ from those of Doni and Telesio but also from those of his contemporary and compatriot Warner.⁵⁶

3.2. *Parts and Materials*

Most anatomists in Warner's day are guided by the views of Galen, Aristotle (384-322) and Hippocrates (460-370) in their division of the body. According to Hippocrates the body consists of parts functioning as container, parts causing

⁵⁴ *The works*, Vol. 5, 335. See for a presentation of Bacon's doctrine of the spirits as new and unorthodox Wallace (1967).

⁵⁵ Yet he also wrote: '...one of the moderns has ingeniously referred all the powers of the soul to motion, and remarked on the conceit and precipitancy of some of the ancients, who in too eagerly fixing their eyes and thoughts on the memory, imagination and reason, have neglected the Thinking Faculty, which holds the first place. For he who remembers or recollects thinks; and in a word the spirit of man, whether prompted by sense or left to itself, whether in the functions of the intellect, or of the will and affections, dances to the tune of the thoughts...' (*The works*, Vol. 4, 325.)

⁵⁶ See about the differences between Bacon's and Telesio's psychological views De Mas (1962), 371-408.

motion, and of parts contained.⁵⁷ Aristotle's division of organisms is dominated by the distinction between similar or homogeneous and dissimilar or heterogeneous parts. By homogeneous parts he understands parts that cannot be divided into substantially different fragments like blood, sperm, flesh, bones, nerves, blood-vessels etc. Heterogeneous parts, on the other hand, are composed of different homogeneous parts. In fact they coincide with the organs or instrumental parts, that is, the means of activity and the homogeneous parts, as sensible substances, with the means for sensation.⁵⁸ According to Galen '...quaecunque corpora nec undequaque circumscriptionem habent propriam, nec undequaque coniuncta sunt aliis, haec particulae vocantur.'⁵⁹ He adopts the Aristotelian distinction between similar and dissimilar parts. As the body is nothing but the instrument of the soul its organs as for their nature, number, and order, correspond to the nature, number, and order, of the powers of the soul.

Warner's physiological speculations are based on the idea of animal organisms as composed of parts and

'...materialls for the restauration and conservation of the parts; which materialls though they may be also accounted parts of the whole as it is a body yet as it is an animall they cannot be understood to be parts but very improperly, no more then the vitalls in a ship may be accounted parts of the ship or the timber and other materialls laid up in some roome of a house for the continuall repaying <there>of, parts of the house.'⁶⁰

The materials

'...after their ministracion ab extra and reception into the body do appere there in three notably different formes or do gradually and subordinatly passe three notably distinct states the first in the stomak and chiloducts in forma chilosa, the second in the sanguiducts in forma sanguinea, the

⁵⁷ See Hippocrates, *Opera*, Vol. 5, 347.

⁵⁸ See *Parts of animals*, 646a13-647a3.

⁵⁹ *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera* (1549), Vol. 1, 418.) (Kühn, Vol. 3, 1-2.)

⁶⁰ BL Add. MS 4394, f. 206r. Warner's 'materials and parts' are reminiscent of Doni's classification of the substances of which the body is composed: 'Sunt in hoc corpore partes magnopere crassae, adhuc terrestres, quae obstant si tangas; sunt non ita crassae, sed humidae et liquidae, quae graviter invadenti facile cedant; sunt aliae vapidae, tenuiores liquidis, quae etiam facilius cedere possint; deprehenduntur etiam adhuc vapidis tenuiores, quas dicemus halitus <Testo: habitus>' (*De natura hominis*, F. 61.) Cf. Alsted (1588-1638): 'In laxiori & communissimo significato pars corporis dicitur omne id, quod in corpore existit, sive vivat sive non: ut humores, spiritus, pili &c. In significato stricto & proprio pars accipitur pro eo, quod ita cohaeret toti, ut vivat, & ad ipsius usum actionemque est comparatum.' (*Encyclopaedia*. Band 2, 756.)

third in the membranous receptacles of the head and the spine in forma coagulari seu plasmatica.’⁶¹

The parts of animals ‘...are of two kinds the one agent, the other instrumentall; the agent spirituall, the instrumentall corporeall; the agent containd <or incorporate>, the instrumentall continent.’⁶²

The instrumental parts, according to Warner

‘...quod ad substantiam attinet are of three kinds. Osseous, the bones the constructure whereof doth make the standing and firme fabrik of the animall and give him his certaine figure or shape at lest the groundwork therof. Nerveous, which are ether nervs, or membranes or the tunicles of the sanguiducts and chiloducts to which kind are also to be referred the ligaments. Thirdly carneous; which is to be understood those red and sanguinous parts which are found inserted or intertexted in the spaces or interfilaments of the nerveous for bolstring or completing them for their better ramification or for other like uses.’⁶³ ‘...The corporeall organs or parts of animalls are of two kinde of substances the one white the other red the one for distinction sake may be termed nerveous the other carneous. And in both these kinds there are found certaine graduall differences, of the white or nerveous, there are osseous, carneous, cartilaginous, nerveous and medullar of the red or carneous; that of the hart, of the kidneis, of the muscles, of the liver and of the lungs.’⁶⁴

The distinction Warner makes between materials and parts, his rejection of blood, chyle and sperm as parts, and his division of the parts into containers and contents were less original than he himself thought. According to Fernel (1497-1558) our bodies consist of containing parts, i.e. components constructed by the innate spirit out of a solid, fleshy substance, of things contained like spirits, blood, excrements etc. and of functions.⁶⁵ In his view something can

⁶¹ Op. cit., f. 206r.

⁶² Op. cit., f. 207v. Cf. Bauhinus’ rendering of Hippocrates’ classification: ‘...continentia, solidas partes nuncupat {Hippocrates}, ut quae comprehendant tegantque humida: contenta, humores, ut quia solidis comprehendantur: & impetum facientia, spiritus, ut qui momento temporis & facile, & citra impedimentum in omnem corporis partem ferantur.’ (Bauhinus, *Theatrum anatomicum*, 1-2.) In his own view ‘Corpos humanum, dividitur in Ventres seu Principia quae animal ipsum administrant, & Artus...constituunt autem hunc ventrae, partes duplices...continentes seu investientes, & contentae.’ (*Institutiones anatomicae*, 17.) Cf. Scaliger in whose view the spirit has to be a part of the body as it is an ‘animae instrumentum ad movendum’. (See *Exercitationes*, Exer. 280, 847.) Fracastoro is of exactly the opposite view ‘...quia animati non sunt, nec nutriuntur proprie, nec crescunt, sed solum per pabulum multiplicantur: nec item sentiunt, nec intelligunt.’ (*Opera*, 209r). Thomas Elyot divides the body into ‘principall members’, ‘offycialle members, ‘partes called Similares’, and ‘members instrumentall’ on the one hand and the ‘Powers’, i.e. the three kinds of spirits on the other. (See *The castel of helth* (1541), 12r-v.)

⁶³ Op. cit., f. 207v.

⁶⁴ Op. cit., 171r.

⁶⁵ *Universa Medicina*, 348.

only be called a part of the body if it is ‘...corpus toti cohaerens, commune vita coniunctum, & ad illius functionem usumque comparatum.’⁶⁶ Accordingly, he rejects the denomination of things like spirits, sperm, blood, bones, nerves, blood-vessels, the skin, flesh, fat, etc. as parts of the body.⁶⁷ The same definition of ‘part of the body’ can be found with Laurentius⁶⁸ and with Archangelo Piccolomini.⁶⁹ Bauhinus considers neither blood, chyle, sperm nor spirits as parts of the body. Consequently they do not figure in his enumeration of the similar, i.e. substantially homogeneous parts.⁷⁰ The same holds good for Laurentius. In his opinion anything contained in the body either is a part of that body, a nutrient, a liquefactor or an excrement. Guided by this classification he does not consider chyle as a part of the body but as a nutrient and blood as well as sperm as ‘excrements’.⁷¹ On the other hand Warner’s classification of the parts of the body into agents and instruments seems to be unique indeed. The instrumental parts function as instruments of the spirit that, by acting on them, performs all functions of the animal. Warner is rather vague about the nature of the spirit, the active part. It is related to the instrumental parts as a force to matter.

3.3. Matter and Force

In his notes on the vital functions of animal organisms Warner states that ‘...there is no solid and corporeall substance be it never so dense and compact but doth hold incorporated some kinde of spirit or other...’⁷² This is a volatile

⁶⁶ Op. cit., 99.

⁶⁷ ‘... sanguinem in venis vel humores toto corpore fusos partes non dicimus, uti neque spiritus impetu cordis impulsos in arterias: hos n. corpora in praesentia non dicimus. Illi quamquam sunt corpora uti & oculorum humores, nusquam tamen haerent coniuncti, sed fluxi deerrant quasi vase conclusi. Si quis humor intus fortè concrevit, haesitque ventriculo aut lieni, quia tamen illi verè coniunctus non est, neque communem vitam accipit qua regatur, pars haberi non debet...’ (Op. cit., 99-100.)

⁶⁸ See *Opera*, 16.

⁶⁹ See *Anatomicae Praelectiones*, 30.

⁷⁰ See *Institutiones anatomicae*, 2.

⁷¹ Op. cit., 286. Cf. Casmann: ‘Sanguinem proprie dici posse animati corporis animatum membrum, negamus. Omne enim membrum est pars integro essentialis, & concurrat ad essentiam integritatemque totius conflandam & constituendam.’ (*Secunda pars anthropologiae*, 490.) Just because it is not fed but feeding it strictly spoken is not a bodily part. Blood, in Alsted’s view, only is a part of the body in so far as it is a ‘naturale animae instrumentum’. (See op. cit., 499).

⁷² Op. cit., f. 187r. See also op. cit., f. 207v. Cf. Francis Bacon: ‘Omne ens tangibile hic in superficie et extimis terrae habet spiritum corpore crassiore contactum...<atque> inclusum...neque ullum est corpus tangibile quod non consistat ex duplici natura, spiritu et...materia crassa.’ (Rees & Upton (1984), 156.) See on the role this idea plays in in Paracelsus’ work Pagel, Paracelsus (1958), 82-9, 117-20.

substance⁷³ of ‘spirituall and fluid consistence’⁷⁴ that by nature is permanently in motion.⁷⁵ As opposed to coarse matter it is endowed with an active power. It can be common air but also, for example, a saline, sulphurous or a mercurial substance.⁷⁶ Though Warner does not say so explicitly these substances, in his view, probably must not be identified with the spirits as such, but have to be considered as the carriers of spiritual forces. Also salt, sulphur and mercury, though opposed sometimes to the passive corporeal substances, conceived as ‘terrestreities’ or as substances of a ‘terrene or...elementary species’, must not be conceived as celestial or immaterial substances but as the ordinary, sublunary, chemical materials.⁷⁷ They, after all, can be tasted⁷⁸ and their temperature can be felt.⁷⁹ Moreover spirits, according to Warner, are composed of ‘single parts or atoms’, of ‘atomical parts’.⁸⁰ Just as he is vague about the precise nature of matter he does not tell us more about these atoms than that they are of a variable size and density.⁸¹ As will appear from the following, despite this terminology his idea of the nature and function of the animal spirit as a consciously and rationally acting force argues against considering him as an atomist. That also is suggested by his view that there are substantially different kinds of spirits. Some, like the airy spirits, are relatively cold and phlegmatic, while others, like sulphurous, saline or mercurial spirits

⁷³ ‘...that property of volatility which is naturall and essentiall to all spirits quatenus they are spirits and can not be restrayned by any density of their continents especially whiles they are in act of heat...’ (Op. cit., f. 161r)

⁷⁴ BL Add. MS 4395, f. 29.

⁷⁵ ‘...motation {i.e. an internal motion of the particles of the substance} being of their essence quatenus spirit and of necessity to their animall function and operation...’ (BL Add. MS 4394, f. 146v.)

⁷⁶ See op. cit., f. 187r. Cf. Libavius: ‘Der Geist ist das aus einem einfachen und scharfen Stoff produzierte lösende Wasser von der Natur eines feuerartigen Dunstes.’ (*Die Alchemia des Libavius*, 121). In the paracelsist tradition the spirit was conceived as an ‘...aetherial fire as a vital sulphur - an aerial sulphur...fixed in saltpeter thereby transferring vital properties to it.’ (Debus (1979), 47.)

⁷⁷ See op. cit., ff. 217v and 174r. His notes on fire, heat and combustion open with the statement that he will not treat of ‘calore aethereo seu coelesti’ but of ‘terrestri seu elementari’ (BL Add. MS 4395, f. 49); on the other hand he also talks there about ‘...the composition or commixtion of the volatile atoms or elements with the terreous and fixed...’ (Op. cit., f. 65)

⁷⁸ See BL Add. MS 4394, ff. 218r, 217r, 187v-189v. Warner determines the differences between the several substances in the body by tasting them. Cf. Doni: ‘Sapor super omnia potest prodere naturam rei...’ (*De natura hominis*, F. 63.) Precisely at the time Warner wrote these notes distillation and tasting as methods of analysis came up for discussion. (See Debus (1965), 162)

⁷⁹ See op. cit., ff. 148v-149v.

⁸⁰ See op. cit., f. 147r-v. Cf. Bacon: ‘...atomi neque ignis scintillis...neque spiritus aut aetheris minutiis, similes sunt.’ (*The works*, Vol. 3, 82.)

⁸¹ See op. cit., f. 146v.

are hot and very active. The spirit controlling digestion, for example, can ‘...not be any fatuous or flegmatic spirit <as the comon aire> but must necessarily be understood to be some active or operative spirit of what kinde or condition so ever it be, whether sulfureous or saline nitrous or armoniak <or arsenicall> or nitrosulfureous or mercuriall.’⁸² Their fluidity implies that they are ‘...per se et proprijs terminis interminable (except it be ultima terminatione mundana) and terminable only termino alieno, that is to say by the boundes and figuration of some subiect or body or organ wherein it is contayned...’⁸³ They can, in other words, only exist and operate as long as they are fixed in an elementary, corporeal substance. Force and matter, spirits and corporeal substances, always go together and are interdependent.

In his notes on the psychological functions of animals Warner does not refer to force and matter in terms of corporeal substances and spirits but in those of matter and form. In all material things that have

‘...any operation or operative virtue in them...there may be understood two kindes of formes the one as it were informant, the other assistent the one resulting ex interna crasi elementorum materialium⁸⁴ <(quasi forma materiationis)> the other supervenient and as it were infused ab extra <(quasi forma formationis)> the one stable and [as it wer]dead: the other in perpetuall motion and lively and as it were animate...’⁸⁵

⁸² Op. cit., f. 187r. See also op. cit., ff. 188v and 189v. In his notes on fire and combustion he even states that air, as opposed to igneous spirits, is in rest and writes concerning the latter that ‘...non immerito dubitari licet utrum spiritus proprie dicti titulus ei iure debeatur necne, vel si spiritus omnino dicendus sit, ac non potius suo et peculiari spiritualitatis modo quam cum aerea communi intelligendum sit.’ (BL Add. MS 4395, f. 55).

⁸³ Op. cit., f. 29. Cf. Aristotle: ‘...moist is that which, though easily adaptable to form, cannot be confined within limits of its own...’ (*On coming-to-be and passing-away*, 329b29); ‘...’capacity for filling up something’ is characteristic of the moist, because it is not confined within bounds but is adaptable in form and follows the shape of that which comes into contact with it...’ (Op. cit., 329b33-35.). Cf. Telesio: ‘...naturae agentes...per se subsistendi et existendi per se prorsus impotentes sunt, et ut subsistant existantque materia opus habent...’ (*De rerum natura*, 179.)

⁸⁴ Cf. Nicolas Hill: ‘Forma est status, & conditio rei, resultatia principiorum materialium connexorum, principium constituens, non operans.’ (*Philosophia*, aph. 35.) The Stoics understood by *krasis* the complete interpenetration of all the components of mixing liquids each component preserving its own properties. (See Sambursky (1987), 13.)

⁸⁵ BL Add. MS 4394, f. 229r. Cf. Campanella: ‘Amplius autem dicitur forma alia activa, ut calor et frigus in igne et terra...et haec potius est forma formans. Non enim formae est agere, sed agentis causae, quae vocatur forma, quatenus inest materiae, licet non sit forma. Alia est forma passiva, ut tenuitas ignis et soliditas telluris...’ The latter is also called a ‘forma materialis’ (Met. pars I, Lib. II, cap. IV, art. 2, p. 136. Quoted in Virnich (1920), 43.)

Both, the objects as well as organs of perception, for example, each possess two forms or principles: a principle of the material it is made of and a principle regulating its operations. The principle of materialization proceeds from a mixture of the material components of the object or organ in question and is inherent to it. It ‘informs’ a thing, i.e. gives it its nature and being qua material. In view of that function such a principle has to be stable and unvarying. Directly opposed to this principle is the principle of formation, for that is not inherent to the object or organ in question but comes from outside and is only added to them for ‘assistance’. Being an active principle it has to be in permanent motion. While the informing form, lacking motion, is as it were dead the assisting form is, as it were, ensouled, i.e. alive. Matter, by the way, is not purely passive but also has, in Warner’s view, certain active conditions ‘...as essentiall thereto as the passible, for matter is as well reactive and proactive as passibilis.’⁸⁶ There are more differences:

‘...the forme of materiation or informant of the matter is a mere accident of the matter and hath none or can have no subsistence of it self but only an insistence in an other, whereas this forme assistent is a thing substantiall per se subsistens et alteri tantum assistens; and <hath> his owne <peculiar> matter or substance which is <quiddam> materiae analogum and his owne proper forme though dependent on the forme insistent of the fundamentall matter because it is a substance per se interminabilis et informabilis but per terminos et formam alterius...’⁸⁷

Thus by an ‘informing form’ Warner understands something that can not exist on its own but only as an accident, i.e. as a property of matter. It is a form inherent in matter. ‘Assisting forms’, on the other hand, are substances of a nature not identical with but analogous to matter: ‘...the spirits though they be but as it were formall in respect of their organ being the forme assistent thereof yet considered without that respect absolutely in themselvs it is certaine that they have their materiality and are materiall and subsistent to their owne forme...’⁸⁸ They are only relatively dependent on the form inherent in the thing they assist in so far as they, like fluids or gases, having no fixed form of themselves can actually only exist and operate contained in something else. Accordingly

⁸⁶ Op. cit., f. 225v. Cf. Fernel’s view of matter as something that, in relation to form, is not purely receptive and passive but possesses an ‘...activité sourde qui, antérieurement à la reception de la forme totale, la prépare et l’organise...’ (Figard (1903), 158). Warner’s concept of matter in these notes is directly opposed to the notion of matter in his notes on the principles of nature where he considers the ‘cessibility’ of matter as ‘...an impotency or a quality merely passive...’ unable to produce an ‘...effect of force and activity...or qualify his subiect with a faculty active...’ (BL Add. MS 4395, f. 69.)

⁸⁷ BL Add. MS 4394, f. 228r.

⁸⁸ Op. cit., f. 224r.

‘...as the objects have their formas assistentes fundatas quod ad substantiam et emanationem attinet in obiectorum materia and depending quod ad formalitatem attinet on the formes insistent of the said objects, so have the organs likewise their formas assistent fundatas quod ad modum assistentiae attinet in materia ipsorum organorum and depending quod ad formalitatem attinet on the formes insistent of the said organs...’⁸⁹

Generally speaking Warner understands by assisting forms actively or passively operative qualities plus their spheres of activity, that is, spherical extensions or emanations of the corresponding powers.⁹⁰ He characterizes, in other words, the operative powers in general, and consequently also those of the spirits in terms initially used to describe the spirits themselves.

Comparing this doctrine of the assisting forms with his ideas about matter and force in the notes on the physiological functions of animals we see that Warner no longer uses the term ‘spirit’ in the double sense of active substance and force but clearly distinguishes these two aspects. Spirits are not forces themselves but substances endowed with operative forces. Moreover these forces are not only attributed to spirits but can be found in all kinds of

⁸⁹ Op. cit., f. 227r. In his notes on time, space, matter, force and motion Warner uses the terme ‘forme’ only in the sense of ‘shape’ or ‘figure’: ‘...formes do determyne and distinguish, and diversifie the indifferency of the matter...matter...is formable and actually formed and is in deed the cheef subject of formation.’ (BL Add. MS 4425, f. 4r-v.); ‘The only subject of forme is matter. Matter formed is called a body.’ (Sion College: Arc. L 40.2/E 10, f. 88v.)

⁹⁰ See BL Add. MS 4394, f.228v-r. Cf. Grosseteste: ‘A natural agent multiplies its power from itself to the recipient, whether it acts on sense or on matter. This power is sometimes called species, sometimes a likeness, and it is the same thing whatever it may be called; and the agent sends the same power into sense and into matter, or into its own contrary...For it does not act by deliberation and choice, and therefore it acts in a single manner whatever it encounters...But the effects are diversified by the diversity of the recipient...’ (Quoted in Lindberg (1976), 98.); R. Bacon: ‘...patet quod multiplicatio est sperica naturaliter, quoniam agens undique et in omnem partem et secundum omnes diametros facit speciem suam...Quare oportet quod agens sit centrum a quo linee in omnem partem procedant...’ (Quoted in Lindberg (1976), 156); William Gilbert conceives the universe as animated: “...and albeit this soul is not in all globes the same...in all globes the effused forms reach out and are projected in a sphere all round...all globes, all stars, and this glorious earth too, we hold to be from the beginning by their own destinate souls governed and from them also to have the impulse of self-preservation.’ (*De magnete*, 309.); Suarez: ‘...dicendum videtur, objectum multiplicare sui speciem in circulum, id enim commune est agentibus naturalibus, ut sphaeram suae activitatis vendicent circularem.’ (*Opera*, Vol. 3, 620); Cf. Digby’s explanation: ‘...an orbe of emanations of the same nature which that body is of within the compasse of which orbe, when any other body cometh that receiveth an immutation by the little atomes whereof that orbe is composed...And because this orbe (regularly speaking) is in the forme of a sphere, the passive is said to be within the sphere of the other’s activity.’ (*Two treatises*, 138).

substances. This does not alter the fact that the notions of spirit and force still tend to be confused. In some notes Warner simply identifies spirits and assisting forms.⁹¹ In others he characterizes these forms as ‘souls’⁹² and as powers ‘animae seu spirituum’.⁹³ Now, most of Warner’s contemporaries agreed that spirit and soul are closely allied. Most of them also subscribed to the idea of the spirit as ‘...curriculum or vehiculum animae: And because the spirit is so united unto the soule by the invisible links of nature it is oftentimes used & taken for the vitall soule it selfe...for none but God himselfe can disioyne thes two frò one an other...’⁹⁴ However, they definitely would have rejected Warner’s identification of spirit and soul for while the former in their view is, at least partly, material the latter is ‘...a substance that by imagination of any bodily thing cannot be comprehended; for every bodily substance is great in greater places, and less in lesser places. The soul is all present wheresoever it is present.’⁹⁵ Being immaterial the soul, according to his contemporaries, simply could not be the same as spirit. Apart from Warner’s confusion of the concepts of spirit and force we now also have two vague notions of substance: the matter-like substance of assisting forms and the ‘atomical parts’ of the spirits.

Warner’s notes on fire, heat and combustion tell us more about the components of the spirits.⁹⁶ In these notes he distinguishes, as we saw, between ‘atoms or prime elements’ in the sense of small, substantially homogeneous particles and ‘minima specialia’, that is, fragments of compounded substances.⁹⁷ There are as many kinds of ‘prime elements’ as there are kinds of substances.⁹⁸ Moreover these atoms differ in figure and size.⁹⁹ In fact we are dealing here not with atoms in the sense of substantially identical, absolutely indivisible particles but with the peripatetic ‘minima naturalia’.¹⁰⁰ By spirits he understands clusters of substantially homogeneous atoms.¹⁰¹ Each of these atoms possesses a ‘...potentia seu impetuositas extensive

⁹¹ ‘...the spirits...be but as it were formall in respect of their organ being the forme assistent thereof...’ (BL Add. MS 4394, f. 224v-r)

⁹² ‘...assistent formes in animalls are their animae...’ (Op. cit., f. 226v).

⁹³ BL Add. MS 4395, f. 34. See also Add. MS 4394, f. 208v where he compares the problem of the original generation of the animal spirit with that concerning the origin of the soul (‘ex traduce’ or ‘infused’). Cf. John Donne: ‘As our blood labours to beget, Spirits, as like souls as it can...’ (Quoted from *The ecstasy* in Cruttwell (1951), 81.)

⁹⁴ Debus (1979), 153.

⁹⁵ Walter Raleigh, *A treatise of the soul*. In: *Works*, Vol. 8, 578.

⁹⁶ BL Add. MS 4395, fols. 49-70.

⁹⁷ See op. cit., ff. 63, 66, and 68.

⁹⁸ See op. cit., f. 60.

⁹⁹ See op. cit., ff. 53, 55, and 56.

¹⁰⁰ See Chapter 1, note 156.

¹⁰¹ See op. cit., f. 49.

seu seipsum omniquaque extendendi...'¹⁰² As long as there is a '...omnimutua inter singula seu atomos radiationis receptio et reflexio...' they, taken together, constitute a spirit.¹⁰³ The acting power of this spirit is based '...in coordinatione seu consistentia spirituosa qua salva et integra manente vim suam exercet, destructa vero hac, perit illa...Singularitas enim est spirituositatis destructio...singularizari dicuntur quorum sphaerae extra se mutuo consistuunt.'¹⁰⁴ Again Warner understands by spirits the medium or carrier of a force. As in his notes on the vital functions of the animal, in these notes too he seems to be of the opinion that there are as many kinds of spirits, differing in activity, as there are kinds of atoms. This time he unambiguously distinguishes between spirits and forces. Spirits are nothing but material substances composed of 'atoms', deriving their activity from a certain radiating force.

This leads us to the last version of Warner's ideas about matter and force, to be found in his notes on the concepts of space, time, matter and force.¹⁰⁵ Here Warner drops the notion of 'minima naturalia' in favour of the idea of atoms as simple, continuous, substantially identical particles of matter varying only in figure and size:

'Matter in respect of his inward substance is homogeneall and simple one part not differing from an other...for although things do infinitely differ according to the infinit variety of formes and magnitudes and other properties of these resulting (diversity of things being in deed nothing else but diverse formes or magnitudes of severall partes or portions of matter...yet matter it self abstractly conceived...hath no diversity in it at all...'.¹⁰⁶

Though in fact undivided these atoms are divisible. As opposed to the 'atomic particles' in the notes on the physiological functions of animals they '...cannot be condensed or rarefied upon this grounde that matter resisteth matter or matter can not penetrate matter...'¹⁰⁷ They are the building-blocks of matter and therefore also of the spirits that, as far as their substance is concerned, no longer are distinguished from matter. Now matter '...is not moveable per se or

¹⁰² Ibid. Cf.: 'Singulum quodque suam habet sphaeram activitatis ex virtute extensiva aetherae...' (Op. cit., f. 50)

¹⁰³ Op. cit., f. 52.

¹⁰⁴ Op.cit., f. 50.

¹⁰⁵ See BL Add. MS 4394, ff. 396r-402r; Add. MS 4395, ff. 191-212.

¹⁰⁶ BL Add. MS 4394, f. 398v.

¹⁰⁷ Op. cit., f. 396v. Cf. Warner's remark in connection with the consumption of spirits: 'Their forme or consistence doth conduce to their consumption in respect of subtiliation or incrassation of their atomical parts...and subtiliation or incrassation or subtilty or crassitude...be understood...for conditions qualifying or disposing them for consumption, as subtilty for transpiration...and crassitude for precipitation...' (Op. cit., f. 146v.)

apt to move it self without the operation of some externall movent...'¹⁰⁸ Accordingly atoms are passive in themselves, deriving their mobility from the operations of a cosmic power or radiative virtue. Warner understands by this cosmic power an immaterial, indivisible substance¹⁰⁹ of which '...the cheef condition...in generall is to cause locall motion (and that of matter for there is nothing els that can be so much as imagined properly to be moved)...'¹¹⁰ Together with matter it fills universal space¹¹¹ and accounts '...for the production of all the species, motions, alterations and effects which are actually apparant in the universe...'¹¹²

Though, like the spirits Warner does not specify this substance either¹¹³ we indirectly get some information about it in so far as he identifies it with light: 'All bodies have in them an efficient power or vertue which may be called light whether sensible or insensible.'¹¹⁴ As was said before this idea of light as a cosmic force suggests an influence of Patrizi in whose view light '...Per omnia permeat. Omnia permeando format, & efficit. Omnia vivificat. Omnia continet. Omnia unit. Omnia disgregat. Omnia quae vel sunt, vel illuminantur, vel calescunt, vel vivunt, vel gignuntur, vel nutriuntur, vel aurescunt, vel perficiuntur, vel moventur, ad se convertit...Omnium rerum est, & numerus & mensura.'¹¹⁵ Apart from that influence Warner in this respect also may have been inspired by the renewed interest in the works of Grosseteste and Roger Bacon¹¹⁶ as well as by the writings of contemporary fellow-countrymen like John Dee, Nicholas Hill¹¹⁷ and Robert Fludd.

¹⁰⁸ 'Matter is not moveable per se or apt to move it self without the operation of some externall movent...' (Op. cit., f. 396v). Cf. Walter Charleton's view that the action of natural agents, procured with 'an Influentiall or Radiall Activity' do not necessarily require direct bodily contact. (See *Physiologia*, xix.)

¹⁰⁹ See op. cit., ff. 397r, 401r and BL Add. MS 4395, f. 209.

¹¹⁰ BL Add. MS 4394, f. 389v. Cf.: 'Matter is resistible unto vis and yet in some sorte cessible and separable or soluble or divisible or compressible or de...rable by vis that is both moveable in whole and alterable in partes by the action of vis.' (Op. cit., f. 386r). See also Op. cit., f. 399r-v. Intriguing in this connection is Warner's characterization of this radiation as the '... the smearer and cutter of atomi...' (Op. cit., f. 397r).

¹¹¹ See op. cit., f. 386r.

¹¹² Op. cit., f. 389r.

¹¹³ '...a cause of motion which may...be termed vis or power [what] by the quality of his office what soever his substance or quiddity be.' (Op. cit., f. 389v).

¹¹⁴ Sion College: Arc. L 40. 2/ E 10, f. 88v. See also BL Add. MS 4395, ff. 207, 209, and 211 where he identifies this radiative virtue with 'lumen', that is, in Warner's terms, the emanation and sphere of activity of lux, an originall light-source.

¹¹⁵ *Nova de universis philosophia*, 1v. See also Chapter 1, note 322.

¹¹⁶ According to Grosseteste 'The first corporeal form which some call corporeity is in my opinion light. For light of its very nature diffuses itself...instantaneously in every direction...' (Quoted in Lindberg (1976), 97) See also Chapter 1, p. 47.

¹¹⁷ See on Hill Chapter 1, pp. 48-50.

According to Dee ‘...whatever exists in actuality spherically projects into each part of the world rays, which fill up the universe to its limit. Whence every locality in the world contains rays of all things existing in it in actuality.’¹¹⁸ In Fludd’s view ‘...the spirit...beareth the vitall light in it as doth the oyle of a lampe the flame...in the ayre the aethereall spirit is carried and in that spirit the light soule is borne as in a chariot, and the darke earth is the foundation to them all...’¹¹⁹ Perhaps Warner also was acquainted with Kepler’s idea of the motive power, propelling the planets, as a materialized version of the primal motive power in the sun.¹²⁰

By light he understands a substantial entity ‘...whatsoever the substance thereof be and active or alterative or motive of matter.’¹²¹ It diffuses itself spherically through the universe assuming the forms of the objects it illuminates and by which it is reflected.¹²² It is an active substance, analogous to matter that, having no boundaries or form of itself, can only be bounded and formed by something else.¹²³ This ‘vis’ or ‘virtue radiative’ or ‘lumen’ has, in other words, the same properties as the assisting form, and consequently as the spirit in the notes on the physiological functions of animals. There is only this difference that the force, talked about in the notes on the principles of nature is not considered as a property of spirits or of any other substance for that matter, but as a separate, self-subsisting natural principle. Neither is it identified with the soul. Moreover this force is not originally within things but acts on them from the outside. As a continuous, naturally active, immaterial substance it differs radically from matter, composed of atoms, discrete and essentially hard.¹²⁴ It is analogous to matter in so far as both are homogenous and uniform, both can be considered as accidents of space and in so far as both occupy a three-dimensional place.

Thus we see how Warner further specifies and demarcates the notions of matter, spirit and force, already present, be it vague and confused, in his notes on the faculties of animal organisms. He seems to trade his initial animistic explanation of the organic functions for a more materialistic,

¹¹⁸ *Propaedeumata aphoristica* (1558), IIII. Quoted in Clulee (1988), 44.

¹¹⁹ Debus (1979), 153-4.

¹²⁰ See Chapter 1, note 299. Though not necessarily inspired by the tradition of light metaphysics many precursors and contemporaries of Warner also deemed the spirits in living bodies luminous. See, for example, Vives (*De anima et vita*, 48, 78); Doni (*De natura hominis*, F. 66); Telesio (*De rerum natura*, 188); Campanella (*Opera latina* I, 65); Thomas Willis, (*Cerebri anatome*, 134).

¹²¹ BL Add. MS 4394, f. 228r.

¹²² See op. cit., f. 228v-r.

¹²³ See op. cit., f. 228r.

¹²⁴ ‘The very quiddity and proper essence of matter is corporeity or resistibility (or antitypia or hardnes...’ (BL Add. MS 4395, f. 212).

mechanistic approach. Keeping this specification and demarcation in mind let us return to these notes to see what he has to say about the spiritual part of the animal.

3.4. *The Animal Spirit*

As there is no corporeal substance that does not contain a spirit no

‘.....active spirit can subsist solitary and per se but doth necessarily require to be incorporated in some body for the retention or fixation and the delation thereof; and that howsoever the body wherein it is first incorporated be altered it doth not leave the same so as to passe from one subject to another...’¹²⁵

The idea that these spirits

‘...should make any evagation or excursion out of their connaturall and congenerate continent without their absolute deperdition or yf they should how they should have any force to make any impression out of the same upon any other body is not imaginable.’¹²⁶

Moreover ‘...there can be but one spirit incorporat in one body...’¹²⁷ This does not mean that there is only one spirit in organisms but that each material substance can contain but one kind of spirit.¹²⁸ Spirits can be contained in a substance in two ways, to wit, ‘confused’, that is, completely mixed with a substance¹²⁹, or ‘organized’, that is, contained in canals and receptacles, especially composed for that purpose, of the substance concerned. Now, as we have seen, the instrumental parts of animals consist of an osseous, nerveous or carneous substance. The active part or spirit of the animal

‘...is containd only in the nerveous kinde, of all the three the rest having no other spirit but their owne confused in their matter...but the maner of the incorporation of this spirit...is to be understood of an other fashion, namely not in confuso or confusedly imbibed or immerged in the matter according to the condition of those corporeall substances whose consistence doth result of an absolute or spherically similar mixture of their elements and their spirit...in the like spherically similar...maner

¹²⁵ BL Add. MS 4394, f. 218r.

¹²⁶ BL Add. MS 4395, f. 29.

¹²⁷ BL Add. MS 4394, f. 189r.

¹²⁸ The animal organism, for example, contains apart from the animal spirit ‘...spirits and organs respiratory toto genere different from the other both in respect of their maner of operation, end and subject or materiall which is the comon aire...’ (Op. cit., f. 173r)

¹²⁹ ‘...the plasmatic {spirit}...is incorporatus that is...it is confusus or immersus in materia crassa seu corporea scilicet in semine vel in sanguine.’ (Op. cit., f. 175v); ‘The spiritus confusus seu immersus seu corporatus in sanguine in respect of somato- or organo-faction is...causative or active or operative that is plasmatic or formative...’ (Op. cit., f. 174r).

confused in them but in aggregat; artifically enclosed and organized in the canallets of the nerveous kinde...'¹³⁰

By animal spirits Warner understands in this connection the spirits '...as they are educed from the bloud and collected and enclosed in the pneumaticall canallets per universum genus nervosum.'¹³¹ This distinction between 'confused' and 'organized' spirits can also be found with Doni, Telesio and Francis Bacon.¹³² The organized spirit, in Warner's view, is of a purely elementary nature.¹³³ Though the majority thought otherwise he was not alone in this opinion.¹³⁴ Argenterius, the Aristotelian critic of Galenism, for example, fiercely opposed Fernel's idea that the spirit is of a divine and heavenly origin.¹³⁵ According to Erastus both sperm and spirit are made out of nothing but elements.¹³⁶ From the fact that the spirit in question, as opposed to heavenly things, is sensitive to heat, cold, dryness, humidity, etc. Casmann too concludes that it must be a purely elementary substance.¹³⁷ According to Helkiah Crooke the spirit in animal organisms '...is called Aetheriall onely Analogically because of his tenuity and divine manner of working, for by his nature and in his originall he is meereley Elementary.'¹³⁸

Apart from being elementary the spirit, in Warner's view, also is hot, yet enclosed. From its high temperature Warner concludes that it must consist of more than pure air.¹³⁹ From the fact that the same spirit '...conclusus est...sequitur illam ex genere igneo non esse, contra antiquorum quorundam opinionem.'¹⁴⁰ Warner leaves undecided of what exactly it does consist. The ingested materials by which the spirit regularly is restored

¹³⁰ Op. cit., f. 207v-208r.

¹³¹ Op. cit., f. 154v.

¹³² See notes 40 and 52.

¹³³ See op. cit., f. 218v.

¹³⁴ According to, for example, Servetus, Fernelius, Riolan Sr., Archangelo Piccolomini, Timothy Bright, Francis Bacon, Robert Fludd and Daniel Sennert the active spirit in living beings contains a celestial (ethereal) component.

¹³⁵ See *Opera*, 2076D.

¹³⁶ *Disputationum de nova Philippi Paracelsi medicina*, 176.

¹³⁷ '...qua nostrum corpus, ut communi instrumento ad universas actiones suas obeundas utitur.' (*Secunda pars Anthropologiae*, 88)

¹³⁸ *Microcosmographia*, 173-4.

¹³⁹ '...the animall spirits...are universally actually hot whereby is excluded the comon aire to be the sole materiall...' (Op. cit., f. 171r) Cf. Caesalpinus: '...spiritus animalis non ex aere sed ex alimento...fit...' (*Peripateticarum Quaestionum*, 108); in Bacon's view too the spirit is '...plane tenue innatum et ab aere diversum...' (MS Hardwick 72A, f. 16r in Rees & Upton (1984), 130); Harvey, *Disputations*, Chapter 71.

¹⁴⁰ BL Add. MS 4395, f. 50. With this idea Warner seems to oppose the current identification of the 'spiritus insitus' and the 'calor natus'. (See also p. 90.) Cf. Zabarella: '...spiritum animale vocare ignem vanissimum est...' (*De rebus naturalibus*, 905) This spirit is supposed to be made in the brain from vital spirit, conveyed through the arteries from the heart. That vital spirit is warm and humid, '...proinde aereus, non igneus...' (Ibid.) Besides this fiery heat would destroy life.

‘...are to be understood compounded of many...elementary...parts heterogeneall and specifically different, of which there is some one wherein that gustable spirit is primely and adequatly subiected and fixed and immediatly incorporated, having no participation with the rest, which part is only and proprely to be accounted alimentary...whatsoever the nature or substance thereof be...whether sulphureous or mercureall or saline or terrene or mixt of any of these or any other...’.¹⁴¹

The spirits, being capable of ‘...alterations formall and of their consistence as dilatation or extension or rarefaction and contraction or condensation or inspissation...’ are in continual motion.¹⁴² In view of this active nature it must indeed be some mercurial, sulphurous, saline or such like substance.¹⁴³

The blood by

‘...the continuall systoles of the hart...is propelled by the iugular arteries up to the hed...and...namely into the plexus choroides where the spiritus confusus thereof is ether by force of the pulsation excussed or by the internall heat of the bloud it self exhaled...and from thence emitted and collected into the spiritall receptacles of the cerebrum or medulla cerebri, from whence part thereof being there retayned ad sensationis, phantasiationis, et intellectionis nec non et motionis voluntariae opera obeunda; the overplus is distributed...into the conducts and canallets of the nervs and nerveous membranes ordinate to sensation whether extra or intra, an other part into the canallets of the nervs motory, a third part into the canallets of the tunicles of the vaines and arteries for sanguiduction or for communication of sense; the fourth by the medulla spinalis into the pleuritik membrane and so successively into the nerveous fibres of the hart ad motum spontaneum pulsationis ciendum.’¹⁴⁴

Though part of the spirits is located in the cerebral ventricles, and part of it streams through the nervous system their continuously changing, yet harmonious distribution among the several organs of the body does ‘...presuppose a universall entrecourse and continuity of the spirits.’¹⁴⁵

The animal spirit, also referred to as ‘the spring or movent of all this [automaton] machination’¹⁴⁶, functions as

‘...both the <originall> architect and fabricator of the organized body of animalls...and the perpetuall maintayner and restaurator both of it self and of the

¹⁴¹ BL Add. MS 4394, ff. 218r-217v.

¹⁴² BL Add. MS 4395, f. 29.

¹⁴³ See BL Add. MS 4394, f. 187r.

¹⁴⁴ Op. cit., ff. 137v-138r.

¹⁴⁵ Op. cit., f. 163v. Cf.: ‘...the plasmatik spirit incorporated in the coagular substance of the braines is the same spirit numero et materialiter with the gustable spirit apparant in the rude materialls ingested ab extra...’ (Op. cit., f. 218r) See also op. cit., ff. 135v, 141r, 251r and BL Add. MS 4395, ff. 12, 16.

¹⁴⁶ BL Add. MS 4394, f. 207v.

said organized fabrik as well by continuall <materiation or suppeditation of materials>...ab extra...as by internall elaboration of the said materials...¹⁴⁷

Warner's comparison of the organism with a machine does not mean, as we saw, that its functions are operated mechanically and without any consciousness whatsoever. In Warner's view the spiritual part is '...moved by a higher cause'¹⁴⁸ in as much as

'...these animated spirits do never will or actuate themselvs but ex praecedente consilio, seu ratione seu argumentatione seu syllogismo vel explicito vel implicito, which is a faculty naturall and intrinsecall and propre unto them and...notwithstanding any instigation by the sense of want though dolorous they never move their organs to work but by the notion and apprehension they have that such working is necessary for their owne conservation and good...'¹⁴⁹

Thus, ultimately all organical processes proceed '...ex occulto seu impercepto spiritus animalis primarij seu gubernantis consilio et amore sui...'¹⁵⁰ The spirits

'...out of the foresaid notion of their owne conservation which is a perpetuall law unto them do necessarily according to the necessity of that law that is unles they should abandon themselvs which is impossible put themselvs in work for the investigation and acquisition and ingestion ab extra ad intus of materials vitall that is spirito and organo-factible and hydraulo-mobile...'¹⁵¹

The spirit, being primarily oriented to self-preservation, necessarily wants to preserve the body, its instrument. That body is a product of, and subservient to the spirit it contains.¹⁵² The spirit can only play its part if it is able to recognize

¹⁴⁷ Op. cit., f. 139r. This was a current metaphor. Cf. J.C. Scaliger's comparison of the spirit with an 'Architectus' doing his job in the body (See *Exercitationes*, Ex. 6, 35); Bruno: '...per nativitatem et adolentiam spiritus architector expanditur in hanc qua consistimus molem, et a corde diffunditur...' (*Opera*, I, 3, 143); Nicholas Hill: 'Anima humana in spumoso semine primordialibus spiritibus instructam proprium corpus architectatur...' (*Philosophia*, aph. 168); Francis Bacon: '...omne vegetabile et sensibile etiam organicum est propter cohaerentiam et integralitatem spiritus qui faber rei est...' (MS Hardwick 72A, f. 16r. In Rees & Upton (1984), 132) The comparison is reminiscent of the Stoic notion of nature as a fire, '...non hunc nostrum corruptorem et corruptibilem; sed artificiosum: id est, artificem atque opificem, condentem ratione et velut arte, vegetantem ac servantem.' (Lipsius. *Physiologia Stoicorum* (1604), 843. Quoted in Saunders (1955), 126).

¹⁴⁸ Op. cit., f. 207v.

¹⁴⁹ Op. cit., f. 143v.

¹⁵⁰ Op. cit., f. 144v. Cf. The views of Doni and Telesio in note 40.

¹⁵¹ Op. cit., f. 144r.

¹⁵² Cf. Henry Power: '...it seems, this Cottage of Clay, with all its Furniture within it, was but made in subserviency to the Animal Spirits; for the extraction, separation, and depuration of which, the whole Body, and all the Organs and Utensils therein are but instrumentally contrived, and preparatorily designed.' (*Experimental philosophy*, 67.) See also Telesio, *De rerum natura*, 275.

what is injurious or profitable to the body, as well as to avoid, or acquire and use it. Accordingly there are five ‘...subordinate acts or operations of the negotiation of the animall spirits about their object. Cognition, Deliberation, Acquisition, Possession, Fruition (besides conservation)...’¹⁵³ This implies that the animal spirit must be ‘...sensitive, memorative, phantasivative, ratiocinative and withall organo-motive...’¹⁵⁴ All these powers, traditionally attributed to the soul, are ascribed by Warner to the spirit, equating it thus with the soul itself.¹⁵⁵ He reduces them to three kinds of powers, to wit, the ‘materio-ministrative faculty voluntary’ which includes the faculties ‘spirito-motive and organo-motive’, the ‘materio-elaborative faculty vitall’ also referred to as the faculty ‘cardio-motive or haematogogik or sanguiductive, and the materio-formative or ‘plasmatic faculty naturall’.¹⁵⁶ The materio-ministrative faculty, covering the faculties sensitive, intellective and locomotive, takes care of the ingestion, liquefaction and transmission of food. These processes are effected by motion of the spirits themselves as well as of their organs. The materio-elaborative or pulsatory faculty regulates the attraction, elaboration and distribution of blood through the body, all effected by motion. These processes are preceded by the transformation of nutrients into chilus and are followed by the transformation of blood into sperm effected by rest combined with heat,

¹⁵³ Op. cit., f. 271v.

¹⁵⁴ Op. cit., f. 139v.

¹⁵⁵ Galen rejects such an identification: ‘...suspiciari posset fortasse aliquis alterum ex duobus, vel si incorporea est anima, spiritum illum qui in cerebri ventriculis continetur, primum animae quasi domicilium esse. vel si est corpus anima, eundem illum spiritum esse animam. sed quia videmus commissis ventriculis animal paulo post rursus sentire, & moveri, neutrum horum sentiendum est. Rectius vero erit, si existimemus in ipso quidem cerebri corpore habitaculum animae esse, qualiscumque substantia eius fuerit, nondum enim de hoc consideramus, sed primum ipsius instrumentum ad sensus omnes, & item ad motus qui ex appetitione fiunt, hunc esse spiritum.’ (*De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati*. In: *Opera* (1549), Vol. 1, 1037.) (Kühn, Vol. 5, 605-6.) See also *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera* (1549), Vol. 1, 597.) (Kühn, Vol. 3, 542.) Cf.: ‘...spiritus non sunt animati; at potentiae vitales, ex quibus anima suas elicit functiones, non nisi in corpore, quod ab ipsa anima informatur, inesse debent.’ (*Commentarii Collegii Conimbricensis*, 396) See further Chapter 2, section 2.4., pp. 67-70.

¹⁵⁶ See op. cit., f. 215r-214v. Cf.: ‘There are foure notably distinct faculties of the spiritus animatus: plasmatic, cardio-motive or haematogogik or sanguiductive, spirito-motive and organo-motive...the plasmatic is brute or naturall and of the other three the cardio-motive is spontaneall and the other two voluntary but the spirito-motive active or imperant or praedominant and the organo-motive passive or obedient or subservient [or ministrant]...The haematogogik and plasmatic...are spontaneall, the spirito-motive and organo-motive which...voluntary.’ (Op. cit., f. 175v.)

and by refrigeration respectively. The plasmatic faculty controls the final transformation of plasmatic substance into restorative material as well as the actual restoration of spirits and parts of the body. These processes are effected by heat. Thus ultimately all operations of the spirit can be explained as effects of heat and/or motion.:

‘The...use of the heat of the spirits...is the fixation or substantification or somatafaction of the materials so as the first use was the preparation of the materials and this second the perfecting and giving the last act of materiation which doth presuppose distribution and application of the materials prepared ad partes materiandas which is understood to be done by the force of the pulsatory agitation...’¹⁵⁷

In other words, with its heat the spirit controls the generation, growth and nutrition of the active and instrumental parts of the organism, while as a principle of motion it operates respiration, the motion of heart and blood, locomotion, sensory perception as well as all mental functions.¹⁵⁸

The several operations require their own, specific organs and are performed by different parts of the spirit. Though substantially one, these parts referred to by Warner as the sensitive, appetitive, locomotive, intellective, pulsatory, etc. spirits differ in several respects. Plasmation and materio-elaboration follow spontaneously, that is, by natural necessity. The natural and vital faculties are, in other words, ruled by ‘nature’. The spirits, in that case, are permanently active, perfectly efficient and infallible. On the other hand the materio-ministrative functions, that is, the voluntary faculties, are controlled by ‘reason’ which implies that the spirits concerned, though not continuously in operation, often do more than is required and are fallible.¹⁵⁹ Further the motions of the part of the spirits that controls cognition are fast but weak, while with locomotion the movements of the spirit and its organs are slower but also stronger. The part of the spirits that regulates the intellective functions is more subtle and changeable than that governing sensation.¹⁶⁰

It seems a paradox that spirits

‘...by those very acts by which they seek to acquire and minister materials and by which they work and apply those materials <being ministred> for the conservation of themselves and their organs should

¹⁵⁷ Op. cit., f. 159r.

¹⁵⁸ Warner wonders ‘...which is the prime function or operation of the spirits in respect of animality that of heat or calefaction for concoction and fixation of the materials alimentary or these or any one of these of motion for materio-ministration or for materio-elaboration...’ (Op. cit., f. 162r-v.)

¹⁵⁹ Op. cit., f. 166r. See on the role of ‘nature’ and ‘reason’ in Warner’s theories about animal organisms Chapter 2, section 2.5.

¹⁶⁰ ‘...the spirits intellective are more subtle and alterable then the sensitive...’ (BL Add. MS 4395, f. 23)

empaire and in part destroy both themselvs and their organs as yf they could not conserve themselvs without labour nor labour without destroying themselvs.’¹⁶¹

Yet, actually by their natural volatility, spirits continually go to waste.¹⁶² That certainly happens when they have the high temperature required to keep an animal organism alive.¹⁶³ The ‘motation’,¹⁶⁴ accompanying the operation of their animal functions indirectly reinforces that effect by making their temperature rise, which in its turn leads to further wastage.¹⁶⁵ Consequently ‘...spirits can not conserve themselvs without consumyng themselvs...’¹⁶⁶ They evaporate throught the pores of their containers, i.e. the nerves, ‘...ether by the force of compression which they are necessarily put to in all their motions or els by the subtiliation or attenuation which they do acquire ether by their motion longe continued or <els> by the action of...vitall heate...they are made...apt for such transpiration or evolation which otherwise being in

¹⁶¹ BL Add. MS 4394, f. 145v.

¹⁶² ‘...out of that property of volatility which is naturall and essentiall to all spirits quatenus they are spirits and can not be restrayned by any density of their continents especially whiles they are in act of heat...’ (Op. cit., f. 161r).

¹⁶³ ‘The other...necessity is with relation to animality which is thus to be understood that yf there were no heat there could be no animall or that the preexistence or coexistence of the heat of the spirits <in animals> is a necessary requisit or condition to their generation and their continuation in esse being generated as without which there could be no concoction nor fixation of the materialls alimentary and without that no generation nor nutrition or conservation.’ (Ibid.); ‘...the more their act is graduated <or the better they performe their function> which is allways the more their naturall heat is graduated the more they consume themselvs...’ (Op. cit., f. 162r)

¹⁶⁴ ‘...by motation for distinction sake understanding the internall agitation or motion of the single parts or atoms thereof inter se <without respect of locall motion in toto> and by motion their locall conduction or discurrence...or course and recourse or flux and reflux from one part of their canallets to an other...in tota masse with abstraction from their motation.’ (Op. cit., f. 146r-v.)

¹⁶⁵ ‘Besides this consumption of the spirits which is necessary and perpetuall as proceeding from a cause that is necessary and perpetuall namely their naturall calidity the same is encesed by the supercalefaction of the spirits consequent of and caused by those motions that are necessarily incident and requisit to their animall functions and operations...’ (Op. cit., f. 161v); ‘...The spirits are ...self-destructive or consumptive by their motation...where is to be noted that motation being of their essence quatenus spirit and of necessity to their animall function and operation is notwithstanding causative of their destruction or consumption...’ (Op. cit., f. 146v); ‘...in the acting of which functions they consume themselvs but not immediatè as in the former because motion primò et per se is no consumption as calefaction is nor necessarily coniunct with consumption but per accidens quia accidit spiritibus moventibus et motis incalescere seu seipsos calefacere et calidi facti evolare so as the consumption of the spirits by way of motion is not immediate but mediante calore seu calefactione...’ (Op. cit., f. 162v)

¹⁶⁶ Op. cit., f. 161v.

their naturall state they are not.’¹⁶⁷ Spirits are also consumed by ‘...precipitation and settling by quiet and adhesion and impaction to the sides of their canallets not by quiet but rather by force of their motion or viscosnes of the concave superficies of their canallets or by some other occasion, or coaduation of many simple atoms into one which may be understood to be the cause of precipitation.’¹⁶⁸ All in all ‘...the causes of consumption of the spirits or the conditions informing or qualifying them for consumption...may be reduced...ether to their forme and consistence or <to their motion or to> their motation...’¹⁶⁹

Hence the spirit is regularly to be replenished if it is to stay active and survive. That is done mainly during sleep.¹⁷⁰ As we saw the spirit is restored by food. Nutrition supplies the ‘gustable’ spirit, i.e. the raw material. This

‘...passeth five subordinate and distinct states. The first in the esculents or dry materialls alimentary ingested ab extra ether as they are taken from nature without preparation or as they are prepared by art; the second in the chilus, the third in the bloud the fourth in the matter spermatik; the fifth in the coagular substance of the braines.’¹⁷¹

The ‘gustable’ spirit

‘...is by the transition thereof thorough the foresaid five subordinate states and the...elaboration and digestion thereof in every one of them succesively graduated from that forme which it originally had in the rude materialls into the forme and consistence coagular of matter plasmatik, so the gustable spirit originally incorporate in the said dissoluble subiect by the successive alteration and graduation thereof is to be understood analogately graduated from his originall forme of gustable spirit to the forme and perfection of a spirit plasmatik...’¹⁷²

This process is completed in the head¹⁷³ where the plasmatic spirit is separated from the blood and collected into the cerebral ventricles and nervous system after which it can function as ‘spiritus...animalis or animatus, which is his state of perfection.’¹⁷⁴ In that state the animal spirit not only fabricates the body but, of course, also is ‘...sui-

¹⁶⁷ Op. cit., f. 146r.

¹⁶⁸ Ibid.

¹⁶⁹ Ibid.

¹⁷⁰ ‘Spiritificatio per somnum.’ (Op. cit., f. 210v) Cf. Vives: ‘Reficitur corpus somno, tanquam stirps salubri quadam irroratione; in vigilia namque extenuantur agendo spiritus, revocantur introrsus per somnum refrigeranturque, unde est conspissatio; atque eo modo reparantur iterum labori vigiliae.’ (*De anima et vita*, 108.)

¹⁷¹ Op. cit., f. 218v.

¹⁷² Op. cit., f. 217r.

¹⁷³ ‘...the act of spirito-faction ascribed to the braine.’ (Op. cit., f. 137v) Warner rejects the theoretical possibility that ‘...the forge and organs of this spirito-faction...be rather attributed to the hart then to the plexus choroides...’. (Op. cit., f. 135r-v)

¹⁷⁴ Op. cit., f. 218v. See also p. 110.

assimilative or multiplicative of his owne species not only being incorporat by way of fermentation but also being solutus et aggregatus by elaboration ut ignis generat et multiplicat ignem.¹⁷⁵ As opposed to his more traditional contemporaries Warner stresses that it is not

‘...to be imagined that the gustable spirit apparant in the first ingestion and mastication of the materialls is annihilated and destroyed, and that the plasmatic spirit finally incorporated in the coagular substance of the braines tanquam in subiecto plasmatico is an other spirit newly generated and educed out of the potentia of the matter ether spermatik or sanguinous or chilous; but that it is <materially or fundamentally> the same spirit.’¹⁷⁶

Though the gustable and plasmatic spirit are not ‘...absolutely homogeneall and of the same species with the animall spirits...’ they are at least ‘...very nerely conforme unto them...’ as ‘...is manifest by their mutuall congruence and agreement that is by the sense or motion of volupty and delectation that the one receveth by the commixture and impression of the other...’¹⁷⁷

¹⁷⁵ Op. cit., f. 175v; see also f. 173v.

¹⁷⁶ Op. cit., f. 217r.

¹⁷⁷ ‘...the difformity or heterogeneity dissimilitude of the other unto the animall spirits namely of those that are displesing doth likewise appere by their discongruity and displesing and as it were by the sense of paine that the one suffereth by the impression of the other.’ (Op. cit., f. 188r.) Cf. Archangelo Piccolomini: ‘...spiritus animalis sit per generationem, non per alterationem...’ and it is a ‘...rem novam, & in substantia distinctam a spiritu vitali...’ (*Anatomicae praelectiones*, 278D); Laurentius: ‘...spiritus tres specie & forma distincti statuendi sunt.’ (*Opera*, 402)

*The Faculties**3.5. Introduction*

Animal spirits are endowed with two kinds of faculties, the ‘brute’ or ‘natural’ faculties and the ‘moral’ or ‘voluntary’ faculties.¹⁷⁸ Faculties of the first kind, i.e. the materio-elaborative and materio-formative faculties, operate from a natural impulse and without self-consciousness. Those of the second, require training and proceed, operating on the basis of previous knowledge, from a conscious choice. In his notes about the natural faculties of animal organisms Warner deals with physiological questions. His treatment of the materio-ministrative, i.e. the moral faculties covers mainly the psychological aspect of animal organisms.¹⁷⁹ He discusses extensively the nature, training or habituation and coordination of these voluntary faculties. Before dealing with his views of each of these faculties separately I shall put his concept of faculties in general as well as his notion of habituation under the microscope.

3.6. Forms, Faculties and Operations

As we have seen, by faculties, Warner understands the same as he does by assisting forms. He distinguishes between the assisting forms of the objects and those of the organs of perception

‘...the one almost in all respects are the converses of the other; for the formes assistent of the objects are totally <nisi> in principio assistentiae extra terminos corporum but the formes assistent of the organs are totally intra terminos corporum <scilicet> the maner of the assistence of the one is ad extra, and of the other ad intra. And besides the extension or nutus processionis <vel activitatis> of the one is ab intra ad extra a centro ad [superficium] circumferentium and the extension or nutus processionis seu passibitatis of the other is ab extra ad intra; a circumferentia ad centrum; the one being active the other passive. Further the one whiles they exist are in continuall motion or emanation whether they meet with

¹⁷⁸ See op. cit., f. 240r. He also distinguishes between ‘brute faculties and operations’ on the one hand and ‘faculties and operations cognoscitive’ on the other. (See op. cit., ff. 161v-162r, 163v.) See also Chapter 2, p. 79.

¹⁷⁹ See p. 113. Most of Warner’s contemporaries did not describe the voluntary faculties but the faculties labelled by Warner as ‘brute’ or ‘natural’ as the ‘ministrative faculties’. Cf. Casmann: ‘Virtutes seu facultates vitales principes fuerunt in procreatrice & conservatrice: sequuntur administratae (vulgo naturales) quarum ministerio & ope principes utuntur...Primi generis naturales seu ministrantes facultates sunt, Attractrix & Retentrix...Secundi generis ministratae facultates sunt Alteratrix & Expultrix.’ (*Psychologia*, 282); see for the same division and terminology Alsted. *Encyclopaedia*, Band 2, 796.); see for a description of the ‘naturall power’ {i.e. the natural spirit} as that ‘whiche dothe minister’ and ‘To whome is ministred’ also Elyot, *The castle of helth*, 10r.

organs or no, the other though they perpetually exist are allways in quiet but only when they are moved by their obiect.’¹⁸⁰

Thus sensible objects are active and operate, for the greater part outside of themselves, permanently. The organs of perception are passive. i.e. they operate only if activated from outside and that operation is always performed within the organ in question.

Apart from these differences Warner mentions two similarities. Firstly they

‘...may be understood both sphericall, for that the formes assistent of the organs being all iontly taken as they are all continuate and as it were one generall forme assistent of the whole animall are likewise sphericall or at lest affecting or tending to a kinde of sphericality quantum figuratio et situs corporum orga...orium patitur.’¹⁸¹

Maybe Warner had the idea in mind of the ‘sensus communis’ as the centre of a circle where all sensory information comes together and from which the sensory power is diffused through the body.¹⁸² Secondly ‘...as...these assistent formes in animalls are their animae so the assistent formes of the obiects may in some sort be said to be their animae that is animalls to be interiorly animated and their sensible obiects quatenus they are obiects, exteriorly animated.’¹⁸³

Most of Warner’s contemporaries considered the soul as an informing form in the sense of something constituting the essence of a thing and as such indissolubly connected to the substance it informs.¹⁸⁴ Consequently the soul

¹⁸⁰ BL Add. MS 4394, ff. 227r-226v.

¹⁸¹ Op. cit., f. 226v.

¹⁸² Philoponus defined the common sense as ‘...centrum circuli, in quod diversae lineae incident.’ (*Commentarii Collegii Conimbricensis*, 467) Cf. Aquinas: ‘...vis sentiendi diffunditur in organa quinque sensuum ab aliqua una radice communi, a qua procedit vis sentiendi in omnia organa, ad quam etiam terminantur omnes immutationes singulorum organorum...’ (Op. cit., no. 609, 152.); Zabarella: ‘Sensus communis ad quinque externos eam habet rationem, quam habet centrum quod unum est, ad quinque distinctas lineas ab eo prodeuntes: est enim tanquam ipsorum radix atque principium...’ (*De rebus naturalibus*, 720C-D)

¹⁸³ Op. cit., f. 226v. Cf. Bruno: ‘l’anima è nel corpo come nocchiero nella nave. Il quale nocchiero, in quanto vien mosso insieme con la nave, è parte di quella; considerato in quanto che la governa e muove, non se intende parte, ma come distinti efficiente.’ (*De la causa, principio, e uno*. 1584. In: *Dialoghi*, 236.) Already by 200 Alexander of Aphrodisias, rediscovered and widely read in the Renaissance, in his commentary on Aristotle’s *De anima* rejected the idea that the soul is in the body like a steersman on a boat. (See Aphrodisias, *The De Anima*, 1.43-45, 30-32.)

¹⁸⁴ Cf. Case: ‘Plures traduntur definitiones formae, ut sit terminus a quo privationis, terminus ad quem generationis, ut sit perfectio rei, ut sit fuga potentiae, ut sit comes & quasi coniux materiae, ut sit cuiusque essentiae lux, decus, & actus; quae omnes huc tendunt ut intelligas formam esse diviniorem partem naturae, quae specificum esse (ut aiunt) rebus attribuat.’ (*Lapis philosophicus*, 133)

never could be an assisting form, located by definition outside the substance of the thing in question.¹⁸⁵ Besides an assisting form does not inform something, i.e. give it its own character but ‘...solum assistat ad regendum, sicuti nauta assistit navi...’¹⁸⁶ Conceiving the soul as an assisting form in Suarez’ opinion also is incompatible with the view of the soul as a principle of life. A being is only called ‘living’ if it activates itself from an intrinsic principle of operation. However, as opposed to the informing form, assisting forms, not being connected to any body whatsoever essentially, operate exclusively as efficient causes, i.e. as external, mechanically operating causes.¹⁸⁷ Accordingly Warner’s characterization of the soul as an assisting form implies, measured by Scholastic standards, an explanation of vital processes as if they were mechanical phenomena.

As appears from this comparison Warner also had a rather unorthodox view of ‘informing forms’. He does not conceive them as essences, indissolubly connected to something and certainly not as vitalizing entities, but, exactly the opposite, as dead, stiff properties of things considered in their materiality. This view of informing forms does not differ from what Zabarella understands by material forms, i.e. informing forms considered solely in so far as they inform matter and give it its specific being abstracting from their cognitive powers by which they also can make matter act. Thus conceived informing forms are inferior to the soul.¹⁸⁸ Accordingly, in Zabarella’s view there also is no real difference between the principle of being and the operative principle. In Warner’s opinion there is, despite the dependence of the one on the other, such a difference.¹⁸⁹

¹⁸⁵ Cf. Zabarella: ‘...quidditas non distiguitur ab eo, cuius est quidditas, sed est ipsamet substantia rei, cuius est quidditas, quod dicere non possumus de forma assistente tantum; est enim quoddam extra rei substantiam, quod rei assistit, ut illa utatur, & illum regat.’ (*In Aristotelis libros De anima*, 152c.)

¹⁸⁶ See Zabarella *De rebus naturalibus*, 755a-b.

¹⁸⁷ *Opera*, Vol. 25, 517; see also Vol. 3, 471. Cf. Eustachio à S. Paulo: ‘Forma...assistens...dicitur, quae movendo seu agitando corpori praeest, quomodo intelligentiae, quas movendis corporibus coelestibus plerique probabiliter praeficiunt, ab ipsis appellantur formae assistentes...Informans verò dicitur, quae intimè & substantialiter unitur cum subiecto ipsum actuando, & cum ipso unum per se compositum substantiale constituendo: quomodo belluarum animae dicuntur formae ipsarum informantes, & hoc genus formae proprium est’. (*Summa*, Tertia pars...quae est physica..., 279.); Burgersdijk: ‘Anima non est actus assistens, sed informans, & vera viventis forma.’ (*Idea philosophiae naturalis*, p. 56.)

¹⁸⁸ ‘Formae autem materiales, quae sunt infra animam, informant materiam sed non regunt, quia non sunt cognoscitivae...’ (*In Aristotelis libros De anima*, 174d; see also p. 134.)

¹⁸⁹ See pp. 102-4.

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The assisting forms function as the source and foundation of the powers or faculties of the objects and organs. Warner derives that from the fact that two things despite other differences or similarities, can have the same powers or faculties, or that they can be similar in several respects and only differ in their powers. That similarity or difference has to be based on the form or matter of the things in question. It cannot be matter for that in all cases is identical. Consequently

‘...seeing the similitude and dissimilitude of things considered simply or only quatenus things or substances...cannot be imagined to consist in [or proceed from] any other then in the similitude and dissimilitude of their substantiall formes ether totally or partially considered, it must follow that the similitude or dissimilitude of faculties doth proceed from the similitude or dissimilitude <of the formes> of the things whose faculties they are...’¹⁹⁰

The same can also be proved from the fact

‘..that all faculties do depend on or proceed from that, quo posito ponitur et quo sublato tollatur...but that is the case of the faculties, for the formes of their subjects being taken away they are taken away, which is manifest by this that in things that have the like formes the like faculties do allwais appere.’¹⁹¹

Accordingly, forms function as necessary conditions of the faculties. In view of the fact that there is ‘...no one materiall thing to be designed or to be found <in rerum natura>...not matter it self in his prime and utmost simplicity most abstractly considered...’ that has not more than one power¹⁹² while it has only one insisting or informing form it always must have more than one assisting form. In fact ‘...the same thing or obiect numero may have as many of these formes assistent and therefore as many faculties active as there are kindes of organs and faculties passive <or sensitive> for the reception of their actions...and all these formes assistent quod ad formalitatem attinet...depend on or receve their formation from the forme insistent [of the matter] which of one body <or subsistent> can be but one and singular...’¹⁹³

Warner also describes these assisting forms as formal qualities.¹⁹⁴ Initially he understood by the ‘...quality or formality <or condition> of the said obiect or organ thereof understanding thereby ether the substantiall forme thereof absolutely and completely <taken> or rather some speciall or particular

¹⁹⁰ BL Add. MS 4394, ff. 231r-230v.

¹⁹¹ Op. cit., f. 230v.

¹⁹² Op. cit., f. 231r.

¹⁹³ Op. cit., f. 225v.

¹⁹⁴ ‘...by the formall quality must be understood the whole forme assistent...’ (Op. cit., f. 226r)

accident or property or intention <of the forme> one or more there being no forme so simple that doth not consist of <or contayne> many accidents or properties or intentions and all adequately extended ad extensionem materiae. It is said rather some particular accident or property or intention of the forme then the forme self absolutely taken...'¹⁹⁵ Later he dropped that view: '...the formall qualities <of the said objects> ought truly to be understood to be these very formes assistent and no particular intentions <or affections> or properties or conditions ether of them or of the formes insistent...'¹⁹⁶ In case of the objects of perception it is their active formal qualities that are referred to as assisting forms. The passive qualities of objects are no assisting forms '...quia corpus patitur per se, scilicet quatenus ipsum et immediatè, agit per aliud, mediante scilicet forma sua assistente.'¹⁹⁷ They are nothing but '...passible conditions of the matter or essentiall of the matter cum tali formalitate...'¹⁹⁸ On the other hand in the organs of perception '... whose formes assistent are of contrary or converse conditions unto <those of> their objects...it is otherwise for in them their formes assistent are their formall qualities passible...'¹⁹⁹

In all these cases Warner is talking about qualities conceived not as modes of being or as further specifications of substances, but as substances themselves:

'... formall qualities of the objects sensible as well active as passible how properly or improperly soever they are for the present termed qualities are not mere accidentall affections or conditions of substances but substances themselvs...because it is not the accidents or conditions of matter or any other substantiall thing that doth agere vel pati or can properly be conceived so to do but the matter or substance itself; but that any substance doth agere vel pati in this or that <certaine> maner or forme proceedeth of the diversitie of the formall accidents or conditions thereof, so as those accidents or conditions are rather to be termed the qualities formative of their actions or passions then formall qualities active or passible; wherefore the supposed or so termed formall qualities of the objects sensible being understood active and passive as of necessity they must where the materiall objects themselvs by reson of their apparant distance or remotenes from the organs do not appere or cannot be imagined ether agere vel

¹⁹⁵ Op. cit., f. 231v-r.

¹⁹⁶ Op. cit., f. 226r.

¹⁹⁷ Op. cit., f. 225v-r.

¹⁹⁸ Op. cit., f. 225v; 'It is said passible conditions of the matter because there are to be understood also active conditions thereof as essentiall thereto as the passible, for matter is as well reactive and proactive as passibilis react..., cum agens aliquod <.. .pso ac.. passio..s> retro vel directe vel obliquè agit; proactiva cum passa ab alio in aliud agit; and the formes assistent are not to be understood so primely and per se active; as without all presupposall of these active conditions of the matter as of their base or firmament.'

(Ibid.)

¹⁹⁹ Op. cit., f. 224v.

pati, must necessarily be understood substances and not only accidents of substances.²⁰⁰

Now ‘...as the formall qualities active [or passible] are substances so the faculties active and the actions must by the same reason be understood substances...’ for in fact these are not based on qualities but ‘...are nothing but the same formall qualities considered with relation to their opposits or correlatives...’²⁰¹

Conceived as material things Warner understands faculties to be really existing entities, i.e. assisting forms or operative qualities.²⁰² His Scholastic precursors and contemporaries might have agreed with him on this point on the understanding that they conceived faculties not as substances but as properties of the soul.²⁰³ Warner’s comparison of assisting forms with the soul suggests that he conceived faculties also as souls themselves. In fact he understands by faculties realized ‘*potentiae animae seu spirituum*’.²⁰⁴ At the same time taken formally the term ‘faculty’ for Warner refers to a fiction, an ‘*ens rationis*’ in so far as it does not signify these qualities considered in themselves but in relation to their counterparts. Faculties are active qualities considered in relation to their passive counterparts and vice versa. Warner’s

²⁰⁰ Op. cit., f. 225r. Traditionally a quality was understood to be ‘...modum et conditionem quae est circa substantiam vel in substantia...’ or an ‘...esse secundum quam quales esse dicimur...’ (Bruno, *Opera*, 1. Band, 4. Teil, 25-6.) Cf. Suarez’ definition of ‘quality’: ‘...accidens quoddam absolutum, adjunctum substantiae creatae ad complementem perfectionis ejus, tam in existendo, quam in agendo...omnis res quae per modum actus et formae aliam efficit vel determinat, et simpliciter dicta explicat aliquid extra substantiam rei, illam modificans...’ (*Opera*, Vol. 26, 607.) One distinguished four kinds of qualities: *dispositio* and *habitus*, *potentia* and *impotentia*, *passio* and *passibilis qualitas*, and *forma* and *figura*. Warner’s notion of the active qualities of spirits as substances is reminiscent of the Stoic theory of the generation of physical qualities by the tension of *pneuma* as well as of the Stoic notion of bodily properties as ‘*pneumata* or air-like tensions’. (See Sambursky (1987), 7-11.)

²⁰¹ Op. cit., ff. 226r-225v.

²⁰² This seems to contradict his identification of the spirits with the assisting forms conceived as souls. Are spirits ‘faculties’ or are faculties properties of spirits? Is the spirit the soul or only the carrier of ‘souls’, i.e. of faculties? It is precisely this type of ambiguities that provoked Harvey’s criticism of traditional pneumatologies. (See p. 88).

²⁰³ According to Suarez philosophers take ‘...*potentia pro principio proximo, connaturali agenti creato ad aliquid agendum, et hoc modo semper est aliquod accidens...*’ (*Opera*, Vol. 26, 613.) A power differs from a quality in so far as qualities are necessary for the perfection of the substance involved while a power is only required on behalf of a corresponding operation. Is such an operation stopped the corresponding power becomes superfluent. (Op. cit., 645.)

²⁰⁴ See BL Add. MS 4395, f. 35.

Scholastic predecessors and contemporaries certainly would have rejected that idea.²⁰⁵

As the faculties can be said to proceed from the formal qualities, the active and passive operations²⁰⁶ of object and organ can be said to proceed from these faculties.²⁰⁷ Warner of course does not identify operations with qualities: ‘...sublata facultate tollitur operatio, sed econtra posita non necessariò ponitur, operatio necessario supponit facultatem sed facultas non necessario ponit operationem.’²⁰⁸ The occurrence of an operation always implies the existence of a power while the converse does not have to be true. Warner counts operations, like powers, or faculties and qualities of things, as substances. Accordingly, when he talks about an operation we are in fact dealing with an operating substance. For example, ‘...in the action of vision, it is not radiation that is the action, for that is only the action of light whereof the question <is not> but the question is of the action of the body object the formall qualitie active whereof being understood to be the assistent sphere of light reflected the action can be understood to be no other then <the radiation of light that is>

²⁰⁵ Cf. Galen: ‘Caeterum potentia ea facultasve in venis, quam sanguificam appellant, atque etiam alia quaevis facultas, in relatione ad aliquid intelligitur. Primum enim actionis ipsius, potentia est causa. Deinde etiam operis ex accidente quodam. At vero si causa ad aliquid est (est enim unius eius, quod ab ea fit, reliquorum nullius), planum est, potentiam quoque in relatione ad aliquid dici. Ac quoad agentis causae substantiam ignoramus, facultatem eam sive potentiam appellamus: in venis quidem potentiam quandam sanguinis factricem dicentes: in ventriculo concoctricem: in corde pulsificam.’ (*De facultatibus naturalibus. Libri tres, Thoma Linacro interprete*. In: *Opera (1549)*, Vol. 1, 1116.) (Kühn, Vol. 2, *De naturalibus facultatibus*, 9). Cf. John Locke: ‘...powers are relations not agents.’ (*An Essay*, book II, chap. xxi, sect. 19, 243) Thus, in Locke’s view there are powers but these are not individual and certainly not independent. Nor can they be invoked as causes. Leibniz reduces faculties to empty dispositions, i.e. remains or traces of former impressions. (See *Nouveaux Essais*, II, chap. 10, par. 2, 128)

²⁰⁶ ‘...(using still the worde operation hoc loco et huius doctrinae gratia for a terme indifferent and comon both to action and passion as it is also by others used)...’ (BL Add. MS 4394, f. 231v) Cf. Aristotle, *The physics* III, cap. 3; Aquinas: ‘...actio et passio sunt unus actus subiecto, sed differunt ratione, prout actio signatur ut ab agente, passio autem ut in patiente...’ (*De anima*, no. 592, 149.); according to Suarez action and passion are modes of one and the same thing or ‘modi ejusdem termini actionis’. (*Opera*, Vol. 26, 898.)

²⁰⁷ Cf. Aquinas: ‘Ex unaquaque...forma sequitur aliqua inclinatio, et ex inclinatione operatio...’ (Op. cit., no. 286, 75.)

²⁰⁸ Op. cit., f. 230v. Cf. Francis Bacon: ‘...the Form of a nature {i.e. a quality} is such, that given the Form the nature infallibly follows. Therefore it is always present when the nature is present, and universally implies it, and is constantly inherent in it. Again, the Form is such, that if it be taken away the nature infallibly vanishes. Therefore it is always absent when the nature is absent, and implies its absence, and inheres in nothing else.’ (*The works*, Vol. 4, 121.)

light it self radiant <from it> upon the organ...'²⁰⁹ Further, like assisting forms, the operation, faculty, and quality of an organ or object are all

'...subiected or have the basis or foundation of their reality in aliqua re materiali tanquam in basi et subiecto as in this question fundantur in obiecto seu organo tanquam basi, qua sublata tolluntur omnes...qualitas est in subiecto primò et immediatè et per se, scilicet quatenus hoc vel ipsam, facultas vero mediate et quatenus tale scilicet ratione qualitatis, nec non et operatio mediate sed duplici ratione et qualitatis et facultatis.'²¹⁰

Mediating between the operative thing and the operation itself faculties occupy a special place. They proceed from qualities in the sense that through these qualities '...the subject is qualified that is habituated or adapted, or enfaculted for operation.'²¹¹ Next these faculties, conceived as possible operations, can be activated or transformed into actual operations.

'The quality and the faculty differ as positum and consequens, the faculty and the operation as potentia and actus which is as much to say as qualitas est ens positum seu existens et reale, facultas ens ex consequenti seu dependens et rationale ens rationis and also in respect of operation facultas est ens non actu et realiter existens sed tantum potentia et intellectu...operatio vero <ens> actu et reale; ac si facultas esset non ens reale sed rationis et quiddam medium inter operans et operationem suam intellectus opera confictum et constitutum. Est enim facultas potentia eius cuius est facultas scilicet subiecti ad operandum seu habitudo operantis ad operationem.'²¹²

Thus faculties relate to qualities as 'consequences' or 'effects' and to operations as 'potencies' or 'powers'. In both cases we are dealing with brain-children, i.e. not actual, objectively existing entities. Asserting that something has a certain quality amounts to saying that such a thing, if confronted with something endowed with the opposite quality can have a certain operation or, in other words, possesses a certain power or faculty. An actual operation is nothing but an actualized power or a realized possibility.²¹³

²⁰⁹ Op. cit., f. 225r.

²¹⁰ Op. cit., f. 230v-r. Oddly enough Warner does not refer in this connexion to the dependence of assisting forms on forms inherent in matter but appeals to a linguistic argument: '...operatio non dicitur facultatis operatio sed obiecti vel organi, nec facultas, qualitatis facultas sed obiecti vel organi qualitas item obiecti vel organi qualitas dicitur...' (Op. cit., f. 230r.)

²¹¹ Ibid.

²¹² Ibid. Cf. Aquinas: 'Potentia...secundum hoc ipsum quod est, importat habitudinem quamdam ad actum: est principium quoddam agendi vel patiendi.' (*De anima*, no. 304, 78.) In Suarez' view the *potentia* differs from a *habitus* in so far as it is a 'principium operationis quoad substantiam eius' while a *habitus* is only a principle of operation 'ad modum operationis'. (See *Opera*, Vol. 26, 644.)

²¹³ In fact Warner is talking about logical possibilities put on a par with physical powers. Cf. Suarez' opinion that the *potentia logica* '...non consistit in aliqua simplici et reali facultate, sed in sola non repugnantia extremorum...quidquid in se repugnantium non involvit...' (Ibid.)

3.7. *The Acquisition or Habituation of the Faculties*

Warner extensively discusses the question how ‘...faculties <are> acquired and perfected ab <pura seu mera> aptitudine seu dispositione <seu potentia> naturali...by way of habituation by reiteration of acts...’²¹⁴ He makes no distinction between the way men or animals acquire certain skills and natural processes, such as the magnetization of iron when touched by a magnet. In all these cases, according to Warner, we are dealing with the acquisition of a durable quality together with specific powers that differ only with respect to the number of acts required to transform such a power or faculty into an actual skill. Some things

‘... are altered and do acquire a fixed and permanent quality as well by one act as by a thousand as iron by one touch of the magnet others do require many consuetudinary acts as well for the perfecting as fixing of any quality in them; others are naturally unapt for the reception of any quality by all the consuetude or reiteration of acts that can be as a stone by being cast up into the aire never so often can never be taught to stay there. Some by reson of their unaptnes for reception as a marble pavement to receive the impression of a path. Some by reson of their unaptnes for retention as the sea to retayne the wais and paths of ships.’²¹⁵

Thus, in Warner’s view human faculties are not directly operative after birth but are ‘...to be actuated or educed ex potentia animae seu spirituum into act...’, i.e. have to be trained.²¹⁶ Such a process of habituation does not procure the quality or power in question but provides the required ‘...promptitude, facility and certitude of his operation and in some cases also...vigour and strength.’²¹⁷ Actually this comes down to ‘...information, or disposition or habilitation or habituation...’²¹⁸ not of the spirits themselves but of their organs. These are soft enough to receive impressions or forms of the spirits they contain and also tenacious enough to retain them. Most of his Scholastic contemporaries and predecessors followed Aquinas in his view that principally there are no habits

²¹⁴ Op. cit., f. 254r. Warner deems ‘...habituation in formalibus or accidentalibus...analogate to generation in materialibus or substantialibus...’ (BL Add. Ms 4395, f. 34.)

²¹⁵ Op. cit., f. 41.

²¹⁶ Op. cit., f. 35.

²¹⁷ Op. cit., f. 42. By habituation ‘...the subject is qualified that is habituated or adapted, or enfaculted for operation.’ (BL Add. MS 4394, f. 230r)

²¹⁸ Op. cit., f.241v. Cf. Zabarella: ‘...habilitas...nihil aliud est quam aptitudo & potestas...facta propinquior...’ (*In Aristotelis libros de anima*, 807d.)

in the body.²¹⁹ Each operation of the body, says Aquinas, stems from a natural quality of the body or from the soul in so far as it moves that body. Natural operations do not require habituation. They are performed instinctively and are focussed on one thing only.²²⁰ Operations proceeding from the soul essentially are controlled by reason. This implies that the corresponding faculties do not operate automatically, can be oriented to more than one thing and are, in that respect, 'habitable'.²²¹ As such operations are primarily located in the soul and only secondarily in the body, the same holds true for their habits. These can only be said to be in the body in so far as such a body is fitted for promptly serving the soul in its operations.²²² In other words, habits, in the view of Aquinas and his followers, are primarily located in the soul and only faculties controlled by reason can be habituated.

Warner explains the process of habituation comparing the original state of the animal organism to

'...a high and plaine ground on which there never had fallen any rayne...and that this ground were such as is apt for the generation of fountaines or springs that is to say apt to imbibe the rayne that falleth on it for a certaine <depth or> distance and not utterly to absorbe it but to give it issue againe at the lower sides thereof; the first raine that falleth on this ground being confusedly imbibed in the upper part thereof as it descendeth lower collecteth it self into small stremes or [canallets] revulets according as it findeth the ground more weke or apter in one place then an other by the force and pressure thereof to be perced or divided; and those small stremes againe as they descende or laterally proceede further collect themselves into gretter vaines <still> percyng or perterebrating the ground where it most cessione and of lest resistance by the encrease of the gravity or pressure of the water into gretter cavities or conducts and so successively till it have all assembled it self into some one or two or more maine canalls by which it issueth and breketh out at the lower parts of the ground. And this is the maner of the originall motion of the water in the generation of springs or fountaines where it is manifest that those pores or vaines or conducts of the erth through which it passeth are not found so redy made but originally perced and made partly by the force and pressure of the gravity of the water; partly by the dissolution <and consumption> of the erth in the water, for it is to be understood that these passages of the erth are not made perfect and

²¹⁹ See *Summa*, Ia sec., q. 50, a. 1, 219.

²²⁰ See *Summa*, Ia sec., q. 50, a. 3, 221. Cf. Suarez: '...habitus solum recipitur in potentia elicitive actus immanentis.' (*Opera*, Vol. 26, 668). The will, intellect, sensitive appetite and the imagination of man can be habituated but 'potentiae...mere naturaliter operantur' like the external senses, not 'cum sint potentiae omnino determinatae ad unum'. (*Op. cit.*, 667)

²²¹ See *Summa*, Ia sec., q. 50, a. 3, 221.

²²² See *Summa*, Ia sec., q. 50, a. 1, 219. Durandus was one of the few Scholastic philosophers propagating the idea that '...in corpore potest esse habitus proprie dictus...' as the body satisfies all conditions of the subject of a habitude. (Durandus, *De habitibus*, 10.)

complete by the first act of raining or imbibition but ether by the continuation thereof or by many successive acts the pressure of the water ether enlarging them where the earth is spongy and cessible or <the water> by continuall carrying away of the earth therein dissolved wering them wider till it come to some gravelly or other matter that will be no more dissolved. So that the originall motion of the water in this case before the conducts or passages thereof be perfect and complete may be accounted to procede ex ex naturali impetu seu vi generantis of the naturall force of the cause generant and to be only dispositionall and the successive acts or continuation of the motion after the conducts are perfect and complete to be ex habitu or habituall.²²³

In a similar way all voluntary faculties of animal organisms, the ‘faculty sensitive’ included²²⁴, are habituated. Warner’s contemporaries would agree that the voluntary faculties are habituable but they definitely rejected the idea that sensory perception too is based on habituation. Following the Scholastic and Aristotelian tradition they believed that the senses are, as it were, habituated by nature²²⁵, i.e. disposed to the performance of one specific act²²⁶ requiring no experience whatsoever.²²⁷ Warner thought otherwise. In his opinion

‘...the impressions of the sensitive though they may be in some degree principiated by the first acts yet upon one act only they are not habitually fixed that is to say they are nether durable or retaynable nor perfect no more then those of the locomotive but to make them perfect for apparition, obvious and facill for actuation and fixed and durable for retention they

²²³ BL Add. MS 4395, f. 45 Cf. ‘And in the generation of paths and avenues by an army or colony that is seated in an unfrequented and dishabited place the case in respect of this purpose is not impertinent...’ (Op. cit., f. 44.)

²²⁴ See Chapter 4, p. 151.

²²⁵ According to Zabarella the senses are procured with an operative power ‘...ita propinqua, ut nullo doctore, nulloque exercitio indigeat, sed satim sine labore species sensilium recipiat...sensus accepisset habitum à generante, non à doctore aliquo...’ (*In Aristotelis libros de anima*, 808a.); ‘...senso...à natura habeat quodammodo habitum, quia sine ullo exercitio statim sentit, & sine ullo labore...’ (Op. cit., 778F) Cf. Suarez, *Opera*, Vol. 26, 667.

²²⁶ Cf. Aquinas: ‘...vires...apprehensivae exteriores...non sunt susceptivae aliquorum habituum, sed secundum dispositionem suae naturae ordinantur ad suos actus determinatos.’ (Op. cit., a. 3, 221-222.) Ockham, too, is of the opinion that external senses cannot be habituated for knowledge acquired that way is intuitive and acts of the intuition are not to be habituated. (See Fuchs (1952), pp. 21 and 46.)

²²⁷ Cf. Durandus: ‘...in sensibus exterioribus nullus est habitus...’ meaning a habit ‘...potentie vel pertinentis ad potentiam respectu operationis.’ Perception is a power that ‘...de se est determinata ad actum et secundum unum modum.’ Accordingly, a frequent use of the senses does not result in ‘...aliquas facilitas aut determinatio ad actum.’ (Op. cit., 17.) It only knows a ‘...dispositio organi ad potentiam.’ (Op. cit., 16.)

do require many reiterate acts and that this is so it is a phenomene of manifest and comon experience which doth infallibly argue that they are habits or consuedinary effects...'²²⁸

Most people do not realize this '...the operation...of the sensitive faculty being most simple...and the originall acts <of sensation> being necessarily done before we have any iudgment or any faculty cognoscitive at all to observe the same or the alteration caused in us thereby...'²²⁹ Likewise the other powers covered by the 'faculty sensitive', memory and imagination, are habituated '...by a certaine <fixed or permanent> figuration or information of the subiect or organ of the spirits sensitive...'.²³⁰ The motory power is acquired by a habituation of the 'fantasy' and the 'organs motory'.²³¹ The same holds good for the appetite, affections, reason and will, i.e. the powers in the sphere of the intellect.²³²

3.8. Steps towards Materialism and Mechanicism

Comparing Warner's doctrine of the spirits with those of his contemporaries, one is struck by the similarity to Francis Bacon's ideas. Both are of the opinion that in each tangible body is hidden a spirit and both distinguish between a 'spiritus confusus' and a 'spiritus organizatus'. Both consider this spirit as the architect and maker of its own container, as something that multiplies itself, as the source of life, as something operating by heat and motion and as something the motions of which are susceptible to training. As opposed to these similarities there are a number of telling differences. Bacon's spirits do not consist of atoms. Being related to the ethereal region they also play a part in natural magic.²³³ The main difference concerns their ideas about the relationship between the spirit and the soul. Bacon identifies the vital spirit only with the vegetative and sensitive soul. It is supposed to be a mere

²²⁸ Op. cit., f. 31.

²²⁹ Op. cit., f. 41.

²³⁰ Op. cit., f. 31. Cf. Aristotle, *On Memory and recollection*, 451b15-20. See Chapter 4, section 4.3.

²³¹ Op. cit. f. 42. Cf. Suarez in whose opinion bodily members can be disposed materially by training but cannot be habituated: 'Haec autem dispositio non videtur esse alia praeter eas, quae vel ad modos quantitatis, aut ad primas qualitates, vel alias, quae ex illis consequuntur, pertinent. Unde etiam in ipsis externis instrumentis artis experimur, interdum fieri ipso usu et exercitio aptiora...Ad hunc ergo modum intelligi potest membra corporis usu reddi aptiora ad motum, quia nervi ipsi vel laxantur, vel contrahuntur magis, vel alia simili causa.' (*Opera*, Vol. 26, 668.)

²³² See BL Add. MS 4394, ff. 241v, 240v; Add. MS 4395, f. 34.

²³³ See about Bacon's views on the astrological and magical significance of spirits Walker (1972), Vol. 2, 121-30.

instrument of the immaterial, rational soul. Warner identifies the spirit as active principle of all organic functions with the soul in itself. Though Telesio, one of Bacon's sources, does not, like Bacon, restrict the operations of the material spirit to the functions traditionally attributed to the two inferior souls he too distinguishes between a mortal soul, proceeding from seed and shared by men and animals for the regulation of all functions bearing on sensory perceptible reality and an, exclusively human, immortal spirit infused by God that would account for rationality proper and for the knowledge of what is really good for us, as opposed to what we only imagine is for our good. This also is the main difference between Telesio's doctrine of the spirits and that of Doni.

Though it is not known whether Warner knew Doni's treatise on the nature of man their ideas are strikingly similar. According to both man, like all animal organisms, is ruled by one homogeneous, material, warm and therefore active spirit distilled from the blood and functioning as the source of life. It is endowed with all the powers required in an organism. Both explicitly state that the body is nothing but an instrument used by the spirit to survive and to reproduce itself. Both believe that the operations of the spirit differ depending on the organ in which it is incorporated²³⁴ and that the several functions are performed by several parts of the spirit.

Warner's ideas about the chemical components of the spirit and about their role as ferments in the nutritive and restorative processes suggests an influence of Paracelsism. He also seems to anticipate in this respect 'chemical anatomists' like Thomas Willis (1621-1675) and especially Henry Power (c. 1624-1668). The latter's *Experimental Philosophy* (1664) contains a long digression about the animal spirits conceived as an '...aetherial substance or subtle particles...diffused...throughout the Universe, to give fermentation and concretion to Minerals; vegetation and maturation to Plants; life, sense, and motion to Animals...' ²³⁵ Taken from food by the chemical activity of the body they constitute in animals

'...the purest, subtlest, and most volatile particles and activest Atoms of the blood, which by continual pulsation of the Heart are carried with the blood...up into the Brain, and there...imbibed and separated from the blood, and thence by the Spinal Marrow and nerves transmitted to all the parts of the Body.'²³⁶

²³⁴ Cf. Campanella, "De Homine" In: *Inediti Theologicorum liber IV*, 32; Bright, *A treatise*, 41-4.

²³⁵ *Experimental Philosophy*, 61.

²³⁶ Op. cit., 66. See for Warner p. 111.

There fermenting spirits produce the necessary vital heat and function as ‘...the immediate Instrument of the Soul, in all her operations both of Sense and Motion.’²³⁷ In its operation the spirit is consumed and probably replenished during sleep.²³⁸ Part of the spirits gets lost because owing to their tenuity and heat, they ‘...pass constantly out of us by insensible transpiration...’²³⁹ The part, not disappearing that way ‘...may...have a kind of circulation; for those which perspire not, having lost their motion, may either mix with the blood...or relapse into a kind of insipid pleghm...and to be returned back by the Lymphiducts again.’²⁴⁰ These ideas, most of which were also held by Thomas Willis, do not differ substantially from those of Warner.²⁴¹ Yet, even a radical experimentalist like Power does not dare to identify, as Warner does, the animal spirits with the soul:

‘For certainly, as Doctor *More* very ingeniously inferrs, if it were an immediate faculty of the Soul to contribute Motion to any matter; I do not understand (that Faculty never failing nor diminishing, no more than the Soul it self can fail or diminish) that we should ever be weary.’²⁴²

This phenomenon demonstrates, in Power’s view, that spirits do not constitute the soul itself but function only as its instrument and as a link between the immaterial soul and matter. His colleague Willis agrees with Francis Bacon in this respect, and identifies the animal spirits only with the sensitive and vital soul. As for the rational soul the spirits are nothing but the executor of its commands in the body.

What does Warner’s doctrine of the spirit and its faculties tell us about the role materialism and mechanicism play in his theory of animal organisms?

²³⁷ Op. cit., 68. See for Warner pp. 111-12.

²³⁸ See op. cit., 70-1. See for Warner p. 116.

²³⁹ Op. cit., 67. See for Warner pp. 115-16.

²⁴⁰ Op. cit., 71. Cf. Warner’s reference to a ‘...circulation or circulatory motion of the animall spirit in the canallets of the tunicles of the vaines and arteries ether secundum or contra cursum sanguinis...’ (BL Add. MS 4394, f. 137r.); ‘Out of that portion of the blood that is propelled by the iugular arteries up to the hed the spiritus confusus or immersus thereof being expressed and segregated in plexu choroide ether by excussion or exhalation and animall spirit thereof made by the self operation of the preexistent in somno, it is againe distributed as before, one portion thereof being still derived and transmitted to the hart ad motum spontaneum pulsationis ciendum, and so about againe perpetua circulatione durante fabrica corporea...’ (Op. cit., f. 138r-v.); ‘...there may be understood two circulations; the one of the spirit quatenus materio-ministrative, the other quatenus materio-laborative...’ (Op. cit., f. 145r). See also Chapter 1, p. 41.

²⁴¹ See Willis, *Cerebri anatome*, cap. IX, 108-38.

²⁴² *Experimental Philosophy*, 70. He also wonders whether ‘...it not be probable enough that these Spirits in the other World, shall onely be the Soul’s Vehicle and Habit...’ (Op. cit., 72.)

The term ‘mechanical’ had many meanings in the 17th century.²⁴³ It could mean that one wanted to explain natural phenomena only in terms of matter in/and motion possibly combined with a corpuscular view of matter. It also could indicate a specific methodological point of view. For example, the idea that nature has to be explained strictly mathematically, the choice of observation and experiment instead of explanations in terms of occult forces, the idea that nature has to be understood in analogy to machines. These differences do not diminish the fact that mechanical philosophers, at least until Newton, shared the view that natural phenomena had to be explained in terms of motion, and that motion required contact between bodies or material particles. Moreover most of them followed Descartes in his fundamental distinction between extended matter, and the soul, an immaterial, thinking substance. They aimed at an explanation of motory phenomena without invoking the idea of animated matter, internal spontaneity, purposiveness, inner change of material parts, an internal spirituous substance or such like things. Some tried to explain natural phenomena purely quantitatively, i.e. with the help of nothing but mathematical notions.

Identifying the animal spirit with the soul, focussing on the operation instead of on the nature of faculties, conceiving habituation as a purely bodily process, and explaining the operations of animal organisms in terms of assisting forms, conceived by the Scholastics as merely external, efficient causes, Warner definitely moved in the direction of a materialistic and mechanistic explanation of the functioning of animal organisms. Yet, the explanation of the same operations in terms of matter and form, potency and act, or as the effects of an animated, purposively operating force, disqualify him as a straight materialist and/or mechanist. True, his animal spirits composed of ‘atomical parts’ are material, but at the same time this substance is endowed with mental powers. Coarse matter in Warner’s view may be passive, as it were dead, but the material stuff spirits are made of is definitely alive and in the possession of all powers characteristic of the human soul.²⁴⁴ Quantification hardly plays a role in the notes at issue.

All this is in accordance with the suggestion in the previous chapter that Warner was primarily inspired by Renaissance naturalism and by Italian natural philosophers from the last quarter of the 16th century in particular.

²⁴³ See Dijksterhuis (1989), 358-539; Westfall (1971), 28-33; McGuire (1972), 523-42.

²⁴⁴ In that respect his doctrine of the spirits might have been acceptable to Richard Baxter (1615-1691) who reproached philosophers like Hobbes that they ‘...doe give so much more to meer matter and motion, than is truly due, and know or say so much too little of Spirits, active natures, Vital Powers, which are the true principles of motion, that they differ as much from true Philosophers, as a Carcass or a Clock from a living man.’ (Quoted in Rattansi (1972), 26)

Within this tradition, represented by philosophers like Girolamo Fracastoro (1483-1553), Geronimo Cardano (1501-1576), Telesio, Patrizi, Bruno and Tommaso Campanella (1568-1639) two variants can be distinguished: 1) systems in which nature is identified with God and in which physics, though deemed indispensable is considered as nothing but a rung on the ladder to metaphysics, i.e. theology; 2) systems based on the conviction that nature has to be studied empirically, and moreover according to its proper immanent principles. The first variant is represented pre-eminently by Giordano Bruno; the second one especially by Telesio.²⁴⁵ Warner's explanations of animal organisms, the distinction between 'nature' and 'reason' included²⁴⁶, seem to be related not to the mystical naturalism represented by Giordano Bruno but to Doni's and Telesio's rational hylozoism. It is not known whether Warner read Doni's *De natura hominis*, but he mentions Telesio once, nota bene in the same breath with Galen:

'...all those alterations of the pulse or motion of the hart which are comonly observed to follow or accompany the passions and perturbations of the mynde which are in gret variety (for which examine Galen & Telesius) do manifestly argue a continuation of these pulsatory spirits with those of the intellect or ratiocination or a dependence of the one on the other...'²⁴⁷

The investigation of Telesio's influence in England is still in its infancy. According to Bacon, in the early 1620s Telesio's philosophy was already forgotten.²⁴⁸ Bacon himself, as we saw, praised Telesio's doctrine of the spirits.²⁴⁹ Raleigh's library contained work by Telesio²⁵⁰, as indeed did the library of John Rainolds, president of Corpus Christi College from 1598 till 1607. Henry Percy's library, on the other hand, contained no writings of Telesio.²⁵¹ It is not known whether Harriot read Telesio or not. Anyway, his legacy contains the following note: '*Telesius 9 lib et De Cometis de iride etc.*'²⁵² Telesio's psychological theories evidently marked Nicholas Hill's *Philosophia Epicurea*.²⁵³ John Webster repeats Bacon's praise of Telesio.²⁵⁴

²⁴⁵ See Kristeller (1978); Collingwood (1945); Védrine (1967).

²⁴⁶ With Warner these active principles, do not, as they do with Galen, represent two substantially different causes, the vital and animal spirit effecting two, essentially different, kinds of operations but, as with Telesio, causes of two, merely gradually differing, modes of operation of one and the same substance.

²⁴⁷ BL Add. MS 4394, f. 135v.

²⁴⁸ See *The works*, Vol. 5, 495.

²⁴⁹ See *The works*, Vol. 4, 398.

²⁵⁰ See Lefranc (1968), 438.

²⁵¹ Written communication, 27-11-'89, from prof. Batho.

²⁵² See Gatti (1985), 147, note 11.

²⁵³ See Prins (1989), 154-60.

²⁵⁴ See *Academiarum Examen*, 188.

Hobbes mentions Telesio's *De rerum natura* in a long list of books compiled by himself. He probably read it too.²⁵⁵

In the next five chapters I will try to determine more precisely Warner's position between Italian naturalists like Doni and Telesio, and his Scholastic contemporaries through a detailed exposition of his views of each of the voluntary faculties, i.e. the 'faculty sensitive', the 'faculty intellective', the 'faculty appetitive', the 'faculty volitive', and the 'faculty locomotive'.

²⁵⁵ See Schuhmann (1988), 109-33.

Chapter Four

Sensation, Imagination and Memory

4.1. Introduction

According to an encyclopedia, widely read in Warner's day, the sensible soul

'...duplicem habet potestatem, scilicet apprehensivam & motivam. Apprehensiva vero dividitur in sensum communem sive interiorem, & in sensum particularem sive exteriorem, sensus vero exterior continet visum, auditum, gustum, odoratum, & tactum, & iste sensus in suis organis producit taliter ad effectum...Sensus...interior dividitur in tres partes, secundum tres cerebri regiones. Nam in cerebro sunt tres cellulae, scilicet anterior, in qua virtus imaginativa operatur...Est & media cellula...in qua ratio sensibilis vel aestimativa virtus dominatur. Est iterum & tertia & postrema, quae est memorativa...'¹

Most of Warner's contemporaries shared this view, or held similar ideas about the sensible soul. All agreed that sensation consists of two different phases. First the external sense-organ is acted upon by a sensible quality. Next the effect of that action is transported by sensory spirits to some inner organ or organs in the brain where, by means of an immaterial, mental representation of the sensible object actual perception takes place. Accordingly, in their view, the power of sensation consists of the external, bodily, passive senses and one or more internal spiritual faculties that were supposed to be located in the ventricles of the brain and to operate without bodily organs.² There were no substantial differences of opinion about the external senses. Though, in Warner's day, opinions were divided about the precise number and nature of the internal senses, most writers on the soul understood by the internal senses, a combination of powers accounting for conscious sensory perception and for the ability to see what the several sense-data share, as well as to know them apart, for the perception of things absent, things from the past and of fictions, for the ability to recognize the useful and the noxious³, and for the

¹ Anglicus, *De rerum proprietatibus*, 52-3.

² See about the history of the idea of 'internal senses' Wolfson (1935).

³ As to this specific faculty most writers made a distinction between animals and men. While animals apprehend the useful or noxious by some natural instinct, called the 'vis aestimativa' men are supposed to possess a 'vis cogitativa', also called 'ratio particularis', enabling them to gather that information by way of comparing sense-data. (See Aquinas, *Summa*, Ia, qu. 78, a. 4, 381.)

conservation as well as recollection of impressions. Most were of the opinion that these operations required three distinct faculties.⁴ Some believed that these operations could be explained by two faculties. According to Gualandi, for example,

‘Dividitur etiam interior in communem sensum, ad quem exteriores ij terminantur, & à quo dijudicantur, & quasi affirmantur, vel negantur, quae ab ijs fuerint delata; & in imaginationem, in qua obiectorum species receptae imprimuntur. Quae cum eas impressas conservat, memoriam dicitur.’⁵

A small minority in the early 17th century deemed it more probable that in fact there is only one internal sense. Thus, while Jean Bodin for example reduces the internal senses to a ‘sensus communis’⁶, Eustachius à Sancto Paulo identifies them all with the ‘phantasia’.⁷

Warner too ascribed imagination and memory to the sensitive faculty. However, as opposed to most of his contemporaries he did neither consider them as distinct faculties of the virtue sensitive nor make a distinction between external and internal senses. In his view

‘...there is a faculty...the function whereof doth consist of three graduall parts namely reception, retention and representation which may be accounted the successive operations of one generall continue faculty though they be comonly understood to be acted by three distinct faculties, reception by the sensitive, retention by the memorative and representation by the fantasiative.’⁸

⁴ See Melanchthon. *Commentarius*, 174v; Davies, *Nosce Teipsum*, 107-112; Burton. *The anatomy*, Vol. 1, 157-60; Alsted, *Encyclopaedia*, 739.

⁵ Gualandi, *De civili facultate*, 40. Cf. Casmann: ‘Interiores cognitionis sensus sunt, qui sensilia intra cerebrum percipiendo cognoscunt...Sunt sensus communis & phantasia, seu vis imaginatrix.’ (*Psychologia*, 359-60). Zabarella doubts: ‘...ego duos proprie loquendo esse arbitror, sensum communem, & phantasiam, à nostris imaginativam appellatam; vel tres, si memoriam addere velimus: sed quia nomen sensus cognitionem denotare videtur, memoria vero non est cognoscitiva, sed solum conservativa imaginum, & tanquam promptuarium imaginativae; ideo dubium est an memoriam liceat sensum appellare.’ (*De rebus naturalibus*, 720A.)

⁶ *Universae naturae theatrum*, 448.

⁷ See Wolfson (1935), 71, 111 and 126. Cf. Suarez: ‘...sensem interiorem unum tantum esse realiter...sensus communis, et phantasia in unam coincidunt potentiam, aestimativa item, ac memoria inter se, cogitativa autem reminiscencia et imaginatio non ponunt in numero...solumque significant diversas perfectiones ejusdem sensus in homine...’ (*Opera*, Vol. 3, 708.)

⁸ BL Add. MS 4394, f. 246v. Accordingly, when Warner mentions a ‘faculty retentive or memorative’, the ‘faculty fantasiative’ etc. in fact he means the faculty sensitive insofar as that retains or represents these images.

He also had his own ideas about the number of the senses. Of course the five external senses, sight, hearing, smell, taste and touch were not disputed. However, since the Middle-Ages the number of tactile senses was debated. According to some writers there are as many different kinds of touch as there are different pairs of contrary tactile qualities such as hot and cold, wet and dry, hard and soft, pain and pleasure, or hunger and thirst.⁹ Cardano, distinguishing these as different modes of one and the same tactile sense, added a mode differentiating between light and heavy as well as one 'qui propriè Veneris gaudia percipit.'¹⁰ Most of Warner's contemporaries rejected that view.¹¹ Though Warner does not say so explicitly he probably sided with the minority who argued that the different kinds of tactile objects implied different kinds of senses. Thus he mentions, apart from 'the five comonly received' senses a 'sense of taction internall voluptific or dolorifik'¹² covering also the sense of thirst¹³ and a 'sense of inanition in the stomak and chiloducts...consisting formally in dolore namely <ether> in a certaine dolorous torsion or vulsion or griping consequent of stronge suction or attraction...'¹⁴ As opposed to Cardano he did not conceive the 'sense of ventry' as a tactile mode but, probably inspired by J.C. Scaliger, as a separate sense.¹⁵ Apart from the foregoing Warner also refers to a couple of other senses, mentioned by no one else, to wit, senses '...connotative of the habitudes or relations of time and place ante post &c...some connotative of the other

⁹ '...alius tactus sit caloris & frigus, alius humidi & sicci, alius duri & mollis, &c. His quidam addunt dolorem, voluptatem, famem & sitim...' (Casmann, *Psychologia*, 320.)

¹⁰ *De Subtilitate*, 570-71

¹¹ See, for example, Suarez, *Opera*, Vol. 3, 698; Burgersdijk, *Idea*, 72; Casmann, *Psychologia*, 321.

¹² See BL Add. MS 4395, f. 3.

¹³ 'The sense of heat in thirst' is 'to be reduced to some internall sense of taction ether the same with that of comon dolour internall...or some other peculiar but such as is ex genere sensus tactivi eius qui est caloris ab extra obiecti or els analogate thereto...' (Op. cit., f. 49.)

¹⁴ Op. cit., f. 4. Cf. Melanchthon: 'Fames est sensus suctionis venarum, quae cum deest nutrimentum, mulgentur ab exhaustis membris. Quare ipsae vicissim sugunt ventriculum.' (*Commentarius*, 138r.)

¹⁵ See op. cit., f. 3. Cf.: 'Scaliger...Veneream voluptatem & titillationem ait sensum sextum, datum ob speciei conservationem.' (Casmann, *Psychologia*, 313); Burton also mentions 'Scaliger's sixth sense of titillation' (*The anatomy*, Vol. 1, 157); Francis Bacon idem dito. (See *The works*, Vol. 2, 556.) According to Campanella too 'Potest sensus veneris distingui: habet enim proprium organum et obiectum.' (*De homine*. In: *Inediti Theologorum*, 20).

conditions of time and place as of their continuity and discontinuity &c...'¹⁶, and to a sense 'of the voluntary motions of the organs...a new sense'.¹⁷

Warner follows his contemporaries in their ideas about the function of the senses. 'Some of the senses are malorum informatores et sollicitatores ad remedia seu bona applicanda others are bonorum seu remediorum informatores et directores ad bona seu remedia assequenda...'¹⁸ There are no 'more or other objects in regione sensitiva but the external...meaning external in respect of the spirits recipient whether the objects be intra vel extra corpus...'¹⁹ By 'object' Warner means an '...agent in case where the application of the agent to the patient is per intervallum seu medium deferens and per transmissionem seu communicationem virtutis and not per contactum corporalem.'²⁰ Yet, '...it is not the things themselves materially but the formal qualities of them that are the objects of the sense'.²¹ Or rather,

'Nos sentimus vel intelligimus hoc est organa sensoria vel intellectoria sentiunt vel intelligunt objecta ad extra qualia sunt seu qualitates obiectorum, sed intra et in seipsis non qualitates aliquas sed tantum alterationes seu motiones vel proprijs actionibus necessariò requisitas et incidentes vel ab obiectorum actionibus causatas proprias scilicet operationes vel activas vel passivas sentiunt vel intelligunt nec aliter fieri potest.'²²

The qualities of the organs, and the operations of the objects are never directly experienced. Organs cannot perceive themselves and the operations of

¹⁶ BL Add. MS 4394, f. 243v.

¹⁷ 'The impressions or fantasms...of our owne motions...are apprehended by a peculiar and distinct sense...the other senses have all this one community that the action of their objects is ab extra whereas of this of self-motions it is ab intra...' (BL Add. MS 4395, f. 38) See also Chapter 7, p. 210. Cf. Galen: '...ratione omnem motum, non sensu dignosci.' (*De dignotione pulsuum libri quatuor eodem interprete* {i.e. Hermannus Cruserius}. In: *Opera* (1549), Vol. 4, 309.) (Kühn, Vol. 8, 884.) Scaliger and Caesalpinus mention the locomotive faculty or rather muscular sense as a medium of apprehension but then not of voluntary motion but of gravity. (See Hamilton (1863), 867-8.)

¹⁸ BL Add. MS 4395, f. 48; '...of the senses <that is of their passions or sensations> some are monitory of the destructive or conservative actions of their objects...' (Op. cit., f. 21). Cf. Casmann: 'Sensus porro est cognitionis, vel conservationis.' (*Psychologia*, 311); Digby: '...by the senses, a living creature becometh iudge of what is good, and of what is bad for him...the senses are seated in us, principally for the end of moving us to, or from objects, that are good for us, or hurtfull to us.' (*Two treatises*, 294-5). See also Melanchthon, *Commentarius*, 157v; Davies, *Nosce teipsum*, 107; Fr. Bacon, *The works*, Vol. 4, 192.

¹⁹ BL Add. MS 4394, f. 246v.

²⁰ Op. cit., f. 235v.

²¹ BL Add. MS 4395, ff. 31-32.

²² BL Add. MS 4394, f. 231v. Cf. Telesio: '...rerum actionum aërisque impulsionum, et propriarum passionum propriarumque immutationum, et propriorum motuum perceptio sensus sit; et horum magis.' (*De rerum natura*, 276.)

sensible objects are only perceived indirectly through their effects on the organs of sense:

‘That the alterations or acts or operations do universally appere ex parte organi tantum et non obiecti (which may be understood also of the faculties as well as of the acts or operations) this may be the reson because the organs are nostra, that is intrinsik and essentiall unto us of whose operations and notions and alterations (and also faculties) we are therefore necessarily conscious <and cannot be ignorant> whereas the obiects quatenus talia are aliena and extranea unto us though in other respects in some cases they be interna.’²³

Further ‘...sensation being only of alteration and not of state...’ things that stay the same will not be perceived.²⁴ Thus according to Warner the senses are not affected by the things themselves, but by their assisting forms.²⁵ In his speculations about light as the assisting form of luminous bodies he describes this process.

4.2. Reception

According to Warner

‘...from all parts of the unifers light is spherically incident to every particular body which being by the same again spherically reflected to all partes of the unifers and being a thing active as it falleth or is incident upon the organ visory of any animall doth cause therein an impression of the thing from whence it was reflected...and this extension or emanation of light from every proposed body or obiect formed according to the superficial formation of the said body tum in magno quam in minimis is to be understood sphericall according as the bodies of the unifers from which the light is incident are to the obiect spherically circumstant or ambient. And this sphericall extension or emanation of luminosity is comonly called the sphere of activity of this kinde.’²⁶

In fact, this sphere of activity is nothing but the assisting form of light.²⁷ Hence light is something that ‘...hath his owne peculiar matter or substance

²³ Op. cit., f. 234r. See also op. cit., f. 232r.

²⁴ Op. cit., f. 221v.

²⁵ He does not explain and probably did not know what exactly it is that enables these ‘assisting forms’ to function as the activating principle of the senses ‘...yet whether that may be reduced sub una communi ratione is a question...’ (BL Add. MS 4395, f. 26) See also note 51.

²⁶ BL Add. MS 4394, 228v-r. Cf. Roger Bacon: ‘...res quaelibet multiplicat speciem suam in omnes diametros et undique sphaerice’ (*Opus Majus*, Vol. 1, 458, 463). See also Chapter 3, note 90.

²⁷ See Chapter 3, p. 108.

which is quiddam materiae analogum and his owne proper forme...²⁸ As we saw light shares this latter property as well as its active nature with spirits.²⁹ In another context Warner even identifies light with the active power of things as such that ‘...is always extensive impulsive or rightly forwards...’ and effects nothing but ‘...motion of the patient secundum totum vel partes, magis vel minus.’³⁰ Light, in other words, like all the other sensorial qualities, is neither a fiction that only exists in the mind³¹ nor an accident or property of a substance³² but is itself ‘...substantiall whatsoever the substance thereof be and active or alterative or motive of matter.’³³ The assisting form of light, its sphere of activity, effects motions in the eye, i.e. in the retina as ‘...the...structure of the eye excepting that membrane namely the rest of the tunics or membranes therof and also the humors enclosed being ordayned only to the intromission, refraction and reunion of the radiation for forming the visible species in the membrane recipient are absolutely void of all sense of vision.’³⁴ The retina contains ‘...a substance alterable or apt to be moved or altered by light namely...spirits visory...’³⁵ These, by the action of light on the retina, have a certain form impressed, namely the form of the object from which that light was reflected, which results in dilatation, contraction or some other change of

²⁸ BL Add. Mss 4394, f. 228r. Cf. Goclenius: ‘...Lux est Substantia corporea summe simplex in generatione corporum: summe multiplex in efficacia: Summe mobilis & absolutae penetrationis, & minimae resistentiae...omnis naturalis motionis principium & origo...’ (*Lexicon*, 654.)

²⁹ See Chapter 3, section 3.3.

³⁰ Sion College: Arc. L 40. 2/ E 10, f. 88v. See also Chapter 3, p. 108.

³¹ BL Add. MS 4394, f. 228r.

³² ‘...qualities sensible or the formall qualities of obiects sensible as color, odor, sonus, sapor, &c are not mere accidents or affections or conditions or qualities of substances ether materiall or immateriall but substances themselves, namely these substantiall emanations ether luminous or spirituall.’ (Op. cit., f. 226r.) Cf. Digby: ‘...the sensible qualities of bodies, are not any positive reall thing, consisting in an indivisible, and distinct from the body it selfe; but meerely the very body, as it affecteth our senses...’ (*Two Treatises*, 243.)

³³ Op. cit., f. 228r. Cf. Grosseteste: ‘Quando vero lux est expandens se in partes diversas, ista incorporatur materiae, si corpulentiam materiae secum extendit, et fit rarefactio materiae vel augmentum. Quando vero congregatur lux secundum unam viam se generat secum trahens materiam, fit motus localis. Cum vero lux, quae est intra materiam, mittatur foras et quod foris est, immittit intus, fit alteratio.’ (*De motu corporali et luce*. In: *Die philosophische Werke*, 92.) See further *De luce seu de inchoatione formarum*, Op. cit., 51-59 and Roger Bacon, *De scientia perspectiva*. In: *Opus Maius*. Pars quinta., Vol. 2, p. 72; *De multiplicatione specierum*. In: Op. cit., Vol. 2, pp. 409, 433. Over the years Warner’s views on the nature of light and vision suffered a radical change. (See Chapter 9, section 9.1.)

³⁴ BL Add. MS 4395, f. 116. Cf. Kepler, *Werke*, Vol. 2, 153 ; Hobbes, OL, Vol. 1, 328-9.

³⁵ BL Add. MS 4394, f. 227r.

their consistency.³⁶ Accordingly, sensible qualities like light are perceived through their action on our organs of sense. Now there are

‘...qualities or conditions or affections of matter that per se and ex ipsarum natura being of no activity or motivity <(as figure &c)> we can have no sensation of; nor consequently notion or concept but by consensation that is by sending them with some other object with which they are always necessarily conjoined in eodem subiecto.’³⁷

In view of the fact that

‘...this is one of the original kinds or ways or manners of our phenomena from whence a great part of our prime and original notions doth springe...it is not only possible but also necessary and therefore common and usual that one sense should have diverse objects of different and distinct kinds. But of these objects it is to be understood there is always some one only that is the deferent of all the rest by mediation where of the rest are sented or by the coincidence or conjunction thereof consented and without which there could be no sensation or consensation of the rest. And this one is to be understood the prime and immediate and proper or natural object of the sense and the rest only objects mediate and accidental or per accidens but per se ex sui natura no objects at all of this sense nor perhaps of any other.’³⁸

In agreement with most of his contemporaries Warner conceived sensory perception as a result of the impression of a species in an organ of sense. According to these same contemporaries the production of such a species in the medium between the external object and the organ of sense as well as in that organ itself, required apart from the external object, another agent:

‘...nam obiectum sensibile est qualitas materialis, eiusvero species est accidens spiritale; at spiritale nobilius est materiali; ergo si obiectum solum sine alio agente speciem produceret, ignobilius produceret effectum nobiliorem, & ageret supra proprias vires; quoniam igitur agens debet esse nobilius patiente: obiectum autem materiale non est nobilius specie sua, quae spiritalis est, sed ignobilius, non potest solum obiectum producere speciem, sed necesse est praeter ipsum esse aliud agens nobilius, a quo species producat.’³⁹

³⁶ See BL Add. MS 4395, ff. 29-30; Add. MS 4394, f. 227r-226v.

³⁷ BL Add. MS 4395, f. 11.

³⁸ Op. cit., ff. 11-12. Cf. Suarez: ‘Sensibile proprium illud dicitur, quod ab unico tantum sensu potest cognosci, in illoque propriam speciem imprimit. Unde sensibile proprium, per se, ac primo est sensibile...*sensibile proprium tantum cognoscitur ab uno sensu*...sensibile per accidens dicitur, quod nullo modo sensum immutat, sed tantum cognoscitur per immutationem alterius objecti, cui coniungitur. Hoc modo substantia corporea est per accidens sensibilis, quia ipsa sui speciem in sensu non imprimit, coniungitur tamen sensibilibus, quae illam imprimunt.’ (*Opera*, Vol. 3, 643-4)

³⁹ Zabarella, *In Aristotelis libros de anima*, 506c.

Warner, on the contrary, deemed ‘...it...<otious and> nugatory...to say the sense passive there being none active or agent...’⁴⁰ The ‘...alteration of the spirits caused by the act or activity of light is to be understood the passion of vision and the formality of that alteration the forme of vision passive...’⁴¹ With the expression ‘vision passive’ Warner distinguishes the passive phase of sensory perception in the sense-organ from, the not separately named, active phase, the ‘making-visible’ (‘visificatio or visio activa’), initiated by the sensible object.⁴² Rejecting the idea that sensory perception requires a transformation of material sensory impressions into immaterial species Warner, had no use of an ‘active sense’.

He gives a detailed enumeration of the different modes of sensation:

‘The first division of sensata is into simple and compound. When by one act of sensation and by one speciall sense we do sent or receve only one simple or single species or impression without consenting any other species or impression of any thing coaccident or coexistent or concomitant with it ether by the same or by any other sense, that sensatum is to be accounted a simple or singular sensatum...When by one act of sensation and ether by one or more senses ether simul or successivè in respect of time and ether unà or deinceps in respect of place we do sent or receve more then one or many species or intentions or impressions; those species or intentions or impressions how many soever they be are to be accounted one compound sensatum. This compound sensatum is subdivided into consensatum et continuo-sensatum and both those againe into temporall and [spaciall] locall; and those 4. againe into homogeneall and heterogeneall which may be thus defined sufficiently for this purpose when by one act of sensation but divers senses simul tempore but not unà loce we do sent divers species or intentions, those divers species or intentions are to be accounted one consensatum temporall but heterogeneall and the sensation of them consensation. When by one act of sensation but divers senses simul tempore et unà loco we do sent divers species or intentions or obiects those divers species or obiects are to be accounted one consensatum temporall and locall but heterogeneall and their sensation consensation. And so forth for the rest.’⁴³

Though Warner presents his idea of reception, strictly speaking sensation, as nothing but a ‘...passion of the spirits sensitive caused by the action of the

⁴⁰ Op. cit., f. 26. Cf. Scaliger: ‘...in visione nullo sensu agente opus esse. In aliis nihilo melius: simplex enim receptio est rei iam nudatae materia.’ (*Exercitationes*, Ex. 298, 16, 375r); Suarez: ‘In sensibus exterioribus species imprimuntur ab objectis: nec proinde necessarius in illis est sensus agens.’ (*Opera*, 3, 647) ‘...respectu sensuum interiorum necessario esse ponendum aliquem sensum agentem intentionales species.’ (Op. cit., 650)

⁴¹ BL Add. MS 4394, f. 227r.

⁴² See op. cit., f. 233r.

⁴³ Op. cit., ff. 245v-r.

externall objects sensible...'⁴⁴ as common coinage most of his contemporaries thought otherwise. Opinions were divided on the question of whether analogous to the active and passive intellect there was also an active and passive sense, or of whether the senses possess a receptive as well as an active power.⁴⁵ Nevertheless the majority agreed that perception simply could not be a purely passive process:

‘...dicamus, visionem fieri per receptionum specierum visibilium in oculo...Spiritus autem visivus lucidus & clarus à cerebro, per nervos...ad oculos usque descendens, & à speciebus immutatus, sensatione confusa regreditur, ad cuius regressum excitata anima, & cernens diaphani sui purissimi et penitus incolorati superficiem, in obiecti similitudinem tigi, se convertit ad obiectum, unde splendor venit, & ipsum discreta sensatione percipit...Spiritus visivus animatus anima sensitiva, per animam configuratur speciei visibili, quam ostendit in oculo.’⁴⁶

Perception, in other words, was not conceived as a mere bodily process but as a cognitive act of the soul operated with the help of some part of the body as an external instrument and requiring, apart from the reception of a species, also attention, distinction and understanding.⁴⁷ Hence:

‘...Visio non sola est passio, sed etiam actio ab interno vitae principio elicita...hoc differt visus à rerum inanimatarum passionibus, quòd non simpliciter obiecti speciem recipiat, sed eam etiam persentiscat, quae est propria quaedam animae actio, quam in se producit, ut vitae principium: ea porro sensone excitata distinctiva potentia exactam postea rei propositae

⁴⁴ Op. cit., f. 246v. Cf. Kepler: ‘Visio est sensio affectae retiformis spiritu visivo plenae: Videre, est sentire affectam retiformem, quatenus affecta.’ (*Werke*, Vol. 4, 372).

⁴⁵ See *Commentarii Collegii Conimbricensis*, 183, 187, 422. Cf. Digby: ‘...vulgar Philosophers,...to explicate life and sense, are not content to give us termes without explicating them; but will force us to beleieve contradictions: telling us, that life consisteth in this, that the same thing hath a power to worke upon it selfe: and that sensation is a working of the active part of the same sense, upon its passive part; and yet will admit no partes in it: but will have the same indivisible power worke upon it selfe.’ (*Two Treatises*, 275)

⁴⁶ Reisch, *Margarita*, 798.

⁴⁷ ‘Sensuum...notitia, receptio tantum est quaedam, ac velut imaginis impressio, sicut annuli in caera, aut formae in speculo...Additum est animum attendere oportere.’ (*Vives, De anima et vita*, 31; see also op. cit., 14.). Cf.: ‘...sentire non est corporis, sed animae per corpus...anima tamen, cui sentiendi vis inest, cum corporea non sit, per subtilius corpus agitat vigorem sentiendi.’ (*Commentarii Collegii Conimbricensis*, 351); ‘...non sola... speciei receptio est visio, sed etiam iudicatio...’ (Zabarella, op. cit., 852d-e); ‘...ubi non est anima, species quidem est: visio verò non est ut in speculo. Quia speculum nihil agit: sed patitur tantum.’ (J. C. Scaliger, op. cit., 374r); ‘Sense begins in the body, and ends in the Soule.’ (Crooke, *Microcosmographia*, 658). Warner too realizes that a visual image cannot be simply identified with a reflection: ‘...there are some four images of images by reflexion from one glasse to another; but in that fantasmè there is this condition that the object being removed the images vanish withall but we must not have it so in the fantasy.’ (BL Add. MS 4395, f. 28.)

notionem elicit, quo tandem pacto visio perficitur atque completur. Est igitur visio non sola passio, qua organum obiecti actionem recipit: sed actio quaedam ab interno vitae principio manans⁴⁸

‘Sense is not an alteration, but a discerning or knowing of the alteration...’⁴⁹ Regarded in this way Warner does not approach perception as a process in an organism guided by the soul, that is, regulated actively and from the inside, but as a mechanical reaction in a machine.⁵⁰

4.3. Retention and Representation

The reception of a visible species in the retina constitutes only the first half of the process of vision. From there this species ‘...is continually transferred by the visive spirits in the nerve optik to the...last recipient which is the whole act of reall vision rightly understood.’⁵¹ This ‘last recipient’ evidently is a multifunctional organ, for Warner refers to it as the ‘comon sensorium’⁵², the

⁴⁸ Aguilonius, *Opticorum Libri sex*, 78. Cf. Zabarella: ‘Recepta...in oculo coloris specie, cuius effectrix causa est color materialis externus, emanat ab ipsa natura animae ut in sua substantia imbibat illam speciem, & fiat spiritaliter color ille, quem sentire dicitur: hoc modo anima est sensationis causa effectrix per emanationem...’ (op. cit., 854b); ‘... colligo ex re visibili prodire actionem spiritalem auxilio luminis, eamque in oculo recipi & iudicari, adeo, ut passio oculi desinat in actionem...’ (F. Piccolomini, *Librorum ad Scientiam de Natura attinentium*, 40v)

⁴⁹ Crooke, op. cit., 658. Cf. Doni: ‘...non est...sensum tantum dignotio alterationis, ut quidam docuerunt, qui quidem unam modo speciem finiverunt sensus, sed etiam eius affectus...qui a similibus et cognatis attingentibus datur; qui quidem non est alterationis et motus de statu, sed dulcissimi et, ut sic dicam, vitalis motus ad vim amicam blandissime quasi afflantem et vegetantem. Ut sic forsitan commode definiatur: sensus est dignotio sui ipsius affectus...’ (*De natura hominis*, 332); Campanella: ‘Sensus...discursus est, vel cum discursu: non enim passio sola est sensus, sed iudicium de passione ac proinde de obiecto, a quo patimur.’ (*Inediti Theologicorum*, 30); Alsted: ‘...sensatio...est partim passio, partim actio. Passio quidem; quatenus recipitur species sensilis, & sensus movetur ab obiecto...Actio autem; quatenus sensus percipit speciem, receptam...Non enim ipsa res corporea ullis machinis potest se insinuare in cerebrum, sed imago sive species sensilis recipitur...’ (*Encyclopaedia*, 739).

⁵⁰ See about Warner’s use of the machine-analogy Chapter 2, section 2.4.

⁵¹ Op. cit., f. 116; ‘...although the senses do all agree in this one community that they convey or report the species or impressions of their severall sensations from their organs or prime recipients to one comon and sensorium or recipient by continue alteration of the spirits from the first to the last yet they differ ech one from other in this that <both> the maner of the said continue alteration communicative and the kinde of the species or impressions <to the comon recipient> communicated is in ech of them proper and peculiar and formally different from <those of> the rest but in every severall sense it self perpetually uniforme or unimodall...’ (Op. cit., f. 12) See also note 25.

⁵² Cf. Aphrodisias’ view of the common sense as ‘...the terminal point for all those individual sensory movements which originate in [external] sensible objects and make their way, through the individual sense organs, to the ultimate sense organ.’ (*De anima*, 2.51/ p. 77). Wallace presents Francis Bacon as the first to eliminate the common sense. (See Wallace (1967), 64-5.) Apart from the question whether he dropped that notion indeed (see Rees & Upton (1984), p. 45, note 39) Nicholas Hill before Bacon wrote: ‘Non est unus communis sensus, sed visibilibus speciebus phantasiam imprimentibus validè, & reductis caeteris speciebus ad visibiles, videtur quaedam omnium sensibilibus in formali ratione convenientia

‘phantasy’⁵³ and as the ‘retentive’⁵⁴ This organ is located in the head which implies that there sensation is effected. Warner also explicitly says that part of the spirit, collected in the brain is ‘...there retayned ad sensationis, phantasiationis, et intellectionis...opera obeunda...’⁵⁵ Most of his contemporaries located sensation in the brain. Warner was not the only one and certainly not the first to identify the common sense and the fantasy.⁵⁶ Apart from this identification opinions differed on the nature of the fantasy. Some distinguished this faculty as the passive recipient and conservator of sensible species from the ‘imaginatio’ conceived as a judicative and creative faculty. Thus Avicenna understands by ‘phantasia’ the retentive imagination and by ‘imaginativa’ the compositive human as well as animal imagination.⁵⁷ According to Suarez the ‘imaginatio’ adds to the ‘phantasia’ the power to compose things that are possible as well as to make up impossible things.⁵⁸ Vives, though interchanging the terms, made a like distinction.⁵⁹

A majority used the terms ‘phantasia’ and ‘imaginatio’ explicitly as synonyms or simply introduced the ‘imaginatio’ or ‘phantasia’ as a faculty

quam tamen nemo declarat.’ (*Philosophia*, aph. 344.). See for Campanella’s rejection of the idea of a ‘sensus communis’ *De sensu rerum et magia* (1620). In: *Opera*, 116-7.

⁵³ See op. cit., f. 116.

⁵⁴ See op. cit., f. 41.

⁵⁵ BL Add. MS 4394, f. 137v. Cf. Aristotle: ‘The seat and source of sensation is the region of the heart.’ (*Parts of animals*, 656a25).

⁵⁶ According to Avicenna ‘Prima est fantasia: que est sensus communis...recipiens per seipsum formas omnes que imprimuntur quinque sensibus et redduntur ei.’ (*De anima* I, v, p. 5r, col. b, D. Quoted in Harvey (1975), 43.) Cf. Suarez: ‘...sensus...communis est potentia interior cognoscens objecta propria sensuum exteriorum, discernens inter illa...’ (*Opera*, Vol. 3, 703) ‘...dicebamus, phantasia potentia, quae species sensibilibus externorum recipit et conservat, ac per illas operetur in absentia objecti...’ (Op. cit., 705). Cf. Davies, *Nosce teipsum*, 107. Digby writes ‘This part {of the brain} seemeth to me...to be that...in which the fansie or common sense resideth...’ (*Two treatises*, 296). Fracastoro rejects such an identification: ‘...semper natura ab imperfectioribus ad perfectiora, & demum ad perfectissima procedit. quare potentiae hae {i.e. sensus communis, phantasia, intellectus} non solum ratione, sed & locis differunt per se.’ (*Opera*, 204r).

⁵⁷ See Wolfson (1935), 120.

⁵⁸ See *Opera*, Vol. 3, 705.

⁵⁹ ‘Imaginativae actio est in animo, quae oculi in corpore, recipere imagines intuendo estque velut orificium quoddam vasis, quod est memoria...Phantasia vero coniungit, et disiungit ea, quae singula et simplicia imaginatio acceperat.’ (*De anima et vita*, 32.)

accounting for a variety of acts. Thus with Gualandi, as we saw before, the imagination accounts for the reception and storage of sensory impressions.⁶⁰ According to Fracastoro ‘Nihil...aliud est imaginari, quam plura ut plura recipere, & comparare ad id, in quo coniuncta sunt, & videre, qualiter unumquodque sese in illo habet...Phantasia...distinxit, comparat...ac videt, quo pacto unumquodque sese in illo habet.’⁶¹ With Charron the phantasy or imagination ‘...ayant recueilly et retiré les especes et images apperceus par les sens, les retient et reserve: tellement qu’ estans les obiets absens et esloignez...elle les represente à l’esprit et à...la pensée’.⁶² In Alsted’s view ‘...phantasia...imagines per sensum communem oblatas componit ac dividit, iudicatque: unde dicitur iudicium inferius & brutum’⁶³ Francis Bacon understands by the ‘imagination’ a faculty that, representing individual thoughts, functions as informant of the understanding and reason and that ‘... not being bound by any law and necessity of nature or matter, may join things which are never found together in nature and separate things which in nature are never found apart...’⁶⁴

As appears from the foregoing to most writers on the soul the ‘phantasy’ or ‘imagination’ is also closely allied to memory, ‘...le Gardoir et le Rigistre de toutes ces especes et images apperceues par les sens, retirees...par l’imagination.’⁶⁵ In Zabarella’s view too ‘...ex imaginatione imago imprimitur in memorativae facultatis quod est proximum organo imaginativae, & est tanquam liber apertus, in quo imaginativa inspicere ac veluti legere imagines sensilium potest...’⁶⁶ Some even identify it as such, i.e. as a passive power with the imagination. To Huarte, for example,

‘...la memoria no es mas que una blandura del cerebro, dispuesta (con cierto genero de humedad) para recevoir y guardar, lo que la ymaginativa percive: en la mesma proporcion que tiene el papel blanco y liso, con el

⁶⁰ See for Gualandi’s view p. 136. Cf. Aquinas: ‘Ad...formarum retentionem aut conservationem ordinatur *phantasia*, sive *imaginatio*, quae idem sunt: est enim phantasia sive imaginatio quasi thesaurus quidam formarum per sensum acceptarum.’ (*Summa*, Ia, qu. 78, a. 4, 381)

⁶¹ *Opera*, 171v. Cf. Hill: ‘...imaginatio nihil aliud est quam sensatio reiterata & firmata.’ (*Philosophia*, aph. 357.)

⁶² *Oeuvres*, 42. Cf. Bartholomeus Anglicus ‘Imaginativa vero est virtus, qua formas prius à particularibus receptas, quamvis absentes, apprehendimus...’ (*De rerum proprietatibus*, 53)

⁶³ *Encyclopaedia*, 739. Cf. Campanella: ‘Imaginatio vero seu phantasia est super motionibus passionibusque praeteritis novas fingere, vel easdem copulando et disiugendo...’ (*Inediti theologorum*, 30) See for a comparable view Burton, *The anatomy*, 159.

⁶⁴ See *The works*, Vol. 2, 654; Vol. 4, 405; Vol. 5, 504.

⁶⁵ Charron, op. cit., 42. See also note 56. Cf. Burton: ‘Memory lays up all the species which the senses have brought in, and records them as a *good register*, that they may be forthcoming when they are called for by phantasy and reason.’ (Op. cit., 160)

⁶⁶ *In Aristotelis libros de anima*, 405A. See also note 5.

que a de escribir: porque assi como el escrivano escrevere y nel papel las cosas que quiere que no se olviden, y despues de escritas, las torna a leer; De la mesma manera se a de entender, que la imaginativa escribe en la memoria las figuras de las cosas que conocieron los cinco sentidos y el entendimiento, y otras que ella mesma fabrica...la ymaginativa (que es la que haze la *reminiscentia*) es contraria del entendimiento. De manera que hazer memoria de las cosas, y acordarse dellas despues de savidas, es obra de la ymaginativa: como el escrevir, y tornarlo a leer, es obra del escrivano, y no del papel. Y assi la memoria queda por potencia passiva, y no activa: como lo liso y blanco del papel, no es mas que commodidad, para que otro pueda escrevir.⁶⁷

This also implies that, in their view, memory is a faculty operating at the level of the senses and not that of the intellect.⁶⁸ Others consider memory in fact as two separate faculties, namely the *memoria* and *reminiscentia*. Suarez, for example, defines *memoria* as ‘potentia apta cognoscere idem quod aestimativa {i.e. the faculty to perceive through the senses qualities that are not directly sensible}, in absentia tamen objectorum’ while by *reminiscentia*, as opposed to the former an exclusively human faculty, he understands a ‘potentia, quae rerum particularium praeteritarum memoratur, non simplici modo, sed cum quadam indagatione et discursu.’⁶⁹ The *memoria* is a sensitive faculty while the *reminiscentia* is related to the intellect.⁷⁰

Warner’s views on these matters are clear. By the ‘phantasy’ or ‘common sense’ he understands a power of the faculty sensitive to receive, store, and recall impressions of the senses. Consequently, by memory he understands nothing else but the part of the ‘fantasy’ that ‘...is subordinate and appropriat to the organs sensitive for the reception and retention of the impressions or ideas

⁶⁷ Huarte, *Examen*, 98-9. Cf. Gualandi’s view on p. 136.

⁶⁸ Cf. Aristotle: ‘...memory...would seem to belong incidentally to the thinking faculty, but essentially to the primary sense-faculty...If it formed part of the intellectual faculty, it would not belong, as it does, to many other animals...memory belongs to that part of the soul to which imagination belongs; all things which are imaginable are essentially objects of memory...’ (*On memory and recollection*, 450a10-25.)

⁶⁹ *Opera*, Vol. 3, 705. Cf. Aquinas: ‘Ad apprehendum autem intentiones quae per sensum non accipiuntur, ordinatur vis *aestimativa*...ad conservandum...vis *memorativa*, quae est thesaurus quidam huiusmodi intentionum...’ (*De anima*, 381). Only man, apart from this faculty, also possesses a ‘*reminiscentia*...quasi syllogistice inquirendo praeteritorum memoriam, secundum individuales intentiones.’ (Ibid.) Cf. Campanella’s use of these terms: ‘*Memoria*...est anticipata sensatio...*Reminiscentia* est excitatio sensationis per novam similem aliqua decem similitudinem.’ (*inediti Theologicorum*, 30).

⁷⁰ Cf. Fracastoro: ‘non...est memorari idem, quod reservare species...at in memoria, reintellectio quaedam fit eius, quod prius etiam intellexeramus.’ (*Opera*, 172r)

of their objects...'⁷¹ Recollection is an act of the fantasy.⁷² The 'retentive' only is a passive power operating, like the 'phantasy' in general, at the level of the senses.

The fact of recollection sufficiently proves '...that there is a print or token or vestigium or an effect of every actual impression relict in regione sensitiva or in the fantasy after the recesses or emotions of the external imprint or object...'⁷³ It is, in other words, evident that

'...of all other real phenomena as well intellectual as sensual or compound there is naturally and necessarily, scilicet non arbitrio sentientis seu intelligentis sed spontaneo seu necessaria naturae ordinatione, a true or iust (analogate) record or notion taken or retained to be indeleibly and perpetually kept or reserved or reposed latent or quiescent in archivis animae whatsoever the same be for the future information and direction of the intellect quatenus syllogistik...'⁷⁴

The question is by what organ or part of the body this faculty is exercised? Not by the spirits for they

'...being a substance fluid and and per se et proprijs terminis interminable (except it be ultima terminatione mundana) and terminable only termino alieno, that is to say by the boundes and figuration of some subject or body or organ wherein it is contained as water in a vessel is in this respect though apt to receive any impression upon the lest force that may be yet of all other substances of what consistence soever the most unapt to retain any impression after the recesses of the imprint as water will receive and apply itself to the figure of any solid thing that is put into it but that being taken away it returneth instantly to his former state retaining no shew or print of that impression, and so it is of the spirits...'⁷⁵

Accordingly, the part of the body that functions as last recipient, i.e. as the memory must be '...such as will hold that impression or figuration that it hath once received. Wherefore it can not be [imagined] understood to be any other

⁷¹ Op. cit., f. 41; '...the fantasy is the retentive (or memorative) and resensitive to the sensitive...' (Op. cit., f. 26). Cf. Gualandi's view on p. 136.

⁷² Cf. Telesio: '...nec imaginatio ipsa aliud nisi dictarum passionum dictorumque motuum memoria, nec iners ea sed quae illos recolit repetitque...' (Op. cit., 324).

⁷³ Op. cit., f. 29; '...the said alteration be not recessible cum recessu agentis as the impression that is made by a solid body in the water but permanent and fixed in recipiente <seu patiente> post recessum agentis, by which permanence or fixation of the alteration is understood the retention thereof...' (BL Add. MS 4394, f. 246v.)

⁷⁴ Op. cit., ff. 240r-239v. Each impression in the senses or the intellect '...is recorded or registred or reposed in archivis animae seu scrinio memoriae as a perpetually canon or principle dormant or quiescent for the future use of the intellect syllogizant...' (Op. cit., f. 222r)

⁷⁵ BL Add. MS 4395, f. 29.

then the spirits owne subiect or body or organ wherein it is contayned...'⁷⁶ Though indirectly caused by the action of external objects

‘...those impressions that are to remaine <after the recesses of the externall objects> as prints or tokens [or representations] or effects of the originall impressions caused in the actual sensation of them and to be the continuation of them and as it were all one with them are to be understood acted by the spirits sensitive themselves by their extension or rarefaction or some such other formall alteration of them as may ad force unto them and the same received and retained in their owne subiect or continent or organ whereafter the recesses of the externall object and remission or relaxation of the spirits or their reversion to their naturall and ordinary state the said impressions do imperceptibly quiescere.’⁷⁷

Hence,

‘...although the spirits be the first patients that do receive the action of the externall object intromitted at their organ intromissory yet in respect of the last recipient they are not patient but agent that is to say the deferent or continuant of the same first action ab extra unto the last recipient where that impression is to be made that is to remaine after the recesses of the externall object and the cessation of the action thereof.’⁷⁸

There is only one sine qua non of the fixation and retention of impressions in so far as ‘...there is never any notion or record reserved in archivis memoriae but only of those acts of sensation which are done cum expressa <seu praecisa> intentione seu notatione intellectus...’⁷⁹

This operation on the organ of the faculty sensitive enables animal organisms to imagine or recall sensory impressions after their cause, some external object, has disappeared.⁸⁰ For

⁷⁶ Ibid. Cf. Avicenna: ‘Debes...scire quod recipere est ex una vi que est alia ab ea qua est retinere. et hoc considera in aqua que habet potentiam recipiendi insculptiones et depictiones et omnino figuram: et non habet potentiam retinendi.’ (Harvey (1975), p. 72, note 142); Aquinas: ‘Oportet...quod animal per animam sensitivam non solum recipiat species sensibilium...sed etiam eas retineat et conservet. Recipere autem et retinere reducuntur in corporalibus ad diversas principia: nam humida bene recipiunt et male retinent; e contrario autem est de siccis.’ (*Summa*, Ia, qu. 78, a. 4, 380-1); Vives: ‘...ut sigillum celeriter in humore fluido imprimitur sed non diu haeret, nisi in arefacta materia: ita biliosi ad retinendum sunt aptiores...’ (*De anima et vita*, 55.); Snellius: ‘Species sunt velut in aqua impressum vestigium...’ (*Risneri optiam*, 11)

⁷⁷ Ibid.

⁷⁸ Ibid.

⁷⁹ BL Add. MS 4394, f. 221v. See also Add. MS 4395, f. 48. Cf. Lucretius: ‘...because they {i.e. perceptions} are thin, the mind cannot perceive any sharply except those which it strains itself to see; therefore all the others perish except those for which it has prepared itself.’ (*De rerum natura*, IV, 802-4). See also note 47.

⁸⁰ ‘...besides these two conditions of the effect of the object alteration and permanence or fixation post recessu agentis it must have yet a third which is reactivity <or representability> absque <actu seu>

‘...whensoever...the spirits to that part belonging are but only excited and <altered or> put into the same state quoad formalem consistentiam as they were before by the action of the externall object <whether it be rarefaction or subtiliation &c> finding the same character or figuration in the organ or continent they must necessarily receive the like or analogate passion to that which they formerly received by the originall sensation or by the action of the externall object that is to say this their fantasiation must needs have the like or analogate apparition to them as they are fantasiative as their originall had to them as they are sensitive.’⁸¹

This faculty, incidentally, only becomes operative after the action on the sense-organs has stopped ‘...quia impossibile est sentire et fantasiare idem simul et eodem actu...’⁸²

Thus sensation and imagination or recollection, in Warner’s view, differ mainly in so far as

‘...the alteration caused in the spirits by the action of the externall object in the originall sensation is both graduall in respect of the formall consistence and also figurall or modified whereas in the succeeding fantasiation, the organ or continent being already figurate or modified by the precedent figurall or modified action of the externall object, the spirits are by their congruence or applicatition thereto sufficiently figurate or modified <quia quicquid recipitur, recipitur &c> and need no other alteration <in that respect> ex parte alterantis but merely the graduall alteration of their formall consistence as some simple rarefaction or subtiliation or such like to force them into the same figuration of their organ.’⁸³

The consistence of the spirits sensitive in case of imagination or recollection is caused ‘...first and mediately by the action of the object and secondarily and immediatly by the alteration of the spirits...by the formall action of the one and alteration of the other...’ while their figuration proceeds of the ‘...predisposition of the substance or consistence of the...organ wherein they [impressions] are received and made.’⁸⁴

presentia obiecti seu agentis the faculty of which reactivation or representation is the fantasiative...’ (BL Add. MS 4394, f. 246r.)

⁸¹ BL Add. MS 4395, ff. 29-30.

⁸² See op. cit., f. 17.

⁸³ Op. cit., f. 30.

⁸⁴ Ibid. Of course the re-excitation of the spirits sensitive in case of recollection requires a cause. Warner does not tell us much more about the nature of that cause than that it ‘...is to be understood some faculty active and therefore different and distinct both from the sensitive and intellective which are both passive...but to be rather ex genere facultatis locomotivae and in this case to be analogate to and to have rationem obiecti but yet only quoad activitatem.’ (Op. cit., f. 31)

The faculty sensitive ‘...in all succeeding acts of fantasiation may be said operari (or pati or moveri) ex habitu...’⁸⁵ for the threefold process of sensory impression, retention, and representation, in Warner’s view, ultimately amounts to a ‘...habituation of the faculty sensitive that is...a certaine fixed or permanent figuration or information of the subject or organ of the spirits sensitive...’⁸⁶. The fantasy is

‘...by way of sensation habitually informed with impressions or characters or sigills <or species> or ideas...which in respect to their aptitude to be resensated or refantasiated or recognized or reactuatoed or represented or internally speculated are called notions or concepts or fantasms⁸⁷ ...Unless the terme of fantasms may be given them in respect of their reception and retention in fantasia seu campo fantastico.’⁸⁸

There is, in Warner’s view,

‘...a precise difference betwene the impressions or fantasms or concepts or notions of things and those of motions and the same not obscure and scrupulous or hard to be discerned but notable and remarquable as the things themselvs extra animam are toto genere distinct and different from the notions of things...the concepts of things may be accounted and termed notions and those of motions experimenta or experientiae the end of the refantasiation of the one being <merely and> only cognition and of the other principally and per se action or imitation...’⁸⁹

⁸⁵ Op. cit., f. 30.

⁸⁶ Op. cit., f. 31; ‘...the maner of the causation of these impressions or figurations by the action of the obiect and alteration of the spirits with their reception in organo seu subiecto sensitivo and the <retention> of them after the recesses of the cause imprimunt is nothing else but a kinde of habituation of the said organ sensitive...’ (Op. cit. f. 30) ‘That the retentive...is by reiteration of acts habituated that is to say that the impressions or species, or ideas therein impressed and retayned are by reiterate acts more firmly <and distinctly> impressed and more fixedly retayned and more promptly and exactly refantasiated is a manifest phenomene...’ (Op. cit., f. 41) See on the process of habituation Chapter 3, section 3.7.

⁸⁷ Op. cit., f. 42; ‘These <species or> impressions in respect of their refantasiation (passive) or our <speculating or> refantasiating of them (active) may be termed fantasms...’ (Op. cit., f. 34) Impressions or fantasms ‘...in respect of their resensation or recognition <or intellection> (passive) or our resenting or recognizing or intellection of them (active) may be termed concepts or notions.’ (Ibid.) Cf. Hill’s terminology: ‘Simulacra, imagines, ideae, characteres, sigilla non simpliciter repraesentant, sed efficienter...’ (*Philosophia*, aph. 441.)

⁸⁸ Op. cit., f. 34.

⁸⁹ Op. cit., ff. 39-8. Cf.: ‘The fantasms of motions rather to be termed peritias than notions especially of self-motions.’ (Op. cit., f. 39.)

As ‘quiescent fantasms’⁹⁰ these fixed impressions are stored ‘in campo fantastico seu loco-specierum’.⁹¹ As ‘actuated fantasms’, ‘...caused by the re-excitation of the spirits sensitive...’ they appear before the mind’s eye.⁹² Resting fantasms in fact are predispositions of the sense-organ, while actuated fantasms do not differ materially from actual sensory impressions:

‘...it is the actuated fantasme and not the quiescent that <is analogate to or> hath rationem passionis originalis <or actualis> sensationis...but the formality of the effect thereof that is of the passion <or apparition> fantastik do depend on or be consequent of this predisposition of the subiect or organ sensitive that is to say of the fantasme quiescent.’⁹³

Fantasms in general are nothing but sensitive spirits, i.e. material entities, with a specific consistency and figure.⁹⁴

⁹⁰ ‘...the figuration or impression fixed in the subiect sensitive is to be understood and accounted the fantasma quiescens...’ (Op. cit., f. 31) See further op. cit., f. 18.

⁹¹ Aristotle considers the soul in general as the place of forms. (*On the soul*, 429a28.) Cf. Galen: ‘Sanè cum ea, quae per dissectiones apparere solent, accurate consideraremus, rationi consonum videbatur, animam in cerebri corpore sedem obtinere, atque in ipso, & rationis vim, & sensibilibus imaginum memoriam residere, ac primum ipsius instrumentum, tum in sensibilibus actionibus omnibus, tum in his quae à consilio & voluntate prodeunt, spiritum esse, qui in ipsius ventriculis, maximeque postremo, continetur...’ (*De locis affectis libri sex, Gulielmo Copo Basiliensi interprete*. In: *Opera* (1549), Vol. 4, 68.) (Kühn, Vol. 8, 174-5.) Aquinas refers to the ‘phantasia’ as the treasury of sensible forms. (See *Summa Ia*, qu. 78, a. 4, p. 381) According to Fracastoro in the intellect the species are ‘...in proprio loco & propria materia...constitutae.’ (*Opera*, 167r) Cf. Zabarella: ‘intellectus...esse locum formarum’ (*In Aristotelis libros de anima*, 237F); Lewis Bryskett: ‘...the possible understanding...is the place of the intelligible kinds or formes...’ (*A Discourse*, 270. Quoted in Wallace (1967), 106.) With Telesio, on the other hand, we read: ‘...quae animalibus ratio quodque malum vitandi bonaque sectandi inest studium, id omne ex iis, quae pridem percepta sunt cognitaque et quae spiritui haesere, inest...’ (*De rerum natura*, 325.) Cf. Doni: ‘...imagines...sint in ipso spiritu...’ (*De natura hominis*, F. 106); Crooke: ‘...the Animall spirit may bee called the place and promptuarie of the species or formes.’ (*Microcosmographia*, 517); Alsted: ‘Species sensiles non inhaerent medullae cerebri, sed spiritibus animalibus.’ (*Encyclopaedia*, 739).

⁹² Op. cit., f. 31.

⁹³ Ibid. Cf.: ‘...originall impressions or fantasms...we may take to be all one though we want a comon name for them...’ (Op. cit., f. 28).

⁹⁴ Cf. Aristotle: ‘...mental pictures are similar to objects perceived except that they are without matter’ (*On the soul*, 432a10); Suarez: ‘De speciebus sensus interioris, quae phantasmata appellantur, fuit opinio quorundam esse corpuscula quaedam, hoc est, spiritus animales in cerebro existentes, repraesentantesque res ipsas sensatas...Quis autem credat posse cerebrum tot carpere corpuscula locum occupantia.’ (*Opera*, Vol. 3, 616) Warner was aware of this problem: ‘...by their maner of progresse the rate of the encrease or propagation of our knoledge from our radicall or originall phenomenes is to be iudged and that the same going continually decreasing <as they doe> it must follow that the augmentation of our knoledge from finite bases or radicalls cannot be infinit. Secondly that these <severall> ordinations in respect of their location are all necessarily only superficially whereby is avoided supercharacterization or confusion or penetration of dimensions in receptaculis seu repositorijs fantasiae seu intellectus, and the corporall completion of the whole solid or body of our knoledge, conveniently and aptly left to the continuall acquisition and

Fantasms only differ from impressions in so far as the latter during perception are ‘in fieri’ while as fantasms, that is, in the ‘phantasy’ they are ‘in facto’.⁹⁵ Moreover as compared with sensory impressions fantasms are ‘...obscure and unperfect like the prints of a seale that are somewhat defaced.’⁹⁶ Accordingly their causes also differ in strength, the force of the external objects

‘...being gretter in altering the consistence of the spirits sensitive, to give the apparition of his sensible species more lively and perfect in the originall sensation and the force of the internall actuant being more weke to give the analogate apparition <thereof> in <the succeding> fantasiation more obscure and unperfect.’⁹⁷

Though Warner may have taken this idea from Aristotle he could also have borrowed it from Telesio, being as far as I know, the only one of his contemporaries stating explicitly that imagination is nothing but sensation ‘...at obscurus, ut dictum est, languidusque.’⁹⁸ Incidentally, Warner uses the comparison with ‘the prints of a seale’ under reserve for it suggests that the fantasm, conceived as the print of a sensory impression, is the signature of a signature.⁹⁹ Anyway, as impressions, caused by external objects are passions

aggregation or coordination of the forsaid bases or radical series of phenomenes which coordination is to be understood also superficial...’ (BL Add. MS 4394, f. 237r)

⁹⁵ BL Add. MS 4395, f. 28; ‘...it is to be noted that betwene the passion of the actuall sensation and the fantasme thereof there must be a difference; for betwene the passion of dolor actually sented and the fantasme thereof afterward reactivated or refantasiated there is gret difference and yf there be such difference betwene the fantasme post actum or absente obiecto and the originall there must be understood the same difference betwene the fantasme in act or presente obiecto and the originall.’ (Op. cit., f. 27)

⁹⁶ Op. cit. f. 28; see also op. cit., f. 17.

⁹⁷ Op. cit., f. 30.

⁹⁸ *De rerum natura*, 325. Cf. Aristotle: ‘...imagination is a weakened sensation...’ (*Art of Rhetoric*, I. xi. 6); ‘...imagination must be a movement produced by sensation actively operating...imagination persist in us and resemble sensations...’ (*On the soul*, 429a1-9).

⁹⁹ See op. cit., f. 27. ‘The...objection of the signature of a signature is further to be examined for we see there are in some sorte images of images by reflexion from one glasse to an other; but in that phenomene there is this condition that the obiect being removed the images vanish withall but we must not have it so in the fantasy.’ (Op. cit., f. 28.) Cf. Aristotle: ‘...sense is that which is receptive of the form of sensible objects without matter, just as the wax receives the impression of the signet-ring without the iron or the gold...’ (*On the soul*, 424a16-20) See for the use of this metaphor also Diogenes Laertius, *Vitae*, Vol. 2, VII, 45-6; Vives, *De anima et vita*, 15; Francis Bacon, *The works*, Vol. 4, 121; Burton, *The anatomy*, Vol. 1, 157. Chrysippus rejected the comparison for it would imply that one can have only one impression at a time and each new impression would wipe out the former. (See Gould (1970), 53). According to Roger Bacon the idea that sensible species are generated ‘...via impressionis non est possibilis, quoniam impressio non fit nisi in superficie, ut sigilli in cera...sed actio naturalis est in profundo patientis. Item per species rerum sentimus res ipsas; sed per impressiones que fiunt in cera et huiusmodi, non sentimus res imprimentes. Ergo non est consimilis actio hinc et inde, ex quo sequitur quod improprie dicitur quod speciei generatio est per viam impressionis, secundum quod utimur hoc nomine prout est impressio in sigillo et huiusmodi.’ (*De multiplicatione specierum*. (Ed. Lindberg) Pars I, cap. 3, 44-6); Fernel

of the senses, fantasms are passions of the ‘phantasy’ and just like the latter constitute the continuation of the original sensory passion after the external object has disappeared, imagination is nothing but the continuation of sensation. In fact, like Telesio, Warner deems imagination ‘...idem re cum sensum’ differing from it only ‘ratione’, that is, conceptually ‘...as yf the sense should still feele the effect after the cause is gone...’ albeit not continuously but intermittently.¹⁰⁰ All this presupposes the continuity of the spirits involved.¹⁰¹

4.4. Pain and Pleasure

The senses function as, what John Davies calls ‘conduit-pipes of knowledge’ to feed the mind.¹⁰² They provide the intellect with notions, that is, concepts or ideas¹⁰³, stored as ‘quiescent fantasms’ in the retentive part of the ‘phantasy’, of things that surround us, as well as of certain states and processes in our organisms. As was said, fixation and storage of impressions requires attention and a purposive reception of sensory impressions. Intention calls for desire, presupposing in its turn pain or pleasure. Consequently ‘...without dolor or volupty there can be no cognition.’¹⁰⁴ As such the senses are of vital

criticized the metaphor for not elucidating the nature of, for example, tactile or olfactory ‘images’. Moreover, in his view, the alteration in the sense-organ and the brain does not result in a material image. (See Figard (1903), 236.)

¹⁰⁰ Op. cit., f. 29. Cf. : ‘Where two strings are tuned upon unison and that the one being striken the other per consensum is therewith moved though wekelier. What conformity betwene this case and that of originall or actuall sensation & fantasiation.’ (Op. cit., f. 32).

¹⁰¹ Cf. Telesio: ‘sentientem substantiam imaginanti eandem esse...’ (Op. cit., 324).

¹⁰² See *Nosce Teipsum*, 107.

¹⁰³ Warner’s use of the term ‘idea’ in the sense of ‘notion’, ‘concept’ and ‘fantasme’, that is, of mental image in general (see op. cit., ff. 42-1) was rare during the first half of the 17th century in England. According to Hamilton it is not used at all in a psychological sense by John Davies, Francis Bacon, Herbert of Cherbury, Kenelm Digby or John Reynolds. Warner’s use of the term comes close to that of Fracastoro, Melanchthon, Caspar Bauhinus, and especially David Buchanan (*Historia animae humanae*. Paris 1636) unjustly presented by Hamilton as the first one to use it in that wide, psychological sense. (See Hamilton (1863), 925-28.)

¹⁰⁴ Op. cit., f. 48. Cf. Cicero: ‘...the internal tactual sense, as the philosophers call it, perceptive of either pain or pleasure, the sole basis, as the Cyrenaics think, of our judgement of truth...’ (*Academica*, II, vii, 20.)

importance.¹⁰⁵ The passions of the senses in so far as these are ‘...monitory of the destructive or conservative actions of their objects...are graduated with paine or plesure...’¹⁰⁶ In fact ‘...in every sense the object may be so graduated that the sensation thereof may be cum dolore more or lesse according to the graduation of the object <versus alterum vel saltem> debitum terminum.’¹⁰⁷ The generation of pain or pleasure is not

‘...instantaneall but necessarily temporall. And being temporall it may be ether terminable or interminable that is terminable salvo subiecto; or non-terminable nisi cum subiecti interitu et terminatione. It may be also ether continue without intermission or discontinue by pauses and lucida intervalla and this ether regularly or irregularly. It may be also equable keeping always one and the same degree or gradually crescent or decrescent and that likewise ether regularly or irregularly. Dolor and volupty may be also graduated in respect of the noxiousnes or innoxiousnes thereof from absolute innoxiousnes to momentaneall destructivity which may be of volupty though not per se yet per accidens <as well> as of dolor.’¹⁰⁸

Warner distinguishes between

‘...divers Kindes of dolor and volupty in which respect by reson of some relation or habitude to other circumstances though in all the former respects equall and indifferent they may be different one from an other in tolerability or intollerability and that in a kinde of graduallity this dolor from that dolor or this volupty from that. There may be also graduall difference of dolor and volupty in respect of solitarines and concurse or coaccidence and concurse or coaccidence not only of dolor with dolor of divers Kindes two or more but also of dolor with volupty one with one or one with more or more with more upon these respects ether singly considered or omnimodally combined dolor and volupty may be

¹⁰⁵ See loc. cit.

¹⁰⁶ Op. cit., f. 21. ‘Whereas all other senses that are graduall in respect of dolour and volupty are graduall both wais that is from <mediocrity or> indifferency or neutrality as well towards the extreme of dolour as towards the extreme of volupty the sense of vitality is singular in this that it is only graduable towards dolour and not possibly towards volupty. Unles the privation of dolor be taken for volupty which it can not be but <comparative and> improprely. And the sense of venery to volupty only and not to dolor. Unles the privation or non-fruition of volupty be accounted dolor.’ (Op. cit., f. 48)

¹⁰⁷ Op. cit., f. 12; ‘Hence followeth that whatsoever seemeth to be the object of any sense yf upon the graduall alteration thereof there do allwais or necessarily follow in the act of sensation <proportionall> alteration in respect of dolor that is the the proper object of that sense. And econtra yf upon the graduall alteration of that which seemeth to be the object of any sense there followeth in the act of sensation no proportionall alteration in respect of dolor that is not the proper object of that sense.’ (Ibid.)

¹⁰⁸ Op. cit., ff. 16-17.

[infinitely] graduated from the medius status or mediocrity to the extreme of ether of them.’¹⁰⁹

Pain is caused by things acting

‘...ether upon our corporeall organs by way of solution <or distraction> of their continuity or by contraction or convulsion or distortion or any maner of deformation or defiguration or corruption of them whereby their functions are mard or depraved; or upon our materialls ether chilous or sanguinous or plastik by any corruptive alteration of them...’¹¹⁰

Inasmuch as damage to these materials and instrumental parts of the body, subservient to the spirit, always leads to a shortage and/or malfunctioning of the spirits, ultimately all pain and pleasure can be reduced to certain states of these spirits. In the spirits pain is felt as ‘...an extraordinary motion...’¹¹¹, ‘...a kind of violent or contranaturall torsion...’¹¹² caused ‘...by distraction of their continuity or accension or precipitation or any other deformation of them whereby they lose their naturall faculty...’¹¹³ The majority of Warner’s contemporaries were less vague about the cause of pain. Some, like Kenelm Digby, deemed pain the effect of a *Solutio continui* in the nerves being nothing but a ‘...compression: for although this solution of continuity may seeme to be a dilatation; yet in truth it is a compression, in the part where the evill is...’¹¹⁴ Suarez ascribes that view also to Aristotle, Galen, Portius and Argenterius.¹¹⁵ Others, for example Casmann and Goelenius, believed that pain was also caused by a distemper of the four primary qualities (heat, cold, humidity, and dryness).¹¹⁶ Suarez attributes pain to a combination of some kind of dissolution and the action of a specific ‘dolorifera qualitas’.¹¹⁷ Anyway, in Warner’s view, ‘Primus dolor est sensatio defectus materiae vitalis...’¹¹⁸ i.e. hunger.

As opposed to most writers on the soul, considering the sense of touch as the exclusive or at least main sense of pain, Warner does not specify the kind of

¹⁰⁹ Op. cit., f. 17.

¹¹⁰ BL Add. MS 4394, ff. 252r-251v.

¹¹¹ BL Add. MS 4395, f. 18.

¹¹² Op. cit., ff. 34-3.

¹¹³ BL Add. MS 4394, f. 251v.

¹¹⁴ *Two treatises*, 298.

¹¹⁵ See *Opera*, Vol. 3, 766.

¹¹⁶ See Casmann, *Psychologia*, 310; Goelenius, *Lexicon*, 559.

¹¹⁷ See *Opera*, Vol. 3, 766.

¹¹⁸ BL Add. MS 4394, f. 223r. Cf.: ‘...primus dolor is that which is consequent of defect or distemper of materialls vitall and yet not quatenus such defect or distemper they are destructive of our esse but quatenus they are offensive or afflictive or turbative of the naturall state of our spirits sensitive that is to say <only> quatenus they are dolorifica...’ (Op. cit., f. 247r)

senses by which pain is felt. Pain in general is the sensory ‘...appareance of an ill-effect tending to our destruction...’¹¹⁹ It is, in other words, ‘...an operation passible or a passion of the organ sensitive...’¹²⁰ We must not conclude from this that it is a quality, a property or accidental change of the spirits. In Warner’s view pain is a substance, i.e. ‘...ipsa spirituum substantia alterata...’¹²¹ Again, this identification of pain with the distorted spirits themselves is reminiscent of Telesio’s description of pain as a sad and troublesome feeling that depresses the spirits and is caused by the devastating action of strong forces contrary to their nature.¹²²

Warner does not say much more about pleasure than, absolutely taken, it is not the same as indolence.¹²³ He seems to share Gualandi’s view that ‘...indolentia privativè dolori opponatur, voluptas verò secundum contrarietatem...indolentia...sit tam voluptatis, quàm appetitus omnis privatio...’¹²⁴ In view of the fact that we do not sense steady states but only alterations, and consequently cannot perceive, let alone enjoy, the natural, painless state of our spirits preceding their first ‘violent or contranatural

¹¹⁹ Op. cit., f. 251r. Cf. Aristotle: ‘...all animals have at least one of the senses, that of touch; and that which has sensation knows pleasure and pain...’ (*On the soul*, 414b5.) See also op. cit., 413b24.

¹²⁰ Op. cit., f. 224v. Cf. Scaliger: ‘Dolor cum sit impactio speciei naturam laedentis, & ipsamet laesio sane dolor erit ipsa sensio.’ (*Exercitationes*, Exer. CCXCIX, 2, 888); Casmann: ‘Sensionem comitatur voluptas, vel dolor sensitivus...Dolor est speciei naturam laedentis & ingratae impactio ac sensio.’ (Op. cit., 289); see for a similar definition Goclenius (Op. cit, 558). According to Gentilis ‘...ille actus sentiendi, sit propriè dolor, & non aliquid sequens sensationem.’ (Portius. *De dolore*, 37.)

¹²¹ ‘...dolor...must be understood a substance; not as yf that alteration which is accidentall to the spirits should be understood the passion answering to the action of the dolorifik agent it being only the passion of the spirits and not of the organ spirituated or of the animall sed ac si spiritus ipse alteratus esset organum spirituati seu animalis passio.’ (Ibid.)

¹²² ‘...sensus...tristis molestusque et qui spiritum divexat et veluti deicit prosternitque; et manifeste ea modo dolorem spiritui inferunt quae, praepotentibus contrariisque donata viribus, corpus inexistensemque spiritum a propria natura propriaque dimovent dispositione, corrumpunt nimirum...’ (*De rerum natura*, 277.)

¹²³ ‘...Unles the privation of dolor be taken for volupty which it can not be but <comparative and> improperly.’ (BL Add. MS 4395, f. 48); ‘...the sensation of convulsion is cum dolore...and the sensation of non-convulsion (which is to be understood privativè and per recessum actus) cum indolentia seu absque dolore that is to say with the reduction or reversion of the spirits to their naturall state which in comparison of their immediatly precedent distraction may appere to be a degree of volupty...’ (Op. cit., ff. 32-3); Cf. Epicurus’ view of pleasure as ‘the absence of pain in the body and of trouble in the soul.’ (Gould (1970, 27.) The Cyrenaics denied this identification of indolence and pleasure. (See Diogenes Laertius, *Vitae*, Vol. 2, X, 136.)

¹²⁴ *De civili facultate*, 30.

torsion'¹²⁵, 'Dolor naturâ prior voluptate.'¹²⁶ This does not take away the fact that in his theory regarding the causes of locomotion Warner in fact consistently opposes pain not to pleasure but to indolence and the malignity of pain to the 'bonity' of indolence.¹²⁷

Pain is '...ordayned by nature for a signe or token to intimate unto us the danger or illnes of the effect and to styrre or excite our faculty appetitive implicite by the amotion thereof to the prevention or reparation of the effect...'¹²⁸ It is '...a signall to give us admonition of the said noxious or destructive accidents and by the sensible effects as it were to sollicite us to the resistance or remedy of the insensible causes...'¹²⁹ It does not inform us about its cause but only tells us that something is wrong and arouses the appetite in order either to make us flee the situation or investigate the '...noxious or destructive accidents or alterations in our body...' causing the pain and do something about them.¹³⁰ Many of his contemporaries conceived pain as a '...passio in appetitu, sequens cognitionem, & iudicium sensus.'¹³¹ In Warner's view pain is not an affection of but precedes the appetite.¹³²

4.5. Conclusion

By the sensitive faculty Warner understands a power that is '...passive, receptive, retentive and representative of externall obiects.'¹³³ In other words sensation, imagination and memory are not conceived as separate faculties but as different operations of one and the same power. In fact he conceives the imagination as nothing but weakened sensation, and memory as the retentive imagination. Warner describes these operations, effected by a number of external organs and one internal organ, in terms of changes of the spirit and its organs, i.e. as purely bodily processes. Most writers on the soul in Warner's day derived their explanation of these functions from Scholasticism. They

¹²⁵ See BL Add. MS 4394, ff. 222r-220r. See also Chapter 6, section 6.2.

¹²⁶ BL Add. MS 4395, f. 45. Cf. Sextus Empiricus: '...it is impossible to acquire a notion of pleasure without having experienced suffering; for it is owing to the withdrawal of everything that gives pain that pleasure really subsists.' (*Against the Physicists*, I, 165.)

¹²⁷ See Chapter 5, section 5.4.

¹²⁸ BL Add. MS 4394, f. 251r.

¹²⁹ BL Add. MS 4395, f. 25.

¹³⁰ Ibid. Cf. Suarez: '...causa doloris, ac cognitio talis causae in exteriori membro est.' (*Opera*, Vol. 3, 766.)

¹³¹ Portius, *De dolore*, 28 (see also pp. 46 and 57). Cf. Suarez: '...dolor vero in appetitu.' (*Opera*, Vol. 3, 766.)

¹³² Cf. Gualandi: 'Voluptas autem, & dolor minime omnium sunt affectus: neque enim appetitus, vel motus, sed fines appetitionum, & animi motuum omnium.' (*De civili facultate*, 47.) See also Melanchthon, *Commentarius*, 179v.

¹³³ Op. cit., f. 20.

conceived sensory perception as a process effected in the body and subsequently in the mind enabling us to perceive objects that, through their qualities, left impressions in the sense-organs. On their way from the external senses to the common sense, the imagination and memory, i.e. to the internal senses, these material impressions were supposed to be dematerialised and thus made fit for objects to the mental powers, reason included. Accordingly most of Warner's contemporaries also distinguished between a material version of the imagination and memory connected to the senses, and an immaterial version connected to reason. Warner did not share these views. In his opinion all the operations of the 'faculty sensitive', activated by nothing but matter in motion are of a bodily nature, and yet controlled by reason. Actually, in his view there are no irrational faculties, i.e. powers that are not guided by reason. Accordingly he deems these functions susceptible to training. Further, the only difference between the external and the internal senses is their location, and Warner recognizes only one kind of imagination and memory. Moreover, in his view the external senses do not perceive the things themselves but only their qualities, and the internal ones do not perceive qualities but only motions of the spirit. With these ideas Warner comes, as we have seen, very close to the theory of sensory perception, imagination and memory of Telesio, the 'first of the moderns'. There is only one major difference between their views in this case. While Warner considers the sensitive faculty as a merely passive power, Telesio, like most of his more orthodox colleagues, deems it active.

The primary use of the senses is to guide us in our search for food, and to inform us about imminent or actual danger. They inform us by making us feel pleasure or pain. These, in their turn, trigger the required operations by arousing the appetite. The operation of the 'faculty appetitive' and the investigation of the causes of painful sensations call for the assistance of the intellect.

Chapter Five

Reason, Joy and Sorrow

5.1. Apprehension, Comparison and Judgement

Like most of his contemporaries Warner elucidates the nature and operations of the intellect by comparing this faculty with that of sensory perception. The validity of such a comparison was cause for debate. A small minority considered the intellect as nothing but an imperfect sense.¹ The majority of writers on the soul, though recognizing the many similarities between these two kinds of faculties, followed Aristotle and his commentators in their rejection of this reduction of understanding to mere sensation.² Thus according to Aquinas, a leading authority in Warner's day, fantasies are to the intellect, as sensibles are to the senses and as the sensory perception of something pleasant leads to approaching it, while a sad thing results in avoidance of it, positive or negative judgements of the intellect provoke the same reactions.³ As sensation is a passion caused by the action of a sensible object understanding is a passion of the intellect effected by an intelligible object.⁴ Both powers are receptive to their objects and share similar passions.⁵ Yet these similarities do not justify an identification for while something can be misunderstood it is only perceived correctly or not at all. Moreover all animals are endowed with senses but only rational animals, are also able to understand what they perceive.⁶ Zabarella also brackets sensory perception with reason as cognitive powers that can be said to be acted on in a certain way by their objects.⁷ However, there are also differences. The sensitive faculty uses a bodily organ which implies that it is affected in an other way than is the intellect, an immaterial faculty. Namely, the reception of intelligible species is not accompanied by bodily changes.⁸ Further the

¹ Cf. Telesio: '...intellectionis cujusvis principium similitudo est sensu percepta; intellectio vero ipsa...sensus quidam, imperfectus nimirum et per similitudinem...' (*De rerum natura*, 316) See also Doni, *De natura hominis*, FF. 106-9.

² See Aristotle, *On the soul*, 427a24-428a20.

³ *De anima*, no. 770, p. 183.

⁴ See op. cit., no. 675, p. 164.

⁵ See op. cit., no. 676, pp. 164-5.

⁶ See op. cit., no. 630-31, pp. 155-6.

⁷ See *In Aristotelis libros de anima*, 678F-679A and 679D.

⁸ Op. cit., 683B.

intellect is susceptible to the species of all things, while each sense is only receptive to a certain kind of species.⁹

Warner, for partly different reasons, takes a comparable stand. A thing cannot be simultaneously the object of sensory perception and of intellectual understanding:

‘The prevalence of actual sensation graduate doth extinguish or nullify all act of intellection graduate so that there can be no alternation of the passion sensually with the passion or with the reaction intellectuall. And the prevalence of the passion intellectuall doth nullify the reaction and hinder their alternation.’¹⁰

Something either is perceived by the senses or it is speculated by the intellect. These two kinds of cognitive processes are, in other words, not synchronous but consecutive ‘Reson and the intellective beginning where nature and the sensitive leave.’¹¹ Warner could not have given us a more concise formulation of his view of the ‘faculty rational’ also referred to as the ‘faculty syllogistik’, ‘faculty applicative’, ‘faculty intellective’, the ‘comparing and applying faculty’ or as the ‘faculty of apprehending and iudging’ . As the sensitive faculty, purely passive, is acted on by nature through external objects the intellect is informed by reason through internal objects. Though different faculties, thanks to ‘...the naturall continuity of the spirits sensitive and intellective...’¹² they are connected. This enables the intellect ‘...cuius est speculari fantasmata et recipere species intelligibiles fantasmatum’¹³ to function as ‘...a spectator of all those alterations that are acted in the sense or in regione sensitiva...’¹⁴ Warner opposes the intellect as the ‘comparing or applying faculty’ to sensation and imagination that ‘...are only representative of the precedent upon the arrival of the like and not comparative of heterogeneall and dislike...’¹⁵ Even in case of ‘...consensation and continue sensation...’ there is ‘...no comparing of fantasms...’¹⁶ Accordingly, as opposed

⁹ Op. cit., 704D.

¹⁰ Bl Add. MS 4394, f. 271v.

¹¹ BL Add. MS 4395, f. 21.

¹² BL Add. MS 4394, f. 251r. The sensitive and intellective spirits are ‘...separate quadamtenus in some sort yet not absolutely and absque omni communicatione.’ (Op. cit., f. 241r)

¹³ BL Add. MS 4395, f. 28.

¹⁴ BL Add. MS 4394, f. 251v.

¹⁵ BL Add. MS 4395, f. 18. Cf. Telesio’s characterization of the sensitive faculty as a ‘...discernendi iudicandique vis...’ (Op. cit., 326); Campanella: ‘Sensus...discursus est, vel cum discursu: non enim passio sola est sensus, sed iudicium de passione ac proinde de obiecto, a quo patimur.’ (*Inediti theologicorum*, 30)

¹⁶ Op. cit., f. 32. See also op. cit., f. 27. Warner does not adduce arguments in support of this conviction. According to the Aristotle-commentators from the Collegium Conimbricense reasoning implies composition and division which, in its turn, presupposes the ability of the thinking-faculty to reflect on its own acts. The sensitive faculty does not have this ability. That also explains, in their view, why it could never affirm its own propositions. Further each proposition contains a copula, i.e. something

to the sensitive faculty, the intellect is not just passive but also operates actively on its objects. First it receives and retains impressions, not, like the phantasy, from the things themselves but from the differences and communities of the fantasms in the phantasy. In that respect it ‘...may be accounted receptivum or campus intellectivus as the first is phantasticus and the externall of the things themselves physicus or realis.’¹⁷ Next these impressions, stored in the intellect, are speculated which ‘...speculation or intuition or intellection of the <species of> this difference of two continue fantasms by the faculty intellective...is nothing els but the comparing <or applying> of the one to the other...’¹⁸ Warner views this faculty as ‘...an aptitude or faculty of the spirits no les natural and necessary then the sensitive is of reception and the fantasiative of representation and refantasiation the naturallness and necessity of whose operations is ex ipsis fenomenis manifest.’¹⁹ In this process reason proceeds analytically.²⁰ Speculation, in other words, comes down to a comparative analysis. Such an analysis of course only leads to real knowledge if the sensory impressions and consequently their fantasms, being nothing else but these impressions themselves in the phantasy, or considered in relation to the

that cannot be perceived by the senses. Finally reasoning presupposes knowledge of general principles while the senses are only receptive to particulars. (See *Commentarii Collegii Conimbricensis*, 400.)

¹⁷ Op. cit., f. 18. The intellect is ‘...a receptive or retentive higher or ulterior then the receptive or campus fantasticus because it is of the differences and communities of phantasmes as the campus phantasticus is of the originals or things themselves...’ (Ibid.)

¹⁸ Ibid. Cf. : Melancthon ‘...primum mens accipit singularia obiecta a sensibus, haec vocatur simplex apprehensio. Deinde ex singularibus eruit universalialia, quae Plato vocabit Ideas, Tertio accedit collatio, qua discernit res quascumque, accidentia inter sese & a substantijs...Haec collatio parit ratiocinationes, quae procul vagantur, considerant effectus, quaerunt causas...’ (*Commentarius*, 207v-208r) In Davies’ view the ‘wit or understanding’ looks in the mirror of the ‘fantasie’ from where it abstracts the forms of the sensory impressions. These are received by the passive intellect and illuminated by the active intellect. Than the intellect through ‘discoursing, anticipating and comparing’ traces the ‘universall natures’ and reduces all ‘effects into their causes.’ (*Nosce teipsum*, 117). William Petty understands by ‘Thinking and consideration...The comparing and matching of *sensata*.’ (See *Papers*, Vol. 1, 157)

¹⁹ Ibid.

²⁰ ‘...the method or way of the operation of the syllogistik in arguing and formyng the obiects...out of the fantasms to be resolatory or analytik.’ BL Add. MS 4394, f. 262v)

rational faculty²¹, are in conformity with the external objects that caused them. This conformity

‘...must be in all respects adequately analogate: that is to say in actual sensation the passion or alteration or effect or species sensible must be conforme to the object in forme and figure, in quantity in number, in order both locall & temporall, in gradu; and the fantasme reactivated in all these respects conforme unto the species and consequently to the object it self; and withall conforme therto in respect of duration whiles it was actually sented...analogate reactivation or representation, meaning analogy or conformity temporall, spaciall and virtuell; and in analogy temporall as well ordination or sequence as duration and in spaciall as well ordination or situation as formall and figurall.’²²

As was said before, the objects of the intellective faculty (‘or rather the *subiecta circa quae versatur* or *quae versat* that is the *comparata* or *applicata*’²³) are not, like those of the sensitive faculty the ‘originalls or things themselves collocated *ad extra in campo physico*’ but the ‘fantasms of the sensitive retayned in *campo fantastico*.’²⁴ That is ‘...the actuated fantasms and not the quiescent are the objects of the intellect.’²⁵ Moreover ‘...as in sensation it is not the things themselvs materially but the formall qualities of them that are the objects of the sense, so in intellection it is not the fantasms themselvs materially but their formall habitudes or relations or respects...’²⁶ While, in other words, the active qualities of sensible objects are substances, those of fantasms, that is, the objects of the intellect, are accidents ‘...*quia intellectus abstrahit a materia*.’²⁷ This, to Warner, does not mean that the intellect

‘...by way of abstraction <from materiality>, as the scholemen comonly hold, from them as particulars conceive and forme their universalls but it speculateth them with 2 modifications the one with their habitude or

²¹ ‘...the originall impression while it doth exist habet rationem fantasmatis in respect of the syllogistik or any thing that it hath to do with in comparing or applying one to an other.’ (BL Add. MS 4395, ff. 27-28)

²² BL Add. MS 4394, ff. 246r-245v.

²³ BL Add. MS 4395, f. 27.

²⁴ Op. cit., f. 18. It is ‘...the fantasms that the syllogistik compareth or applyeth one to another and not the things themselves *ad extra*, for those it can not.’ (Op. cit. f. 27.); ‘...the subjects of the syllogistik are only the fantasms and...the operation thereof is not extended *ad extra*.’ (Op. cit., f. 28)

²⁵ Op. cit., f. 31.

²⁶ Ibid. ‘*Sensus speculatur res, intellectus speculatur non res sed rerum habitudines seu respectus...*’ (Op. cit., f. 32)

²⁷ BL Add. MS 4394, f. 224r.

relation to their originals and of their originals to our esse or bene esse, the other with differences of time.’²⁸

Thus the intellect is informed with notions of ‘...the qualities or accidents or conditions <or effects> or habitudes tam inter se quam ad nos of things ether temporally or locally absent and not actually sented...’²⁹ In fact, by notions Warner understands sensory impressions considered ‘...in respect of their resensation or recognition <or intellection> (passive) or our resenting or recognizing or intellection of them (active)...’³⁰ They are ‘...firmly fixed and indeleibly retayned...quiescing in anima...’ to be applied ‘...tanquam per criterium seu canonem seu normam seu legem certam et necessariam...’ in the judgement of similar situations to come.³¹ All this requires habituation, i.e. training: ‘...the operations of the syllogistic are rude and simple at the first acts thereof and by practice and exercise in the succeeding <acts> groeth by degrees continually to gretter perfection...’³² Like the other faculties the ‘faculty syllogistik’ too, in other words, ‘...hath his principiation and augmentation but different in this from those faculties that are brought to their perfection <or perfectly habituated> by a few reiterate acts as the sensitive and locomotive &c...’ that it ‘...is capable of infinit augmentation by the continuall accesse of new notions...’³³

5.2. *The Active and the Passive Intellect*

As appears from his loose terminology, Warner had not made up his mind whether the rational faculty is passive or active or both at the same time, or whether it consists of two different faculties. Two distinctions are involved here. That between reason and the intellect, and that between the passive and the active intellect. Generally speaking in Warner’s day, the term reason did not refer to a separate faculty but to the intellect arriving at intelligible truths

²⁸ BL Add. MS 4395, f. 19. Cf. Doni: ‘Abstrationes formarum, a veteribus fictae, falsae sunt.’ (*De natura hominis*, F. 108)

²⁹ BL Add. MS 4394, f. 241r.

³⁰ BL Add. MS 4395, f. 34. Cf. Fracastoro’s view that in the senses and the intellect ‘...unam esse & eandem speciem...sed modis diversis. in sensu enim est confusa et coniuncta cum aliis coniunctis, in intellectu vero separata, et distincta, ac si universalis facta.’ Universal not ‘secundum esse’ but ‘quatenus imago est, et repraesentat.’ (*Opera*, 177v).

³¹ BL Add. MS 4394, f. 242r.

³² BL Add. MS 4395, f. 22. Cf. Aquinas: ‘...intellectus agens...est sicut habitus...’ (*De anima*, no. 728, p. 174); Zabarella: ‘Sensus est talis secundum naturam, qualis est intellectus post acquisitionem habituum...’ (*In Aristotelis libros de anima*, 501)

³³ Ibid.

by logical thinking.³⁴ Further many writers in agreement with Aquinas made a distinction between a ‘ratio particularis’ comparing particulars and a ‘ratio universalis’ operating on universals.³⁵

Of far greater importance is the distinction between the active and the passive intellect, one of the most contentious topics in Renaissance literature concerning the rational soul. Many writers conceived this distinction as one between two really different faculties. According to the philosopher and physician Johann Ludwig Hawenreuter (1548-1618) for example, the human mind is twofold:

‘Una παθητικὴ patibilis, quae cum inferioribus animi gradibus coniuncta est, & quasi materia existit; quae τὰ νοητὰ & intelligibilia in se recipere potest: Vulgo possibilis dicitur, quia potestate est, & res quae intelliguntur potest tales efficere. Altera ποιητικὴ agens, quae omni materiâ vacat, & à corpore est separabilis, atque efficit ut ea, quae facultate tantùm intelliguntur, actu intelliguntur, & νοητὰ & intelligibilia sint.’³⁶

Everybody agreed of course that the active intellect had to act, i.e. to actualize the mere potential. Opinions only differed as to whether this active intellect acted on fantasms, on the passive intellect or on both.³⁷ According to others the distinction did not refer to a substantial difference but to two different operations of one and the same faculty.³⁸ Only

³⁴ Op. cit., no. 812, p. 191; ‘...ratio et intellectus in homine non possunt esse diversae potentiae.’ (*Summa*, Ia, 389). Cf. Melanchthon: ‘Ratio saepe significat utranque partem, intellectum gubernantem, & voluntatem obtemperantem, qua vires coniunctas vocant Platonici ἡγεμονικόν.’ (*Commentarius*, 215v); Suarez’ statement that the intellect ‘Ex principiis...ratiocinando conclusiones colligit: eoque modo appellatur ratio.’ (Op. cit., 751) According to Davies the intellect is called ‘reason...when she rates things and moves from ground to ground...understanding...when by reason she the truth hath found and standeth fixt...’ (Op. cit., 117)

³⁵ See *De anima*, no. 396, p. 101; ‘ratio particularis...est enim collativa intentionum individualium, sicut ratio intellectiva intentionum universalium.’ (*Summa*, Ia, 381) Cf. Anglicus: ‘Vis...aestimativa, sive ratio sensibilis est, secundum quam in praecavendis malis nobis vel in delectabilibus consequendis prudentes sunt homines & sagaces, & haec aestimativa nobis communis est & brutis...’ (*De rerum proprietatibus*, 53)

³⁶ *Compendium*, 586-7. Hawenreuter published Jacopo Zabarella’s *Opera Logica* (Köln 1594). Zabarella also rejected the idea of these two kinds of intellect as substantially identical on account of the fact that the intellect is a ‘simple form’ and consequently cannot move itself for ‘...quicquid movetur, ab alio moveri...’ (*De rebus naturalibus*, 1022D-1025D) See also *Commentarii Collegii Conimbricensis*, 187, 406-7, 414, 419-20, 426-7, 473-4.

³⁷ See Zabarella, *De rebus naturalibus*, 1008B-1009D.

³⁸ ‘...intellectus unus, qui quatenus enodat species, agens est; quatenus earum est subiectum, materialis est.’ (J.C. Scaliger, *Exercitationes*, 402v.) Cf. Fernel: ‘Haec tota {i.e. the active intellect} patibili intelligentiae immergitur intexiturque, atque ex his tanquam ex materia et specie fit res una.’ (*Physiologiae*, lib. 5, cap. 14, p. 158. Quoted in Figard (1903), 297); ‘Dum enim haec mentis essentia primo consideratur ut nudata, ut apta indui et ut a phantasmate excitatur, dicitur mens potestate. Eadem, ut abstrahit, iudicat, componit, ratiocinatur, dicitur agens...Colligamus itaque mentem hominis...esse essentiam unam, cui distincta ratione, duae differentiae competunt, agendi et patiendi, invicem non

to some, Fracastoro for example, the problem of the nature of this distinction did not exist at all as, inspired perhaps by Durandus and other representatives of the *via moderna*, he believed ‘...tantum pati anima intelligendo, & nihil praeterea agere.’³⁹ The active intellect is supposed to extract universal notions from sensible fantasms but what, Fracastoro asks, do they understand by this *extrahere* ? Surely not that the active intellect generates these notions, for that is impossible. They probably mean to say that it abstracts universal natures from fantasm. How ? Are fantasms somehow transformed in that process ? Are they ‘illuminated’? Fracastoro would have none of it : ‘...irradiare intellectum illum super fantasma, & denudare ipsum à conditionibus singularium, metaphorica quidem & poetica istaec videntur.’⁴⁰

Warner wonders

‘...how the comparing or applying faculty can be understood only and allways passive and never active when as both the terme and act of comparing or applying do import or imply rather action then passion and <though> the one can not be without as there can be no applicans without an applicatum or comparans absque comparato, yet the wordes are and therefore the operation should be active.’⁴¹

pugnantes.’ (Francesco Piccolomini, *De anima* (1596), 1307. Quoted in Schmitt (1988), 529, note 327.) According to Suarez it is not the active but the possible intellect that abstracts universal natures from fantasms. (See *Opera*, Vol. 3, 728)

³⁹ Op. cit., 166v; ‘Videntur...d’amici omnes ferè, qui sese è peripatesi philosophos faciunt, separatum quendam intellectum inducere, quem agentem vocant, à quo fiat universale. facultatem nam illi attribuunt è sensibilibus rerum simulachris (quae phantasmata appellant) simplex ipsum universale, & puram ideam extrahere: quae non hoc, non illud, sed simplicem ipsam naturam repraesentat, denudatam ab omnibus ijs, quae cum singulari coniuncta erant atque hoc intelligibile iam vocant, cum prius sensibile tantum foret.’ (*Opera*, 176r) Cf. Durandus: ‘...q sicut non ponit sensus agens qui cum obiecto causet actum sentiendi sic non oportet ponere intellectu agentem ad hoc ut cum fantasmate moveat intellectum possibilem ad actum intelligendi tanquam duo imperfecta agentis. Cum ergo intellectus agens non agat in fantasmata aliquid imprimendo vel aliquid abstrahendo...nec agat in intellectum possibilem nec sine fantasmata nec cum fantasmate ut deductum est videtur quod debeat ipsum ponere.’ (*Quaestio de natura cognitionis*, f. 30r); ‘Puto esse sententiam Durandi probabilem et eorum qui negant intellectum agentem aut saltem sola ponunt ratione distinctum. Neque enim duos habemus intellectus ut videtur, sed unum, sicut nec duas voluntates...nulla est ratio contra hoc conveniens: tamen quia nec in contrarium rationes habentur convincentes, sequimur communem sententiam.’ (Fr. Toletus. *Commentaria una cum quaestionibus in tres libros Aristotelis De anima*. Venice 1592, f. 146va. Quoted in Schmitt (1988), p. 512, note 199.)

⁴⁰ *Opera*, 176r

⁴¹ BL Add. MS 4395, ff. 26-7.

In that respect it cannot be just passive. On the other hand the intellect seems passive, as the receiver and depository of the results of such comparisons.⁴² Initially the ‘faculty syllogistik’ does not seem to be

‘...the same with the faculty intellective patient that receveth the obiect...no more then the faculty illuminative of the sunne is all one with the faculty visive or the faculty radiative of odors with the faculty odorative &c which are toto genere different the one active the other passive and the one externall to the other and locally distinct and separate the one from the other...’⁴³

However this operation of the ‘faculty syllogistik’ does not account for the incidental action of the so called passive intellect. After all,

‘...yf the things themselves ad extra be <actually> applied the one to the other ether per se or by the hands or any other operation of the organo-motive the intellect is to be understood immediatly to speculate <and apprehend> their said equality or inequality in their fantasme or impression without any help or mediation or operation of the syllogistik or faculty applicative for the applying of them. And yf the application of fantasms in this <maner> and to this end be ether the function or one of the functions of the syllogistik it can be no such principall and magistrall faculty as it is supposed to be but a certaine faculty spirito-motive <facultas versatilis> merely ministeriall and subordinat to the intellect as the motive of <the> eyes is to the faculty visive...’⁴⁴

Maybe this irregularity induced Warner to change his mind:

‘It is rather to be understood that the faculty syllogistik and the intellect passive...are analogate to the faculty sensitive and the fantasy or memorative, that is to say that there is the same habitude betwene the syllogistik and the intellect passive as betwene the sensitive and the fantasy which is that as the fantasy is the retentive <(or memorative)> and resensitive to the sensitive so the intellect passive is the retentive (or memorative) and reintellective to the syllogistik.’⁴⁵

Warner concludes from this that

‘...as the sensitive is passive so is the syllogistik and as the externall obiects of the sensitive are not actuated by any operation of the sensitive but by their owne qualities or properties or conditions and by the action of nature in them or upon them according to the universall contingency thereof no more are the fantasms (which though internall in respect of the fantasy are to be understood the obiects of the syllogistik and in respect thereof externall) actuated by the operation of the

⁴² ‘Rationalis versatilis ut oculi...non tamen intellectus agens. Ut nec visus agens. (Op. cit., f. 32) Cf. Durandus’ opinion quoted in note 39.

⁴³ Op. cit., f. 20.

⁴⁴ Op. cit., f. 28.

⁴⁵ Op. cit., ff. 25-6; ‘...Intellectus patiens memorativa facultatis syllogisticae ut fantasia sensitivae...’ (Op. cit., f. 24)

sylogistik but as those of the sensitive in one respect by their owne qualities, or properties or conditions and in an other by some other actuant.’⁴⁶

Therefore

‘...the syllogistik is not to be understood to be a faculty distinct and different from the intellect passive as yf the one were agent the other patient...but that they are both one and the same faculty and <their operations> acted by one and the same spirit or portion of the spirits as particular duties or parts or functions of one generall office or faculty one succedent or subordinat to an other as it doth necessarily belonge to one mans office <or as they are only successive acts of one function> to receve and keepe and redeliver, nether can they but absurdly and with inconvenience be separated or divided.’ Consequently he concludes ‘...that...<the syllogistik and the intellect passive> may be comprehended under one name or appellation as that of rationally or syllogistik ether of the words being alike proper for that they both imply or import comparing or applying which is the very point wherein the formality of that faculty doth consist and wherein it is formally different from the sensitive or which is superadded unto it in comparison to the sensitive...’⁴⁷

There being no such thing as an essentially active intellect Warner, just as he did with relation to the senses, drops the qualification ‘passive’ as ‘nugatory’.⁴⁸

5.3. *The Process of Syllogization*

Starting from ‘phenomena’, i.e. sensory impressions, the intellect generates two kinds of notions or concepts.⁴⁹ Each phenomene consists of one or more ‘terms’, that is, components or parts.⁵⁰ First the intellect combines these terms two by two into original or radical notions. Thus it composes the radical notion ‘ab’ from a phenomene consisting of the terms a and b; a phenomene of three terms furnishes the radical notions ‘ab’ and ‘bc’; if there are four terms a, b, c and d, the intellect combines these into the radical notions ‘ab’, ‘bc’ and ‘cd’, etc.⁵¹ Thus concepts can only be formed on the basis of phenomena consisting of at least two terms. Different phenomena can also share one or

⁴⁶ Op. cit., f. 26.

⁴⁷ Ibid.

⁴⁸ ‘...though this rationally or syllogistik faculty be passive yet to terme it the intellect passive is...nugatory...there being none active or agent...but per accidens and not quatenus talia.’ (Ibid.) See also Chapter 4, p. 142.

⁴⁹ See note 21.

⁵⁰ In logic the word ‘term’ means ‘Each of the two things or notions which are compared, or between which some relation is apprehended or stated, in an act of thought, or (more commonly) each of the words or phrases denoting these in a verbal statement...’ (*The Oxford English Dictionary* (1989), Vol. 17, 801).

⁵¹ See Add. MS 4394, f. 237v.

more terms. In that case the series of radical notions derived from these phenomena will partly overlap. Thus out of the two phenomena ‘a-b-c-d-e-f’ and ‘h-i-k-d-l-m-n’ can be made the following two series of radical notions, ‘ab . bc . cd . de . ef’ and ‘hi . ik . kd . dl . lm . mn’.⁵² Typical of a radical notion is that the similarity it expresses is not derived by the intellect from something else but is directly given. Warner calls such notions ‘asymbola’, meaning that the terms, constituting such a notion, are not indirectly, through a third, common, term but directly connected.⁵³

Though Warner does not say so explicitly, from what he does say it is clear that, in his view, terms cannot be joined arbitrarily. Only if there is some real relationship, ascertained through a comparison by the intellect, they can be combined in a notion. Accordingly a radical notion like ‘ab’ can be read as ‘a est b’, that is, ‘b’, being somehow related to ‘a’, can be predicated of ‘a’.⁵⁴

The second step consists of the deduction⁵⁵ of all binomial combinations of terms, i.e. all propositions implied by the relationships between radical notions or propositions.⁵⁶ Warner calls such derived notions ‘subnotions’.⁵⁷ They differ depending on ‘...the number of media or symbola by which they are syllogized as subnotions of one medium, or unimediata subnotions of 2 media or bimedia of 3 or trimedia &c. or in the greek appellations monosymbola, dyssymbola, trisymbola &c...’.⁵⁸ For example, from a series of five radical notions ten other subnotions can be derived, spread over four levels:

⁵² Ibid.

⁵³ Ibid.

⁵⁴ Op. cit., f. 237r.

⁵⁵ Warner distinguishes three ‘...ways or methods of argumentation...a priore and a posteriore and a simili...’ that is ‘...per syllogizationem analogicam similitudinis (commonly called induction)...’ (Op. cit., ff. 266v-267r.) An example of induction is ‘a. est b.’ Ergo ‘-a. est -b.’ (See op. cit., f.270v)

⁵⁶ Cf. Zabarella: ‘...notificare nil aliud est quam ex uno conceptu alium conceptum ab eo diversum gignere...Per inductionem ex conceptu singularium generatur conceptus universalis, per demonstrationem ex conceptu praemissarum gignitur conceptus conclusionis...’ (*In Aristotelis libros de anima*, 36D-E)

⁵⁷ As far as I know Fracastoro is the only other person who uses this term albeit in another sense than it has with Warner. With Fracastoro it means the kind of knowledge: ‘...qua sub uno quodam apprehensio multa alia simul confuso quodam ordine sese offerunt; ad quae consequenter movetur anima, unum post aliud ceu inspectura.’ Fracastoro is not talking here about ‘compositio aut ratiocinatio’ but only about the simple representation of one thing after another, about an operation of the soul by which several species, for example the heat and redness of fire, are combined into a coherent whole while at the same time the components of such a complex can still be discerned clearly. (*Opera*, 169v.)

⁵⁸ Add. MS 4394, f. 237v.

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Radical notions ab . bc . cd . de . ef = O

ac bd ce df = I

ad be cf = II

Subnotions ae bf = III

af = IIII

‘These ordinations are thus to be expounded...First the basis or radix of the phenomenes thus a est b; b est c; c est d; d est e; e est f; then the subnotions thus, ergo per monosymbolam syllogizationem a est c; b est d; c est e; d est f. Ergo per dyssymb. syllog. a est d; b est e; c est f. Ergo per trissymb. syllogiz. a est e; b est f. Ergo per tetrasymb. syllog. a est f.’⁵⁹

These bases of radical notions and series of subnotions constitute as it were

‘...two extensions or dimensions of mens wits or understandings or knowledges the one as it were of latitude namely that of the phenomenes, the other of profundity namely that of subnotions, the one of experience the other of speculation, or the one practicall, the other theoreticall.’⁶⁰

According to Warner ‘all the variety and differences possible of wits’ can be reduced to the different proportions and relations within, as well as between, these two dimensions. Warner poses some interesting questions concerning these operation of the intellect. Introspection suggests that thought involves all kinds of motions, alterations and

⁵⁹ Op. cit., f. 237r. If several series of radical notions share terms than of course much more radical notions can be derived from them. Thus from a combination of the two overlaping phenomena, mentioned before, ‘a-b-c-d-e-f’ and ‘h-i-k-d-l-m-n’, fourty different subnotions can be derived (Op. cit., f. 237v.):

<u>ab . bc . cd . de . ef</u>	<u>hi . ik . kd . dl . lm . mn</u>
ac bd ce df	hk id kl dm ln
ad be cf	hd il km dn
ae bf	hl im kn
af	hm in
	hn

<u>ab . bc . cd . dl . lm . mn</u>	<u>hi . ik . kd . de . ef</u>
ac bd cl dm ln	hk cd ke df
ad bl cm dn	id ie kf
al bm cn	he if
am bn	hf
an	

⁶⁰ Op. cit., ff. 237r-236v.

transformations of the fantasms. Are they ‘...so within the horizon of the intellect that they need no transportation or versation of one to an other or of them to it or of it to them...’⁶¹ Maybe

‘...fantasms are of themselves allways <so> sufficiently...actuated that is to say speculable that there needeth no alteration on their parts but only the intention or direction or vexation of the organ intellective (whatsoever it be) <towards them or upon them> on the part of the intellect...’⁶²

But if so ‘...by what faculty those operations are performed...by the intellect it self...by the faculty actuative of the fantasms⁶³ ...or by any other active or motive faculty subordinat to the intellect peculiarly for that purpose...’⁶⁴ Warner considers, as we saw, the possibility that the mental play with fantasms can be reduced to ‘...the versation or direction of the organ intellective to them as the eyes to the objects visible...’⁶⁵ In fact he rejects the traditional idea that fantasms, in order to be speculated, have to be illuminated by an active intellect on behalf of the passive intellect functioning as the mind’s eye.⁶⁶ Firstly because it is unclear what exactly is ment by ‘illumination’. Some conceived it as a direct action of the active intellect on fantasms that enabled them to generate the intelligible species of the things represented, i.e. the universal nature of these material things without their individuating properties. Others, rejecting the idea that a material entity like a phantasm could be acted on by a purely spiritual power, held that fantasms, without actually receiving any light of the active intellect, thanks to its presence, were enabled to produce intelligible species. Suarez categorically rejects the idea of an illumination of fantasms by the intellect. In his view it is nothing but the production of an intelligible species in the possible intellect. These species are not generated and impressed in the passive intellect by the fantasms but by an action of the active on the passive intellect. It is only called ‘illumination of phantasms’ in so far as it gives the intellect a clear view of the things represented by these phantasms.⁶⁷ Apart from these differences of opinion regarding the nature of that ‘illumination’ the metaphor also is inadequate in so far as there are many fantasms, like those representing differences of time, relations etc.

⁶¹ BL Add. MS 4395, f. 32.

⁶² Op. cit., f. 19. Cf. According to the commentators of Coimbra the human imagination thanks to its connection with the intellect ‘...ab se promat illustriora & efficaciora phantasmata, quaeque una cum intellectu agente possint intelligibiles species producere.’ (*Commentarii Collegii Conimbricensis*, 425)

⁶³ See Chapter 4, note 84.

⁶⁴ Op. cit., f. 32.

⁶⁵ Ibid.

⁶⁶ Cf. Zabarella’s view that ‘...phantasmata...in intellectu patibili...non imprimerent speciem quidditatis, nisi essent illuminata ab intellectu agente...’ (*De rebus naturalibus*, 1014CD).

⁶⁷ See *Opera*, Vol. 3, 720. See for an extensive discussion of this debate *Commentarii Collegii Conimbricensis*, 423 ff.

that in no sense can be said to be illuminable. Ultimately Warner again sides with a minority as represented by, for example, Fracastoro according to whom the formation of concepts does not require any activity on the part of the soul but only ‘...applicatio animae, & intentio...’⁶⁸:

‘When all is said in the act of speculating the fantasms, there is no other illumination but syllogization...the conclusion which is the object of the intellect passive or patient is educed ex potentia scil. speculabilitatis seu intelligibilitatis in actum that is to say by syllogization the object is actuated...So that it is the faculty rationally or syllogistic that doth <prepare and> actuate the objects to the intellect passive or to the faculty intellective as it is patient <which hath nothing to do but to intend or to direct it self to the object>.’⁶⁹

5.4. *The Acquisition of the Notions of Good and Evil*

All concepts derive, directly or indirectly, from sensory perception. The senses inform us about beneficial, or natural and injurious, or unnatural alterations in our body. As we have seen the sensation of beneficial effects is linked with pleasure, while injuries are sensed as pain. Being substances, pleasure and pain have their own matter and form. The sensitive spirits, in a natural or unnatural state, constitute their matter while their form, i.e. their active quality, consists in their constructive or destructive effects on the organism. The effects of pleasure and pain, i.e. their salutariness and noxiousness constitute the essence of ‘bonum’ and ‘malum’ respectively. Thus malignity is nothing but

‘...the habitude of noxiousness or repugnancy to our state either naturally or politically either per se et directè or per accidens et indirectè...the prime malignity or primum malum is dolor⁷⁰ ...the habitude of dolor or things causative of dolor as of agents unto us as unto patients in respect of the destructivity of our esse or the habitude between that action of the one and that passion of the other namely of our selves that doth concerne or tend to either the destruction or to the disperfection of our esse.’⁷¹

Likewise the term ‘bonity’ refers to the wholesome effects of the actions of pleasurable things. Thus ‘...the one repugnant to the natural state of the spirits is conceived sub ratione formali mali and the other appearing congruent or

⁶⁸ *Opera*, 169v. See also this chapter, p. 167.

⁶⁹ *Op. cit.*, f. 20.

⁷⁰ BL Add. MS 4394, f. 247r

⁷¹ *Op. cit.*, ff. 250r-249v.

agreeable to the naturall state of the spirits is conceived sub ratione formali boni.⁷² Accordingly these ‘formalities’ of pleasure and pain ‘...are not sensible nor so much as fantasiabie or imaginary, but certaine affections or habitudes or conditions of the fantasm or educed or actuated out of fantasm...’ by the intellect.⁷³ ‘Bonum’ and ‘malum’ are, in other words, no ‘...entia sensata but merely intellecta...’⁷⁴

Our first concept or notion is that of evil⁷⁵ for the senses are only receptive to alterations and the first alteration in healthy animal organisms is that from being well-fed to being hungry, that is, from a natural to an unnatural state of its spirits. Accordingly ‘...the most prime malum is this of convulsion and distemper consequent of inanition and siccity malum famis et sitis...’, a shortage of vital materials felt as pain.⁷⁶ This

‘...habitude of noxiousnes ether to our naturall state or to our politicall as it is <really or physically> the generall and comon ration or condition to all those severall things or obiects though in other respects never so different so it is intellectually <or metaphysically or logically> conceived or apprehended by the intellect under the generall and comon notion signified or expressed by the terme of evill or malignity.’⁷⁷

Thus

‘...it is not dolor per se et quatenus tale that is the formall and immediat obiect of the intellect but dolor per accidens et quatenus malum that is to say the illnes or malignity of dolor that the intellect doth speculate or espy ether in the actuall sensation or in the fantasiation thereof that is the proper and formall obiect of the intellect...’⁷⁸

This is not a voluntary process for

‘...there is by the ordination of nature as gret a necessity on the part of the intellect to apprehend or receive the impression or notion of this malignity of dolor by speculating the same in the sense as there is on the part of the sense to receive the impression of the dolor or paine it self by sensing the dolorifik action of what kinde soever it be; nether is it naturally more

⁷² BL Add. MS 4395, f. 18. Cf. Suarez’s view that each thing desired is desired ‘...propter convenientiam quam habet cum appetente...ergo ratio boni in hac ratione convenientiae consistit...consistit convenientia in relatione; et non reali...ergo rationis.’ (*Opera*, Vol. 25, 329)

⁷³ Op. cit., f. 23.

⁷⁴ BL Add. MS 4394, f. 252r.

⁷⁵ ‘Bonum naturâ prius malo, sed notio mali naturâ prior notione boni.’ (BL Add. MS 4395, f. 23.)

⁷⁶ BL Add. MS 4394, f. 252v.

⁷⁷ Op. cit., f. 247v.

⁷⁸ Op. cit., f. 247r. Cf.: ‘...the formall quality active of this materiall obiect dolor may be understood to be the very formality of the spirits as they are in actuall doloris alteratione signified by the terme of malignity and malum to be the formall obiect of the intellect as dolor is the materiall.’ (Op. cit., f. 224r)

possible for the one to shunne or decline the apprehension or notion of the malignity...then it is for the other to shunne or decline the sensation of the dolorifik action...⁷⁹

Warner distinguishes between the real and apparent malignity of dolor. By the real malignity of dolor he means

‘...the <immediat> effect of those things that are dolorifik or causative of dolor...to be understood only as it tends to the destruction of our esse without any respect of the sensation thereof or with abstraction from all sensation...And this notion of dolor is no prime notion but afterwards acquired upon longe processe of observation and argumentation. By the phenomene or apparent malignity of dolor is ment only the present sensible paine it self without any respect of the <further> effect thereof in the destruction of our esse and the apprehension or notion thereof by the intellect...is that prime notion before mentioned.’⁸⁰

This first notion of apparent evil is opposed to the notion of real evil, afterwards to be acquired, as general and not very precise. Accordingly, the intellect is said to speculate that first fantasm of dolor ‘...implicitè or confusè because the <originall> intellection or apprehension thereof is not sub precisa seu explicita seu distincta formalitate seu quidditate destructivitatatis seu deperfectivitatatis sed sub implicita seu confusa ratione seu notione malignitatis...’⁸¹ In fact this formulation is misleading in so far as ‘...we do not originally intelligere dolorem sub confusa ratione et notione mali but econtra omnia et universa mala seu malignitatem in genere seu confuso sub distincta ratione seu notione doloris...’⁸² In view of the fact that the senses are only acted on by particular things, and that fantasms cannot represent things in general our first image of pain ‘...may be understood to be rather the notion of the malignity thereof than the refantasiation or imagination of paine or dolor it self...’⁸³ Thus our ‘...first notion is that of dolor, and our first notion of evill is

⁷⁹ Op. cit., f. 251v-r. See also BL Add. MS 4395, f. 33.

⁸⁰ BL Add. MS 4394, ff. 252r-251v. Warner’s interpretation of the distinction between real and apparent good or evil is reminiscent of that of Guillaume Du vair (1556-1621) who also understood the ‘apparent’ good to be a sensible good instead of something that sensorily might appear as good but that in reality was not. (See Levi (1964), 88). Cf. Suarez: ‘Verum bonum dicitur, quod tale est quale existimatur et cognoscitur; apparens vero, quod existimatur, non tamen est in re.’ (*Opera*, Vol. 25, 335)

⁸¹ Op. cit., f. 249v.

⁸² Ibid.

⁸³ ‘...this supposed imagination of dolor may be rather the excitation of the notion of the malignity thereof in intellectum than the reactivation of dolor it self in fantasterio.’ (Op. cit., f. 249r.)

that of dolor.’⁸⁴ It neither is nor could have been acquired by syllogization for that requires a comparison of fantasms while here we are talking of a notion derived from our first sensation. Therefore this first ‘...speculation or intellection of the malignity of dolor is effected...ex principio naturali by the naturall and necessary continuation of the passion of dolor from the spirits sensitive to the intellective...’⁸⁵ It is ‘...an originall phenomene intellectuall that is to say no subnotion deduced by syllogization but a mere phenomene apprehended <per autophaneian or speculation> by simple intellection...’⁸⁶ As such it is the first phenomene at the level of the intellect, i.e. the first radical notion, not only in man but in all kinds of animals.⁸⁷

Though the first pain we felt probably had a beginning and was preceded by a natural and therefore painless state of the spirits, that state must not be conceived as indolence and certainly was not experienced or known as such. Warner conceives indolence as something that has no independent, absolute reality but only exists in relation to, i.e. as the absence of, pain.⁸⁸ Accordingly, it does not exist outside of the mind and independently of our consciousness but is generated

‘...by the operation of the intellect in anima by comparing the naturall state of the spirits sensitive to their state alteratory or contranaturall as it is in the actuall sensation of dolor.’⁸⁹ But of the naturall state of the spirits precedent to the originall act of dolor unto their contranaturall state in the act of dolor ether before or in the time of the said act there can be no such comparison for that the comparing operation of the intellect doth necessarily presuppose the notice or <cognition or> intellection of both the terms of the comparison but of the naturall state precedent there being no notion or record reserved in archivis memoriae there can be no <re>cognition thereof in the time of dolition and therefore no comparison

⁸⁴ BL Add. MS 4395, f. 23; ‘It is the sensitive faculty that first feeleth paine...it feeleth the same only as paine that is as an extraordinary motion of the spirits but nether as good or evill because it hath never felt any thing before ether better or worse...’ (Op. cit., ff., 17-18)

⁸⁵ BL Add. MS 4394, f. 236v.

⁸⁶ Op. cit., f. 220v; ‘...the malignity of dolor...the prime notion acquired per autophaneian...the prime phenomene.’ (Op. cit., f. 219v). See also Op. cit., f. 222r.

⁸⁷ ‘...as this notion of evill is the first in the perfectest animalls so it is universall to all even to the simplest and most imperfect.’ (BL Add. MS 4395, f. 25)

⁸⁸ Cf. Vives: ‘Absentia boni pro malo est, mali autem pro bono.’ (*De anima et vita*, 151)

⁸⁹ ‘...the intellect by the originall acts of dolorifik sensation doth come to the formall conception or notion of the malignity of dolor and of the bonity of the cessation thereof...by the continuat and alternely succedent acts of sensation of the one to the other of indolence to dolor and of dolor to indolence (in what sense indolence [is] may be understood to be sented is to be considered) and by comparing of the one sensation to the other which is done by the intellect by speculating the present sensations together with the precedent fantasmes reactivated...’ (BL Add. MS 4394, f. 253v)

thereof to the present state contranaturall and therefore it can not be conceived sub ratione formali indolentiae.’⁹⁰

All this implies that the intellect cannot conceive indolence

‘...till the cessation of the originall act of dolorifik sensation and the returne or restitution of the spirits sensitive to their naturall state; upon which cessation of the contranaturall alteration and restitution of the naturall state the same is immediatly effected in this maner. The intellect having ben intent...upon dolor during the time of the actuall sensation thereof; that intention of the intellect is necessarily continued to the cessation thereof and the restitution of the spirits to their naturall state’⁹¹ ...and by meanes of this intention the intellect is further excited <by his comparing faculty> to note or speculate the difference or opposition privative between this present naturall <state> and the precedent contranaturall alteration of the spirits and upon <the comparison> necessarily to apprehend or conceve the naturall state of the spirits sub formali ratione indolentiae in opposition of the contranaturall of dolor...’⁹²

As appears from this explanation the excitation of the rational faculty requires, just like that of the sensitive faculty, a change from one state to another

‘...for yf the intention of the intellect had not ben excited and principiated by the actuall sensation of dolor <precedent> and so continued to the subsequent state it could never have ben actuated or excited thereby no state but rather mutation much less the naturall state of the spirits being excitative of the intellect as being insensible and <per se> void of all activity or motivity ether of the sense or intellect...’⁹³

Accordingly

‘...yf the animall should be borne and continue all his life under any one of the states were it of dolor or of indolence without any alternation or change from the one to the other it is impossible there could be <any formall notion of the bonity or illnes of ether of them nor any comparison> made by the intellect of the one to the

⁹⁰ Op. cit., f. 221v.

⁹¹ ‘...<the naturall state being otherwise not excitative thereof> quia facilius est continuari quam principiari; et per se continuatur quod non absque alio principiatur...’ (Op. cit., f. 220v)

⁹² Op. cit., ff. 221r- f. 220v; ‘...by the sensation or rather fantasiation of this difference we come to fantasiate the one sub forma seu specie mali and the other sub <forma seu> specie boni which at the first sensation of convulsion before the continue sensation of both we could not possibly do for before there had past at lest one continue sensation of both there could be no <re>fantasiation of their difference uno intuitu that is to say no comparison of the one to the other sub forma bonitatis vel malignitatis.’ (BL Add. MS 4395, f. 33)

⁹³ BL Add. MS 4394, f. 220v.

other whereby any notion of the bonity of the one or malignity of the other might result.’⁹⁴

The notion or, to be more precise, the subnotion of indolence is

‘...argued by syllogization analogicall thus dolor est malum ergo indolentia est bonum seu non malum.’⁹⁵ And this being understood to be done post cessationem doloris and durante actu indolentiae the antecedent of the syllogization is a phenomene quiescent recorded in the precedent actual sensation of dolor...and the force or validity or firmety of the consecution dependeth upon the analogy of the termes of the consequent to those of the antecedent as of indolentia and bonitas to dolor and malignitas and as it were upon this principle or canon oppositorum opposita est ratio.’⁹⁶

This principle ‘...is to be understood not acquisitum but naturale...’⁹⁷ Apart from his conviction that the notions of pain, pleasure, good and evil, inscribed in the mind before birth are not directly given to the animal but are the results of a learning process in utero, Warner also apparently believed in innate principles.

The primary notions of bonity and malignity as well as that of their difference, stored in the memory, enable us to recognize and judge by comparison the next painful sensation as bad, to anticipate the consequent indolence and to judge that as good.’⁹⁸

With the next painful sensation

‘...the fantasm of the precedent is eodem instante and as it were eodem actu reactualated and refantasiated as yf the <present and> later sensatum were directly and congruently applied to the precedent fantasm by which application and congruence, the present dolor is conceived sub eadem forma mali as the as the fantasm of the precedent is fantasiated and by continuation of the same congruence that is by the continue refantasiation of the notion or fantasm of the

⁹⁴ Op. cit., f. 253v.

⁹⁵ Op. cit., f. 219v. Cf. ‘The intellective faculty <speculating in the fantasm of dolor> first the malignity thereof when it was present, secondly the preterition of the act, thirdly by the application of those two notions to a certaine generall or abstract notion or principium (namely that the privation or preterition of evill is good) precedently acquired tanquam ad canonem or by the assumption of the said principium tanquam lemmatis it inferreth or concludeth <by way of syllogization> that the privation or preterition of dolor is good (how the intellect cometh by that or the like principium that is how it cometh to be precedently informed there with is to be considered hereafter).’ (BL Add. MS 4395, f. 19)

⁹⁶ BL Add. MS 4394, f. 219v.

⁹⁷ Ibid. According to Melanchthon ‘...hominibus natura insita essent adminicula quaedam, hoc est artium principia, numeri, agnitio ordinis & proportionis, connexio syllogistica, geometrica, physica, et moralia principia.’ (*Commentarius*, 208r); Cf. John Woolton’s conviction that in man’s reason are ‘Notices, or the understanding of things ingrafted, and as it were bredde in men naturally...’ (*A Treatise on the Immortalitie of the Soule*. London 1576., f. 63. Quoted in Wallace (1967), 105, note 21.). In Davies’ view, too, the soul is not ‘blancke were nought is writ at all’ but is endowed with ‘sparkes of light, some common things to see’, that is, certain natural laws concerning the true and the good. (See *Nosce teipsum*, 118); Bacon also mentions innate ideas. (See *The works*, Vol. 4, 27.)

⁹⁸ Ibid. See also op. cit., f. 253v.

bonity of the precedent indolence continue to the fantasme of the malignity of the dolor analogately to the temporall succession of the acts the bonity of the future indolence <to be continued> to the present dolor is anticipated or preconceived, that is, both the futurity of the indolence is conceived and the same conceived sub forma et ratione boni. And upon this fantasiation of the dolor precedent sub ratione mali and of the indolence <thereto> succedent sub ratione boni, the sensation of the dolor present sub ratione mali and the anticipation or prefantasiation of the future indolence sub ratione boni following by a kinde of argumentation or application of the one to the other...'⁹⁹

The 'bonity' of indolence is

'...argued by a double syllogization analogicall, first the succedence of indolence out of the notion thereof recorded in the originall act <and quiescent> ¹⁰⁰...per syllogizationem analogicam similitudinis, secondly the bonity thereof out of the present notion of the malignity of dolor per syllogizationem analogicam oppositionis or out of the notion of the like <precedent..> recorded and quiescent per syllogizationem analogicam similitudinis.'¹⁰¹

In opposition to the original generation of the notion of indolence these later argumentations are '...to be understood to be done durante actu doloris which in the originall could not be done ante cessationem...' as in that case the notions needed for this comparison were not yet stored in the memorative part of the imagination.¹⁰² Once these notions have been formed they always go together '...they being necessarily acquired eodem actu and being but relatively opposit intentions of one and the same reall notion or principium...'¹⁰³

The '...malignity of dolor and the bonity of the cessation thereof are absolutely and necessarily the two most prime notions that can cadere in intellectum animalis that the intellect of any animall is capable of.'¹⁰⁴ They are even said to be acquired as soon as the intellectual spirits are completely 'organized for their function', that is, '...ante partum animalis dum in utero gestatur.'¹⁰⁵ These primary notions do not bear on any kind of pain and pleasure whatsoever but on '...the dolor of inanition and siccity and of the

⁹⁹ BL Add. MS 4395, f. 33.

¹⁰⁰ '...which is to be understood a phenomene of immediat succedence whereas that of the malignity of dolor is a phenomene of coexistence/ consensation & continue sensation or cointellection and continuat intellection or conception and continuat perception when one of the termes is a sensatum the other an intellectum and both together a cognitum...' (BL Add. MS 4394, f. 219r.)

¹⁰¹ Ibid.

¹⁰² Ibid.

¹⁰³ Op. cit., f. 242r. Cf.: '...yf they may be properly accounted two distinct <notions> and not rather one or two rationally respects or relative [conceptions] <intentions> of one and the same reall notion...' (Op. cit., f. 253r)

¹⁰⁴ Ibid.

¹⁰⁵ Op. cit., f. 253r.

cessation thereof...' felt indirectly through the maternal body.¹⁰⁶ Bearing on '...those things that do primely and principally concerne us as of our conservatives <that are> of necessity naturall and internall',¹⁰⁷ they are

'...all the knowledges and affections that we can possibly have whiles we are in the state of our plasmation where we can have the use of no other sense naturally but that of dolor naturall namely...sensus defectus materiae vitalis...'¹⁰⁸

Only after we are born do we also acquire

'...notions...of those things that do secondarily concerne us as of our defensives or conservatives that are of necessity likewise naturall but externall and so successively our third notions and appetitions of our conservatives that are of necessity accidental and internall and the fourth and last of those that are of necessity only accidental and externall which do lastly and lest concerne us...'¹⁰⁹

This sequence illustrates in Warner's view, '...the perfection of natures ordination...'¹¹⁰

5.5. *Joy and Sorrow*

Passions, in Warner's day, were generally conceived as motions of the soul and of the sensitive appetite in particular '...caused by the apprehension or imagination of good or evill, the which is followed with a change or alteration in the body contrary to the Lawes of Nature...'¹¹¹ Drawing upon the works of Vives¹¹² and especially Melanchthon¹¹³ most writers on the soul conceived

¹⁰⁶ Op. cit., f. 252v.

¹⁰⁷ Op. cit., f. 252r.

¹⁰⁸ Op. cit., f. 219r.

¹⁰⁹ Op. cit., f. 252r.

¹¹⁰ Ibid.

¹¹¹ Coeffeteau, *A table*, 2. The rational part of the soul, being independent of bodily organs for its operation and not being focussed on alterations in the body, was supposed to be free of passions. (See op. cit., 3.) See also Suarez, *Opera*, Vol. 3, 764, 768.

¹¹² 'Motus omnis animi de bono est, aut de malo, quatenus contrarium est bono. Estque vel ad bonum, vel à malo, vel contra malum. Bonum autem et malum, vel praesens est, vel futurum, vel transactum, vel possibile.' (*De anima et vita*, 151)

¹¹³ 'Leticia est motus, quo cor praesenti bono suaviter fruitur - dilatatio quaedam est, qua velut amplectitur obiectum praesens, & suaviter effunditur sanguis & spiritus...Tristicia est motus, quo cor quasi percussum constringitur, premitur, angitur, tremit & languescit cum acri sensu doloris.' (*Commentarius*, 179v-180r.) Cf. Casmann: 'Laetitia est affectus, quo animus in bono praesenti acquiescens, illud corde spiritibus vibrato & dilatato ad fruendum amplectitur.' (*Psychologia*, 407), 'Tristitia est affectus, quo animus ob sibi praesens malum retractis ad principia sua spiritibus cor constringit & comprimit.' (Op. cit., 412)

such alterations as ‘...nothing else but a motion of the bloud and spirits about the hart...’¹¹⁴

Warner too considered passions as motions of the spirits evoked by the apprehension of good and bad things. However, he did not want ‘...to make bonum and malum the proper object of the appetitive or concupiscible faculty as comonly they do and nothing at all to concerne the intellect but the formall object thereof to be only verum et falsum...’¹¹⁵ Accordingly he attributed the passions not to the sensitive appetite but to the intellect. The notions of good and evil, educed by the syllogizing intellect from fantsms of pain and pleasure, are impressed in that same intellect ‘as it is recipient or patient...with a kinde of exultance or remorse of the spirits intellective called sorow or ioy.’¹¹⁶ Sorrow, to be more precise, is a notion in the intellect ‘...of illnes or malignity whether it proceed of the habit or existence of paine or of the privation or non-existence of plesure, and whether it be considered in respect of our esse simply or of our bene esse or of both.’¹¹⁷ The notion of the ‘...bonity or goodnes of the preterition of dolor...doth make a certaine alteration or impression in the spirits intellective which (whatsoever the formality thereof be whether exultation or dilatation &c) we call ioy...’¹¹⁸ These feelings arouse a negative or positive appetite inciting to avoidance or approach.¹¹⁹

¹¹⁴ Digby, *Two treatises*, 306.

¹¹⁵ ‘...which whether it may be properly termed an object of the intellect or no shalbe hereafter examined.’ (Op. cit., f. 264r) That examination, if he performed it, is no longer extant.

¹¹⁶ BL Add. MS 4395, f. 19.

¹¹⁷ Op. cit., f. 17.

¹¹⁸ Op. cit., f. 19. Like Melanchthon Vives usually refers to these feelings as ‘affections’. So does, in the early 17th century, Alsted. (See *Encyclopaedia*, lib. XIII, 738.) Others, like François de Sales (1567-1623) distinguished ‘passions’ as motions in the sensitive appetite from ‘affections’ as motions in the intellective appetite. (See Levi (1964), 117-18) Shakespeare is said to have used the term ‘affection’ in the sense of a positive or negative inclination caused by a sensory impression and resulting in some inner disturbance referred to as a ‘passion’. (See Dowden (1920)) Aquinas considered the terms as synonyms but usually talked of ‘passiones’. (See *Summa*, Ia sec., q. 22, a. 2, p. 115) Cf. Reisch: ‘Passiones sive affectiones animi sunt, quas a concupiscibili et irascibili potentiis et objectis harum exoriri diximus.’ (*Margarita*, 933). The same is true for Warner. (See BL Add. MS 4394, ff. 254v, 262r; Add. MS 4395, f. 48)

¹¹⁹ Thus these feelings precede or are simultaneous with the appetite. They must not be confused with ‘imaginary’ joy or sorrow. That is but a ‘...fantastik extension or continuation or ampliation or multiplication...’ of hope and fear, i.e. a positive or negative appetite evoked by the imagination of some future good or evil. (BL Add. MS 4394, f. 258r; ‘...there comonly apperes a certaine imaginary or fantastik ioy consequent unto hope and the like sorow unto fere...’ (Op. cit. f. 259r)) These feelings, not raised by real experiences but by figments of the mind ‘...are most frequently incident to spirits that have the fantasiative facill and swift and precipitate and stronge and the receptive very passible (that is such as are lustfull and hopefull) and the motive slow; and that nether the one nor the other doth tend to the actuation of the effects, that is nether the fantastik ampliation of the appetitive to the actuation of the sperative nor that of the sperative to the actuation of the volunty but are mere digressions or evagations or diversions of those faculties whereby their <fervor or> force is oftentimes so vented or spent and vanished of the one in imaginary plesure and of the other in imaginary ioy that the reall effect for the prosecution

Warner dwells long on the relationship between these passions, conceived as states of the intellect, that is, the part of the spirits taking care of intellectual operations and the passions of the sensitive part of these spirits felt as pain or pleasure. There is a close

‘...analogy <and similitude> betwene plesure or paine and ioy or sorow...dislike only in this that plesure and paine appere more superficially ioy and sorow more profound, which agrees with the maners of their generation, plesure and paine being caused in the spirits sensitive by the action of things externall in campo physico as they <are> actuated and presented by the simple operation of nature, ioy and plesure caused in the spirits intellective by the action of the accidents and intentions of the internall fantasms in campo fantastico, actuated and presented by the intricate operation of reson or of the faculty syllogistik...’¹²⁰

Consequently a ‘...mere foole can have no sorow because there is no sorow but per syllogismum.’¹²¹ In a way joy and sorrow are but

‘...the completion or desinence of the effect continued from the originall...action or <agent> whatsoever it be ab extra by the sense unto the intellect which by reson of the naturall continuity of the spirits sensitive and intellective being naturall and necessary can not possibly be stopt...’¹²²

Accordingly, once the notions of good and evil are acquired, the occurrence of these feelings does not require argumentation. They follow automatically on pleasant or painfull sensations. They are, in other words,

‘...effected by the naturall and necessary way of continuation of the passion from the spirits sensitive to the spirits intellective without any syllogization or application of any notion or principium of malignity originally acquired and quiescent in anima...that is by the intellects immediat beholding or spectation (autopseian) of the...effect...in the spirits sensitive <as in a part of it self> which...is as much to say as by

whereof they are directly ordayned is thereby frustrated or so diminished that the execution <thereof> is thereby so much retarded (the faculties as it were terminating and quiescing in those imaginary ends).’ (Op. cit., f. 257v-r)

¹²⁰ BL Add. MS 4395, f. 22.

¹²¹ Op. cit., f. 23. Cf. Galen’s rejection of the Stoic idea ‘...that no irrational animal feels desire or anger...’ (*On the doctrines*, 1st part, I. Testimonies and fragments, VI, p. 69)

¹²² BL Add. MS 4394, f. 251r.

continuation or communication of the effect...from the spirits sensitive to the intellective...'¹²³

According to this theory pain and pleasure on the one hand, and joy and sorrow on the other, are successive transformations of one and the same alteration of the sensitive spirits. These transformations are not, like the initial alteration, caused by some external object. Warner suggests that they might '...proceed of the different complexions and other substantiall conditions of those two portions of spirit the one from the other or rather of their different maner of organization or incorporation.'¹²⁴ The analogy between pain or pleasure and sorrow or joy should not make us forget that these two kinds of passion, states of two different parts of one and the same material substance, cannot be simply identified. As the feeling of joy is not identical with the fantasm of pleasure

'...sorrow is not merely the fantasm or image of paine quia sensatum et fantasiatum eiusdem sunt eiusdem generis seu speciei differing only secundum <fortius> et debilius vel distinctius et confusius but sorrow may be intense in case where the fantasm of <the> paine <to which it hath relation> is so remisse that it is scarce fantasiabile; the paine <it self> whereof it is the fantasm having ben whiles it did actually exist but remisse...Wherefore it is certaine that sorrow is a passion of an other kinde from the fantasm of paine or at lest of an other as of a higher or ulterior order. It is not the fantasiation <or anticipation> of the paine it self materially (meaning paine present or futur but especially futur¹²⁵) that doth or can actuate sorrow but the prefantasiation thereof formally that is to say of the illnes or malignity thereof.'¹²⁶

¹²³ Op. cit., f. 240v-r. Warner, in this connexion, wonders whether or not '...the maner of the originall acquisition of the notion of malignity that is the originall impression of the passion of tristation...be ex principio naturali by necessity naturall of the continuation or communication of the passion from the spirits sensitive to the intellective without any necessity or reiterate and alterne sensation of dolor and indolence, no more in the originall and prime act then in the succeeding and the origination of the faculty tristative...to be naturall and not morall or consuetudinary or acquisita per habitationem...' (Ibid.)

¹²⁴ Op. cit., f. 240v. Cf. Doni: '...aliae tamen operationes in altera parte spiritus parte, aliae in altera solum magisve appareant. Evenit enim illud non propter aliud quam propter conditionem, qua poni et agere in corpore spiritum partibus suis contingit, quae talis est: ea pars, quae est sub cellas cerebri, est caput totius spiritus...eius, qui ab eo extenduntur per ductus nerveos...sunt quasi artus spiritus aut rami sicut arboris.' (*De natura hominis*, F. 113)

¹²⁵ Cf. 'Why should we rather have present sorrow by the anticipation of a paine future, then present ioy by the fantasiation of the non-existence thereof present.' (BL Add. MS 4395, f. 24)

¹²⁶ Op. cit., f. 17.

At the level of the senses ‘...dolor is an alteration but in the act of tristative or tristable intellection and in respect of the intellectory tristable it is a thing.’¹²⁷ Consequently, though sorrow always follows on pain and might be considered as the completion of the noxious action of some external object it would be a mistake to think that

‘...the distraction of the spirits intellective that is supposed to be the formality of sorow and their incension or tumultuation or insurrection in discupiscence should be nothing but the continuation and termination of that turbation or dilaceration of the spirits sensitive that we feele in the sensation of dolor...’¹²⁸

If that were true, pain and sorrow would always go together. Experience shows otherwise in so far as

‘...we may comonly observe in our selvcs the deepest sorows...when we are void of all sense of dolor and our spirits sensitive in an universall repose; nether can that continuation of turbation be imputed to the fantasiation of dolor future or imminent because the spirits sensitive are no more disturbed by the fantasiation of dolor then they are by the fantasiation of the red or yellow collour, but it is the intellect it self that by the apprehension of the malignity of those obiects though <they> be but potentiall and not actually sented that doth <both begin and cesse and also continue> those turbative alterations in the spirits intellective. Further the difference betwene sensible paine and intellectual sorow is such a cleare and manifest phenomene that sorow can not be conceived to be the formality of the intellection of paine or paine the immediat and formall obiect of the intellect in the graduated intellection of sorrow, for as in sensation the species externall <ex parte obiecti> is allwais eiusdem generis with the sensible species internall ex parte recipientis so it is in intellection but the species intelligibilis externall which is dolor doth differ plus quam genere from sorow and therefore the one can not be the species of the other...’¹²⁹

Sorrow also in its own way is malignant, i.e. has its own

‘...reall effect destructive or tending to the destruction of our esse no les then that destructive action whereof dolor is the formality or apparence...The maner of the destructivity...of sorow doth consist in the avocation of the spirits pulsatory whereby their function or operation is defectively performed and [answerably] thereby the animall de..... in the due elaboration of his materialls vitall and consequently in the necessary reparation of his organs and restauration of his spirits universall...’¹³⁰

¹²⁷ BL Add. MS 4394, f. 234v.

¹²⁸ Op. cit., f. 247v.

¹²⁹ Op. cit., f. 247v-r.

¹³⁰ Op. cit., ff. 251r-250v; ‘Concerning the...malignity of sorow it is to be noted that there may be...malignity upon malignity and sorow upon sorow and avocation upon avocation continued usque ad presentaneam destructionem and ether by way of syncope or lipothymy or els per atrophiam or els &c.’ (Ibid.) John Woodall (1569-1643) describes this ‘syncope’ as ‘...a solution of the spirits which forsake the heart.’ (*The surgions mate*. 1653, 88. Quoted in *The Oxford English Dictionary*, (1989), Vol. 17, 474) Cf.

Thus as hunger is the first kind of pain we feel ‘...prima tristitia est sensatio defectus spiritus vitalis.’¹³¹

5.6. *The Theoretical and the Practical Intellect*

The intellect determines whether something is true or false and good or bad:

‘Affirmation and negation and consequently verum and falsum do result or depend on the comparing of the fantasms to their originalls which is as much to say as to the things themselves which is done by the intellect quatenus theoreticus. Bonum and malum by the comparing of the originalls to us which is done per intellectum quatenus practicus.’¹³²

Warner uses the distinction between the theoretical and the practical intellect also in another sense:

‘The one faculty cognoscitive doth speculate and consider only the natures <ifferences>, qualities, conditions, effects &c of things <(and not of motions but as they are supposed for things)> in respect of their habitude to us that is to say <of their bonity or malignity> or of their aptnes and conducibility ether to our conservation or delectation whereby the appetite is informed that is graduated or degraded¹³³: the other doth

Francis Bacon: ‘Grief and sadness, if devoid of fear, and not too keen, rather prolong life; for these contract the spirits, and are a kind of condensation.’ (*The works*, Vol. 5, 279)

¹³¹ Op. cit., f. 223r.

¹³² BL Add. MS 4395, f. 32. Cf. Aquinas: ‘...omnis intelligentia aut est practica, aut speculativa...practicarum intelligentiarum termini sunt, idest fines. Nam omnes sunt alterius causa, scilicet operis, et ad opus terminantur. Speculativae autem intelligentiae finem habent, scilicet rationes...quae...sunt "definitio" ...aut demonstratio"...’ (*De anima*, no. 119, p. 32); ‘...intellectus practicus et speculativus non sunt diversae potentiae...’ (*Summa*, Ia, 391-2). Suarez shares this view (See *Opera*, Vol. 3, 748). See for the same opinion also Vives, *De anima et vita*, 65 and Melanchthon, *Commentarius*, 215r;

¹³³ Cf. ‘...whether there may be any bonum simpliciter that is not so quoad nos is to be considered and in what sense the same is to be understood; whether as the scholemen understand bonum entis or rather that to be bonum simpliciter that by the forme or faculties or vertues thereof doth appere ether to have ben, or to be, or to be like to be apt ether for the necessary use or for the ornament of some men or other and for our owne use yf we <wanted or> had need of such a thing; for it is to be understood that it is the need or want ether reall or fantastik that we have of a thing that makes it bonum nobis without which need or want though the thing in it self be never so apt to be applied to our use or <being applied or used> to proc... our good it is not nor can not be conceived by us to be bonum nobis nor apprehended with appetite and yet it is to be understood that the thing in it self doth not therefore (that is for our not wanting thereof) lose his aptitude and cesse to be good in respect of which aptitude it may be understood to be bonum simpliciter that is homini though not nobis...’ (BL Add. MS 4394, 261r) Cf. Suarez: ‘...bonum simpliciter dicetur illud, quod totam entis bonitatem et perfectionem in se continet; bonum vero secundum quid, est illud quod ex parte tantum bonum est.’ (*Opera*, Vol. 25, 345)

only speculate and consider motions local <and not things> primely and per se our owne, secondarily and per accidens of other things as theirs are subordinat to ours and that in two respects; first <our owne> in respect of <our> owne motu-potentia secondly the motions of other things in respect of theyr aptnes to be ether instrumentalls or auxiliars unto ours and no otherwise that is to say in respect of the motu-potentia of the said instrumentalls and auxiliars or subordinats; secondly it doth speculat and consider the said motions as well our owne as of our subordinats in respect of our motu-peritia only because the subordinats cannot properly be understood to have any for though they be animata quatenus they are subordinat to us for the assecution of our obiects their motu-peritia is to be accounted ours (the like may be also understood of the motu-potentia of our subordinats).¹³⁴

This time he is not talking about two modes of operation of one and the same faculty, but of two different powers:

‘...these two faculties do execute their forsaid functions or offices severally and distinctly the one nothing at all intermedling with the other and it being also manifest that as well their obiects as their ends are heterogeneall or generally different and distinct, it must follow that the maners of their operations whatsoever they be are so far different as may suffize to make them accounted different and heterogeneall faculties.’¹³⁵

The one faculty speculates

‘...things <extra nos> ut bona and subordinat to our faculty appetitive the other speculating our owne motions ut possibilis and subordinat to the faculty volitive or the one speculating the qualities and conditions <as well of our selvs as> of things <or obiects> extra nos in respect both of their aptnes to work or act upon us and our aptnes to suffer or be altdred by their actions ad nostri conservationem that is quatenus they are bona and we capable of their bonity and all for the actuation, information and graduation of the appetite; the other speculating the <grades and formalities or maners of> motions as well of our selvs internall as of our subordinats whether instrumentalls or auxiliars extra nos; and not only of these as of agents but also of the things <or obiects> themselvs that are to be patients and moved both in respect of their aptnes <or possibility> to be moved by us tam quoad gradum quam quoad modum and in respect of our and our subordinats faculty to move them tam quoad potentiam quam quoad peritiam ad eorum assecutionem that is quatenus the things or obiects are obtinibiles and our motu-potentia and motu-peritia sufficient for

¹³⁴ BL Add. MS 4395, f. 37.

¹³⁵ Ibid. According to Zabarella the practical and theoretical intellect, though not substantially different, must be distinguished for ‘...distinctae sunt obiectorum rationes, quatenus obiecta sunt, & diversi etiam modi operandi circa illas...’ (*In Aristotelis libros de anima*, 411A)

the assecution of them and all this for the actuating, informyng, directing of the volunty.¹³⁶

Though, in a way, both faculties are theoretical as well as practical Warner prefers to consider ‘...the one theoricall the other practicall or the one to belong ad intellectum theoreticum the other ad practicum...’ In other words, the theoretical intellect functions as the actuator of the appetite and the will is started by the practical intellect.¹³⁷

5.7. Conclusion

Warner’s theory of the thinking-faculty constitutes a somewhat confusing mixture of ideas reminiscent of 16th century Italian naturalism, ideas borrowed from the Scholastic tradition, and some of his own idiosyncratic versions of the peripatetic heritage. Like most of his contemporaries Warner considers reason and the intellect not as separate faculties but as two aspects of one and the same power. With Telesio he shares the view of this faculty as a purely bodily power. By comparing fantasms in search of similarities, it enables us to acquire knowledge of things not actually present, i.e. perceived. Consequently Warner does not, like his Scholastic contemporaries and predecessors, oppose the intellect to the bodily powers, or distinguish between a kind of reason connected to the senses, common to man and animals, and its purely intellectual counterpart, a prerogative of man. In this respect, Warner is more consistent than Telesio who believed that man, apart from his bodily intellect, also possessed an immaterial, Godly intellect accounting for his reasoning power proper. In Warner’s view there is only one kind of reasoning power, inseparable from the ‘faculty sensitive’. Yet, he does not follow Telesio in considering the bodily intellect as nothing but an inferior

¹³⁶ ‘...reserving the higher and more abstract sense of that distinction used by the schoolmen to further examination hereafter.’ (Op. cit., ff. 37-36.) Warner here probably had in mind a distinction like that made by Alexander of Aphrodisias who opposes the practical intellect, bent on things that can be done in several ways, as deliberative to the theoretical intellect as a power that, being focused on eternal truths, does not deliberate but is ‘scientific’. (See *De anima*, 3.6/ p. 107) Cf. ‘Rationalis hoc quidem est theoreticum (id est contemplativum), illud vero practicum (gestivum); theoreticum quidem est quod excogitat qualiter habent ea quae sunt; practicum vero est quod est consiliativum, quod determinat gestibilibus rectam rationem. Et vocant theoreticum quidem intellectum, practicum vero logon (id est rationem), et hoc quidem sophiam (id est sapientiam), illud vero phronesin (id est prudentiam).’ (Némésius, *De natura hominis*, 149-50.)

¹³⁷ ‘...the intellect it self in respect of the prime actuation and successive operation thereof is accounted <not only appetitory but> voluntary being a kinde of motion or not done without motion...’ (Op. cit., 47.) Warner also calls reason a ‘faculty spirito-motive’, ‘...the spirits...being moved without any motion at all of their organs continent...’ (Op. cit., f. 16)

sense. In Warner's opinion the senses are merely receptive, while reason compares the impressions it receives. In contrast to Telesio and most of his more traditional contemporaries Warner also deems the intellect, like the 'faculty sensitive', passive.

The intellect reasons on the basis of innate principles and the first notions it acquires are those of good and evil. The storage of these notions in the intellect is accompanied by the passions of sorrow and joy. Unlike the majority of his contemporaries Warner considers these passions, like all other emotions, not as affections of the sensitive soul in general and of the sensitive appetite in particular, but as passions of the intellect, as cognitions of the salutariness or noxiousness of certain actions on or in the body. In other words, like Telesio, he conceives these passions as certain states of the part of the spirits effecting intellectual operations.

The intellect speculates either the malignity and salutariness of things in relation to us or the (im)possibility of actions. Like his contemporaries Warner labels the latter as the practical intellect. However, deviating from the traditional view, he qualifies the former as the theoretical intellect. Generating the concepts of good and evil in general, as well as the notion that either the one or the other is actually present, i.e. the feelings of joy and sorrow, this 'theoretical intellect', activating the appetite, initiates the third phase of the process leading up to locomotion.

Chapter Six

Appetite, Hope and Fear

6.1. *The Nature of the Appetite*

Warner's notes on the appetitive faculty contain one of the few explicit references to the sources of his ideas on the voluntary faculties of animal organisms. He mentions Odoardo Gualandi¹ referring to, among other things, his characterization of the appetite as '...quaedam animae exporrectio ad bona capienda...'². There are, in Gualandi's view, as many kinds of appetite as there are different powers of the soul.³ He only discusses the 'natural' appetite '...cuius partes sunt, cibi potusque desiderium, ex venarum hepatis attractione, suctuque ventriculi excitatum, quae fames, sitisque naturales dicuntur, & unà libido venerea.'⁴ The appetite is always preceded by the knowledge of some good.⁵ According to Gualandi even the will, considered in relation to man as a whole, is nothing but a combination of appetite and knowledge.⁶ Consequently he rejects the Stoic view of the appetite as an opinion or judgement.⁷

Melanchthon, earlier than Gualandi, also criticized the Stoics for believing that passions are opinions, that they are all bad and ought to be eliminated. He

¹ Italian philosopher, born in the early 16th century in Pisa and died 17 march 1597 in Rome. From 1557 to 1588 he was bishop of Cesena. He wrote *Philosophiae moralis ac totius facultatis civilis vera et absoluta methodus*. (Roma 1598 and 1604). (See Firmin Didot Frères (1857), Vol. 22, 302.)

² *De civili facultate*...Romae 1598, 37. Cf. Warner: '<Appetitus inquit Gualand. exporrectio animae ad obiectum>.' (BL Add. MS 4395, f. 39); 'Posse et scire (inquit Gualand.) sunt agendi principia, posse et scire posito appetitu faciunt velle quod est universale <immediatum> et unum agendi principium.' (Op. cit., f. 38) Cf. Gualandi: '...ad omnem verò actionem, cognitio, appetitio, & potentia requiratur, vel scire, velle, & posse, quae...sunt agendi principia...Inter haec autem principia, primum locum voluntas obtinet: nam quamvis scientia, & potentia adsint, ea tamen deficiente, nihil fit; secundus potentiae tribuendus videtur; postremus verò scientiae.' (Op. cit., 315-16)

³ Op. cit., 38.

⁴ Ibid. Cf. Reisch: 'naturalem quidem vocant, voluntatem: qua volumus quae non appetere non possumus...' (*Margarita philosophica*, 848)

⁵ 'Cognitionem boni sequitur appetitus...' (Op. cit., 88)

⁶ '...voluntas hominis ad totum hominem relata nihil aliud est, quàm appetitus quidam, & cognitio...' (Op. cit., 169)

⁷ 'Stoici...errabant...dum appetitus cum opinionibus confundebant, cum sint re ipsa omnino distincti.' (Op. cit., 59)

also criticizes them for blurring the distinction between the different kinds of appetite.⁸ Like most theories of the appetite from the 16th and early 17th century his own theory is based on the Scholastic division of this faculty into a natural, sensitive or animal, and a rational appetite.⁹ By the appetite in general Melanchthon understands the power, accompanying knowledge, to pursue good and flee bad things.¹⁰ First there is the natural appetite like that of matter ‘desiring a form’ or that of a stone naturally ‘wanting to go down’. Melanchthon conceives this kind of appetite not as an action but as an inclination that, moreover, is not dependent on sensory perception.¹¹ That is exactly wherein it differs from the sensitive appetite; for that faculty always goes together with sensation and consequently is only to be found in living beings.¹² Melanchthon distinguishes between pain and pleasure on the one hand as forms of sensitive appetite that require contact, and on the other affections (‘*adfectus ac πάθη*’) like joy, hope, sorrow, love, etc., i.e. motions of the heart that make us approach or avoid things and that do not require contact but are evoked by knowledge.¹³ Though a kind of appetite, the will, an

⁸ The Stoics unjustly think ‘*Quod affectus sunt opiniones, quod omnes sint viciosi. Quod omnes ex natura tollendi sint. Et hae absurditates cumulatae sunt, quod miscuerunt appetitiones naturales, & affectus tactum comitantes, & motus cordis...*’ (*Commentarius*, 187r)

⁹ ‘*Φυσικὸν, Naturalis appetitus (qui dicitur quodammodo improprie appetitus) qualis est in stirpe, quae attrahit & appetit alimentum absque sensu...in inanimis, ut magnete. Αἰσθητικὸς: seu animalis appetitus, qui propius est animantium & comitatur sensus. Λογικὸν seu τῆσ βουλήσεως, quae est tantum naturae intelligentis & voluntariae: quia προαίρεσις est in homine, qui est imago Dei...*’ (Goclenius, *Lexicon*, 115.) See also Suarez, *Opera*, Vol. 3, 753-4. Cf. Aristotle: ‘...if the soul is divided into three <parts>, appetite will be found in each.’ (*On the soul*, 432b6)

¹⁰ ‘...*facultas prosequens, aut fugiens obiecta. Comes est cognitionis, ideo enim indita est animantibus cognitio, ut vitae praesidia, & conveniencia appetant, ac contraria fugiant.*’ (Op. cit., 177v)

¹¹ Op. cit., 177v-178r. Cf. ‘...*inclinatio, qua unumquodque, nulla praeunte notitia, fertur in id, quod sibi conveniens est, ut propensio materie in propriam formam...*’ (*Commentarii Collegii Conimbricensis*, 533)

¹² See op. cit., 179v. Cf. Zabarella: ‘...*unus est naturalis, qui sine cognitione est; alter vero animalis, & cum cognitione: appetitus naturalis proprii loci est gravitas & levitas, & inest primo elementis...appetitus autem animalis insequitur animam...non est...appetitus loci conservantis...sed est appetitus alimenti necessarii ad vitam conservandam...*’ (*De rebus naturalibus*, 369E-F)

¹³ Op. cit., 179v-186r-v. Cf. Richard Hooker (1554-1600): ‘*Affections, as joy and grief, and fear, and anger, with such like...as it were the sundry fashions and forms of Appetite...*’ (*Ecclesiastical Polity*, Vol. 1, 170) Cf. Harvey: ‘*Appetite arises from the heart and returns to the heart, for it exists entirely in the emotions, anger, fear, etc., and every emotional state is accompanied by concentration or expansion or ebullition. Moreover all concentration is towards the heart. Because the heart is the centre.*’ (*De motu locali animalium*, 103) According to others, for example Casmann, emotions do not coincide with but are caused by and consequently follow on the appetite: ‘*Affectus sunt cordis motiones ab animali facultate motrice procedentes, quibus cor interna sanguinis & spirituum commotione, cognitionem & appetitionem sensitivam sequente, afficitur.*’ (*Psychologia*, 406) See also Chapter 5, p. 180, note 119.

exclusively human power, is not mentioned in this connexion but, being considered as the appetitive part of the intellect, is relegated to the discussion of the intellective soul.¹⁴ This distinction between a sensitive appetite, and the will as a rational or intellectual appetite was primarily based on the idea that the will, as opposed to the appetite, is a completely free immaterial power that is focussed on intelligible universals instead of on sensible particulars.¹⁵

All writers on the soul agreed that the appetite is raised by the knowledge or impression of something good or bad. As we have seen Warner conceives notions like those of good and evil as passions of the intellect, i.e. the intellective spirits caused by pleasant or painful sensations. However, that is not their only effect. In Warner's view these sensations by natural necessity simultaneously elicit a reaction of the intellect, a '...naturall force and extension of the spirits...' towards or away from the object that caused these sensations.¹⁶ Thus

'Cupiscentia est affectio orta ex opinione quam quis habet de bonitate alicuius rei quam indiget; seu exporrectio animae orta ex opinione quam quis habet de bonitate alicuius rei quam indiget, ad eam fruendam: so that there must be two objects of our opinion in this case; our indigence and the bonity or aptnes of the thing to salve or supply our indigence.'¹⁷

A positive appetite or cupiscence, in other words, is nothing but a reactive motion of the intellective spirits towards an object.¹⁸ Its opposite, i.e. '...the reaction or renitence or resistence or reluctance of the intellect or spirits intellective in or upon the intellection or notion of evill...' constitutes the nature of a negative appetite or discupiscence.¹⁹ In fact the terms 'cupiscence'

¹⁴ '...vocamus voluntatem potentiam, seu ut ita dicam partem animae intellectivae appetentem, quae potentia est superior adpetitu sensuum...suprema ac libere agens monstrato obiecto ab intellectu.' (*Commentarius*, 218)

¹⁵ See *Commentarii Collegii Conimbricensis*, 536; Suarez, *Opera*, Vol. 3, 754; Goclenius, *Lexicon*, 114-16 and 329-31; Burton, *The anatomy*, 167-9.

¹⁶ BL Add. MS 4395, ff. 44-3.

¹⁷ BL Add. MS 4394, f. 269v.

¹⁸ Cf. Casmann: 'Letitiae motu spiritus feruntur extra, cum similia maximè appetant unionem...' (*Op. cit.*, 407)

¹⁹ *Op. cit.*, ff. 249r-248v. As soon as the objects of a positive or negative appetite are actually present '...cupiscence and discupiscence...do change into other affections as cupiscence into amor and discupiscence into odium...' (*Op. cit.*, f. 271r); '...amor is nothing but a desire or appetition of the conservation of the thing acquired or of the continuation of the habit or possession thereof...' (*Op. cit.*, f. 270v); '...odium...magis propriè dicitur de presenti, discupiscencia de futuro, de praeteribo...' (*Op. cit.*, f. 236r)

and ‘discupiscence’ refer to one and the same movement of the spirits.²⁰ Though in principle distinct ‘Discupiscencia mali scilicet doloris et cupiscencia boni scilicet indolentia...in fine coincidunt.’²¹ They constitute ‘...both one and the same act not really but respectfully only different.’²²

Thus by the appetite in general Warner understands a ‘passio orta ex indigentia obiecti’²³ or, to be more precise, a ‘passio seu affectio scilicet accensio seu inflammatio spirituum cognoscitivorum causata vel ex sensatione alicuius mali presentis cuius opposito indigemus vel ex fantasiatione alicuius boni absentis quo indigemus.’²⁴ It is

‘...this predisposition of the spirits cognoscitive whether it be acted with perception or without as sometimes it is the very quiddity and formality of that affection which appereth in us and is conceived by us to be <that we terme> appetite and the aptnes of the consistence or substantiation of the spirits <cognoscitive> and of their organization for the receving of this <previous> alteration or predisposition is that which is comonly called the faculty appetitive.’²⁵

Now ‘... intellectio mali is as necessarily cum tristitia et discupiscencia as sensatio convulsionis seu flagellationis is cum dolore...’²⁶ Accordingly, as soon as the intellect discovers the possibility of approaching something pleasant or of avoiding a harmful thing ‘...in the actuated fantasms of the sensitive by comparing of precedents...it can not but be affected with appetition ether positive or privative...according to the exigence of the case...’²⁷ Appetite, in other words, is a power, prompted by natural necessity,²⁸ of the intellect ‘...in his first disposition to activity sub ratione possibilis seu obtinibilis

²⁰ ‘The motion of the spirits sensitive in dolor, indolence and volupty different or contrary; the motion of the spirits intellective in cupiscence and discupiscence or appetition affirmative and negative all one.’ (BL Add. MS 4395, f. 24)

²¹ BL Add. MS 4394, f. 271v.

²² BL Add. MS 4395, f. 36. They ‘...are but severall respects or relations of one and the same reall act...’ (Op. cit., f. 35.) ‘Yet’, Warner continues, ‘...<it> doth not follow that yf there can be no cupiscence of things or actions privant there can be no discupiscence of things or actions continuant for besides that they are acts relatively opposit as the former of privation and continuation their relations are to termes really opposit which is sufficient to make them so different that the one may exist without the other, that is to say there may be discupiscence of continuants in case where there can be no cupiscence of privants.’ (Ibid.)

²³ Op. cit., f. 48.

²⁴ Op. cit., ff. 48-7.

²⁵ Op. cit., f. 16

²⁶ BL Add. MS 4394, f. 248v.

²⁷ Op. cit., f. 264r.

²⁸ Non est liber appetitus...’ (Op. cit., f. 243v).

simpliciter.’²⁹ This qualification is rather confusing. It suggests that in Warner’s opinion, the appetite is activated by the knowledge that approach or avoidance is possible. However, that was not his view. An appetite ‘...supponit possibilitatem sed non necessario intendit’ and it certainly does not depend on that knowledge for its activation.³⁰ By the mere notions of ‘...the malignity of dolor and the bonity of indolence the objects to the tristable and appetitive are completely formed and those faculties completely actuated simul et <quasi> eodem actu...’³¹ Accordingly, the appetite as well as joy and sorrow ‘...though in themselves very different and distinct must necessarily be existent in one and the same subject <or region> or acted by one and the same operant...the intellect...’, i.e. the only faculty capable of the knowledge of good and evil.³² While with respect to the production of feelings like joy and sorrow the notions of good and evil as objects are active and the intellect is passive in the activation of the appetite these roles are reversed:

‘...dolor quatenus malum hath a twofold ratio object[ive] to two <several> faculties; to the tristable and to the discupisci[ble]tive; to the tristable it is an object active seu quatenus tristative and to the discupiscitive an object passive <or passible scilicet> quatenus discupiscible, tristation or tristitia being passion and the faculty tristable a faculty passive <or passible> (impotentia) and discupiscence being reaction and the faculty discupiscitive a faculty reactive (potentia).’³³

Thus

‘...without the intervention and operation of the faculty syllogistik there can be no intention or formality of good or evil in act and without the actuation and presentation of good or evil to the intellect passive whose proper and formal object it is there can be no impression of joy or sorrow and without joy or sorrow no appetite affirmative or negative and therefore no appetite, no joy or sorrow, no good or evil but per syllogismum.’³⁴

The involvement of reason, the power to compare fantasms, implies that the operation of the appetitive faculty also requires and presupposes the faculty of sensory

²⁹ Op. cit., f. 264r; ‘...discovering the possibility thereof...in the actuated fantasms of the sensitive by comparing of precedents and upon the apprehension thereof as possible it can not but be affected with appetite either positive or privative...according to the exigence of the case...’ (Ibid.)

³⁰ BL Add. MS 4395, f. 24; ‘...there may be appetite of things impossible and naturally and necessarily in some cases there is. But whether such appetitions seeming to be vaine be indeed naturall and necessary or only consequent of the imperfection or deprivation of the faculty appetitive or cognoscitive as of ignorance &c is to be considered.’ (Op. cit., f. 25)

³¹ BL Add. MS 4394, f. 219r. ‘...bonity alone without possibility is sufficient to actuate the appetite...’ (BL Add. MS 4395, f. 40).

³² BL Add. MS 4394, f. 248v.

³³ Op. cit., f. 236r. See also op. cit., f. 234r.

³⁴ BL Add. MS 4395, f. 23.

perception³⁵ as well as the ability to retain perceptions for later use.³⁶ Warner, in this connection, criticizes

‘...those which wold have the cognition of evill to be performed by the intellect and the other as sorow and appetition to belong to an other part of the soule or as it were to an other soule which they call concupiscibilis³⁷, as yf one should allot the sensation of dolorifik actions to the sense and the passion of dolor to some other faculty...’,³⁸

As a faculty of the animal spirits the appetite is basically motivated by the urge for self-preservation.³⁹ Accordingly ‘...yf no appetite nor volunty no life.’⁴⁰

6.2. *The Habituation of the Appetite*

Positive and negative appetite are reactions of the intellect to the passions of joy and sorrow evoked by the notions of good and evil. Accordingly the habituation, that is, the ‘... origination or originall generation of the faculty appetitive in intellectu or...the eduction of that faculty a potentia in habitu seu actu...’ presupposes the formation of these concepts.⁴¹ As soon as these or rather the principle that the presence of pain is bad and its absence good is fixed in the memory, pleasant or painful sensations directly, automatically so to speak, result in joy or sorrow. Now, what about the habituation of the appetite, the reaction of the intellect to these passions? Warner’s answer to this question is confusing. In his notes he seems to shift haphazardly from considerations of the appetite in general, to speculations about discupiscence or cupiscence and back again. Now he seems to affirm, then to deny that the formation of the concepts of good

³⁵ ‘If we should have no notions of things we could have no appetitions...’ (Op. cit., f. 36); ‘The...activity of things upon us...or our passions or sensations of their actions the oboiect or principium actuative of the appetite...’ (Op. cit., f. 38)

³⁶ ‘...yf there were no reposition or retention of the fantasmes of those things that we have formerly sented we could have no appetite present ...’ (Op. cit., f. 40)

³⁷ The Scholastics divided the passions of the sensitive appetite into concupiscible and irascible passions: ‘...bonum vel malum, secundum quod habet rationem ardui vel difficilis, est objectum irascibilis. Quaecumque...passiones respiciunt absolute bonum vel malum, pertinent ad concupiscibilem...’ (Aquinas, *Summa*, Ia sec, 118). Cf. Suarez, *Opera*, Vol. 3, 768. Love, hate, sorrow and joy, for example, are concupiscible passions. Examples of irascible passions are hope, fear, temerity and anger. Vives in his day was one of the few writers on the soul who rejected this distinction. (See Pade (1893).)

³⁸ BL Add. MS 4394, f. 248v. Cf. Coeffeteau: ‘Passion...a motion of the sensitive appetite...not fashioned but in the irrationall part of the soule: so as if we should give the name of passions to the motions of the understanding or of the will; it is by a kind of impropre and figurative speech...’ (*A table*, 2)

³⁹ See op. cit., f. 144r and Chapter 3. Cf. Vives: ‘Appetitus...inditus est viventibus ad conservationem sui, nempe ut sequatur utilia, fugiat à noxiis.’ (*De anima et vita*, 3)

⁴⁰ BL Add. MS 4395, f. 40.

⁴¹ BL Add. MS 4394, f. 242v.

and evil is coincidental with the habituation of the appetite. Some of his notes suggest that the habituation of the negative appetite proceeds differently from that of the positive. Others, dealing with the appetite in general, suggest that there is no such difference. He evidently wavered between two different explanations of the habituation of the appetite.⁴²

Most of his notes on this topic focus on the development of discupiscence, the negative appetite for that, ultimately, is caused by pain and pain is the first thing we feel.⁴³ Initially he thought that the habituation of the appetite required reasoning on the basis of a sequence of experiences of pain followed by indolence. Our first painful sensation could not possibly excite the appetitive faculty

‘...for yf we should have any appetition upon the first sensation of dolor it must be ether of cupiscence or discupiscence ether of the continuation thereof or of some things <or actions> continuant or conservant thereof or els of the privation or ablation thereof or of some things or actions privant or auferent thereof or of both cupiscence of the one and discupiscence of the other simul et eodem actu. That we should have any cupiscence of the continuation or continuants thereof or discupiscence of the privation or privants thereof is impossible for that being <ex hypothesi> the first act and continuing we can have no notion of the privation thereof much less of any things or actions privant but of alterations or of things or actions alterant whereof we have no notion that is to say nether present and actuall sensation nor present and actuall fantasiation upon precedent sensation we can have no <cupiscitive> appetition...And yf we can have no cupiscence of the privation thereof we can have no discupiscence of the continuation thereof they being both one and the same act...’⁴⁴

Accordingly, it also is impossible that before ‘...the first sensation of dolor there can be...discupiscence of the future existence or actuation thereof because ex hypothesi there can be no notion thereof...’⁴⁵ Warner concludes that ‘...the

first act of dolorifik sensation cannot possibly excite or cause in us any act of appetition much less habituate in us a faculty appetitive.’⁴⁶

⁴² Cf. op. cit., f. 244-238, ff. 222-219 and MS 4395, ff. 36-3.

⁴³ ‘The principium actuative <of the faculty appetitive> or the immediat cause of the foresaid accension or inflammation or irritation of the spirits appetitive is the sensation of dolor and volupty and especially and more primely of dolour then of volupty...’ (BL Add. MS 4395, f. 16)

⁴⁴ Op. cit., f. 36.

⁴⁵ Op. cit., f. 35; ‘Unles it may be said that there hath necessarily passed the alteration ab indolentia ad dolorem though not a dolore ad indolentiam upon supposall that the sense of dolor doth actually continue and so it may be a question whether the sensation of that alteration may not impresse and leave in the fantasy some fantasme or notion <thereof> which now the act of sensation of dolor continuynng may excite the spirits to the cupiscence of the privation thereof or to the discupiscence of the continuation thereof...’ (Op. cit., ff. 36-5)

Though, according to this hypothesis, the appetite could not be activated by the first sensation of pain, there is only one more painful sensation required to generate the notions eliciting the appetite. Initially these sensations are weak and irregular in their effect, but depending on ‘...the aptnes or disposition of the subiect ether in specie or individuo that is of the temper or organization of the spirits or both’,⁴⁷ after three, four, five or more confrontations with a painful object the appetitive power is perfectly habituated and reacts directly on pain.⁴⁸

This process originates as follows:

‘In the first acts of dolorifik sensation by the continuate sensation of <precedent> convulsion and <succedent> non convulsion...or by the continuate sensation of precedent non-convulsion and succedent convulsion or by the continuate sensation of precedent non-convulsion, intercedent convulsion and succedent non-convulsion and by the...sensation of the difference of the effects that those 2 or 3 continuate acts of sensation of convulsion and non-convulsion do make in our spirits...We come at last habitually to retayne <in campo interno> the fantasms or impressions of the said different or opposit effects...and together with the fantasms of the things or effects the fantasme of their difference or opposition and not only to retayne the said fantasms or impressions but also to be able or to get the faculty to speculate or recognize or refantasiatate them.’⁴⁹

By natural necessity from

‘...the sensation of...dolor present sub ratione mali and the anticipation or prefantasiatation of the future indolence sub ratione boni following by a kinde of argumentation or application of the one to the other...doth necessarily eodem instante et actu result or arise the first act of appetition or the originall actuation of appetite.’⁵⁰

Later, two facts induced Warner to abandon this explanation of the operation of the appetite after its original activation. To begin with ‘...the instantaneallnes of the transition of the effect of the dolorifik sensation from the sense to the intellect, from dolor to tristation and discuspiscence which is so necessary and naturall that it is not

⁴⁶ Op. cit., f. 35.

⁴⁷ Op. cit., f. 34.

⁴⁸ Ibid. The graduation of the appetite ‘...is to be terminated in finito whereas that of numbers doth extend in infinitum; there are usually such graduations as well in abstractis as in materialibus that begin a nihilo and terminate in finito; and yet their progresse from the one terme to the other is by innumerable acts...’ (Op. cit., ff. 35-4) Cf. Harriot: ‘...for a last in decreasing progressions we must needs understand a quantitie absolutelie indivisible; but multiplicable infinitelie infinite till a quantitie absolutelie unmultiplicable be produced which I may call universally infinite...And in increasing progressions we must understand that for a last there must be a quantity unmultiplicable absolutelie but divisible infinitelie infinite till that quantity be issued that is absolutelie indivisible.’ (BL Add. MS 6785, f. 436. Quoted in Kargon (1966), 25.)

⁴⁹ Op. cit., f. 34.

⁵⁰ Op. cit., f. 33.

possible to resist it or defer it...'⁵¹ There simply would not be enough time for reasoning. But even if there were, it would be superfluous in so far as reasoning only informs the intellect about qualities, relations, and effects not actually sensed.⁵² However, the malignity of painful sensations is directly felt and conceived as such. Moreover,

‘the notion or principium...by the application whereof as by a <perpetuall> criterium or canon <quiescent in anima> the intellect was said to iudg of the malignity of dolor in all present acts of dolorifik sensation <will be found to be> in effect nothing els but the forsaid information, or disposition or habilitation or habituation of the intellect caused by the originall act of iudication in the first act of dolorifik sensation; whence must also follow that in the present acts of dolorifik sensation there needs no syllogization or rememoration and application of any criterium or principium notionall previously latent or quiescent in anima for concluding the malignity of dolor and presenting the same to the intellect quatenus passive or reactive tristative or discupiscitive...’⁵³

Accordingly with painful sensations, following on the first experience of that kind

‘...the reaction of discupiscence be not impressed or excited in the intellect by recognition or application of any notion of the malignity of dolor latent or quiescent in anima ex vestigijs priorum actuum or as it were by serching...and inspection <or survaying> of the records of the precedent acts...but merely by immediat intellection that is by the intellects immediat beholding or spectation (autopseian) of the turbulent and contranaturall effect of dolor in the spirits sensitive <as in a part of it self> which...is as much to say as by continuation or communication of the effect of dolor from the spirits sensitive to the intellective...’⁵⁴

To Warner this continual transition from pain through sorrow to a negative appetite is not pure speculation or a mere hypothesis but ‘...a reall and overt act and a manifest phenomene...’⁵⁵ Ultimately this change of mind caused him also to reject the idea of

⁵¹ BL Add. MS 4394, f. 241r

⁵² See *ibid.*

⁵³ *Op. cit.*, f. 241v.

⁵⁴ *Op. cit.*, f. 240r. Cf. : ‘...the intellect...doth instantaneously and immediatly upon all present acts of dolorifik sensation necessarily receive the impression of the contranaturallnes or malignity of dolor by way not of speculation or inspection or spectation of actuall dolor or of dolor past in regione sensitiva <vel fantastica> but of compassion or rather continue passion of the alteration or effect of dolor whatsoever it be a regione sensitiva ad intellectivam from the spirits sensitive to the intellective though separate graduatenus in some sort yet not absolutely and absque omni communicatione.’ (*Op. cit.*, f. 241v-r) See also *op. cit.*, f. 236v-r.

⁵⁵ *Op. cit.*, f. 240r.

‘...that origination or original actuation of the faculty appetitive by way of habituation...as false and nugatory and the manner of the original acquisition of the notion of malignity that is the original impression of the passion of tristation and reaction of discuspiscence to be ex principio naturali by necessity natural of the continuation or communication of the passion from the spirits sensitive to the intellective without any necessity of reiterate and alterne sensation of dolor and indolence, no more in the original and prime act then in the succeeding and the origination of the faculty...appetitive to be natural and not morall or consuetudinary or acquisita per habituationem...’⁵⁶

Thus ‘...the first act of dolorifik sensation may be accounted principiative of the appetitive faculty or that first extension or incension of the spirits caused thereby to be the principium of the appetite...’⁵⁷ activated ‘...not by induction or reiterate intellection of the said opposite acts but merely by the [natural] necessary impression of the <contra->natural repugnancy of the one and <natural> conveniency of the other to the natural state of our spirits...’⁵⁸

Accordingly, the habituation of the appetitive faculty ‘...being natural and therefore necessary is to be understood and to be acted and perfected as well by the first act as by the offer reiteration of the succeeding...’⁵⁹ Yet, despite the fact that the first painful sensation goes with

‘...the same naturalis conatus spirituum as in the succeeding...it can <not> properly be termed appetitus simpliciter but with the adiection of confusus quia nihil certi appeti potest cum nihil cognoscatur but in the succeeding acts the notions of bonum and malum being now acquired by that conatus or exporrection of the spirits is directed to a known and certaine object or objects and may therefore be accounted appetitus perfectus or distinctus.’⁶⁰

Though, in other words, ‘...the forming of the objects to the appetitive...is as perfectly and sufficiently done in the first act quoad substantiam operis as in the succeeding...by the succeeding acts it may be further rectified in respect of distinction and habitude to opposit or other notions...’⁶¹ This distinction

between a vague, and a distinct appetite, corresponds to Warner’s division of the appetitive faculty into a ‘faculty placitive or applausive’, and the appetite properly so called. That first faculty accounts for the fact that whenever we perceive a thing it is

⁵⁶ Op. cit., f. 240v-r.

⁵⁷ BL Add. MS 4395, f. 34.

⁵⁸ BL Add. MS 4394, f. 242v. Cf. op. cit., f. 222r.

⁵⁹ Op. cit., f. 242v

⁶⁰ BL Add. MS 4395, f. 33.

⁶¹ BL Add. MS 4394, f. 236v.

always apprehended as ‘bonum vel malum, pulchrum vel turpe simply’.⁶² Its object, in other words, is ‘bonum vel malum simpliciter’, i.e. ‘bonum ex parte rei’. That of the appetitive faculty proper is ‘bonum vel malum nobis or quoad nos simpliciter’, i.e. ‘bonum ex parte nostri (presupposing ex parte rei)’ and ‘...it is the need or want either reall or fantastik that we have of anything that maketh it bonum nobis...’⁶³ Regarding the difference between their objects they could be considered as two distinct faculties⁶⁴ Yet, not wanting needlessly to increase the number of faculties, Warner prefers to view the ‘faculty applausive’ simply as an ‘inchoative degree’ of the appetite⁶⁵ that in its acts only differs from the appetite itself ‘...secundum hypothesim et thesim; as yf the act or actuation of the applausive should be only an hypotheticall or conditionall appetite namely yf the <habit of the> obiect were good or needfull to the appetent...’⁶⁶

6.3. Hope and Fear

The objects of the appetite, a personal good or evil, ‘...may be ether both present and actually sented or the one present and actually sented the other absent or futur and only fantasiated...or both absent or future and only fantasiated.’⁶⁷ As the cupiscence of some future good is accompanied by hope ‘...the discupiscence of evill futur is with feare...’⁶⁸ The passions of hope and fear constitute, after the applausive and the appetitive faculty, the ‘...third degree or order of effect that the same obiect of good or evill worketh in the intellect...’⁶⁹ These passions are not raised by the good or evil

‘...quatenus intelligibile or quatenus tale simpliciter scilicet bonum vel malum nor quatenus bonum vel malum possibile simpliciter but quatenus bonum vel malum possibile vel contingibile vel obtinibile <vel futuribile> quoad nos tam ex parte rei quam nostri as it is probable or improbable, likely or unlikely to fall out or not to

⁶² ‘...because it is impossible for us to do with a flat and non-graduated apprehension but necessarily with some degree of passion or affection namely of liking or disliking, plesing or displesing, loving or lothing...’ (Op. cit., f. 261v)

⁶³ See op. cit., f. 261r and f. 260r. Cf.: ‘Applausiva est utilium realiter. Appetitus est utilium personaliter seu quoad nos.’ (Op. cit., f. 243v)

⁶⁴ ‘...in respect of bonum ex parte rei and bonum ex parte nostri there do manifestly appere two severall and distinct faculties gradually subordinate the one to the other that have those two subordinate formalities of bonum for their obiects...expressed by the applausive and the appetitive...’ (Op. cit., f. 260v)

⁶⁵ ‘...yf the divisions seeme overcurious and subtile and the multiplication of faculties arising thereof superfluous those three primary faculties may be understood implied in the secondaryes as inchoative degres or graduations thereof or to be the same faculties...’ (Op. cit., f. 255r)

⁶⁶ Ibid. Cf. Casmann’s idea that the appetite is preceded by knowledge ‘...& cogniti objecti approbatio, vel improbatio.’ (*Psychologia*, 403.)

⁶⁷ BL Add. MS 4395, f. 40. Warner suggests ‘...that in these cases consideration is to be had also of the obiect-past <whereby perhaps the nature of the faculty appetitive may be the better discovered.>’ (Ibid.)

⁶⁸ Op. cit., f. 24.

⁶⁹ BL Add. MS 4394, f. 264r.

fall out unto us as yf cupiscentia and discupiscentia or appetition affirmative and negative being understood to be bonorum vel malorum possibilium ex parte rei tantum⁷⁰ ; hope and feare being of an ulterior order and allwais presupposing appetition should superad ex parte nostri and so to be bonorum vel malorum possibilium tam ex parte nostri quam rei.⁷¹

Most people seem to think that hope ‘...est anticipatio seu imminatio...orta ex opinione quam quis habet de probabilitate contingentiae alicuius boni seu non contingentiae alicuius mali (contingentiae scilicet nobis.)⁷² Warner, however, stresses that hope is activated by the idea that something is possible or may happen.⁷³

‘Probability although it be a formality of the obiect of the sperative yet it is not the prime and immediat formality thereof nor quatenus tale <namely> as it is the obiect of the sperative but an ulterior formality superadded unto possibility, possibility qualifying it to be the obiect of the sperative before the accesse of probability and sufficiently and completely though the other were never superadded. It is a formality argued and formed by the syllogistik after the actuation of hope out of the fantasms of <our> owne motions and modifications motory...by way of anticipation that is anticipating the effect or execution before it be done and in fantasiating it as done...’⁷⁴

The possibility of some good is ascertained by considering the means, either our own means or those of someone on whom we are dependent, to acquire, conserve, and use such a thing.⁷⁵ Now, there are

‘...media of conservation as well as of acquisition and of application as well as of conservation and the perfect formation of the obiect to the faculty sperative is to

⁷⁰ Strictly speaking the appetite presupposes possibility but that is not its primary object. (See this chapter, p. 191-2.)

⁷¹ Op. cit., ff. 264r-263v.

⁷² Op. cit., f. 269v; ‘...the formality of the obiect of the sperative is comonly understood to be rather likelihood or probability of contingency or contingibility or futuribility then possibility. (Op. cit., f. 258v) Cf. Casmann: ‘Affectus absentis boni est spes...spei motu spiritus fibris cor diffundunt, ut objectum expectatum & desideratum intra sinus quasi suos recipiat.’ (*Psychologia*, 407)

⁷³ ‘...the formal<ity of the> obiect of the sperative is possibility...and not probability.’ (Op. cit., f. 257r).

⁷⁴ Op. cit., f. 258v-r.

⁷⁵ ‘Acquisitio est rerum quibus privamur <et indigemus>: conservatio est rerum quas habemus, applicatio est rerum quibus fruimur; privatio terminatur in habitu, habitus in fruitione; acquisita conservamus, conservata applicamus.’ (Op. cit., f. 270r)

be derived from the notion or consideration of the aptnes of the two later kindes of media as well as from that of the first namely of acquisition...⁷⁶

Accordingly, Warner distinguishes between

‘...two kindes of spes the one derived from the speculation and notion of our owne sufficiency or media that is from our owne power and skill...termed spes activa, the other from <our notion of> the cupiscence and sufficiency of an other termed spes passiva.’⁷⁷

Active hope,

‘...est anticipatio orta ex opinione quam quis habet 1. de propria sufficientia (scil. peritia et potentia) bonum aliquod sibi procurandi vel malum aliquod fugiendi seu repellendi 2. Item de propria sufficientia alteri malum aliquod sibi inferenti vel bonum aliquod impediendi seu privanti resistendi. Spes passiva est anticipatio orta ex opinione quam quis habet 3. de alterius cupiscentia et sufficientia bonum aliquod conferendi vel malum aliquod impediendi seu removandi.’⁷⁸

The modification of the notion which functions as the object of the appetite, qualifying it for an object of hope or fear proceeds

‘...of some further syllogization or operation of the faculty syllogistik of the intellect by some further inspection or survay of the actuated fantasms of the sensitive namely by speculation or inspection of the fantasms of our owne motions <and motory habits> tam quoad modum quam quoad gradum seu potentiam and of the fantasms of our media and instrumentalls that is by survaying our owne motu-potentia and motu-peritia. And this obiect so formalized by the operation of the faculty syllogistik and by the same presented to the intellect to be apprehended thereby with the passion or affection of hope or feare. So that the formall obiect of the intellect as it is appetitive or of the appetitive as it is a speciall faculty of the intellect is to be understood bonum vel malum <possibile> ex parte rei and the formall of the intellect as it is metu-sperative (till a

better terme be found) or of the metu-sperative as it is a speciall faculty of the intellect of an ulterior ordre to the appetitive to be bonum vel malum possibile ex parte rei et nostri.’⁷⁹

Being, for example, in pain hope for indolence can be raised

‘...by arguyng the possibility of the future existence by the acts precedent for the immediat succedence of indolence to the precedent acts of dolor being recorded;

⁷⁶ Ibid.

⁷⁷ Op. cit., f. 265r.

⁷⁸ Op. cit., f. 269v. Cf. Gualandi’s notion of ‘fides’ as something that objectively is the same as ‘spes’ and ‘...ratione tantum differt. Nam quã opinamur alios nobis bona tradituros, fides; quã verò opinamur nos accepturos, eisque fruituros, spes dicitur.’ (*De civili facultate*, 128-9)

⁷⁹ Op. cit., f. 263v.

out of the notion thereof...the intellect in the posterior acts doth argue the futurity of indolence as yf it were by this canon or principle that, si effectus aliquis in aliquo tempore acta sunt est vel exit existens similis effectus in alio tempore preterito presenti vel futuro existere potest/ In preteritis <actu vel> actibus dolor cessevit vel dolorem sequuta est indolentia ergo in presenti actu doloris dolorem cessare vel dolorem sequuturam esse indolentiam est possibile. So that by this syllogization the possibility of indolence or the privation or cessation of dolor...being argued and presented to the intellect quatenus sperative as being the formall obiect thereto, with presupposall that the bonity of indolence is formerly concluded the faculty sperative is thereby actuated.’⁸⁰

Of course all this presupposes ‘...that the intellect is preinformed with the notions of the differences of time past, present and future or of the priority or posteriority thereof...’⁸¹ Corresponding to the distinction between good and bad in themselves as well as in relation to us, there is a real distinction between the possible ‘...ex parte rei and ex parte nostri’. As

‘...the first may be and is in many cases presented or objected to the intellect by the syllogistik distinctly before the second and in some cases without any presentation at all of the second, it stands with reson that there should be also two severall and distinct faculties gradually subordinate the one to the other to correspond unto these two subordinate formalities of possibile as to their formall objects...’⁸²

They function as objects, of respectively

‘the aspirative and the sperative...the aspirative being but of a degree principiative or inchoative to the sperative...The aspirative <with his obiect> bonum possibile ex parte rei...The sperative with his obiect bonum possibile ex parte nostri, meaning also bonum ex parte nostri.’⁸³

All that has been said on hope mutatis mutandis also holds good for fear.⁸⁴ Appetite as well as hope and fear ‘...are the faculties subordinat to the volunty as principiative or actuative thereof...’⁸⁵

6.4. Conclusion

⁸⁰ Op. cit., ff. 265v-266r.

⁸¹ Op. cit., f. 266r.

⁸² Op. cit., f. 260v.

⁸³ ‘...and the difference betwene them so subtile that it hath not ben hitherto noted and therefore nether concept nor denomination instituted of any such affection or faculty as is by the aspirative intended...’ (Op. cit., f. 260v-r.)

⁸⁴ Op. cit., f. 269r.

⁸⁵ Op. cit., f. 263v.

Warner's ideas regarding the object of the appetite, and especially about the way this faculty is habituated are somewhat muddled. Yet, it is clear that by the appetite he understands a motion of the intellectual spirits triggered by a notion, i.e. another state of these spirits, initiating the approach or avoidance of some personal good or evil. Accordingly, the appetite is indispensable for life. It is not free but evoked by natural necessity. There is no mention of a separate sensitive appetite or of a distinction between cupiscible and irascible passions operated by the appetite. Passions like hope and fear are not conceived as physical modifications of the body caused by passions of the soul, but as a kind of appetitive motions of the intellectual spirits, i.e. bodily processes coinciding with or immediately following on certain opinions. Thus Warner conceives the appetite as an intellectual and yet material phenomenon.⁸⁶

Like his theory of the spirits Warner's ideas concerning the nature of the appetite and its operations suggest an influence from Stoicism.⁸⁷ Differing

fundamentally from the Scholastic views current at that time, they are close to those of Telesio.

However, this does not mean that Warner identifies the will with the intellect in general or with the appetitive intellect in particular: 'Appetitus natura prior voluntate.'⁸⁸ Preceding the will as its activator the appetite can be called and considered the 'voluntas inchoata'.⁸⁹

⁸⁶ The same is suggested by one of his reflections on the highest good: '...whether our felicity be to be sought in regione seu campo physico or in regione seu campo sensitivo <vel fantastico> or in regione seu campo intellectivo being superior to the other. Where our summum bonum doth consist there ought to be the region of our felicity. The intellect only is receptive or apprehensive of the formall action of good and evill (it being the formall obiect thereof) and not the sensitive but good or evill may be said materially to exist as well in regione fantastica as physica.' (BL Add. MS 4395, f. 23.) Cf.: 'Two things required to make one happy. To know what is best for himself to be desired, and to have it when he desires it. But that which is best for Socrates perhaps is not best for Plato. Whether there be any universall <comon> condition of those things that are to be desired by which may be defined and specified what is best for all men yf there bee to know those conditions is to know quid sit summum bonum.' (BL Add. MS 4394, f. 175r) Considerations of God and our beatitude are, in this connection, conspicuous by their absence.

⁸⁷ Most of Warner's views on the appetite are reminiscent of ideas about the relationship between the affections and reason ascribed by Galen to Chrysippus and severely criticized by him. (See *De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati*. In: *Opera (1549)*, Vol. 1, 928, 960, 950, 974 and 1003-4.) (Kühn, Vol. 5, 309, 365-6, 367, 428-9, 515-16.) See about the Stoic psychology in general and especially about the distinction between passions conceived as opinions or as states of the spirits following on opinions Rist (1977), 22-36. See about the revival of the Stoic doctrine of the passions since the end of the 16th century Levi (1964).

⁸⁸ BL Add. MS 4395, f. 41.

⁸⁹ Op. cit., f. 45.

Chapter Seven

The Will or The Informed Appetite

7.1. Introduction

The majority of Warner's contemporaries conceived the will along peripatetic lines, i.e. as an 'appetite of the rational soul'¹ or as an 'inclination to realize things conceived and known by the intellect'.² Thus according to Hooker

'...Appetite is the Will's solicitor, and the Will is Appetite's controller; what we covet according to the one by the other we often reject; neither is any other desire termed properly Will, but that where Reason and Understanding, or the show of reason, prescribeth the thing desired.'³

Moreover, it was considered as a spiritual power operating independently of the body.⁴ In contrast with the sensitive appetite it was supposed to be focussed on things not perceived as good in a particular respect but known to be universally good⁵, i.e. things agreeing with the nature of the subject willing them.⁶ Though oriented by nature to the universal good, as known and presented by the intellect the will was also said to be free in so far as its decision either to follow the suggestion of the intellect or not was supposed to be based on an autonomous choice.⁷ The will was, in other words, conceived as the counterpart in the rational soul of the appetitive power in the sensitive soul.

¹ See Zabarella, *De rebus naturalibus*, 725; Suarez, *Opera*, Vol. 3, 771.

² See Goclenius, *Lexicon*, 329. 'Voluntas est, quae quid cum ratione desiderat.' (Ibid.)

³ *Ecclesiastical Polity*, Vol. 1, 170.

⁴ See Suarez, loc. cit.

⁵ See Aquinas, *De anima*, n. 804, p. 190.

⁶ See *Summa*, Ia secundae, 57) Cf. Suarez: 'Objectum voluntatis est bonum in communi.' (Loc. cit.) According to Melancthon 'Deus & rerum universitas' constitute the object of the will. (See *Commentarius*, 221v)

⁷ 'Voluntas excitatur à principio partim externo, partim interno. Principium externum & remotum est intellectus, qui monstrat voluntati objectum, & ipsam movet. Principium internum est ipsa voluntatis inclinatio, ita ut illa moveatur proximè & principaliter à seipsâ. Cùm enim intellectus monstrat voluntati objectum, voluntas liberè potest illud velle & nolle, sequi vel non sequi. Ab intellectu igitur est monstratio objecti, applicatio autem voluntatis ad illud objectum tota pendet à principio & arbitrio interno ipsius voluntatis.' (Alsted, *Encyclopaedia*, 765.) Cf. Aquinas: '...voluntas et liberum arbitrium non sunt duae potentiae, sed una.' (*Summa*, 1a, 406). See also Melancthon, op. cit., 218; Suarez, *Opera*, Vol. 3, 527; Burton, *The anatomy*, Vol. 1, 167-9.

Warner's notes concerning the will are a little confusing in so far as he uses two different concepts of the will. With one concept he seems to adhere to the traditional theory of the will as a rational appetite, considering the appetite and the will, conceived as '...the assent of reason unto the cupiscitive...'⁸, as two separate faculties. However, as opposed to most of his contemporaries, he tried to combine these ideas with the view of both powers as faculties of the intellect. No wonder then, that over and over again he apparently felt the urge to point out their difference. 'That the appetite and the volunty are distinct faculties may be argued by this that we have appetite where we can have no volunty, and volunty in motions indifferent and compulsory where we can have no appetite.'⁹ Moreover are the '...act of appetition and the act of volition always distinct and commonly a phenomenon though sometimes the distinction be imperceptible.'¹⁰ Preceding the will 'Appetitus terminatur in voluntate...'¹¹ Ultimately, changing his mind, he attributes the rationalisation of the appetite to a special power, the 'determinative faculty', and conceives the will as the beginning of locomotion itself.

7.2. *The Differences between Appetite and Will*

While the appetite is evoked by the need for some object the will '...est potentia seu principium movendi ad obiectum assequendum...'.¹² It is a '...facultas <(seu potentia)> actuativa tam principiativa quam continuativa motionis propter finem, non <motionis> simpliciter ut potentia physica.'¹³ 'We desire always something, but we cannot say except improperly we have a will to a thing but a will to do this or that thing...'¹⁴ The will is even said to be

'...tantum motionis non quietis for although we may say properly enough in respect of grammar <volo sedere vel> quiescere yet logically that proposition is to be understood equipollent to this nolo seu non volo

⁸ BL Add. MS 4394, f. 266r. Cf. Burton's description of the will as the power '...which covets or avoids such things as have been before judged, and apprehended, by the understanding.' (*The anatomy*, Vol. 1, 146)

⁹ BL Add. MS 4395, f. 40.

¹⁰ Op. cit., f. 36.

¹¹ Op. cit., f. 41.

¹² Op. cit., f. 48; 'Appetitus est obiecti. Voluntas est motionis ad obiectum. Voluntas est motionis, appetitus est termini ad quem. Appetitus est rei. Voluntas est actionis.' (Op. cit., f. 47) Cf. Locke: 'Desiderium fertur in jucundum fateor sed voluntas fertur solum in actiones nostras et ibi terminatur.' (*The correspondence*, Vol. 7, 403; '...the will or power of volition is conversant about nothing but our own actions...Desire...is an uneasiness of the mind for want of some absent good.' (*An Essay II*, xxi, 30-1, pp. 250-1)

¹³ Op. cit., f. 47.

¹⁴ Ibid.

ambulare vel moveri and not otherwise. Noluntas being the privative or negative of voluntas.¹⁵

In opposition to the will (and the hope) the positive and negative appetite do not come to a halt as soon as the thing desired is acquired but ‘...do change into other affections as cupiscence into amor and discupiscence into odium which are extinguished only by actual fruition.’¹⁶ Though both are powers to move ‘Appetitus...est potentia movendi impedita seu retenta seu refrenata. Voluntas potentia movendi soluta seu actu movens.’¹⁷ Further ‘...it is to be considered whether the appetite may possibly be restrained or suppressed at all but it is certayne that the will may.’¹⁸ The appetite definitely is not free but the will may be.¹⁹ The main difference between appetite and will is that

‘...betwene the first actuation of the appetite and the first actuation of the volunty there doth allwais and necessarily intercede some act or operation of the faculty cognoscitive that is some act or acts of fantasiation or cognition or recognition <or intellection> or ratiocination or consideration <or cogitation> nether is it possible to be otherwise except it be in brutis aut insensatis aut furiosis or in case of precipitation which falls out in violent and inordinate or overpassionate appetitions or in case of habit.’²⁰

Thus ‘...appetitus may be defined voluntas inchoata and voluntas appetitus informatus.’²¹

7.3. *The Nature and Kinds of the Will*

Warner defines the will considered as a faculty, and as an act. Considered as a faculty the will

‘...may be defined to be the power or faculty executive of the decree or resolution or commande of the intellect or cognoscitive or ratiocination, by the comande of the intellect understanding the same as it is urged or solicited by the appetite

¹⁵ Ibid.

¹⁶ BL Add. MS 4394, f. 271r.

¹⁷ BL Add. MS 4395, f. 48. Cf.: ‘The appetite and the volunty compared to the wepon of present force and retayned.’ (Op. cit., f. 41.)

¹⁸ Op. cit., f. 48. ‘Et tamen voluntas aliquando etiam retenta seu cohibita seu refrenata actu perseverante seu manente seu coexistente appetitu non cohibito.’ (ibid.)

¹⁹ ‘Non est liber appetitus ergo non libera voluntas. Verum est si appetitus actualis necessario actuaret voluntatem sed solus appetitus non sufficit ad actuandam voluntatem.’ (BL Add. MS 4394, f. 243v) See also Chapter 6, p. 191.

²⁰ BL Add. MS 4395, f. 47.

²¹ Op. cit., f. 45. Cf. Francis Bacon’s view of the passions and the appetite as the ‘...inceptions and rudiments of the will.’ (*The works*, Vol. 7, 101)

which is not only principiative of the actuation thereof but also continuative of the whole processe of the operation thereof...ut actus est principium actuativum spirituum motivorum et organorum motoriorum seu facultatis motricis; et quia animalium motus non <est> vanus aut frustraneus sed propter finem, est principium actuativum facultatis motricis ad obiectum scilicet vel bonum aliquod <cupitum> absens seu sensatum seu fantasiatum assequendum vel malum discupitum presens sensatum fugiendum.²²

The will not only starts the locomotive faculty but also keeps it going ‘...so as the will cessing it cesseth except sometimes in case of habit.’²³ As a faculty the will is ‘...understood to be the <immediat> principium or faculty principiant of all our <arbitrary> motions and actions whatsoever...’²⁴

An object can only be pursued as good if it is known as such and presented as desirable by the intellect. By the will Warner understands

‘...the assent of reson unto the cupiscitive upon the examination and comparison of the valews of the two bonities that ex parte obiecti and that ex parte nostri; that which proceedeth from the obiect to us and which we forgoe in exchange thereof whether it be in expersis mediorum or in circumstantijs seu symptomatis obiecti...’²⁵

In relation to the intellect it is a ‘...decretum intellectus; decreto orto ex opinione de boni alicuius possibilis et *facilis* <utilis> executione understanding *facile* <utilis>... .. decreto exequendi rem aliquam orta ex opinione de eius bonitate possibilitate *facilitate* <utilitate>.’²⁶ This should not be interpreted as if the will were a faculty external to the intellect, for in Warner’s theory the intellect itself ‘...is accounted <not only appetitory but> voluntary being a kinde of motion or not done without motion...’²⁷ Consequently materially speaking the will is nothing but a certain state of the intellectual spirits themselves.

²² Op. cit., f. 47; ‘And seing voluntas est principium actuativum omnis animale motionis quae fit cum cognitione sive organica sit sive spiritualis tantum and that nullus in animale motus qui fit cum cognitione est per se vel per accidens actuabilis nisi per voluntatem whether that cognition or intellection that doth precede the volunty be non motus or non cum motu and that which is actuated by the volunty motus or cum motu...is...to be examined...’ (Op. cit., f. 46)

²³ Op. cit., f. 47.

²⁴ BL Add. MS 4394, f. 263v.

²⁵ Op. cit., ff. 266r-v.

²⁶ Op. cit., f. 268v.

²⁷ BL Add. MS 4395, f. 47. Cf. Scaliger: ‘Voluntas est intellectus extensus seu promotus ad habendum aut faciendum quod cognoscit.’ (Quoted in Goclenius, *Lexicon*, 330); Fracastoro: ‘...non est...voluntas distincta ab intellectu potentia, nisi ratione.’ (*Opera*, 182r); Charron: ‘L’action qui suit ceste cognoissance et resolution qui est á s’estendre, pousser et avancer à la chose cognevë, c’est Volonté intellectus extensus et promotus.’ (*Oeuvres*, 50)

Warner distinguishes between a positive and a negative version of an absolute, as well as a relative will. By the ‘voluntas absoluta’ or ‘operativa’ he understands the determination to act and to acquire ‘cum propria potentia et scientia’ the desired object. Its negative counterpart, the ‘noluntas absoluta’ or ‘recusativa’ consists of the determination not to act. The relative will concerns the willingness to cooperate or otherwise. It consists of the ‘voluntas relativa’ or ‘permissiva’, i.e. the determination not to resist the attempts of someone else to give me something or to act on my behalf and its opposit, the ‘noluntas relativa’ or ‘resistiva’.²⁸ The will in general

‘...is analogate to the spurre and the bridle not unto one alone; in the spurre there is voluntas operativa and noluntas recusativa; in the bridle voluntas permissiva and noluntas resistiva. Voluntas operativa and noluntas recusativa presupponunt quietem and so the spurre, voluntas permissiva and noluntas [recusativa] resistiva presupponunt motionem and in like maner the bridle.’²⁹

Corresponding to the division ‘...of bonity and possibility...by the respects of ex parte rei and ex parte nostri and correspondent faculties...’ Warner tentatively proposes ‘...the like distinction in this of faculty and the like division of the faculty volitive...’³⁰ In case of an active will it could not be exactly the same distinction ‘... because the actions and instruments and meanes by which we endeavour the same are altogether and only our owne that is only ex parte <nostri> and nothing at all ex parte rei...’³¹ It might be

‘...conceived ex parte effectiois and ex parte efficientis or ex parte operis and ex parte operantis or ex parte efficientis and ex parte hominis, meaning that although the action or operation for the acquiring of such an object be facill that is to say may be effected well or without any ill conditions ether concomitant or consequent as it is the operation for such an object but being considered as it is the operation of such an operant or person in respect of some personall circumstances that are accident to that operant it can not. So that it may be facill in respect of the operation but not of the operant or the operation may be facill in respect of the object but not of the person operant. The like may be understood for the voluty passive; in respect of the reception and the recipiant making the one reall and the other personall.’³²

Analogously to the division of the ‘faculty sperative’ into an aspirative and sperative phase and of the ‘faculty appetitive’ into the applausive and appetitive, Warner also divides the will into an ‘assertive’ or ‘assensive phase’ elicited by

²⁸ See BL Add. MS 4394, f. 271r.

²⁹ Op. cit., f. 269v. Cf. Melanchthon: ‘...sunt in voluntate actiones & habitus. Actiones sunt velle, nolle, suspendere actionem, imperare alijs potencijs.’ (*Commentarius*, 237v)

³⁰ Op. cit. f. 256r.

³¹ Ibid.

³² Op. cit., ff. 256r-255v.

objects qualified by the ‘formality of faculty reall’, and the ‘faculty volitive’ properly so called.³³

7.4. *The ‘Subject’ of the Will*

According to Goclenius, expressing the common view, the will has a twofold object, to wit, some final end as well as the means to achieve it.³⁴ However, in Warner’s opinion that

‘...which according to vulgar conceiving is called the object of the volunty is but by misprision and error so conceived and so called, mistaking the object of the appetitive and metu-sperative for the object of the volunty, by reason of the continuall continuance of those 2 faculties with the volunty the volunty being not only actuated and principiated but also continued necessarily by them...’³⁵

In desiring some present good, hoping for a future good, or fearing some expected evil we are passive, but in case of the will we are the agents.³⁶ The objects of the appetite

‘...are active or agent and properly objects but the object of the volunty passive or patient and therefore improperly termed an object being no object but rather the subject thereof. For that which was the object to the appetitive and metu-sperative and in respect of them agent or movent doth become the subject to the volunty that is to say the patient or thing acted or moved...So that the volunty to speke properly can have no object...’³⁷

Being two different faculties the appetite and the will cannot be activated by the same object. The will is activated by something considered as possible in relation to us. The appetite is activated by possibilities as such³⁸ or rather ‘...informed by bonity, the volunty by both bonity and possibility’, i.e. ‘...possibilitas ex parte nostri et ex parte rei’³⁹ ‘...neque hoc simpliciter sed quoad nos scilicet volenti. Ita ut obiectum voluntatis sit bonum volenti possibile scil.

³³ Op. cit., f. 255v. Cf. ‘Assentiva est facilius realiter. Voluntas est facilius personaliter seu quoad nos.’ (Op. cit., f. 243v)

³⁴ See *Lexicon*, 330. Cf. Aquinas: ‘Si...loquamur de voluntate secundum quod nominat potentiam, sic se extendit et ad finem, et ad ea quae sunt ad finem.’ (*Summa*, Ia sec., q. 8, a. 2, 49)

³⁵ Op. cit., f. 263r.

³⁶ ‘Whether the act of appetite be properly an action or a passion, or both is to be considered.’ (BL Add. MS 4395, f. 47)

³⁷ BL Add. MS 4394, f. 263r.

³⁸ ‘Appetitus (forsan) possibilium simpliciter, voluntas possibilium quoad nos. Appetitus supponit possibilitatem sed non necessario intendit...’ (BL Add. MS 4395, f. 24.)

³⁹ Op. cit., f. 40; ‘The object of the appetite is bonum simpliciter, the object of the volunty is bonum possibile...’ (Ibid.)

motu-potentiae suae et motu-peritiae par.’⁴⁰ Accordingly, the possible only ‘...doth proprely and formally actuate the volunty the preexistence or coexistence or perseverancy of appetite supposed.’⁴¹ In relation to the will ‘bonity’ constitutes ‘...the obiect materiall, possibility the obiect formall...’⁴²

7.5. *The Activation of the Will*

As there is a difference between the objects of the appetite and the will the

‘...impressions or fantasms of the reall obiects of the appetite are of a different kinde from those of <of the volunty> <namely of> motions not only of our owne motions which are apprehended by a peculiar and distinct sense and therefore may have an other maner of sigillation or characterization or formation in the retentive or campo fantastico then those of the other senses...but also of motions of things externall though sented per accidens and intromitted by the way of some of the ordinary senses...’⁴³

While concepts of things are speculated on by the theoretical intellect to inform the appetite, concepts of motions are speculated on by the practical intellect not for knowledge in itself but primarily and per se for the sake of ‘...action or imitation and only per accidens in some cases cognition that is when they are considered not as motions and propter actionem but as things and propter scientiam vel cognitionem...’⁴⁴

Warner’s notes contain two different theories about the specific nature of this latter concept as well as about the way it is formed. According to the first theory by storing and speculating ‘...the fantasms as well of our <owne> motions as of the motions of the things appetible or of the instruments that we use for the assecution of them both our power is mesured and our skill lerned for doing the like...’⁴⁵ Therefore, broadly speaking, ‘...as soone as we speculate

⁴⁰ Op. cit., f. 38. ‘Pollere et callere; power and skill; the whole requisit to volunty may though...not ex parte nostri but rei be comprehended under that one terme of possibility.’ (Ibid.)

⁴¹ Op. cit., f. 40.

⁴² Ibid. ‘The double sense of words implying possibility or impossibility the one in respect of the will the other of the power as intollerable &c is to be considered and the like of the terme necessity which may be taken for absolute or respective and conditionall which different senses ought properly to be expressed by distinct termes.’ (BL Add. MS 4394, f. 170v)

⁴³ BL Add. MS 4395, f. 38. See also Chapter 4, notes 17 and 89.

⁴⁴ Ibid. Cf.: ‘...in respect of the sensory dolible dolor is an alteration but in the act of tristative or tristable intellection and in respect of the intellectuory tristable it is a thing.’ (Op. cit., f. 234v) See further Chapter 5, p. 183.

⁴⁵ Op. cit., f. 38. ‘It is not only the refantasiation of the like motion or the fantasiation of possibility that doth actuate the volunty but also the fantasiation of the maner and meanes of the motion or of the assecution of the obiect by motion is thereto especially in some cases required. Unles the maners or modifications and meanes be understood comprized under the terme and concept of possibility. And it is manifest that in some cases the only refantasiation of the like motion doth actuate the volunty without any

or refantasiate those fantasms being pressed to the assecution of the like things by the appetite we sodainly apprehend the same possible and eodem actu our will is actuated.⁴⁶

According to the second theory things not only are different but also more complicated. The activation of the will necessarily presupposes successively, firstly the apprehension of something as 'bonum vel malum simpliciter'⁴⁷, secondly a desire for that thing conceived as 'bonum vel malum possibile simpliciter', and thirdly the activation of hope or fear by the notion of the thing concerned as 'bonum vel malum possibile quoad nos simpliciter'.⁴⁸ In the first theory this was enough to activate the will, in the second Warner believes otherwise. The will becomes active only after the operation of yet another faculty which

'...for distinction sake we may call the determinative as well affirmative as negative and the same to be a faculty passive and of the same nature that the appetitive and the metu-sperative are, actuated in the intellect by some further syllogization or operation of the syllogistik namely by inspection or speculation both of the fantasms of the obiect materiall and of the fantasms of our owne motions and means and instrumentalls that we are to use and employ for the assecution of the obiect and in both those fantasms espying or discovering or arguing the good or ill of both to compare <or balance> the good or ill of the one to the good or ill of the other and thereupon to forme the obiect to the determinative by superadding to the presupposed obiect of the metu-sperative the ulterior formality of expediency as the obiect of the metu-sperative being bonum vel malum possibile quoad nos expedienter.'⁴⁹

other cogitation of possibility whether that very fantasme of the like motion is to be accounted possibility or no and how and yf not how no volunty without cognition of possibility.' (Op. cit., f. 40)

⁴⁶ Op. cit., f. 38; 'Our...ability as well in respect of power as of skill to move things by commoving our selvs or their mobility or aptnes to be moved by our motions the principium actuative of the will. Understanding propter assecutionem.' (Ibid.)

⁴⁷ '...taking in the apprehensive simple as the first notwithstanding it was formerly left out...' (BL Add. MS 4394, f. 262v)

⁴⁸ Ibid.

⁴⁹ Op. cit., ff. 263r-262v. Cf. Aquinas: 'Non...omne bonum est appetibile et movens, sed bonum agibile, quod est bonum applicatum ad operationem...' (*De anima*, no. 827, p. 195); Harvey: 'Principium...motus in agibili quod prosequendum et fugiendum.' (*De motu locali animalium*, 34). According to Jan Swammerdam (1637-1680) '...a voluntary movement is never produced except as it is preceded by a "determining principle"...This...may be a thought "merely casual", a dream " presenting itself before us in the night", or some pattern of physical stimuli...' (Fearing (1929), 451.)

The appetite, in other words, ‘...est voluntas indeterminata and voluntas est appetitus determinatus for where there wants this determination there properly is no volunty but only appetitus.’⁵⁰ Consequently in irrational beings there can be no will distinct from the appetite and the less rational a being is the more it will be inclined to follow the dictates of its appetite instead of the will.⁵¹

‘The appetite respecteth only the good that proceedeth from the object to the subject but nether the evill that it bringeth with it nor the the good that is to proceed from the subject to the object in counterchange but in the actuation of the will the intellect respecteth both and according to the excesse enacteth the determination which is the volunty; in ordinatis this is perpetuall though in inordinatis it be sometimes perturbed. Like an inconsiderate <or passionate> buyer that to please his fancy will give more for a thing then it is worth, respecting the thing and not the price whereas in rationally proceeding both ought to be respected and compared.’⁵²

Thus only after the actuation of the will, are both sides of the matter taken into consideration. This determinative operation of the intellect can be considered as

‘...a kinde of bargayning betwene them (that is betwene the appetitive and the operative on the one part and the volunty on the other) as yf it should be said for the volunty though the object be good and needfull and also possible yet yf it cost too dere or can not be had but with over hard conditions it is <to be> resisted but yf the price and conditions be resonable it is a bargaine.’⁵³

The object in question, apart from being good and possible, is also called ‘facile’ meaning ‘...id quod quis bone, idest comodè, tuto, utiliter, expedienter facere possit. And so the formality of the object to be bonity, possibility, facility.’⁵⁴ Thus Warner

⁵⁰ Op. cit., f. 269r. ‘...the terme of volunty is...generally received in comon use namely for that which...was made to be the determinative...’ Op. cit., ff. 262r-261v)

⁵¹ Op. cit., f. 268v.

⁵² Op. cit., ff. 269r-268v; ‘in appetitionibus et volitionibus...inordinatis where the speculation of the aptitude of the media out of precipitation...is either omitted or postponed to the speculation of their value (or both neglected by the prevalence of the appetite) for ordinatè procedendo the value of the media can not be considered before their aptnes because before their aptnes be knowen they can not be knowen to be media or understood sub ratione mediorum and therefore impossible their valuation should be considered.’ (Op. cit., f. 270r); ‘...cupiscence that is acted without hesitation of the intellect in respect of the effectibility doth quoad effectum imply in it hope and without questioning or pausing in respect of facility habet rationem voluntatis.’ (Op. cit., f. 267r)

⁵³ Op. cit., ff. 256v-r.

⁵⁴ Op. cit., f. 256r. Cf. Aquinas: ‘...in eis {i.e. imperfect animals} est phantasia vel concupiscentia indeterminata, in quantum imaginantur et concupiscunt aliquid ut conveniens non autem ut hoc aut illud, hic aut ibi; sed habent confusam imaginationem et concupiscentiam.’ (*De anima*, no. 839, p. 198) ‘...illa, quae est per deliberationem, est tantum in rationalibus; quia considerare utrum hoc sit agendum, aut hoc quod est deliberare, opus est rationis...Et in tali consideratione necesse est accipere aliquam unam regulam, vel finem, vel aliquid huiusmodi, ad quod mensuretur quid sit magis agendum...Et hoc est

gives a peculiar twist to the traditional view of the will as a ‘...rationis assensus appetitui.’⁵⁵ Qualifying a desire as rational does not mean to him that it is aimed at some metaphysical entity like the universal, absolute or even eternal good, but that it is an ‘economically’ justified wish. To Warner a rational man is an economical man.

The will presupposes apprehension, desire, hope or fear and determination. All these faculties are supposed ‘...<...to be passive and> the method or way of the operation of the syllogistik in arguing and forming the objects to them all out of the fancies to be resolutive or analytic.’⁵⁶ Once the intellect has ascertained the thing desired as good, possible, and to be acquired at a reasonable price, the activation of the will requires only one more operation of the intellect

‘...but for as much as the resolutive process thereof continued in forming the objects to the four precedent subordinate faculties is fully complete in the last the method of syllogization that is <next> to precede unto the volunty is to be understood synthetically or compository not for actuation or excitation <there>of <as of> any further passion or affection in the intellect which was the case of the four precedent but for information thereof to the execution or assecution of the object which is done by direct regress through the former whole analytic process with the determination of all circumstances of time, place, &c.’⁵⁷

This final synthesis or composition of the results of the preceding analyses leads to a mental performance of the intended act qualifying its actual operation as voluntary.

medium ex quo ratio practica syllogizat quid sit eligendum...animalia non habent opinionem...quia non possunt uti syllogismo, per quem unum praeeligant alteri. Sed deliberatio rationis habet illam...Et inde est, quod appetitus inferior, qui sequitur phantasiam, non habet deliberationem, sed absque deliberatione movetur ad concupiscendum vel irascendum, quia scilicet sequitur phantasiam sensibilem.’ (Op. cit., nos. 840-42, p. 198) Cf. Suarez, *Opera*, Vol. 3, 778.

⁵⁵ Op. cit., f. 268v.

⁵⁶ Op. cit., f. 262v.

⁵⁷ Op. cit., f. 262v-r; ‘But whether there be any necessity of such intellectual synthesis to precede the execution or that there be only required the operation of the syllogistik for determination of circumstances and that there be no other synthesis but <that> which is really and actually performed by the loco-motive in the assecution of the object is to be considered hereafter.’ (Op. cit., f. 262r.)

7.6. Conclusion

Like his doctrine of the appetite Warner's ideas regarding the will are somewhat muddled. He described this faculty as a state of the intellective spirits, i.e. as a cognitive act and as the actual beginning of voluntary motion. He also wavered between two explanations of the activation of the will. Further he apparently could not decide whether the will is free or not, and is rather vague about the way will and reason are related. As opposed to most of his contemporaries, Warner considered the will like all animal powers, to be a bodily faculty. This did not stop him from characterizing the will, traditionally, as a rationally justified appetite. Yet, within the boundaries of that essentially Scholastic view he developed some unorthodox ideas concerning the 'object' of the will, the kind of rationality involved, and about its relationship to the appetite as a preceding passion of the intellect. Being an active faculty the will has no object but only a subject. This subject is never conceived as a thing or as a steady state, but always, and only with respect to the motions required to obtain the object of a positive appetite or to dispose of the object of a negative one. Furthermore, the will is not focussed on the absolute good but rather on the acquisition of things that, on the basis of an analysis of profits and losses, are deemed to be the most reasonable options. While the appetite, taking but part of the relevant conditions into consideration, is only partly rational, its continuation, the will is fully rational.

In view of the fact that the successive objects of the apprehensive, appetitive, metusperative and determinative faculties, afterwards not only function as the subject of the will but also of the locomotive faculty, the intellectual analysis and synthesis preceding the will suffice to set the animal organism in motion. Accordingly '...the volunty falls out ether to be only the instantaneall actuative of the loco-motive or to be one and the same faculty with it...'⁵⁸

⁵⁸ Ibid. Cf. : '...this vital sense...doth actuate the appetite and the appetite the loco-motive volunty.' (BL Add. MS 4395, f. 4)

Chapter Eight

Voluntary Motion

8.1. Aristotle, Galen and Descartes

The theories of locomotion propagated in Warner's day were derived from Aristotelianism and Galenism. According to Aristotle '...all animals move and are moved with some object...' and '...the things which move the animal are intellect, imagination, purpose, wish and appetite...', that is, '...mind and desire...', or rather their objects in so far as these belong to the sphere of action.¹ Aristotle is talking here not about the theoretical, but about the practical intellect. He conceives action as a kind of conclusion of a practical argument.

'For example, when you conceive that every man ought to walk, and you yourself are a man, you immediately walk; or if you conceive that on a particular occasion no man ought to walk, and you yourself are a man, you immediately remain at rest. In both instances action follows unless there is some hindrance or compulsion...The action results from the beginning of the train of thought.'²

It is a conclusion from the premises that something is good and can be acquired or done. In many cases the 'conclusion' is too obvious to require explicit argumentation. Thus

'...when a man acts for the object which he has in view from either perception or imagination or thought, he immediately does what he desires; the carrying out of his desire takes the place of inquiry or thought. My appetite says, I must drink; this is drink, says sensation or imagination or thought, and one immediately drinks. It is in this manner that animals are impelled to move and act, the final cause of their movement being desire; and this comes into being through either sensation or imagination and thought.'³

The perception, imagination or thought of something pleasant or painful causes movement by making certain organs suffer heating or chilling, and thus making them change from solid to liquid, soft to hard, etc. and vice versa. These '...affections fittingly prepare the organic parts, the desire prepares the affections, and the imagination prepares the desire, while the imagination is

¹ Movement of animals, 700b16-19.

² Op. cit., 701a14-22.

³ Op. cit., 701a29-35. See also *On the soul*, III, ix-xi.

due to thought or sensation.⁴ The motive force of desire flows from the fact that it is in motion itself. It exists in animate bodies as a bodily substance, to wit, an innate spirit located in the heart or in something corresponding to that organ. It causes movement, i.e. thrusting and pulling, by expansion and contraction.⁵ Apart from voluntary motions Aristotle distinguishes involuntary and non-voluntary motions:

‘By involuntary I mean such movements as those of the heart and of the privy member, which are often moved by the presentation of some image and not at the bidding of reason. By non-voluntary I mean sleeping and waking and respiration and the like. For neither imagination nor desire is strictly speaking responsible for any of these movements...’⁶

In Galen’s view, as stated previously, animals are not controlled by one principle located in the heart, but by a vegetative principle in the liver regulating nutrition and generation; a sensitive principle in the heart controlling the pulse, vital heat and the passions, and a rational principle in the head accounting for sensory perception, imagination, memory, intellect and for voluntary motion.⁷ Galen distinguishes motions, caused by the principles in liver and heart as natural, from the animal motions caused by the principle in the head: ‘Cum & sensus, & voluntarius motus propria animalium sint: auctio, & nutritio, plantis etiam communia: fuerint non immerito priora duo, animae: posteriora, naturae ipsius opera...animal quidem ab anima simul, & natura gubernari dicimus: stirpes, à sola natura...’⁸ As opposed to natural motions, animal motions are based on knowledge. Galen calls these motions spontaneous meaning voluntary.⁹

Philipp Melanchthon, one of the leading writers on the soul in the 16th and early 17th century, followed Aristotle in his explanation of locomotion. The organs of locomotion are nerves, muscles and tendons. Nerves go like spindles through muscles and make them contract or relax; muscles pull the tendons and these, in their turn, move the bodily part they are connected to. Now these organs serve voluntary motions. Accordingly, there must be some preceding cause by which these organs are impelled. The soul, being the

⁴ Op. cit., 702a19.

⁵ Op. cit., 703a5-27.

⁶ Op. cit., 703b5-11.

⁷ See Chapter 2, p. 68-9.

⁸ *De facultatibus naturalibus. Libri tres, Thoma Linacro interprete.* In: *Opera (1549)*, Vol. 1, 1113.) (Kühn, Vol. 2, 1-2.)

⁹ ‘...motus, qui ex arteria et vena procedunt, naturales sunt et voluntatis expertes: qui autem à musculis, animales et voluntarii. Sive autem consulto dicas musculorum fieri motus, sive spontaneos, aut cum voluntate, nihil refert.’ (*Galen De motu musculorum libri duo, Nicolao Leonicensi interprete.* In: *Opera (1549)*, Vol. 1, 1185.) (Kühn, Vol. 4, 372)

principle of all operations of an organism, is, of course, the first cause and source of locomotion. As for its proximate causes locomotion is effected by a miraculous, yet natural transformation, mediated by the spirits, of some idea and desire into a motion of the nerves, leading to an activation of the muscles which, in their turn, pull the tendons resulting finally in a motion of the members of the body.¹⁰ Like Aristotle Melanchthon distinguishes between natural, voluntary and mixed motions equivalent to Aristotle's non-voluntary motions.¹¹ In the leading medical writings of Warner's day, Galen's views predominate.¹² Suarez combines ideas of Aristotle and Galen in his own

¹⁰ '...imaginatio seu deliberatio, & appetitio...His obtemperant nervi mirabili foedere naturae, sed impelli tamen eos spiritu existimo, cum videlicet in imaginatione & appetitione agitantur spiritus...Appetitio...excitato spiritu nervos impellit, qui ciet musculos, musculi chordas, chordae trahunt membra...' (*Commentarius*, 202v.)

¹¹ Op. cit., 203v. Hieronymo Cardano practically repeats Aristotle's views. (See *De rerum varietate*. In *Opera*, Vol. 3, 79-82.) In the 1630s Alsted presents a view similar to that of Melanchthon: '*Appetitus est principium locomotivae propinquum; spiritus, proximum; anima sensitiva, remotum...Series causarum in locomotiva haec est*. Primò objectum movet sensum externum: deinde sensus externus objectum percipit: tertio sensus communis objectum discernit ac distinguit: quartò phantasia dijudicat, bonumne sit an malum, utile an inutile: quintò cor commovetur: sextò cor commovet sanguinem & spiritus: septimò spiritus ita moti movent nervos: octavò nervi movent musculos: nonò musculi trahendo vel retrahendo movent chordas: decimò chordae junctae ossibus, movent ossa & membra: undecimò ex motu membrorum prodit motus totius animalis.' (*Encyclopaedia*, 743. The same holds true for William Harvey. (See *De motu locali animalium* (1627).)

¹² According to Laurentius: 'Cerebrum imperat, nervus imperium defert, musculus obsequitur: cerebrum, de obiecto appetibili sitne utile, aut noxium, prosequendum, an fugiendum cogitat, hinc motus principium; facultatem movendi defert nervus, spirituum lator; musculus spiritus radijs illustratus, statim contrahitur, partemque varie pro voluntatis imperio immediate agit...ita vis animae fictrix in cerebro sedens, nervis quasi habenis, musculos movet. Haec ergo ad motum localem & voluntarium sunt necessaria, quae ordine se consequuntur, obiectum appetibile, facultas appetens, vis locomotiva, cerebrum, animalis spiritus, nervi, musculi...' (*Opera*, 126.) Bauhinus sides with Laurentius. (See *Theatrum*, 45-6) Piccolomini states that '...ab anima sensitiva editur duplex motus, alter, qui est in nostra potestate situs ita, ut illum quando nobis libet inchoare, & inchoatum cohibere, possimus, qualis est articulorum, & vulgatorum musculorum, qui in hominibus voluntarius, in brutis, spontaneus, nuncupatur: alter qui non est in nostro arbitrio, nostravè potestate positus: nec illum inchoare, nec inchoatum, inhibere & finire, valemus, qui, quòd proprio nomine caruit, nomine naturalis exprimitur...' (*Anatomicae Praelectiones*, 213-16 (pp. 214 and 215 are skipped)). Cf. Laurentius: 'Est... voluntarius ille motus, quem & sedare potes cum vis, & rursus excitare quiescentem, eumque velociorem, tardiozem, rariozem, & frequentiozem facere...' (*Opera*, 126.) Casmann explains locomotion as follows: '1. Objectum movet sensum. 2. A sensu oritur notita. 3. Notitiam sequitur appetitio & rei desideratio. 4. Cogniti appetitio vibrat ac ferit cerebrum ac spiritus animales. 5. Cerebrum motos spiritus animales ejaculatur in nervos. 6. Spiritus animales transeunt per nervos ad musculum partis movendae. 7. Musculus ille ictus & vibratus animali spiritu contrahit, & movet sese sua carne versus caput, seu initium musculi. 8. Musculus contractus attrahit ad se chordas. 9. Chorda attracta trahit & ciet membrum cui est insertum.' (*Psychologia*, 422-3)

theory of locomotion. Like the latter he distinguishes between natural or vital motions, and animal motions like locomotion that are dependent on the appetite.¹³ However, the power of moving, from one place to another, in his view, is not located in the brain but, following closely on the appetite, in the heart, the seat of the appetite.¹⁴

Though most of these theories contain rather detailed descriptions of the physiology of locomotion,¹⁵ the points at issue mainly concern the psychological side of the process. The nature and location of the ‘vis motiva’, its susceptibility to habituation as well as its relationship to the soul in general, and to the appetite and will in particular, were hotly debated. However, marred by a confusion of the mental and material, these debates were from the beginning doomed to lead nowhere. As long as one tried to explain locomotion, a bodily process, teleologically and as an effect of the soul or will conceived as immaterial entities, mixing up animal motion and the motion of physics, it would prove to be impossible to give an adequate account of this phenomenon.¹⁶

In the 17th century Descartes broke radically with that tradition in strictly separating mind from matter and conceiving the animal body as an hydraulic machine.¹⁷ In his view all animal motions, voluntary as well as involuntary, could be explained on the basis of mechanical principles.¹⁸ They follow naturally

‘...en cette machine {i.e. the animal body}, de la seule disposition de ses organes, ne plus ne moins que sont les mouvemens d’une horloge, ou autre automate, de celle de ses contrepoids & de ses roües; en sorte qu’il ne faut point à leur occasion concevoir en elle aucune autre Ame vegetative, ny sensitive, ny aucun autre principe de mouvement & de vie, que son

¹³ See *Opera*, Vol. 3, 778.

¹⁴ See *Op. cit.*, 780. See for a mixture of Aristotelian and Galenic views also *Commentarii Collegii Conimbricensis*, 554-661.

¹⁵ Some, Timothy Bright for example, even formulated, as we saw, a quasi-mechanical answer to the question of how the soul, through the spirit, simultaneously could effect a variety of motions in the body. (See Chapter 2, pp. 85-6 and note 166.)

¹⁶ See Jaynes (1973), New York: 166-179.

¹⁷ See Chapter 2, section 2.6. See about Descartes theory of animal motion Huxley (1970); Kemp Smith (1952), 124-37; Watson (1971); Caton (1973), 74-100.

¹⁸ ‘...la digestion des viandes, le battement du coeur & des arteres, la nourriture et la croissance des membres, la respiration, la veille & le sommeil; la reception de la lumiere, des sons, des odeurs, des gousts, de la chaleur, & de telles autres qualitez, dans les organes des sens exterieurs; l’impression de leurs idées dans l’organe du sens commun & de l’imagination, la retention ou l’empreinte de ces idées dans la Memoire; les mouvemens interieurs des Appetits & des Passions; & enfin les mouvemens exterieurs de tous les membres, qui suivent si à propos, tant des actions des objets qui se presentent aux sens, que des passions, & des impressions qui se rencontrent dans la Memoire...’ (AT, Vol. 11, 201-2.)

sang & ses esprits, agitez par la chaleur du feu qui brûle continuellement dans son coeur, & qui n'est point d'autre nature que tous les feux qui sont dans les corps inanimez.¹⁹

The machine of our body is composed in such a way

'...que tous les mouvemens que nous faisons sans que nostre volonté y contribuë...ne dépendent que de la conformation de nos membres, & du cours que les esprits excitez par la chaleur du coeur suivent naturellement dans le cerveau, dans les nerfs & dans les muscles...'²⁰

Though the mind or soul can act on the body through the animal spirits many motions that we make, or that occur in our bodies like the beating of the heart, digestion, respiration and even actions like walking or singing done thoughtlessly are performed automatically, i.e. triggered off by certain sensations, and independently of the mind.²¹ The main difference between voluntary and involuntary movements is that only the former are preceded and caused by the idea of the motion concerned, that is, by the animal spirits in so far as these leave the pineal gland, the structure in the head that receives spirits from the heart and sends them through the nerves, in a specific way.²² Though certain kinds of voluntary motions usually stay unperceived most of them are made consciously.²³ According to Descartes only in case of

¹⁹ AT, Vol. 11, 202. See also op. cit., 130-2.

²⁰ Cf. '...que tous les changemens qui arrivent au mouvement des esprits, peuvent faire qu'ils ouvrent quelques pores du cerveau plus que les autres; & reciproquement que, lors que quelcun de ces pores est tant soit peu plus ou moins ouvert que de coustume, par l'action des nerfs qui servent au sens, cela change quelque chose au mouvement des esprits, & fait qu'ils sont conduits dans les muscles qui servent à mouvoir le corps, en la façon qu'il est ordinairement meu à l'occasion d'une telle action.' (Op. cit., 341-2.) Cf. Bright's view (see Chapter 2, section 2.6.)

²¹ '...lorsque ceux qui tombent de haut, présentent leurs mains les premières pour sauver leur tête, ce n'est point par le conseil de leur raison qu'ils font cette action; et elle ne dépend point de leur esprit, mais seulement de ce que leurs sens, étant touchés par le danger présent, causent quelque changement en leur cerveau qui détermine les esprits animaux à passer de là dans les nerfs, en la façon qui est requise pour produire ce mouvement tout de même que dans une machine, et sans que l'esprit le puisse empêcher.' (AT, Vol. 11, 178.)

²² '...l'idée de ce mouvement des membres ne consiste qu'en la façon ces esprits sortent pour lors de cette glande, & ainsi que c'est son idée qui le cause.' (Op. cit., 181); '...toute l'action de l'ame consiste en ce que, par cela seul qu'elle veut quelque chose, elle fait que la petite glande, a qui elle est estroitement jointe, se meut en la façon qui est requise pour produire l'effect qui se rapporte à cette volonté.' (Op. cit., 360)

²³ Thus the movement of the pupil of the eye '...doit estre appelé volontaire, nonobstant qu'il soit ordinairement ignoré de ceux qui le font, car il ne laisse pas pour cela d'estre dependant & de suivre de la volonté qu'ils ont de bien voir; ainsi que les mouvemens des leures & de la langue, qui serve a prononcer les paroles, se nomment volontaires, a cause qu'ils suivent de la volonté qu'on a de parler, nonobstant qu'on ignore souvent quels ils doivent estre pour servir a la prononciation de chaque lettre.' (AT, Vol. 4, 108; see also AT, Vol. 11, 361-2)

voluntary motion is the underlying physiological mechanism susceptible to change by habituation.²⁴

8.2. *The 'Faculty Motive'*

By the 'faculty motive' Warner understands an operative disposition of the animal spirits enabling them to move themselves, effecting, among other things, reasoning and to move '...the mayne lymys or organs of the body whose nerveous parts are animated with spirits motory...' together with themselves, effecting locomotion.²⁵ Thus physiologically the difference between locomotion and reasoning, both consisting of matter in motion, is that '...in the one the spirits with and by their owne motion moving the corporeall organs wherein they are contayned but in the other the spirits only being moved without any motion at all of their organs continent...' ²⁶

According to Aristotle all change, especially local motion, requires two separate things, to wit, a mover as active cause, and a thing moved as passive subject. Nothing, in other words, can be the cause of its own motion. Everything that moves is moved by something else.²⁷ In Warner's day some deemed this principle only applicable to specific motions like bodily changes of inanimate things or, in case of animate things, to changes that were not proper to them as such. Others considered it as a universally valid principle.²⁸ Warner probably sided with the latter.²⁹ Anyway, in his universe there are no such things as 'automats' or self-moving entities, i.e. things, living or dead, moving independently of some distinct mover. Hence, '...the loco-motive

²⁴ '...ainsi que l'experience fait voir aux paroles, qui excitent des mouvemens en la glande, lesquels, selon l'institution de la nature, ne representent à l'ame que leur son, lors qu'elles sont proferées de la voix, ou la figure de leurs lettres, lors qu'elles sont escrites, & qui neantmoins, par l'habitude qu'on a acquise en pensant à ce qu'elles signifient, lors qu'on a ouy leur son ou bien qu'on a vû leurs lettres, ont coustume de faires concevoir cette signification, plustost que la figure de leurs lettres ou bien le son de leurs syllabes...encore que les mouvemens, tant de la glande que des esprits & du cerveau, qui representent à l'ame certains objets, soient naturellement joints avec ceux qui excitent en elle certaines passions, ils peuvent toutefois par habitude en estre separez, & joints à d'autres fort differens; et mesme, que cette habitude peut estre acquise par une seule action, & ne requiert point un long usage.' (AT, Vol. 11, 369)

²⁵ BL Add. MS 4395, f. 15.

²⁶ Op. cit., f. 16.

²⁷ See *The Physics*, II, iv; VII, ii; VIII, iv-v.

²⁸ See Effler (1962).

²⁹ '...quicquid movetur ab alio movetur' (BL Add. MS 4394, f. 134v)

faculty...nether...is automaticall or <without a distinct principium movent> or self-motive because absolutly such there can be none.³⁰ Conceiving the organism as a combination of integrated systems, some sub-systems though triggered by some external stimulus, may seem to be self-motive in their operations. Ultimately all motion presupposes a separate activating principle. Such a principle can be related to an organism or rather to its motive power in two different ways. Either it is ‘...connaturall with it or so <internally> coniunct or connected unto it or dependent on it that it must necessarily and perpetually and invariably move...’³¹ like the motion of the heart or, being less intimately connected to that power, its effects are intermittent and variable like walking, talking etc. The former Warner distinguishes as ‘naturall’ or ‘spontaneall’ from the latter as ‘voluntary’ or ‘ex habitu’.³² Thus while

‘...the originall acts of our locomotions...are...necessarily...naturall and spontaneall, although the succeeding acts are effected by the same causes namely by spirits of <the same> condition or disposition and with the same habitude...yet in respect of the preexistent habituation of the faculty and organs which in the originall was wanting they are understood to be ex habitu and voluntary. That difference of voluntarines or volition consisting especially in this point that the succeeding motions, the fantasy being preinformed with analogate impressions or ideas of the like can not be acted without recognition or refantasiation of those impressions, that is to say that the faculty motive ether can not or doth never execute his function without ether tacit or apparant consultation with the cognoscitive or without speculating the preexistent fantasm; and by the speculation or refantasiation of those impressions or concepts or fantasm the volitory spirits are not only actuated for volition but also governed and directed in their actuation and continuation of the motions. And this precession or intervention of some act or acts of fantasiation or speculation of fantasm makes these motions understood and termed voluntary...’³³

³⁰ BL Add. MS 4395, f. 1.

³¹ Ibid.

³² See Chapter 2, section 2.5. about Warner’s distinction between nature and reason as the two active principles of the universe. Note his deviating terminology. As opposed to most of his contemporaries and like Swammerdam (see note 42) Warner uses the word ‘spontaneall’ not in the sense of ‘voluntary’ but as a synonym of ‘natural’. Cf. Aquapendente’s view of voluntary motion as a motion ‘...ad quem praestandum concurrat princeps facultas ipsius animalis, id est, phantasia, & ipsius appetitus, qui spontaneus est, & liber.’ (*Opera*, 398.)

³³ Op. cit., ff. 42-41. See notes 23 and 24 about Descartes’ view of voluntary motion. Francis Bacon too states that ‘Voluntary motion is ever preceded and incited by imagination...’ (*The works*, Vol. 4, 406) He does not tell us by what kind of image exactly voluntary motion is preceded. Cf. Locke: ‘The forbearance of that action, consequent to...order or command of the mind, is called *voluntary*. And whatsoever action is performed without such a thought of the mind, is called *involuntary*.’ (*An Essay*, 236)

Thus some motions are only made after they have been performed, as it were, in the mind while others do not require such a preliminary performance.³⁴ Warner elucidates that difference as follows. A natural motion like the beating of the heart

‘...being perpetuall without intermission or discontinuation hath no need of any notions or concepts to be retayned for the voluntary reactivation thereof which the other have...and rather although there may be in effect the like impression communicated thereby to the fantasy as there is by the other motions there being no reson to the contrary yet by reson of the perpetuall uniforme continuation thereof without intermission or alteration, such impression can not be fantasiated under any distinct forme of concept, quia conceptio obiectorum simpliciter non fit nisi per alterationem contradictoriam (scilicet per reiterationem presentiae et absentiae obiectorum) specialiter vero per differentiam statariam.’³⁵

As opposed to natural motions voluntary motions like imagination and reasoning, or locomotion are ‘...not perpetuall and necessary...and not only their acts and pauses are not necessarily determinate but voluntarily determinable but also the intention and remission or degree of...their acts is arbitrary or voluntary or their acts are graduable by the volunity...’³⁶ According to most of Warner’s (near) contemporaries ‘...actions which issue from the disposition of the Will are in the power thereof to be performed or stayed’.³⁷ To Warner, on the other hand, only in case of locomotion ‘...the operation of the spirits...is voluntary sistible...the other not except in some cases...’³⁸

In view of the modest role played by the will in Warner’s theory of animal organisms, it is not surprising that straightaway he qualifies this distinction between natural and voluntary behaviour, as if he wishes to prevent his

³⁴ See Chapter 2, section 2.5. on the difference between nature and reason.

³⁵ Op. cit., f. 43.

³⁶ BL Add. MS 4394, f. 162r. Cf. Fabricius of Aquapendente. "De musculi actione". In: *Opera*, 398.

³⁷ Hooker, *Ecclesiastical Polity*, Vol. 1, 170. See for the views of Piccolomini, Laurentius and Bauhinus note 12. According to William Harvey: ‘Eorum quae in nostra potestate sunt, aliqua possumus sistere cum volumus et sicut volumus, et proinde moderare.’ (*De motu locali animalium*, 40)

³⁸ BL Add. MS 4395, f. 39. Warner explains that difference by the fact that the operations of the spirits in local motion are more active than passive. The ‘...conditions and cases of the voluntariness of the operation of the spirits in fantasiation and ratiocination is best speculated by the voluntariness of their operation in sensation of externall objects the one being analogate to the other and both of one and the same kinde...’ (Ibid.) Cf. Piccolomini: ‘...voluntarium motum duplicem facimus, alterum voluntarium simpliciter, ut progressio, deambulatio: alterum voluntarium quidem, sed necessitate aliqua urgente, ac requirente illum motum, ut respiratio, deiectio, mictio...’ (*Anatomicae praelectiones*, 200).

readers from attaching too much importance to it. Voluntary motions only ‘...appere...as yf they were of a different kinde from those that are accounted naturall and spontaneall which are actuated without cognition...’³⁹ From the fact that originally all motions are necessarily natural, he concludes that

‘...the same formality or disposition and habitude of spirit that doth actuate and continuate the pulsatory motion doth not only originally actuate but also continually reactuate the other motions termed voluntary, especially they being both motions of one and the same nature, quality or condition namely locall, and there being no other difference betwene them but that the impressions of the one are refantasiabable and of the other not, that that <accidental> difference notwithstanding the former and other communities should infer <an essential> difference of their cause their is no reson.’⁴⁰

Both kinds of motion, voluntary as well as natural, not only have the same cause and are of the same kind but also are ‘...acted by spirits of one and the same nature and condition.’⁴¹ Though not going as far as Telesio who completely dissolves the opposition between voluntary and involuntary behaviour, Warner strongly dilutes it.⁴²

His notes on the ‘faculty locomotive’ mainly deal with the nature of the physiological cause of locomotion, with the kinds of faculties presupposed by locomotion, i.e. with its psychological cause and with the habituation of this faculty.

³⁹ Op. cit., f. 41.

⁴⁰ Op. cit., f. 42.

⁴¹ Op. cit., f. 41. Consequently, though repeating the galenic notion of muscles as ‘...the instruments or organs of voluntary motion...’ (Op. cit., f. 44) Warner at the same time conceives, as we saw, the heart as a muscle. (See Chapter 2, p. 68.)

⁴² See Chapter 3, pp. 93-5. Cf. Swammerdam: ‘I would have it particularly observed, that I admit no essential difference between the natural and spontaneous contraction of the muscles, and that performed by the will. I consider this difference as merely accidental...’ (*Biblia naturae* (1738), 125. Quoted in Fearing (1929a), 450.)

8.3. *The Physiological Cause of Locomotion*

Warner's speculations about the prime activator of the power of locomotion constitute one of the very few complete essays among his papers.⁴³ It opens with a reference to former notes, no longer extant, wherein he would have demonstrated that this power neither operates naturally or spontaneously, nor automatically.⁴⁴

This faculty, in other words, operates voluntarily and requires a distinct activating principle. The next question is whether that principle is inherent in the locomotive power and essentially connected to it in such a way that the one can not exist without the other, or whether it is located outside this power and exists independently of it. Warner rejects the first possibility, for that would imply that the corresponding power, under the sway of necessity, operates permanently, and always in the same way, like the natural motion of the heart. Normally locomotion satisfies none of these conditions.

‘And for as much as the office or function of the loco-motive faculty by the ordination of nature consisteth wholly in the acquisition and ministration of materialls vitall for the <continually> reparation and supply of those consumptiones and decays that the animall is continually subiect unto...the principium actuativum or motivum thereof must have this condition that the acts and pauses of the loco-motive thereby occasioned or procured may be so regulated that the supplies ministred <ab extra> may iustly correspond or be equivalent to the internall decays of the animall.’⁴⁵

The activation of the locomotive power requires, in other words, a distinct, external principle.⁴⁶

In its effects on locomotion this principle will have to correspond exactly to the shortage of vital materials in an organism. This implies that the corresponding power cannot be activated or deactivated by a quality or property of food or whatever, outside the animal organism. Of course the desirability or nutritional value of something may provoke the appetite and thus the locomotive power but that would imply that its activation is fortuitous. If that would be the activating principle of locomotion animal organisms, would permanently run the risk of over- or underfeeding. Consequently the activating principle has to be a property, quality or affection, either of the

⁴³ See op. cit., ff. 1-17.

⁴⁴ ‘...the loco-motive faculty is not naturall or spontaneall... nether...automaticall...’
(Op. cit., f. 1)

⁴⁵ Ibid.

⁴⁶ ‘Wherefore it must follow that a principium actuativum it must have and the motions or acts thereof being <finall or propter finem and therefore> variable and occasional (as ex ipsis phenomenis it is manifest they are) the principium thereof must be externall and independent the one on the other.’ (Ibid.)

animal as a whole or of some of its parts. Further, ‘...for as much as the affection of decaying is perpetually inherent in the animall and connaturall with it; that which is the auctor or agent of this principiation must be no <uncertaine> or mutable or separable accident or quality but a naturall and standing and certaine faculty.’⁴⁷

The locomotive power can only be put into operation by or through the appetite which ‘...cannot possibly be actuated but by some notion or concept or cognoscitive obiect presented unto it and the same not fatuous or adiaphoron but necessarily ether voluptifik or dolorifik, ether present or fantasiate...’⁴⁸ Consequently the activating principle of locomotion ‘...must necessarily be some cognoscitive faculty ether sensitive or fantasiative, but because all fantasiation is consequent of some sensation and the question is here of the originall it must therefore be some faculty sensitive.’⁴⁹

That faculty will have to satisfy certain conditions set by the purpose of locomotion. Now

‘...the end of all the operations as well of the loco-motive as of the other ministrative faculties being...the conservation of our being and the conservation of our being formally consisting...in <continually> supplying <of> the <continually> decayes and consumptions of our substance and such supplying <being> not to be understood of <any> simply and indefinitely but of a certaine and determinate supplying namely with this determination that the supplies do iustly correspond or be equivalent and adequate to the decayes, it must follow that the conditions of the principium that is to actuate the loco-motive faculty must be such as this equivalency of the supplies to the decayes may necessarily follow thereof. Which can be conceived to be no other then these two, first that the acts of the one namely of the principium and consequently of the loco-motive it self correspond and be commensurate to the acts of the other namely of the decays, secondly that the graduations of the one be equall to the graduations of the other.’⁵⁰

Of all the senses that of ‘inanition in the stomak and chiloducts’, i.e. the feeling of hunger and thirst fulfils these conditions.⁵¹ Moreover it is ‘...of all other that naturally move the appetite the strongest motive...In comparison of voluptifik obiects in generall for this reson that the sensation of dolour present

⁴⁷ Op. cit., f. 2.

⁴⁸ Ibid.

⁴⁹ Ibid.

⁵⁰ Op. cit., ff. 3-4.

⁵¹ See op. cit., f. 3. See for Warner’s ideas about the kinds of senses and about the nature of sensory perception Chapter 4.

is far more motive <for depulsion thereof> than the fantasiation of volupty absent for acquisition thereof.⁵²

Traditionally hunger and thirst were conceived as ‘..desire, the former for what is dry and hot, the latter for what is cold and wet...’⁵³ Many of Warner’s contemporaries dropped the aspect of temperature, considering it as something of minor importance or even irrelevant and subordinated thirst to hunger.⁵⁴ Warner shared these views. Hunger and thirst, in his opinion, ‘...are consequents of two mayne inconvenients of the hydraulik motion vitall tending...the one the want of bloud to be moved and distributed the other the crassitude or influidity thereof difficulting the motion and distribution thereof...’⁵⁵

Thus the sense of inanition has two kinds of objects, ‘...the one naturall and necessary as hunger the other preternaturall and accidentall as thirst. The sense of inanition is properly that of hunger for that it proceedeth originally of inanition...of both sanguiducts and chiloducts...’⁵⁶ Hunger ‘...is naturall and necessary and perpetuall and the other quatenus per se et solitarie existit preternaturall accidentall and casual...’⁵⁷ Thirst is ‘...in some sort namely secundum quid and not simpliciter consequent of inanition...’⁵⁸ As for the role of heat in thirst

‘...it may be argued that drines is the propre and adequate and immediat obiect of the sense of thirst and heat only an obiect <mediate and> accidentall thereof. For ex ipsis phenomenis it is manifest that upon the

⁵² Op. cit., f. 5. Cf. Aquinas: ‘...per accidens contingit quod tristitiam aliquis magis fugit, quam delectationem appetat...’ (*Summa*, Ia sec., q. 35, art. 6, pp. 168-9).

⁵³ Aristotle, *On the Soul*, 414b12.

⁵⁴ ‘...licet fami, calidum, & siccum attribuantur; siti vero frigidum, & humidum, tamen fames est primario sicci, secundario autem calidi: & sitis primario est humidum, secundario autem frigidi...fames est appetitus principalior siti; fames enim immediate dirigitur ad reparationem deperditi, & ad partium solidarum restaurationem, quae quidem fit alimento sicco: Sitis vero non dirigitur immediate ad reparationem deperditi, sed ad liquidandum cibum, ut facilius per omnes corporis partes distribui possit...’ (Zabarella, *In Aristotelis libros de anima*, 352D-F.)

⁵⁵ ‘...the said two inconvenients namely the deficiencie of bloud and the influidity thereof may be understood to tend immediatly to the destruction of the animall scilicet ad atrophiam seu non-nutritionem without any <mediate> relation to the hydraulik motion vitall.’ (Op. cit., f. 8.)

⁵⁶ Op. cit., ff. 5-6. According to Piccolomini, following Galen, hunger is felt ‘...quando venae sugunt, non amplius chylum in ventriculo existentem, sed ipsammet ventriculi & oris eius substantiam, ut ventriculus eiusque os impensè exsiccentur & humido alimentario priventur, & ob hanc insignem siccitatem corrugentur & collabuntur...’ (*Anatomicae Praelectiones*, 410).

⁵⁷ Op. cit., f. 15.

⁵⁸ Op. cit., f. 7. Cf. Suarez: ‘...alimentum distingui solet in cibum et potum...quamvis potus non habeat proprie rationem alimenti...naturaliter fames prius sentitur, quam sitis: nam potus non est nisi propter alimentum...’ (*Opera*, Vol. 3, 587).

continuation thereof that is to say upon the abstinence of the opposit no namely humidity there will necessarily follow an augmentation of the dolour thereof and that gradually usque ad interitur and upon the amotion thereof namely upon the ingestion of the opposit there doth allwais follow a cessation of the dolor. And of the other namely of heat the contrary that nether of the continuation thereof that is to say of the continuall use of hot <meat or> drinke there will follow any augmentation of the dolor nor of the amotion thereof that is to say of <the application of cold things as the ingestion> of cold meates any cessation of the dolour.’⁵⁹

Accordingly

‘...it is only humidity of liquors that doth formally and properly qualifie them for drinks or depulsives of thirst and that their heat or cold is altogether impertinent and doth nothing at all concerne that purpose or use of them yf the customary use of cold drink be well examined in respect of the salubrity thereof otherwise there being no necessity thereof in respect of asswaging the thirst...’⁶⁰

Further though thirst ‘...be with a confused dolor as that of hunger is...ordinary thirsts appere rather displesing and offensive then painfull.’⁶¹ All this is not to deny that together with hunger it constitutes the ‘vitall sense’ which

‘...being actuated by the dolorifik effects or consequents of the decays doth actuate the appetite and the appetite the loco-motive volunty. So that the decays themselvs by way of sensation are in this maner the principium motive to their owne reparation or supply.’⁶²

That this sense of inanition as activating principle of locomotion guarantees an adequate supply of vital materials is further argued as follows:

‘...this sense of vitality consisting...in a certaine dolorous torsion or vulsion or griping consequent of stronge suction or attraction in case of hunger only or in a painfull distemper of heat or driness or both in case of thirst only or in both in case were both concur and this griping or

⁵⁹ Op. cit., f. 13. See also op. cit., f. 49. Cf. Casmann: ‘Sitis est ex defectu necessarii humoris orto é siccitate quam calor induxit potus appetentia.’ (*Psychologia*, 220); Campanella: ‘...falsum est, quod dicit Aristoteles famem calidi, siccique appetitum esse. nam cibi etiam frigidi appetuntur, nec sitis est frigidi humidique. Sufficit enim res humida ad coquendum cibos: frigidus autem potus requiritur ob usum.’ (*Compendium de rerum natura*. (*Opera*, Vol. 1, 71).

⁶⁰ Op. cit., f. 14. Cf. Telesio: ‘...liquor nullus, nisi frigidus sit, satis sitim sedat.’ (*De rerum natura*, 237).

⁶¹ Op. cit., ff. 7-8. Cf. Portius: ‘Sitis...privativè...dolorem infligere potest...’ (*De dolore*, 34-5).

⁶² Op. cit., f. 4.

distemper being gretter or lesser according to the intention or remission of inanition...and inanition necessarily proportionall to consumption or decay this being really one and the same thing differing only ratione it must follow <that> this sense and consequently the appetite and therby the loco-motive and finally the supplies must necessarily be graduated according to the graduations of the decaies...⁶³

8.4. *The Psychological Cause of Locomotion*

Hunger and thirst do not activate ‘the faculties ministrative...the locomotive and loco-directive’, i.e. effect locomotion, directly. The spirit as well as its bodily organs ‘...whose nerveous parts are animated with spirits motory...’⁶⁴ cannot be set in motion ‘...without some change or alteration of the said spirits motory whatsoever it be whether by way of extension or dilatation without accession or augmentation of quantity or by influxion and augmentation without dilatation...’⁶⁵ Neither is it possible that this

‘...change or alteration of the spirits motory should be <primely and> originally effected and acted in themselvs only without some previous alteration of the spirits cognoscitive on which they depend and to which they are continuat...whatsoever the maner or formality thereof be or howsoever it be acted or effected whether by way of extension or ampliacion or dilatation of the spirits themselvs consequent of some kinde of incension or inflammation &c...or by way of compression or constriction of their organ or continent or by way of augmentation and accesse of new from the pulsatory which by the turbation...of that motion consequent of inordinat and vehement appetitions might be argued.’⁶⁶

That change, in its turn, ‘...must be such as may habilitate the spirits cognoscitive and give them power or force communicable of the like unto the spirits motory that is yf it be by way of inflammation to inflame and yf by way of augmentation to augment the spirits motory...’⁶⁷

Warner’s speculations about this question are not altogether clear. Apart from more or less identifying will and locomotion as faculties, without explicitly saying so he presents three different versions of a theory about the way the ‘loco-motive volunty’ is activated. According to one version locomotion is

⁶³ Op. cit., f. 4; ‘That the pauses of ministration are not casuall or arbitrary but of necessity...is manifestly confirmed by the <solemne> ordination of the stomak or some other organ analogate to the stomak in all perfect animalls as a cisterne or receptacle or promptuary for the reception and reposition of the present ingested materialls ether till the preingested be disposed of or for store or provision against casualties of penury within the limit of some competent time &c.’ (Ibid.)

⁶⁴ Op. cit., f. 15.

⁶⁵ Op. cit., f. 16.

⁶⁶ Ibid.

⁶⁷ Ibid.

effected by a combination of appetite, hope or fear, and will: ‘...the volunty or faculty volitive being understood to be the <immediat> principium or faculty principiant of all our <arbitrary> motions and actions whatsoever these two faculties namely the appetitive and metu-sperative may be accounted the actuatives or principiatives of it.’⁶⁸ In another version locomotion is supposed to be activated by apprehension, appetite, and hope or fear:

‘...there are foure faculties gradually subordinat to the executive or loco-motive as actuatives or principiatives thereof for the assecution of oboiects. The first is that faculty whereby we first apprehend a thing to be bonum vel malum, pulchrum vel turpe simply...the faculty placitive <or applausive>...The second the appetitive and the oboiect thereof bonum vel malum nobis or quoad nos simpliciter...The third the sperative <or metu-sperative> with the oboiect thereof bonum vel malum quoad nos, obtinibile seu <nobis> possibile...’ that is, ‘...the aspirative and the sperative...the aspirative being but of a degree principiative or inchoative to the the sperative...’⁶⁹

Finally a third version, adds to these preceding faculties the so-called determinative faculty, a ‘synthesis’ and the will meaning the actual beginning of locomotion.⁷⁰

Essentially these speculations express the idea that locomotion presupposes sensory perception, appetite, and a rational account of profits and losses. Thus formulated, Warner’s theory of locomotion does not seem to differ substantially from the traditional view. Most of his contemporaries agree that locomotion requires sensory perception, appetite and/or will plus a special power to move. On closer inspection there turn out to be some intriguing differences. Warner’s theory about the faculties preceding the locomotive faculty is based on an analysis of ‘...the graduall formation of their oboiects...’⁷¹, and especially on a consideration of ‘...the necessity of the graduall subordination of their formall and proper oboiects...’ compared with the direct actuator of the will.⁷² As opposed to the sensitive and intellective faculties, the locomotive faculty like its beginning, the will, not being acted on but being active itself, has a subject instead of an object for its actuator. Like all animals we are generally incited to locomotion by things that are deemed to be ‘facile’, i.e. to be acquired or removed easily.⁷³ This presupposes that their acquisition

⁶⁸ BL Add. MS 4394, f. 263v-r.

⁶⁹ Op. cit., ff. 261v-260v. See also Chapter 7, section 7.5.

⁷⁰ See op. cit., f. 262v-r.

⁷¹ ‘That there are foure...faculties precedent to the locomotive may be necessarily argued out of the graduall formation of their oboiects...’ (Op. cit., f. 262r)

⁷² Op. cit., f. 254v.

⁷³ ‘...facill that is to say the bonity thereof liquid no part thereof elided or checked or countrevalued by the malignity ether of the media or of the symptomes.’ (Op. cit., f. 267r)

or removal is possible not only objectively but also with respect to our capabilities. That is only relevant if we have any interest in it, i.e. if it is good or bad subjectively. This, finally, presupposes that we apprehended the thing in question as good or bad as such. These qualities coincide with the characteristics of the objects of the sensitive faculty and of the ‘faculties deliberative’, i.e. the appetite, feelings like hope and fear, and the determinative faculty.⁷⁴ Assuming, as Warner does, that these characteristics, combined in the subject of locomotion, necessarily go together as successive specifications of one and the same notion locomotion, the will, its beginning included, can not be but preceded by acts of the corresponding faculties.

‘Although in some cases by reason of the momentaneall or ioynt presentation of their objects their severall acts are not distinctly perceived or out of habit sometimes and sometimes thorough precipitation or festination or other turbation of the passion of appetite some of the succeeding acts may seeme to be omitted yet they do allwais ether explicite or implicite tacitè or manifestè diverso vel eodem actu precede the voluty.’⁷⁵

In fact the subject of the will and therefore also that of the faculty locomotive, is nothing other than the notion that functioned as the object to the preceding faculties.

Most of Warner’s contemporaries shared his conviction that locomotion presupposes and requires cognition, appetite and a special power to move.⁷⁶ Yet, apart from conceiving these faculties differently than Warner, they also had other reasons for that conviction, proceeding from their different concept of the soul. Warner explains all functions of the animal organism as effects of the operative qualities of a material substance, diffused through the body and, being continuous, always acting as a whole. This means that wherever this substance, the spirit is, there also are its operative qualities, its faculties. Essentially all of its faculties are involved in the execution of each animal function. Warner does not have to bridge a gap between body and soul, both being material, or to account for interrelationships between different souls, different parts of the soul, or different levels of functioning of the soul like sense and reason. His theory of the faculties preceding locomotion is not

⁷⁴ See op. cit., ff. 265r-267v.

⁷⁵ Op. cit., f. 260r.

⁷⁶ ‘...Ad motum progressionis concurrat vis dirigens quae in hominibus ratio est, caeteris animantibus imaginatio...Praeter appetitum danda est virtus quaedam inhaerens membris, quae motum proximè exequatur.’ (*Commentarii Collegii Conimbricensis*, 554-6.) Cf. Suarez: ‘...ex sensu sequitur appetitus et ex appetitu motus.’ (*Opera*, Vol. 3, 700); ‘Ad motum progressivum concurrunt cognitio, appetitus, externa membra, eorumque dispositio.’ (Op. cit., 778) See also Aquinas, *De anima*, lectio XV-XVI.

based on observation but on a detailed analysis of concepts, the ‘causes’ of the different kinds of operations, and their formation. Having almost completely obliterated the distinction between natural and animal motion, and only touching on the physiological side of locomotion he could hardly have done much else.

The corresponding theory of his Scholastic contemporaries, on the other hand, was explicitly meant as an explanation of motions conceived as proceeding from a choice and as the execution of a command. Appetite, i.e. the sensitive appetite in brutes and the rational appetite in man, was said to precede locomotion as an instigating factor and had to account for its being goal-directed. Cognition, sensory or rational, was supposed to show the way. In their view reason did not, as in Warner’s opinion, play the role of an economist or ergonomist, but was supposed to inform the animal about the really and morally true good as well as about the best means to acquire it.⁷⁷ The special locomotive power, finally, had to account for the bodily execution of the said choice and command.⁷⁸ The will, instead of being reduced to the first phase of locomotion as in Warner’s theory, was generally conceived as the prime mover and first principle of all human operations.⁷⁹ Though the will was not supposed to be able to obstruct an act chosen by the sensitive appetite, the latter could not move the body ‘renuente voluntate’ and the will certainly could impede locomotion. Apart from these arguments they also adduced another kind of explanation for the unity of the soul and its powers:

‘...vis Animi sentiens, etiam sit movens; non quia sentiens tantum, sed quia Appetitum coniunctum habet: Nec differt sentiens Animi facultas & loco movens subiecto, sed tantum ratione. Secundario autem cum intelligente Animo loco movens est eadem facultas; quoniam intelligens absque sentiente nunquam existit.’⁸⁰

As appears from this quotation they did not, like Warner, explain that unity in terms of the ‘hardware’ of animal organism, i.e. the nature of the spirit, but

⁷⁷ ‘Solum Appetitum, principium et causam mutationis loci in animalibus esse non posse, apparet in hominibus continentibus: etiamsi enim ij saepè mala appetunt & cupiscunt, non tamen agunt ea quae appetunt: sed rectè dictantem mentem & rationem sequuntur.’ (Hawenreuter. *Compendium*, 596)

⁷⁸ Cf. Burgersdijk: ‘Ad motum localem concurrat sensus, (in homine etiam ratio) ut principium dirigens; appetitus, ut principium imperans; vis locomotiva, ut principium exequens.’ (*Idea*, 77); ‘Sensus, appetitus et potentia motiva proportionaliter se habent in illo {i.e. ‘omnibus animantibus’}, et perfectiorem sensum perfectior virtus motiva comitatur.’ (Suarez, *Opera*, Vol. 3, 780; see also op. cit., 778)

⁷⁹ See Suarez, *Opera*, Vol. 3, 781.

⁸⁰ Hawenreuter, *Compendium*, 599. Cf. Suarez, *Opera*, Vol. 3, 508.

based their explanation on certain preconceptions concerning the organization of the soul and its powers in general.

8.5. *The Habituation of the Locomotive Faculty*

Suarez denied that the locomotive power could be habituated. It does not even need habituation being an instrument that by natural necessity simply has to obey the appetite. What looks like a habituation of the bodily members is probably nothing but a material aptitude acquired by the daily use of one's arms and legs.⁸¹

Warner thinks otherwise. 'Nullum esse motu nisi ex habitu implicat contradictionem, ita enim nullus esset originalis <motus> et per consequens nullus habitus et consequenter nullus motus; intellige de motu animali.'⁸² In fact

'The originall acts of the locomotive faculty are...necessarilly spontaneall as those of the pulsatory and the maner of their acting is as yf they were effected merely by the systole and diastole of the hart or by some such like naturall and spontaneall dilatation or contraction of the spirits as in the <first> sucking and deglutition of milk in infants'⁸³

This does not take away the need for further habituation. Voluntary motions by

'...the originall and first acts of the spirits do but make their owne wayes and passages which afterwards in the succeeding acts they do habitually finde. And this is generall in all the locall motions of the animall, by locall motion understanding not only that of the legs whereby the <whole> animall is transported from place to place but also that of the armes and of every single finger and generally of any other part of the body that is effected by the muscles...whereby the positure of the body is in any sort <or particle> changed though the whole keepe still one and the same station.'⁸⁴

Of motions, differing in complexity,

⁸¹ See *Opera*, Vol. 26, 668. See also Chapter 3, section 3.7.

⁸² BL Add. MS 4395, f. 45.

⁸³ Op. cit., f. 39; '...all our locall motions in respect of their originall actuation are to be understood merely spontaneall...' (Op. cit. f. 43).

⁸⁴ Op. cit., f. 44 Cf. Descartes: '...lors que l'ame veut se souvenir de quelque chose, cette volonté fait que la glande, se penchant successivement vers divers costez, pousse les esprits vers divers endroits du cerveau, jusques à ce qu'ils rencontrent celuy où sont les traces que l'objet dont on veut se souvenir y a laissées. Car ces traces ne sont autre chose, sinon que les pores du cerveau, par où les esprits ont auparavant pris leur cours à cause de la presence de cet objet, ont acquis par cela une plus grande facilité que les autres, à estre ouverts derechef en mesme façon par les esprits qui vienent vers eux. En sorte que ces esprits, rencontrant ces pores, entrent dedans plus facilement que dans les autres...' (AT, Vol. 11, 360)

‘...some...are simple consisting only of one alternation or of two alternatory or correlatively opposit acts namely of constriction and relaxation in one perpetuall maner and way as that of closing and opening the eyelids, that of deglutition, that of manducation, all the motions of evacuation &c.; other more <compounded> and those of the armes hands and fingers most; those of the legs not so manifold and full of variety nor those of the tong.’⁸⁵

By nature

‘...those motions that are of grettest use and necessity for the maintenance of our life are most simple; for there are some of them, the use and exercise whereof is of that absolute necessity not only as soone as we are borne and in the whole course of our life afterwards but also before we are borne as soone as we have receved the complete formation of our kinde that of the <present> non execution of them must needs follow our no-existence that is yf we could not presently and perpetually use them we could not live; so that yf such motions were much compounded and did consist of many intricate changes and transitions that they could not be presently and promptly acted before their organs were habituated by long precedent exercise and practise and much frequentation and reiteration of acts we must necessarily have perished before we could have acquired that habit and consequently the whole genus of us could never have had being. Wherefore it was necessary that they should be so simple that they might be originally acted by...the appetite.’⁸⁶

Hence

‘...the first acts of these our simple voluntary motions may be understood and accounted spontaneall or necessary or naturall and the succeeding acts voluntary or arbitrary and the like may be understood of all the rest...with this difference that in the simple motions the organs are as perfectly habituated by the first or second acts as by all the succeeding but in the compound there is required gret reiteration or frequentation of many acts to perfect and habituate the organs more or lesse according to the gretter or lesse composition of ether the motion or the organ which is all one the composition of the one following the composition of the other.’⁸⁷

Voluntary motion differs from natural motion in so far as it is always preceded by the recollection of a similar motion made in the past. Accordingly ‘...we have a certaine and peculiar sense of all our owne locall motions how simple or how compounded soever they be...’⁸⁸ This implies that

⁸⁵ Ibid.

⁸⁶ Ibid.

⁸⁷ Op. cit., f. 43.

⁸⁸ Ibid. Only the beating of the heart is acted ‘...without any inspection or speculation of the fantasy or cooperation of spirits cognoscitive which happens of necessity there being ex hypothesi no concepts or phantasms of those motions preexistent to be speculated...’ (Op. cit., f. 42)

the acquisition of the power to move from place to place apart from the habituation of the organs of the motory spirits also requires the habituation

‘...of the faculty cognoscitive...that is to say of the organs sensitive and of the fantasy or retentive of the impressions or fantasmes of things externall as of the organs locomotive and of the <fantasy or> retentive of the impressions or fantasm of self-motions locall...’⁸⁹

Thus by the same acts through which the organs of locomotion are

‘...habituated that is to say adapted and perfected for the [reception] operation of the spirits motory <in the succeeding acts>...is the fantasy or campus <seu horizon> phantasticus or receptivum seu retentivum seu repositorium fantasticum by way of sensation habitually informed with impressions...<like and analogate> to the said motions...And by this twofold habituation of the organs motory and <the> fantasy is the faculty motive it self understood to be habituated for promptitude, facility and certitude of his operation and in some cases also for vigour and strength. The fantasy is habitually informed with notions or concepts of motions precedent for the recognition of those that succeed, the organs are cohabituated by the precedent acts for prompt, facill and certaine execution of the succeeding...’⁹⁰

Therefore

‘...in all our locall motions...there is this community that as their organs are gradually perfected and habituated...so the notions or concepts of them in campo phantastico are in like proportion gradually fixed and habituated so as the notionall habit of our motions is allwais analogate to their habit reall and organically, yf the one never actuated the other blank yf the one rude and vagous the other confused yf the one dispositionall so the other yf the one perfect and habituall so the other...’⁹¹

8.6. Conclusion

Warner’s doctrine of locomotion constitutes a synthesis of his ideas about the other voluntary faculties discussed in the foregoing chapters. Consequently the eclectic mixture of Scholastic ideas and notions that seem to derive from Telesio’s rational hylozoism adduced to explain the operations of the ‘faculty

⁸⁹ Op. cit., f. 41; ‘...the habits of the locomotive are directed and governed by some dependence or correspondence that they have to some impressions or notions in the cognoscitive which impressions or notions do require to be as perfectly habituated as the <loco-motive> organs themselvs or els their motions cannot possibly be habituall and perfect, this correspondence doth...argue a necessary conformity of habituation of both the faculties as well <of> the cognoscitive that is the sensitive and the intellective...as of the loco-motive.’ (Op. cit., f. 31)

⁹⁰ Op. cit., f. 42. Cf. op. cit., f. 30. See also Chapter 4, p. 151.

⁹¹ Op. cit., f. 43.

sensitive' and the thinking-faculty returns in his explanation of locomotion. It is based on the idea that animal organisms are controlled by just one soul conceived as a material yet rationally acting substance driven by the urge for self-preservation. The continuity of this psychic substance guarantees in Warner's view the mutual attunement of the several faculties and accounts for the fact that all operations of the organism are controlled by reason. Accordingly, Warner minimizes the distinction between voluntary and involuntary behaviour. His notes on locomotion show an uncommon interest in its physiological cause, but instead of extending that interest to the physiology of locomotion itself Warner, like his more orthodox contemporaries, restricted himself to speculations about the psychology of locomotion. The theories in question are rather unclear. He formulates three different explanations of the psychological activation of the 'faculty locomotive' without indicating which one he prefers.

Though based on a view of the soul and its faculties differing fundamentally from the Scholastic ideas current in his day, Warner discusses his theory of locomotion as nothing but an elaboration and correction of that tradition. He reproaches his Scholastic colleagues with not having distinguished correctly the faculties, preceding locomotion, i.e. its causes conceived by Warner as a combination of thinking-processes and corresponding movements of the spirit. His criticism focusses on their account of the deliberative faculties, i.e. the appetite, feelings like hope or fear, and the will. In response he introduces a number of new distinctions and corresponding concepts. These, though original and interesting enough in themselves, are partly too close to the traditional teleological explanation of voluntary behaviour and partly too ambiguous to be considered as preludes to the breaking of what would be essentially new grounds. That would have required either a radical, unambiguous separation of mind from matter like Descartes, or a Hobbesian reduction of all phenomena, the mental included, to matter in motion. In the next chapter I will investigate Hobbes' debt to Warner's explanations of the physiological and psychological functions of animal organisms.

Chapter Nine

Hobbes and Warner

9.1. Introduction

In the early 1970s Jean Jacquot, one of the few and certainly one of the first Hobbes-researchers showing a substantial interest in Warner, wrote that Warner's '...approach to the discussion of pleasure, pain, joy, sorrow, sensation, intellection, and volition is strikingly similar to that of Thomas Hobbes in early manuscripts such as the *Elements of Law*, or the criticism of Thomas White's *De mundo*, as well as his published work, *De Homine* and *Leviathan*...' According to Jacquot, Hobbes knew Warner's research in that field and was stimulated by it.¹

Already ten years after Warner's death Seth Ward in his criticism of the *Leviathan* (1651) alleged that Hobbes'

'...Theory of explaining sence upon the grounds of motion...is contained for substance (as I am certainly informed by one who hath seen it²) in Mr. *Warners* Papers, which Mr. *Hobbs* had long since in his hands, and

¹ See Jacquot (1974), 124-5. He was preceded by Brandt who in his classical study, *Thomas Hobbes' mechanical conception of nature* (1928), devoted an extensive footnote to Warner (pp. 391-2). Hobbes will be cited from the following works: Aalen's reprint of Molesworth's edition of the *English Works*, referred to as EW, and the *Opera Latina*, referred to as OL, followed by the numbers of the volume and the page, F. Alessio, *Thomas Hobbes: Tractatus Opticus*. Rivista critica di storia della filosofia, XVIII, no. 2 1963, 147-228, referred to as TO II, followed by the number of the page, Elaine Condouris Stroud. *Thomas Hobbes' A minute or first draught of the optiques: A critical edition*. Ph. D. dissertation. The University of Wisconsin-Madison, 1983, referred to as FD, followed by the number of the page, *The elements of law natural & politic*. Edited by Ferdinand Tönnies (1889). Reprint with an introduction by Prof. M. M. Goldsmith. London 1984, referred to as *The elements*, followed by the number of the page, from *Thomas Hobbes, Critique du De Mundo de Thomas White*, édition critique d'un texte inédit par Jean Jacquot et Harold Whitmore Jones, Paris 1973, referred to as AW, ('Anti-White') followed by the number of the page, and from Bernhardt's edition of the *Short Tract*, referred to as ST followed by the number of the page.

² Perhaps Herbert Thorndike (1598-1672), Anglican divine and friend of Ward, who came into possession of Warner's papers in 1652. (See Chapter 1, section 1.2.1.) Or that other friend and mathematician John Wallis (1618-1673), a fierce opponent of Hobbes in general and of his mathematical theories in particular. According to Hartlib the task of ordering Warner's papers fell initially, i.e. about 1650, to Seth Ward himself: 'Mr. Ward the Prof[essor] of Astron[omy] is to set out the mathematical and other workes of Warner conc[erning] coyne etc.' (Ephemerides 1650, 28/1/62A. Quoted from Clucas (1991), p. 53, note 88.)

is delivered in the very beginning of that tract of vision, which treats *de penicillo optico*...³.

In reply to that accusation Hobbes acknowledges having seen once a tract by Warner on the ‘proportions of alloy in gold and silver coin’.⁴ However, he denies having seen other papers on optics by Warner besides a tract about *Vision by Refraction*⁵, or ever having heard him talk about a treatise *De penicillo optico*. Perhaps he suffered from a lapse of memory. Anyway, it is implausible in view of his close relationship with Charles Cavendish that Hobbes did not know more of Warner’s work. Like Robert Payne, Cavendish regularly contacted Warner about his scientific activities. Hobbes probably saw the tract on the place of the image after reflection from concave and convex mirrors, and the one about the construction of perspective glasses that Warner sent Cavendish in 1636.⁶ Also his letter to Newcastle from July/August 1636, wherein he praises Warner together with Mydorge as optical scientists of European stature, but also reproaches them for not proving enough, suggest that he knew more of Warner’s writings.⁷ Finally, among his papers at Chatsworth there is, written by Hobbes, a copy of Warner’s *De tactionibus* plus a text titled ‘*ad architecturam nauticam problema*’.⁸ Of course it is possible that he saw these texts only after 1656, i.e. after writing his reply to Ward’s accusation. Anyhow, according to Hobbes it was from him that Warner ‘...first heard it mentioned that light and colour were but fancy. Which he embraced presently as a truth, and told me it would remove a rub he was then come to in the discovery of the place of the image...’⁹ Hobbes, the

³ *Vindiciae Academicarum*, 247.

⁴ See BL Harley Ms. 6755, ff. 15r-18r: *Mr. Warner’s Tract of the commixture of metallis for the mint*.

⁵ In 1640 John Pell mentioned Walter Warner in answer to Mersenne’s suggestion that apart from Descartes there seemed to be someone in England ‘qui veram habeat demonstrationem proportionis, per quam fit refractionis radiorum in diaphano’. (Mersenne, *Correspondance*, Vol. 9, 61-62.) (According to Lohne, it was not Warner but Harriot who in c. 1601 discovered the law of refraction. He considers Warner’s measurements on refraction, performed together with Thomas Aylesbury in 1627 (See BL Add. MS. 4395, f. 99) as attempts merely to validate Harriot’s law. ((1963), 152-172) As appears from his correspondence already in an early phase Mersenne was interested in Warner’s work. See for example his letter from 1-5-1641 to Pell. (Op. cit., Vol. , 10, 611) Through Hobbes Mersenne later acquired a copy of Warner’s tract on the law of refraction which he published together with Hobbes’ first optical tract. (See Chapter 1, note 111.)

⁶ See Halliwell (1965), 67.

⁷ HMC (1893), 128.

⁸ See ROYAL COMMISSION (1977), B. 5. (p. 6-7), C. 1. 9. (p. 9).

⁹ EW Vol. 7, 340-342

neophyte in optics, would not have drawn from Warner's papers, but the 'doctissimus senex' would have learned something from him.

The supposition that Hobbes took his ideas about the 'facultyes and passions of the soul' from Warner's manuscripts or was, at least, heavily influenced by them, implies that he saw that material when Warner was still alive for most of the ideas in question can be found in his writings as early as the 1640s.¹⁰ In fact his comment in a letter of August 1635 to the Earl of Newcastle regarding Warner's opinions on the 'facultyes and passions of the soule', confirms that he had not seen it up to that time. Therefore he can only have seen the manuscripts in question somewhere between October 1636 when he returned from his third trip to the continent, and November 1640 when he left for a long voluntary exile in France. The letter to Newcastle suggests that in 1634 Hobbes had one or more conversations with Warner on the subject, but what in fact, at that time, did he learn from Warner?¹¹

Over the years Warner's views about light and vision underwent some substantial changes. During the first two decades of the 17th century he, as stated previously, understood by sensory perception the impression of certain forms in a sensory organ located in the head. These impressions are effected by spirits, activated in their turn by sensible qualities conceived as active substances analogous to or even identical with light¹², i.e. a cosmic force either operating nothing but motion in some of the parts of the thing acted on or setting that thing as such in motion.¹³

In the 1620s, Warner adheres to this concept of a cosmic power identified with light but dissociates it from sensory qualities. These he no longer conceives as objectively existing entities but, being by now an atomist, as subjective experiences caused by the action of that force on the sense-organs. He also no longer explains sensory perception in terms of matter and (assisting) form but unequivocally describes it as an effect of matter in motion.¹⁴

These changes in Warner's theory of perception are still in line with his former views. In the early 1630s however he introduces yet another, more radical change. Around June 1636 he sent Charles Cavendish two tracts, probably written in the early thirties, on the place of the visual image after

¹⁰ See *The Elements*, TO I, the AW, and the TO II.

¹¹ See Chapter 1, section 1.1., p. 15, Tönnies (1971) and Reik (1977).

¹² See Chapter 4, section 4.2.

¹³ Sion College: Arc. L 40. 2/ E 10, f. 88v. See also Chapter 4, p. 140.

¹⁴ '...sensation is alteration and no alteration can be without locall motion...and that of matter for there is nothing els that can be so much as imagined properly to be moved...' (BL Add. MS 4394, f. 389v). See also op. cit., ff. 389r, 399r. Cf. Chapter 1, note 149 and Chapter 3, note 108.

reflexion from different types of mirrors.¹⁵ The first of these two tracts ends with four corollaries the last of which concerns a ‘paradoxon opticum pertinens’.¹⁶ It concerns the fact that in direct vision things appear to be coloured while in fact, he now believes, the things around us are not coloured at all:

‘Speciei vero radiosae imago...in visione directa cum ipso obiecto coniuncta perpetue cernitur, superficiei eius affixa, eamque colorans, ac si qualitas aliqua esset naturaliter ipsi inhaerens. Cum tamen in obiecti superficiei materialis omnino cum sit, qualitas alia praeter ipsius materiae accidentia et affectiones ut sunt particularum componentium et intermistarum vacuitatum (quas atomos et poros vocare licet) magnitudines et figurae et totius structurae configuratio (quae cum de genere prorsus geometrico sint quantum a natura coloris distant manifestum est) ne excogitari quidem potest.’¹⁷

The surface of a material object consists only of form and magnitude. To wit, those of the particles out of which it is composed, the vacuities in between included, or - if one prefers - atoms and pores plus the configuration of the whole. ‘Form’ and ‘magnitude’, however, are geometrical properties and thus of a nature totally different from colour.

Warner gives the following explanation for the fact that such objects, directly perceived, nevertheless seem to be coloured. Vision in general requires a visible, material object, a ‘species radiosa’ of such an object¹⁸, and an image of that species. In the case of reflection and refraction those three are clearly separated and occupy different places:

‘Videlicet obiectum ut materiale, per se extrinsecus subsistens, obiecti species radiosa in spiritibus visivis per membranae et ei continuati nervi optici filamenta discursantibus speciei radiosae imago proprie et natura sua sine omni subiecto, in ipso aere pendula ni forte in loco eius corpus

¹⁵ BL Add. MS Harley 6756: De loco imaginis in visione a speculo spherico concave reflexa (ff. 5r-23r) and De loco imaginis in visione a speculo cylindrico concavo reflexâ (ff. 24-26r). The last tract is followed by the statement: ‘M^r. Warners Tract, transcribed by Huntington Smithson.’ Smithson probably transcribed these tracts in the last quarter of the century. See for information on him Wright (1972), 307. See also Halliwell (1965), 67 and HMC (1893), 128.

¹⁶ Op. cit., f. 22r-v; BL Add. MS 4395 contains a draft in Warner’s own handwriting (ff. 104-105). A comparison of this handwriting with that of Warner’s letters from the early 1630s to Payne and Cavendish as well as that of the text of the ‘*Ad mathematices studioso*’ (Op. cit., f. 92), published later in the edition of Thomas Harriot’s *Artis analyticae praxis* (1631), suggests that this fragment was written at the earliest in the late 1620s.

¹⁷ Op. cit., f. 104.

¹⁸ Roger Bacon distinguishes between *species incidentiae* that multiply themselves between object and mirror, *species reflexa* that propagate themselves from the mirror to the eye or the other way around, and the *species radiosa* which expression indicates that the species multiply themselves radiating instantaneously in all directions. (See *Opus Majus*, Vol. 2, 458, 463 and Michaud-Quantin (1970), 119).

aliquod subesse accidat; quod tamen a paritioni eius non magis officit quam si in inani aere suspensa sit.¹⁹

In direct vision, on the other hand, ‘Speciei vero radiosae imago...in visione directa cum ipso obiecto coniuncta perpetue cernitur, superficiei eius affixa, eamque colorans, ac si qualitas aliqua esset naturaliter ipsi inhaerens.’²⁰ While such an object thus appears as the bearer of that colour, in reality only visual spirits, says Warner, can be, and in this case really are coloured.

‘Rerum igitur visibilium apparentem colorationem mere imaginariam esse concludimus et realitatis expertem, quam licet spiritibus visivis, quoad colorationis actum attribuendam esse certum sit; nempe in quibus colores tanquam in locis suis et subiectis vere et realiter existunt...’²¹

The only contribution of the object consists of the fact that the specific configuration of plenitude and vacuity on its surface leads to a specific combination of light and shadow and thus, by way of the impression in and corresponding transfiguration of the spirits, results in a specific colour.²² However, ‘...una cum spirituum coloratione ista interna [coloris] eiusdem imago quaedam et representatio fallax ex phantasiae deceptione extrorsum

¹⁹ Op. cit., f. 104.

²⁰ Ibid.

²¹ Ibid. Cf. Kepler: ‘...spiritus pati à coloribus et luminibus, passionemque hanc, esse quandam, ut ita dicam, colorationem et illustrationem. Nam resident in visu species fortiorum colorum, post intuitum factum...Haec species separabilis à praesentia rei visae existens, non est in humoribus aut tunicis...ergò in spiritibus et per hanc impressionem specierum in spiritus, fit visio.’ (*Werke*, Band 2, 152.)

²² ‘...quoad specificationem colorum scilicet differentias et diversitates constituendam ipsis obiectis causatio originalis deneganda non est. Nam obiecti configuratio superficialis ex pleno et vacuo constructa (quo nomine supradictas obiecti affectiones materiales significamus) quae radiositati ab obiecto ad visum tendenti sub ratione lucis et umbrae ipsius configurationis pleno et vacuo exacte congrua imprimitur a radiositate in visum se ante in spiritum radiosam speciem impressioni analogam in spiritibus visivis transfiguratur. Quae quidem alteratio configurationis scilicet transfiguratio in spiritibus facta ipsorum spirituum vera et realis coloratio est, obiecto interim a quo coloratio illa saltem quoad specificationem originaliter profecta et causata est, inalterato penitus et incolorato persistente.’ (Ibid.) Cf. Hobbes: ‘...when it {light} cometh to the eyes by reflection from uneven, rough and coarse bodies, or such as are affected with internal motion of their own, that may alter it, then we call it colour; colour and light differing only in this, that the one is pure, the other a perturbed light.’ (*The elements*, 6); Cf. Digby: ‘...colour is nothing else, but the disposition of a bodies superficies, as it is more or lesse apt to reflect light...’ (*Two treatises*, 260).

profertur...²³ That image in direct vision coincides, as was said, with the object:

‘Atque hinc fit ut de spiritibus intra nos latentibus et incognitis minimè solliciti res materiales extra nos extantes et visibus nostris expositas hallucinatione metonymicae causae pro effecto (tanquam sigilli pro signatura) coloratas iudicamus et varijs colorum nominibus insignimus.’²⁴

Thus because we can not see the spirits while the material object is visible we wrongly ascribe the colour to that object. We will have to determine whether it was this theory that appealed so much to Hobbes or one of the earlier versions.

Hobbes’ own doctrine on the ‘faculties and passions of the soul’ constitutes another complicating factor in as much as it, like Warner’s views, over the years became substantially modified in several respects. Since the 1650s his philosophy met with an almost unanimous rejection. He was ridiculed for his mathematical work, suspect for his political philosophy and flatly detested for his supposed atheism. The latter accusation was based on his denial of spirits in the sense of incorporeall substances. According to Hobbes ‘...there is nothing that truly exists in the world but single individual bodies producing single and individual acts or effects from law, rule or form and in order or succession.’²⁵ Hobbes understands a body to be

‘...that which filleth, or occupyeth some certain room, or imagined place; and dependeth not on the imagination, but is a reall part of that we call the *Universe*...The same also, because Bodies are subject to change, that is to say, to variety of apparence to the sense of living creatures, is called *Substance*, that is to say, *Subject*, to various accidents...’²⁶

Accordingly, in Hobbes’ view, the terms ‘substance’ and ‘body’ being synonyms, an expression like ‘Substance incorporeall’ is meaningless. These bodies or substances are in motion. Their movements are subjected to natural necessity. Hence, nature, man included, is completely determined in its operations, and all phenomena material as well as mental, can only be

²³ Op. cit., f. 105. Cf. Hobbes: ‘...species, imago, color, lumen, et quaecunque sunt imaginis partes, non sunt, si accurate loqui velimus, res visae, aut obiecta visus, sed ipse actus visionis, qui consistit realiter in sola reactione sive motu partium internarum videntis propagato extrorsum, ex quo efficitur ut moventis imago appareat extra.’ (TO II, 206)

²⁴ Op. cit., f. 105. Cf. Hobbes: ‘...the variety of thinges is but the variety of locall motion in the spirits or invisible partes of bodies.’ (HMC (1893), 128)

²⁵ National Library of Wales, MS 5297, f. 1. In AW, 449.

²⁶ EW, Vol. 3, 381.

conceived and explained as physical motions effected by other physical motions.

This tenet runs like a continuous thread through all of Hobbes' writings, to begin with the *Short Tract*, an untitled manuscript probably dating from c. 1630 and published in 1889 by Ferdinand Tönnies as "A short tract on first principles".²⁷ This text consists of three sections each composed of one or more principles followed by a number of conclusions.

In the first section, Hobbes presents the conceptual building blocks and principles of a mechanical explanation of natural operations. The things constituting nature are defined in terms of their relationship qua being, operation and generation. Some things, substances, exist by themselves,

²⁷ See Chapter 1, p. 51. Tönnies published the manuscript as appendix I to his edition of *The elements of law natural and politic*. (London 1889). See for an exhaustive study of this manuscript *Thomas Hobbes Court Traité des premiers principes*. Le Short Tract on first principles de 1630-1631. Texte, traduction et commentaire par Jean Bernhardt. PUF 1988; Napoli (1990), 539-569. Until recently most writers on Hobbes took Tönnies' attribution of the manuscript to Hobbes for granted. Only Pacchi (1978/1, p. 62, note 36) uttered his doubts. Tuck (1988) bluntly rejects the idea of Hobbes as the writer of the "Short Tract". In his view the manuscript contains, apart from its mechanicism, on the one hand 'nothing...particularly Hobbesian...' (p. 17) and on the other a theory about the propagation of light directly opposed to Hobbes' explanation of that phenomenon since the 1640s (Ibid.). Tuck's first argument is manifestly untrue. The second one however is pertinent. While in his later writings Hobbes consistently denies that the action of luminous bodies requires local motion of these bodies or of their parts and explains the propagation of light mediummistically in the *Short Tract* light is said to be propagated through the emanation of substantial particles from luminous bodies. Yet the question is hard to decide for Hobbes' letters and writings contain statements suggesting that already by 1630 he adhered to a mediummistic explanation of the propagation of light. (See Mersenne, *Correspondance*, Vol. 10, 568 Nr. 994 and the dedication of FD, 76-77) Still, assuming that the *Short Tract* was written by someone belonging to the Cavendish-Circle (see Chapter 1, pp. 14-16) on account of its handwriting as well as its contents Hobbes, in my view, seems to be the most likely candidate. Anyway, the handwriting convincingly excludes Charles Cavendish and Warner as authors. Though it is very similar to the handwriting of Robert Payne there also are differences in favour of Hobbes. As appears from Payne's translations of Benedetto Castelli (Harley MS 6796, ff. 309v-316r: *Geometricall demonstrations of the measure of running-waters*) and of Galilei (Op. cit., ff. 317-330r: *Of the profitt which is drawn from the art mechanic & it's instruments*) as well as from his letters to G. Sheldon (Harley MS 6942, ff. 126r-135v) his handwriting is less fluent, less neat, more irregular, smaller and less sloping than that of the *Short Tract*. As opposed to the writer of that manuscript Payne also always writes 'y^e' for 'the' and 'y^t' for 'that'. All in all the handwriting of the *Short Tract* is much more similar to that of Hobbes' letter from 8 February 1641 to Charles Cavendish (Op. cit., ff. 291-293v) than to that of Payne.

others, accidents, only in so far as they inhere in substances.²⁸ These substances are related as agents and patients, i.e. as substances that either have a ‘power to move’ or a ‘power to be moved’.²⁹ Some of these agents act on other bodies by an active power inherent in themselves, others ‘by motion received from another’.³⁰ Agents produce nothing ‘but Motion, or some inherent forme’.³¹ Though Hobbes does not say so explicitly, from the context it is clear that by ‘change’ and ‘motion’ he understands nothing but local motion and in that motion ‘the Action of the Agent is the Locall Motion of the Patient.’³² Already in this early writing he formulates a principle of inertia according to which ‘That, whereto nothing is added, and from which nothing is taken, remains in the same state it was.’³³ Each change, in other words, requires contact. Accordingly, agents function as the causes of changes, local motions, in patients. Hobbes defines a cause as an agent endowed with all things requisite to produce the effect in question. Such a cause cannot but produce its effect. A sufficient cause, in other words, is a necessary cause and there are no such things as ‘Free Agents’.³⁴

In the second section, Hobbes explains how agents, possessed of an original power to move, work at a distance; not the ones that act on patients by successively changing the parts of the medium between agent and patient, but agents, like the sun that act on patients at a distance by species, i.e. particles emanating from them.³⁵ An agent like the sun sends out its species continually.³⁶ These species, not moving instantaneously and therefore also locally³⁷, proceede infinitely³⁸ and the greater the distance to their source, the weaker they are.³⁹ As the sun is an active substance carrying *lux*, i.e. primitive light as an accident, its species are substances too, functioning as carriers of *lumen*, i.e. derivative light.⁴⁰

²⁸ ‘Substance is that which hath being not in another, so as it may be of it self, as Aire or Gold’; ‘Accident is that which hath being in another, so as, without that other it could not be. As Colour cannot be, but in somewhat coloured.’ (ST, 14.)

²⁹ Op. cit., 12.

³⁰ Ibid.

³¹ Ibid.

³² Ibid.

³³ Ibid.

³⁴ Op. cit., 20.

³⁵ Op. cit., 24-8

³⁶ Op. cit., 28.

³⁷ Op. cit., 32.

³⁸ Op. cit., 30.

³⁹ Op. cit., 28.

⁴⁰ Op. cit., 40.

As the second section is devoted to agents with an inherent power to move and to motion between bodies, the third and last section of the *Short Tract* is devoted to agents that derive their power to move from some other agent and to motions within bodies. In this section Hobbes explains the nature and operation of a number of human faculties, to wit, sensory perception, understanding and appetite. These faculties are conceived as passive powers to be moved of the animal spirits, i.e. ‘the instruments of sense and motion’.⁴¹ Much later Hobbes described this spirit as

‘...a body natural, but of such subtilty, that it worketh not upon the senses; but that filleth up the place which the image of a visible body might fill up. Our conception therefore of spirit consisteth of figure without colour; and in figure is understood dimension, and consequently, to conceive a spirit, is to conceive something that hath dimension.’⁴²

This material, yet imperceptible, liquid substance was supposed to circulate, like the blood, through the body. It is a substance purified in the heart and, like the blood, transported through the arteries to the head or rather the beginning of the spinal marrow where it enters the nerves.⁴³ In the *Short Tract* these spirits are said to have only one power, namely, the passive power to be moved locally. Not being endowed with an inherent active power they can only function as an agent after being moved by something else. Linking the several parts of the body and circulating through it they effect all operations of the organism by propagating motion from one part of the body to another, like from the senses to the brain or from the brain to the bodily members. In the Scholastic tradition the animal spirits are conceived as instruments of the soul or rather as its faculties. Considering faculties or powers as accidents, Hobbes rejects that view. A substance like the animal spirits can only be moved by contact with another substance, and consequently ‘cannot be moved, by the will and Appetite; for these being facultyes, are but Accidents.’⁴⁴ In fact the animal spirits are moved, immediatly or mediately by the species of external objects, i.e. agents acting at a distance. Thus sense ‘is a passive power of the Animal spirits, to be moved by the species of an externall obiect, suppos’d to be present.’⁴⁵

Sensible qualities themselves ‘are nothing but the severall Actions of Externall things upon the Animal spirits, by severall Organs. and when they

⁴¹ Op. cit., 40.

⁴² EW, Vol. 4, 60-1. See also EW, Vol. 3, 380-3. Cf.: ‘...neque spiritus in corpore animalis saltem *vegeto*...omnino gravitat, sed cursu quodam circulari ad servitia singulorum membrorum circumcursat...’ (AW, 350)

⁴³ ‘...spiritus vitales a corde per arterias delati et reddituri puriores...’ (OL, Vol. 1, 328)

⁴⁴ ST, 42.

⁴⁵ Op. cit., 48. See also OL, Vol. 5, 217, 220; AW, 162, 326; TO II, 206.

are not actually perceiv'd, then they be powers of the Agents to produce such actions.⁴⁶ The motions caused by these species are transmitted by the spirits to the brain which is thus qualified, i.e. enabled to cause in its turn the same type of motion in the animal spirits. Hobbes refers to this action of the brain as a fantasm or apparition of the external object that originally caused the motions in question.⁴⁷ Having a fantasm is the same as understanding the corresponding external object. Accordingly understanding 'is a passive power in the Animal spirits to be moved by the action of the brayne qualified.'⁴⁸ Hobbes divides the external objects acting through their species on the animal spirits into good and evil things. 'Whatsoever is Good is desireable; and whatsoever is desireable is Good.' In fact 'Good is every thing that...hath power to Attract it.'⁴⁹ That power is called 'goodness'.⁵⁰ The good, in other words, functions as the object of desire and appetite. 'The act of appetite is a Motion of the Animal Spirits towards the obiect that moveth them...and as a power, is a passive power in the Animal spirits, to be moved towards the obiect that moveth them.'⁵¹ The section ends with the conclusion that there being but two different ways the animal spirits can be moved, namely by the species or by the brain, there 'are but two discerning facultyes, in generall, of the Soul; Sense and Understanding.'⁵²

The Hobbes-research is guided by the idea of Hobbes as '...an inveterate re-worker of his basic ideas...', who '...modifies them little, but adds further or improved documentation...'⁵³ Hobbes indeed since the 1640s in numerous writings over and over again states essentially the same tenets referring often to former writings. Yet he never refers to the text published as the *Short Tract* nor for that matter is it ever mentioned by any of his contemporaries. His views on light and vision, as set forth in his optical writings since the 1640s⁵⁴, differ substantially from what we read in the *Short Tract*. His first optical tract, dealing with refraction opens with five 'hypotheses' the first of which repeats the definitions in the *Short Tract* of agent, patient, action and passion. 'Omnis actio est motus localis in agente, sicut et omnis passio est motus localis in

⁴⁶ ST, 44.

⁴⁷ Ibid.

⁴⁸ Op. cit., 50.

⁴⁹ Ibid. 'Malum...is that, which hath active power to repell it.' (Ibid.)

⁵⁰ Ibid. 'Badness is the power of Malum' (Ibid.)

⁵¹ Op. cit., 52. 'The Act contrary to the Act of Appetite, with his power, are...a Motion, or passive power in the Animal spirits, to be moved from the obiect.' (Op. cit., 52-4)

⁵² Op. cit., 54-6.

⁵³ '...Hobbes...rarely changes his basic ideas, but often re-works their expression.' (Jones (1984), 278-9)

⁵⁴ *Tractatus Opticus I* (1640), *Tractatus Opticus II* (1644-5), *A Minute or First Draught of the Optiques* (1646), and the chapters 2 to 9 of *De Homine* (1658).

patiente: ‘*Agentis nomine intelligo corpus, cujus motu producitur effectus in alio corpore; patientis, in quo motus aliquis ab alio corpore generatur.*’⁵⁵ Also in this tract vision is characterized as a passion in the sensing subject produced by the action of a luminous or illuminated object.⁵⁶ The third hypothesis however is directly opposed to what Hobbes stated in the second section of the *Short Tract* :

‘In visione, neque objectum, neque pars ejus quaecunque transit a loco suo ad oculum. Ut motus possit motum generare ad quamlibet distantiam, non est necessarium ut corpus illud a quo motus generatur, transeat per totum illud spatium per quod motus propagatur.’⁵⁷

Luminous bodies permanently dilate and contract, a motion perceived by us as scintillation, and that motion is propagated from the source of light to the eye by exertion of a continuous pressure on the contiguous parts of the medium.⁵⁸ Thus Hobbes traded his corpuscular theory of the propagation of light for mediummism. Though this is the most important difference with his theory of light and vision in the *Short Tract* , it is not the only one. Light, consequently referred to as *lumen*, is now said to be propagated instantaneously from the source of light through the eye and its nerve to the brain and back again to the eye.⁵⁹ Further, in view of the fact that there is no such thing as light before there is vision the motion in question is only called ‘light’ (*lumen*) after it has entered the brain.⁶⁰ Light, in other words, is identified now with the phantasm, i.e. ‘an image conceived in the brain’, of the luminous object.⁶¹ Sensation, a reaction from the brain to the eye, coincides with imagination.

In *Human Nature*, the first part of *The Elements of Law*, written in 1640 Hobbes presents a theory of ‘the faculties of the mind’ including this new theory of sensory perception. ‘*Man’s nature*’, says Hobbes, ‘*is the sum of his natural faculties and powers, as the faculties of nutrition, motion, generation, sense, reason, &c.*’ The first three faculties are powers of the body and the other two, that is, the ‘powers...*cognitive, imaginative, or conceptive* and

⁵⁵ OL, Vol. 5, 217.

⁵⁶ Ibid.

⁵⁷ Op. cit., 217-8.

⁵⁸ See op. cit., 219.

⁵⁹ See op. cit., 220.

⁶⁰ See op. cit., 220.

⁶¹ See op. cit., 221.

motive’, belong to the mind.⁶² In our mind there are continually certain images or conceptions of the things outside ourselves

‘...This imagery and representations of the qualities of things without us is that we call our cognition, imagination, ideas notice, conception, or knowledge of them. And the faculty, or power, by which we are capable of such knowledge, is that I here call power cognitive, or conceptive, the power of knowing or conceiving.’⁶³

All these conceptions proceed from the actions of the corresponding objects on the senses. Thus ‘...from all lucid, shining and illuminated bodies, there is a motion produced to the eye, and through the eye to the optic nerve, and so into the brain, by which that apparition of light or colour is effected...’⁶⁴ The ‘...said image or colour is but an apparition unto us of that motion, agitation, or alteration, which the object worketh in the brain or spirits, or some internal substance of the head.’⁶⁵ That motion instead of ceasing as soon as the external object stops working or disappears

‘...remaineth; but more obscurely while we are awake, because some object or other continually plieeth and solliciteth our eyes, and ears, keeping the mind in a stronger motion, whereby the weaker doth not easily appear. And this obscure conception is that we call phantasy or imagination: imagination being...conception remaining, and by little and little decaying from and after the act of sense.’⁶⁶

Apart from the five senses by which we perceive external objects actually present, man is also able to recognize a conception he had before ‘...which is as much as to imagine a thing past...This...may be accounted a sixth sense, but internal, not external, as the rest, and is commonly called remembrance.’⁶⁷ The remembrance of these perceptions, especially of their order, constitutes experience.⁶⁸

⁶² *Elements*, 2. Rejecting the Scholastic tradition including the traditional distinction between the material body and the immaterial, rational soul Hobbes states that all ‘...these powers we do unanimously call natural...’ (Ibid.)

⁶³ Ibid.

⁶⁴ Op. cit., 5.

⁶⁵ Op. cit., 4. Cf.: ‘...whatsoever accidents or qualities our senses make us think there be in the world without us, they are not there, but are seemings and apparitions only. The things that really are in the world without us, are those motions by which these seemings are caused. And this is the great deception of sense, which also is by sense to be corrected.’ (Op. cit., 7)

⁶⁶ Op. cit., 8.

⁶⁷ Op. cit., 11.

⁶⁸ ‘...experience...is nothing else but remembrance of what antecedents have been followed with what consequents.’ (Op. cit., 15)

To facilitate remembrance man has arbitrarily marked things with ‘...human voices (which we call the names or appellations of things) sensible to the ear, by which we recall into our mind some conceptions of the things to which we give those names or appellations.’⁶⁹ These names are often equivocal. ‘Understanding’ is the ability to find out nevertheless ‘...the true meaning of what is said.’⁷⁰ Hobbes, in other words, conceives this faculty not as the power to form fantasms as such, but as the faculty to conceive the things referred to by spoken or written language. Two names joined by the word ‘is’ constitute an affirmative or negative proposition. These propositions can be combined into syllogisms and ‘...that making of syllogisms is that we call ratiocination or reasoning.’⁷¹ Reason, in other words, like the understanding does not operate on or with fantasms but with words.

The motions of the animal spirits in the head caused by things or by their names do not stay there but necessarily proceed to the heart where they either ‘...help or hinder that motion which is called vital...’, i.e. the circulation of the blood.⁷² When it helps ‘...it is called delight, contentment, or pleasure, which is nothing really but motion about the heart, as conception is nothing but motion within the head...but when such motion weakeneth or hindereth the vital motion, then it is called pain...’⁷³ The same motion called pleasure or pain

‘...is also a solicitation or provocation either to draw near to the thing that pleaseth, or to retire from the thing that displeaseth. And this solicitation is the endeavour or internal beginning of animal motion, which when the object delighteth, is called appetite; when it displeaseth, it is called aversion, in respect of the displeasure present; but in respect of the displeasure expected, fear.’⁷⁴

In a word ‘To endeavour, is appetite.’⁷⁵ This definition of appetite and aversion constitutes a specification of the corresponding definition in the *Short Tract*.

Hobbes repeats in *Human nature* the definitions of ‘bonum’, ‘malum’, ‘goodness’ and ‘badness’ from the *Short Tract*.⁷⁶ This time however these qualifications are said to be subjective. What appears pleasant and therefore good to one person is felt as painful and thus deemed evil by another. Things, in other words, are neither objectively good, nor evil. ‘Nor is there any such

⁶⁹ Op. cit., 18.

⁷⁰ Op. cit., 21.

⁷¹ Op. cit., 22.

⁷² Op. cit., 28.

⁷³ Ibid.

⁷⁴ Op. cit., 28-9.

⁷⁵ Op. cit., 47.

⁷⁶ See this chapter, p. 245 and notes 49-50.

thing as...simply good.’⁷⁷ Further Hobbes now distinguishes between bodily or sensual and mental pleasure and pain. Bodily pleasures like sexual or culinary delights are connected to certain organs of sense. The mental counterparts of sensual pleasure and pain, called joy and grief, are not connected to any part of the body.⁷⁸ As opposed to in the *Short Tract*, in *Human Nature* Hobbes also treats of the will. As we saw by appetite or hope and aversion or fear, he understands ‘...the first unperceived beginnings of our actions.’ Some act or its omission either directly follows on such an appetite ‘...or else to our first appetite there succeedeth some conception of evil to happen unto us by such actions, which is fear...And to that fear may succeed a new appetite, and to that appetite another fear, alternately, till the action be either done, or some accident come between, to make it impossible...’⁷⁹ This sequence of positive and negative appetites following on the consideration of the good and bad consequences respectively of the intended action is called deliberation. By the will Hobbes understands nothing but the last appetite in such a sequence before doing or omitting the act in question. Thus all actions and omissions proceeding from an appetite are called voluntary and ‘all other are involuntary or mixed.’⁸⁰ Corresponding to his rejection in the *Short Tract* of the notion of ‘free agent’ as a contradiction in terms, Hobbes now points out that the will itself, like the appetite, hope, fear and all the other passions functioning as causes of voluntary behaviour, cannot be said to be free in the sense of voluntary.⁸¹

In his later writings on the ‘faculties of the mind’ Hobbes elaborates and embellishes this theory without introducing substantial changes.⁸² Only his explanation of sensory perception suffers a major change. While in *Human Nature* the central organ of sensory perception is said to be located in the head and that of the appetite in the heart, in his later works these two functions are united in the heart. His extensive criticism on Thomas White’s *De Mundo* marks the transition. Though still referring in this work to the brain and

⁷⁷ Op. cit., 29.

⁷⁸ See op. cit., 31.

⁷⁹ Op. cit., 61.

⁸⁰ Op. cit., 62. Cf.: ‘There be in Animals, two sorts of *Motions* peculiar to them: One called *Vitall* ; begun in generation, and continued without interruption through their whole life; such as are the *course* of the *Bloud*, the *Pulse*, the *Breathing*...to which *Motions* there needs no help of *Imagination*: The other is *Animall Motion*, otherwise called *Voluntary motion*; as to *go*, to *speak*, to *move* any of our *limbes*, in such manner as is first fancied in our minds.’ (EW, Vol. 3, 23)

⁸¹ *Elements*, 63.

⁸² See AW, XXX, 23-29, pp. 359-62; EW, Vol. 3, 38-51; *De Corpore*, cap. 25 (OL, Vol. 1); *De Homine* (OL, Vol. 2).

animal spirit as the organs of vision⁸³ sensory perception in general is now said ‘...fieri per actionem objectorum...per medium continuò a parte in partem propagatum...usque ad cerebrum, atque etiam ad ipsum cor...Hi motus repulsi sive retro procreati per reactionem & resistentiam cordis usque ad partes animalis extimas, sunt phantasmata illa externè apparentia...’⁸⁴ Fantasms, i.e. reactive motions provoked by the action on the organs of sense are no longer said to originate in the brain but to come from the heart.⁸⁵

9.2. Similarities and Differences

Comparing Hobbes’ psychological theories with Warner’s views as expounded in his notes on animal organisms it does not come as a surprise that Hobbes praised Warner for his ideas concerning the ‘facultyes and passions of the soul’.⁸⁶ Warner’s critical attitude towards the Scholastic tradition,⁸⁷ his conception of animals as ‘machines’ impelled by the urge for self-conservation⁸⁷, his disregard of the traditional distinction between irrational and rational functions, his view of the appetite as indispensable to life, and of the will as nothing but the actual beginning of locomotion, his view of speech as the main difference between man and animals⁸⁸, as well as his explanation of all animal operations in terms of nothing but the motions of a material substance, may all very well have appealed strongly to Hobbes.

Yet, measured by Hobbes’ own standards, Warner’s speculations were not scientific in that he, apparently, gave Hobbes no, or no good reasons for his views. A scientist, according to Hobbes, does not just state or describe matters of fact, or what seems to be the case but explains facts by deriving them from their causes, thus demonstrating the truth of what he says. Warner presumably, in Hobbes’ view, did not adequately account for the nature of the

⁸³ ‘...eodem...instante quo movetur quaelibet pars lucidi versus oculum...fit ut motus impingat in oculum, id est lucidum agat in oculum; atque eodem modo etiam derivatur actio usque ad interna capitis ubi est cerebrum & animalis spiritus, quae sunt videndi organa...’ (AW, 162.)

⁸⁴ Op. cit., 326.

⁸⁵ In the TO II he defines vision as ‘...reactionem a Corde per Cerebrum & nervum opticum et Retinae crassitiem versus externa procreatum ab actione corporis Lucidi sive illuminati propagata per medium diaphanum ad oculum et per oculum, Retinam, nervum opticum, cerebrumque usque ad Cor.’ (206)

⁸⁶ See Chapter 1, section 1.1., p. 15.

⁸⁷ ‘...seeing life is but a motion of Limbs, the beginning whereof is in some principall part within; why may we not say, that all *Automata* (Engines that move themselves by springs and wheeles as doth a watch) have an artificiall life ? For what is the *Heart* but a *Spring*; and the *Nerves* but so many *Strings*; and the *Joynts*, but so many *Wheeles*, giving motion to the whole Body, such as was intended by the Artificer ?’ (EW, Vol. 3 : *Leviathan*, The introduction, ix)

⁸⁸ See section 9.4.7. and note 156.

faculties of the soul in general, for the different kinds of faculties, or for their manner of operation.

Both understand faculties or powers to be operative qualities of agents and patients the combination of which necessarily leads to certain operations.⁸⁹ Faculties, in their view, are nothing but potential causes, and a cause is nothing but a collection of qualities necessarily followed by another collection of qualities, i.e. an effect.⁹⁰ Thus in Warner's notes as well as in Hobbes' writings the term 'faculty' does not refer to a thing as such but only in so far as it is considered with respect to something else. However, there are also some substantial differences. Hobbes presents faculties as accidents of bodily substances and explains their operation purely in terms of motion, characterizing them as nothing but reactions to impressions in the body made by the action of external objects. In fact he reduces the operation of nearly all faculties to one and the same reactive motion considered in different respects. Thus in *Human Nature* the 'motion in some internal substance of the head' called 'sense' as long as the external object causing that motion is still present is called 'imagination' or 'remembrance', as soon as that same object has disappeared or stopped acting, 'pleasure' and 'joy' or 'pain' and 'sorrow' in as much as it proceeding to the heart, helps or hinders the circulation of the

⁸⁹ According to Bernhardt Hobbes distinguishes between 'faculties' in the sense of mere possibilities or accidents and 'powers' conceived as the same accidents considered as inherent in the animal spirits as their substance. (See ST, 229, note 57.) Bernhardt, in my view, makes too much of this distinction. Hobbes uses the terms in question simply as synonyms. He describes, for example, the notion of 'accident' as '...that power or faculty by which a body is conceived.' (NLW, MS 5297, f. 2/ AW, 452) Man's nature he defines as '...the sum of his natural faculties and powers as the faculties of nutrition, motion, generation, sense, reason, &c. For these powers we do unanimously call natural...' (*Elements*, 2)

⁹⁰ '...quam potentiam *integram* vel *plenam* appellare licet, idem est quod causa integra, nam utraque consistit in aggregato omnium simul accidentium, quae ad effectum producendum, tum in agente tum in patiente, requiruntur. Denique sicut accidens quod productum est, respectu causae, *effectus* ; ita respectu potentiae, *actus* appellatur.' (OL, Vol. 1, 114.) Cf. Warner: 'A thing can not be said to be or become a cause but with these conditions. first it must have reall existence...Secondly besides reall existence [it] there is necessarily required the state [of] or condition of determinate and certaine habitude to the obiect (that is to say that thing which is to be the deferent [of] or subiect of the proposed effect) (or rather a determinate [or] mutuall habitude betwene the agent and the patient) and yf a thing be possessed of this last state or condition for some certaine time it can not then indifferently or casually in any instant of that time begin to produce his effect but at the first instant or beginnyng of the time that it is so possessed or modified or habituated with that state or condition it doth instantly begin to produce his effect or the other at the same instant doth begin to receive or suffer some [new] alteration or new state as an effect of that cause...' (BL Add. MS 4395, ff. 197-8) See also about his doctrine of the faculties Chapter 3, p. 118 ff.

blood, 'appetite' and 'hope' or 'aversion' and 'fear' in so far as that same motion provokes the organism to approach or avoid the external object in question, and 'will' when it is directly followed by the intended approach or avoidance.⁹¹

Though Warner, too, understands faculties to be 'qualities' he conceives them as substances, or more precisely as forces of different parts of the spirits disposed to certain states of motion and configurations. Accordingly his distinction between the several kinds of faculties is not based on different considerations of one and the same thing, but corresponds to different entities, parts of the animal spirit, defined in terms of their proper objects. As with Hobbes, for Warner too, motion plays a crucial role in his explanation of the operations of these faculties. Yet, he does not conceive the process from sensory perception to voluntary motion as just a reaction but as a combination of two successive passions, i.e. impressions in the sensitive and intellective part of the spirits respectively, followed by the appetite, a reaction of the intellective spirits leading to 'determination', a kind of rational deliberation, i.e. another reaction in that same part of the spirits, resulting in an action of the motory part of the spirits. From a mechanical point of view that last phase seems hard to explain. The word 'action' instead of 'reaction' suggests a completely original and free motion, not caused by the preceding motions in the other parts of the spirits. Warner broaches the question whether the will is free or not but leaves it unresolved.⁹²

Both, Hobbes and Warner, divide the faculties preceding voluntary motion into cognitive and executive or motive powers. However, while Hobbes' distinction is based on the mechanical model of action and reaction Warner in his classification of the faculties is also guided by an implicit non-mechanical distinction between sensation (passive), intellection (passive as well as active) and locomotion (active). Hobbes treats pain, pleasure, joy and sorrow as motive, i.e. reactive faculties. Warner reckons these among the cognitive powers.

Though the general concept of Warner's theory may have appealed to Hobbes, if indeed this is what he heard from Warner, one would, in view of Hobbes' own ideas especially since the 1640s, have expected him to have missed more than just 'good reasons'. By 1635 Warner impressed Hobbes as the only person making sense concerning the faculties and passions of the soul. If Hobbes took some of his ideas from Warner, then which ones did he take? If, as Jacquot says, he was stimulated by Warner, in what respects and in what sense did Warner stimulate him? Can his conversations with Warner explain the differences between the *Short Tract* and his later

⁹¹ See *Elements*, 28-9.

⁹² See BL Add. MS 4394, f. 243v.

writings ? These questions call for a more detailed comparison of their ideas regarding the faculties of body and mind.

9.3. *The Faculties of the Body*

As a political philosopher Hobbes did not waste many words on the physiology of man, but what he says clearly demonstrates that he did not take his views on the ‘faculties of the body’ from Warner. As for the nature of nerves Hobbes sides with the anatomists claiming to have determined empirically that the substance of nerves is totally homogeneous and apart from being a little harder and more compact, similar to that of the brain.⁹³ According to Warner, on the other hand,

‘...the nervs and membranes and the other nerveous parts are not the mere continuations and desinences of the substance of the braines differing only from it in hardnes or firmnes or compactnes or tenacity of their consistence, acquired by the<ir> elongation from the maine and originall part of the braines in the hed which is most fluid or humid, and the further any part thereof is produced from thence the more firme and solid it becomes as hath hitherto ben supposed, as yf the nerveous substances were nothing els but the very substance of the braines indurated by their said elongation, having receved no other alteration at all in their substance and so the cerebrous and nerveous substance remayning still continue. But the very ocular inspection of these two substances may suffize to disprove this continuation. The one namely that of the braines, being of an omnimodally similar consistence as water or erth or stone or metall or generally those things that have bin generated by a confused aggregation of their parts component...as yf one should understand the coagular part of milk apt matter not so much to make cheese of which is but an accidentall alteration as to generate wormes of which is a proper and substantiall generation for there is the like difference betwene the coagular <and similar> plasmatik substance of the braines and and the ordinate artificiall composition of the nerveous spiritalls as betwene the coagular part of the milk and those wormes that are generated thereof after it is become cheese the wormes being <nothing> els but a spiritall complete whereas the severall parts of the nerveous substances of the animall are but parts of a spiritall complete...’.⁹⁴

⁹³ ‘De Substantia *Nervi optici* scriptores Anatomiae diverse sentiunt. Alij enim eam habere in se aiunt calculam quandam repletam substantia quae similis et colore et mollitie, medullae cerebri, Alij affirmant experimento se invenisse contrarium et esse substantiam nervi totam homogeam, cerebroque duriorem compactioremque, caetera similem, quorum quidem ego sententiae accedo.’ (TO II, 200)

⁹⁴ Op. cit., ff. 202r-203v. Cf. Galen, *De Hippocratis & Platonis decretis libri novem, primus à Iano Cornario, reliqui ab Ioanne Bernardo Feliciano interpretati*. In: *Opera* (1549), Vol. 1, 1042.) (Kühn, Vol. 5, 621.)

Hobbes explains digestion in terms of nothing but motion.⁹⁵ Warner, considering digestion as an effect of heat and fermentation, offers a chemical instead of a mechanical explanation of this phenomenon.⁹⁶ The fleshy parts of the body, according to Hobbes, are restored through the nerves by the nutritive part of the blood.⁹⁷ In Warner's view these parts are restored through the arteries by 'the sanguinous or grumous parts of the blood'.⁹⁸ Hobbes praises William Harvey for his theory of the circulation of the blood and was one of the few members of the Cavendish-Circle that neither seems, nor is said by others, to have known Warner's manuscript on that subject.⁹⁹ According to Hobbes the motion of the heart is caused by air or something inhaled with air.¹⁰⁰ Consequently, in his view, respiration is of vital importance. Warner ascribes the motion of the heart to the activity of the spirits as well as to the muscular construction and substance of the heart itself.¹⁰¹ Air, in his view, contains nothing vital. It is a mere 'fatuous or flegmatik spirit', missing the qualities that make a spirit active and can initiate fermentation.¹⁰² Respiration only serves the contemperation of the blood and the voice.¹⁰³ Hobbes enumerates several causes of death¹⁰⁴ except the one adduced by Warner, namely, the inadequate functioning of the spirits consequent on their shortage

⁹⁵ 'Cibus enim motu illo, quem deglutitionem dicimus, dejicitur in ventriculum. Ventriculus motu quodam sibi proprio dejectum jactat, ita ut misceat et emolliat; truditque in intestina. Intestina emollitum protrudunt, et partem ejus tenuissimam, id est chylum, per motum peristalticum, cogunt in venas lacteas.' (OL, Vol. 2, 2.) From there the chyle enters the bloodstream.

⁹⁶ See op. cit., ff. 177r-209v, 218v-210v.

⁹⁷ '...carnis, quae in musculis continetur, materia illuc advecta est vel per arterias, vel per nervos. Non per arterias, in quibus nihil fertur praeter sanguinem: caro autem non ex sanguine constat, qui salva carne elui potest. Quare materia carnis defertur ad musculos per nervos. Materia autem quae in nervis continetur tenuissimus spiritus est: qui cum in musculis fit caro, constat ex innumeris filiculis adeo minutis et fissilibus, ut visum tandem fugiant.' (Vol. IV, 285.) See also OL, Vol. 2, 2-3. This explanation is reminiscent of Thomas Willis' theory of the nerveous and nutrient juice, produced in the cerebrum and cerebellum, that, contained in the nerves, feeds the bodily parts dependent on these nerves. In Willis' view nutritive material is only transformed into nutrition and assimilated to the body by the fermentation caused by this nerveous juice. (See Isler (1968), 97.)

⁹⁸ Op. cit., ff. 194v-195r.

⁹⁹ 'Motus...vitalis sanguinis motus est, per venas arteriasque, ut a primo ejus rei observatore nostrate Harvaeo multis certissimisque signis ostensum est, perpetuo circumceuntis.' (OL, Vol. 1, 331).

¹⁰⁰ '...vitam, id est, motum cordis dependere ab aere, et proinde aerem vel aliquid, quod cum aere imbibitur, causam esse motus cordis.' (OL, Vol. 2, 3)

¹⁰¹ See op. cit., f. 133r-v.

¹⁰² See op. cit., f. 187r.

¹⁰³ See op. cit., f. 213v.

¹⁰⁴ See OL, Vol. 2, 5-6.

or disruption.¹⁰⁵ While according to Hobbes man is generated in about the same way as plants are¹⁰⁶ in Warner's opinion plants and animals are generated in totally different ways.¹⁰⁷ As with most of his contemporaries, Warner included, the animal spirits, conceived as a material fluid substance, play a crucial role with Hobbes, linking as carriers of motion, the several organs of the body. Yet there are some subtle differences. Hobbes describes the spirits as 'instruments' endowed with only one power, namely the passive power to be moved.¹⁰⁸ Mobility or activity as such is not a distinguishing mark of these spirits in Hobbes' universe where everything is perpetually in motion.¹⁰⁹ Warner, on the contrary, opposes the spirits as the active part to its containers as the organs or instrumental parts of the organism. In fact the whole body is characterized as an instrument of the spirits endowed with exactly the same faculties as were ascribed by his more traditional contemporaries to the human soul. Though the spirit as a material substance does nothing but move it is said to sense, feel, desire, and argue. Warner deals with this spirit, a life-giving principle, in relation to the body as if it were a soul.

9.4. *The Faculties of the Mind*

9.4.1. Sensory Perception

Seth Ward accused Hobbes of having taken his explanation of sensory perception in the *Leviathan* from Warner's tract 'de penicillo optico'. Though it is possible, as Hobbes claims, that Warner never told him he was working on such a piece, the numerous definitions dispersed through Warner's papers, of the ray of light, suggest that he did indeed do so.¹¹⁰ According to a text, probably written before 1620

'Ex omnibus lineis quae utcunque ab obiecto ad oculum produci possint unum tantum est per quam obiecti forma seu specie visibilis ad oculum deferri potest...Intelligendum est quod huiusmodi radius speciem visibilem deferens licet immaterialis sit non est tamen linea mere mathematicam sed ut optici loquuntur physice et substantialis ex genere

¹⁰⁵ See op. cit., ff. 160v-170r.

¹⁰⁶ See op. cit., 6.

¹⁰⁷ See op. cit., f. 175r. Cf. f. 132r. See also Chapter 1, note 159.

¹⁰⁸ See ST, 40-2.

¹⁰⁹ See Lasswitz (1963), Vol. 2, 236-7.

¹¹⁰ See BL Add. MS 4395: f. 110, f. 111, ff. 132-3, and ff. 142-7. Under the definitions on f. 110 he wrote: 'Definitiones istae et quae de radio optico hic occasione literarum ad quas pertinebant mittendarum raptim scripsimus in alijs chartis nostris ubi de modo visionis maiore studio ac diligentia quaestionem illam tractavimus paulo aliter enunciata et correctiora habentur.' (Op. cit., f. 110). This strengthens the conjecture that he did write a treatise 'de penicillo optico' indeed.

luminoso cuius appulsu ad oculum ac intromissione in intimum sensorium verè ac realiter perficitur visio obiecti a quo processit.’¹¹¹

In one of his last optical tracts, dating from the 1630s, Warner abandons this notion of rays for that of ‘radiation’ which, moreover, is said to leave an ‘impression’ in the eye instead of transporting ‘species’: ‘Radius opticus (sive visibilem sive visivum appellare libuerit) generatim consideratus est radiositas (non linearis sed conicè figurata) ab obiecto visibili ad oculum procedens impressione suâ visionem in sensu efficiens.’¹¹² These ideas, especially the latter, are reminiscent of Hobbes’ own speculations and terminology.¹¹³ Yet, Warner’s views will not, as Ward suggested, have served as models for his notion of ray and radiation.¹¹⁴ Apart from the fact that the idea of the ‘linea lucis’, the most revolutionary element in Hobbes’ conception, is absent from Warner’s theory, Hobbes never conceived light as an immaterial entity.¹¹⁵

¹¹¹ Op. cit., f. 148. Cf. Scheiner: ‘Notandum...est...has lineas non esse phantasias aut figmenta Mathematicorum, secundum perturbatam quorundam imaginationem, sed entia verè ex naturâ rei existentia...’ (*Oculus*, 61). On the other hand Kepler, well known in Warner’s milieu, considers the ray of light a mathematical fiction. (See *Werke*, Band 2, 20-21.)

¹¹² BL Add. MS 4394, f. 111r: *Radii optici definitiones pro triplici visionis differentia*. There is a copy of these definitions in BL Add. MS Harley 6756, ff. 1-4r. This text is more extensive than the autograph and contains the statement that ‘...the descriptions of the severall cases of the Radius opticus are to be understood of naturall vision, as it is different from artificial observation where both the obiect and pupilla are restrayned by instrumentall adaptation, with as much exactness as may be, to the Axis of the cone, or to some certaine line thereof of knowen inclination to the axis.’ (f. 4r.)

¹¹³ ‘...non potest radius lucis dici corpus, ut radius rotae lignae lignum, sed tantum via motus propagati. Rursus quoniam motus intelligi non potest nisi in corpore, habeatque omne Corpus, tres dimensiones, Longitudinem, Latitudinem, et crassitiem, necesse est ut etiam via motus constet dimensionibus iisdem. Non est ergo radius longitudo sine latitudine, sed solidum, cuius longitudo terminatur superficie corporis lucidi sive radiantis; quanquam possit interdum illa considerari non ut superficies, sed ut punctum, nimirum cum ratiocinatione, obiecti sive lucidi magnitudo non consideratur; neque dicitur aliquid punctum vel linea, vel superficies mathematica propterea quod dimensionibus careat, sed quia in argumentum non assumuntur. Ego itaque ubi alij utuntur vocabula Radij, vitandi aequivoci causâ, utar voce Radiationis.’ (TO II, 160.)

¹¹⁴ In view of the date, 16 Februari 1634, over a copy, probably written by Robert Payne of *Radii optici definitiones pro triplici visionis differentia* (see note 112) containing the definition in question this text was written before Hobbes’ departure that year to the continent. By then Warner already knew Hobbes. The first definition of the ray of light as a substantial line is irrelevant to the question of Warner’s influence. Hobbes never conceived rays of light as substances.

¹¹⁵ ‘Est...radius spatium solidum...Lineam unde radii latera incipiunt...appello *lineam lucis* simpliciter. Linearum autem quae a linea lucis continua protrusione derivantur...appello *lineam lucis eousque propagatam*.’ (OL, Vol. 5, 222) See for a thorough analysis of this notion Shapiro (1970), 141-143 and 153-162. See on Hobbes’ ray-concept in general Prins (1987), 297.

As explained in the foregoing, Warner in his notes on animal organisms, does not approach perception as an active process controlled by the mind, but as a mechanically evoked reaction.¹¹⁶ In that respect his theory of vision certainly is reminiscent of Hobbes' views in the *Short Tract*. There Hobbes too characterizes light as an active power or as an action of external objects on the eye.¹¹⁷ Also, like Warner, in that tract he defines sense as a passive power and locates sensation in the head. Yet despite these similarities the idea of Warner as the man behind that theory has to be rejected. Warner did not, like Hobbes, conceive light as the accident of a corpuscular substance but as a substance itself, i.e. a continuous fluid enclosing the atomical parts of matter¹¹⁸, nor did he make a distinction between primary and secondary light, i.e. *lux* and *lumen*. Further, in the *Short Tract* Hobbes offers a purely mechanical explanation of perception. In Warner's notes animal bodies, compared to machines, are actually governed by (self)conscious spirits. Apart from this the *Short Tract* was written towards the end of 1630, while Hobbes and Warner probably did not get to know each other until c. 1634.¹¹⁹

If these ideas did not inspire Hobbes to write the *Short Tract*, especially the third section, they certainly were not behind his later optical views. By 1640 he would still have agreed with Warner's idea of sense, for in *Human Nature* he defines perception as '...an apparition unto us of that motion, agitation or alteration, which the object worketh in the brain or spirits, or some internal substance of the head.'¹²⁰ At the same time, however, he no longer considered light as the accident of an external object. While Warner understands by light or colour a (*nota bene*) immaterial substance Hobbes already in 1636 wrote to the Earl of Newcastle that '...light and colour are but the effects of that motion in the brayne.'¹²¹ It is not a substance but an accident, namely motion, and that not in an objective but in a subjective sense, i. e. a motion not outside

¹¹⁶ See Chapter 2, section 2.4. Cf. Kepler's use of the term 'vis' instead of 'anima' (*Werke*, Band 4, 917-18).

¹¹⁷ According to Henry Hobbes' notion of the '...agent with active power inherent in itself is either modelled directly on light or on Warner's (or al-Kindi's) notion that all things emit an efficient virtue analogous to light.' (p. 23)

¹¹⁸ See BL Add. MS 4395, f. 209 and 4394, f. 400v.

¹¹⁹ Cf. Henry (1988): 'As Hobbes deals with "the facultyes and passions of the soule" in The little treatise, we have every reason to suppose that he felt this was his own attempt to be "the first" to "give reasons" for them, assuming Warner to have failed.' (p. 6)

¹²⁰ *The elements*, 4.

¹²¹ HMC (1893), 130. In the dedication of *The First Draught* (1646) he claims to have affirmed already in 1630 that '...light is a fancy in the mynde...'. Cf. Warner: 'Whether collor may be more properly said to be in the obiect or in the organ of sense.' (BL Add. MS 4395, f. 23) This note, written in the same period as the notes discussed here, suggests that he was aware of the problem.

but within the perceiver himself. As opposed to Warner, Hobbes now explicitly characterizes sensation as a *réaction* that moreover, from his criticism of White's *De mundo* onwards, no longer is said to originate from the head but from the heart. Further, while in Warner's explanation of sensory perception the effects of actions on the organs of sense are said to end in a 'comon sensorium'¹²² Hobbes, in his later writings, denies the existence of such an organ.¹²³ Last but not least, Warner's early theory of sensory perception does not contain so much as a shadow of Hobbes scepticism about the senses as sources of true knowledge. If the senses are in good order they supply a truthfull image of reality. Things, according to Warner, are not seen outside us because, as Hobbes claimed the motion of the spirits in case of sensory perception is outwardly directed, but simply because that is were the external objects, the causes of fantasms, are. Hobbes, far less naive, considers science, i.e. knowledge proper, though based on experience, as a product of reason.¹²⁴ These facts in my view justify the conclusion that, if Hobbes plagiarised at all he did not, as claimed by Ward, copy Warner's theory of light and vision as formulated in his manuscripts on animal organisms.

Things are different with regard to Warner's second theory of sensory perception. Hobbes' ideas on vision since the 1640s concur with Warner's ideas about colour and vision in the corollary of his tract on the place of the visual image from the 1630s. According to both, sensation requires a change in the sensing subject caused by motion. Both consider colour to be a product of the imagination, both believe that vision always goes together with an outwardly directed, reactive motion in the perceiver¹²⁵, and both adduce these ideas to explain the paradoxical fact that we see something, colour, which in reality does not exist.¹²⁶ Hobbes also probably knew Warner's tract 'De loco imaginis'.

Yet this still does not justify the conclusion that he took his kinematical theory of perception from Warner. After all, in this corollary Warner, unlike

¹²² See op. cit., f. 12.

¹²³ 'Differentiarum...observatio non est a sensione proprie dicta sensio aliqua, per sensorium aliquod commune, distincta, sed manentibus aliquantisper phantasmatis particularibus, differentiarum memoria...' (OL, Vol. 1, 325.)

¹²⁴ See *Elements*, 9; OL, Vol. 1: *De Corpore*, cap. 2, 5; OL, Vol. 2: *De Cive*, cap. 17, 12; EW, Vol. 3: *Leviathan*, chap. 5, 29-38.

¹²⁵ Yet, in a rough draught of a letter to Cavendish, probably from 1636, there is no talk of 'vision' as 'reaction': '...the optik membrane is the prime recipient of the visible species from whence it is continually transferred by the visive spirits in the nerve optik to the phantasy or last recipient which is the whole act of reall [sensation] vision rightly understood.' (Op. cit., f. 116.)

¹²⁶ However, Hobbes derived this paradox from an incompatibility in his visual experience, Warner from his atomistic view of matter.

Hobbes, still understands by light not an accident, motion, but a radiating, immaterial substance (see pp. 107-8, 238-241). Further, in opposition to Hobbes' optics since the 1640s, also this theory of Warner is, like Hobbes' theory of light in the *Short Tract*, combined with an atomistical view of matter. It is true that Warner's atomistic notes on time, space, matter and force, containing ideas about light and vision very much akin to those of Hobbes, were already written before 1630 but again nothing indicates that in the period he associated with Warner Hobbes actually saw these notes. If he had seen them he would most likely have brought them to the attention of Robert Payne and Charles Cavendish. They undoubtedly would have spoken and corresponded about them. However, in their still extant letters from the 1630s there is no mention of these notes or even of the subject itself. They rather suggest that in those years Warner had turned from physics, physiology and psychology to mathematics and to the geometrical solution of optical problems, an approach which Hobbes, already by that time had little respect for.¹²⁷

In a letter from 1641 to Mersenne and in the dedication of the TO I from 1646 Hobbes claims to have taught by as early as 1630 that light and colour exist only in the imagination. The earliest proof that he held this view is from October 1636 when he wrote to Newcastle: '...whereas I use the phrases, the light passes, or the colour passes or diffuseth itselfe, my meaning is that the motion is onely in the medium, and light and colour are but the effects of that motion in the brayne.'¹²⁸ The same is true for Warner, but Warner, according to Hobbes, would have heard it from him. As an answer to Ward's accusation that Hobbes took his explanation of sensory perception in terms of motion from Warner, Hobbes' claim requires elucidation. At first view it only partly seems to refute Ward's criticism. Ward, after all, accuses him of more than just of having stolen from Warner the idea that colour is a fiction. Moreover, Hobbes' reply, taken at face value, probably would not hold true. Warner's corpuscularism fits in the revival of atomism in England during the early 1620s.¹²⁹ Apart from his new look at sensible qualities, it can even be seen as a crystallization of his views in the years between 1605 and 1625. As appears from his question concerning the spirits '...whether the subtilty of their atomical parts and the velocity of their motation do continue allwais the same it was in the generation receiving no graduation or augmentation afterwards by any cause or occasion soever...' Warner already by then ascribed an atomic structure to the spirits.¹³⁰ And then there were the similarities between

¹²⁷ See Chapter 1, p. 15.

¹²⁸ HMC (1893), 130.

¹²⁹ See Kargon (1966).

¹³⁰ BL Add. MS 4394, f. 147r.

his ideas about light as ‘assisting form’ in the sense of an active principle and the ‘virtue radiative’ or ‘vis’ in the notes on space, time, matter and force. In the same notes he also argues that colour is not a property of atomic particles but an effect of the ‘vis’ on the ‘visive spirits’.¹³¹ Apart from all that, his mere association with the mathematician and scientist Thomas Harriot supposed to have been very interested in atomism, makes it improbable that, before he met Hobbes, Warner did not know the atomistic view of sensible qualities.¹³² Hobbes’ reaction to Ward’s accusation becomes more intelligible when we realize that by the characterization of light and colour as ‘fancy’ he means nothing but a motion of the spirits in the brain of the perceiver caused by the operation of an external object on the organ of sensation. It is a reactive motion that, because it is outwardly directed, only seems to be outside the perceiver. Warner uses this idea in the corollary under discussion. It is rather improbable that Hobbes took it from Warner. After all, though not explicitly formulated in the *Short Tract*, the idea is already present there in rudimentary form, as far as ‘fantasms’ are described as actions of the brain on the animal spirits.¹³³ In *Human Nature* Hobbes repeats this characterization of visual images with only one, albeit essential, difference: that the action of the brain is specified now as a ‘rebound’ or reaction, an idea not to be found in atomistical theories of contemporary compatriots like Sir Kenelm Digby or Walter Charleton.¹³⁴ Moreover *Human Nature* was written in 1640 and it is hardly likely that Hobbes would have presented such a crucial addition to his theory of perception without mentioning Warner, by then still alive, if he had taken that idea from him. According to Hobbes ‘...sensioni adhaeret proprie dictae, ut ei aliqua insita sit perpetuo phantasmatum varietas ita ut aliud ab alio

¹³¹ See op. cit., f. 399r.

¹³² See Kargon (1966), 18-30; Shirley (1983), 242.

¹³³ ‘A Phantasma is an Action of the brayne on the Animal spirits by the power it receiveth from externall sensible things.’ (ST, 44.)

¹³⁴ See *Elements*, 6. Cf. Digby: ‘...to exercise sense...is, *Our braine to receive an impression from the externe obiect by the operation or mediation of an organicall part made for that purpose, and some one of those which we terme an externe sense...the spirits are the instruments of this conveyance...*’ (*Two Treatises*, 277); Charleton: ‘...insomuch as it is indisputable, that in the act of Vision there is a certain *Sigillation* of the figure and colour of the object, made upon that part of the Eye, wherein the Perception is; and this sigillation cannot be conceived to be effected otherwise then by an *Impression*; nor that *Impression* be conceived to be made, but by way of *Incursion* of the Image, or Type: it is a clear Consequence, that to admit a *Sigillation* without *Impression*, and an *Impression* without *Incursion* of the Image, is a manifest alogy, an open Inconsistence. And upon this consideration it is, that we have judged *Epicurus* to have shot nearest the White, in his Position that Vision is performed...*per simulachra incursionem, sive incidentiam...*’ (*Physiologia*, 152).

discerni possit...sentire semper idem, et non sentire, ad idem recidunt.’¹³⁵ From that fact he concludes that all things in the universe flow from nothing but a diversity of motions.¹³⁶ Warner too deems variety of motion indispensable for perception: ‘...sensation is alteration and no alteration can be without local motion...’¹³⁷ However,¹³⁸ while in Hobbes’ later view sensory perception implies distinguishing and comparing Warner explicitly contrasts the faculty of sense as merely receptive and retentive, to reason as the comparing faculty. Accordingly

‘...in the sensation of two or more severall objects...together with the fantasms or species of the sensible formes or qualities of the things is necessarily or by <necessary> consequence uno eodemque actu impressed in receptivo fantastico the fantasme or species of their difference not as a distinct sensatum but as a necessary modification of the sensata quia quicquid recipitur, recipitur cum omnibus suis modis...’¹³⁹

The senses, in his view, simply directly perceive differences.¹⁴⁰

9.4.2. Pain and Pleasure

Both consider pain and pleasure as experiences connected primarily to sensation and as the consequences of harmful or beneficial actions on the body. However, Warner conceives these feelings as substances in a certain state, i.e. as distorted spirits in general, endangering in principle all functions. Hobbes understands by pain and pleasure motions of the spirit helping or obstructing the circulation of the blood. Further, while according to Warner pain and pleasure are felt in the body simply because that is where they are, Hobbes explains that location, like he does in case of sensory perception, as an effect of the direction of the conatus in question.¹⁴¹ Initially Hobbes, like Warner, conceived pain and pleasure as nothing but specific kinds of sensations, which in his case implied that they were thought of as motions

¹³⁵ OL, Vol. 1, 321.

¹³⁶ OL, Vol. 1, xxi.

¹³⁷ See BL Add. MS 4394, f. 389v and Chapter 5, p. 176. Warner concludes from this fact to the existence of a cosmic force as an independent principle next to time, matter and space. (See Chapter 1, note 149)

¹³⁸ ‘...per sensationem vulgo intelligimus aliquam de rebus objectis per phantasmata iudicationem; phantasmata scilicet comparando, et distinguendo...’ (OL, Vol. 1, 320)

¹³⁹ BL Add. MS 4395, f. 34.

¹⁴⁰ Barnouw unjustly deems Hobbes’ presentation of his theory of perception as the ‘common view’ surprising. Actually, in comparison with the then current views on this subject Hobbes’ characterization of perception as implying a judgement was common while Warner’s view of perception as nothing but reception was out of line. (See Barnouw (1980), 122)

¹⁴¹ See OL, Vol. 1, 331.

from the head to the heart. In *De Corpore* he separates sensation, a reaction, directed outwardly, from the heart via the brain to the organs of sense, from pain and pleasure conceived as motions going from the organs of sense to the heart.¹⁴²

9.4.3. Good and Evil

Both understand by good and evil things that, endowed with certain powers referred to as ‘goodness’ and ‘badness’, cause pleasure or pain. In contrast with Hobbes, Warner explicitly presents them as conceptions as opposed to sensations, of the destructibility or salutariness of the objects in question. In other words, good and bad, according to Warner only exist at the level of the intellect. In the *Leviathan* Hobbes refers to pleasure and pain as the ‘apparence, or sense’ of good and evil.¹⁴³ Though questioning the nature of good and evil simply as well as that of the *summum bonum* Warner does not deny their existence.¹⁴⁴ Hobbes does: ‘...these words of Good, Evill, and Contemptible, are ever used with relation to the person that useth them: There being nothing simply and absolutely so¹⁴⁵ ...*Continuall successe* in obtaining those things which a man from time to time desireth, that is to say, continuall prospering, is that men call Felicity; I mean the Felicity if this life. For there is no such thing as perpetuall Tranquillity of mind, while we live here; because Life it selfe is but Motion...’¹⁴⁶

9.4.4. Imagination and Memory

According to both, action on the senses results in fantasms, i.e. representations of external objects caused in the animal spirits by the brain. Both explain this phenomenon as the effect of a ‘habituation’ or ‘qualification’ of the organ in question.¹⁴⁷ Again, both consider fantasms as sensations with only this difference that the latter are ‘in fieri’ while fantasms are ‘in facto’. Both also,

¹⁴² Ibid. Warner neither does, as Henry claimed in his lecture on Hobbes’ debt to Warner, understand by ‘pain’ the same thing as what Hobbes calls “Aversion” or “Fear” (Henry (1988), 9); nor do his notes justify Henry’s belief that Warner, like the Epicureans, simply identified the absence of pain with happiness. (Henry (1988), p. 34, note 33.) Cf. Chapter 4, pp. 157-8 and note 106; Chapter 6, pp. 190-1.

¹⁴³ See EW, Vol. 3, 42. Cf. Henry (1988): ‘Appetite and its opposite...provide both men with working definitions of what is signified by good and bad - which both men choose to refer to in latin: bonum and malum.’ (p. 9)

¹⁴⁴ See Chapter 5, note 133 and Chapter 6, p. 198.

¹⁴⁵ EW, Vol. 3, 41.

¹⁴⁶ Op. cit., 51.

¹⁴⁷ As Henry ((1988), p. 11) pointed out in his lecture both illustrate this process by comparing it to the effect of a magnet on iron or steel. See also Chapter 3, p. 126 and ST, 38.

talking about fantasms, are not too strict in their terminology referring to them as ‘ideas’, ‘concepts’, ‘species’, ‘impressions’, ‘images’, etc. Both consider imagination and recollection as operations of materially one and the same faculty, recollection being nothing but the imagination of things past. However, there are also substantial differences. Warner understands by fantasms configurations pressed into the spirits by corresponding patterns in the brain while Hobbes always conceives them explicitly as motions. Moreover from the time of his criticism on White’s *De mundo* onwards he supposes these motions not to flow from the head but from the heart. Both distinguish voluntary motion from involuntary motion as the kind of motion preceded by an act of imagination. To Hobbes this means that imagination ‘...is the first internall beginning of all Voluntary Motion’.¹⁴⁸ Warner only considers the will as such.¹⁴⁹

9.4.5. Joy and Sorrow

According to Warner the formation of the concepts of good and evil is accompanied by certain motions of the intellective spirits called joy and sorrow. These feelings, passions of the intellect, accompany thoughts of good and evil, past as well as future. In Hobbes’ view these feelings are only invoked by the thought of expected pain and pleasure. In fact Hobbes considers joy and sorrow as the mental counterparts of bodily pain and pleasure. This does not mean that they are not passions of the body or that they are felt in another part of the body than bodily pleasure and pain, but that they are not coupled to specific organs. However, in Warner’s opinion they are. As passions of the intellect they are effected in another part of the spirits than pain and pleasure, a part not only disposed to passive but also to active operations.

9.4.6. Appetite and Will

Both consider the appetite as essential to or even as identical with life.¹⁵⁰ Warner because without appetite there would be no will and consequently no voluntary action like the search for and gathering of food; Hobbes because life itself is nothing but motion. Warner, quoting Gualandi, describes that motion as an ‘exporrectio’, a reaching out towards the desired object and as a reactive ‘conatus spirituum’.¹⁵¹ It is the first beginning of, or disposition to, locomotion. Maybe he discussed that idea with Hobbes who in the *Short Tract*

¹⁴⁸ Op. cit., 39.

¹⁴⁹ See Chapter 7, section 7.3.

¹⁵⁰ ‘...if no appetite nor volunty no life...’ (BL Add. MS 4395, f. 40); ‘...nemo...dum vivit caret appetitu...’ (AW, 373); ‘...Life it selfe is but Motion, and can never be without Desire, nor without Feare...’; ‘...to have no Desire, is to be Dead...’ (EW, Vol. 3, 51 and 62)

¹⁵¹ See op. cit., f. 33.

characterized the appetite simply as a motion of the animal spirits and only in *Human Nature* specified it as the beginning, the first endeavour of animal motion.¹⁵² However, as opposed to Warner's use of the term 'conatus' in the general sense of impulsion or tendency¹⁵³ Hobbes gave it a distinctly mechanical meaning defining the notion of 'endeavour' or 'conatus' as '*...motum per spatium et tempus minus quam quod datur, id est, determinatur, sive expositione vel numero assignatur, id est, per punctum.*'¹⁵⁴ This concept of a minimal, imperceptible motion enabled Hobbes to explain not only the physical, i.e. the external and overt actions between bodies but also the internal, covert psycho-physiological processes involved in voluntary behaviour in terms of motion. An even more important difference with Warner's views is his characterization of the appetite, already in the *Short Tract*, as a passion caused by its object. While according to Warner the object of the appetite merely functions as a passive cause of the reactive motion called appetite, in Hobbes' view man, desiring something, is not the agent but a patient acted on, i.e. attracted by the desired object. In contrast to Warner Hobbes in *Human Nature* identifies the motion called appetite with the one referred to as pleasure or pain. Accordingly, in Hobbes' view, materially there also is no difference between appetite, conceived by Warner as a reaction, on the one hand and joy and sorrow, conceived by Warner as impressions, on the other. With Hobbes the appetite is not, as it is with Warner, a passion of the intellect, i.e. the part of the spirits located in the head, but a passion originating in the heart.

Both reject the idea of a physiological difference between voluntary and involuntary behaviour, and both minimize the psychological distinction. However, according to Hobbes the will simply is the strongest endeavour, while Warner considers it the beginning of a motion rationally considered as the most efficient alternative. Thus as opposed to Hobbes and contrary to his own doctrine of the spirit, Warner in fact adheres to the traditional distinction

¹⁵² Cf. Henry (1988): '...Hobbes's well-known but rather puzzling concept of conatus, or "endeavour", becomes less puzzling when it is realised that it is not a debased form of Descartes' concept of conatus but is closely reminiscent of Warner's use of the concept.' (p. 12)

¹⁵³ Cf. Cicero: '...natura mundi omnes motus habet voluntarios conatusque et adpetitiones quas ὁρμάς Graeci vocant, et his consentaneas actiones sic adhibet ut nosmet ipsi qui animis movemur et sensibus.' (*De natura deorum*, II, 58.); Hill: 'Voluntas est resultantia intellectus, i. motus omnium partium et ardentissimus membrorum conatus eorum, quorum impulsus exigitur, vel illius actualis et subita prosecutio, quod intellectui se obtulit sub forma boni.' (*Philosophia*, aph. 22, p. 11)

¹⁵⁴ OL, Vol. 1, 177. Cf. 'Conatum autem esse idem, quod motus principium, manifestum praeterea est partem omnem motus esse motum, principiumque uniuscuiusque rei esse primam eius partem, unde sequitur conatum omnem esse motum.' (AW, 195)

between the sensitive and rational appetite. While Hobbes considers the will as nothing but an appetite Warner characterizes it as a rationally informed or determined appetite. Moreover, while Warner questions the freedom of the will Hobbes categorically denies the possibility of free agents.

9.4.7. Understanding and Reason

Both Hobbes and Warner distinguish between a passive and an active operation of the intellect. In the *Short Tract* Hobbes only mentions the understanding, a passive operation consisting of having the fantasm of an external object. Though he says nothing there about reason, the active operation, principles 4 to 10 of the third section, all dealing with concept-formation suggest that he originally intended to discuss that aspect too. In an early version of some chapters of *De Corpore*, dated c. 1638 it says ‘...in truth upon a diligent advertence of what we do when we reason or of the act of ratiocination...we compute nothing else but our phantasms or ideas...’¹⁵⁵ However, from *Human Nature* onwards these two operations of the intellect are linked to the faculty of speech. Understanding is now said to be the faculty to find out the true meaning of what is said, and reasoning that of formulating propositions and constructing syllogisms, i.e. the power to calculate not with fantasms but with words.¹⁵⁶ Hobbes now distinguishes speculation on the basis of a comparison of fantasms, i.e. ‘...a *Praesumption* of the *Future* , contracted from the *Experience* of time *Past*...’ as prudence, a natural faculty shared by animals and man¹⁵⁷, from reasoning, a prerogative of man, the only animal procured with the power of speech:

‘I have said...that a Man did excell all other Animals in this faculty, that when he conceived any thing whatsoever, he was apt to enquire the consequences of it, and what effects he could do with it. And now I adde this other degree of the same excellence, that he can by words reduce the consequences he findes to generall Rules...that is, he can Reason, or

¹⁵⁵ National Library of Wales, MS 5297, f. 1. In: AW, 449-50.

¹⁵⁶ ‘...Reason...is nothing but *Reckoning* (that is, Adding and Subtracting) of the consequences of generall names agreed upon, for the *marking* and *signifying* of our thought; I say *marking* them, when we reckon by our selves; and *signifying*, when we demonstrate, or approve our reckonings to other men.’ (EW, Vol. 3, 30)

¹⁵⁷ EW, Vol. 3, 16. Cf.: ‘...prudentia sit via à potentia ad potentiam et impedimentorum quae in illis sunt praevisio...Praevisio autem futuri consistit in memoriâ sive experientiâ consequentiarum praeteritarum, quarum similes de futuro expectantur, ita ut prudentissimi sint qui maximam habent experienciam, & expertissimi sint, qui plures fecerint in praeterito observationes circa bonorum & malorum consequentias.’ (AW, 419); ‘The Imagination that is rayseed in man (or any other creature indued with the faculty of imagining) by words, or other voluntary signes, is that we generally call *Understanding*; and is common to Man and Beast.’ (EW, Vol. 3, 11) See also this chapter, p. 248.

reckon, not onely in number; but in all other things, whereof one may be added unto, or subtracted from another.’¹⁵⁸

While prudence is focussed on particulars and merely conjectural the rational calculation with words, if done according to the rules of the game, i.e. syllogistic logic may result in knowledge not just of other sensorally known facts but in rational knowledge of the causes of these facts. The rational power, intimately connected to the power of speech, enables man, in other words to acquire absolutely certain and universally true knowledge, i.e. scientific knowledge of reality. The prudent man, guided by his experience, i.e. knowledge of the past, copes as best as he can with a given reality. The scientist, guided by his causal knowledge, reconstructs natural reality or constructs an artificial world.¹⁵⁹

Only Hobbes’ initial view of the intellectual operations is fairly close to Warner’s ideas. By ‘understanding’ Warner means the mental inspection of fantasms, and by reasoning the formulation of propositions and the construction of arguments by comparing fantasms, i.e. by studying their relationship to each other as well as to us. According to Warner the rational faculty, a kind of extension of the senses, enables us to make the most of experience. It leads to more but not to a qualitatively different kind of knowledge than do the senses alone. In this respect man and animals differ only in degree.¹⁶⁰ Like Hobbes Warner believes that the only essential difference between man and animals is to be looked for in ‘...that naturall

¹⁵⁸ EW, Vol. 3, 33.

¹⁵⁹ See *Elements*, 16-7.

¹⁶⁰ According to Warner the difference between men and animals cannot be explained by the fact that man stands upright or by the anatomy of his hands: ‘...other animals...are naturally furnished with senses in the same degree of perfection that we are unless it may be thought that our organization of the hands and our erect incession should give us any advantage above them which in parity or indifferency of all other conditions can not be conceived to be any other then that which the ape or babovin hath in respect of the other species.’ (BL Add. MS 4394, f. 238v.) Cf. Aristotle: ‘...man...has hands because he is the most intelligent animal. We should expect the most intelligent to be able to employ the greatest number of organs or instruments to good purpose; now the hand would appear to be not one single instrument but many, as it were an instrument that represents many instruments. Thus it is to that animal (viz. man) which has the capability for acquiring the greatest number of crafts that Nature has given that instrument (viz. the hand) whose range of uses is the most extensive.’ (*Parts of animals*, 687a5-24) Galen is of the same opinion. (See *De usu partium corporis humani libri XVII. Nicolao Regio Calabro interprete*. In: *Opera (1549)*, Vol. 1, 418.) (Kühn, Vol. 3, 5-6.) Just because of those hands man is the only animal that walks upright. Besides, in Galen’s view, man is the only animal that can sit. Galen’s judgement of apes, by the way, is far less favourable than Warner’s judgement: ‘...ridiculo anima animali ridiculam corporis constructionem dari oportere...ipsius universum corpus ridicula sit hominis imitatio...’ (Op cit., 443.) (Kühn, Vol. 3, 80). See also op. cit., 770. (Kühn, Vol. 4, 126.)

prerogative which we have beyond all other animalls namely our language whereby we are naturally and necessarily disposed <and adapted> to a far other kinde of sociable life then is apparant in any of the other species...'¹⁶¹ This power of speech enables man to learn from, as well as to transmit his own knowledge to other people. To this natural widening of our cognitive powers

‘...by vocall communication and tradition hath succeeded the artificiall invention of lettres and scription by which both the imperfections and defects and uncertainties or anomalies of the other are supplied and rectified and the augmentable power thereof also incresed; and to this againe of writing that of printing whereby the same is far more augmented and multiplied.’¹⁶²

However, in Warner’s opinion, this faculty as such has nothing to do with rationality. Apart from his belief in the senses as sources of absolutely true and certain knowledge Warner’s view of reason does not differ substantially from what Hobbes calls the understanding.

9.4.8. Voluntary Motion

The process leading to voluntary motion, in Warner’s view, consists of a passive phase, comprehending sensation, pain or pleasure, and sorrow or joy, and an active phase including appetite, determination and locomotion. He divides the faculties involved into three groups, to wit, the sensitive, intellective and locomotive faculties. Sensory perception, a configuration of matter caused by motion, leads to pain or pleasure as well as to an appetitive and determinative reaction in the intellect, i.e. to other material configurations and motions, followed by an action. The corresponding faculties, conceived as dispositions to certain motions, are distributed over different parts of the spirits. As each faculty corresponds with a different movement in a different part of the spirits, some passive, others active, loco-motion cannot be effected by the propagation of but one and the same impulse.

¹⁶¹ Op. cit., f. 238v. Cf. Fabricius of Aquapendente: ‘...locutio ultima sit omnium aliarum actionum, quae per...aeris emissionem complentur; merito finis omnium est, & praestantissima. Per hanc enim unam homines maxime à caeteres animantibus differunt; haec mentis interpres, & veluti nuntia est: hac intellectus ea, quae concepit, facile exprimit, atque indicat...’ (*De locutione* 1601. In: *Opera*, 306.) See also Fracastoro, *Turrius sive de intellectione*. In: *Opera*, 365r.)

¹⁶² Op. cit., f. 238r. Cf.: ‘The grettest effects that ever ben have proceeded from slight intentions as almost all the knolege of the world hath proceeded from the use of 24 letters or marks &c which is but a mere trik.’ (Op. cit., f. 268r.) Cf. Hobbes: ‘The Invention of Printing, though ingenious, compared with the invention of Letters, is no great matter...But the most noble and profitable invention of all other, was that of Speech...’ (EW, Vol. 3, p. 18)

Nevertheless the faculties involved somehow are connected to each other and the operation of each faculty is supposed to provoke that of the one directly following it:

‘...of all the faculties internall cognoscitive informative or theoreticall the objects are active and the organs passible and <econtra> of all the faculties active or practicall as well internall <and deliberative> as externall <and executive> the organs are active and the objects passible. Where is to be noted this analogy or analogate reciprocation betwene the two processes or subordinations the passive or theoreticall and the active or practicall that the subordination or processe theoreticall from the objects ab extra to dolor is (sensitive) and from dolor to tristitia (intellective) and the processe or subordination active or practicall from discupiscentia to voluntas is <deliberative and> analytically and from voluntas to the objects ad extra <executive and> synthetically, so that dolor in the one and voluntas in the other are termes subalterne and tristitia in the one and discupiscentia in the other, termes tropicall, the one being passion and the terminus or end of the passive processe the other reaction and the principium of the succeeding processe active...’¹⁶³

Warner labels the transition from the cognitive phase to the deliberative and executive phase, i.e. the transition from joy or sorrow, passions, to a positive or negative appetite, actions, as a reaction. This term, not so much explaining as describing the process, must not be taken in a mechanical sense. It simply characterizes the process involved as a change from something into its opposit. How this comes about and why this ‘reaction’ occurs precisely at that particular point in the process is not explained. Starting from the mechanically unexplained assumptions that the sensitive spirits are only disposed to passive operations and that the appetite is an action of the intellective spirits all this was self-evident to Warner. On the other hand

‘...seeing the transition from the processe passive to the active is by reversion or regresse thatstosay by reaction, it is to be considered what is the maner or way of transition from the sensitive to the intellective in the passive and from the analytik to the synthetik in the active; since by reaction they can not be, cum reactio sit actionis contrariae destructiva seu frustrative et sit etiam ad idem.’¹⁶⁴

This transition was far from evident to Warner. He could not explain, to be more precise, how joy and sorrow are caused by pleasure and pain or how the operation of the intellective spirits leading to a determined or an informed appetite, can result in locomotion. From a mechanical point of view, there would not seem to be a problem. Regarding the continuity of the spirits, the transitions involved could be explained as the effects of a propagated impulse.

¹⁶³ Op. cit., ff. 234r-233v.

¹⁶⁴ Op. cit., f. 233v.

That obvious idea, however, if it crossed his mind at all, seems not to have been acceptable to Warner.

Despite the fact that he apparently somehow conceived these transitions as the result of operations between opposites he also rejected their explanation in terms of action and reaction for that model presupposes the, in these cases irrelevant, reversal from a passive to an active operation or vice versa. The transition from pain or pleasure to sorrow or joy, in Warner's view, amounted to a shift from the sensitive to the intellectual spirits. That from the informed appetite to the execution of an intended act came down to the change from an intellectual analysis to a motory synthesis. Though his pneumatology suggests a mechanical interpretation of these processes, an explanation in terms of matter and local motion, we are dealing here in fact with qualitative changes. These as such could not be conceived mechanically at all. The distinctions involved point to Scholasticism. According to his Scholastic predecessors and contemporaries a theory of locomotion had to account for a transition from sensory knowledge of material particulars, to the intellectual knowledge of immaterial universals as well as for the transformation of an immaterial entity like a wish or decision into local motion of a material body. They thought to solve the first problem with the theory that material, sensible species somehow are transformed into immaterial, intelligible ones, i.e. objects proper to the intellect and introduced a special 'vis locomotiva' to explain the bodily execution of mental commands.

Hobbes would have explained these transitions or what looked like that either as a mechanical reaction, i.e. as a result of resistance, a collision of opposing forces¹⁶⁵ or solved the problem by showing that there was not a real transition the faculties involved being identical or the one being simply a continuation of the other. In fact according to Hobbes the explanation of locomotion does not involve a transition from the senses to the intellect as two, ontologically, distinct domains and he does not need a separate 'locomotive faculty', apart from the appetite and other passions as 'motive faculties'. In healthy organisms painful or pleasant sensations, thanks to the propagation of motion by the spirits, directly result in a reactive approach or avoidance of the perceived object. Pain and pleasure directly cause a transportation of the animal spirits to the muscles that have to be activated to produce the kinds of motions that will remove the obstruction of the circulation of the blood or that will enhance it.¹⁶⁶

¹⁶⁵ He understands by resistance a '...in contactu duorum mobilium, conatum conatui, vel omnino vel ex aliqua parte, contrarium' (OL, Vol. 1, 178.)

¹⁶⁶ If the circulation of the blood '...a motu facto per objectorum sensibilium actionem impediatur, rursus per partium corporis flexionem directionemve restituetur, spiritibus scilicet modo in hos modo in illos nervos impulsis, donec quantum fieri potest molestia omnis tollatur. Sin a motu per sensionem vitalis motus adjuvetur, disponetur partes organi ad spiritus ita regendos, ut is motus quantum fieri potest nervorum ope conservetur et adaugeatur.' (OL, Vol. 1, 331-2.)

9.5. *Hobbes' Debt to Warner*

As appears from the foregoing, Hobbes' doctrine of the 'facultyes and passions of the soul' in the 1630s shows, apart from many differences, some striking similarities with Warner's views. In *Human Nature* Hobbes presented a substantially different doctrine that removed him from Warner, a process continued in his criticism of White's *De Mundo* and in his later works. The unambiguous mechanistic approach of the *Short Tract* in general as well as the differences between the theory of sensible qualities, the appetite and the will in this treatise and Warner's views, argue against the idea of Warner as the man behind the *Short Tract*. They certainly invalidate the view of this tract, especially its second and third section, as deriving from Warner's papers. Hobbes very probably wrote the *Short Tract* before he got to know Warner.

There is all the more reason to reject Ward's suggestion that Hobbes took his mechanical explanation of sensory perception or, for that matter, his doctrine of the faculties of the soul in general, as formulated in *Leviathan* from Warner's manuscripts. At any rate Hobbes did not take that explanation from the manuscripts still extant. The doctrines in these fragments, moreover, make it hard to believe that Warner ever formulated views on the subject as clear and as radically mechanical as did Hobbes.¹⁶⁷

All this does not alter the fact that Hobbes' conversations with Warner may very well have inspired him to an adjustment and further elaboration of his explanations in the *Short Tract* which found concrete shape in *Human Nature* and later writings. Hobbes, about the only one of Warner's contemporaries, known to have taken an interest in his doctrine of the 'facultyes and passions of the soul', probably did not exaggerate when he praised Warner as the first one whose views on the subject made sense to him. He must have recognized in Warner's ideas a general tenor, similar to his own approach in the *Short Tract* and differing radically from the current views. At that time, the 1630s, it must have been hard to find, at least in England, a kindred spirit like Warner. He may have found support in Warner for his aversion to the Scholastic philosophy of nature, his approach of the science of man as a part of natural philosophy, his view of the soul as a material substance, his conviction that an

¹⁶⁷ That is, as a writer on the faculties of the soul. A detailed comparison of Hobbes' writings with Warner's notes on space, time, matter and force might lead to other conclusions. Anyway, in these notes Warner opts for a distinctly mechanical approach of natural processes.

organism is controlled by but one principle of life, his idea of man as differing only by degree from animals who, as a continually striving organism, is impelled by the urge for self-conservation, his reduction of the will to the beginning of locomotion, his idea that all knowledge is based on sensory perception, and for his keeping apart natural philosophy and theology.¹⁶⁸

On the other hand Warner obviously did not give Hobbes good reasons for his views on the 'faculties and passions of the soul'. These views were inspired by Warner's opinion that until then writers on the soul did not adequately distinguish between the several faculties preceding voluntary motion. Apparently, in Warner's view, that lack was caused by an inadequate consideration and analysis of the objects and faculties in question. His own alternative is based on a meticulous analysis of the said objects. His irresolution in abandoning the traditional dualism and finalism in favour of a straight materialistic and mechanistic explanation of nature together with the attendant ambiguity and vagueness of many of his explanations may have made Hobbes see the shortcomings, i.e. from a mechanist's point of view, of his own initial approach in the *Short Tract*. As for sensory perception he traded the corpuscularism in the *Short Tract* for a mediumistic explanation of sensation, conceived no longer as an impression in the sense-organ but as a mechanical reaction originating in the brain. Accordingly, he dropped the view of sensible qualities as entities existing outside of the perceiver, in favour of their conception as motions in the perceiving subject. While considering in the *Short Tract* sensation and appetite as two distinct processes, in his later writings Hobbes concentrates these functions in one and the same organ. The qualification in the *Short Tract* of the appetite as a motion of the animal spirits is traded for its description as the beginning of animal motion, specified later on as *conatus* in the sense of a minimal motion. Consequently, Hobbes henceforth unambiguously conceives everything defined in terms of the appetite, for example the notions of 'good' and 'bad', as a mechanical phenomenon. His talks with Warner may have encouraged Hobbes to this economization of his conceptual apparatus in general, to this clarification and sharpening of his explanatory concepts, and to the formulation of a purely mechanical explanation of human functions.

¹⁶⁸ Most of these points of agreement suggest Telesio as a common source of Hobbes and Warner. (See Chapter 3, sections 3.1., 3.8. and Schuhmann (1988)) They share that affinity up to a point with Nicholas Hill. (See Prins (1989))

Chapter Ten

Concluding Remarks

In the secondary literature on Thomas Harriot and Thomas Hobbes, Warner is presented as an atomistic natural philosopher inspired primarily by Giordano Bruno. However, the preceding investigation leads to other conclusions. Until the end of the 19th century Warner was only considered as mathematician and optical scientist. His papers in the British Library confirm that image. Apart from a few suggestive remarks by Pell, Hobbes and John Wilkins¹, as well as the rumour that he wrote a treatise on the circulation of the blood, there is no evidence that Warner was also known to his contemporaries as a natural philosopher. That recent qualification is mainly based on a collection of notes on the principles of nature, one on fire and combustion and one on the physiology and psychology of animal organisms dispersed amongst Warner's 'mathematical collections' in the British Library. Pell, Wilkins and some of the latter's friends² may actually have seen these notes. Aylesbury and Payne are said to have known Warner's treatise on the circulation of the blood. However, John Collins mentions none of these notes in his inventory.

The topics discussed, the way they are dealt with, as well as the authorities referred to, suggest that these notes were written at the end of the 16th or in the early 17th century. Considering the interests of Warner's patron Henry Percy as well as those of Thomas Harriot they very well may have been written by someone belonging to the group of scholars Percy gathered around himself. In view of their handwriting they cannot have been written by the Earl himself, by Harriot or by Torporley. Though the handwriting of the notes on the principles of nature, and those on fire and combustion, differs from that of those on animal organisms, graphological as well as stylistic similarities suggest that all these notes were written by one and the same person. That person was probably Warner.

The notes on the principles of nature were written by an atomist. In the notes on fire and combustion, the term 'atoms' is used in the sense of 'minima naturalia'. The notes on animal organisms are inspired by an eclectic mixture of Aristotelianism, Nominalism, Stoicism, a pinch of Paracelsism, and Doni's or Telesio's doctrine of the spirits. Occultism and mysticism, very popular in Warner's day, are conspicuously absent. Accordingly, if these notes are from

¹ See Chapter 1, pp. 15-6 and notes 115 and 119.

² See Chapter 1, notes 115 and 119.

one and the same person they were written in different periods. Assuming that they are from Warner the notes on animal organisms were probably written sometime between the late 1590s and 1620 and the first two groups of notes in the 1620s.

Only the notes on the principles of nature seem to justify the view of Warner as an atomist. They do not corroborate the idea that in these matters Warner was primarily inspired by Bruno. They point rather to an influence of Patrizi's doctrine of light as a cosmic force. The notes on fire and combustion, presenting another kind of corpuscularism than the former group, seem to be inspired by the alchemical literature. This influence as well as that of Patrizi link Warner with Nicholas Hill.³ It would definitely be worthwhile to submit his notes on physics to a closer investigation in that respect.

Warner's notes on animal organisms offer quite a different picture. His explanation of animal functions in terms of matter and form, his attempt to determine exactly the faculties preceding locomotion, his speculations on the active and passive, as well as on the theoretical and practical intellect, on the relationship between the appetite and the will and those on the transition of operations from the senses to the intellect, or from the intellect to locomotion, are all characteristic of Scholasticism. However, in contrast with many of his contemporaries, Warner, dissociating himself from the 'scholmen of Aristoteles sect',⁴ did not simply repeat Scholastic tenets, but found numerous things to criticize. Instead of the traditional explanations of vital functions he formulated a theory according to which animal organisms are controlled by an animal spirit, i.e. a material and yet rationally acting substance, and he explained the bodily as well as mental functions, as effects of 'assisting forms', i.e. external, efficient causes. His speculations concerning voluntary behaviour focussed not so much on the nature of the faculties involved as on the way they are transformed into actual skills. He introduced an unorthodox concept of rationality and reduced the will to nothing but an 'inchoative degree' of locomotion. His doctrine of the spirits, borrowed probably from Doni or Telesio, leads to psychological theories that are no longer determined by the traditional distinctions between the material and immaterial as well as the irrational and rational. Warner even goes further in his materialism than Telesio insofar as he ascribes but one, material soul to animal organisms, and conceives all faculties preceding locomotion as mere passive powers. Considering the processes involved in voluntary behaviour in terms of action and reaction, Warner comes very close to a mechanical view of body and

³ See Chapter 1, section 1.2.4.

⁴ See for this expression BL Add. MS 4395, f. 20. See also ff. 19, 26, 36 and MS 4394, ff. 235r, 261r.

soul. However, his pneumatology, inviting, with its mixture of the mental and material, to the kind of mentalistic explanations typical for Scholasticism, precluded his complete transformation into a mechanist. The notes in question show Warner as a transitional figure, giving, with his attempts at explaining animal organisms as integrated systems controlled by feedback-mechanisms, just a materialistic and, to a certain degree, mechanistic twist to the eclectic Aristotelian views that set the tone in his day.

The results of this investigation of Warner's notes on animal organisms also suggest that Telesio's psychological theories were more widely known and probably exerted a stronger influence in early 17th century England, than until now, on the authority of Francis Bacon, has been assumed. Finally, the investigation has lifted one corner of the veil lying over the sources of Hobbes' materialistic psychology. It vitiates the allegation that Hobbes simply took his explanation of sensory perception or of the other psychological functions in terms of motion from Warner. Though it does not answer the question why Hobbes already in the early 1630s opted for materialism, it shows at least that he did not have to go to the continent or read Gassendi, to meet a kindred spirit during the years of his formation as a natural philosopher.⁵ It, moreover, suggests that his discussions with Warner had a catalyzing effect on the development of a radically kinematic psychology as set forth in *Human Nature* (1640) and in his later writings.

Though Warner did not make a lasting contribution to anatomy, physiology or psychology his notes on these subjects deserve further investigation. Anticipating up to a point Hobbes' mechanical psychology as well as the rise of the circulation physiology during the second half of the 17th century, they shed some light on the developments of natural philosophy in England, started by John Case and continued in the work of Francis Bacon, that were to lead up to a definite break with Renaissance philosophy.

⁵ Cf. Mintz (1962): 'In his earliest philosophical treatise Hobbes showed himself to have been a materialist, and to this doctrine he adhered all his life. Why was he a materialist: Why, that is to say, did he reject spirit and adopt a theory of matter as ultimate reality at a time when the notion of spirit as real held a firm grip on the minds of men? To this question research into Hobbes's life and the sources of his thought has not yet produced a satisfactory answer.' (66) Hobbes may have been inspired to or confirmed in his option for materialism not only by Warner but also by Nicholas Hill's *Philosophia epicurea*.

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Samenvatting

De wiskundige en natuurfilosoof Walter Warner (ca. 1557-1643) is een van die moeilijk grijpbare figuren die, ook al hebben ze onmiskenbaar een belangrijke rol gespeeld in hun tijd, hun plaats in de geschiedenisboekjes vooral te danken lijken te hebben aan de geruchten en vermoedens die er over hen de ronde doen. Zo is Warner de geschiedenis ingegaan als wiskundige en opticus van formaat die nauw zou hebben samengewerkt met de wiskundige Thomas Harriot (1560-1621), als vermeend schrijver van een verhandeling over de bloedsomloop die William Harvey (1578-1657) op het spoor gezet zou hebben van zijn verklaring van dat verschijnsel in *De motu cordis* (1628), en als de vermeende inspirator van Hobbes' materialistisch-mechanistische psychologie. Hij zou lid geweest zijn van een aantal groepen hecht samenwerkende, progressieve wetenschappers waaronder een groep rond zijn baas Henry Percy (1564-1632), de negende graaf van Northumberland en de 'Cavendish Circle', een groep wetenschappers rond Hobbes' broodheer William Cavendish, graaf van Newcastle, en diens broer Sir Charles Cavendish (1591-1654). Warner zou, met andere woorden, in de vroege 17e eeuw hebben behoord tot de wetenschappelijke avant-garde in Engeland.

Bij zijn dood liet hij een grote verzameling aantekeningen achter betreffende met name de wiskunde, de optica en de metallurgie. Na veel omzwervingen belandde wat er van restte in de British Library waar ze, samen met een grote hoeveelheid aantekeningen op het gebied van zowel de fysica als betreffende de vitale functies van dierlijke organismen plus wat correspondentie zijn gebundeld onder de titel 'Warner's Mathematical Collections'.

Al in de 17e eeuw raakten die aantekeningen uit het zicht en daarmee in de vergetelheid. Eind vorige eeuw werden ze daar weer aan ontrukkt door George Rolleston die op grond van enkele fragmenten uit de aantekeningen over dierlijke organismen tot de conclusie kwam dat Warner ten onrechte door tijdgenoten was beschouwd als voorloper of zelfs als inspirator van William Harvey. (Zie Rolleston (1884).) De paar historici van de geneeskunde die zich sindsdien met deze kwestie hebben beziggehouden delen die mening. Met de groeiende belangstelling sinds de vijftiger jaren voor het werk van de wiskundige Thomas Harriot en voor Thomas Hobbes (1588-1679) kregen ook andere delen van Warner's nalatenschap, met name een verzameling aantekeningen over de principes van de natuur, meer aandacht. Op grond van die aantekeningen wordt Warner wordt in de secundaire literatuur gepresenteerd als een, voornamelijk door Giordano Bruno (1548-1600) geïnspireerde, atomist. (Zie Kargon (1966), Gatti (1983, 1985), Ricci (1985), en

Jacquot (1952b, 1974.) Jacquot betreft als enige ook de aantekeningen over de vitale functies van dierlijke organismen in zijn beschouwingen. Hij suggereert niet alleen dat Warner streefde naar de ontwikkeling van een alomvattend natuurfilosofisch systeem op atomistische grondslag maar ook dat Thomas Hobbes Warner's opvattingen betreffende, met name de psychologische functies van dierlijke organismen gekend zou hebben en er een substantiële invloed van zou hebben ondergaan.

Deze suggestie vormde de directe aanleiding tot dit onderzoek. Gelet op het feit dat we nog maar zo weinig weten over de geschiedenis van het natuurfilosofisch denken gedurende de eerste decennia van de 17e eeuw in Engeland en daarmee over de periode waarin Hobbes zich ontwikkelde tot natuurfilosoof wilde ik een duidelijker, door de feiten gestaafd beeld krijgen van zowel Warner zelf, als van zijn theorieën over de werking van dierlijke organismen. Daarnaast wilde ik Jacquot's hypothese betreffende de invloed van deze theorieën op Hobbes toetsen.

Dit was makkelijker gezegd dan gedaan. 'Warner's 'Mathematical Collections' bleken te bestaan uit een bonte verzameling fragmentarische aantekeningen, kris kras door elkaar gebundeld en geschreven in verschillende handschriften. Veel van de onderwerpen die in die aantekeningen ter sprake komen corresponderen weliswaar met het hedendaagse beeld van Warner maar leken niet te worden gedekt door de reputatie die hij in de 17e eeuw genoot. Bovendien waren de aantekeningen met betrekking tot de fysica niet alleen doordrongen van verschillende soorten corpuscularisme in plaats van een eenduidig atomisme zoals in de secundaire literatuur werd beweerd maar ook onmiskenbaar geschreven vanuit een heel andere theoretische achtergrond dan die over dierlijke organismen. Daar komt nog bij dat het op het eerste gezicht heel moeilijk bleek een duidelijke lijn te ontdekken in die laatste groep aantekeningen. Hoewel het onmiskenbaar ging om fragmenten van een samenhangende verhandeling leek er niet een bepaald thema te zijn dat er als een rode draad doorheen liep en ze een eenheid gaf. Alvorens die aantekeningen onder handen te kunnen nemen moest ik, mede gelet op de onbetrouwbaarheid van het beeld dat er in de secundaire literatuur van Warner werd gegeven, eerst meer zekerheid hebben over de vraag of al die manuscripten in de British Library inderdaad van een en dezelfde persoon afkomstig waren en of dat Warner was. Vervolgens moest ik, als die eerste vraag positief beantwoord was, in ieder geval de datering van de fysische aantekeningen en die van de aantekeningen over dierlijke organismen nader bepalen om er achter te komen wannéér Warner met wélke onderwerpen bezig was, wat hem daarbij waarschijnlijk voor ogen stond en om een beeld te krijgen van de veranderingen die zijn opvattingen in de loop der jaren kennelijk hadden ondergaan. Tenslotte moest er een duidelijker structuur worden aangebracht in de aantekeningen over dierlijke organismen en, door de daarin verwoorde

opvattingen te plaatsen in hun tijd, een kader worden gecreëerd waarbinnen ze object van doelgericht onderzoek zouden kunnen worden. Met die doelen voor ogen heb ik:

1. De hele nalatenschap gedetailleerd geïnventariseerd en beschreven.
2. Alle aantekeningen betreffende de fysica en die over de werking van dierlijke organismen verzameld, getranscribeerd, geschift op bruikbaar en onbruikbaar materiaal en ze, voor zover dat niet al duidelijk was, geordend naar onderwerp.
3. De verschillende groepen aantekeningen vergeleken qua handschrift en stijl ten einde te bepalen of ze terecht aan een en dezelfde persoon werden toegeschreven.
4. Op basis van zowel grafologische en stilistische als biografische gegevens bepaald of dat Warner geweest zou hebben kunnen zijn.
5. De aantekeningen zo nauwkeurig mogelijk gedateerd.
6. De relatie tussen de fysiologische, psychologische en fysische opvattingen bepaald op basis van een gedetailleerde analyse en interpretatie van de desbetreffende aantekeningen.
7. Warner als schrijver van de aantekeningen over de werking van dierlijke organismen gesitueerd in zijn tijd door een breed opgezette vergelijking van zijn ideeën met corresponderende opvattingen van (bijna)tijdgenoten. Pas nadat deze problemen waren opgelost kon ik me weer bezighouden met de vraag naar de mogelijke invloed van Warner op Hobbes.

Het uiteindelijke resultaat kan worden opgesplitst in drie delen. In Hoofdstuk 1 schets ik een beeld van zowel Warner en zijn werk in het algemeen als van de plaats die hij in nam in het intellectuele leven van die tijd in Engeland. In de Hoofdstukken 2 tot en met 8 beschrijf en analyseer ik in detail zijn opvattingen over de werking van dierlijke organismen en laat zien hoe die zich verhouden tot de opvattingen dienaangaande gangbaar in zijn tijd. Daarbij gaat mijn aandacht vooral uit naar de vraag in hoeverre ze het beeld dat er van Warner in de secundaire literatuur wordt gegeven als vroege materialist en mechanist rechtvaardigen. In Hoofdstuk 9 ten slotte vergelijk ik de desbetreffende theorieën van Warner met die van Hobbes om te bepalen welke invloed de laatste van de eerste heeft ondergaan.

In het eerste hoofdstuk van deze studie neem ik dus Warner's reputatie en zijn nalatenschap inclusief het onderzoek dat daar tot nu toe naar is gedaan onder de loep. Het beeld van Warner als veelzijdig wetenschapper die actief betrokken zou zijn geweest bij de opkomst van de moderne wetenschap in Engeland blijkt maar zeer ten dele te worden bevestigd door de feiten. Het weinige dat we over zijn leven weten rechtvaardigt slechts de conclusie dat Warner zich weliswaar van jongs af aan met vele takken van wetenschap heeft beziggehouden maar pas de laatste 10 tot 15 jaar van zijn leven, met name binnen de 'Cavendish Circle' en bij het nageslacht in de 17e eeuw erkenning vond als wetenschapper. De bestudering van zijn totale

nalatenschap leert ons verder dat de moderne presentatie van Warner als atomist deels onjuist is en deels vraagt om een nadere specificatie. De aantekeningen betreffende de werking van dierlijke organismen bijvoorbeeld werden niet geschreven door een atomist maar zijn veeleer geïnspireerd door een eclectisch mengsel van Aristotelianisme, Nominalisme, Stoïcisme, een snuffe Paracelsisme, en de Italiaanse natuurfilosofie. De schrijver van de aantekeningen over de principes van de natuur en andere onderwerpen uit de fysica toont zich niet zozeer een atomist als wel een corpuscularist die er bovendien in de loop der jaren verschillende opvattingen over de aard van die deeltjes op nahield. In die opvattingen blijkt hij ook veel sterker geïnspireerd te zijn door successievelijk het klassieke atomisme, de peripatetische leer van de ‘minima naturalia’ en door de lichttheorie van Francesco Patrizi (1529-1597) dan door de opvattingen van Giordano Bruno. Als die collecties in de British Library dus van een en dezelfde persoon zijn dan werden die aantekeningen in ieder geval in heel verschillende periodes geschreven. Dat wordt ook gesuggereerd door de verschillen in handschrift. Die zijn echter ook weer niet zo groot dat de aantekeningen niet door dezelfde persoon geschreven zouden kunnen zijn. De besproken onderwerpen, de manier waarop dat gebeurt en de autoriteiten waarnaar in dat verband wordt verwezen doen vermoeden dat ze werden geschreven in een periode lopend van het eind van de 16e tot in de eerste helft van de 17e eeuw. Gelet op de interesses van Warner’s patroon, Henry Percy evenals die van Thomas Harriot zijn ze waarschijnlijk ook inderdaad geschreven door iemand die behoorde tot de groep van geleerden die Percy om zich heen verzamelde. Gelet op zowel het handschrift plus een aantal stilistische kenmerken als op de inhoudelijke overeenkomst tussen veel van deze aantekeningen en de inventarisatie die de wiskundige John Collins in de 17e eeuw maakte van Warner’s nalatenschap was dat waarschijnlijk Warner. Daarvan uitgaande mogen we, mede gelet op wat we over Warner’s leven weten, aannemen dat de aantekeningen over dierlijke organismen werden geschreven in de decennia rond de overgang van de 16e naar de 17e eeuw en de natuurwetenschappelijke aantekeningen in het derde decennium van de 17e eeuw. De wisseling in theoretische achtergrond suggereert dat Warner zich ontwikkelde van een eclectisch Aristotelicus tot een corpuscularist. Deze gegevens zijn onverenigbaar met Jacquot’s interpretatie van Warner’s nalatenschap als fragmenten van een door het atomisme geïnspireerd natuurfilosofisch systeem. Dat doet echter niets af aan het belang van zijn suggestie dat Hobbes in zijn materialistisch-mechanistische psychologische theorieën een substantiele invloed van Warner zou hebben ondergaan.

In het tweede hoofdstuk wordt de inhoud van de aantekeningen over de werking van dierlijke organismen in het algemeen geschetst. Globaal gesteld hebben ze betrekking op de vraag hoe dierlijke organismen zichzelf in leven

houden. In het deel van de aantekeningen over, wat Warner noemt, 'brute faculties and operations', dat wil zeggen, fysiologische functies staan allerlei processen betrokken bij de voeding en regeneratie centraal. Warner behandelt in dat verband, onder meer, de vraag naar de oorzaak van de beweging van het hart en van de stroming van voedzaam bloed door het lichaam, naar de oorsprong en rol van vitale warmte, en de vraag naar de aard en werking van de zogenaamde 'animale geesten', de actieve component van het lichaam. Verder staat hij in deze aantekeningen stil bij de productie van chylus, bloed, sperma en plasma, bij de wijze waarop bloed en sperma worden geassimileerd door het lichaam, bij de afvoer van afvalstoffen en bij de rol die de hersenen spelen bij voeding en restauratie. Ook verklaart hij in detail hoe de vrijwillige, doelgerichte beweging van organismen wordt veroorzaakt door het hongergevoel en door dorst. Al deze beschouwingen zijn gebaseerd op het idee van het leven als een toestand van permanente verandering en wording. Ze zijn gericht op een verklaring van het feit dat in gezonde organismen, opgevat als zelf-regulerende mechanismen, verval en regeneratie, de aanvoer en verwerking van bouwstoffen voor het lichaam perfect op elkaar zijn afgestemd.

In het deel van de aantekeningen betreffende de 'faculties and operations cognoscitive', dat wil zeggen, de psychische vermogens van dierlijke organismen, behandelt Warner de vermogens die mens en dier in staat stellen voedsel te verzamelen. Dat zijn de 'faculty sensitive' ofwel de zintuiglijke waarneming, verbeelding, het geheugen en het gevoel voor lust en onlust; de 'faculty intellective' omvattende de rede, de passies en de begeerte, en de 'faculty locomotive', het vermogen zich voort te bewegen. Het gaat Warner in die aantekeningen om drie dingen. Ten eerst wil hij de betrokken vermogens scherp van elkaar afbakenen door een nauwkeurige bepaling van het object waardoor ze worden geactiveerd. Ten tweede gaat hij uitvoerig in op de wijze waarop ze via leerprocessen worden omgezet in concrete vaardigheden. Ten derde onderzoekt hij hun wederzijdse afstemming en koppeling in de praktijk.

Wat betreft zijn fysiologische opvattingen volgt Warner in grote lijnen de volgelingen van Claudius Galenus (129-200), de grootste autoriteit op medisch gebied in zijn dagen. Waar hij het niet eens is met de Galenisten sluit hij zich doorgaans aan bij orthodox Aristotelische medici uit de 16e eeuw. Deze binding aan de traditie neemt niet weg dat Warner een onorthodoxe benadering van het lichaam in het algemeen heeft. Dat blijkt op de eerste plaats uit het feit dat hij, in tegenstelling tot zijn voorgangers en meer traditionele tijdgenoten, niet alleen primair geïnteresseerd is in de fysiologie in plaats van in de anatomie maar ook dat hij het onderscheid tussen anatomie en fysiologie niet langer, zoals zijn voorgangers deden, koppelt aan dat tussen lichaam en ziel. Alle fysiologische processen behandelt hij in termen van het lichaam, door hem beschouwd als een 'natuurlijke machine'.

Daarnaast speelt ook de alchemie een grote rol in zijn fysiologische verklaringen. In feite beschouwt hij het lichaam als één groot chemisch laboratorium. Met zijn belangstelling voor de chemische transformatie en circulatie van vloeistoffen in het lichaam liep Warner vooruit op zijn chemiatrische collega's uit de tweede helft van de 17e eeuw.

De psychologische literatuur van Engelse bodem rond 1600 stond op een lager peil dan die van het continent. Gebaseerd op een onduidelijk mengsel van medische en religieuze overtuigingen hield ze het midden tussen een verzameling elementaire inleidingen in de psychologie en stichtelijke lectuur. Warner's opvattingen over de 'faculties cognoscitive', zijn psychologische theorieën dus, tonen zich met hun combinatie van traditionalisme en originaliteit veeleer verwant aan de continentale psychologische literatuur uit de 15e en 16e eeuw. Traditiegetrouw maakte men in de psychologie onderscheid tussen een vegetatieve, een sensitieve en een rationele ziel. De vegetatieve ziel zou de voeding, groei en reproductie reguleren. De sensitieve ziel zou niet alleen die vegetatieve functies maar ook de waarneming en alle motorische processen beheersen. De rationele ziel werd zowel verantwoordelijk geacht voor de werkingen van de vegetatieve en de sensitieve ziel als voor het intellect en de wil. Planten werd een vegetatieve ziel toegeschreven, dieren een sensitieve ziel en alleen de mens zou in het bezit zijn van een rationele ziel. Het voornaamste verschil tussen de vegetatieve en sensitieve ziel, in combinatie ook te betitelen als de organische ziel, en de rationele ziel is dat de organische ziel zijn werk alleen kan doen onder gebruikmaking van het lichaam als instrument terwijl de rationele ziel onafhankelijk van het lichaam bestaat en werkt. Als de wetenschap van het levensbeginsel van organismen vormde de psychologie een onderdeel van de natuurfilosofie.

Terwijl het onderzoek naar de rationele ziel nog een sterk metafysisch karakter droeg en vaak meer door theologische dan door psychologische overwegingen werd beheerst was het onderzoek dat men deed naar de organische ziel primair van fysiologische aard en als zodanig gericht op het ondermaanse. Geleid door het idee van het organisme als een eenvoudige hydraulische machine samengesteld uit organen, vloeistoffen en 'geesten' zocht men naar adequate, causale beschrijvingen van psychologische en psychofysiologische processen. De literatuur betreffende de organische ziel getuigt dan ook van meer belangstelling voor de werkingen dan voor het wezen van de ziel. Dit betekent dat men bij de bestudering van allerlei psychologische processen ook aandacht had voor de daarbij betrokken organen. In de verklaring van verschijnselen als de zintuiglijke waarneming, het geheugen, de verbeelding, emotie, etc combineerde men, met andere woorden, altijd de psychologische en biologische aspecten. Een en ander bracht twee verstrekkende veranderingen in de traditionele opvattingen over de ziel met zich mee. Om te beginnen ging men mentale

vermogens, dingen waarvan de ontologische status ter discussie stond, identificeren met de ziel zelf. Ten tweede verschoof de aandacht geleidelijk van deze vermogens naar hun organen hetgeen uiteindelijk resulteerde in een materialisering van de organische ziel voor zover deze geïdentificeerd werd met de 'animale geesten', dat wil zeggen, een materiële substantie die tot dan toe was beschouwd als niets anders dan een lichamenlijk instrument van de, immaterieel geachte, organische ziel. Zo verklaarde Bernardino Telesio (1509-1588) niet alleen alle functies die traditioneel werden toegeschreven aan de organische ziel maar ook de wil en alle cognitieve processen betreffende de zintuiglijk waarneembare wereld in termen van een geest opgevat als een materiële substantie afkomstig uit zaad en geïdentificeerd met de organische ziel. Alleen de mens werd verondersteld naast die geest nog een immateriële onsterfelijke ziel te hebben, ingegoten door God, die hem in staat stelde kennis te verwerven van zijn heil en zaligheid in het hiernamaals.

Eenzijds toont Warner zich afhankelijk van de Aristotelische en Scholastieke traditie voor zover hij psychologische processen louter speculatief benadert en verklaart in termen van materie, vorm, act, potentie, vermogens en hun objecten. Anderzijds suggereren zijn rationalisme evenals het vervaagde onderscheid in zijn speculaties tussen lichamenlijke en mentale processen een invloed van de Italiaanse natuurfilosofie uit het laatste kwart van de 16e eeuw. Binnen die traditie, gerepresenteerd door filosofen als Girolamo Fracastoro (1483-1553), Geronimo Cardano (1501-1576), Telesio, Patrizi, Bruno en Tommaso Campanella (1568-1639) kunnen twee varianten worden onderscheiden: 1) systemen waarin de natuur wordt geïdentificeerd met God en waarin de fysica, ook al wordt ze onmisbaar geacht wordt beschouwd als een opstapje naar de metaphysica, dat wil zeggen, de theologie; 2) systemen gebaseerd op de overtuiging dat de natuur empirisch bestudeerd moet worden en dat bovendien overeenkomstig haar eigen, immanente principes. De eerste variant wordt bij uitstek gerepresenteerd door Giordano Bruno; de tweede vooral door Telesio. Warner's verklaringen van dierlijke organismen lijken niet gerelateerd te zijn aan het mystieke naturalisme gerepresenteerd door Giordano Bruno maar aan een rationeel hylozoïsme als dat van Telesio.

Evenals zijn collega's van het continent beschrijft Warner dierlijke organismen als complexen van inerte, materiële structuren en vloeistoffen, de passieve componenten en een zeer subtiele, beweeglijke materiële substantie, de animale geest, die als de actieve component fungeert. Dankzij een aantal vermogens reguleert deze geest alle functies traditioneel toegeschreven aan de vegetatieve, sensitieve en rationele ziel. Bij Warner is geen sprake van een afzonderlijk, onsterfelijk intellect waardoor de mens de waarheid in het algemeen dan wel zijn zieleheil of zelfs God zou kunnen kennen. Gelet op de diverse verwijzingen naar de animale geest of delen daarvan als een ziel of zielen vatte hij de ziel blijkbaar op als een materieel ding waarvan alle

werkingen kunnen worden herleid tot bewegingen van materiedeeltjes. Hij beschrijft dierlijke organismen alsof het zelf-regulerende machines zijn.

Warner distantieert zich dus van de Scholastieke traditie voor zover hij in zijn opvattingen over de ziel een onorthodoxe doctrine als die van Telesio op de spits drijft en zo vooruit loopt op ontwikkelingen later in de 17e eeuw. Hij worstelt niet langer met het probleem van de oorsprong en aard van de ziel of met de vraag hoe de ziel in het lichaam zit, hoe zij verbonden is met de vermogens of hoe ze in de uitoefening van die vermogens het lichaam als instrument kan gebruiken. Aangezien hij niet langer onderscheid maakt tussen het materiële en immateriële of tussen het rationele en irrationele als essentieel verschillende componenten van de werkelijkheid kan Warner deze vragen makelijk beantwoorden. Dienovereenkomstig maakt hij ook geen onderscheid tussen een rationele en een organische ziel. Dit impliceert onder meer dat er zijns inziens geen essentieel verschil is tussen mens en dier.

Zijn verwantschap met de 16e eeuwse Italiaanse natuurfilosofie, met name met de opvattingen van Telesio, manifesteert zich het duidelijkst in zijn ideeën over de animale geest, de actieve component van het lichaam. Warner's tijdgenoten gingen er, zoals we zagen, van uit dat het lichaam in zijn werkingen wordt beheerst door zogenaamde 'geesten'. Warner is dezelfde mening toegedaan maar houdt er een radicaal andere opvatting op na wat betreft zowel de aard van die 'geesten' als hun relatie tot de ziel. Vrijwel al zijn tijdgenoten verstonden onder die geesten een ijle, warme, beweeglijke substantie, een instrument met behulp waarvan de ziel haar werkingen kon uitoefenen in het lichaam. Om als zodanig te kunnen functioneren moesten die geesten qua substantie zowel verwant zijn aan de onsterfelijke, immateriële ziel als aan het vergankelijke, materiële lichaam. Ze werden dan ook geacht te bestaan uit een combinatie van aardse elementen en een hemelse component. Verder maakte men doorgaans onderscheid tussen drie substantieel en kwalitatief verschillende soorten geesten. Te weten, een natuurlijke geest in de lever en de venen ter regulering van de voeding, groei en reproductie, een vitale geest in het hart en de arterieën ter verspreiding van de voor het leven onmisbare warmte en energie, en een animale geest in de hersenen en het zenuwstelsel ter regulering van de zintuiglijke waarneming en de vrijwillige beweging.

Ook Warner verstaat onder animale geesten een zeer subtiele, warme, beweeglijke substantie verspreid door het lichaam via het zenuwstelsel vanuit de hersenen. In tegenstelling tot het merendeel van zijn tijdgenoten acht hij die geesten echter zuiver elementair. Verder erkent hij maar één soort geest en beschouwt deze bovendien niet als een instrument van de ziel ter overbrugging van de kloof met het lichaam maar als de ziel zelf. Deze verzorgt in zijn streven naar zelfbehoud alle organische functies. Die geest is er dan ook niet ten behoeve van het lichaam maar het lichaam is er voor die geest en

wordt door hem alleen in stand gehouden als een instrument dat hij nodig heeft om zichzelf te handhaven.

Daartoe is die geest in staat dankzij bepaalde vermogens. Deze vloeien, aldus Warner, voort uit 'assisterende vormen', dat wil zeggen, werkzame kwaliteiten. Daaronder verstaat hij geen zijnswijzen of nadere specificaties van substanties maar substanties zelf die, zoals licht, hun werkzaamheid continu in alle richtingen tegelijk uitstralen. Materieel gesproken vallen vermogens samen met werkzame kwaliteiten en zijn het dus werkelijk bestaande dingen. In formele zin verwijst de term 'vermogen' naar een 'hersenspinsel' ('ens rationis') voor zover hij niet die kwaliteiten op zich aanduidt maar beschouwd in relatie tot hun tegenhangers. Warner, met andere woorden, verstaat onder vermogens actieve kwaliteiten beschouwd in relatie tot hun passieve tegenhangers en omgekeerd.

Animale geesten beschikken over twee soorten vermogens, te weten, *brute faculties*, dat wil zeggen, vermogens die, gestuurd door de natuur, alle onbewuste processen in dierlijke organismen reguleren en *moral faculties*, dat wil zeggen, de vermogens die ten grondslag liggen aan alle bewust verlopende processen en die in hun werking geleid worden door de rede, opgevat als rivaal van de natuur. In feite gaat het om het onderscheid tussen, zoals we dat tegenwoordig noemen, de fysiologische en psychologische functies van dierlijke organismen. Vermogens van de eerste soort, dat wil zeggen, de vermogens die bouwstoffen door het lichaam vervoeren en zorgen voor de assimilatie er van, opereren, aangedreven door een natuurlijke impuls noodzakelijkerwijs en onbewust. De tweede soort werkt op basis van voorkennis en, voortvloeiend uit een bewust keuze, vrijwillig. Zoals Warner in zijn aantekeningen over de natuurlijke functies van dierlijke organismen een theorie ontwikkelt over circulaire of wederkerige processen ter verklaring van het feit dat de natuur, mits ongehinderd, precies doet wat haar behoud vereist is hij in de aantekeningen betreffende de vrijwillige functies uit op een analoge verklaring van doelgericht gedrag. In dat verband bespreekt hij uitvoerig de aard, training en coördinatie van de verschillende vrijwillige vermogens.

Met zijn identificatie van de animale geest met de ziel, zijn concentratie op de werking in plaats van het wezen van vermogens, zijn opvatting over de transformatie van die vermogens in concrete vaardigheden als een zuiver lichamelijk proces en met zijn verklaring van alle organische functies in termen van 'assisterende vormen', door de Scholastici opgevat als machinale, dat wil zeggen, dode, louter externe, werkoorzaken, bewoog Warner zich onmiskkenbaar in de richting van een materialistische en mechanische verklaring van de werking van dierlijke organismen. De verklaring van diezelfde operaties in termen van materie en vorm, potentie en act, of als de effecten van een bezielde, doelgericht werkende kracht disqualificeren hem echter als materialist en/of mechanist pur sang. Zijn animale geesten zijn

weliswaar materieel maar tegelijkertijd is deze substantie voorzien van mentale vermogens. Het is een levende stof, in het bezit van alle vermogens kenmerkend voor de menselijke ziel.

In het vierde tot en met het achtste hoofdstuk worden Warner's opvattingen behandeld betreffende de functies ressorterend onder respectievelijk de 'faculty sensitive', de 'intellective faculty' en de 'faculty locomotive'. In tegenstelling tot het merendeel van zijn tijdgenoten verstaat Warner onder de waarneming, verbeelding en het geheugen geen afzonderlijke vermogens maar opeenvolgende werkingen van dat ene sensitieve vermogen. Bovendien acht hij die werkingen zuiver lichamelijk en passief. In tegenstelling tot het merendeel van zijn tijdgenoten benadert hij de waarneming ook niet als een hoofdzakelijk mentaal, actief proces maar als een mechanisch uitgelokte reactie in het lichaam. Verder meent hij dat de externe zintuigen niet de dingen zelf maar alleen hun kwaliteiten waarnemen en de interne zintuigen alleen de bewegingen van de animale geesten. Zoals zijn leer van de animale geesten in het algemeen suggereren ook deze opvattingen een invloed van Telesio. De voornaamste taak van de zintuigen is ons te informeren over dreigend gevaar en ons te leiden bij het zoeken naar voedsel. Ze informeren ons via de gevoelens van pijn en lust die op hun beurt de begeerte oproepen. Dat vereist echter ook de hulp van het intellect.

Zoals vrijwel al zijn tijdgenoten acht Warner de rede en het intellect geen afzonderlijke vermogens maar aspecten van een en hetzelfde vermogen. In tegenstelling tot het merendeel van zijn tijdgenoten beschouwt hij dat echter ook als een zuiver lichamelijk vermogen. Door de vergelijking van zintuiglijke indrukken opgeslagen in het geheugen, op zoek naar overeenkomsten, verschaft de rede ons kennis van dingen die niet feitelijk aanwezig zijn. Hoewel ze in tegenstelling tot de zintuigen die indrukken dus niet alleen ontvangt maar ze ook vergelijkt acht Warner beide vermogens passief. Het intellect redeneert op basis van aangeboren principes en de eerste begrippen die het verwerft zijn die van goed en kwaad. Deze gaan gepaard met gevoelens van vreugde en droefheid. Warner beschouwt dergelijke emoties niet als aandoeningen van de sensitieve ziel maar als passies van het intellect, als vormen waarin we de heilzaamheid dan wel schadelijkheid van inwerkingen op het lichaam leren kennen. Die kennis activeert de begeerte.

Warner verstaat onder de begeerte een beweging in het intellect, dat wil zeggen, een beweging van de geesten die ook de cognitieve processen op het rationele vlak effectueren, opgeroepen door de voorstelling van iets als heilzaam of schadelijk. Die beweging zet aan tot toenadering of vermijding. Begeerte opgeroepen door een toekomstig goed heet 'hoop', en gericht op een dreigend kwaad 'vrees'. Evenals vreugde en verdriet beschouwt Warner dergelijke gevoelens dus als werkingen van en in het intellect. Aangezien de begeerte van levensbelang is treden dergelijke reacties noodzakelijkerwijs op.

Ze zijn intellectueel én materieel van aard. Ook deze opvattingen kunnen worden gevonden bij Telesio.

De uitvoering van een door de begeerte opgeroepen neiging tot toenadering dan wel vermijding vereist een wilsact. Zoals alle vermogens acht Warner ook de wil, dat wil zeggen, de rationeel gerechtvaardigde begeerte, een lichamenlijk vermogen. In tegenstelling tot de voorgaande vermogens is de wil echter actief. Bovendien is hij nooit gericht op dingen maar op bewegingen. Namelijk op de bewegingen vereist om een goed te verwerven dan wel een kwaad uit de weg te gaan. Hoewel het idee van de wil als een rationeel gerechtvaardigde begeerte traditioneel is geeft Warner er een onorthodoxe interpretatie aan. De wil is zijns inziens rationeel voor zover zij zich in haar werking laat leiden door een zakelijke kosten-baten analyse. Dit in tegenstelling tot de begeerte die alleen kijkt naar de baten en in die zin slechts gedeeltelijk rationeel is. De intellectuele activiteit die dat ter activering van de wil vereist start, indien de analyse gunstig uitvalt, tegelijkertijd de beoogde beweging. Zo beschouwd valt de wil in feite samen met het vermogen tot locomotie.

Warner's leer van de 'faculty locomotive' vormt een synthese van zijn opvattingen over de zintuiglijke en de intellectuele vermogens en verklaart hoe deze, dankzij het feit dat de animale geesten een continuüm vormen in het lichaam perfect op elkaar zijn afgestemd en in een harmonieuze samenwerking kunnen leiden tot doelgerichte bewegingen van het organisme. Hoewel Warner's aantekeningen over locomotie getuigen van een ongebruikelijke belangstelling voor de fysiologische oorzaak van dat verschijnsel gaat hij niet in op de fysiologie van de locomotie zelf maar beperkt zich, evenals het merendeel van zijn tijdgenoten, tot beschouwingen over de psychologische aspecten van dit verschijnsel. De desbetreffende theorieën zijn nogal onhelder. Warner formuleert drie verschillende verklaringen van de psychologische activering van het vermogen in kwestie zonder aan te geven welke hij prefereert. Hoewel die theorieën gebaseerd zijn op een onorthodox begrip van de ziel en haar vermogens presenteert Warner ze als niet meer dan correcties en nadere uitwerkingen van de Scholastieke traditie. Hij verwijt zijn Scholastieke collega's een gebrekkig onderscheid tussen de vermogens voorafgaand aan locomotie. Zijn kritiek is vooral gericht op hun verklaring van de aard en functie van de deliberatieve vermogens, dat wil zeggen, begeerte, hoop, vrees en de wil. Als reactie introduceert hij een aantal nieuwe distincties en corresponderende begrippen van de betrokken vermogens c.q. deelvermogens en legt uit hoe deze, aan elkaar gekoppeld, als in een kettingreactie voeren van een zintuiglijke waarneming naar een doelgerichte beweging. Hoewel die theorie origineel en interessant genoeg is op zichzelf staat hij deels te dicht bij de traditionele teleologische verklaringen van vrijwillig gedrag en is hij deels te dubbelzinnig wat betreft het onderscheid tussen het materiële en het mentale aspect om beschouwd te

kunnen worden als aanzet tot een fundamenteel nieuwe benadering zoals we die bijvoorbeeld aantreffen bij zijn land- en tijdgenoot Hobbes die alle verschijnselen, inclusief de mentale, expliciet reduceert tot materie in beweging.

Toch werd al in de 17e eeuw gesuggereerd dat Hobbes het idee om fysiologische en psychologische processen, met name de zintuiglijke waarneming, te herleiden tot materie in beweging had overgenomen van Warner. In het negende hoofdstuk wordt die aantijging onder de loep genomen. Wat betreft de fysiologische aspecten van organismen lopen hun opvattingen te zeer uiteen om aan te nemen dat Hobbes zich dienaangaande door Warner heeft laten leiden. Wat betreft de psychologische aspecten moeten we rekening houden met het feit dat de desbetreffende opvattingen, met name die over het licht en het zien, van zowel Warner als Hobbes in de loop der jaren substantiële veranderingen ondergingen. In de eerste twee decennia van de 17e eeuw, verstond Warner onder licht een actieve substantie die, zoals alle zintuiglijke kwaliteiten, niets anders bewerkstelligt dan beweging in de dingen waar het op inwerkt. In zijn natuurwetenschappelijke aantekeningen, geschreven in het derde decennium, handhaaft hij dat idee van licht maar maakt het los van de zintuiglijke kwaliteiten die nu worden beschreven als louter subjectieve ervaringen veroorzaakt door objectieve inwerkingen op de zintuigen. Zintuiglijke waarneming in het algemeen verklaart hij nu ook niet langer in termen van (assisterende) vormen en materie maar ondubbelzinnig in termen van materie en beweging. Nog eens tien jaar later herhaalt hij in een verhandeling over de plaats van het visuele beeld na reflectie van verschillende soorten spiegels niet alleen het idee dat zintuiglijke kwaliteiten, in het bijzonder kleur, subjectief zijn maar voegt hij er aan toe dat zintuiglijke waarneming altijd gepaard gaat met de naar buiten toe gerichte beweging van een beeld in de waarnemer. Wat betreft Hobbes' opvattingen dienaangaande moeten we onderscheid maken tussen zijn ideeën uit de dertiger jaren van de 17e eeuw en zijn latere theorieën. In de *Short Tract*, een manuscript dat door de meeste Hobbes-onderzoekers wordt beschouwd als de neerslag van een van Hobbes eerste pogingen zijn natuurfilosofische opvattingen in een systematische vorm te gieten, ging hij er nog van uit dat licht wordt voortgeplant doordat lichtbronnen sferisch kleine deeltjes uitstoten die, wanneer ze op hun tocht door de ruimte op een oog botsen tot visuele waarneming kunnen leiden. In zijn latere werk, te beginnen met *Human Nature* (1640), ruilt hij die opvatting in voor het idee dat de voortplanting van licht naar het oog in feite neerkomt op de voortplanting van een beweging in het medium tussen lichtbron en oog veroorzaakt door een permanente uitzetting en inkrimping van die lichtbron. Terwijl hij aanvankelijk ook meende dat de verplaatsing van lichtdeeltjes tijd kost gaat hij er later van uit dat licht instantaan wordt voortgeplant van de lichtbron via het oog en de zenuw naar de hersenen en vandaar weer terug

naar het oog. Terwijl hij verder in de *Short Tract* nog onderscheid maakte tussen licht als iets dat buiten de waarnemer bestaat en het visuele beeld identificeert hij die twee later vanuit het idee dat er pas sprake van licht is zodra we het zien. Tenslotte verandert ook zijn opvatting over de plaats van het interne, eigenlijke waarnemingsorgaan. Terwijl hij in de *Short Tract* nog meende dat dit orgaan in het hoofd zit gaat hij er later van uit dat het in het hart is gelocaliseerd.

Warner's optische ideeën uit het begin van de 17e eeuw vertonen inderdaad enkele frappante overeenkomsten met Hobbes' vroegere opvattingen dienaangaande. Zo is zijn benadering van de waarneming als een mechanisch uitgelokte reactie zeker verwant aan Hobbes' karakterisering in de *Short Tract* van licht als een actief vermogen of als een werking van de externe objecten op de ogen. Evenals Warner definieert hij in die verhandeling de waarneming ook als een passief vermogen en localiseert de waarneming in de hersenen. Ondanks deze overeenkomsten moet het idee van Warner als de man achter de *Short Tract* toch worden verworpen. Warner verstond onder licht niet, zoals Hobbes, de eigenschap van een corpusculaire substantie maar een, door de cosmos verspreide, vloeibare substantie die verondersteld werd de atomaire delen van de materie te omgeven en in beweging te zetten. Verder spreekt Warner weliswaar over dierlijke organismen alsof het machines zijn maar in feite worden ze beheerst door een (zelf)bewust opererende substantie terwijl Hobbes in de *Short Tract* een zuiver mechanische verklaring van de waarneming presenteert. Afgezien hiervan wijzen alle relevante gegevens er op dat de *Short Tract* werd geschreven tegen het eind van 1630, terwijl Hobbes en Warner elkaar waarschijnlijk pas rond 1634 leerden kennen. Als deze opvattingen van Warner over licht en zien Hobbes niet inspireerden tot het schrijven van de *Short Tract* dan zullen ze zeker niet bepalend geweest zijn voor zijn latere optische ideeën. Terwijl Warner onder licht een, nota bene, immateriële substantie verstaat beschouwde Hobbes het al in de dertiger jaren als niet meer dan een eigenschap, beweging, en dat bovendien binnen de waarnemer zelf. In tegenstelling tot Warner karakteriseert Hobbes de waarneming al in *Human nature* (1640) ook expliciet als een reactie die bovendien niet uit het hoofd zou komen maar uit het hart. Terwijl volgens Warner de effecten in de verschillende zintuigen uiteindelijk samenkomen in één gemeenschappelijk zintuig ontkent Hobbes in zijn latere geschriften het bestaan van zo'n orgaan. Tenslotte bevat Warners eerste theorie van de zintuiglijke waarneming geen spoor van Hobbes' scepticisme jegens de zintuigen als bronnen van kennis.

De dingen liggen anders bij Warner's latere theorie van de zintuiglijke waarneming zoals we die kennen uit zijn laatste optische geschriften. Zijn ideeën over de ontologische status van kleuren en over het zien in de dertiger jaren van de 17e eeuw komen sterk overeen met Hobbes' ideeën

dienaangaande sinds ca. 1640. Volgens beiden vereist waarneming een verandering in het waarnemende subject veroorzaakt door beweging. Beiden beschouwen kleur als een product van de verbeelding, beiden geloven dat zien altijd samen gaat met een naar buiten gerichte, reactieve beweging in de waarnemer, en beiden voeren deze ideeën aan ter verklaring van het paradoxale feit dat we iets zien, kleur, dat er in werkelijkheid niet is. Hobbes kende Warner's optische geschriften uit die periode waarschijnlijk ook. Toch zou dat nog niet de conclusie rechtvaardigen dat hij zijn kinematische waarnemingsleer van Warner heeft. Uiteindelijk houdt Warner tot aan het eind van zijn leven, in tegenstelling tot Hobbes, vast aan het idee van licht als een stralende, immateriële substantie. Bovendien combineert Warner dit idee, zoals dat ook gebeurde in Hobbes' lichttheorie in de *Short Tract* maar niet langer in zijn *optica* sinds ca. 1640, met een atomistisch materiebegrip. Sommige van Warner's natuurwetenschappelijke aantekeningen, geschreven voor 1630, bevatten weliswaar ideeën over licht en zien sterk gelijkend op die van Hobbes sinds ca. 1640 maar niets wijst er op dat Hobbes deze aantekeningen kende in de tijd dat hij met Warner om ging. Het is ook niet waarschijnlijk dat hij het idee van de waarneming als een naar buiten gerichte reactieve beweging in de waarnemer zoals we dat vinden in een van Warner's laatste optische geschriften simpelweg overnam van Warner. Uiteindelijk is dit idee, zij het niet expliciet geformuleerd, al in rudimentaire vorm aanwezig in de *Short Tract* voor zover waarnemingsbeelden daar worden beschreven als werkingen van de hersenen, op hun beurt in beweging gezet door een inwerking op de waarnemingsorganen van buitenaf, op de animale geesten. In *Human Nature* herhaalt Hobbes deze karakterisering van waarnemingsbeelden met dit essentiële verschil dat die werking van de hersenen nu wordt gespecificeerd als een terugkaatsing of reactie, een idee dat niet gevonden zal worden in de atomistische theorieën van contemporaine landgenoten als Sir Kenelm Digby of Walter Charleton. Daar komt nog bij dat *Human Nature* werd geschreven in 1640 en ik geloof niet dat Hobbes zo'n cruciale toevoeging aan zijn waarnemingsleer gepresenteerd zou hebben zonder Warner, die toen nog leefde, te noemen als hij dat idee van hem had overgenomen. Beiden gaan er van uit dat waarneming verandering, een diversiteit aan bewegingen, vereist. Terwijl echter naar Hobbes' latere opvattingen de zintuiglijke waarneming van iets impliceert dat het met iets anders wordt vergeleken en er van wordt onderscheiden contrasteert Warner het waarnemingsvermogen als louter receptief en retentief expliciet met de rede als een vergelijkend vermogen. Vanaf 1640 ontwikkelen Hobbes' psychologische opvattingen in het algemeen zich, net zoals zijn theorie van de waarneming, in een richting die hem steeds verder verwijderd van Warner. Dit alles neemt niet weg dat Warner een van de zeer weinige mensen geweest zal zijn bij wie Hobbes in de dertiger jaren van de 17e eeuw in

Engeland weerklank vond. Beiden keerden zich expliciet tegen de Scholastieke natuurfilosofie, benaderden de menswetenschap als een deel van de natuurfilosofie, beschouwden de ziel als een materiële substantie, gingen er van uit dat organismen worden beheerst door niet meer dan één levensbeginsel en beschouwden de mens als een wezen dat, slechts gradueel verschillend van dieren en gedreven door de drang tot zelfbehoud, voortdurend streeft. Beiden reduceerden ook de wil tot het begin van vrijwillige beweging, gingen er van uit dat alle kennis is gebaseerd op zintuiglijke waarneming en hielden natuurfilosofie en theologie scherp uit elkaar. Zijn gesprekken met Warner kunnen Hobbes wel degelijk geïnspireerd hebben tot de ontwikkeling van een zuiniger begrippenapparaat in het algemeen, tot de verheldering en aanscherping van een aantal basisbegrippen uit de *Short Tract* en tot de formulering van een zuiver mechanische verklaring van psychologische functies in zijn latere geschriften.

De studie wordt in het tiende hoofdstuk afgerond met een kort pleidooi voor verder onderzoek. Zijn natuurwetenschappelijke aantekeningen bevestigen maar ten dele het beeld van Warner als atomist en wijzen niet op een invloed van Giordano Bruno maar van het klassieke atomisme, de alchemistische literatuur en vooral van Francesco Patrizi's lichttheorie. De combinatie van elementen uit de traditie van de lichtmetaphysica en het atomisme koppelen Warner aan Nicholas Hill (1570-1610/20), een van de eerste pleitbezorgers van een materialistische psychologie in Engeland. De desbetreffende aantekeningen verdienen juist in dat opzicht dan ook nader onderzoek. Het onderzoek naar zijn aantekeningen over dierlijke organismen doet vermoeden dat Telesio's psychologische theorieën een grotere rol hebben gespeeld in het vroeg 17e eeuwse Engeland dan tot nu toe, voornamelijk op gezag van Francis Bacon, werd aangenomen. Ten slotte heeft dit onderzoek een tipje opgelicht van de sluier over de bronnen van Hobbes' materialistische psychologie. Het geeft geen antwoord op de vraag waarom Hobbes al in de vroege dertiger jaren van de 17e eeuw koos voor een radicaal materialisme maar laat in ieder geval zien dat hij niet naar het continent hoefde te gaan of eerst het werk van Gassendi moest lezen om een geestverwant te treffen in de jaren dat hij zich ontwikkelde tot natuurfilosoof. Hoewel Warner geen blijvende bijdrage heeft geleverd aan de anatomie, fysiologie of psychologie verdienen zijn aantekeningen dienaangaande daarom dan ook nader onderzoek. Vooruitlopend op Hobbes' mechanische psychologie en op de circulatie-fysiologie die in de tweede helft van de 17e eeuw tot grote bloei zou komen werpen ze licht op de ontwikkelingen van de natuurfilosofie in Engeland opgestart door John Case (1575-1650) en voortgezet in het werk van Francis Bacon (1561-1626), die uiteindelijk zouden leiden tot een definitieve breuk met de Renaissancefilosofie.

curriculum vitae

Jan Prins werd geboren op 11 december 1949 te Hillegom. In 1968 behaalde hij het eindexamen HBS-A. Van 1968 tot 1973 studeerde hij psychologie aan de Rijksuniversiteit te Utrecht en van 1973 tot 1974 aan de University of Florida (USA). In 1974 studeerde hij in Utrecht af in de klinische psychologie. Van 1974 tot 1976 werkte hij als vertaler van sociaal wetenschappelijke literatuur. Van 1975 tot 1980 was hij verbonden aan de Technische Universiteit te Eindhoven als studentenpsycholoog. Vervolgens studeerde hij van 1980 tot 1985 filosofie aan de Rijksuniversiteit te Utrecht en studeerde af in de geschiedenis van de nieuwere wijsbegeerte op een onderzoek naar de bronnen van Hobbes' methodenleer. Van 1985 tot maart 1992 was hij, eerst als wetenschappelijk assistent en daarna als assistent in opleiding, verbonden aan de Faculteit der Wijsbegeerte van diezelfde universiteit. Het onderzoek dat hij in deze periode deed resulteerde, naast dit proefschrift, in een aantal publicaties in, onder meer, het *Tijdschrift voor Filosofie*, *Philosophia Naturalis*, *Archives de Philosophie*, en in *Archiv für Geschichte der Philosophie*.

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