

## Reviews

### Religion, Science and Enlightenment: Interpreting Bernard Nieuwentijt (1654-1718)

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Review of: Rienk H. Vermij, *Secularisering en natuurwetenschap in de zeventiende en achttiende eeuw: Bernard Nieuwentijt* (Amsterdam: Rodopi, 1991; ISBN 90-5183-284-2), 173 pp.

Interpreting the thought of Bernard Nieuwentijt, the well-known Dutch physico-theologian, is by no means an easy or simple task. His major works were all written and published in that period of extraordinary intellectual ferment between ca. 1680 and ca. 1720 referred to by historians since Paul Hazard as the crisis of the European mind.<sup>1</sup> Hazard's crisis, still intensively studied by today's scholars, was multi-faceted and extremely complex and is generally regarded as the seedbed of the eighteenth-century Enlightenment.<sup>2</sup> It was brought about by numerous factors, ranging from the expansion of European man's geographical, temporal and cultural horizons to the impact of the new science and from the growing revulsion felt against endless religious disputes to the widespread detestation of Louis XIV's imperialist divine right absolutism. Nieuwentijt, whose central concern was the reconciliation of orthodox Calvinism and modern natural science, lived in a country that played an essential role in Hazard's crisis and his work, as is immediately clear from his choice of subject matter, can only be understood in the broad context of the transformation of the European mind that the decades around 1700 witnessed. In the following, I shall first briefly summarize Nieuwentijt's life and work. I shall then proceed to discuss the way in which Rienk Vermij in his recent *Secularization and science in the seventeenth and eighteenth centuries* has sought to place Nieuwentijt's writings in a larger Dutch and European context.

In his early career Bernard Nieuwentijt, who was the son of a minister from a small village in the Northern part of Holland, suffered a series of setbacks. Shortly after he was registered as a medical student at Leiden University in 1675, he was sent down for repeated drunk, disorderly and violent behavior. He moved to Utrecht University, where in 1676 he became a doctor of medicine on the basis of a Cartesian thesis (*Disputatio Inauguralis De Obstructionibus*). Nieuwentijt then returned to his native area of the country. In 1682 he became

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<sup>1</sup> Paul Hazard, *La Crise de la Conscience européenne, 1680-1715* (Paris, 1935).

<sup>2</sup> See e.g. recently Margaret C. Jacob, "The crisis of the European mind: Hazard revisited," in Phyllis Mack and Margaret C. Jacob (ed.), *Politics and Culture in Early Modern Europe. Essays in Honor of H.G. Koenigsberger* (Cambridge/New York, etc., 1987), pp. 251-271.

town physician of Purmerend, a job he would keep until his death. Clearly, however, his ambitions were not fulfilled by this modest position. Through successive marriages to wealthy widows Nieuwentijt bettered both his social and his material position. Unsurprisingly, he soon entered Purmerend town politics in a variety of functions. But this rapid rise in the political world of Purmerend was abruptly terminated when in the late 1680s the faction of Gerard Constantijn van Ruytenburg, to which he did not belong, gained dominance. Local politics being blocked as an avenue for advancement, Nieuwentijt now sought to gain entry into the international Republic of Letters by means of mathematical works written in Latin. In this field too, however, his efforts turned out to be less than successful. Nieuwentijt's writings of the 1690s dealt with infinitesimal methods and were, so the experts assure us, of considerable merit, especially the *Analysis Infinitorum* of 1695. But the same matter had been treated before by the far greater mind of Leibniz. When Nieuwentijt found out about this, he made a grave tactical mistake. Instead of accepting Leibniz as his superior, he picked a futile quarrel with him on relatively minor points and thereby quickly succeeded in making himself impossible in the international world of learning. It was as a provincial and isolated amateur that he would henceforth have to conduct his investigations.

After 1700, things took a turn for the better. In Purmerend politics, the hegemony of the Van Ruytenburg faction came to an end and Nieuwentijt regained prominence, serving as a burgomaster for a number of years and acting as deputy to the States of Holland on several occasions. He also became an elder in the Dutch reformed church of Purmerend and fulfilled a wide variety of functions in that role. His social success was paralleled by intellectual recognition. Already in the 1690s, when his main work had been in mathematics, Nieuwentijt had shown a lively interest in experimental physics along the lines set out by, among others, Robert Boyle. In order to conduct scientific experiments, he surrounded himself with a number of like-minded men and thereby became the founder of the first known Dutch *collegie*. Innumerable others would follow in the course of the eighteenth century. In the 1710s these early experiments and the methodological significance he attached to them became the basis for the two works that would bring Nieuwentijt fame as an author: *Het Regt Gebruik der Wereltbeschouwingen* (The Right Use of Contemplating the World, published in 1715) and *Gronden van Zekerheid* (Foundations of Certitude, published posthumously in 1720).

These two books, it should be stressed, contained very little original scientific research and hardly any new scientific insights. Having come to reject Cartesianism, what Nieuwentijt intended was first of all to explain the proper way to proceed in the sciences, namely by observation and experiment: the 'experimental philosophy' made famous by the English. Secondly, and even more



importantly, he wished to demonstrate that there was no antagonism whatsoever between modern science interpreted in this way and the tenets of the Dutch reformed church. Indeed, modern science and its findings marvelously illustrated that nature was constantly directed by an almighty transcendent God. This, of course, was the physico-theological part of the argument. Nieuwentijt went even further, however, and claimed that each and every result obtained by modern scientific observation and experiment was in fact already contained in the Bible, which he interpreted as the word of God in the most strict and literal sense. All these arguments, Nieuwentijt emphasized, were intended to convince atheists (Epicureans, who believed that chance ruled the world, but more particularly Spinozists, who saw the world as ruled by blind and immutable natural laws) and unbelievers (those who believed in God, but not in the authority of the Bible) that their position was entirely erroneous and untenable. It was especially the *Regt Gebruik* that became a huge success. The book was reprinted eight times in the Dutch Republic between 1715 and 1759. More generally, the physico-theology of which Nieuwentijt had been the first Dutch representative became an enormously popular genre, with a host of eighteenth-century Dutch practitioners such as Nicolaas Duyn, Jan Engelman (who published a snow theology in 1747) and especially Johannes Florentius Martinet, whose four volume *Catechism of Nature* (first published 1777-1779) became one of the best loved Dutch publications of the second half of the century. The *Regt Gebruik* was moreover also translated into English, French and German. It was thus only after his death that Nieuwentijt gained the international fame he had always desired.

Vermij's account clearly enlarges our factual knowledge of Nieuwentijt's life and work. He discusses his mathematical writings, his international intellectual contacts and his political and clerical activities in more detail than has ever been done before. Nieuwentijt's main importance, however, by common scholarly agreement lies in his physico-theological work and about that much was already known before the appearance of Vermij's dissertation.<sup>3</sup> The primary significance of the book must therefore be sought in its interpretative contribution. Nieuwentijt's physico-theology is generally regarded as an expression of the synthesis of reason and revelation that is thought to be one of the characteristic features of the Moderate Enlightenment in general and of the Dutch Enlightenment in particular.<sup>4</sup> Substituting the study of nature for acrimonious

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<sup>3</sup> See especially J. Bots, *Tussen Descartes en Darwin. Geloof en Natuurwetenschap in de achttiende eeuw in Nederland* (Assen, 1972), where Nieuwentijt is the central figure.

<sup>4</sup> E.g. Hans Bots and Jan de Vet, "Les Provinces-Unies et Les Lumières," *Dix-Huitième Siècle* 10, 1978, pp. 109-112; W.W. Mijnhardt, "De Nederlandse Verlichting," in F. Grijzenhout a.o. (ed.), *Voor Vaderland en Vrijheid. De revolutie van de patriotten* (Amsterdam, 1987), p. 57.

dogmatic disputes, fully accepting the methods and findings of modern empirical science, stressing the harmony and beauty of a nature ruled by a good God instead of man's depravity, the physico-theological mode of argument can be seen as a decisive shift in Christian apologetics. As such, it was a creative response to the intellectual uncertainty generated by Hazard's crisis. It exemplified the emergence of Enlightenment *within* protestant Christianity.

It appears to be Vermij's intention to contest this currently dominant interpretation. The highly ambiguous way in which he tries to do so, however, leaves the reader somewhat perplexed. The Enlightenment, Vermij quite rightly argues (although unfortunately without clearly defining what is to be understood by the term), took many different forms in response to a wide variety of national and regional circumstances. Whereas for instance in catholic France it was dominated by anti-clerical and often anti-Christian *philosophes*, in protestant Northwestern Europe no need for such bitter polemic was felt. Thus in England the Enlightenment can largely be defined as the triumph of latitudinarianism within the Anglican church.<sup>5</sup> The emergence of latitudinarianism, which combined tolerance and religious anti-dogmatism with an increased reliance on reason and the incorporation of modern science (experimental philosophy, Newtonian philosophy, physico-theology) into Christian apologetics, was according to Vermij ultimately caused by political factors, by the "continued emancipation of the state" (p. 98). Latitudinarianism, which is seen here as a form of secularization, rapidly spread through Europe in the decades around 1700. It is, the author claims, the most important context in which Nieuwentijt's work should be analyzed (p. 113). At this point the argument becomes especially difficult to comprehend, for it is now argued that Nieuwentijt represented a particularly Dutch form of latitudinarianism which was characterized by a strict adherence to orthodoxy (pp. 121-124 and 148-149). On the basis of his own previous attempts at a definition of latitudinarianism this would seem to be a contradiction in terms, but to the author it is obviously not. Indeed, he proceeds to the (in the light of the English experience) remarkable claim that Nieuwentijt's Dutch latitudinarianism had nothing whatsoever to do with the

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<sup>5</sup> It should be remarked here that this view is certainly not universally accepted. It may be criticized for largely ignoring the persistence of both High Church Anglicanism and the emergence of radical anti-clericalism in English discourse in the period under discussion. See J.C.D. Clark, *English Society 1688-1832. Ideology, social structure and political practice during the ancien regime* (Cambridge, etc., 1985) and, very recently, J.A.I. Champion, *The Pillars of Priestcraft Shaken. The Church of England and its Enemies, 1660-1730* (Cambridge, etc., 1992). Missing from Vermij's discussion of the English Enlightenment is John Redwood's important if disorderly *Reason, Ridicule and Religion. The Age of Enlightenment in England, 1660-1750* (London, 1976).



Enlightenment.<sup>6</sup> This in turn leads him to the even more iconoclastic conclusion that there was no such thing as a Dutch Enlightenment before roughly 1750 (p. 135).

Vermij's thesis, of which only the most important aspects have been touched upon here, is original, bold and wide-ranging. The author has certainly succeeded in giving his readers food for thought and he richly deserves their gratitude and admiration for his courageous refusal to follow the beaten track. Yet in the end his ambitious attempt at historiographic revision must be judged unsuccessful, for the book shows several serious shortcomings. Not only does it suffer from a lack of conceptual clarity, it is also marred by a tendency to jump to huge and sweeping conclusions on the basis of flimsy and insufficient evidence. The conceptual deficiencies are most evident in the way the problem of latitudinarianism is handled. If, as the author claims, latitudinarianism had similar political roots everywhere ("the emancipation of the state"), and if in England it was the very embodiment of the Enlightenment, how then could it be so completely divorced from the Enlightenment in the Dutch Republic? Does this not imply that the central category of the book is so flexible as to be of very little use as an analytical instrument? Even more perplexing, however, is the author's predilection for basing broad generalizations on fragile foundations. His observations on the primarily political roots of the spread of latitudinarianism around 1700 are a case in point: not nearly enough material is presented to substantiate this controversial claim. A similar striking lack of evidence is present in the manner in which the existence of a pre-1750 Dutch Enlightenment is dismissed. Indeed, here a whole body of historical research is simply ignored. Vermij may convince some that Nieuwentijt in no way belonged to the or a Dutch Enlightenment, but to altogether deny the existence of such a phenomenon in the first half of the eighteenth century much more is needed. It would at the very least have been necessary to discuss (and to deny the enlightened nature of) such matters as the efflorescence of natural law, the thought of the Leiden Newtonians, Van Effen's moralism and the rise of spectatorial writings<sup>7</sup>. The author, however, chooses not to do so and thereby

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<sup>6</sup> Vermij does not, however, totally succeed in unambiguously formulating his position on Nieuwentijt's relationship to the Enlightenment. He was not part of it, nor is he to be regarded as a forerunner, yet he may legitimately be viewed as "paving the way" (p. 135). To the present reviewer the distinction between being a forerunner and "paving the way" borders on the scholastic.

<sup>7</sup> On natural law see for example G.C.J.J. van den Bergh, *The Life and Work of Gerard Noodt (1674-1725). Dutch Legal Scholarship between Humanism and the Enlightenment* (Oxford, 1988). The relationship between Newtonianism and the Enlightenment is discussed by, among others, Margaret C. Jacob, *The Radical Enlightenment: Pantheists, Freemasons and Republicans* (London, etc., 1981), pp. 87-109 and *The Cultural Meaning of the Scientific Revolution* (New York, 1988), pp. 105-135. There is a substantial literature on Van Effen. The most recent addition is P.J. Buijnsters, *Justus van Effen (1684-1735). Leven en Werk* (Utrecht, 1992). The same author has done pioneering work

casts grave doubt on the validity of his interpretation.

Enough has been said here to demonstrate that many of Vermij's wider interpretative claims are daring rather than convincing. But what of Nieuwentijt himself? Are we to regard him from now on as an orthodox latitudinarian who was neither enlightened nor a forerunner of the Enlightenment? The author insists that Nieuwentijt's brand of physico-theology represented an episode *sui generis* in Dutch cultural history (p. 135). Yet at the same time he does not object to seeing Nieuwentijt's work as an attempt to resolve Hazard's crisis (p. 136). Others would say that this very way of resolving Hazard's crisis is best described with the term Moderate Enlightenment. Maybe, then, it is all a matter of the terminology we choose or refuse to employ.

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## BOOK REVIEWS

Review of: Frank Huisman, *Stadsbelang en standsbesef: gezondheidszorg en medisch beroep in Groningen 1500-1730* (Rotterdam: Erasmus Publishing, 1993; ISBN 90-5253-037-X), 477 pp.

Frank Huisman has written an important study of the development of medicine in a Dutch town of the early modern period, raising issues that other medical historians will want to consider. It is an unusual work in that it explores medicine in Groningen, a town that lay outside the Province of Holland, whose towns have received most attention by historians. It is unusual, too, in that Huisman has attempted a total history of medicine over a period of almost 250 years, in a kind of study lacking for any other Dutch town. He therefore brings to light enormous amounts of new information: in appendices, he even gives us the text of the most important municipal ordinances along with lists of Groningen practitioners. Huisman relies mainly on documents located in the municipal archives to tell his story, but he also reaches for any other pieces of evidence he can find, connecting medical developments to social, economic, religious and political changes in the town and province. His approach is what

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on spectatorial writings. See his *Spectatoriale Geschriften* (Utrecht, 1991).



might be called a political economy of medicine, for although he properly considers a wide range of influences in accounting for historical change in the medical world, he stresses politico-legal and economic causes. Throughout, he takes the position that the different kinds of practitioners, who were in direct economic competition with one another, were virtually indistinguishable according to their ability to treat, but were primarily divided according to the legal and economic rights and duties they possessed. The picture he paints of medical developments in an early modern Dutch town is generally convincing.

Huisman divides his account into three periods (to about 1594, from 1594 to about 1650, and from about 1650 to 1730), and takes up three themes in each part: the magistrates' concerns with medical advice and care; major outbreaks of epidemic disease (mainly plague) and attempts to manage them; and the various medical practitioners and their behaviour and organization. The practitioners are the main focus of attention, and are in turn divided into three groups, the physicians (*medicinae doctores*), the surgeons and the itinerants (*reizende meesters*). For some reason, apothecaries figure little in Huisman's account, while there was apparently very little information about traditional and domestic medicine. At any rate, the three groups he discusses were those with which the municipal government was mainly concerned.

To simplify a complex story, Huisman's account is one of the gradual growth of municipal concern for medical matters, leading by the early eighteenth century to a public sphere in which the local medical professionals had carved out their own region of expertise with the blessings of the magistrates. During the late fifteenth and early sixteenth centuries, when Groningen was at the height of its power as a self-regulating trading centre, the municipal government drew up its first 'medical' ordinances. These first regulations governed the disposal of waste, which may have had as much to do with changing sensibilities about the need to clear the streets for economic exchange as with 'public health', but the increasingly common connection between dirt and disease in a period of repeated outbreaks of plague probably helped spur on the magistrates in making these rules. By the early sixteenth century, formally appointed municipal physicians and surgeons were making their appearance, helping to advise the rulers of the town on matters regarding health and making sure that the causes of violent injuries were brought to the attention of the authorities. Itinerant healers came to be regulated by the officers who governed the markets. Following the incorporation of the town and the surrounding area into the Dutch Republic at the end of the sixteenth century, local interests led to the appointment of provincial doctors and surgeons as well, while much of the care entrusted to the town surgeon was turned over to a newly-established surgeons guild. With the establishment of the university in Groningen in 1614, the number of positions for physicians in the town began to increase, and within five years

complaints were heard for the first time about healers who practised badly; the town physicians (who sometimes also held office as university professors) were then entrusted with looking into the practices of others. The care of the poor also changed with the replacement of Catholic charities by municipal institutions; and when plague struck, much greater care was taken to elaborate ordinances by which it was hoped the effects of the epidemic could be limited.

From the middle of the seventeenth century, Huisman observes, there were fewer formally appointed provincial physicians, as more and more university-trained doctors began to practise in the countryside and in the town without offices to help support them. The surgeons were transformed from guild brothers into professional colleagues. For example, they transformed the guild examinations into hurdles that could be leaped only by proving medical expertise, while some among them even sought out university medical degrees. The surgeons also made allies with reformers within the church to try to exclude the itinerants from practice. By the later seventeenth century, the construction of a negative view of the itinerants' medical abilities was almost complete. The itinerants had to go to much more trouble to practice their trade by seeking permits from the town magistrates, provincial authorities or even the States General. Outbreaks and threatened outbreaks of plague were met with energetic efforts to break the chain of transmission by provincial and even national policies (although as usual, the powerful Province of Holland could obtain exceptions for its own merchants). The last decades of the seventeenth century saw a high-point in the number of physicians in Groningen (fifteen in 1690-99) and in the social status they held, while public respect for their medical expertise was also much higher than ever before. At the same time, they engaged in healing people far more than in giving advice to authorities, so that their medical roles had become more that of *medicus* than of *academicus*. The establishment of the Groningen *Collegium Medicum* in 1728 consolidated the influence of the physicians, as they began to regulate medical practice and practitioners according to (the newly clinically informed) academic medicine. The civic sociability of the well-educated Enlightenment elite had become clear in the organization of medicine.

In giving us this complex but clearly written account of the development of medicine in one town – for which any summary hardly does justice – Huisman raises a number of problems, some of his own making. He places too much reliance on Vern Bullough's dated study of medieval physicians for his definition of a 'profession', for example. And the emphasis he gives to an 'enormous gulf' between the theory and the practice of physicians is too great for my own tastes, and allows Huisman to marginalize any influences that changing medical ideas might have had for his story. Above all, one wonders what kind of example is the medical story of Groningen? Is the story 'peripheral' to the Holland 'centre'



of the Dutch Republic, with the Groningers merely following in the footsteps of larger Dutch cities, many of which established surgeons' guilds, universities and colleges of physicians earlier than they? Or can one see clearly in the example of Groningen the kind of processes at work that produced changes in the medical community throughout northern Europe? While one presumes that Huisman wants to argue the latter case – it looks, for instance, as if the large number of physicians in Groningen in the late seventeenth century is reflected in an oversupply of physicians in other places in the Republic – some explicit comparisons might have helped us know his own views on the importance of the Groningen example. But any of these reservations are minor compared to the achievements of the book. One can only hope that Huisman will be able to develop his explorations further in the future, for the story of how the changing political economy of Groningen brought about the rise of a recognizable medical profession has great potential for instructing us all.

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Review of: E.S. Houwaart, *De Hygienisten. Artsen, Staat en Volksgezondheid in Nederland 1840-1890* (Groningen: Historische Uitgeverij Groningen, 1991; ISBN 90-6554-151-9), 425 pp.

It has become something of a commonplace for medical historians to lay claim to a bid to rescue their chosen topic from a kind of 'Cinderella status', to select a subject, hitherto neglected, but of great importance, to be raised up to deserved prominence by the well-meaning scholar in the guise of the 'good fairy'. Eddy Houwaart does not make such grand claims, but perhaps he should, for if any aspect of the history of medicine can be likened to Cinderella being raised out of the dirt and ashes then it is that of public health. George Rosen indicated way back in the 1930s that the study of public health, the ways in which its problems were outlined and the solutions offered to them, is of immense importance in understanding how medical science and its practitioners interacted with society and governments. He was particularly concerned with the reactions of politics to public health problems through the creation of legal codes, bureaucratic organizations and professional bodies. In recent years, historians have taken up the baton thrown down by Rosen, including Houwaart in his splendid study of public health in the Netherlands in the mid-nineteenth

century, in particular its relation to political movements and forces, the emergence of a unified state, government initiatives, and the interaction of doctors, who were busy organizing themselves on a national basis, with these processes.

*De Hygienisten. Artsen, Staat and Volkgezondheid in Nederland 1840-1890* (The hygienists. Doctors, state and public health in the Netherlands 1840-1890) demonstrates the many demands put on historians working on social medicine, a need to be thoroughly grounded in the background of the organization of health care and its practitioners, and the daunting range of source material. Eddy Houwaart tackles these two problems admirably, perhaps even erring on the side of presenting too much background to his main issues. His conclusions are thoroughly supported by primary and secondary Dutch material, including the enormous journal literature, while he builds on and compares with international studies. Early chapters discuss the development of medical legislation and the regulation of medical practice from the departure of the French from the Netherlands in 1813, reactions to infectious disease, contemporary medical theories on health and sickness, the early organization of investigations into the sickness of the populace, and the efforts of doctors to organize themselves and medical care which led to the creation of the Nederlandsche Maatschappij tot Bevordering der Geneeskunst (NMG, the Dutch Association for the Promotion of Medicine) in 1849.

The first real introduction to the hygienists comes in chapter 3 which surveys national developments in public health medicine. Houwaart does not go so far as to suggest some kind of international link between those with 'hygienistic leanings', but demonstrates that there were groups of doctors in a number of European countries who were strongly influenced by positivistic ideas, with a reforming push which extended way beyond professional interests, to encompass a concern with excessive mortality and disease, and with common agendas based partly on the use of statistics to resolve these problems. But the interactions of medical practitioners in France, England, Germany and the Netherlands are tenuous, and for the English case Houwaart perhaps overestimates the impact of personalities such as Chadwick and Farr and the introduction of national legislation, principally the Public Health Act of 1848. This was an important piece of legislation, which inspired doctors in other countries to push for reform. But its implementation and that of other legislation in England faced problems similar to those outlined so adeptly by Eddy Houwaart for the Netherlands, an absence of compulsive power, and the resistance of local authorities, which resulted in patchy, often half-hearted and ineffective provision of services. The 1848 English Public Health Act established, as with early Dutch legislation, the principle of 'state responsibility', but little more.

The cholera epidemics of the mid-nineteenth century pushed the government



and health reformers into a higher gear, the cholera years witnessing great debate on the value of quarantine regulations as opposed to sanitary reform, but, in a Europe-wide phenomenon, little effective action. Before 1850 the hygienists argued that without political and social reform, national health could not be improved. After 1850, in a shift in emphasis from largely political to more technical solutions, the hygienists referred increasingly to the work of Max von Pettenkofer, whose *bodemtheorie* (soil theory) concluded that soil pollution was the main cause of epidemics, including cholera. The solution lay in a reconstruction of urban water supplies to eliminate pollution. The cholera years, just as significantly, formed a period of consolidation for doctors, as the NMG, becoming ever more convinced of the link between medical and political reform, and the importance of municipal control of public health policies, pushed for the unity of the profession and improved conditions. In this, they supported J.R. Thorbecke, the influential Minister of Internal Affairs, who was responsible for steering through important legislation in the field of health care and the regulation of medical practice in the mid-nineteenth century.

A further enormous influence on the hygienists was the work of the Belgian statistician L.A.J. Quetelet, who developed the idea that in a situation of 'social rest' and equilibrium social and biological factors would be distributed normally amongst the population. Imbalance and deviance could be solved by political and social action. William Farr's application of statistical methods to biological facts, and his establishment of a 'norm' of mortality, also made a great impression on the hygienists. The net result was a flurry of data collection and presentation of statistics across the country, which culminated in the publication of the *Sterfte-atlas van Nederland* (Mortality atlas of the Netherlands) in 1866, which contained data on over one thousand communities. The volume includes many examples of the tables and maps drawn up by the hygienists charting out death and disease.

Thorbecke was responsible, supported by the hygienists, for a series of mid-century acts pertaining to public health, out of which the 1865 Health Acts were outstanding. These acts vested control in the hands of local councils, but, while on paper they achieved a great deal, they were permissive not mandatory, and without the means to enforce action, much of this legislation was to become a dead letter in the hands of the local authorities. Yet the acts established the principle that the state rather than the individual was responsible for the nation's health, in a crucial shift in ways of thinking about the problems of health provision and the use of resources. The state was to prevent local authorities from sacrificing the general interest in the cause of obstinacy, narrow-mindedness or 'guilder'-pinching.

In the last quarter of the nineteenth century, as urbanization and industrialization made their greatest impacts in the Netherlands, more of the

aims of the hygienists became reality as legislation was passed on many aspects of preventive medicine: industrial pollution, the regulation of drinking water, public buildings and housing, and the control of infectious diseases. The hygienists, still furiously collecting statistics, broadened their concerns to embrace children's labour, factory conditions, and nutrition.

One of the problems of *De Hygienisten*, implicit in its title, is the emphasis on public health from the top downwards, on state, legislation and the work of leading medical and government figures. Eddy Houwaart includes a short account of public health in Amsterdam in chapter 5 and many of the reports of the hygienists on localities are discussed, but detailed analysis of the problems at ground level, independent of the collation of statistics – presumably local authorities did act on occasion without central government prodding – would have added significantly to our picture of the state of the nation's health and action to improve it. We get little sense from Houwaart's volume about what the often appalling sanitary conditions meant for the daily existence of Dutch people, for essentially this is a 'clean' study of public health without the drains, dirt, sewers, sickness and physical discomfort. Just to take a small segment of the study as an example, Chapter 8 includes a short section on children's labour, but refers – seeing this sombre chapter in the history of the child and industrial history as an 'issue' rather than 'problem' – only to discussions, committee reports and agendas for reform. The labouring children are absent. Houwaart's emphasis reflects the dilution of the hygienists' political ideals, as they shifted from broader social issues to mapping out statistics and technical problems.

A resolute definition of the hygienists, how one became one and what criteria defined them, is not offered by Houwaart, and this remains a serious problem in a volume which is after all dedicated largely to the activities of this group. A list of twenty-seven important Dutch hygienists is given in an appendix, plus a longer list of sixty-two doctors who made an important contribution to public health work without winning the denomination 'hygienist'. Can twenty-seven individuals make a movement? And what distinguished hygienists from their contemporary public health reformers? If only a handful of hygienists were listed in Houwaart's appendices, what do we call the others who were contributing to the vast collection of statistical data throughout the Netherlands? How could Professor G.J. Mulder of Utrecht be both a conservative advocating a technocratic-centralist policy in opposition to Thorbecke and one of the select twenty-seven hygienists?

The achievements of Houwaart's book are, despite these reservations, enormous. As Charles Rosenberg has recently suggested, disease is an elusive entity, which only when it has been perceived, named and responded to acquires existence. The hygienists, with their concern for labelling and quantifying, served to bring disease and its attendant death rates to the attention of the Dutch



government, and played an important role in bringing forward legislation, which was eventually to play a large role in improving health conditions. Given the initial inertia of the local authorities, perhaps the greatest achievement of the hygienists, aside from going some way towards putting their own house – the medical profession – in order, was helping to forge this new approach to public health problems. In this role perhaps they deserve to be called 'handsome princes', although at the same time they were actively improving their individual standing, making medical scientists of themselves, and propelling the field of social medicine to a higher status. In drawing out these important strands of development and change in ideas concerning sickness and public health, Houwaart's study serves the history of social medicine well.

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Review of: Ton van Helvoort, *Research styles in virus studies in the twentieth century: controversies and the formation of consensus* (Ph.D. dissertation University of Limburg, Department of Health Ethics and Philosophy: Maastricht 1993), 223 pp.

Since the 1980s the history of microbiology in the twentieth century has attracted increasing attention from historians. Several researchers are now studying the diverse contexts within which bacteriology developed in the decades before the Second World War – a period that has received little attention in the classical historical surveys of the field. Where the history of virology is concerned, however, the period preceding the spectacular phage research of the 1940s and 1950s is still understudied. Ton van Helvoort's doctoral dissertation on twentieth-century controversies over the virus concept makes an important contribution towards filling this gap. Van Helvoort's wider aim is, first, to analyze the controversies in terms of the opposing styles of research that, in his view, characterized them and, secondly, to provide an explanation for the seemingly progressive nature of virus research until the 'modern conception of virus' was accepted in the 1950s. Van Helvoort has selected a number of major controversies for detailed treatment, and together these case studies constitute the main part of the book. Let me first characterize the nature of these controversies in a few lines.

The first case concerns the investigation of tobacco mosaic disease and its causative agent, tobacco mosaic virus (TMV). In the first decades of the

twentieth century, the central question in virus research was: what is a virus? As can be exemplified by the research on tobacco mosaic disease, two different answers to the question were proposed, the first being that the disease was caused by an exogenous agent, a small microbe or ultramicrobe, and the second that a chemical substance, produced by the diseased plant itself, was involved. The first explanation, which drew on the analogy with bacterial diseases, can be called the bacteriological explanation, the second the chemical. The different lines of investigation into the cause of the disease can be shown to have been heavily influenced by the theories, methods and techniques that constituted the core of the two disciplinary approaches involved, i.e., bacteriology and chemistry. Stanley's crystallization of tobacco mosaic virus (TMV) in 1935 gave rise to a new approach that formed a bridge between the bacteriological and the chemical explanations. According to Stanley's physicochemical view a virus possessed a fundamental property of life, namely the ability to multiply, while its being crystallizable relegated it to the domain of chemistry. Research within this physicochemical disciplinary approach received much of its impetus from the investigation of enzymes, which were considered to share their properties of autocatalysis and crystallization with the viruses. Meanwhile, the nature of the mosaic virus continued to be contested by biochemical workers who denied the possibility of independent multiplication and continued to defend the view that the virus was an endogenous product, the result of a physiological disturbance within the plant. Biochemical research was conducted within the context of physiology and pathology and focused attention on processes within the diseased plant. The controversy that resulted from these opposing views and approaches of the virus was only resolved by the acceptance, in the 1950s, of the 'modern concept of virus', as defined by Lwoff in 1957.

The case study on influenza virus provides another instance of the bacteriological approach to viruses. The agent held responsible for influenza was identified in the early 1930s. Research on the virus took the germ theory of disease as its starting point, and relied on what was known of bacteria in this respect. In fact, viruses were held to be 'degraded' bacteria which multiplied by binary fission. This view ran into problems in the 1940s, when immunization experiments turned out to be failures. Also the virus's disintegration or 'eclipse', once it has entered a cell, was hard to explain within the bacteriological approach.

An example of the conflict between a bacteriological and a physiological approach is provided by the controversy between d'Herelle and Bordet over the nature of bacteriophages, a category of viruses which infect bacteria. D'Herelle, who coined the name bacteriophage, saw viruses as 'living' colloidal particles capable of assimilation and adaptation. Yet their multiplication was a purely physical phenomenon: the particles merely split up in two parts after having



attained a critical size. In d'Herelle's view these properties of the virus implied that the cellular theory of life, which implied that the cell was the smallest living entity, had to be abandoned. According to his opponent Bordet, who had a background in immunological and serological research, nothing but bacterial physiological processes were responsible for the phenomenon of bacteriophagy. A normal physiological process was involved, namely bacterial variation, in which lysis of the bacteria, also a normal bacteriological phenomenon, played an important role.

A somewhat comparable controversy developed between Northrop and Max Delbrück. Northrop held that phage is a product of bacterial physiology, while Delbrück saw phage as a virus which infects bacteria. In this case study van Helvoort rightly takes pains to counterbalance the 'winner-takes-all effect' in the historiography of virology, which has resulted in Northrop being depicted as an obstructionist defending 'crazy results and crazy interpretations'. Northrop believed that phage production in bacteria was a special case of protein synthesis. Drawing on the analogy with enzymes, he assumed the existence of phage precursors and suggested that phages could grow in the absence of bacterial metabolism. Delbrück, on the other hand, treated phages as living viruses and performed experiments in which the bacterium was considered as a black box, the inner workings of which were not the object of investigation. In the end, Delbrück's 'exogenous' theory won the day, as we know, but before the consensus of the 'modern view' settled the dispute, Delbrück, too, had to give up several of his hypotheses regarding the mechanisms involved.

The 1940s and 1950s witnessed several attempts to bridge the gap between the 'exogenous' and 'endogenous' views of virus activity. Macfarlane Burnet and Eugène and Elisabeth Wollman opened up such a perspective by investigating the link between phage and the hereditary material of the bacterium. Lwoff did the same by establishing the connection between bacterial lysis and the release of phage. Before lysis, the phages were assumed to be in a prophage stage, which was connected to endogenous functions of the bacterium. Another bridge was suggested by biochemical research showing that phage depended on the metabolism of the bacterium for multiplication. The most important question now remained how prophage grew. Here the suggested link between prophage and the bacterial hereditary material on the one hand, and the connection between phage multiplication and bacterial metabolism on the other, provided the cues to the development of the 'modern conception of virus' which resolved the endogenous-exogenous controversy.

In my view the case histories on which van Helvoort's argument rests, constitute the most valuable part of his dissertation. They are all carefully researched and documented, using a wealth of primary sources; they contain many additions and quite a few corrections to the existing secondary literature;

and they are without exception written in a transparent style and presented in a well-organized way. The cases all have been or will be published in international history of science periodicals, and I am sure that they will become obligatory passage points for all historians of virology.

I am less happy with the framework van Helvoort has designed to make the case studies join forces to support a book-length argument. The dissertation as a whole purports to show that the controversies over the nature of viruses can be described in terms of conflicting thought styles and research styles. According to van Helvoort, there was an exogenous and an endogenous thought style, there was a bacteriological research style, a biochemical one, etc. By introducing the style issue, van Helvoort is trying to push up his level of analysis one level too high, in my view. His analyses in the case studies run smoothly on a vocabulary that includes only such familiar terms as theories, research programmes, disciplinary approaches, 'paradigms', etc. I am not saying that such terms have sharp, unambiguous meanings for historians or that they cover all there is to be said about science, but provided they are used in an informed way they can do the job they are supposed to do; and this is indeed how van Helvoort uses them in his analyses. Yet according to the opening and closing chapters of the dissertation these different research programmes and disciplinary approaches — terms which, I repeat, van Helvoort does not shun in the case studies — are actually to be seen as different research *styles* and thought *styles*. Something on a different level is apparently involved which shapes and directs theory choice, experimental approach, explanation etc. Yet I must confess that I have been unable to grasp what 'style' in van Helvoort's sense really refers to or what it might entail, apart from the theories and approaches it supposedly shapes.

Now van Helvoort admits that there is also a sociological aspect to the matter of styles, but he has chosen not to investigate this aspect. It seems to me, however, that it is doubtful that talk of styles makes sense at all if the sociological dimension is left out entirely. The fact that people work in different disciplinary environments and that they opt for different theories does not in itself necessitate us to call in the style concept. People simply have different job preferences; and don't scientists tend to disagree all the time? Neither can it surprise us that different theories and different disciplinary backgrounds may go hand in hand with different research agenda's, different experimental setups and different explanatory models. We do not need the style concept to explain this, either. Again, I am not saying that this is all there is to science. We do of course want to obtain a deeper and richer insight into what is going on in scientific research. But in order to obtain such insights, we cannot continue to eschew the sociological dimension. And it is only when this sociological dimension is taken into account, that I can see a clear role for the style concept.

I am prepared to grant van Helvoort that there is at least an indication that



styles may have played a part in the case histories he has investigated. The controversies without exception involve an endogenous and an exogenous view of viruses and the popularity of the endogenous view among biochemists is certainly remarkable. In themselves, such observations are not enough to invoke an explanation in terms of style, but they may lead one to suspect that styles were indeed involved. Yet this requires us to investigate whether or not there are other differences to be discerned between the opposing groups of researchers which somehow run parallel to their position in the virus debate. Such differences might pertain to their social and cultural backgrounds, their self-appointed task as scientists, their stance with regard to practice, etc. Against the background of such a broader view of the controversies we may begin to understand *why* the scientists involved preferred particular kinds of questions, approaches and explanations, and it is on this level that the style concept may begin to make sense, in my view.

Van Helvoort ends his dissertation with a suggestion with regard to how a sense of continuity and progress was maintained during the successive stages in the investigation of viruses. The earliest researchers defined the virus on the basis of the material virus particle. Later this concept was 'deconstructed', and viruses were then defined on the basis of their pathological effects in plants. Finally the 'modern view' reverted to the notion of the virus as an infectious entity. In this way the virus concept continued to be meaningful and useful to investigators, despite their strongly opposed notions of what a virus really was. This 'continuity' of the concept helped to overcome incommensurability during controversies; there was often at least some sense in which contestants agreed that they were studying the same phenomenon. D'Herelle and Bordet agreed, for instance, that they were researching the bacteriophage phenomenon, which in both interpretations involved a transmissible lysis of bacteria; and the investigators of TMV, however different their views on the nature of this virus, agreed that they were studying tobacco mosaic disease. The result of this 'continuity through discontinuity', as van Helvoort calls it, was that an impression of progress, of progressive development of the virus concept was created, culminating in the consensus of the 'modern concept of virus'. Van Helvoort suggests that a similar oscillating mechanism between different levels of explanation, creating an impression of continuity and progress, may have been at work in, for instance, the investigation of the gene, the cell, and in cancer research. This definitely sounds interesting and deserves further attention.

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