

'Open and Wide, yet Without Height or Depth'*

H. Floris Cohen

Review of: K. van Berkel, *In het voetspoor van Stevin. Geschiedenis van de natuurwetenschap in Nederland 1580-1940* ('In Stevin's Footsteps. A History of Science in the Netherlands 1580-1940'), (Meppel: Boom, 1985; ISBN 90-6009-639-8), 243 pp., ill.

Is it not quite impossible to present a survey of almost the entire history of the sciences in the Netherlands? Impossible because science is, by its very nature, an international enterprise which therefore does not permit an historiographical subdivision into national categories? Or is such an undertaking, if not perhaps downright impossible, at least quite premature?

The author of the book to be reviewed here has anticipated objections along such lines. In his Preface he argues that, to the extent that science is an activity carried out in groups, the institutional setting of science has great significance for its advance. Institutions are, however, marked by an important national dimension. In other words, so he asserts, a national historiography of science makes sense when individual achievement is being discussed in an institutional framework. Van Berkel equally rejects the consideration that, as yet, an insufficient number of detailed studies is available to support a more comprehensive effort aimed at synthesis. In this sense, so he rightly observes, syntheses will never fail to arrive too early. The specialist will always be entitled to file complaints, but this is not a good enough reason for forgoing recurrent attempts to prepare a novel framework, encompassing those topics that have been investigated in detail as well as those that, so far, have not.

Remarkably, van Berkel's first book – his doctoral dissertation on Isaac Beeckman – rests upon a somewhat similar argument.¹ There I found the argument less persuasive; in-depth studies of Beeckman's manifold specialized investigations are as yet too rare to justify the impression, given by van Berkel, that an acquaintance with his surely brilliantly innovative study puts the reader in possession of all the leading features of Beeckman's thought. In the case of *In het voetspoor van Stevin* the historiographical situation is quite different. The bibliography at the end of the book demonstrates, to the satisfaction of anyone not already aware of it, that we possess a great many detailed studies on aspects of the cultivation of science in the Netherlands, whereas the first serious, truly historical

* This essay review is a slightly altered version of a review published originally in Dutch: H.F. Cohen, "Open en wijd, maar zonder hoogten en diepten," *Tijdschrift voor de Geschiedenis der Geneeskunde, Natuurwetenschappen, Wiskunde en Techniek* 11, 1988, pp. 12-16.

¹ K. van Berkel, *Isaac Beeckman (1588-1637) en de mechanisering van het wereldbeeld* (Amsterdam: Rodopi, 1983) (reviewed by me in: *Tijdschrift voor Geschiedenis* 97, 1984, pp. 612-613).

survey still remained to be written. As van Berkel observes, the only books which cover the whole period are collections of biographical sketches arranged in chronological order. As opposed to this genre, van Berkel presents a full-blown historical overview in which two distinct objectives are combined with a great measure of success.

In the first place, van Berkel presents brief surveys of the lives and works of the main individuals who – whether or not they were born Dutch – did important scientific work in either the Netherlands or the Dutch Indies. Examples are Stevin, Drebbel, Descartes, Huygens, van Leeuwenhoek, 's Gravesande, Linnaeus, Buys Ballot, van der Waals, Lorentz, de Vries, Ehrenfest, de Sitter. Such basic data as date of birth, education, principal publications and the like, have been set apart from the main text for ready consultation and also in order not to interfere unduly with the story as it unfolds. The resulting survey of scientific achievement on Dutch-owned soil provides the main thread running across the book. Even though the author quite often succeeds in summarizing the essence of individual achievements in a nutshell, this is of course not where the most innovative aspect of his book is to be sought. For that we must address the institutional setting within which the author has placed his entire survey.

That is to say, throughout every stage of the story the author directs his attention towards the state of the various institutions within which science in the Netherlands was being cultivated. In practice this amounts to saying that the history of the evolving Dutch university system provides the overall framework within which, in the author's view, scientific life was mainly situated in our country over the entire period. As a result, the historical survey is presented to us on three alternating levels. One is the level of individuals engaged in science; another, the level of the universities which, more than any other institution, informed scientific life; finally, we have the level of governmental administrations which, whether or not these spelled out definite policies for their universities, delimited the extent to which these could unfold themselves. In this manner the history of Dutch science is placed firmly within the context of the political history of our country.

What has been said so far is no more than a formal description of what the reader may expect to find in this book. Let us turn now to its style and its content, and assess its qualities.

As is invariably true of this quite productive author, he has written a very readable book. The style flows easily without lapsing into popular over-simplification. One may therefore condone some mild pedantries as expressed in recurring sentence constructions of the following general type: "Nonetheless the question arises of whether p may not have been q," concerning matters where the immediate sequel makes it crystal clear that the author thinks that p was indeed q, so that the sentence might fruitfully have been condensed into 'p was q'. Thus a lot is being 'asked' and 'posited' that might better have been merely stated, but we all suffer from our own stylistic peculiarities.

Next, the sketches of the lives and works of our Dutch heroes of scientific thought seem to me to be generally of excellent quality – clear, pithy, to the point. Evidently, this is the point at which every specialist is handed the opportunity to

give vent to annoyance over the type of mistakes which, in a book like this, cannot perhaps be avoided. But the truly important thing is that an overall picture of Dutch science over the centuries gradually emerges – a picture that is amply documented, the importance of which greatly outweighs the questionable validity of a limited number of details. Take such topics as engineering science at the time of Simon Stevin (the main practitioner of the genre); the increasing identification of science with the aristocracy in the course of the 17th century (e.g., Huygens, Hudde, de Witt); the work done by the societies in the Age of the Enlightenment and the role of the universities therein; the failed effort at recovery around 1850; the 'second Golden Age' of Dutch science at the turn of the century. Most of what van Berkel has to say on these matters has been said elsewhere, by himself and by others; much of it over the past decades by members of the group of historians of science at Utrecht University supervised at present by H.A.M. Snelders. Yet never before has it all been put together and given an identifiable profile of its own, and this is the key point. The publication of van Berkel's book has by no means removed the *raison d'être* for ongoing studies to be devoted to the most varied aspects of the history of Dutch science, but van Berkel has decisively altered the rules of the game. Whoever may decide henceforward to join in the game now has at his disposal a coherent interpretation of the successive stages of that history. He may choose to utilize it as a framework within which to work, or he may prefer to sharpen his own wits or to rebel against it; in any case, he ignores the van Berkel landmark only at his peril. In short, now that the appeal once exerted by nationalist or by simple-minded progressivist motives for studying the history of science has irrevocably disappeared, *In het voetspoor van Stevin* conveys a new sense of direction to the student of the history of Dutch science.

What lends coherence to van Berkel's interpretations is the institutional element given so much room in his treatment. It does not only serve as a means of description in that it helps solidify the chronological overview; it serves in addition as his favorite mode of explanation. On occasion van Berkel derives a great deal from it. Take the 'second Golden Age' – the period of van der Waals and van 't Hoff and Lorentz and many others who together, during the closing decades of the 19th century, transported a rather parochial Dutch scientific scene upwards, right on to the contemporary zenith of international science. Van Berkel shows persuasively how much this sudden and quite astounding upsurge owed to a unique confluence of largely institutional changes: a number of extraordinarily gifted pupils raised in a novel, 'dehumanized' type of high school found themselves in possession of generously expanded funds and of very light teaching loads, their primary obligation being no other than to perform research on scientific topics chosen in accordance with their own lights. Or, to take an earlier example, van Berkel makes it very clear how, during the first 'Golden Age', the lack of a Dutch counterpart to the Royal Society or the Académie Royale – which in its turn he ascribes to the absence of a proper court-life – stamped a deep impression on Dutch science of the time.

Van Berkel's expert handling of both the general outlines and relevant details of the political and social history of the Netherlands helps to make such an

institutional analysis of the ups and downs of science during given periods very useful. Nonetheless I do not think that he is sufficiently aware of the limits to this type of explanation. Granted that, for example, the Dutch Republic in the 17th century was highly fragmented, from an administrative point of view; that the anti-Orangist, patrician authorities had successfully nipped in the bud Stadtholder Frederik Hendrik's efforts to emulate the court life of his royal colleagues elsewhere; that the circumstances attending the formation, in France and England, of flourishing scientific societies were therefore not present on the Dutch scene. Granted all this, it is still true that during the very same period of the second half of the 17th century (soon after the devastating Thirty Years' War came to an end, that is) a substantial number of German mini-states proved perfectly able to produce societies devoted at least partly to science. It is by no means clear that, even in the absence of a proper court, patricians belonging to the wealthiest burgher class the world had ever seen could not possibly have gathered together in the name of science, among other pursuits. If the patricians of the Dutch Golden Age had shown a true and lasting interest in this novel enterprise called 'science', there is no doubt that a learned society, or academy, might have been founded here, too. It might not have been quite so prominent as those in England or France, but nonetheless it might have provided the kind of institution that would have supported Huygens (intellectually if not materially) after his return from France, or that would have helped to keep men like Hudde within the domains of science – the same kind of service the Royal Society performed for Newton. Why did nothing of the kind happen here? Only because there was no court? Yet patronage may emanate from other centers, too. Whence – and here we face a theme that runs through a good deal of van Berkel's book, without receiving the explicit treatment it seems so amply to deserve – whence the frequent absence, then as well as later, of interest, guidance, and support of this kind?

Van Berkel's apparent reason for adhering to his institutional answers is his evident belief that the only available alternative – the explicit discussion of 'national styles' in science – would inexorably lead to becoming caught in the net of explanations in terms of those 'national characters' we have all been taught to abhor. There is surely a positive side to such fears – so much nonsense has been said about national characters.² Yet is such healthy fear sufficient reason for forgoing all further thought on the possibility that there might indeed be a specifically Dutch style of scientific investigation? Here and there in van Berkel's book one spots reluctant passes in the general direction of loose statements about such a style, yet a systematic treatment of the topic is avoided altogether. This is how by far the most inspiring remark on what might have been the leading theme of van Berkel's book – what general approach, if any, has been characteristic of Dutch science through the centuries? – is indeed to be found in his book, but only in the guise of a quotation from an article by Hooykaas on Huygens:

² Cf. a disheartening sample elsewhere in the present issue of *Tractrix*.

When considering Huygens, what is it that I miss? It seems as if from Huygens as well as from the country that brought him forth one dimension is lacking – both are open and wide, yet without height or depth ... Our intellect therefore admires his scientific treatises, his technical ingenuity, and his experimental ability, but our feeling is not touched by his smooth, unwrinkled perfection.³

One predominant characteristic of the cultivation of science in the Netherlands runs right across van Berkel's entire overview. As noted, he observes this feature repeatedly yet always in passing; it is never turned into a starting point for further reflection. I mean the strongly positivist nature of so much of Dutch science, often feeding on utilitarian purposes and generally devoid of what its practitioners were wont to call metaphysical speculation. In the Netherlands the observer appears to face, virtually all the time, science that is practicable (whether directly so or in the longer run); science adopted as a field for demonstrating one's technical proclivities; science cultivated in an effort to find out how things fit together; but rarely if ever science conceived as a vital key in man's ongoing search for a comprehensive insight into reality. It is this very urge, however, that has served as an ongoing source of inspiration for many of the truly greatest – outside the borders of our country. If one wishes to attach labels one might call this common streak (which seems to run across the history of Dutch science) 'sceptical-positivist'. Often, such scepticism about what science may ultimately accomplish has fed on utilitarian motives, but this has by no means invariably been the case. Let me illustrate what I am loosely driving at here by means of one example, taken from outside van Berkel's book:

... in our theories our only concern is to form pictures of the external world, which serve to reveal the mutual connections between phenomena as well as the rules under which they take place, so as to enable us, with the help of these pictures, easily to find our way amidst the phenomena. One cannot in any other sense speak of the 'correctness' of the panorama thus drawn, and if, in the above sense, two pictures satisfy us equally, we are free in our choice and we may even employ now the one, then the other, just as we please.⁴

I may be entirely mistaken here, but to me there is something quintessentially Dutch about such a passage, admirable as it is by itself for its clear-cut formulation of a consistent point of view. It was pronounced in 1915 by H.A. Lorentz on one of the rare occasions when he dared cross the borders of physics at all. Its author was a master of physics as few have been, yet the lack of faith in man's ability to grasp reality, expressed here so eloquently, seems to have something to do with the fact that Lorentz' name is not the obvious one with which to couple the revolutionary transformation which our conception of the world underwent at the time, and

³ Quoted on p. 60; the passage is on pp. 35-36 of R. Hooykaas, *Experientia ac Ratione: Huygens tussen Descartes en Newton* (Leiden: Museum Boerhaave, 1979).

⁴ H.A. Lorentz, "De lichtaether en het relativiteitsbeginsel," *Collected Papers* 9, 1939, p. 241; quoted in J. Illy, "Einstein Teaches Lorentz, Lorentz Teaches Einstein. Their Collaboration in General Relativity, 1913-1920," *Archive for History of Exact Sciences* 39, 1989, p. 275.

for which he did so much to prepare the way.⁵

Naturally I am aware that it is one thing to speculate on matters of national scientific styles, but quite another to solidify hunches like these into pieces of responsible historiography. My point here is that their virtual absence confronts us with a hole in van Berkel's book at the very place where his institutional analysis ceases to be fully convincing. To my mind, the author identifies largely with these positivist patterns of thought. His positivism, to be sure – evinced equally in the closing pages of his book on Isaac Beeckman – is nothing if not refined and sophisticated. Still, its in-built scepticism is in no small measure responsible for the somewhat even tone that pervades his book. Little sense of excitement is conveyed to the reader and I doubt whether, except for those who have already gained an interest in its subject matter, the book will convert many others to the past of Dutch science.

It is this very conception of science that allows van Berkel to discuss in one and the same tone of voice Huygens' honest search for the truth of things and the repellent negotiations over truth that took place, during the same period, at the universities of Leyden and Utrecht – debates to which van Berkel devotes with gusto some ten pages of his book. I do not wish to imply that those academic conflicts between Aristotelians and Cartesians in their various shades and colors were unimportant. Far from it. My point is that not even a wide chasm in intellectual level adequately measures the distance between the two topics. The search for truth takes place in an intellectual world entirely distinct from the world in which truth is subjected to estimations of immediate expediency, and one cannot properly write about these matters as if, at bottom, identical values stood at issue.

The criterion I wish to employ here is surely a personal one. For me, the most inspiring feature of the history of science is the intellectual adventure embodied in the grand spectacle of what Koyré inimitably called "*l'esprit humain aux prises avec la réalité*" – the human spirit in its ongoing struggle with reality.⁶ In van Berkel's book one finds precious little of such a sense of adventure. This has a great deal to do with the chosen topic which, after all, does not inspire much of a sense of ultimate intellectual excitement, nor is its absence quite foreign to the author's conception of what science ultimately is about. What remains is not at all to be disparaged – a useful, judicious, well-composed, responsible, considerate, in short, an excellent book that needs no justification whatsoever for its right to exist. When considered against the background of what happened in science on the international scene during three and a half centuries, van Berkel's book undoubtedly throws into relief a great deal of what was accomplished on Stevin's footsteps between 1580 and 1940.

One final remark. As yet, the book exists only in Dutch. Precisely because Dutch science and its past display a number of features remarkably different from

⁵ For an in-depth discussion of the issues involved see N.J. Nersessian, "Why wasn't Lorentz Einstein?" An Examination of the Scientific Method of H.A. Lorentz," *Centaurus* 29, 1986, pp. 205-242.

⁶ A. Koyré, *Études Galiléennes* (Paris: Hermann, 1966² [1939¹]), p. 11.

their counterparts in other countries, *In het voetspoor van Stevin* would seem eminently suited to being employed as one reliable source for a comparative investigation into the fate of science in environments with different institutional settings and markedly distinct styles and approaches. Also, van Berkel's book for the first time provides a coherent background for the assorted bits and pieces written about Dutch scientific luminaries, which the non-Dutch historian of science can hardly fail to come across from time to time in his own researches. For a proper performance of all these services, however, the book should first be translated. I hope that *In het voetspoor van Stevin* may in due time reach the international audience it fully deserves.

*Department of History
University of Twente
P.O. Box 217
7500 AE Enschede
The Netherlands*