

HEGEL AND NEWTONIANISM

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HEGEL AND NEWTONIANISM
EDITED BY
MICHAEL JOHN PETRY

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*To Andrew and Clare,
as they come into their inheritance of the past,
and set about forming the future.*

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FOREWORD

It could certainly be argued that the way in which Hegel criticizes Newton in the *Dissertation*, the *Philosophy of Nature* and the lectures on the *History of Philosophy*, has done more than anything else to prejudice his own reputation. At first sight, what we seem to have here is little more than the contrast between the tested accomplishments of the founding father of modern science, and the random remarks of a confused and somewhat disgruntled philosopher; and if we are persuaded to concede that it may perhaps be something more than this – between the work of a clear-sighted mathematician and experimentalist, and the blind assertions of some sort of Kantian logician, blundering about among the facts of the real world.

By and large, it was this clear-cut simplistic view of the matter which prevailed among Hegel's contemporaries, and which persisted until fairly recently. The modification and eventual transformation of it have come about gradually, over the past twenty or twenty-five years. The first full-scale commentary on the *Philosophy of Nature* was published in 1970, and gave rise to the realization that to some extent at least, the Hegelian criticism was directed against Newtonianism rather than the work of Newton himself, and that it tended to draw its inspiration from developments within the natural sciences, rather than from the exigencies imposed upon Hegel's thinking by a priori categorial relationships.

In 1983 the *Istituto Italiano per gli Studi Filosofici* organized an international conference at the University of Tübingen at which the basic principles of the *Philosophy of Nature* were discussed, and their relevance to the Hegelian treatment of disciplines such as mathematics, mechanics, physics and the organic sciences was submitted to close and careful analysis. The proceedings were published in German in 1987. Soon afterwards, the *Internationale Hegel-Vereinigung*, with the help of the Royal Dutch Academy of Sciences, organized a similar conference at Leusden in the Netherlands, at which it was the treatment of the various sciences rather than the general principles of the *Philosophy of Nature* which came under consideration. There were, however,

some particularly important papers on Hegel's conception of mathematics. These proceedings, once again mainly in German, were published in 1986.

Certain real advances were made in the general understanding of the Newton-Hegel relationship as a result of the publication of these volumes. By opening up the whole question of Hegel's grasp of the logical foundations of mathematics, showing that his central concern was the state of the calculus in the wake of Euler and Lagrange, and that in certain respects his work in the field anticipated the advances made by Cauchy, Bolzano and Cantor, a firm foundation was laid for a constructive consideration of his appreciative assessment of Newton's having reduced his demonstrations, "to the first and last sums and ratios of nascent and evanescent quantities". By calling attention to the whole range of scientific disciplines surveyed in the *Philosophy of Nature*, and not confining attention simply to a consideration of basic principles, the volumes gave rise to a general awareness of the great diversity of issues involved in Hegel's critique of the Newtonianism of his day – not only in connection with pure and applied mathematics, but also in respect of general and celestial mechanics, light- and colour-theory. To a certain extent, the attention they drew to Hegel's Platonic and Aristotelian heritage, and to the teleological element in his thinking, encouraged the view that his differences with Newton were simply typical of the later eighteenth century – related as they were to his declining to structure his basic thinking in mechanistic terms, to his adopting the fundamental model of the organism. In this particular respect, however, as will be apparent from several of the contributions to this volume, it now looks as though it was the traditional scientific procedures of analysis and synthesis which determined the central conceptions of both Newton and Hegel.

Developments in Newton scholarship during this period have been no less momentous, and just as effective in forcing us to reconsider traditional preconceptions. Only a generation ago, Brewster's *Life of Sir Isaac Newton*, first published in 1831, was still essential reading for anyone attempting to get an idea of the man behind the scientist. Now that the correspondence has been properly edited, we have at our disposal a wealth of hitherto inaccessible information concerning the social and cultural context in which Newton was working, and the issues raised in the course of preparing his writings for the press. Correspondingly definitive editions of the mathematical papers, the *Principia* and the lecture-notes, have opened up the prospect of mapping out in detail the various stages in the development of his thinking. Cohen's reconstruction of the famous revolution in style, together with the fine series of biographical studies by Manuel, Westfall, Christianson and Hall, have had the effect of putting the whole business of assessing the man and his works on a new basis. Betty Dobbs and Karen Figala, at long last, have helped

us to view with greater equanimity the master's disconcerting preoccupation with alchemy, to realize what was actually at stake during the hunting of the green lion. After a full quarter of a millennium of relative stagnation, so much has been accomplished in such a short period of time, that it is by no means easy to take the full measure of it. One certainly realizes, when one thinks back over this great surge of scholarly activity, how limited the general understanding of Newton must have been, even in the very recent past. And there is as yet little prospect of reaching any final conclusions, since we are only just beginning to sort out the great mass of Newton manuscripts relating to chronology, Biblical exegesis, Church history and theological issues.

This being the case, it is hardly surprising that a great deal of the general history of Newtonianism should now need rewriting, and will almost certainly have to be revised again once the theological works have been published. In fact nearly all of those who have created this history by capitalizing on Newton's mathematical and scientific accomplishments, would now appear to stand in need of reassessment. Assumptions which only a generation ago were regarded by many as being self-evident, are now open issues. This is certainly the case not only with Dijksterhuis's account of the mechanization of the world-picture, but also with many of the conclusions the Machists drew from the assumption that scientific laws are essentially descriptions of phenomena in terms of sensation. As we look further back into the past, established attitudes appear to be even less satisfactory. It is a sobering fact that by far the most popular exposition of Newtonianism during the later eighteenth century was Martin's *Philosophia Britannica*, and that Hegel had a copy of the third German edition of it in his private library. Is it at all possible, in the light of our present insights, to respond anew to the beguiling image of Blake – to envisage a Newton who really was bent over his compasses, absorbed in binding the Infinite and annihilating the imagination? Who will still maintain, with Kant, that it is absurd for us to hope for a second Newton, for someone able to enlighten us as to the genesis of a blade of grass? What is now to be made of Hume's having laboured to construct a Newtonian-style philosophy of human nature, of Berkeley's being persuaded that there is no extension other than that apprehended by perception, of the tasks Locke allotted to the under-labourer?

It was with questions like these in mind that we set about planning the Trinity Conference on Hegel's critique of Newtonianism, the proceedings of which constitute the contents of the present volume. The order in which the various topics are presented reflects the general lay-out of Hegel's *Encyclopedia*. At the conference, basic or universal principles, metaphysical issues, were covered in a series of general lectures, open to everyone, and these are to be

found in part one. Specific disciplines – mathematics, mechanics, optics and chemistry, were covered in a series of parallel sessions, and these lectures are to be found in parts two to six. As will be apparent from the present volume, it was decided when planning the details of the programme to aim at as comprehensive a coverage as possible. It was, therefore, the topics required which determined the invitations extended. Each was dealt with in two lectures, the first concentrating on the part played by this particular topic in the general history of eighteenth-century Newtonianism, the second on the treatment it receives within the Hegelian system.

In respect of this broad distinction between papers devoted to the discussion of basic principles and those concerned with specific disciplines, the Trinity Conference was similar to those held at Tübingen and Leusden. Unlike them, however, it was not concerned with the *Philosophy of Nature* as a whole, but simply with those sections of it giving evidence of Hegel's critique of Newtonianism. It is a matter of some importance, therefore, that in both the first and the following parts of the present volume, there should be so much evidence of common ground between Newton and Hegel. Time and again, in the course of criticizing the Newtonianism of his own day, Hegel won through to positions already established by the Newton who was then lost behind an aura of public acclaim, and who has since been revealed to us through the publication of his private papers.

The Trinity Conference was held at Newton's own College in Cambridge, at the end of August and the beginning of September, 1989. The setting certainly added to the tone of the proceedings. Professor Whiteside showed us around the library, pointing out the importance of some of the annotated volumes from Newton's private collection. Lady Huxley entertained us at the Lodge, and in the Master's Garden. For those who had never been to Cambridge before, it was a matter of uncommon interest to find the memorials to Bacon and Whewell in the College Chapel.

It was the *Istituto Italiano per gli Studi Filosofici* which encouraged me to take up the project, and which made the conference possible by meeting all the expenses. I am deeply grateful to them, and especially to Professor Antonio Gargano, who managed to keep the whole complex business of organizing such a meeting running smoothly. I hope that the present volume will prove to be worthy of the trust they have shown in me.

Rotterdam
November 1992

M.J.P.