

The eighteenth-century generation game

Christopher Lawrence

Matter, Life and Generation: Eighteenth-century Embryology and the Haller-Wolff Debate. By Shirley A. Roe. Pp.214. ISBN 0-521-23540-5. (Cambridge University Press: 1981.) £16, \$32.50.

AT FIRST sight the eighteenth-century debate on the nature of generation and embryological development might appear to have been a parochial affair. The path from fertilization to birth, however, was by no means a simple scientific conundrum calling for a straightforward empirical enquiry. As Professor Roe displays so clearly in this excellent book, generation was a hinge on which turned alternative cosmologies. Different theories of development brought into conflict incommensurable universes. Professor Roe has therefore used this particular study as a case history to illustrate some more general philosophical points about the nature of scientific enquiry and explanation.

In the eighteenth century there were two possible views on generation which were scientifically respectable. Preformationists held that embryos pre-existed in either the semen or the egg and these embryos in turn, like a nest of dolls, contained intact the next generation in their germinal material, and so on. This theory, first fully articulated by Malebranche in 1674, had considerable advantages over its rivals. The scientific revolution had virtually swept the intellectual field by the late seventeenth century. It left behind only matter, motion and — after Newton — force as the fundamental explanatory principles in the cosmos. Preformationism therefore explained the puzzle of why it was that the embryo developed in the way it did, rather than crediting the possibility that matter in motion could somehow give rise to organized material.

This latter eventuality was embraced by the epigenesists, who held that the embryo developed form and parts from where there

had been neither form nor parts before. The most famous epigenesists of the eighteenth century were Maupertuis, Buffon and Needham, and in the world of belles-lettres the philosopher Denis Diderot. All of these thinkers circumvented the problem of formal development by postulating that matter was innately active and not the passive servant of other forces. The preformation-epigenesis dichotomy therefore was not a simple scientific schism. Rather, on the one hand lay the divinely formed embryo, special creation, a meaningful universe, and thus a Christian cosmology and salvation. With epigenetic development lay chance, purposelessness, Lucretianism and extinction.

In the middle of the eighteenth century this debate was rekindled by the pious, Newtonian, Professor of Anatomy at Gottingen, Albrecht von Haller and the rationalist, upstart physician, Caspar Friedrich Wolff. Haller espoused preformationism and Wolff epigenesis, and for ten years they discussed the issue in print and in private correspondence. Two factors make the debate particularly interesting. First, they both conducted a great deal of detailed empirical research on the development of the hen's egg, attempting to discover or refute whether the chicken came first so to speak. The debate thus turned on complex technical questions such as the appearance of the heart, the gut membranes or the yolk sac vessels. Second, Wolff was no ranting atheist. Rather, he too was a deeply pious Christian, but one who had begun with his feet in quite different metaphysical starting blocks to those of Haller. For Wolff, the laws of motion observed by matter had been created by God in the first place. Thus, epigenetic development was, in a way, preformationism one stage back.

Professor Roe unfurls this dialogue, or rather these two monologues, and shows clearly that, given the metaphysical corners of the protagonists, neither was going to get near enough to strike a blow. Where Wolff saw a heart developing and new bits forming, Haller saw a previously transparent structure becoming denser, coloured and demarcated from its surroundings. Professor Roe reveals these aspects of the debate with faultless precision founded on superb scholarship.

What is disappointing, however, is that she stops short at either end of the argument. At the observational end she offers no discussion as to whether Haller and Wolff were interpreting differently the same data or whether they were actually seeing the world differently. Professor Roe never says whether Haller ever disagreed with Wolff's embryological drawings and denied that they represented reality, or whether Haller only disputed the meaning

of agreed observations. Neither is it clear whether Haller produced any drawings of what he saw. At the metaphysical end of the argument, Professor Roe seems to suggest her task is over when she has related a scientific debate to more general metaphysical principles. Having shown that the world rests on the back of an elephant, she neither asks if the elephant itself rests on anything or, if not, shows why her explanation of the Haller-Wolff debate might be sufficient once the metaphysics have been invoked. The epigenesis-preformationism debate is therefore still a somewhat circumscribed area in eighteenth-century science. After this book, however, historians will need to perambulate a much extended perimeter fence. □

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Battle over bacteria

G.D. Heathcote

The Fischer-Smith Controversy: Are There Bacterial Diseases of Plants? Phytopathological Classic No.13. Translated and prepared by C. Lee Campbell. Pp.65. ISBN 0-89054-014-4. (American Phytopathological Society, 3340 Pilot Knob Rd, St Paul, Minnesota: 1981.) \$8.50.

PROBABLY few plant pathologists will make the time to read this pamphlet, which consists of little more than seven review papers published in Germany between 1897 and 1901, but the American Phytopathological Society did well to publish it. Perhaps they did so because it has a plot which could not fail to appeal to the American spirit. It tells how Erwin Smith, originally a poor farm boy from Michigan, battled (with words only of course) against the academic might of the classically trained Alfred Fischer, once an unsalaried lecturer in botany at the University of Leipzig, at the time when plant pathology was almost a German science.

The debate as to whether or not bacteria can be the direct cause of disease in plants stimulated the two protagonists into making bitter and personal attacks against each other. Smith's statement regarding part of one of Fischer's lectures: "It is seldom in a genuinely scientific book that one finds so many unwarranted assumptions and serious misstatements in the space of a single page . . ." would undoubtedly have infuriated Fischer, and attacking Smith he wrote: ". . . after experiments of that kind . . . no one will think badly of me that I had not sought further statements in the American

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Chicken development — detail from Fabricius's *De Formatione Ovi et Pulli* (*Opera Physica Anatomica*, 1625).

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