A Clash between Naturalists

The Cuvier-Geoffroy Debate. French Biology in the Decades before Darwin. TOBY A. APPEL. Oxford University Press, New York, 1987. viii, 305 pp. + plates. $35. Monographs on the History and Philosophy of Biology.

This book comes at a good time, given the recent surge of research on the significance and dynamics of scientific controversies. Few such controversies have generated as much lasting interest and passion as this 1830 clash between Georges Cuvier and Etienne Geoffroy Saint-Hilaire, two already famous naturalists who had been close collaborators early in their careers and were still colleagues at the Muséum d'Histoire Naturelle. This debate in front of the Academy of Sciences lasted less than two months—and it is specifically dealt with by Appel in less than 30 pages—whereas the controversy, which became obvious around 1825, was kept alive till the death of Geoffroy in 1844, 12 years after that of his opponent.

It is significant that even with the publication of Geoffroy's major work, the *Philosophie anatomique*, in 1817–18 there was, according to Appel, only a "hint of dissension" between the two zoologists. However, by that time, Geoffroy's morphological approach was well known. In his 1807 papers, Geoffroy had attempted to establish the complete homology ("analogies" in his language) between the bones of fishes and mammals, not on the basis of shape or function, but on the basis of the connections of parts. Indeed the "principle of connection" was to become the key concept of his "*théorie des analogues*." In this regard, Geoffroy's morphological approach was basically and obviously different from that of Cuvier, for whom consideration of the "conditions of existence" of the organism and functional analysis provided the means by which subordination of characters and thence a natural classification were made possible.

These differences did not necessarily entail conflict; they might have been seen just as two ways of looking at the organism. This may explain why, as Appel emphasizes, Geoffroy's 1807 papers were met with a warm reception, even from Cuvier, who was for instance enthusiastic over the method of counting centers of ossification in the fetus; this is also why even the *Philosophie anatomique* was publicly welcomed by some of Cuvier's disciples and why the master himself, in his annual report as secretary of the Academy of Sciences, gave a fair if cautiously critical review of the book. Though in retrospect it seems that morphology, or "philosophical anatomy" as it was then called, threatened to displace functional anatomy, it clearly was not that obvious in the early years. Indeed, as Appel points out, "everyone, even Cuvier and his disciples, dabbled in it"; before 1820 Cuvier not only condoned but even encouraged the morphological approach.

What then precipitated the controversy? The "first break" came in 1820 when Geoffroy advanced the idea that the common plan of the vertebrates also obtained among insects. This for Cuvier not only was unacceptable because anatomically wrong; it was an almost personal aggression, since much of his reputation rested on his famous distinction between four *embranchements* in the animal kingdom, four totally distinct anatomo-physiological stystems, making untenable the doctrine of a single series of animals. Moreover, Geoffroy's morphological approach, which had even enticed the Cuvieran zoologists before 1820, was generating enthusiasm among the younger generation of French scientists in the 1820s. Now, clearly, Cuvier and Geoffroy were on collision courses intellectually and professionally. From 1825 on, the conflict was open. Geoffroy condemned the concept of "conditions of existence" as a remnant of the doctrine of final causes, hinted at the possibility of transformation of species by environmental factors acting teratologically upon the embryo, and claimed a central theoretical position for his concept of "unity of composition." Cuvier totally rejected that concept in 1825 and gave a long refutation in the first volume of his *Histoire naturelle des poissons* in 1828; he renewed his opposition to the idea of a series and asserted the superiority of a science of "facts" over the a priori speculations of would-be theoreticians. In articles on "Nature" the naturalists even opposed one another on their views of nature and on its relation to the Creator. As Appel says, by 1829 the two men found themselves divided on many levels, such as anatomical doctrine, methodology, metaphysics, and patronage; all the issues of the debate of 1830 had surfaced: "the battle lines were drawn." Nevertheless, without this debate, the skirmishes of the 1820s might have been long since forgotten. What then triggered the debate? After all, though many controversies come to be aired in public, a formal debate between contenders is not encountered in most cases.

Appel believes that Cuvier had been traumatically impressed by the experience of the French Revolution and that, in that politically volatile country, he "feared that speculative theories, most of which had a materialistic tinge, would be exploited in the name of science to undermine religion and promote social unrest." "Perhaps the impending Revolution was the critically important factor, for given Cuvier's anxiety about uprisings, the political instability of those months before the Revolution of July might have made it imperative that he once and for all destroy the basis of theories that he regarded as a threat to the well-being of society." To me this hypothesis is dubious at best.

As Dorinda Outram has shown, Cuvier was far from being the arch-conservative that his enemies depicted, and it seems farfetched to depict him as an intellectual warrior fighting for the reactionary Restoration monarchy. Moreover, the debate started in February 1830, five months before the Revolution erupted. Cuvier was not that prescient. Indeed, as Appel herself points out, when Pfaff, a friend of his youth, met him in Paris in July of 1829, "Cuvier assured Pfaff that France had settled down, and that there would be no more revolutions." And after all, if something was threatened by Geoffroy's ideas, it certainly was not the social order; it precisely was the would-be hegemonic Cuvieran programme.

After Dorinda Outram and Pietro Corsi, Appel rightly stresses that Cuvier had, from the mid-1820s, more and more to suffer challenges to his authority, and, as she aptly writes, with Geoffroy "a battle over concepts had also become a battle for disciples." This, I think, was crucial.

One has to distinguish what were the issues discussed and what was at stake. The issues opposing Cuvier to Lamarck had been no less profound, but Cuvier never engaged with him in a formal debate because Lamarck never seriously threatened his hegemony on the French biological scene. Geoffroy created a totally different situation: Cuvier's established authority and patronage power were at stake.

What triggered the debate was the presentation at the Academy of a paper by two young naturalists, Laurencet and Meyranx, who asserted, with support of Geoffroy, unity of composition between cephalopods and vertebrates. Cuvier seized the occasion and tried to win the contest by "sound argument," that is to say on a purely anatomical basis, on a plane where his expertise was best. The issues were debated through

alternated presentations of papers by the two zoologists. However, Geoffroy refused to restrict the discussions to Cuvier's agenda and widened the scope by including broader issues, among them final causes, facts versus theories, and evolution. The debate came to a close at the 5 April meeting when Geoffroy announced that he would no more reply: the polemics in his opinion did not clarify the issues and were becoming acrimonious.

While Cuvier has been generally recognized as having had the upper hand, Appel shows that no one really won the contest and that French naturalists in the 1830s and 1840s "reached an extraordinary degree of unanimity" and integrated both approaches in their zoological theorizing.

While Geoffroy more and more estranged himself from the professional community of scientists by his grandiose theorizing (he fancied himself as a natural philosopher completing Newton's synthesis and dabbled in physics) and by his direct appeals to the public, where he found substantial support, the debate soon took many guises and became a romanticized historical event laden with polymorphic significances, carefully chronicled and analyzed in the last chapters of the book.

Appel's is a much richer monograph than I have been able to convey here. It is the most thorough analysis we have of the controversy at issue; it will also no doubt become a required reading for historians of French biology in the first half of the last century, as well as for sociologists interested in unraveling the intricacies of scientific controversies.

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Dualisms

Medicine, Mind, and the Double Brain. A Study in Nineteenth-Century Thought. ANNE HARRINGTON. Princeton University Press, Princeton, NJ, 1987. xiv, 336 pp., illus. $39.50.

Brain function was one of the most important, yet one of the most murky, aspects of science in the 19th century. Exact measurements, ingenious behavioral tests, and innovative theorizing coexisted with crude vivisections, uncontrolled speculations, and violent arguments. Scholars are only beginning to understand the range of issues at stake. This book opens up one part of the history of brain physiology, namely, ideas concerning the cerebrum's dual nature. Like the early localization experiments, the book generates suggestive results; but also like those studies, it leaves the reader uncertain about the meaning of a seemingly rather arbitrary cut through a complex web of intellectual activity.

For two centuries following Descartes, physicians and philosophers agreed that the brain was a single, symmetrical organ. A few English medical writers, most notably Arthur Wigan in 1844, speculated that the two hemispheres were not functionally identical. But real interest in the subject only began in 1861, when the French pathologist Paul Broca argued that articulate speech could be localized in the third frontal convolution of the left hemisphere. Harrington describes the scientific context for Broca's work on aphasia, explains the broad implications he drew from it, and demonstrates his extensive influence on French neurology for the rest of the century. Broca, J.-M. Charcot, and their followers, seeking to demonstrate important functional differences between the two halves of the brain, blended sophisticated neuropathological tests with credulous descriptions of hysterics, hypnotics, and subjects supposedly under the unilateral sympathetic influence of metal disks. They believed that the tension between a rational left and an emotional right hemisphere could explain not only aphasia, hemiplegia, and double personality but also sex and race differences, religious enthusiasm, and supposed occult phenomena. Harrington is very effective in conveying the power of the double-brain concept in generating an amazingly varied range of "facts."

Enthusiasm for brain duality was localized in both time and place. Although the English neurologist John Hughlings Jackson relied on the concept for his complex theory of brain function and Freud drew on Jackson's insights in developing the psychoanalytic concept of repression, influence outside France was largely private and idiosyncratic. Furthermore, the subject all but disappeared from scientific awareness after 1920, as psychiatrists turned to psychological explanations and neurologists emphasized holistic brain dynamics. The scientific community that developed in the 1960s out of Roger Sperry's split brain experiments essentially rediscovered brain duality. This book is written largely for that audience, both to inform them about the tradition to which they belong and to caution them about the extent to which their field has been susceptible to "easy generalizations, philosophical pitfalls, and influences from extrascientific quarters" (p. 5).

Although Harrington persuasively describes the extent and peculiar nature of 19th-century work on the double brain, she is less successful in conveying the structure of scientific activity and its historical significance. Because she jumps rapidly between individuals and situations, extracting ideas relevant to brain duality, she neglects to explain how those ideas fit within the broader framework of physiological and neuropathological investigation. A more significant problem is her isolation of brain science from other intellectual concerns. She explains that scientific interest in the double brain arose from concern about the seat of the soul but ignores the extent to which the theory was and remained—in the words of one opponent—"a kind of psychological Manichaeism" (p. 151). Double-brain theory was one manifestation of the belief, central from Mani and St. Paul through Calvin and Jerry Falwell, that conflict between good and evil is inherent in human nature. Harrington reports without comment that Broca came from the small French Calvinist community; similarly, she notes in passing that Blaise Pascal, famous both as a scientist and as a fervent Calvinist, was described more than a century before Broca as lucid about events in the right half of his visual field but having a mad fear of "the abyss" on his left.

This is not to say Harrington ignores "extrascientific" influences. But she sees them as a separate sphere, introduced only when the properly scientific narrative reaches a dead end. As a result of this dualism, she misses what seems to me the most striking factor in the late-19th-century French obsession with brain duality. In Germany, united for the first time under the Prussian bureaucracy, most scientists described the brain as a set of functionally distinct departments; English medical writers, confronted with the psychiatric consequences of a class-based society, worried how the rational cortex could control lower, more primitive elements of the central nervous system. It was only in France, especially in the uncertain early years of the Third Republic, that anti-Catholic liberal scientists were determined to show that civilization and rationality resided necessarily on the Left, while decadence and mysticism were on the Right. Given the structure of language and the power of social interests, articulation of basic issues about human nature has always involved the blending of scientific and extrascientific concerns; the unresolved problem is to understand how particular sets of concerns have generated differently valued forms of science.

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