

MISCELLANEOUS.

RUDOLF VIRCHOW.

(1821-1902.)

In the recent death of Rudolf Virchow at the age of eighty-one, Germany has lost the most commanding figure of her scientific world. Virchow's activity embraced every field connected with the science of man, and his influence in social, political, and cultural domains generally perhaps exceeded that of any other scientific man of his generation. He was involved in the political troubles of 1848, having been removed from his position by the Prussian government; he was a member of the city council of Berlin in 1859; a representative in the Prussian House of Commons in 1862, a staunch champion of the *National-Verein*, founder of the *Fortschrittspartei*, etc., etc.; frequently he crossed swords with Bismarck in animated parliamentary debates, and from his pen flowed the famous word, *Kulturkampf*, which became the shibboleth of the most significant struggle in modern German politics.

Yet all this, and vastly more besides, was only Virchow's avocation. His real work lay in the sciences of medicine, anatomy, pathology, and anthropology. Born in Schivelbein, Pomerania, October 13, 1821, he first became famous as a professor of the so-called Würzburg school of medicine. He afterwards returned to Berlin, where he was to remain, and where he founded the famous Pathological Institute. The science of pathological anatomy as it is to-day owes in nearly all its parts its fundamental conformation to him, and the impress that he left on the science of medicine at large was no less deep. Physical anthropology and prehistoric archæology, especially in Germany, received immense aid from his researches and it is perhaps in this field that his name is widest known to the general scientific public. But his greatest achievement was the foundation of *cellular pathology*, and to his view of the nature of the animal cell we shall briefly refer, before proceeding to his well-known and often misinterpreted attitude toward the theory of evolution.

According to Virchow, every cell is born of a cell. Cells change in the organism, and may therefore be said to be variable; they possess, as Virchow phrased it, *mutability*. "From his point of view the whole question of the origin of species centers in the problem of the relation between the mutability of the organism and the mutability of the cell. The comparison of the forms of organisms and organs may form the starting-point of researches on variability, but the study of the variations of the whole organism or organ must be based on the study of the variations of the constituent cells, since the physiological changes of the whole body depend upon the correlated physiological changes that take place in the cells. Without a

knowledge of the processes that take place in varying cells, it is impossible to determine whether a deviation from the normal form is due to secondary causes that affect during their period of development organs already formed, or whether it is due to primary deviations which develop before the first formation of the varying organ. Two questions, therefore, arise: the first, whether secondary deviations may become hereditary. For this no convincing proof has been found. The second question is, whether primary variations do occur, and if so, whether they are hereditary."¹

Now, cellular research, Virchow claims, has given no satisfactory answer to these questions, and since problems concerning the origin of species and the forms of organisms must be determined by investigations concerning the mutability and general function of cells, therefore Virchow regarded any *definite* theory with regard to the descent of man as *speculation* and not as an assured scientific result. His attitude was one of extreme scientific reserve and caution; he withheld judgment; he did not disbelieve in evolution; he took the same stand in the interpretation of the Neanderthal skull, which he considered an individual variation, claiming it would be absurd to construct an entire race from a single cranium. He was hypercritical and conservative to a degree in science, and his attitude on these momentous questions contrasts strangely with his impetuous progressiveness and liberalism in politics. Broad and encyclopædic as his attainments were, he brought the spirit of the specialist to this problem and demanded that it should be solved by the specialist's criteria.

Virchow's position has been so admirably summarised by Clifford in his essay on the great scientist's famous address made in 1877 on "The Liberty of Science in the Modern State," that we cannot refrain from quoting it. Clifford says:²

"He [Virchow] recalled the early days of the Association, when it had to meet in secret for fear of the authorities; and he warned his colleagues that their present liberty was not a secure possession, that a reaction was possible, and that they should endeavor to make sure of the ground by a wise moderation, by a putting forward of those things which are established in the sight of all men, rather than of individual opinions. He divided scientific doctrines into those which are actually proved and perfectly determined, which we may give out as real science in the strictest sense of the word; and those which are still to be proved, but which, in the meantime, may be taught with a certain amount of probability, in order to fill up gaps in our knowledge. Doctrines of the former class must be completely admitted into the scientific treasure of the nation, and must become part of the nation itself; they must modify the whole method of thinking. For an example of such a doctrine he took the great increase in our knowledge of the eye and its working which has come to us in recent times, and the doctrine of perception founded upon it. Things so well known as this, he said, must be taught to children in the schools. 'If the theory of descent is as certain as Professor Haeckel thinks it is, then we must demand its admission into the school, and this demand is a necessary one.' And this, even although there is danger of an alliance between socialism and the doctrine of evolution.

"But, he went on to say, there are parts of the evolution theory which are not yet established scientific doctrines in the sense that they ought to be taught dogmatically in schools. Of these he specially named two: the spontaneous gene-

¹ Quoted from an article by Dr. Boas in *Science* for Sept. 19, 1902.

² "Virchow on the Teaching of Science," in *Lectures and Essays*, Macmillan, New York and London, second edition, p. 418.

ration of living matter out of inorganic bodies, without the presence of previously living matter; and the descent of man from some non-human vertebrate animal. These, he said, are problems; we may think it ever so probable that living matter has been formed out of non-living matter, and that man has descended from an ape-like ancestor; we may fully expect that evidence will shortly be forthcoming to establish these statements; but meanwhile we must not teach them as known and established scientific facts. We ought to say, 'Do not take this for established truth, be prepared to find that it is otherwise; only for the moment we are of opinion that *it may be true.*'"

Professor Clifford, then, in a thoroughgoing review of the situation discusses the nature of the evidence for the descent of man and shows it to be of equal validity with that on which the so-called "actually assured" results of science rest. The strength of this evidence is not apparent to infantile minds, and therefore it cannot, of its own nature, be taught to others than advanced pupils; but the *facts* can be taught to children in the schools, and if that be done the demonstration will arise later inevitably and of itself.

To us, of thirty years later, the discussion appears belated. But not so the question of the spontaneous generation of life, the adversaries of which have recently again reared aloft their grim-visaged heads. "Life from life, and from life only," is their cry. The eternity and indestructibility of life they have placed on the same footing with that of energy and matter. And the recent experiments on the viability of bacteria in very low degrees of cold and in very high degrees of heat have furnished them with unexpected straws of support. Yet Clifford's trenchant remarks still hold. "We can only get out of spontaneous generation," he says, "by the supposition made by Sir W. Thompson, in jest or earnest, that some piece of living matter came to the earth from outside, perhaps with a meteorite. I wish to treat all hypotheses with respect, and to have no preferences which are not entirely founded on reason; and yet, whenever I contemplate this

'simpler protoplastic shape
Which came down in a fire-escape,'

an internal monitor, of which I can give no rational account, invariably whispers 'Fiddlesticks!'"

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A propos of Clifford's essay on Virchow and his discussion of the ancestry of hoofed animals and the wiles of the devil in "salting" the geological strata with fossils to deceive mankind, we cannot omit repeating a little pleasantry recorded by him of a meeting of the great French naturalist Cuvier with his Satanic Majesty. The Devil is said to have appeared to Cuvier and threatened to eat him. "Horns? Hoofs?" said Cuvier. "Graminivorous. Can't eat me." "All flesh is grass," replied the Devil, with that fatal habit of misapplying Scripture which has always clung to him.

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We have merely indicated the salient features of Virchow's illustrious career. It would be impossible for us to enter here into the details of his life, or to make more than the merest reference to his myriad social and scientific achievements. His was one of the most versatile minds of the last century; he was one of the dictators of its scientific opinion; and, not least of all, he was a shining example of the devotion of a man of pure science to the welfare of his city and nation. His life was destined to great length and fullest fruition.

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