QUOTATIONS

FOOT-AND-MOUTH DISEASE

In view of the recent outbreak of foot-and-mouth disease in the Mississippi Valley, the most extensive as yet in the United States, a brief consideration of the principal features of the disease may be of interest. It is an acute, highly infectious disease, which occurs chiefly in cattle, sheep, goats and swine, though other animals such as the horse and dog, as well as certain wild animals are attacked also, and it may affect human beings. In animals it is characterized especially by the eruption of vesicles in the mouth and on the feet, in some species more in the mouth, in others more on the feet. It cattle the incubation period averages from three to five days, whereupon a moderate fever with loss of appetite and other general symptoms sets in. In two or three days small blisters appear on the lining of the mouth, and now the fever usually subsides. At the same time one or more feet may show tenderness and swelling of the skin, soon vesicles form here also, and the animal goes lame. In the mouth the blisters may reach half an inch or more in diameter, but usually they are smaller; the contents, at first clear, become turbid, and as the covering bursts, small painful erosions are produced which either heal quite promptly or turn into ulcers that heal more slowly. Usually the milk is altered and reduced in quantity; blisters and ulcers may form on the udder. There is marked loss of weight, as the animals do not eat because of the pain. In this, the ordinary form, in which the death-rate is very small except among the young, the symptoms fade away in from ten to twenty days or so, except when complicating local secondary infections delay recovery, but there are also severe forms with extensive infection of the respiratory tract and gastro-intestinal inflammation, which frequently end in sudden death. In such severe cases ulcers are found in the stomach and intestines. In sheep and swine, lesions of the feet predominate. The disease is transmissible to the fetus in utero.

The cause of the disease is present in the contents of the vesicles, the discharges from the ulcers, the saliva, the milk, the urine and feces, but as a rule not after the tenth day. It is stated that animals having had the disease may carry the virus for months.[1] Any susceptible species may infect any other susceptible species. Infection occurs not only through direct contact, but also indirectly, as the virus retains its virulence for some little time, at least outside the body. Contamination of fodder, of stalls, of feeding and drinking troughs, of milk and milk products and of the hands and clothes of drovers serves to spread the disease, which often travels over wide stretches of country with remarkable rapidity, as shown by the present outbreak. As from 25 to 50 per cent. of the cattle exposed to infection may become sick, there results great loss from fall in the production of milk, from reduction of vitality and fecundity, and from deaths as well as on account of the measures adopted to stamp out the epizootic.

The immunity produced by an attack seems to be feeble, as animals are said to suffer sometimes more than one attack within a short time. So far no practical method of protective inoculation has been developed.

Our knowledge of the cause of foot-and-mouth disease is limited to the fact that it concerns a filterable virus, as yet invisible and incultivable. It was in 1897 that Löffler and Frosch made their classical experiment, showing that the disease is caused by a living, proliferative virus that passes filters which do not permit bacteria to go through, an experiment that has served as a model for all the subsequent work on the many other forms of filterable virus recognized since then. Foot-and-mouth virus may remain active for months if kept cool and moist, but is destroyed rapidly by drying, by heat at 60° C. (140° F.) and above, by formaldehyd and by phenol (carbolic acid). The wide range of virulence of this virus among animal species has been indicated, and as stated, the disease may affect human beings, especially children, being transmitted by milk from diseased cows (experimentally verified) and by butter and cheese made from such milk as well as through

[1] Moore, "The Etiology of Infectious Diseases in Animals," 1906.

wounds and in other ways. While the course usually is favorable, an epidemic described by Siegel had a mortality of 8 per cent. The manifestations are fever, digestive disturbances and vesicular eruption on the lips, the oropharyngeal lining ("aphthous fever") and sometimes on the skin. Where there is danger of contamination of the milk with the foot-and-mouth virus, thorough pasteurization of all milk and milk products is doubly indicated.—*Journal of the American Medical Association.*

SCIENTIFIC BOOKS

Perception, Physics and Reality. By C. D. BROAD, M.A., Fellow of Trinity College, Cambridge. Cambridge University Press. 1914. Pp. xii + 388.

The essay of Mr. Broad is the outgrowth of a dissertation presented to Trinity College, Cambridge, at the examination for fellowships. As now published it is an enquiry into the information that physical science can supply about the real. Evidently the speculative tendencies of recent science have attracted the attention of philosophers, and to some extent their envy. As Mr. Broad says: "When a certain way of looking at the universe meets with the extraordinary success with which that of physics has met it becomes the duty of the philosopher to investigate it with care; for it is likely to offer a very much better cosmology than his own unaided efforts can do." This success is due to the fact, he thinks, that most scientists start from a position of naïf realism. The only successful rival, at the present time, to this realism is the phenomenalism which has resulted from the work of Mach and his followers. And this phenomenalism which holds that the objects of our perceptions are non-existent except when they are perceived is not according to Mr. Broad, an adequate foundation for a scientific system. He thus disapproves of the modern physicists who are regarding energy and electricity as entities rather than as attributes.

The essay begins with a discussion of the arguments which have been advanced against naïf realism, and after weighing the evidence he comes to the conclusion "that none of these arguments which are so confidently repeated by philosophers really give conclusive reasons for dropping even the crudest kind of realism." Since it is difficult to advance in science without a belief in some law of cause and effect, he next discusses the arguments which philosophers have advanced against causation. This is followed by chapters on the arguments for and against phenomenalism and the causal theory of perception. The essay closes with a comparison between Newtonian mechanics and the so-called new mechanics which is based on variability of mass with speed. Mr. Broad is quite conservative, for while he does not say that the principles of mechanics which have become classic may not require revision from time to time, yet "the more general laws will still be laws about positions and velocities of some extended quality or qualities, and, as such, will be capable of the same sort of defence that I have offered for the traditional mechanical physics." His opinion is not of great value to the physicist who is not asking for a defence of traditional mechanical physics but who is much worried about the nature of "some extended quality or qualities" which has position and velocity. He is anxious to know whether it is matter, electricity or energy.

The philosophical method of Mr. Broad is that of the neo-realists and he owes much, as he acknowledges, to the lectures and conversation of Mr. Bertrand Russell. His point of greatest departure from Mr. Russell's teaching is perhaps the substitution of the criterion of probability for certainty. This is to make philosophy approach more closely to science. As he says in his introduction: "I have constantly put my conclusions in terms of probability and not of certainty. This will perhaps seem peculiar in a work which claims to be philosophical. It seems to me that one of the most unfortunate of Kant's *obiter dicta* is that philosophy only deals with certainty, and not with probability. So far is this from being the case that to many philosophical questions about the nature of reality no