

among important causes of the destruction of birds "the attentions of that trio of self-styled bird lovers, the gamekeeper, the bird catcher, and the ornithologist." Surely this derogatory classification of ornithologists is unjustified in Great Britain as we know it would be in this country. Most ornithologists are true bird lovers, and their collecting of specimens, on the whole, is considerably regulated. Moreover, it should not be forgotten that it is only because of collecting, and the labors of ornithologists that the facts of economic ornithology were brought to light, and that it is upon these that the whole structure of bird protection rests.—W. L. M.

Birds in Relation to the Foot-and-Mouth Disease of Cattle.—The recent outbreak of foot-and-mouth disease in California, although quickly put under control and prevented from spreading, caused excitement throughout the far western states. Since cattle-raising is one of the most important industries of the region apprehension among the people was no more than was to be expected. Numerous proposals for curbing the disease, however, were based on speculation only and among them were some affecting birds. At the original center of the outbreak a demand arose for a general poisoning campaign against Blackbirds and certain other species which were thought capable of distributing the disease. In Arizona, it was proposed to establish a guard near the California line, one of the duties of which would be to shoot all Buzzards and other carrion-feeders attempting to come across. Washington appealed for an open season on "pigeons, crows, and other scavenger birds" that might carry the disease to that State in migration, and so on.

Before action was taken on any of these suggestions, however, cooler counsel prevailed and no campaigns against birds, of any great extent at least, materialized. Investigation by representatives of the Biological Survey and others in the heart of the infected district yielded no positive evidence that wild birds distribute the disease. This has been the net result of previous investigations also and until we know definitely what rôle birds play in relation to the disease, clamor for bird destruction based on insufficient knowledge will recur. We are informed by Dr. J. R. Mohler, Chief of the Federal Bureau of Animal Industry, that in the general outbreak of 1914, when 22 states and the District of Columbia were infected by the disease, considerable time was given to tracing out its various sources of infection, and that at that time among the birds the Crow seemed to have been the chief suspected carrier and that "a careful study of its habits by a number of inspectors brought out some interesting facts in this connection. In one instance a flock of crows was followed by telephone and automobile for a distance of 35 miles. The habits of these birds in flying from place to place, alighting in cattle and hog yards and running over the ground, picking up small bits of manure or litter upon their feet, showed that they may become carriers of such an intensely infectious disease. However, in the 3,556 herds infected in 1914, the birds (and crows particularly) were incriminated in only a few cases, as follows:

Iowa 3, Kansas 2, Michigan 1, New York 3, Ohio 2, Pennsylvania 3, Wisconsin 4."

Incriminated in this case means suspected, for to this day there has been no adequate investigation of the means of spread of foot-and-mouth disease, and statements as to their identity and importance reflect opinion more than anything else. The inadequacy of the ordinary observational approach to this problem is shown by a recent English paper¹ on the subject. The authors, one a distinguished veterinarian and the other experienced in ornithology, conclude that "There would appear to be most remarkable relations, both as regards seasons and localities between the movements of birds and the initial outbreaks of invasion in foot-and-mouth disease in Great Britain" (p. 693).

However, Mr. A. Landsborough Thomson, an eminent British naturalist, after a careful examination of the data upon which this dictum is based does not consider² the correspondence between the two sets of phenomena, when examined in detail, so remarkable as the authors contend, and here the reviewer, upon inspection of the maps and other information given, certainly shares this opinion.

The most striking thing about the whole subject of the relations of birds to the foot-and-mouth disease is the lack of definite evidence. From the standpoint of cure of the malady as well as of preventing its spread, rigidly controlled experimental investigation of possible carriers would seem most desirable. When the relation of the tick to Texas fever of cattle was discovered, the way was opened for control and extirpation of that pest of southern livestock. Similarly, when the rôle of the yellow-fever mosquito became known that disease lost its terrors. Until adequate investigation of alleged bird carriers of the foot-and-mouth disease is made, at every recurring outbreak we shall be in the same position of uncertainty as now, and the hysteria of the public will continue to be matched by the ignorance of scientists. Mr. Thomson strikes a hopeful note in his final sentences when he says that "Sir Stewart Stockman is now experimentally investigating the possibility of the infection being carried by birds. The question remains open, and further research may well be useful." He then concludes as to birds carrying the disease (and it would seem that the conclusion is applicable in the United States as in England), that the "evidence put before us does very little towards establishing a *prima facie* positive case."—W. L. M.

Economic Ornithology in Recent Entomological Publications.—As the results of research accumulate it becomes more and more evident that practically all insect pests have their bird enemies. Intensive study

¹ Stockman, S., and Marjory Barnett. Bird Migration and the Introduction of Foot-and-Mouth Disease. Journ. Ministry Agr. (London), 30, No. 8, Nov., 1923, pp. 681-695, 6 maps.

² Bird Migration in Relation to Foot-and-Mouth Disease. Nature, 113, pp 52-54, Jan. 12, 1924.