

BEE DISEASE.

IN the article which appeared in NATURE of August 23, 1917 (vol. xcix., p. 507), upon the above subject, it was pointed out that, as popularly used at all events, the expression "Isle of Wight disease" connotes not so much a disease as a group of diseases, due to different organisms. The cause of this misuse of the term is the inability of the honey-bee to express otherwise than by certain simple means the changes wrought on its system by the introduction of various parasites or poisons. The symptoms which are noticed by lay observers, when bees are suffering from any severe attack, are hastily assumed to be characteristic of "Isle of Wight disease," and the appearance of such symptoms in another colony is considered sufficient evidence that the same disease is present.

As a result of this misconception thousands of cases have been diagnosed as "Isle of Wight disease" merely because "crawling" or dysentery has been observed, while the dwindling of the colony or the death of the entire stock has often been accepted as conclusive proof without any trouble being taken to ascertain whether some other influence has been at work. If the honey-bee were a dangerous pest, the extirpation of which was desired by man for economic reasons, this unwarranted assumption might be of comparatively little importance, but in the case of a highly valuable insect, one of the very few which are of direct service to man, and which it is to his interest to keep alive, the error of thought leads to serious consequences. It appears to have led some scientific workers to the conclusion that *Nosema apis* is not the cause of any bee disease, just as it has led unscientific observers to the belief that "Isle of Wight disease" must be the cause of every case of extensive mortality in their apiaries, when no other obvious explanation is forthcoming. From every point of view, therefore, it is desirable that it should be universally recognised that bees are liable to many diseases, though their macroscopic symptoms are almost, if not entirely, identical, and that the only satisfactory definition of "Isle of Wight disease" is "the disease caused by *Nosema apis*." Bee-keepers should also realise that the presence of this parasite can be determined, in our present state of knowledge, only by the examination of the affected organs of a bee under a microscope of high power. As it has been objected to this definition that certain bees of great resistant power may harbour *Nosema apis* in their intestines without apparent ill-effects on their system, a further definition is needed, and either it must be admitted that every bee in which the parasite is found is scientifically "diseased," or a distinction must be drawn between actual and potential disease, since it is believed that, in certain circumstances, even resistant parasite-carriers may suddenly, and without ascertainable cause, sicken and succumb to an attack.

The importance of this definition of "Isle of

Wight disease" becomes clear when its bearing on scientific research into the treatment of bee diseases is considered. During the last six or seven years several remedies or preventives have been tried, and reports on the results of the experiments published in the journals devoted to bee culture. First it was a coal-tar preparation, then a compound of several well-known and powerful antiseptics, then peroxide of hydrogen, and at the present time "Flavine" is being widely recommended. Each of these remedies has had its vogue for a time, and the columns of the technical Press have been filled with enthusiastic testimonials from bee-keepers who have tried them with apparent success, only to be followed at a later date by letters from other bee-keepers who have completely failed to get any good results from their use. It is not suggested that any of these testimonials were other than genuine, but in view of what has been stated above it is at least regrettable that in no case that can be traced has the experimenter taken the trouble to ascertain by microscopical examination whether *Nosema apis* was present in the intestines of any of his bees, or, in other words, whether his colonies were really affected with "Isle of Wight disease" at all. The result of such treatment may be satisfactory to the owner of the bees, but it can have no bearing on its value in other equally undetermined cases of sickness.

The neglect to ascertain beforehand whether the causal organism of "Isle of Wight disease" is actually present when the experiment is begun must also invalidate the results in another way. So long as the parasite is present even in a more or less quiescent state, the affected bee is liable to an attack of "actual disease," and complete success cannot be claimed for any treatment unless it can be shown that after a considerable lapse of time the treated bees are free not only from the symptoms of sickness, but also from the parasites which may cause a fresh attack. In many cases statements as to the efficacy of this or that drug have been made within a few days, and even a few hours, of its application, though it is well known to all who have had any experience of bee diseases that bees respond very readily to a stimulus, and may under its influence reassume the appearance of perfect health for a time. The recovery, however, seldom lasts for long, and the influence of the stimulus declines progressively. Results should not, therefore, be published until after a delay of several weeks, during which time the bees should be carefully examined, and as the susceptibility of bees to "Isle of Wight disease" is greatest in the winter it would be better always to postpone judgment in every case until the spring, when the activity of the bees affords presumptive evidence of a cure. Nothing, however, but a careful microscopical examination of several specimens of the treated bees is sufficient to justify the confident statement that a cure has been effected.

Further investigation into "Isle of Wight disease" is urgently needed, but it should proceed

on ascertained facts, and in the main should be devoted to the discovery of a method whereby the infection of the bee by the protozoon *Nosema apis* can be prevented or remedied, and the test of the success of any experiment to cure an affected colony must include, first, the determination of the presence of the causal organisms; secondly, the elimination of any other influence; and, finally, the proof of the freedom of the colony from the parasite after a considerable lapse of time.

THE DAMAGE TO AGRICULTURE BY VERMIN AND BIRDS.¹

THAT farm vermin and certain wild birds annually commit an extraordinary amount of damage to agriculture and agricultural crops has long been recognised, and the need for more careful and systematic study of the subject has been frequently dwelt upon in these pages. The personal opinion held by "landowners, sportsmen, farmers, rat-catchers, and naturalists," as well as by a large class of bird-lovers, is really of very little moment. Anyone who has had to sift the evidence obtained from such sources knows how thoroughly untrustworthy and misleading it usually is. It is now universally recognised that a very definite and careful procedure is necessary, carried out by experienced and well-trained workers, if one wishes to arrive at a trustworthy and just conclusion respecting the economic status of any wild animal.

During part of 1916-17 an inquiry was undertaken upon this subject under the auspices of the Oxford School of Rural Economy in the counties of Oxfordshire and Norfolk. The method of inquiry will, we feel sure, strike every economic ornithologist, or, indeed, anyone versed in investigating the economic status of any wild animal, as peculiar, if not unscientific. The whole of the data here collected are practically obtained from local sources, viz. the opinions of "landowners, sportsmen, farmers, rat-catchers, and naturalists," and innumerable quotations from various newspapers. True, there are a few references to the writings of Tegetmeier, Gurney, and others, but the bulk of the work that has been done during the past twelve or fifteen years seems to have been ignored. Surely the conditions existing in the two above-mentioned counties do not differ so materially from those in all other counties as to make the results of such investigations superfluous to the farmers of Oxfordshire and Norfolk.

Dr. Gunther would, we feel certain, strongly deprecate such a method in any other biological inquiry. All investigators know how exceedingly difficult it is to arrive at a just conclusion with reference to the feeding habits of any particular species of wild bird and to be able to state definitely whether or not it is beneficial or injurious. To weigh the evidence rightly, long experience in such work is imperative, and whilst the author of this report has no doubt brought together much

material that is interesting, it is not such as could be introduced into any scientific inquiry upon the subject, and it carries little, if any, conviction.

What this correspondent thinks or what that one has seen is really of very little importance, and, so far as the species of wild birds are concerned, only a prolonged inquiry, by an experienced investigator, upon the data obtained from numerous stomach and crop contents, as well as careful field observations, will ever prove of any practical service.

The only really valuable item in the whole report is that with reference to the pheasant, and, curiously, this is largely based on the careful investigations of a member of the Cambridge University School of Agriculture, Miss A. F. C.-H. Evershed. The much-maligned pheasant does not support existence upon a diet of mangels, in spite of weighty statements to the contrary. Miss Evershed and others have shown that unless excessive numbers of birds are kept upon a small area, it is distinctly beneficial to agriculture. Dr. Gunther directs attention to the fact that on some estates where many pheasants are reared there is an absence of wireworm, whereas on others where there are no pheasants wireworm is found in abundance.

In many cases the information given is exceedingly scrappy, e.g. in the case of the wild goose, the gull, the crow, the jackdaw, and the lark. As regards the author's conclusions, they do not materially differ from those that have been before the public for some years. We do not think that such reports as these are likely to enhance the reputation of the Oxford School of Rural Economy in the eyes either of the agriculturist or of the more restricted world of science; moreover, in our opinion, they are to be deprecated, as the work is based, not on "the solid ground of Nature," but on a loose and very heterogeneous mass of details obtained from sources not always trustworthy and free from prejudice.

Finally, if the report were intended for the instruction and benefit of farmers, surely a summary of the results obtained elsewhere, from exhaustive inquiries on large numbers of each species, during different months of the year and from various counties, should have been given.

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NOTES.

FROM the *Scotsman* of March 13 we take this interesting illustration of the intervention of biological Providence in Scotland. "On a recent week-end there was a remarkable run of salmon in one of the Border rivers. The fish ascended the cauld in large numbers, and in the shallow water on either side it was a matter of no difficulty to seize some of them as they made the passage. The spectacle of so many fish passing to the upper waters led to a general relaxation of the ordinary conditions. On one of the days of the week-end, men, women, and boys could be seen in the water up to the knees and armed with gaffs. The operations of those actively engaged were watched by large crowds on the banks. The natural instinct for capture, aided by the food stringency, became so

¹ "Report on Agricultural Damage by Vermin and Birds in the Counties of Norfolk and Oxfordshire in 1916." By R. T. Gunther. Pp. 92. (Oxford University Press, 1917.) Price 2s. 6d. net.