to the botany of each district, but a general sketch of the distribution of the flowering plants, at any rate, should have been given in this "Guide." The island would afford excellent scope for a botanical survey, on the lines of the well-known work done by Dr. Smith, Dr. Moss, and other ecologists, in various parts of Britain. It is greatly to be hoped that in a future edition of, or supplement to, this "Guide" it will be found possible to include a chapter on plant distribution, with a vegetation map of the island, and, for comparison and correlation, a geological map. This would, if carefully done, preferably by an ecologically-minded botanist residing in the district, undoubtedly enhance the value of the book and secure for it more than the local interest that attaches to a merely floristic work.

Photo.] [*H. F. Poole.*

FIG. 2.—White Stork—a rare visitor—captured at Shorwell in 1902. From "A Guide to the Natural History of the Isle of Wight."

The second suggestion we venture to make, with reference generally to books similar in scope to this "Guide," is that most of the systematists responsible for the various lists of plants and animals given in local naturalistic compilations would do well to obtain the cooperation of a biological botanist or zoologist when writing their prefatory remarks on the group of plants or animals they are dealing with. So far as this "Guide" is concerned, we refer chiefly, as examples, to the sections dealing with some of the cryptogamic plants. It would be far better for the average cryptogamic systematist to pass straight on to his list and say nothing whatever about the life-history and development of his group than to write a string of incoherent and inaccurate sentences, repeating and perpetuating long since exploded errors and mare's-nests. Lichenologists, we know, are a stiff-necked generation, but surely it is time they hesitated to record in print their refusal to recognise the dual nature of the lichen thallus, which has been fully and finally established. There can be no excuse, either, for the hepaticologist who tells us that the liverworts are "linked to the lichens" by means of their thalloid forms! The account of the relationship between the liverwort Frullania and the rotifer which sometimes occupies its pitchers is entirely imaginative. The list of hepatics (liverworts) is conspicuous by the omission of several species which are certainly found in the island, and often abundantly in places, such as *Anthoceros laevis, Scapania nemorosa,* and *Lepidozia reptans.*

The articles by Mr. G. W. Colenutt (geology), Mr. P. Wadham (fishes, mammals, &c.), and Mr. R. H. Fox (birds) stand out as refreshing oases in the arid desert of species lists, being written in a "nature-study" spirit which can hardly be said to characterise the work of the other contributors. The "Guide" is illustrated by twenty-six excellent plates, chiefly from photographs by Mr. H. F. Poole, two of which we are permitted to reproduce here. F. C.

SLEEPING SICKNESS.[1]

IT may be taken as definitely established that sleeping sickness is due to infection with a trypanosome (*Trypanosoma gambiense*), and that this trypanosome is conveyed by a tsetse-fly (*Glossina palpalis*). But if we proceed to analyse and extend this proposition we soon get into difficulties. We do not know for certain whether man is the only "reservoir" of this trypanosome, or whether monkeys and other mammals, especially native dogs, can also harbour it. Should this prove to be so—though the balance of evidence is against the supposition—it must materially affect prophylactic measures. If we consider next the mode by which the trypanosome is conveyed we find ourselves in the midst of the most conflicting evidence. It is still uncertain whether the transmission is mechanical or whether there is a cycle of development[2] of the trypanosome in the fly; facts appear to be all in favour of the first view, analogy all in favour of the latter. Nor is the question a purely academical one, for if the transmission is mechanical, then the flies are no longer infective after the infecting reservoir (man) is removed; if, however, there is a cycle of development, then it remains to be determined how long an infected fly can remain infective after the infecting source is removed.

If, again, we consider the question, Can sleeping sickness be conveyed by any other species of tsetse-fly than *Gl. palpalis*? we must confess our ignorance. The balance of evidence certainly seems to be against the possibility, but should it be shown that other species can convey the disease, then the question of prophylaxis would be even more difficult than it now is. These reports show that these are some of the questions that urgently need solution, but there are others of equal importance which arise in the immediate carrying out of prophylactic measures. They concern the fly itself, its habits, duration of its life, its breeding grounds, its food, its powers of flight, its likes and dislikes in regard to foliage, trees, shrubs, grass, &c. These questions are all important, and

[1] "Reports of the Sleeping Sickness Commission of the Royal Society." No. ix.

[2] The existence of such a cycle is now practically established by the recent work of Kleine confirmed by Bruce.

in our opinion it is imperative to appoint one or more officers with special entomological knowledge to study these points minutely. It is true that these reports afford evidence that the officers concerned in these investigations have made additions to our knowledge on these points, but the other duties of these officers are so multifarious that valuable time is being lost through this defect. It is true also that in the epidemic in Uganda the condition of things is so terrible that it is impossible to wait for the solution of all these questions, however important, before any action is taken, and we may now consider what, with the present available knowledge, is being done to check the epidemic. The means of prophylaxis may be considered under three aspects:—(1) Those directed against the fly; (2) those directed against the carrier of the trypanosome, *i.e.* man; (3) those directed against the trypanosome itself.

(1) With regard to measures directed against the fly. It has been found, and it is a matter of the highest importance, that the "natural range" of the fly, *i.e.* the distance to which flies follow from water in search of blood, is, as a rule, under 50 yards. The still more important fact has been determined that clearing and burning or removing the undergrowth for a distance of 100 yards in either direction, *e.g.* from a ferry for a strip 50–100 yards broad, has the effect of banishing the fly. It is this method, then, *i.e.* banishing the fly by clearing from its "normal fly range," that is the basis of the methods now being carried out in Uganda. It is not necessary to clear extensively around a village, but simply to clear comparatively small strips of the "fly range" frequented by man. Although flies may occur in the village itself, unless there is a "fly area" present these flies are those which have followed their victims beyond the "fly range" to the village. If the flies of the "fly range" are banished, then, *ipso facto*, the "following" flies also disappear. A typical fly area, though there are exceptions, consists of more or less open water with contiguous and especially overhanging shade and generally a fairly well-defined bank or shore. If, then, clearing can permanently banish the fly, and we believe that this will be found to be the case, because the fly still has plenty of uncleared area to frequent—though the fact that its human blood supply is at the same time removed may modify the result—it is an important measure of prophylaxis, though its value is perhaps restricted to somewhat small areas and special conditions.

If the fly cannot be removed by clearing, then the population must be deported from the vicinity of the fly. This measure has been extensively carried out in Uganda by the removal of populations from the lake to inland fly-free areas two miles away, to prevent traffic from the lake, which is responsible for the great bulk of the infection; but in many cases there are serious difficulties in the way. Further, the removal of populations still non-infected from a potentially dangerous fly area to a safe fly-free area would be of the greatest importance, and would form a more striking object-lesson to the native of the value of these measures than the removal of an infected population, because a certain, probably high, percentage of these latter will eventually die of sleeping sickness, although in a safe area; whereas this would not be the case if the population removed was non-infected.

(2) As the two measures, clearing and deportation, of the healthy, are undertaken with the object in view of preventing access of the fly to man, so segregation of the sick prevents fresh infection of the fly, and diminution of the infectivity of the fly in a fly area. This implies the removal of the sick of a village to another village or camp in a fly-free area, and it is important to note that such areas are numerous, and may often be only a few hundred yards away. Fresh infection of the fly is also avoided by preventing the removal of infected natives to uninfected fly areas. The applicability of this measure depends mainly upon the "attitude" of the native.

(3) Measures directed against the trypanosome itself, *i.e.* the treatment of infected persons, are bound up closely with the segregation of the sick. The treatment of the segregated in fly-free areas by atoxyl or other arsenic preparations is the only one that is at all effective, but it must be admitted that the results are disappointing, and that the good results of the drug are in many cases only temporary. The patient's blood becomes free from trypanosomes (and presumably non-infective, though this is not proved), and so the chance of infection of the fly, if patients come in contact with fly areas, becomes less.

Time will show how far these measures, the numerous important details of which we have to leave unconsidered, will be successful. Those engaged in carrying out these arduous and dangerous measures have hope that although sleeping sickness may not be eradicated or the fly totally annihilated, yet that the epidemic will soon be under control. It must be the sincere wish of everyone that this hope may be justified.

J. W. W. S.

THE CONTAMINATION OF MILK.

THE contamination of milk has been the subject of a detailed research by Dr. Orr, carried out on behalf of the councils of the county boroughs of Bradford, Hull, Leeds, Rotherham and Sheffield, and the administrative counties of the East and West Ridings of Yorkshire. Of previous investigations, Delépine concluded that though his results did not exclude the possibility of infection at the home of the consumer, or during transit from the farm, they did indicate that infection at the farm, or through vessels infected at the farm and used by the farmer for the storage and carriage of milk, was of paramount importance. On the other hand, Newsholme attaches little importance to infection at the cowshed. Dr. Orr's investigation was carried out in a systematic manner, and not only were the bacteriological examinations carefully performed, but, in addition, the condition of the cows and cowsheds and the effects of season and atmospheric temperature were noted. First, the bacterial content of the milk in the udder was estimated, and it was found that the fore-milk (that first milked) contained from 18,000 to 48,000 microorganisms per cubic centimetre, and the milk after the removal of the fore-milk 890 to 4800 per cubic centimetre.

It is generally agreed that the milk as secreted is sterile, the microorganisms in the milk as drawn being derived from lodgment and multiplication in the teats and cistern.

Dirt on the udder is a fruitful source of contamination, and, during milking, dust, &c., from the udder adds much to the bacterial content of the milk. Dust in the cowsheds, and the entrance of dirt during transit and delivery, further add to the contamination, so that the milk, when it reaches the consumer, may contain an appalling number of microbes. The chief conclusions derived from Dr. Orr's work are:—

(1) Of the total organisms in the milk used by the consumer, the greatest number are contributed by the farmer. During railway transit, at the retailer's premises, and in the consumer's house, smaller amounts are added, the amount in each instance being apparently about the same.

(2) Of the glucose-fermenting or intestinal organisms and the streptococci, by far the greatest number are added