the verdict strongly in favor of the sparrows as an important natural check upon the growth of noxious weeds. Says Dr. Judd: "When the food of the native sparrows is divided into the three classes .... the neutral part proves to be small, not exceeding a third of all that is eaten; the injurious part very small; and the beneficial part much larger than that of most birds, and from five to ten times as great as the injurious part. We may therefore safely conclude that, as a class, these small birds are well worthy of our protection." The greater part of the first fifty pages of this important and very interesting paper are devoted to an account of the author's methods of investigation, and the general subject of the food of sparrows and its effect on agriculture, while some forty pages treat of the food of the species individually. Several pages are given to the European House Sparrow, with the conclusion that there is little to be said in its favor. "Its insectivorous habits are creditable, as far as they go, but they are insignificant, because the diet is almost exclusively vegetable; and while it is in the vegetable fare that the value of most sparrows consists, yet in the case of the English Sparrow the damage to grain far overbalances the benifit of weed-seed destruction. Adding to this the injury it causes to buildings and statues in cities, there is no escape from the conclusion that the bird is a serious pest the extermination of which would be an unmixed blessing."

It is to be hoped that Dr. Judd's convincing report on the economic value of our native sparrows will have a wide distribution. — J. A. A.

Bonhote's 'On the Evolution of Pattern in Feathers.'[1] — Mr. Bonhote's paper is highly speculative and not easy to comprehend, nor does he himself appear to be very clear as to just what points he believes he has even tentatively established. Toward the close of the paper he says: "My object has rather been to show that all the many and diverse markings on the feathers of birds are in the main variations of one type, namely: a longitudinal stripe with great tendency towards lateral expansions into transverse stripes, and that on modifications of this, by suppressing one portion or increasing another, all the various patterns have been built up..... The main question that now remains to be answered is that relating to the method in which the pigment groups itself to form these markings, but that is a matter which I hope to be able to investigate when dealing with the question of colour-change..... To sum up .... it should be noted that the most exposed portions of a bird, generally the upper parts, undergo a further evolution than those less conspicuously situated, and if there be any difference between the sexes, the male shows the higher form."

He takes, primarily, in illustrating his theme, the European Sparrow Hawk (*Accipiter nisus*), his plate (pl. xix) giving "diagrammatic" but

[1] On the Evolution of Pattern in feathers. By J. L. Bonhote, M. A., F. Z. S. Proc. Zoöl. Soc. London, 1901, pp. 316–326, pll. xix, xx.

"accurate representations of actual feathers" from this bird, taken, however, in each case, he says, "from different birds, and that I have no proof of the pattern on any individual feather being changed as some writers (*cf.* R. B. Sharpe, P. Z. S. 1873, p. 44) have suggested: it may be so, or it may not, but that contingency has not been taken into account in this paper."

He sets out with the hypothesis that "the most primitive feathers were entirely colourless, or of a dull dingy grey, the first trace of a pattern being a longitudinal stripe of colour down the rachis. Possibly the feathers of some species become self-coloured without undergoing any pattern stage, but this is doubtful; and in the majority of self-coloured birds, even when white, the self-colouration has been subsequently assumed. The self-coloured feathers are those in which it is most difficult to fix the period of evolution...." There is much more in this line, but Mr. Bonhote fails to tell us how we are to distinguish 'self-coloured feathers,' or in what the process of 'self-colouring' consists, whereby, apparently, a striped or barred feather may become white, or of some uniform dark shade. Evidently he still believes in the increase, or decrease, or entire rearrangement of pigment within the grown feather; but even from this point of view we fail to see how he has thrown any real light on the evolution of the pattern of feathers.

The facts in the case are: in birds which undergo a series of changes in color, in passing from first to mature plumage, there is often, or usually, a color pattern in the young bird very different from that of the adult, with sometimes intermediate stages different from either. If the *same feathers* were worn throughout these changes there would be some basis for a theory of "evolution of pattern in feathers"; or rather, there would be no need of any theory at all, for the evolution would be a matter of simple aud easy observation. As a matter of fact, however, such an evolution of pattern is impossible; the juvenal plumage of a bird, with its particular pattern of markings, is one thing; the postjuvenal, with a different pattern is another; and so on with subsequent plumages till the mature pattern is reached. Each moult may give a different pattern from that of the plumage which preceded it. How then can we say that a barred type of feather, or a whole-colored feather is 'evolved' from a longitudinally striped one, with any regard to the strict meaning of the term?

On the other hand, in certain birds of varied plumage, it is possible to select feathers from different parts of the body of the same individual which will show not only wholly distinct patterns, but also every intermediate stage connecting the two, feathers of a certain type or pattern always being characteristic of a certain part of the pterylosis and other types or patterns of other parts of the pterylosis. Furthermore, these different types or patterns are not successional but are all developed at the same time, each in its respective position in the pterylosis. Yet, in certain instances, a series may be plucked from different parts of the same bird, some of which will have simply a narrow stripe along the

rachis, others in which the stripe is much broader, perhaps with a tendency to break into bars, then others distinctly barred, with still other stages between these and wholly colored feathers. It is rare of course to find such a variety of intergrading patterns in a single bird, but a strong approach to such a condition is by no means rare. So long as these different patterns cannot be demonstrated to be *successional stages in the same feather*, it seems idle to consider them in any strict sense evolutional stages, or to refer to them as illustrating the evolution of color pattern, evolution implying the evolving of one thing by direct outgrowth from another; and in like manner the term 'self-coloured' in such a connection is clearly inadmissible and misleading. In other words the implied genetic connection does not exist; the relation is simply incidental.

Feathers are classified as striped, barred, etc., in accordance with their pattern of marking, and the markings themselves are indicated by a variety of descriptive terms; and, as almost every conceivable style is represented, there is necessarily a gradation of one form into another, so that all may be considered arbitrarily or theoretically as modifications of the simplest type of all, the longitudinally streaked feather, which seems to be the main conclusion of Mr. Bonhote's paper.

That evolution has played a prominent part in the development of the different styles of coloration that characterize particular groups of birds is beyond question, adapting them to their varied environments and different modes of life, but we do not see how Mr. Bonhote's paper bears especially upon this phase of the question; nor, in fact does he appear to claim that it has such bearing. — J. A. A.

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