and wheeling over the waters. They were formerly greatly more abundant, but from the wanton destruction both of the birds and eggs, their numbers are much reduced. Now, however, the destruction of both birds and eggs is forbidden by law, and it is to be hoped they will again become numerous. This year the advance guard arrived February 28,—rather earlier than usual. On this date I saw them for the first time at the 'Ferry' between the islands of Hamilton and St. George; forty or fifty were circling around and examining the rocky cliffs as though selecting their breeding places. The Tropic Bird is popularly called the 'Bo'sin Bird.'

RECENT LITERATURE.

Stone on the Molting of Birds.[1]—In this paper the author has given the results of considerable personal work and experience. The paper consists of two parts, the first being "a general account of the methods of plumage change," and the second, "brief accounts of the molts and seasonal plumages of most of the smaller land birds of eastern North America, from the Cuckoos through the Passeres in the order of the American Ornithologists' Union Check List." The trouble attending the bringing together of even an incomplete series, and consequent difficulty in determining the exact changes occurring in many plumages, are duly set forth, and our author is careful to state that "no doubt alterations will have to be made in my accounts of the molt in several species, in the light of future investigations." Under 'Change of Color by Abrasion,' and 'Direct Change of Color in Feathers,' the results of investigations made with the assistance of Dr. A. P. Brown are given, with illustrations. The changes of plumage in the Snow Bunting, Dunlin and Sanderling are pointed out and commented on, this work having been done without knowledge of Mr. Chapman's recent efforts in the same line. The views of Mr. Chapman are fully indorsed and those of Herr Gätke correspondingly disproved. The only instance known to our author "of an actual change of color in the plumage, except by fading, is in the case of certain delicate pink tints on the breasts of gulls." Certain opinions of Drs. Stejneger and Sharpe regarding the changes of color in *Motacilla lugens* and *Zanthopygia narcissina* and

[1] The Molting of Birds with Special Reference to the Plumages of the Smaller Land Birds of Eastern North America. By Witmer Stone. Proc. Acad. Nat. Sci. Phila., 1896, pp. 108–167, pll. iv and v.

Z. tricolor are also given, commented on, and to some extent controverted.

The bulk of this paper of 59 pages is taken up with statements and discussions of the plumage conditions and molts of 135 species belonging to 22 families of our commoner land birds. In some, a line or two suffices for the purpose, to others considerable space is devoted, while in the cases of the Rose-breasted Grosbeak and Scarlet Tanager, several pages for each are given up to original and extremely interesting descriptions of the various plumage phases assumed by these birds. Under 'Order of Molt' the sequence of the growth of new feathers and also the wearing, are not only well discussed but are well illustrated by seventeen figures in two plates.

Mr. Stone tabulates the results of his investigations under six generalizations as follows: — "I. The annual molt at the close of the breeding season is a physiological necessity and is common to all birds. II. The spring molt and striking changes of plumage effected by abrasion are not physiological necessities and their extent is dependent upon the height of development of coloration in the adult plumage, and does not necessarily bear any relation to the systematic relationships of the species. III. The amount of change effected in the plumage at any particular molt varies considerably in different individuals of the same species and sex. IV. Some species which have a well marked spring molt in their first and second years may discontinue it afterwards, when the adult plumage has once been acquired. And, on the other hand, some individuals may continue to molt in the spring, while others of the same species cease to do so. V. The remiges are molted less frequently than any other part of the plumage. As a rule, they are only renewed at the annual molt (exception, *Dolichonyx*). VI. Variability in the order of molt in the remiges and presence or absence of molt in the flight feathers at the end of the first summer are generally family characters," etc. Objections might be made to some of the above. Thus, *Spinus tristis* and *Ammodramus sandwichensis savanna* are equal, in the adults at least, in the extent of the spring molt, but the change is hardly "dependent upon the height of development of coloration in the adult plumage," for in one a total change of color takes place, whereas in the other there is little more than a replacement of feathers by others of the same color. Again, has our author seen a sufficient number of specimens of molting second year birds of undoubtedly correctly determined age, to warrant the statement that they have a "well marked spring molt?" Also, when some individuals of a species molt in the spring and others do not, is it not because the former are immature and the latter adult?

With such an extensive self-imposed task and the necessarily large amount of material and conditions examined, it would be perhaps too much to expect that our author would always 'hew to the line,' but the lapses detract little from the merits of this important paper on a hitherto almost neglected branch of American ornithology. Most of those that do

occur are due to lack of complete series showing all grades of changes and which in many cases were not seen by the writer, or still remain to be collected before one can be sure of knowing how and when changes occur. If collectors would save their worn and molting specimens instead of throwing them away as 'worthless,' changes of plumage would be far better known.

Our author's selection of the words, "first winter, and nuptial," to indicate certain conditions of plumage seems unfortunate, for several reasons. In some cases "nuptial" indicates a plumage condition and colors, obtained wholly by wearing, in others the same word designates plumages obtained partly or entirely by molt, and again in others by a combination of molt and wear. All birds have these seasonal changes, yet differ in the process and time of changing; therefore it would seem that a better formula is necessary by which to designate those instances where the same seasonal comparative conditions are obtained by entirely different physiological processes. These words are used for such birds as *Spinus tristis* which has a double molt, and also for *Plectrophenax nivalis* which has but one; also for *Junco hyemalis*, *Melospiza fasciata*, *Scolecophagus carolinus*, *Cistothorus palustris*, and others, which differ considerably not only in the nature and extent of the molt, but also as to the time of plumage change; and the matter is further complicated by the fact that the immature birds of many species molt at different times from the adults, some in the fall, others in the spring, even differing as to the parts of the plumage affected. For instance, the young Song Sparrow obtains a new tail in the fall. One specimen taken Sept. 13, another taken Nov. 6, have new central feathers, and I have watched a live one completely renew its tail. A *Cistothorus palustris* on April 15, is molting all except the remiges and the tail is half grown. A Savanna Sparrow, May 6, is similar, but the outer rectrices are still in place and most of the secondaries and tertials have been renewed. Two Henslow's Sparrows, same date, have the central tail-feathers just appearing; in one ten, in the other seven old feathers are still in place. Two Indigos, Sept. 1, and Oct. 2, have not only molted their tail-feathers but have also nearly completed the new wing feathers. All the above are immature birds, and the Henslow's are molting nothing except the tail. It is hardly safe to say that these nestling rectrices were lost by accident.

No mention is made of the spring molt of immature *Agelaius phœniceus*. In the female this is one of the least extensive of our birds, being confined to the throat, around the eyes and along the superciliary stripe. Under *Dendroica cærulescens* occurs a *lapsus calami*, where our author speaks of the white edging of the throat feathers of "fall adults." These are birds of the year, as is readily proved by their osteology.

Much work remains to be done before we can understand the changes and conditions of even our most common birds; the difficulty is great and success uncertain, owing chiefly to the fact that no individuals as such are resident with us but migrate extensively.

Mr. Stone deserves great credit for the present paper, which is a good basis on which to build a better knowledge of plumage changes. Such work is tending rapidly to disprove the many guesses formerly so common but now gradually being displaced by the results of unbiased, systematic study.— W. P.

Stone on Birds collected in North Greenland.[1]— Mr. Stone gives an annotated list of the birds "obtained by the Peary party during their sojourn in North Greenland from July, 1891, to August, 1892, and also of those collected by the Relief Expedition of 1892." They consist of 122 specimens, besides numerous nests and eggs, part of which were collected by Mr. Langdon Gibson in the vicinity of Peary's winter quarters, and the remainder by Mr. Charles E. Hite, at various points from Disko to Cape York. The two collections number 19 species each, and collectively represent 28 species, only a part of the species being common to both collections. The annotations give the localities, and generally the dates, of the specimens obtained, with occasionally further notes of interest. No species are added to the Greenland fauna, but the breeding grounds of *Chen hyperborea nivalis* appear to be for the first time here made known. —J. A. A.

Schalow on a Collection of Birds from West Greenland.[2]— In 1892 the Geographical Society of Berlin sent an expedition to West Greenland, under the direction of Dr. von Drygalski, which was accompanied by Dr. Vanhöffen as naturalist. The region explored extends from latitude 69° to 73°, and the expedition remained in the field from May, 1892, to October, 1893. The birds collected number 29 species, of which 12 are represented only by eggs. Dr. Schalow, in his report upon this collection, includes also notices of a number of additional Greenland birds' eggs contained in the collection of Major Krüger-Velthusen; some 35 species are thus formally noticed, with passing remarks on a number of others. Many field notes are given, apparently extracted from Dr. Vanhöffen's previously published observations,[3] with many technical notes on various species. While the collection gathered by Dr. Vanhöffen added no species to the Greenland fauna he reports seeing a skin of *Tadorna casarca* [=*Casarca casarca* (Linn.)] in a small collection of bird's skins made at Augpalartok, in the District of Upernavik, which was collected

[1] List of Birds collected in North Greenland by the Peary Expedition of 1891–92 and the Relief Expedition of 1892. By Witmer Stone. Proc. Acad. Nat. Sci. Philadelphia, 1895, pp. 502–505.

[2] Ueber eine Vogelsammlung aus Westgrönland. Von Herman Schalow. Journ. für Orn., Oct., 1895, pp. 457–481.

[3] "Frühlingsleben in Nord-Grönland (Verhandl. Ges. für Erdkunde zu Berlin, XX, 1893, pp. 454–469)."