

taken between April 2 and May 22 show various stages of the moult. "Many of these new black or rufous and black feathers are half grown, while a few are fully grown and their unworn edges are in strong contrast to the ragged borders of the gray winter plumage." In one specimen, "one cannot raise the plumage of any part of the body without discovering numbers of growing new feathers wrapped in their dermal sheaths." Twenty specimens of the Sanderling likewise show a moult in progress during March, April and May. Mr. Chapman has also seen moulting spring specimens of the Golden Plover, Knot and others of the Limicolæ, in which group Gätke states that color changes without moult frequently occur. That no moulting birds should have fallen into this ornithologist's hands is most surprising, and yet on hardly any other assumption can we understand his reaffirmation of the old idea of a color change in worn feathers with restoration by a new growth of the ragged edges. Inasmuch as this theory, resting as it does, upon a most unphysiological basis, is upset in the case of two of the species cited by Gätke in its support, what grounds have we for believing it will apply to any of the others?

He asserts almost dogmatically that a number of species acquire their summer dress without spring moult and Mr. Chapman shows us specimens of two of these very species in the midst of a moult at the time when Gätke declares they are simply growing new barbs on the old feathers and providing in them a fresh influx of new pigment. Can there be any doubt as to who is in error? If fifty years' experience with the birds of Heligoland leads to such deductions as these we may well wonder on what sort of material they are based and hope for more light upon the other species which Gätke has deprived of the normal way of changing their plumage by a moult. To Mr. Chapman we are indebted for the valuable contribution he makes to a subject which has long vexed those who have been readier with strange theories to fit obvious facts than with material to substantiate their theories. — J. D., JR.

Chapman on the Plumage of the Snowflake.¹ — The gradual change from the brown tinged winter plumage of the Snowflake into its abraded black and white summer dress is clearly demonstrated to occur without the loss of a single feather. Diagrams show at a glance that the dorsal feathers of the male during the winter gradually lose their brownish margins and by June "in place of the rounded outline of the brown-tipped feather we have left only its pointed black base. The rest of the plumage undergoes a similar alteration which in some places is evidently assisted by fading." The knowledge of this change without moult is not new, although among our early writers Wilson and Audubon do not seem to have been aware of it. Richardson and Swainson in 'Fauna Boreali-

¹ On the Changes of Plumage in the Snowflake (*Plectrophenax nivalis*). By Frank M. Chapman. Bull. Amer. Mus. Nat. Hist., VIII, Art. II., pp. 9-12 (March 5, 1896).

Americana,' 1831, and Nuttall in his 'Manual,' 1832, describe it, but not as if they considered it new. Mr. Chapman, however, goes further and would explain why the dorsal feathers wear only down to the black bases. He says that microscopical examination "shows that at their apical portion the barbs are separated and that the barbules do not become fairly interlocked until the black basal part is reached." The black area is therefore more protected and furthermore it is asserted that the black pigment by virtue of its density adds strength to the feather. The fact that the female never entirely wears away the brownish border and the fact that the "interlocking" of the barbules in many cases does *not* correspond with the black area, both militate against Mr. Chapman's theory and suggest other factors to explain the deciduous feather tips.

Incidentally a new and valuable point of difference between the plumages of the two sexes is brought out. "The male has the feathers of the head, nape and rump basally white, while in the female they are basally black,"—this difference holding at all seasons of the year. The Snowflake is one of the interesting species that undergo but one moult in the year.—J. D., JR.

Allen on Alleged Changes of Color in the Feathers of Birds without Moulting.¹—It is small wonder that this paper should bristle with exclamation points. It is a summary and criticism of the work of some of the more important writers upon the subject of color changes in feathers without moult, and it deals unsparingly with those who have asserted as possible the complete rejuvenation of an abraded feather. Beginning apparently with the Rev. John Flemming, there have been many writers of greater or less repute, even down to the present day, who have advanced various theories to account for color changes in plumage otherwise than by moult. The most radical of them have assumed that a recoloration of the individual feathers takes place and even a renewal, by a new growth of barbs, of the ragged edges of worn feathers. After stating that this "delusion" "forms a most instructive chapter in the general history of the origin and persistence of error," Dr. Allen proceeds to sketch this history and demonstrate the worthlessness of most of the evidence presented in its support. He maintains that, almost without exception, the hypotheses advanced are not supported by facts and that if moulting specimens of birds had not been so generally discarded in making collections, speculation upon supposed color changes would not have run riot. In brief, "the inventors of these diverse theories have assumed and attempted to explain conditions that in nine cases out of ten had no existence; namely, a color change demonstrately due—normally at least—to moult, which they have supposed must happen in some other

¹ Alleged Changes of Color in the Feathers of Birds without Molting. By J. A. Allen. Bull. Am. Mus. Nat. Hist., Vol. VIII, Art. III, pp. 13-44 (March 18, 1896).