lighter in color and much more soluble. The latter show various shades of light brown and even orange ("rotgelb"). The orange colored melanins mentioned by the writer are, in the reviewer's judgment, better described as broken orange.

An iron reaction was obtained for some of this pigment, isolated from "rotbrauner" feathers. Eumelanin pigment treated with either chlorine or hydrogen peroxide was converted into a substance resembling eumelanin in color and solubility. This result led to the assumption that phaeomelanins may be oxidation products of eumalinins or represent a more advanced stage of oxidation. This is contrary to an opinion which has existed that darker melanins represent the more advanced oxidation such as is involved in the action of tyrosinase on tyrosin.

The chemical considerations are followed by a discussion of the effects of climate on feather colors. A large number of geographical variations of different species are compared from the standpoint of temperature and humidity. Here the author deals with the very difficult problem of the evolution of color patterns. Though numerous exceptions are encountered, the following conclusions are reached. First, that melanin pigment formation is increased by higher temperatures and decreased by cold, eumelanins being susceptible to extreme cold only. Second, dry climates show an increase in phaeomelanin formation and a decrease in the production of eumelanin.

The lipochromes also are treated. Zooxanthin shows a tendency to increase in warm climates and to decrease in very cold climates. Zoonerythrin was found to show little climatic variation, but a slight tendency to the same behavior is claimed. The color patterns of migrating species are influenced by the climate of their winter range, especially when the winter stay is a long one. The writer claims to have discovered an alkali solubility for lipochrome pigment. Boiling yellow feathers in a solution of sodium hydroxide resulted in a yellow color for the solution. A similar result was obtained for red lipochrome pigment. In the reviewer's judgment, the solutions obtained should have been tested for further evidence of actual lipochrome solution.

An old error occurs in both papers, i. e., the idea that white feathers owe their color to the entrance of air into the feather structure. (See Strong, 194).[1]—R. M. S.

Thomson's 'The Biology of Birds.'—There have appeared in recent years a number of general works on birds, dealing with their structure and activities, such as those by Pycraft, Beebe, Evans, etc., not to mention the introductory chapters of the larger systematic works, and now Prof. Thomson presents his 'The Biology of Birds'[2] covering much the same ground but under a slightly different title.

[1] The Causes of Whiteness in Hair and Feathers, By R. M. Strong, Science, N. S., Vol. LIV., No. 1398, Page 356, October 14, 1921.

[2] The Biology of Birds. By J. Arthur Thomson, M. A., LL. D., Professor of Natural History in the University of Aberdeen. New York. The MacMillan Company. 1923. Pp. 1–436

This volume is most welcome, not only because it brings our knowledge of the subject more nearly up to date, but because the author, being a zoologist in the broader sense of the word, approaches his subject from a somewhat different point of view from that of the specialist in ornithology. He quite naturally considers birds as simply one of the groups of the animal kingdom, not as a subject apart, and brings into his discussions the work of authors with whose researches the ornithologist is often unacquainted, while he is able to draw upon his knowledge of other groups in treating the general problems and in making comparisons and deductions. Furthermore Prof. Thomson's well known ability to write of technical matters in a language and manner that are within the understanding of the laity, makes his work of peculiar educational value and furnishes us with a readible account of the present views of scientists upon such topics as migration, origin of sex, evolution of birds, instinct and intelligence, etc.

The extent of the author's knowledge of the literature of his subject is shown by the numerous references and quotations and the care with which he sets forth conflicting theories and experiments. It seems in all ways the best work of its kind that has yet appeared and one which every bird student who has the ambition to become an ornithologist should read and digest.

The chapter headings which give a good idea of the scope of the work are as follows: The chief characteristics of birds; external features biologically considered; adaptation of the bird's skeleton; the flight of birds; food: its capture and utilization; the internal economy of the bird's body; adaptation to haunts; migration; courtship and sex; birds' eggs; parental care and nest making; senses, instinct and intelligence; the pedigree of birds; birds and evolution; birds and the web of life.

The work of American authors seems to be thoroughly recognized which has not always been the case with British books. The work of Watson and Lashley on migration; of Whitman on inheritance in Pigeons and of Pearle, Riddle, Curtis, etc., on sex problems and egg development, all receive attention. In the bibliography however we find the names of but a very few Americans who will be recognized as ornithologists—Allen, Beebe, Coues, A. H. Clark, L. J. Cole, Lucas, Strong and A. H. Thayer, a commentory upon our neglect of the "biology" of birds in favor of the purely systematic study and field work. There is today, however, a marked reaction in this respect and more of our ornithologists are turning to the more general problems for the solution of which birds offer such wonderful opportunities.

The volume closes with a useful bibliography while the illustrations comprise eleven plates, one in colors, and fifty-nine text figures. It is difficult to detect any errors typographical or otherwise but we think that there has been a slip of the pen on p. 325 where *Cyanospiza* is referred to as a genus or Parrots.—W. S.