

as before. About Dec. 15, it left, and the following letter from Mr. W. E. Bray, Anderson, South Carolina, gives subsequent history.

Anderson, S. C.

On Friday evening, Jan. 14, I was hunting on Rockey River near this city, and killed a wild duck, with a band on his leg marked Box 48 Kingsville, Ont.

I supposed who ever sent him out wanted to hear from him, so I am writing to let you know where he came to his end. He was a very fine specimen. I must commend him for his judgment, for he came to the best county in the best state in America.

If you will let me hear from you, I will return the band I took from his leg. So hoping you will send me his pedigree, I will close until I hear from you. Send me your address in full. W. E. Bray.

Mr. Miner writes that Mr. Bray has since sent him the identical ring which was on the Duck's leg.

Kingsville lies on the north shore of Lake Erie, about twenty-five miles from the east end of the lake.—W. E. SAUNDERS, *London, Ontario*.

RECENT LITERATURE.

Thayer on Concealing Coloration in Animals.¹—It is now fourteen years since the eminent artist, Abbott H. Thayer, first published his discovery of "The law which underlies Protective Coloration," in 'The Auk' for April and July, 1896. These articles were later republished, in full or in abstract, in the 'Yearbook' of the Smithsonian Institution for 1898, and in 'Nature' in 1902. Mr. Thayer has also given many practical demonstrations of his discovery before various gatherings of naturalists, his first oral presentation of the subject, with experiments and demonstrations, so far as we are aware, having been made before the American Ornithologists' Union at the annual meeting held in Cambridge, in November, 1896, and again more elaborately before the same body in New York, in November, 1897. Later similar demonstrations were given in England and in various cities in Europe. His previous most elaborate exposition of the subject in print appeared in the 'Popular Science Monthly' for December,

¹ Concealing-Coloration | in the | Animal Kingdom | An Exposition of the Laws of Disguise | through Color and Pattern: | Being a Summary of | Abbott H. Thayer's | Discoveries | By | Gerald H. Thayer | With an Introductory Essay by | A. H. Thayer | Illustrated by | Abbott H. Thayer Gerald H. Thayer | Richard S. Meryman and others | and with Photographs | New York | The Macmillan Co. | 1909 [= February, 1910] — 4to, pp. xix + 260, 16 colored plates, and 140 black-and-white figures.

1909,¹ under the title 'An Arraignment of the Theories of Mimicry and Warning Colors.' Thus the general principles and outlines of Mr. Thayer's discoveries have become more or less well known to a large number of naturalists, and their important bearing on previous theories of protective coloration has been widely recognized. For nearly twenty years he has persistently continued his studies and experiments, visiting tropical countries for the express purpose of widening his opportunities for research, and in the present volume we have his mature results. The main text has been prepared by his son, who has worked with him in his investigations, evidently under the close supervision of Mr. Thayer, who has contributed an introductory essay on the general subject, and supplementary matter in the form of footnotes and addenda to the main text. Mr. Thayer's important discoveries in the field of animal coloration are here for the first time elaborately set forth and profusely illustrated.

In the preface it is stated: "The present book has been constructed for two main purposes: First, to lay before the comparatively few naturalists and others who have appreciated the original articles on the subject, the results of my father's further researches, with examples of the working of the newly revealed laws in many branches of the animal kingdom; and second, to present the matter, both in its simplest terms and variously elaborated, to a wider circle of readers. We hope thus to clear the way to a more general understanding and more intelligent study of the relations between animals' costumes and their environments."

The 'Introduction' (pp. 3-12) is an essay by Abbott H. Thayer, on the "psychological and other basic principles" of the subject, in which it is claimed that while protective coloration in animals is naturally considered as belonging to the province of the zoölogist, "it properly belongs to the realm of *pictorial art*, and can be interpreted only by painters. For it deals wholly in optical illusion, and this is the very gist of a painter's life. He is born with a sense of it; . . . and his pictures live by it." The revelation of principles and facts relating to the subject which have escaped the penetration of the naturalist prove that this claim is not an empty boast.

No adequate synopsis of Mr. Thayer's work can be given within the limits available in the present connection, but a summary of the twenty-seven chapter headings, with a minimum of comment, will give some intimation of its scope and methods. Thus, in Chapter I, "the law which underlies Protective Coloration" is introduced and analyzed. This law is thus stated: "Animals are painted by Nature darkest on those parts which tend to be most lighted by the sky's light, and *vice versa*." It is shown that "light-and-shade is more important than color, because it is an attribute of form, while color is only secondarily so." Chapter II includes definition of terms and illustrations of "obliterative coloration" (figs. 1-13). Protective or disguising coloration tends to render animals invisible in their normal haunts, while 'mimicry,' as the term is here used,

¹ Vol. LXXV, pp. 555-570, with 2 half-tone plates and 12 text figures.

tends to deceptive visibility. On sandy deserts birds, mammals, and reptiles are counter-shaded from sand-color to white, and on dark-colored ground, from very dark to white.

Chapters III-IX deal especially with obliterative coloration, or the use of markings ("picture-patterns") on counter-shaded birds, illustrated mostly by photographs from life of Woodcock, Snipe, Ruffed Grouse, Whip-poor-wills, Nighthawks, Ptarmigan, Sage Grouse, Meadowlarks, Eider Ducks, Short-eared Owls, Plovers, etc. (figs. 14-52). These chapters are designed to show the perfect obliterative coloration of terrestrial birds that live among weeds and grass, fallen leaves and sticks, patches of mud, and pools of water — the perfect merging of their forms and markings with the background. The two next succeeding chapters (X and XI) treat of the markings of rails, bitterns, and other swamp birds, of obliteratively shaded ducks, and the uses served by spots and patterns in bird costumes (figs. 53-55).

In Chapter XII the birds of the ocean are taken up. Chapter XIII discusses the "inherent obliterative power of markings," which tend to obliterate or cancel, "by their separate and conflicting pattern, the visibility of the details and boundaries of form," and is illustrated by diagrams, both colored and in black-and-white, and photographs of birds from life (figs. 56-63). The same general subject is continued in Chapter XIV, in which are considered the special functions of markings, and the protective coloration of nestlings, illustrated with numerous figures of birds from life (figs. 64-82). Chapters XV-XIX deal with other features of coloration in birds, as the bright colors of bills and feet, the brilliant hues and iridescent patches of color so characteristic of hummingbirds and other tropical birds, etc., in connection with their surroundings (pl. vi and fig. 83).

Chapters XX-XXII deal with mammals, which are treated along much the same lines as the birds, the consideration of which occupies the nineteen preceding chapters. Fishes are considered in Chapter XXIII, reptiles and amphibians in Chapter XXIV, and caterpillars, butterflies and moths, and a variety of other insects in Chapters XXV-XXVII, followed by supplementary matter in two appendices.

The text is devoted to a definition of principles and the presentation and illustration of facts; hypothetical conclusions from the facts are left to the reader. Optical illusions are disclosed and explained, some of the most important parts of the text being the explanatory legends accompanying the figures and colored plates. It is not to be overlooked that the work is by an artist, a vision-expert, who is qualified to contribute experience and expert knowledge in the field of optical effects. A striking feature in a book of this character is the absence of argument.

Mr. Thayer's position in the matter of animal coloration is directly the opposite of that of most naturalists, who assume that patterns of color or markings *reveal* the wearer, while Mr. Thayer convincingly shows that in reality they *conceal* when the animal, in its normal surroundings, is seen

from the viewpoints of its enemies, or its prey, as the case may be. (See especially fig. 103 with its explanatory legend.) He also discriminates between the way an animal looks to man and the way it must look to its fellow creatures — *i. e.*, whether the viewpoint is from above or from below, etc., or from the point most vital to the animal. This is perhaps more fully brought out in his recent paper in the 'Popular Science Monthly,' already cited, in which he endeavors to demonstrate that striking and diversified colors tend to concealment, if not at all times, that this is the net result of these supposed conspicuous costumes. The optical hypotheses on which have been based the theories of 'warning-colors,' 'recognition marks,' and mimicry he believes "would never have lived a day had their originators begun by testing them." His contention is that animals are colored to match their backgrounds. "Scarlet and yellow fruit colors, sky-blue and green leaf colors, on the Macaw, are as absolutely the picture of this bird's background while he is dangerously absorbed in feeding in a tropical fruit tree, as is the little terrestrial mammal's brown the picture of the universal earth-brown on which he lives." Nowhere, however, does the author say that the costumes of animals are *for* concealment nor does he attempt to show how or why they came to be as they are. It is, however, said (in a footnote to p. 36): "We ourselves attribute all such to natural selection, pure and simple and omnipotent."

Here and there the explanations and illustrations will doubtless appear to some of Mr. Thayer's readers a little strained and overdone, but they cannot fail to recognize that he has in the main kept well within reasonable bounds, and that he has discovered a key to much that was before contradictory and irreconcilable, and that, as a whole, his work is by far the most important contribution yet made to the subject of animal coloration. — J. A. A.

Howard's 'The British Warblers,' Part IV.¹—The good things said of Parts I–III of this excellent work are equally applicable to Part IV, which consists mainly of two monographs, respectively of the Whitethroat and Lesser Whitethroat, the former occupying 23 pages of text and the latter 20 pages, each with a colored plate and several photogravures. In addition a colored plate and two pages of text are devoted, respectively, to the Greenish Willow Warbler and the Siberian Chiff-chaff; there is also an excellent colored plate of eggs, illustrating the eggs of eight species of British Warblers, figuring 44 eggs, series of six to eight specimens being given in several instances to show the range of variation.

¹ The British Warblers: A History with Problems of their Lives. By H. Eliot Howard, F. Z. S., M. B. O. U. Illustrated by Henrik Grönvold. London: R. H. Porter, 7 Princes Street, Cavendish Square, W. Part 4, December, 1901. Price 21 s. net.

Contents:— Whitethroat, pp. 1–23, 1 colored plate, 4 photogravure plates; Lesser Whitethroat, pp. 1–20, 1 colored plate, 2 photogravure plates; Greenish Willow Warbler, pp. 2, 1 colored plate; Siberian Chiff-chaff, pp. 2, 1 colored plate; Eggs of British Warblers, 1 colored plate; temporary titlepage and contents for Parts 1–4.



Thayer, Gerald Handerson and Thayer, Abbott Handerson. 1910. "Thayer on Concealing Coloration in Animals." *The Auk* 27, 222–225.

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