

The serious defects and very numerous faults of this treatise are those which we have not discovered and therefore decline to mention. The wingshooter does not live who never made a miss. On the contrary, plenty of critics continue in existence who do not find what they want in books because they do not know what they ought to want. Our advice to all such, were it asked, would be, to waste none of their precious time in finding fault with anybody until after they have done better themselves. This practice would greatly promote industry among critics, and might convert some of them into authors in due course of time, besides sparing us much illiterate literature. Those who like to sample a bushel of wheat by the grain of chaff which may reward their diligent search will continue to amuse themselves in this manner until they discover the first rudiments of sound book-reviewing. It is a young rooster that would rather put on than take off his gaffs.—E. C.

Allen on the Emargination of the Primaries.—A recent episode, not lacking interest to one with any sense of humor, has recalled attention to the mechanism of the wing and the mechanics of the flight of birds, and has had one useful end in explaining the purpose of the emargination of the primaries in Hawks and many other birds. It seems that Professor W. P. Trowbridge, of New York, eminent in many walks in science, conceived the idea, groundless in point of fact, that the emargination served to 'interlock' the primaries under some circumstances; and in this novel notion he received the support of Professor J. S. Newberry, the distinguished geologist and naturalist. The subject was laid before the New York Academy of Sciences, at a meeting held Oct. 17, 1887,* and resumed Dec. 12, 1887,† when considerable discussion was elicited, and at the same time papers appeared elsewhere.‡ At the meeting of the Academy of Dec. 19, 1887, the subject was resumed, eliciting a warm discussion among the members present.§ The ornithologists, without exception, declined to consider the interlocking theory in any other light than that of a mistake. The outcome of the affair, which has closed the subject to date, was an address by Professor J. A. Allen, before the Academy, Jan. 9,

* Trowbridge, W. P. "A discovery by C. C. Trowbridge regarding the purpose of emargination in the primary wing-feathers of certain birds." *Trans. N. Y. Acad. Sci.* VII, Oct.-Nov. 1887, pp. 19-21.

† Trowbridge, W. P., Newberry, J. S., and others. "The Mechanism of Flight in Soaring Birds." *Trans. N. Y. Acad. Sci.*, VII, Dec. 1887-Mar. 1888, pp. 75-78.

‡ Newbury, J. S., "The Flight of Birds," *Science*, Dec. 16, 1887, p. 290.

Coues, E., "The Mechanism of the Flight of Birds," *Science*, Dec. 30, 1887.

Newberry, J. S., "The Flight of Birds," *Science*, Jan. 6, 1888, pp. 9, 10, and Trowbridge, W. P., *Id.*, *ibid.*, p. 10.

§ "Discussion of the Mechanics of Bird Flight," by Professors Trowbridge, Newberry Allen, Messrs. D. G. Elliot, G. B. Sennett, E. E. Thompson, and N. L. Britton, and notes on the "Soaring of Birds," by Dr. J. B. Holder. *Trans. N. Y. Acad. Sci.*, Dec. 1887-Mar. 1888, pp. 80-87.

1888.* This important paper, the special subject of the present review, has three main heads:—1. It discusses the general problem of flight, and especially of soaring flight, taking the usual position, that the mechanics of soaring are referable to those of the paper kite, in which the figure of the bird compares to the body of the kite, and its weight to the resistance of the string of the kite. This proposition was very fully discussed and illustrated in an unknown paper by an unknown man, thirty years ago. 2. A concise description of the eighteen known muscles of the forearm and manus of birds, and their effect in moving the parts upon which they lie.‡—3. The special consideration of the emargination of the primaries, forming the body of the paper. This matter is so interesting, not only in reference to the ‘interlocking’ theory, but in its general bearing, that we transcribe it in full for the readers of ‘The Auk,’ who will no doubt agree with us as to its entire soundness:

“It has been intimated that the emargination in the primaries of hawks and other soaring birds gives evidence of interlocking, being apparently a provision for this purpose. That it has suggested the theory of interlocking is quite evident, but it has no further bearing on the subject. That it is not distinctively characteristic of soaring birds has been abundantly shown. The purpose of this structure evidently varies in different birds.

“In some birds, as the woodcock, various genera of pigeons, flycatchers, and humming-birds, the falcate tips of the outer primaries give rise to musical sounds, of somewhat varying character in different species, due to the rapidity and angle with which they strike the air in rapid flight, the emission of the sound being voluntary on the part of the bird, and often forming a part of its amatory demonstrations, as does song or certain peculiar notes in many song-birds. In herons, many water-birds, hawks, eagles, owls, vultures, etc., it is apparently the elimination of a part of the vane which, if present, would prove only an impediment and an obstruction in flight. The emargination extends, it will be observed, from the point where, in the fully extended wing, the inner vane fails to fill the entire space between two contiguous quills. The vane becomes very weak and flexible along its edge, and requires the support of the overlying feather to keep it smooth and intact, so that were the vane to retain its full width to the tip of the feather, on which the air impinges with the greatest force in flight, it would have no support from the contiguous feather, and would be too weak to resist the air; it would consequently be more or less rolled upward at its free edge and prevent the free closing of the tips of the feathers; it would not be firm enough to give much sustaining power, would be in the way, and become folded and rumped in the closing of the wing. Therefore just that useless and obstructive

* Allen, J. A., “On the Structure of Birds in Relation to Flight, with Special Reference to Recent Alleged Discoveries in the Mechanism of the Wing,” *Trans. N. Y. Acad. Sci.*, Dec. 1887-Mar. 1888, pp. 89-100.

† Davidson, R. O., “A New Theory of the Flight of Birds,” 8vo., paper. Washington, 1858, pp. 28, plate.

‡ See paper in present *Auk*, p. 435.

portion is the part eliminated by the emargination of the vane. To give the portion of the vane thus cut away sufficient strength and breadth to add its share to the sustaining power of the wing, the vane would have to be thickened to make it more rigid, and broadened to fill the wide interval between the tips of the feathers, thus making a heavy club-shaped clumsy tip to the feather, and obviously decreasing the efficiency of the wing as an organ of flight.

“Further evidence of the pertinency of this explanation of emargination is afforded, when we recall the fact that emargination is confined to a certain type of wing, and that when absent the wing is of an entirely different type as regards its general form. The wing of the frigate-bird well illustrates the form of wing in which there is no such emargination. It is a very long, acutely pointed wing, in which the first primary is the longest, the second, third, and all of the following being successively shorter, and all sharply pointed, so that when the wing is fully extended there is practically no open space between the tips of any of the primaries.

“There are three principal types of wing in relation to its form :

“I. A very long, pointed wing, in which the first primary is the longest, and all the outer primaries are narrowed toward the tip, and successively decrease rapidly in length, rendering no emargination necessary. Examples : man-of-war birds, albatrosses, shearwaters, gulls, terns, plovers, sandpipers, swallows, swifts, etc.

“II. A short, rounded wing, in which the tip is formed by the four or five outer primaries, which are sub-equal in length. Here, owing to the shortness of the wing, the tips of the primaries are not separated when the wing is fully extended. Here no emargination is necessary, and none exists. Examples : sparrows, and the smaller song-birds in general ; also rails, quails, tinamous and many grouse.

“III. A long, pointed wing, but in which the tip is formed not by either the first or second primaries, but by the third, fourth, and fifth, and in which the six or seven outer primaries form the point of the wing, and are graduated in length from the longest, which is about the fourth or fifth, outwardly to the first, and inwardly to about the seventh or eighth. This form of wing, in which emargination is present, is typically exemplified in hawks, eagles, buzzards, vultures, ravens, crows, etc.

“Between these types of wing there is every stage of intergradation, with corresponding variation in the emargination of the primaries, in the form of wing characterized by this structure. The true falcons have a very pointed wing, in which the longest primary is the second ; the first is somewhat shorter, and is the only quill showing emargination. In this the emargination is slight, and extends for only about two inches. If we remove the first primary, we have a wing in which the outer primary is the longest, the next succeeding primaries being each shorter than the one next in front, resulting in a long pointed wing, in which the primaries are narrowed toward the tip, and recede successively in length, giving the same form of wing we have in the man-of-war birds, in swallows,

swifts, humming-birds, night-hawks, etc., in which there is never any emargination.

“Again, the emargination varies in extent, being limited in many birds to the first primary alone, and to the extreme apical portion of this; in others it occurs on the apical portion only, say for two to four inches, or perhaps the outer four to six primaries; while in very many birds, including the turkey buzzard and its allies, and many hawks, it extends to the basal third or fourth of all the outer primaries.

“Having now shown that interlocking does not and cannot take place, it may be worth while further to point out that it is unnecessary.

“In a soaring bird, no great muscular tension is called into action. The large pectoral muscles, which move the wings up and down, are in a state of equilibrium, and under very slight tension, not more than are the muscles of a man’s arm when the arm is in an ordinary position of rest. The mechanism of the bony framework is such, as has been already shown, that the wing is kept extended in such a way that there can be only very slight strain on any of the numerous muscles of the wing itself. The extension of the primaries is automatically effected by the extension of the wing, and results in no special strain, when once the wing is fully extended, upon any of the muscles whose function is to flex and extend the outer or phalangeal segments of the pinion. Hence the comparison made at the meeting of December 12th, of a man’s arm held extended at a right angle to the body, in an unnatural position, with a bird’s wing held extended in soaring, in a perfectly natural position, was wholly irrelevant.

“The hypothesis of the interlocking of the primaries during protracted soaring, to conserve energy and lessen fatigue, has not only no basis in fact, but is entirely gratuitous.”—E. C.

Birds of Morris County, New Jersey.—Nearly a year ago the list to which attention is now called* was published in a local newspaper, and as the distribution of New Jersey birds is known inferentially rather than by any recent and reliable published information, such an excellent list as the present one seems worthy of wider notice. It is the result of over four years’ work in the northern part of the State and numbers 205 species and subspecies, not a large number, to be sure, but it must be remembered that Morris county is inland, and the usual array of water birds that goes to swell many lists is therefore wanting, although some occur as stragglers. The summer residents are mostly Alleghanian with a considerable sprinkling of Carolinian forms, such as *Cardinalis cardinalis*, *Seiurus motacilla*, *Mimus polyglottos*, *Thryothorus ludovicianus*, *Parus bicolor*, and others less distinctive, while little needs be said of the migrants and accidental visitors recorded. Few local lists can boast of two species relegated to the hypothetical list of the A. O. U. Check List. A specimen of *Helminthophila lawrencei*, and two of *H. leucobronchialis*

*A List of Birds of Morris County, New Jersey. By E. Carleton Thurber, True Democratic Banner, Morristown, N. J., Nov. 10, 17, 24, 1887.