anatomical structure of the vocal apparatus in birds, which, with the accompanying illustrations, gives a fair idea of the parts concerned and their functions. Chapter II. treats of the differences in the development of the vocal muscles in different groups of birds, and especially among different groups of song birds (Oscines), as well as of the differences in the vocal apparatus in the two sexes of the same species. In the female the parts are similar to those in the male, but much more feebly developed.

Chapter III. deals with the development of the song instinct, and discusses at some length the theories of Darwin, Wallace, Groos and others, and finally presents his own views on the subject, based in part on new material. The original call-notes, from which song has been developed, he believes were originally signal or recognition sounds, and that these have become specialized according to sex and as an aid to the male in attracting the female. He recognizes four stages or phases in the development of birds' calls and songs, namely: (1) A simple, uniform call, serving as a signal and recognition note for the species, developed by natural selection; (2) varied sexual calls or pairing calls, and (3) singing and warbling, or pairing songs, serving for the mutual attraction of the sexes, and developed through natural unconscious sexual selection; (4) summer, autumn and winter songs of Palæarctic birds, expressive of the ordinary emotions of the species ('allgemeine Wirkung auf die Psyche'), and due, at least in part, to natural selection.

Chapter IV. treats of other love-making demonstrations, as the 'clapping' of the stork, the 'drumming' of woodpeckers (forms of 'instrumental music'), the 'bleating' of snipe, song-flights, dances, display of color-marking and other ornamentation, etc., and of their relation to voice and song. In this connection the evolution of courtship or love-making is also considered.

Finally there is a convenient summary of the author's evidence and conclusions, the whole forming a highly original and suggestive treatment of a very interesting subject.

J. A. A.

Catalogue of the Lepidoptera Phalænæ in the British Museum. By SIR GEORGE F. HAMPSON, Bart. Vol. III., Arctiadæ (Arctianæ) and Agaristidæ. London. 1901.

This volume of 690 pages is published in the same style as Volume II. of this series, already noted in these pages. The Arctiadæ subfamily Arctianæ comprises 946 species from the entire world, of which 83 are here first described. Fifty new generic names are proposed. The small family Agaristidæ, which are, as the author rightly observes, an outgrowth of the Noctuidæ, comprises 225 species, of which eight are here first described. Eleven new generic names are proposed in this group. The author has made some orthographical changes. *Westwoodi, whiteleyi, kinkelini, blakei,* etc., appear in a scarcely recognizable guise as *vestvoodi, vhiteleyi, cincelini, blacei,* etc. But *loewi* on page 226 escaped, doubtless by inadvertence. We think these changes scarcely advisable. The woodcuts in the text and the volume of 19 colored plates accompanying the book are up to the author's usual standard, if not slightly superior to it, and add greatly to the usefulness of the work. Owing to the author's method of selecting the types of the older genera, his refusal to recognize some of the names proposed by Jacob Hübner, and to his ideas of the extent of genera, we find the familiar names of the North American species sadly changed. We hope to become accustomed to these changes; but it emphasizes the fact that the concept of the genus is very largely a personal one. With this in view I have catalogued the specimens in the National Museum by specific names, as being the more stable. We miss the genera *Cydosia, Doa, Cerathosia, Psychomorpha, Eupseudomorpha* (*Edwardsia* Neum.), *Eudryas* and *Ciris;* but these the author doubtless regards as Noctuidæ. We hope they will not fail to find place in the succeeding volumes, as seems to have happened to the genus *Pygoctnucha* with the species *harrisii* Bd., *funerea* Grt. and *robinsonii* Bd., and to *Ptychoglene coccinea* Hy. Edw., which do not appear in either Vol. II. or III., and certainly cannot come in the Noctuidæ which will follow. Our large and handsome Arctain, *Platyprepia virginalis* Bd., has been quite omitted. Equally

surprising is the absence of the familiar genus *Callimorpha* with its European and Asiatic species. If this genus belongs to the Noctuidæ by the author's classification, we think the scheme is some way at fault, for the insects are certainly Arctains in their broad characters. *Holomelina* (*Eubaphe*) *immaculata* Reak. has escaped notice, doubtless owing to Kirby's erroneous reference of it to the genus *Eudule* (Geometridæ). The species *Euhalesidota otho* Barnes, *Dodia albertæ* Dyar and *Pseudalypia geronimo* Barnes, appeared too late in description to be included. Most of these omissions are, we presume, intentional, but some seem due rather to the method by which the work has progressed, by which one family is completed before the critical study of the next one has been begun. Thus species which have been wrongly referred by cataloguers are liable to be overlooked. On page 79 *Bertholdia braziliensis* is described as new. The name must fall before *B. soror* Dyar (*Proc. Ent. Soc. Wash.*, IV., 391, May 3, 1901), which seems unquestionably the same species. On page 267 our author places *Spilosoma congrua* Walk. as a synonym of *Diacrisia virginica* Fab. We cannot agree to this, since it has been shown that a part of Walker's types were a distinct species, *antigone* Streck., and to this his description applies. *Arctia complicata* Walk. is made a synonym of *A. quenseli* Payk. We had always supposed it to be a form of *ornata*, which occurs in the same region (British Columbia), whereas *quenseli* is an Alpine form from the Alps, Labrador, White Mts., etc. But the author has Walker's type and should know. We shall be interested to see if *quenseli* can be found again in Vancouver Island.

Condensed descriptions of the larvæ of several species are given, but in a sporadic manner. Most of the life histories published within the last few years are included, but practically all the older ones published more than ten years ago are omitted. Doubtless it would have added greatly to the author's labors to have made a thorough search for all larval descriptions, but surely the North American species might have been included as they have been very completely catalogued in a bulletin issued by the U. S. National Museum in 1889. We do not, of course, desire to depreciate the value of this work, which, as we have before remarked, is a great boon to working entomologists, enabling us to identify our species far more readily than ever before. For, unlike many published synopses, Hampson's tables are practicable, not containing contradictions nor hair-splitting differences. Variation within specific limits may invalidate some of the characters which he uses, but we find this a very minor objection.

Harrison G. Dyar.

Gaupp's Anatomy of the Frog.*

This is not the first time that the present work has been noticed in this journal. The other parts as they have appeared have been reviewed as follows: Parts I. and II., Science, Vol. VII., p. 463; Part III., Science, Vol., X., p. 491.

The present part deals with the viscera, the next and concluding 'Heft' is to take up the integument and sense organs. The organs are discussed in the following order: Digestive tract, respiratory organs, thyroid gland, derivations of the pharyngeal region, urogenital organs, cloaca, and the cœlomic cavities. As with the portions of the work already published it is impossible with this to analyze the facts presented and to point out the features which are novel. Attention, however, must be called to the broadly morphological aspects of the work. Dr. Gaupp has given us not only the anatomy of the adult frog but has emphasized the bearings of the various structures. Thus at the beginning we have an account of the developmental history of the head-gut region without which the account of the derivatives of the branchial region would lose much of its interest. In the same way the urogenital structures are introduced by a longer account of their history. Then there is a valuable summary of what is known concerning hermaphroditism in the frogs. The illustrations throughout illustrate the frequent use of the

*A. Ecker's und R. Weidersheim's 'Anatomie des Frosches auf Grund eigener Untersuchungen durchaus neu bearbeitet,' von Dr. Ernst Gaupp. Dritte Abtheilung, erstes Hälfte. Lehre von den Eingeweiden. Braunschweig, Fr. Vieweg und Sohn. Pp. 438. 95 figures. Mk. 15.