While we must thus congratulate the German Zoological Society upon the eminently satisfactory beginning of its enormous enterprise, and the zoological world at large upon the prospect of the assistance and stimulus which such a work must necessarily afford, we cannot forbear expressing the reservation that the promotors of the task when expecting that 'Das Tierreich' may become the foundation and starting point of all future systematic research ('Grundlage und Ausgangspunkt aller künftigen Systematik'). A work to become, in our days, the foundation and starting point of future systematic research must break new ground, open up new views and utilize new material to a much greater extent than it is possible in a general work of the scope of 'Das Tierreich,' with its necessarily excessive condensation and also necessarily uneven authority. No matter how prominent the monographers may be, it is conceivable that the work of many may fail to receive the universal acceptance which is essential to the fulfilment of the Society's fond hope. The time is not ripe yet for a new starting point. We are still in the midst of a period of development and upheaval. The natural relationships of animals are, to a great extent, obscure as yet, and the systematic arrangement in the work is bound to be greatly artificial in many groups at least. It is even to be feared that the very conciseness of the form and the consequent unavoidable preciseness of the statements, coupled with the superficial uniformity of the arrangement, may tempt the habitual generalizers, who are deficient in the special knowledge which 'Das Tierreich' is destined to be an expression for, into a belief that zoological science has reached a well-balanced uniformity which might make it safe to use the work as an undisputed authority in all branches upon which to build daring and glittering generalizations. For the working specialist, it is safe to say, no general work, however, well executed, will even supersede the Systema Naturæ of Linnæus as a starting point.

LEONHARD STEJNEGER.

A Study in Insect Parasitism: A Consideration of the Parasites of the White-marked Tussock Moth, with an account of their habits and interrelations, and with descriptions of new species. By L. O. HOWARD. U. S. Department of Agriculture, Division of Entomology, Technical Series (Bulletin) No. 5. [April] 1897.

One of the first insects which met the writer's eye on landing in New York in 1887 was the larva of the white-marked tussock moth (*Orgyia Hemerocampa leucostigma*). It is a beautiful creature, but destructive to the shade trees. It exhibits 'warning colors,' and is not eaten by the sparrows; so there is no telling how abundant it might become but for parasites and diseases.

Dr. L. O. Howard undertook a few years ago to study the life history and parasites of this insect, especially as observed in the City of Washington. One might have supposed that at this late date there was nothing new to be learned about so common a creature, but Dr. Howard knew better, and the present bulletin exhibits part of the new facts ascertained. It is not necessary to recount these facts, as the bulletin itself can be obtained without difficulty, but I should like to emphasize two or three points.

In the first place, we see that most admirable work may yet be done even in the very midst of our great cities, and that even new species may be obtained in tolerable abundance. Dr. Howard, in the present bulletin, records thirty-five parasites and hyperparasites of the *Orgyia*, of which no less than nine are described as new, all the new ones being from the District of Columbia. So even our business men, who have but a spare half-hour or twenty minutes at noon, can, if they are so inclined, gather a lot of *Orgyia* cocoons and breed parasites, with a fair chance of turning up actual novelties! Here, indeed, is an exciting and interesting pastime for young clerks and such persons whose city life is at present rather dull.

Secondly, we observe that when the various factors bearing upon the life of an insect are considered together, the interest of the subject is enormously increased. It is unfortunate that at least nine-tenths of the current literature of entomology relates either to dead specimens removed from their natural environment, or when referring to living insects takes an extremely narrow view of the subject. It results from this that one of the most fascinating

studies known, and one which yields abundant facts of philosophical interest, has the reputation in many quarters of being excessively dry and unprofitable. It may be laid down as a law that no one can take a really intelligent view of a group of insects while ignoring all those outside factors which influence its being and have made it what it is. Such a one may become skillful in determining species, but he is like a collector of coins, who should know perfectly every kind of coin which he possessed, but neither knows nor cares when or by whom the coins were made nor what the figures and inscriptions upon them meant.

Thirdly, it is perfectly clear that entomological works of the best kind can no longer be written by one man unaided. Dr. Howard could by no means have given us so satisfactory a treatise had he not been helped by his several assistants and investigators. Such help is gladly rendered by entomologists to one another, when it is known that it will be judiciously used and justly credited. It is a pleasure to assist such a man as Dr. Howard, and it is to be hoped that all who can cooperate usefully with him will make haste to do so. For while many of us cannot by ourselves write profitably on various subjects, we may together afford the materials, which, put together and added to by a competent person, will result in the production of an admirable treatise. Those who, like Dr. Howard, have shown that they can be trusted to use properly the materials or information supplied to them should receive strong support; while others (there are such) who persistently ignore field notes and biological data, or do not quote those data correctly, out of sheer carelessness, should not be supplied with material.

When the writer began to describe western hymenoptera he was solemnly warned that, not having access to the type specimens, he would be very likely to make synonyms. So far, he believes there are not more synonyms among his names than among an equal number of those proposed by Eastern entomologists—those detected on sending the types east are very few, but even if there were, he believes he would be justified, because he gives the exact conditions under which the insects were taken, while most of those described in the East are credited vaguely to 'Colo.', 'N. Mex.', etc., to the extreme vexation of one working on the fauna of this region. It is true, of course, that the material so described has been mostly sent in with inadequate labels, but the writer knows cases enough where the available data were not quoted; and certainly had any serious effort been made to get professional collectors to cite localities, etc., the information would have been forthcoming. This is shown by the fact that Mr. W. H. Edwards almost always manages to get excellent details. Compare Mr. Edwards' accounts of the butterflies taken by Bruce with the records of moths collected by the same entomologist but published by others. Compare also the different reports on the St. Vincent material collected by Mr. H. H. Smith.*

Several other matters might be touched upon. How interesting it is to read of the indirect influence of the sparrows on the *Orgyia*, of the fluctuation of the several insects from year to year, of the way in which the parasites abounded in different degrees in different parts of the city, and a dozen other things. The inadequacy of a bald record that one insect infests another is clearly brought out. Thus, while it is correct to say that *Apanteles hyphantriæ* and *Chalcis ovata* both infest the *Orgyia* and *Hyphantria*, they infest them in utterly different proportions.

There is little or nothing to criticise adversely. *Theronia fulvescens*, credited to Brullé, was, I believe, described by Cresson. On p. 52 it is said that the dipterous parasites apparently had no hyperparasites. But *Hemiteles townsendi* was surely such, as is duly indicated on p. 31.

The promptness of publication is very much to be commended. The Bulletin was trans-

* In the report on the Diptera, Tr. Ent. Soc. Lond., 1896, Professor Aldrich, reporting on the Dolichopodidæ and Phoridæ, gives the altitude, etc., while Professor Williston, reporting on the other families, generally fails to give any such data. It cannot be supposed that Mr. Smith carefully labelled two families of flies, and was quite careless about the rest! One of the individuals who worked up a group of the St. Vincent fauna (not flies) confessed to me that he threw away Smith's minute-locality labels.

mitted for publication on February 1st, and it comes to hand early in April. This is in great contrast with the delay which formerly used to occur.

T. D. A. Cockerell.

Mesilla, N. M.

Marine Fossils from the Coal Measures of Arkansas. By James Perrin Smith. (Preface by John C. Branner, late State Geologist of Arkansas.) Pp. 72. Plates xvi.–xxiv.

This memoir, reprinted January 7, 1897, from the Proceedings of the *American Philosophical Society*, Vol. XXXV., No. 152, is also "the ninth of a series designed to illustrate the investigations and explorations of the Hopkins Seaside Laboratory, an adjunct of the biological laboratories of the Leland Stanford Junior University." It was prepared at the request of Dr. Branner and deals with the rarer, and therefore more interesting, fossils of the Coal Measures. In these strata marine species furnish the most valuable data for the purposes of correlation. Heretofore they had been announced from but one locality: now, after a careful study of the material brought together by the last (Branner) survey, Professor Smith is able to announce them from twenty-one additional localities, extending from Independence county, on the east, to the Indian Territory, on the west. Forty-eight genera are represented by ninety species, of which forty-eight are found in the in the Lower Coal Measures and fifty-two in the Upper, ten species being common to both. The author characterizes the fauna as poor, such as would wander in whenever, by subsidence, the shallow waters became more habitable, and he also points out that, under the conditions then prevailing, it could not become well established, as it was frequently forced to migrate. In consequence of this, a gradual transition from the fauna of the Lower Carboniferous Limestone does not exist in this region. No attempt is made to classify the beds more minutely than into Upper and Lower Coal Measures, and even this is at times uncertain, especially when their marked similarity, folding and faulting are taken into consideration. Then follows a list of localities in which marine fossils were found, seventeen in the Lower Coal Measures and four in the Upper (one of which, Poteau mountain, is two miles west of the Scott county, Arkansas, line, in Indian Territory), together with the names of the fossils, character of the deposits, and the names of the collectors. A comparison is made with the Permo-Carboniferous of Kansas and Nebraska and the strong faunal resemblance of the Upper Coal Measures of Arkansas to the youngest Paleozoic rocks of Nebraska shown. The relations of the Arkansas deposits to those of Texas are also noted: "None of the characteristic ammonite genera [of the Permian] were found in the Arkansas region, but nearly every fossil found in these Coal Measures was also found in Texas. And in the Texas Permian nearly all the species excepting the ammonites were found in the underlying Upper Coal Measures. This makes the analogy between the Upper Coal Measures of the two regions very strong."

In view of this Professor Smith concludes "that while some of the beds in western Arkansas are very high up in the Coal Measures, none that belong above them are as yet certainly known, and the Poteau mountain syncline, across the line in Indian Territory, is the only place where there is any likelihood of finding Permian deposits." Some very interesting comparisons are also made with foreign faunas: for instance, of the Lo-ping fauna in China "nearly all of the species are either found in America, or they have their nearest relatives there." In this connection another point of unusual interest is brought out, viz., that many of the species which are "very common in America and Asia are unknown or rare in Europe, which fact would tend to prove a connection with Asia by water, and the separation of the European and the American Upper Coal Measure deposits by a land barrier." In short, our author regards the two regions, America and Asia, as belonging to the "same zoological province, the Pacific Carboniferous sea." Moreover, "many of the American species that are found at Lo-ping are also found in the Salt Range beds," thus extending the close relationship to India. Of the Upper Carboniferous fauna, at Itaitúba, Brazil, described by Derby, twelve out of twenty-seven species of brachiopods are shown to be "iden-