

DEFERRED BUSINESS.

The Committee on Entomological Organization submitted a report, containing recommendations to the Bishop Museum and the Committee of the National Council of Research, on entomological work in the Pacific. The report was accepted and the Secretary ordered to communicate a copy to Dr. H. E. Gregory, Director of the Bishop Museum, and to print the same in the Proceedings. The Committee was then discharged and its work transferred to the Executive Committee with the addition of J. C. Bridwell.

The President announced the appointment of Messrs. Timberlake, Pemberton and Bridwell as a Committee on Common Names of Economic Insects, Mr. Timberlake to act as chairman.

Report of the Committee on Entomological Organization.

(Submitted Dec. 9, 1919)

BIOLOGICAL PROBLEMS OF THE HAWAIIAN INSECT FAUNA.

In the recommendations made by this Committee for lines of entomological work appropriate to be carried on by the Bishop Museum, and presented to the Society for consideration at a special meeting June 17, 1919, and later transmitted to the Director of the Museum, one topic was designated, "Biological Problems," in connection with the endemic insect fauna, without giving detailed statement of such problems. The Committee now presents a detailed outline of certain lines of work open for research investigations with the endemic Hawaiian insect fauna.

1. *Life Histories in General.*

Much remains to be done in working out life histories and other habits in all the Orders of insects; and the discovery of their food plants and host relations, or other food habits.

SPECIAL SUBJECTS.

Lepidoptera.

- Leafminers of *Pelea* (*Opostega* sp.).
- Other leafminers.
- Banana moths.
- Leafroller caterpillars.
- Wood feeding caterpillars.
- Fruit and seed caterpillars.
- Discovery of food plants of caterpillars in genera in which they are at present unknown, e. g.: *Mestolobes*, *Orthomecyma*, etc.
- Habits of the case moths of the large genus *Hyposmocoma* (170 species).

Hymenoptera.

- Nesting habits of wasps.
- Food of predatory and parasitic wasps.
- The genus *Sierola* and host relations.
- The genus *Sclerodermus* and host relations.
- The genus *Eupelmus* and host relations.
- Parasites of *Lepidoptera*.
- Parasites of scale insects.
- Parasites of mealy bugs and *Aphis*.
- Parasites of *Delphacidae*.
- Parasites of *Coleoptera*.

Coleoptera.

- The *Carabidae*.
- The longhorn beetles (*Plagithmysids*).
- The genus *Heteramphus*.
- The genus *Rhynocogonus*.
- The genus *Proterhinus*.
- Beetles in relation to the declining forests.
- Beetles feeding in dead wood.
- Predacious beetles.
- Flightless beetles.
- Hosts of *Laboulbeniaceae*.
- Scavenger beetles.
- Parasitism of *Coleoptera*.

Diptera.

- Aquatic *Diptera*.
- Leafminers.
- Parasitic *Diptera*
- The crane flies.
- The genus *Dyscritomyia*.
- The genus *Drosophila* (many native species).

Homoptera.

The Jumping Plant-lice (*Psyllidae*).
 Leafhoppers (*Delphacidae*).
 The genus *Oliarus*.
 Tree hoppers (*Jassidae*).
 Endemic mealy-bugs.
 Parasitism of *Homoptera*.

Heteroptera.

Predacious bugs
 The genus *Oechalia*.
 The genus *Reduviolus*.
 The genus *Nysius*.
 The *Capsidae*.

Orthoptera.

Predacious forms.
 Parasitism of *Orthoptera*.

Odonata, Neuroptera, etc.

Habits of the *Hemerobiids*.
 Parasitism of the *Hemerobiids*.
 Discovery of larval habits of native antlion.
 Dragon-flies.
Psocidae.

Studies in Variation, including breeding experiments, can be carried on with several of the groups. This line of research is specially attractive here, for six or more generations may be had per year.

Of these special subjects, those with reference to *Hymenoptera* have several of the members of the Society specially interested in them: the *Aculeates*—Messrs. Giffard, Williams, Timberlake and Bridwell; the *Parasitica*—Messrs. Fullaway, Timberlake, Bridwell and Swezey.

In the *Lepidoptera*, Mr. Swezey has been carrying on researches in most of the lines mentioned.

In *Coleoptera*, Messrs. Giffard, Bridwell and Swezey are especially interested in certain problems, and Dr. Perkins is still doing systematic work with the beetles.

The *Diptera* are receiving less attention than some of the Orders. They have been considerably neglected in the past.

The *Homoptera* have several working on them: Messrs. Giffard, Muir, Timberlake, Swezey, Bridwell and Crawford.

The *Heteroptera* are not being actively dealt with just at present, nor are the other Orders: *Orthoptera*, *Odonata*, *Neuroptera*, etc., though much material is at hand for working, especially in the *Heteroptera*.

In fact the entomologists of Honolulu, members of the Hawaiian Entomological Society, or those engaged officially in entomological work of one kind or another chiefly with reference to economic or practical work with insect pests at one or another of the different institutions, are interested in many of the lines of research above indicated, and have spent much time on some of them, and are continuing to do so as time and opportunity presents. But in this way progress must needs be slow as compared with a research worker putting his whole time and attention on a special subject, without other duties to continually interrupt or interfere with his progress.

2. *Collecting.*

For most of the lines above mentioned, much collecting is necessary, not only in general throughout the Islands, but in special places where no collecting has been done, particularly in localities where the native forests are rapidly on the decline and are disappearing, and this can best be done by persons trained in the special methods of insect collecting in these Islands, to obtain results, and capable of taking the desired notes and data as to host, location, other conditions, etc.

3. *Systematic Entomology.*

This line of work must go hand in hand with biological researches. It involves: descriptions of new species; revisions of groups; production of synoptic tables, etc. Many of the members of the Entomological Society are having a share in this already.

4. *Bearing on Factors of Evolution.*

Many of the biological problems are of great importance on

account of the bearing they have on the factors of evolution, and should be carried on with these points in mind.

The present economic entomologists should by all means be encouraged to continue with the lines of research they are interested in and now following; but an efficient entomological staff at the Museum would be in position to carry on many lines of research to advantage which cannot be satisfactorily handled by the other entomologists.

REFERENCE COLLECTION OF HAWAIIAN INSECTS.

It is only natural that a subject of such consuming interest to the active workers in entomology here, as the entomological policy of the Bishop Museum, should receive further thought and deliberation, and we find ourselves at present, after the lapse of six months, burdened with many suggestions of a specific nature on the means of accomplishing the work outlined. Regarding a "Reference Collection of Hawaiian Insects," we desire to state our absolute conviction that nothing of importance can be accomplished in the way of building up such a collection of Hawaiian insects until a competent, trustworthy and permanent curator of insects is appointed. Only a competent man can do the work well, and the labor involved would require his entire time for many years. It has been stated before that there are "types" and series of specimens of endemic as well as introduced insects ready for the Museum when a competent and trustworthy custodian is provided and liberal regulation of their use admitted.

It has also been pointed out that the Museum now has representatives of sixty-four per cent of the species of Hawaiian insects known and listed at the time the *Fauna Hawaiiensis* was published. These are virtually "types," being actual specimens in hand when the descriptions were made. With so large a proportion already possessed a complete representation seems eminently desirable, and its importance to workers here, who are desirous of carrying on the labors of Blackburn, Perkins, Kirkaldy and others, cannot be over-stated. It is impossible for most of us to go as far as London to examine the "types"

unrepresented here, yet thorough descriptive work cannot be done without seeing them. Apparently undescribed species are constantly being discovered as the result of intensive collecting, which should be published. Also many groups of Hawaiian insects need revision badly and the material is at hand for the work. The Museum could foster work of this kind by offering to finance the study of the "types" by specialists undertaking descriptive or revisory work, receiving in return for the outlay, the manuscripts for publication and insect material, including "types," specimens compared with "types," and series of specimens for reference to build up the collections. Some of this work could undoubtedly be undertaken by the curator.

When the further entomological exploration of the Pacific, now in contemplation, begins to secure results, if, as this Society has strongly urged, the material obtained is turned over to the Museum, the need for this advanced organization of its entomological work will become more imperative and indeed, this work should not otherwise be undertaken.

THE ENTOMOLOGICAL EXPLORATION OF THE PACIFIC.

In view of the plans now under consideration for the further scientific exploration of the South Pacific by means of an exploring voyage in the near future, the Hawaiian Entomological Society has felt it could be of assistance by a formulation of its experience and its conception of the methods by which the work in its own field may best be carried out. In the fifteen years of its existence there has been developed among its membership a lively interest in the wider entomological problems of the Pacific and the discussions of these matters have resulted in the crystallization of definite ideas among its members, probably based upon a broader experience of Pacific, and particularly Polynesian, entomology than can be found in any other body of scientific men.

The broad purpose of the scientific exploration now in contemplation is doubtless to secure material upon which to

base a well grounded opinion in regard to the supposed former existence of a Pacific continent and thus to secure further evidence upon the question of the permanence of the continents and oceans, and, if there may be considered to have been such a Pacific continent, to find its former extent and its relations to the surrounding continental areas, its antiquity, the origin of its fauna and flora, and the extent of divergence in the various groups, and to trace as far as it may be done, the history of the human race in the Pacific. To the broad purpose of the exploration and to the subordinate ends, we feel that an adequate entomological exploration will contribute largely. The richness and diversity of any insect fauna in comparison with that of other phases of land animals and its greater persistence under conditions leading to the extinction of the larger forms of animal life, tends to make the conclusions drawn from it less subject to accidental errors. We believe that the biological evidence in regard to these problems must rest primarily upon a thorough knowledge of the phanerogamic flora, the land shells and the insects of the regions to be explored.

How this knowledge of the insect fauna may best be secured is indicated by the work done in the past. Few, if any, of the great explorations in the Pacific have made any considerable contribution to our knowledge of the insect fauna, and today the only group of islands in the Pacific where this fauna is at all adequately known is our own group where the Committee of the Royal Society and the British Association hit upon the method by which an insect fauna may be made known. It was by the selection of such an extremely capable entomological naturalist as Dr. Perkins and by keeping him long enough upon the ground to do the work that the truly remarkable results embodied in the *Fauna Hawaiiensis* were secured.

In the opinion of this Society, the adequate entomological exploration of the Pacific from the standpoint of the problems stated and the particular phase of the relation of the Hawaiian

insect fauna to that of the South Pacific, requires the exploration of certain islands or groups of islands. Those which seem to us most important are these: The Galopagos, San Juan Fernandez, Easter Island, some of the low eastern coral islands such as the Paumotus, the Marquesas, Tahiti, Samoa, the Fijis, and some of the low western coral islands, probably the Marshall Islands. Aside from these the Bonin Islands are known to have some curious biological relations which make their exploration desirable and the insect fauna of New Zealand, other than the beetle fauna is in great need of further exploration. The island groups between Fiji and New Guinea, while of very great interest, are so obviously related entomologically to New Guinea that their exploration would fall into relation with the exploration of that region rather than with the region which we have under consideration.

The Galopagos Islands are generally supposed to have been more or less thoroughly explored entomologically but in discussing the matter with Dr. F. X. Williams, who did the entomological work for the California Academy of Sciences Expedition, we learn that he considers that less than fifty per cent of the Galopagos insect fauna is known and that more intense collecting, particularly in the upland forest, which has proved to have so many peculiar and interesting forms in the Hawaiian Islands, is much to be desired.

While an exploring voyage such as is being planned at present, may, under proper arrangements, secure results of inestimable value in planning the future work of exploration, it will be a most deplorable mistake to suppose that it will be possible, under the conditions of such a voyage at its very best, to make an adequate entomological exploration of any but the smallest of the islands and then only if there are other matters of importance which are likely to lead to a considerable time being spent there. The only way in which the explorations may secure materials upon which any well based opinions can be founded, is to place a well trained man on the ground for a period of not less than one year and in all probability for a

longer period. If his work can be done simultaneously with botanical explorations, much will be gained, for the most effective entomological work in these regions calls for an intimate knowledge of the flora which can hardly be expected from an entomologist working alone.

Judging from our experience here, even the best collector of insects from the temperate regions needs a complete reeducation in methods of work before he can work in such regions as those to be explored, for it may be expected that the insects there, as they are in Hawaii, will be found closely attached to the endemic or native plants and one unfamiliar with the hundreds of tropicopolitan plants will waste much of his time on these plants, when one familiar with conditions would be doing significant work. It seems to be of the greatest importance that there should be secured, if possible, for the work with the proposed expedition and in the necessary subsequent work, someone who has had experience in collecting in the Hawaiian Islands and is already somewhat familiar with the special methods of collecting which have been developed here, and with the special problems of the Pacific.

We have already expressed ourselves as of the opinion that such future explorations of the entomology of the Pacific should be centered in the Bishop Museum of Honolulu and we believe the material secured should be placed there and studied under the administration of the curator of insects when that position is filled. With the proper organization of this work, in that institution, it is probable that these explorations will arouse a continuing interest in this work among residents of the various island groups and will result in further material being made available for study when they know where such material can be sent.

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