Knowledge of Lepidoptera in the island groups of the Pacific has been accumulating for the past hundred years, from a beginning of mere casual collections by various of the early exploring expeditions to the more extensive and more special entomological explorations of the later four or five decades.

The first record of Lepidoptera collected in Hawaii was the Kamehameha butterfly, Vanessa tamacana (Schmaholtz), collected on Keakeha's voyage of discovery, 1822-1825 (Hawaii, 1825), and described in 1821 by Friedrich Schmaholtz.

In 1844 Mr. Edward Doubleday records the capture of Vanessa cardui in Hawaii by Captains Byron in 1820 and by Captain Beechey in 1827.

In 1861 Wallengren records 3 species of Lepidoptera from Oahu, 2 species from Tahiti, and 4 species from Galapagos, taken on the voyage of the frigate "Puysegur", 1851-1853.

In 1874 Butler listed 104 species of butterflies known in the South Sea Islands, describing some as new, but most of them had been described at various times previously. A few of these were from Samoa and the Society Islands, mostly from Fiji and islands farther west.

In 1876, 6 butterflies are recorded by Felder from Fiji and 3 from New Caledonia, collected on the Frigate "Neuver", 1857-1859. Most of their collections were from other regions, for example, tropical America and the Australian and Malay regions.

Nothing of any particular consequence was done on the Pacific island groups until the Rev. Thomas Blackburn's six years at the Bishop's Church in Honolulu, beginning in 1876. Being interested in insects, he devoted as much time as was available from his pastoral duties to making collected excursions into the native mountain forests. His chief interest was in the Coleoptera, but he collected many Lepidoptera, as well as insects of other orders. The Lepidoptera were studied by Mr. A. G. Butler of the British Museum. A series of papers was printed on his results, 1877-1883.

This Hawaiian Lepidopterous material was later studied and revised by Mr. Edward Meyrick, who said: "The importance of a thorough investigation of this fauna is very great, as bearing on questions of geographical distribution and development. Some studies in other orders also aroused interest, and in each of the Russian Amograms for the Advancement of Science appointed, in 1890, a committee to report on the present state of our knowledge of the Sandwich Islands, and to take steps to investigate ascertain defects in the fauna, with power to cooperate with the committee appointed for the purpose by the Royal Society, and to avail themselves of such assistance as may be offered by the Hawaiian Government or the trustees of the Museum at Honolulu." An expedition of the Hawaiian Islands was decided on, and the services of Mr. C. L. Perkins, then a young graduate of the University of Oxford, were secured. Mr. Perkins' explorations in Hawaii continued for several years, from 1892 to 1901, with some interruptions. An enormous amount of material was obtained. It was studied by a large number of naturalists, and the results were published in three large volumes of more than two thousand pages, "The Fauna Hawaiianica. The Macrolepidoptera were worked up by Mr. Edward Meyrick, and the Microlepidoptera by Lord Wakeham. Though it is not yet complete, we now have a fuller knowledge of the Lepi-
recorded in the Puna 292 species of the Macrolepidoptera, of which 82 percent were endemic, and 441 species of Microlepidoptera, of which 26 percent were endemic. Since the publication of the Puna, 140 additional species of Lepidoptera have been reported in Hawaii, 29 of which were immigrants, and 111, or 78 percent, endemic species.

In 1908-1909 the California Academy of Sciences sent an expedition to the Galapagos Islands. The butterflies and hawkmoths were worked up by Dr. P. F. X. Wunderlich, who was the entomologist of the expedition. Six kinds of butterflies were obtained, of which 3 species and 1 variety are endemic. No kinds of hawkmoths were found, of which 1 species and 3 varieties are endemic, but 4 species and 3 varieties are introduced, and 1 species is of uncertain status. The rest of the Lepidoptera obtained at this time have not yet been published.

The next group of Pacific Islands to receive particular attention was Samoa. In 1918, Dr. R. M. W. Robson of the U. S. Navy, stationed at Pago Pago, became interested in insects and formed a collection, which was forwarded to Honolulu. There, in 1923, Messrs. G. P. Wilder and G. B. Sneeden prepared a list of insects collected on the islands of Tutuila, on the islands, and on Savaii. In 1923, Messrs. G. P. Wilder and G. B. Sneeden made extensive collections in Samoa and on an expedition of the London School of Tropical Medicine and the South Pacific. This collection has been published and published in series of 195 volumes. In this work mention is also made of material in the British Museum (Natural History), and of materials in other European museums. As a result of the study of these collections and the publication of the catalogues of the British Museum, the insects of Samoa are better known than those of any other Pacific island except the Hawaiian Islands.

The Lepidoptera are treated in Volume III of the series: 280 pages, or 57 plates. The butterflies are by Mr. J. V. E. Hopkinson, Micronesia, and Mr. Edward Meyrick, Geometridae, by Mr. Louis R. Froud; the rest of the Heterocentron, by Mr. C. T. Tschumi. There are, altogether, 423 species, of which 187, or 44 percent, are endemic.

In 1922-1923, the George Expedition was performed in the Hawaiian islands. It was inaugurated with the Scientific Expeditionary Research Association of England. It was, however, the Galapagos, Marquesas, Tuamotus, Society Islands, and Austral Islands. The Micronesia and Pyralidae of the expedition were by Mr. F. C. H. Heslop, and the Pyralidae by Mr. F. C. H. Heslop. All the data on the Geometridae and 41 other species, 100 percent of which were endemic, are given in detail. The proportions of endemic species are not accurate, however, as the total number is based on several published records of endemic species. In 1925-1933, collections were made in Tahiti and the Marquesas Islands. The Lepidoptera were by Dr. E. N. Sleeman, and the Pyralidae by Mr. H. F. Snodgrass. There were, altogether, 79 species, of which 66, or 83 percent, were endemic.

In 1928-1933, collections were made in Tahiti and the Marquesas Islands. The Lepidoptera were by Dr. E. N. Sleeman, and the Pyralidae by Mr. H. F. Snodgrass. There were, altogether, 135 species, of which 104, or 78 percent, were endemic. The species of Microlepidoptera, 65 species, of which 10, or 16 percent, were endemic, are also given in detail. The proportions of endemic species are not accurate, however, as the total number is based on several published records of endemic species. In 1925-1933, collections were made in Tahiti and the Marquesas Islands. The Lepidoptera were by Dr. E. N. Sleeman, and the Pyralidae by Mr. H. F. Snodgrass. There were, altogether, 135 species, of which 104, or 78 percent, were endemic.
Indeed, evolution has reached such lengths of deviation that it is difficult to find what might be considered close relatives to some of these in any existing continental fauna.

Mr. Meyrick, who studied the Hawaiian Microlepidoptera, considered the group of the 45 genera present to be a single species. Of these, he considered a total of 24 genera, and of Indomalayan type. Nine genera have been native species, that is, offshoots of other genera; 1 of Australian origin; 1 of Malay origin; 1 of Indomalayan origin; and 1 of the 3 genera of the 3 larger endemism groups. Meyrick considered the immigration of the South American group and the 8 endemic species to be distributed in 44 genera, only 8 of which are endemic and also monotypic. Thirty-three genera include only one or two species each. Of these, he considered 14 to be endemic species, each of which has a single endemic species, or else have indigenous species of others in the same group or region. The fauna of the Pacific islands is entirely of Indomalayan origin. Meyrick considered that immigration passing through the Neotropical region.

A study of the Microlepidoptera of the St. George Expedition, Meyrick considers that the fauna of the Pacific (Marquesas, Society, Tuamotu, and Austral groups, and Galapagos) is the result of immigration from the eastern island of the Pacific, where the fauna is more complete.

As the evidence goes, there is no trace whatever of any communication between the species of the Pacific islands and South American regions. The species are actually rather nearer to South America than to Australia, but the fauna of the Pacific islands is entirely of Indomalayan origin. The fauna of the Galapagos is typical of pure American type, without a suspicion of any native influence.

Meyrick derives his conclusions from the discussion of the development of the Picidae in a few important genera. The genus Lebias has a large development as a species in the western Pacific, and only two species have been found in the eastern Pacific, and none in Australia.

Less than half of the total number of species of Microlepidoptera in these eastern island groups are entirely peculiar, unconnected with the fauna of Australia or of the Pacific. On the whole, and with that of Hawaii on the other, the considerable endemic species of the two genera, which include a large proportion of the development of the Picidae, imply an extensive limit in the development of the species. All the evidence, therefore confirms and amplifies the conclusion expressed in the Baja paper, and thus the limits of the present period are to close the whole of this region of the Picidae from Baja to the Marquesas, and from Pianos to the Society and Cook Islands according to the Torres Strait Atlas of the World, in the case of 12,000 feet, in the case of 10,000 feet, it would be sufficiently effective, contrasting all its areas into a single type of fauna, not comparable in general form, trend, or extent, with New Guinea and the surrounding groups as they exist at the present day. Its continued existence as a defined area is more a period of time relative to a mere comparatively short period of time relative to the same for purposes of measurement the species.

If it has not previously obtained this recognition, I suggest that of the paleontological interest of the cosmopolitan Picidae fauna of the western Pacific islands, it may be possible to see the history of these areas in a series of more or less distinct groups, either in the east or west, or possibly both, or perhaps in the eastern or western, or possibly both, or possibly both of these areas, or possibly both of these areas. If the ancient inhabitants of these areas are situated in the eastern or western, or possibly both, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or possibly both of these areas, or 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number of species: Diakohopla with 18 species and Asymphorophora with 14 species, respectively. Of these, Mayrink says:

The proved existence of the two endemic genera (Diakohopla and Asymphorophora) with large development in species of the region, does not appear to us, from what we have seen, to be as complete as it is generally supposed. The influence of the general development of such a large area, as the New Guinea, is not yet fully understood. The former has, however, a peculiar influence on the fauna of the region, as is well known.

The Geometridae of Samos, Marquesas, Society, Tuamotu, and Austral Islands have recently been studied by Mr. Louis Provost. The records of 30 species from Samos, 9 from the Marquesas, 3 from the Tuamotus, 6 from the Society Islands, 3 from the Austral Islands, 4 from Tonga, 6 from Fiji. Six species were widely distributed, a list of which is contained in the Atlas, and, according to this list, the number of species in the region of Samos, or is approximately 200 species. In the region of Samos only. These might be considered as endemic unless further explorations should locate some of them elsewhere. As indicating the wide spread of many of the species, Mr. Tame's table shows that 54 species of Samos fauna occur in the islands to the east, 102 in Fiji; 32 in Tonga, in the New Hebrides; 7 in the Loyalty Islands; 8 in the New Hebrides; 44 in the Solomon; 65 in New Guinea; 75 in Australia; 87 in the Pacific Archipelago; 81 in India. I note in the last only 2 species which are not present in the region of Samos and are in the list of the 102 species which have been carried by commerce. Others are the larger ones which are seen to be more few and have been able to migrate from group to group islands over the great area of islands between the Asia continent, Australia, and Samos.

The largest group in the vicinity of Samos (about 500 miles distant) and the largest number of species in common with Samos, being 102 species, is the fauna of Fiji which is the same as the fauna of the group of islands, but no doubt has not become proportionately as well known in some of the groups with a more mesophyll fauna. About 700 species are already known, and a number of new species have been added annually late years. These have not been completely listed. There have been put from time to time into the Transactions of the Entomological Society of London, Annales and Magazine of Natural History, and other journals, and as no list of the species has been made by Mayrink in his Katal. Lepidopterorum. Of the species already known, about 100 are butterflies, about 1000 Sphingidae; more than 400, other Micros, and nearly 200, Micros.
THE COLONIZATION OF IMPORTED PARASITES OF THE
EUROPEAN CORN BORER IN THE UNITED STATES

By W. A. Baker and W. G. Bradley

The European corn borer, *Pyrausta nubilalis* (L.), which was first dis-
covered in the United States in the vicinity of Boston, Mass., in the summer
of 1871, is distributed generally over the corn-growing regions of the Northern
and Southern States. Nowhere is its present known distribution restricted to
the northeastern part of the United States and adjacent parts of Canada. In the United States its dis-
tribution extends from eastern Wisconsin eastward to the Atlantic Coast,
and northward to the Great Lakes. In Canada it includes New Jersey, southern Dakota, the Eastern Shore of Mary-
land and Virginia, and several counties in the eastern Virginias mainland.
The serious losses caused by the borer after its discovery in eastern Massa-
chusetts were due to ignorance of the insect's history as a serious enemy of corn,
maize, millet, and hemp in the Old World. It was first reported in the United States in 1871.

The colonizing species of parasites have been available for use during
the past 14 years of the colonization program, ranging in numbers of adults of
chalcid species from 8 of *Metopus agricolus* to more than 2,900,000 of
*Leucospis brevicorpa*.

**Securing the parasites.** From foreign importations, which at first were
made direct by a unit included in the organization for European corn
borer research and later through cooperation with the Division of Foreign
Parasite Introduction of the Bureau of Entomology and Plant Quarantine
and the Entomological Branch of the Department of Agriculture of the
Government of Canada, a total of more than 2,000,000 parasite adults were
made available for release in the United States. These were supplemented
with 2,000,000 adults, originating principally of *M. agricolus*, *L. brevicorpa*,
*Leucospis annulata*, and *Ophiogomphus campestris*, produced through laboratory
breeding operations, and through domestic field collections. In the latter
year, the general handling technique used was as with the importations,
and the species consisted principally of *Ioera rufilana* and *Lydiaella
punctella* from the vicinity of Boston. It was found that this species had
been established and had attained such abundance in this district that
it could not be obtained more effectively from either source by laboratory
breeding. In addition, this served to add the adult host to the list of
hosts physiologically adjusted to conditions prevailing in many
localities in the United States.

During the progress of the importation program, nearly 2,000,000
parasitized corn borer larvae were imported into the United States for
the rearing of these parasites. More than 1,600,000 of these came from Europe
and 500,000 from the Orient. The importations of parasitized corn borer larvae
were started in 1873.