EARLY REFERENCES TO HAWAIIAN ENTOMOLOGY

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INTRODUCTION

While examining the narratives of the early voyages of the Pacific, I came across several entomological references so interesting that I decided to extend the search and present the results in a form more readily available to workers in this field.

As the investigation proceeded, references multiplied so rapidly that I decided to call a halt with the year 1900, as the numerous papers appearing since that time are fairly well known.

In preparing the bibliography an effort has been made to examine all available printed matter dealing directly or indirectly with Hawaii, but it is not unlikely that some references have been overlooked, especially in the earlier writings of the missionaries.

It is a pleasure to acknowledge the assistance received—particularly in regard to the more recent publications—from the published bibliography by D. L. Van Dine (224)[1] and from the card catalogues that have been gradually built up in Hawaiian institutions.

The subject of the distribution of organisms, especially in the Pacific, has a most important bearing upon our life here in the Hawaiian islands. Among insects, practically all of our pests have gradually arrived along the lines of commerce; and even now, with our strict quarantine system, new ones continue to gain an entrance every year.

Hence, such a review of the literature is especially interesting and valuable, because it aids in determining the time of introduction and also the distribution of the various organisms found in Hawaii.

DISCUSSION OF THE LITERATURE

In reviewing the written history of these islands, I naturally began with the account of the voyages of Captain Cook (2), who discovered the Hawaiian islands in 1778. Diligent search failed to locate any reference to insects, although dogs, hogs, rats, and birds are mentioned. However, in a separate narrative, William Ellis, the assistant surgeon of this voyage of 1778, indicates clearly that at least house flies were troublesome. In describing the natives, Ellis says (1, Vol. II, p. 156),

> They have also a kind of fly-flap, made of a bunch of feathers fixed to the end of a thin piece of smooth and polished wood; they are generally made of the

[1]The references in parentheses refer to works listed in the bibliography on pages 19 to 50.

tail feathers of the cock but the better sort of people have them of the tropick birds' feathers, or those belonging to a black and yellow bird called Mo-ho. The handle is very frequently made of the bones of the arm or leg of those whom they have killed in battle, curiously inlaid with tortoise-shell; these they deem very valuable and will not part with them under great price. This ornament is common to superiors of both sexes.

Later, Captain Nathaniel Portlock referred to these brushes (4, p. 88) when describing the supplies purchased from the natives:

Curiosities, too, found their way to market and I purchased two very curious fly-flaps, the upper part composed of very beautiful variegated feathers; the handles were human bone, inlaid with tortoise-shell in the neatest manner which gave them the appearance of fineered (veneered) work.

Captain George Dixon, who was associated with Portlock refers to these objects (3, p. 272) as follows:

Fans and fly-flaps are used by both sexes . . . The fly-flaps are very curious; the handles are decorated with alternate pieces of wood and bone which at a distance has the appearance of fineered work; the upper part or flap is the feathers of the man-of-war bird.

Vancouver, also, mentions fly-flaps (6, Vol. III, p. 42) for the dispersal of offending insects; but makes no further references to entomology.

Apparently, the first entomological work in Hawaii was done by Doctor Johann Friedrich Eschscholtz, who at the age of 22, in the capacity of physician and naturalist, accompanied the Russian explorer Otto von Kotzebue on his first voyage. This brilliant student, upon his return to his native country was appointed professor of anatomy and afterwards director of the zoological museum of the university at the University of Dorpat, his native city. Kotzebue himself, though only an intelligent sailor, makes several interesting allusions (7, Vol. I, p. 306) to the fauna of the group: "The chief employment of the royal ladies consists in smoking tobacco, combing their hair, driving away the flies with a fan and eating." Speaking of the king's daughter (7, Vol. I, p. 307), he says: "Behind her stood a little negro boy, holding a silk umbrella over her head to protect her from the rays of the sun; two other boys with tufts of red feathers, drove away the flies from her." And in describing how the sailors were entertained at dinner ashore, Kotzebue (7, Vol. I, p. 311) relates: "Each of them had, like us, a kanaka standing behind him with a tuft of red feathers to drive away the flies." Finally he speaks more directly of the fauna (7, Vol. III, p. 237), "The only original wild quadrupeds of the Sandwich Islands are a small bat and the rat. To these is added our common mouse, besides the flea, some species of Blatta and other noxious parasites."

In the appendix of the third volume of the narrative of Kotzebue's voyage (7, p. 376) is the description by Eschscholtz of our native Hawaiian butterfly, *Vanessa tameamea* and descriptions of all the new butterflies collected in the various countries visited. The other orders of in-

sects, taken during the voyage, were described later in separate papers, of which the most important are his "Entomographien" (8).

A missionary, James Montgomery, states that the boat used by his party swarmed with cockroaches at the time of its arrival in Hawaii (1822) (15, Vol. I, p. 365). In describing a gathering at a mission service, he says (15, Vol. I, p. 417), " . . . members of the royal family had servants in attendance with fly-flaps and fans of peacock's feathers to cool their faces and drive away the troublesome insects." He says also (15, Vol. I, p. 434):

> There are no mosquitoes here; neither are there any bugs. When the latter are brought on shore in bedding or packages from shipboard, they presently die; the climate of the Society Islands is equally fatal to them. Flies are very numerous and annoying, . . . The few spiders, moths and dragon flies which we have seen, much resemble those of the South Sea Islands.

In referring to the table manners of the natives, Montgomery (Vol. I, p. 472) writes:

> When a common fly was found drowned in their messes, they seemed at once to grow sick and turn away their faces with no equivocal expression of utter loathing. Flies, indeed, may be said to be an abomination with these savages—probably from some superstitious prejudice, for vermin far more disgusting are greedily picked by them from their own bodies—nay, from the very dogs—and devoured.

Gilbert F. Mathison, an English traveler, also remarked upon the troublesome house flies. In speaking of the chiefs in their home life (9, p. 365), he says he found "some asleep, some fanning away the flies . . . " He further states that the queen at the mission service "was attended by several female servants, carrying fly-fans" (9, p. 378). When dining with the natives, he notes (9, p. 401), "One brushed away the flies . . ."

C. S. Stewart, a London missionary who spent several years in the islands, also made reference (11, p. 153) to these annoying insects, describing the natives as "eating *poe* surrounded by swarms of flies . . ." Further, in referring to the unsanitary conditions and skin diseases of the people, he remarked the prevalence of head-lice, saying:

> Dozens may, at any time, be seen sporting among the decorated locks of ignoble heads; while, not infrequently, a privileged few wend their way through the garlands of princes of the blood, or trimuphantly mount the coronets of majesty itself.
>
> As to the servants of the chiefs and the common people, we think ourselves fortunate indeed, if, after a call of a few minutes, we do not find living testimonies of their visit, on our mats and floors, and even on our clothes and persons! The bare relation of the fact, without the experience of it, is sufficiently shocking. But the half is not told; and, I scarce dare let the truth, here, run to its climax. The lower classes not only suffer their heads and tapas to harbour these vermin; but they openly and unblushingly *eat them!* Yet so fastidious are they in point of cleanliness, than an emetic could scarce be more efficaciously administered than to cause them to eat from a dish in which a fly had been drowned! So much for the force of custom, and the power of habit!

In 1824, Kotzebue made a second voyage to the Hawaiian islands and was accompanied, as before, by the naturalist, Professor Eschscholtz. Again this navigator remarked on the house flies, which were evidently abundant. He states, "Two young girls lightly dressed, sat cross-legged by the side of the queen, flapping away the flies with bunches of feathers," and that the queen ate, "Whilst two boys flapped away the flies with large bunches of feathers" (13, Vol. II, p. 207).

In the appendix of this second volume, Eschscholtz (13, Vol. II, p. 357) alludes to the entomological material collected in the Hawaiian islands:

> The number of insects is small, as is indeed the case with all land animals; it is therefore creditable to our industry, that we were able to muster twenty sorts of beetles. A small *Platynus* is the only Carabide; in the water, two *Colymbetes* and a *Hydrophilus* were found. The only *Elater* belongs to a species *(Agrypnus N)* in which we reckon various specimens found only in the old world, such as *Elater tormentosus, fuscipes, senegalensis,* etc.; beetles which have two deep furrows in the lower part of the neck-shield, to receive the feelers, and which go in search of their food at night. They resemble many of the European springing beetles covered with scales and included by Megerle under the name Lepidotus; such are *fasciatus, murimus, varius.* Two Aphodii were found; one of the size of the *Psammodius porcalus,* but very flat, lives under the bark of a decayed tree, the wood of which has become soft. Another has the almost prickly shoulders of the *Aphodius stercorator* and *asper;* of these we form the species *stenocnemis* and include therein four new varieties found in Brazil and Luzon. It may be here observed that *Psammodius sabuleti* and *cylindricus* N, must be classed with *Aegialia* which, on account of the horny nature of the jaws, and the projection of the upper lip, enter into the same class with the *Trox;* the remaining kinds of *Psammodius,* however, do not at all agree with the character given them by Gyllenhal, and ought in their turn to be classed with Aphodius. Among the remaining beetles, all of which dwell under the bark of trees, a *Parandra* was the largest.

A few remarks on the various beetles mentioned by Eschscholtz will not be out of place here. The carabid, *platynus,* is probably one of the numerous small native Hawaiian species of Anchomenus. The two Colymbetes are undoubtedly our *Coplatus parvulus* (Esch.) and *Rhantus pacificus* (Esch.); possibly both introduced very early. The hydrophylid was later described by Eschschlotz as *Hydrophilus semicylindricus,* though it is now placed in the genus Hydrobius. Blackburn considered it an immigrant. The elatrid, *Agrypnus N.,* is undoubtedly the *Agrypnus modestus,* MacL., which is now placed in the genus Adelocera. This species is said to be widely distributed in Polynesia and elsewhere. I have had more difficulty in trying to place the two Aphodii mentioned. It is hard to say what the flattened species is; but the one with the "almost prickly shoulders" is probably *Ataenius stercorator* Fab. This widely distributed species, Blackburn states, is not rare in the neighborhood of Honolulu, yet no specimens of it are in the Hawaiian collections.

Finally, the cerambycid, Parandra, is undoubtedly *Parandra puncticeps* Sharp, which Blackburn and Sharp (120) state is closely allied to a species occurring in the Philippine Islands.

Lord Byron, though on a mission of mercy to the Hawaiian Government, spent some time during 1825 in exploration. In his narrative there are a few interesting references to the fauna and flora of the Hawaiian group. Andrew Bloxam, an enthusiastic student just out of Oxford, was naturalist on the voyage and though a botanist by preference, he collected many zoological specimens during the eighteen months spent in Hawaii. This material was deposited in the British Museum. Probably based on information supplied by Bloxam, Lord Byron (10, p. 252) states:

> We met with only one Papilio, which Kotzebue has described under the name *Vanessa tamehameha* (tameamea). We caught one sphinx moth; brown, with a purple stripe on each side of its body, which glitters in the sun. There are several minute moths, several varieties of Libellula (dragon-flies), one species of Cicada, a black earwig, a wood spider and innumerable fleas.

It would be interesting to know what the cicada mentioned is, also the sphinx; no moth answering that description is in the Hawaiian collections.

Captain F. W. Beechey (14), an English explorer, who visited Hawaii in 1826 and 1827, apparently made no reference to the insect fauna, though his remarks (14, Vol. II, pp. 100 and 112) on the first export of a cargo of sugar to California are of interest, considering the prominence which the sugar industry has now attained.

In the Reminiscences of Rev. Sereno Edward Bishop I found two interesting references. Describing the customs of the chief, Bishop says: (16, p. 30):

> Objects much in evidence among the natives, when visiting or at meetings as well as in their homes were their fans, and their fly brushes or kahilis. The fans were made from the ends of young coconut leaves. The broad end being elastic, threw the air far more efficiently than the stiff fans now commonly braided. Get an old-fashioned native fan for comfortable use. Small fly-brushes were used by all the people. They were about four feet long, the upper half of the stick having the tail feathers of fowls tied on. The kahilis of the chiefs were larger and more elaborate. The long handles were often beautifully encased with tubes and rings of human bone and whale-tooth, also turtle shell, all finely polished. A high-chief always had two or more attendants armed with such fly-brushes.

In discussing (p. 37) the destruction of the trees of the islands, Bishop remarks;

> About 1860, a minute insect called "red spider" came to infest the under-side of the leaves to such an extent as in the course of a year to destroy every kou tree, not only in Lahaina, but throughout the group. The timber of the dead trees was cut and used for furniture, much being sent to Germany. The chief's great calabash bowls of kou are now rare and choice. Young trees of the species exist here and there. The trees have always succumbed to the insect pest before attaining any considerable size.

"Moolele Hawaii," written about 1832 by David Malo, a native, has interesting references (17, p. 65). Malo says:

> The following are the flying things (birds, *manu*) that are not eatable: The *o-pea pea* or bat, the *pinao* or dragon-fly, the *okai,* (a butterfly), the *lepe-lepe-ahina* (a moth or butterfly), the *pu-lele hua* (a butterfly), the *nalo,* or common house-fly,

the *nalopaka* or wasp. None of these creatures are fit to be eaten. The *uhini* or grasshopper, however, is used as food.

The following are wild creeping things; the mouse or rat, (*iole*), the *makaula* (a species of dark lizard), the *elelu,* or cockroach, the *poki-poki* (sow-bug), the *koe* (earthworm), the *lo* (a species of long black bug with sharp claws) the *aha* or ear-wig, the *puna-wele-wele* or spider, the *lalana* (a species of spider), the *nuhe* or caterpillar, the *poko* (a species of worm or caterpillar), the *nao-nao* or ant, the *mu* (a brown-black bug or beetle that bores into wood), the *kua-paa* (a worm that eats vegetables), the *uku-poo* or head-louse, the *uku-kapa* or body louse.

Whence comes these little creatures? From the soil no doubt, but who knows?

Speaking of the animals imported from foreign lands during the time of Kamehameha I and as late as the time of Kamehameha III, Malo (17, p. 66), after enumerating those valuable for food continues:

There are also some flying things that are not good for food: such as the mosquito (*makika*), the small roach (*elelu liilii*), the large flat cockroach (*elelu-papa*), the flea (*ukulele,* jumping louse). The following are things that crawl: the rabbit, or *iole-lapaki,* which makes excellent food, the rat or *iole- nui,* the mouse or *iole-liilii,* the centipede (*kanapi*) the *moo-niho-awa* (probably the scorpion for there are no serpents in Hawaii). These things are late importations; the number of such things will doubtless increase in the future.

This prophecy has been abundantly fulfilled, for even now with our efficient quarantine, new organisms frequently gain entrance.

F. D. Bennet, an English naturalist, who came to the Pacific primarily to investigate the anatomy and habits of the whales of the Southern Pacific and to collect natural history material, discusses the insect fauna of Hawaii (24, p. 252) as follows:

Insects are not more numerous here than at the Society Islands; they present, also, nearly the same genera, and are equally remarkable for the apparent addition of many exotic kinds to those few which were found on the soil by our navigators when this archipelago was first discovered. Together with some smaller butterflies, we find at Oahu a *Venessa,* closely resembling the *V. atalanta* of Europe; as well as a second species, differing in no appreciable respect from *V. cardui;* and as the habitat of the latter insect is the thistle in the northern parts of the globe, so here the analogous species resorts to the prickly foliage of the *Argemone Mexicana.* A hawk-moth, (*Sphinx pungens*) similar to that inhabiting the Society Islands, is very common on the pastures in the vicinity of the coast. Its larva is large, of a green colour with longitudinal and oblique lilac bands on the sides, and has the characteristic horn on the back. The habits of the perfect insect are similar to those of the humming bird, hawk-moth, *Sphinx macroglossum.* It flies by day, and appears to seek the warmth and brightness of the noontide sun; and flitting from flower to flower, on which it seldom alights, it drains the nectar from the blossoms with its proboscis as it floats in the air with a rapid, vibratory motion of the wings. On one occasion, when I was endeavouring to capture this coqueting insect, a native came to my assistance and undertook the task in his own way: gathering two of the elegant blue convolvulus flowers around which the moth had been fluttering, and holding one in each hand in an inviting position, he cautiously approached or followed the insect to tempt it within his reach. The active but stealthy movements of the young and scantily-clad islander, as he pursued his shy game over the plains; the seducing attitudes he assumed, and the insinuating manner in which he presented the flowers to the moth when opportunities offered, afforded a very ludicrous scene. Although the exertions of my entomological friend were at this time fruitless, I have often seen the plan he adopted successfully employed by other natives; the hawk-moth, approaching the proffered blossoms, protrudes its long proboscis, which is seized with the fingers and the creature secured.

The insects we noticed here, though not at any of the other Polynesian Islands we visited, were large tarantula spiders, (*Lycosa Sp.*) the millipede or wood-louse, (*Oniscus asellus*) and centipedes, eight or ten inches long, their colour brown-yellow, the sides and abdomen blue. The luminous centipede (*Scolopendra electrica*) is also found in the houses at Honoruru, emitting its characteristic phosphorescent light, and leaving behind it a trail of luminous matter.

In a footnote Bennet gives this additional information:

Ships are, doubtless, the active, though involuntary agents in disseminating insects over remote regions of the globe. After we had been at sea for several weeks, or even months, it was not uncommon to find on board the Tuscan many kinds of land-insects in a living state, from the hardy beetle to the delicate and more ephemeral butterfly, whose germs had probably been received on board together with supplies of fruit and vegetables.

The statement quoted from Bennet is one of the earliest definite references that I have been able to find bearing upon the introduction of the cosmopolitan butterfly, *Vanessa cardui Linn.*, other than the unverified report of four specimens sent to the British Museum, two collected by Captain Byron in 1825 and two by Captain Beechey in 1827. (See Bibliography Nos. 27 and 65.)

Dr. Alonzo Chapin, a resident missionary, in writing on the diseases of the Hawaiian islands in 1838, remarks (22, p. 253) upon the absence of malaria as follows:

Before going out to the Sandwich Islands, I spent several years in our southern states, much of the time in the low country of South Carolina; and was, during the hot seasons of the year, accustomed to recoil at every standing body of water, on account of the poisonous exhaltions which they there emit, endangering the lives of every individual exposed to their influence. On my arrival at the islands, I more than once made the inquiry, "why the numerous kalo (taro) ponds are not productive of sickness." Thousands of acres are entirely converted into ponds of standing water in which the natives cultivate their kalo, while their houses are built on the narrow spaces between. These are never dry, and are often so numerous as to exhaust entire rivers in keeping them filled. I could not at once reconcile my mind to the belief of their innoxious tendency, notwithstanding circumstances are such as to make the fact very obvious. Though the ponds are subject to the perpetual influence of a torrid sun, they cannot become putrid by reason of the continual supply of fresh water, and multitudes of fish live and thrive in them, such is their freshness and purity.

The streams originate from springs and rain on the summits of the mountains, pour down their sides with great impetuosity and after a few meanderings are turned aside from their courses to irrigate the lands and replenish the ponds, or are discharged directly into the sea; and I know of no body of water emitting sufficient miasma to create sickness along its borders. I have occasionally met with stagnant ponds, which emit a foul and offensive odour, and could in no way satisfy myself of the reason for the exemption of the inhabitants along their borders from fevers, but by supposing the effluvia to be diluted and rendered inert by the continual currents of winds.

Small marshes abound but are fed by springs, and the pure mountain streams, and are thus prevented becoming noxious. They speedily dry up during a few weeks absence of rain; and the rivers also disappear unless kept alive by frequent showers, and the small pools, which remain at such times and which abound after every rainy season, do not become sufficiently putrid to exhale a *fever-generating* miasm.

If any one variety of *soil* has a specific power to produce malaria it does not appear to exist at those islands. The upland soil is there formed of decomposed lava, the lowland plains along the sea are constituted of a mixture of alluvion washed from the mountains, and decomposed coral. Its immunity from noxious exhalations is the same, whether parched with drought, or merely moist, as when the evaporation is most abundant, after the rains.

The habitations of the natives are for the most part considerably scattered, but are in a few instances crowded together in such numbers as to exhibit the dense appearance of our large towns and villages. There is, however, throughout, an entire exemption from those pestiferous exhalations which, so extensively, poison the atmosphere of populous places in hot climates. All animal and vegetable substances thrown away by the people, or cast up by the sea, are quickly devoured by the multitudes of starving dogs and swine, so that no detriment is experienced from their putrefaction.

With so entire an exemption from the existence of miasmata, there is also an entire exemption from those affections induced by it. Malignant bilious fevers do not occur, and as I shall, hereafter, have occasion more particularly to state, derangements of the liver and biliary organs do not prevail, neither is the stomach and intestinal canal, and other organs of the abdominal viscera subject to the numerous and complicated affections so common in every miasmatic region.

It should be borne in mind, however, that Chapin wrote before the relation of mosquitoes to malaria was known, and that probably these insects had not become generally distributed in Hawaii at that date.

Jarves' notes (23, p. 70) on the beginning of the silk industry in Hawaii are also of interest:

In 1836 Messrs. Ladd & Co. leased a portion of their land to Messrs. Peck and Titcomb, for the purpose of cultivating the mulberry and raising silk. They have now upwards of forty thousand trees, which at nine months growth, are as thrifty and forward as those of several years, in New England. As yet they have been disappointed in obtaining the silk worm, but are daily expecting a supply of eggs from China.

The following (23, p. 75) gives some indications of the proportions of the new industry:

At Mouna Silika, the mulberry-plantation, 85,200 of the black mulberry (*Morus multicaulis*) have been planted, and the ground and slips prepared for many more. Many thousands of the white mulberry (*Morus alba*) have also been set out. The average age of 42,000 of the former is six months, and it is computed that they will afford thirty and a half tons of leaves, sufficient to feed 1,200,000 worms. The leaves of one tree of eight months growth, weighed three and a half pounds, and a leaf of three months growth measured seven inches in length. The trees that were plucked, leaved out again in six weeks so fully, that they could not be distinguished from those in the same row which were left unplucked. They are planted in hedge rows, ten feet apart, and two feet separate in the row. The silkworm of the white species, which produces the finest silk, has been received from China, but the proprietors do not intend to raise them in numbers until the plantation is thoroughly stocked with trees, and the necessary arrangements for buildings, machinery, reeling, etc., be made in the United States, which one of the proprietors, Mr. Peck, is upon the point of visiting, for that purpose. If the natives can be taught the art of reeling silk, this branch of industry will be of infinite benefit to them, as the raising of cocoons is attended with so little expense and trouble. Women and children are particularly adapted to it, as well as old and infirm persons. Thus it will afford occupation to many who are incapacitated from entering into any laborious trade. The amount of land in the plantation is between three and four hundred acres, undulating partly wooded, and well watered.

These citations by James J. Jarves, who came here from Boston in search of health in 1837, are only a prelude to his later writing on Hawaii. In his history (25, p. 10) discussing the fauna, Jarves writes:

> Insects are few, though mostly of a destructive or troublesome character. A species of caterpillar at certain seasons destroys vegetation to a great extent, eating even the grass to its very roots. A slug deposits its eggs in the cotton blossoms, which, when ripe, are pierced through by the young insects, and the staple entirely destroyed. Large spiders are very numerous and mischievous weaving strong webs upon shrubs and young trees, in such quantities as to check their growth, and even impede the passage through an orchard. A species of woodlouse fastens upon the limbs, entirely covering them, and which speedily exhausts the juices; and their growth is for the time effectually checked. A black rust, firm, hard, and stiff, like strong paper, resembling soot in its appearance, attacks many varieties of trees and plants, covering the bark, and even the leaves, giving them the singular appearance of being clothed in mourning. This causes no permanent damage, and while it disfigures fruit, does not appear seriously to injure it. Rats damage the sugar-cane to a considerable extent, annually. Though the Hawaiian agriculturist escapes many of the evils incidental to other tropical climes, enough exist here to make his labours no sinecure. The noxious vermin, such as mosquitoes, fleas, cockroaches, scorpions, and centipedes, are a modern importation, and have extensively increased. The bite of the two latter causes no permanent injury, and is not more injurious than the sting of a common wasp. They are very abundant about the seaports. No serpents, frogs, or toads, have as yet reached the islands. A small lizard is common.

Later, in his Scenes and Scenery in the Hawaiian Islands, Jarves refers to the extensive silk industry and the many difficulties that beset it. (See 28, pp. 105-112 and 164-9.)

The United States Exploring Expedition being principally a marine investigation, hardly touched upon the land fauna of Hawaii, yet I found two valuable references in the Races of Man by the naturalist, Charles Pickering. Discussing animals and plants of aboriginal introduction (26, p. 314) he says:

> There are, however, uninvited attendants on human migrations; such as, a small species of rat, whose presence throughout Tropical Polynesia, seems nearly universal. On some of the more remote coral islets, the presence of this animal, proved to be the only remaining evidence of the visits of man.
>
> On the other hand, the house fly, which so abounds at certain coral islands, was uniformly absent from the uninhabited ones. Various other insects, have doubtless been transferred from island to island by human means.
>
> This, too, was probably the case with the lizards (Scincidae); for the agency of drift-wood, seems insufficient to account for their universal presence.

In referring to animals and plants of European introduction, Pickering (26, p. 333) writes:

> We were informed at the Hawaiian Islands, that the centipede, was "introduced five years previously from Mazatlan." It has greatly multiplied at Honolulu; and during our visit, it made its first appearance on Maui.
>
> The house scorpion, likewise abounds at Honolulu; and its introduction was equally attributed to vessels from Mazatlan. The other Polynesian groups, remain free from the above two pests.
>
> The natives of the Hawaiian Islands, attributed the introduction of the mosquito to the same quarter; and we obtained evidence of the possibility of such an occurence, in the larva continuing on shipboard for many days after we left Honolulu. One or more native species of mosquito, were observed at the other Polynesian groups.

It will be noted that these observations coincide with those of all the earlier navigators, that flies were evidently a native introduction previous to the appearance of European ships. That the house fly, *Musca domestica* Linn., will travel long distances by small boats is now a matter of common observation. Moreover, on this point there is the conclusive evidence by S. C. Ball (225), who recently investigated the migration of insects over sea, along the coast of Florida.

Since the natives in their wanderings in the Pacific previous to the appearance of white men, evidently took along their hogs and dogs, together with coconuts and other plants, it is only natural to conclude that flies also traveled from place to place with them.

That flies very early made their appearance in the Hawaiian islands, is further indicated by the great development of the kahilis or fly flaps. Dr. Brigham amplifies this point in his comprehensive review of Hawaiian feather work (193, p. 14), in which he says:

> It is probable that a bunch of feathers used as a fly-flap was the primal form of feather work. Flies (*nalo*) were here though not in such abundance as found by early explorers on other islands of the Pacific; but even for this useful purpose the bunch of feathers was no doubt preceded by a bunch of leaves, and the prototype of the kahili seems to have been a stem of that most useful plant the *ki* (*Cordyline terminalis* Kunth). On many of the islands of the Pacific, a branch of *ki* was the symbol of peace and on the Hawaiian islands it shared in early times with a coconut leaf the representation of high rank . . . .
>
> Very early the hand plumes became symbols of rank and on all public occasions kahili bearers attended a chief, or while he ate or slept a *kaakui* brushed away with small ones all troublesome insects. In public they were tokens; in private fly-flaps.

Indeed, it is hardly necessary to draw upon the imagination to understand the gradual development of the immense, symbolic kahilis with shafts of twenty feet or more in length, used at funerals of royalty; especially when it is known that small fly-flaps of similar construction have always been waved over the body at funerals in Hawaii to keep away these obnoxious insects.

In describing the Hawaiian fauna in 1850, Henry T. Cheever (33, pp. 105-6) says:

> Not a noxious beast, reptile, or insect existed on the islands when first made known to Europeans. Now they have mosquitoes, fleas, centipedes, and scorpions.
>
> The snake, toad, bee, and all stinging insects of the latter sort are still unknown. One would think the flea certainly indigenous, where now it is found so much at home both with man and beast; but the natives have an amusing story of the first time they got ashore from a ship, through the trick of a sailor, which is better to be imagined than told.
>
> Whether that be true or not, the name by which they call the flea is pretty convincing evidence that it has not been known as long as some other things. It is called *uku lele,* or the jumping louse, the *uku* being an old settler from time immemorial, and nothing else they knew so much like the imported flea. So they named the stranger the jumping *uku*: it is one of the first aboriginals

a traveler becomes acquainted with in going about among Hawaiians and sleeping in native houses, and it is the last he is so glad to bid good-by to when he comes away, though it is ten chances to one if they do not insist upon keeping him company and making themselves familiar half the voyage home.

The Royal Hawaiian Agricultural Society organized in 1850 did splendid work for several years. In the Transactions of this society I found a number of references to entomology. William Duncan (36) suggested good cultivation and clean culture for the eradication of insects and urged that land adjoining sugar plantations be either kept fallow or burned to keep away caterpillars.

Dr. Wesley Newcomb also contributed to the Transactions (37) an interesting paper in which (p. 95) he states that *Vanessa cardui* was introduced presumably at the same time as *Argemone mexicana* (poppy or thistle) though he does not suggest the date. Among other insects, he mentions three species of Sphynx, one of them, *S. pugnans,* being common at Honolulu. Of the small moths he recognized seven species as enemies of agriculture and gives the larval characters of the principal cut-worms. The corn leaf-hopper, or corn-fly, he records as a serious pest at that time. He mentions also the red spider as destructive to the leaves of many plants and a microscopic white fly (from his description difficult to determine) destructive to the leaves of melons. Mention, too, is made of a small caterpillar that bores into the stalks of tobacco—undoubtedly the tobacco split worm, *Phthorimaea operculella* Z. a rather serious pest in more recent years. The description of a wormlike borer of the sweet potato suggests the larva of our common pest, the sweet potato weevil, *Cylas formicarius* Fab. Newcomb states that he was not able to detect any true aphids, but he recognizes that the numerous ants filling the soil play an important part in the destruction of the larvae of pestiferious moths and of other insects.

At meetings of the Society in 1851, the introduction of the common honey bee was considered, and the next year it was reported (38) that three hives were coming from New Zealand by the first vessel direct to Honolulu. I could find no statement indicating that these ever arrived, but the record (42) shows that two years later an attempt to import two hives of bees from Boston proved unsuccessful because of the ravages of the bee moth on the way. In 1855, a report was presented to the Society upon the economic relation of insects to crops with suggestions for the importation of natural enemies of these from abroad (45). The report states that though wasps are abundant, bees have not yet been successfully introduced.

At a meeting in 1856 a very valuable paper was presented by the well-known botanist, Dr. William Hillebrand (46). This paper written by Valdemar Knudsen, deals primarily with the control of cutworms which

were evidently very numerous at that time. Descriptions (46, p. 96) are given of five kinds as follows:

1st. Brown, with a white stripe on the back and white belly. It grows to the largest size, fully 2½ inches long and one-quarter inch thick. It is very voracious, and a single worm will strip a large plant, leaving nothing but the ribs.

2nd. Gray, with a brown back of a bright, shining appearance; it does not grow as large as No. 1. It is the regular cutworm that seems to enjoy nothing but the juice of the stems, which it will often cut off when quite large and hard.

3d. It is destructive as the former, and also like it in color and size, only not bright or shining on its back.

4th. Is bluish-gray, with head and tail white—rather rare.

5th. Mud-colored; is the one that appears every year, and seems able to do with less wet soil. It is not quite as voracious, nor does it attain the size of the former ones, but still is very destructive.

It is interesting to note that the cutworms were excessively abundant on land that had been flooded for a few days. This observation agrees with my experiences in North Queensland. The only explanation that I am able to suggest is that flooding in some way interferes with the natural enemies of these pests.

A great impulse was given to the investigation of the Pacific fauna by the coming of the Swedish Frigate "Eugenie" with a staff of trained investigators. These scientists arrived in Hawaii in August, 1852 and though their stay in the islands was short, they evidently improved the opportunity, for among the insects collected were about twenty new species, belonging to several orders. Unfortunately no record was made of their catches except of the new species. These records were worked up several years later—the Coleoptera by C. H. Boheman, the Orthoptera and Hemiptera by Carl Stal, the Lepidoptera by D. J. Wallengren, the Hymenoptera by A. E. Holmgren, and the Diptera by C. G. Thomson (49).

The coming of the energetic student, Rev. Thomas Blackburn, in 1877 marked a new epoch in the history of systematic entomology in Hawaii. Though his special hobby was Coleoptera, Blackburn collected all orders of insects and published papers on most of them (67). The extent of his scientific work during the six years of his stay is marvelous especially considering that it was all done at odd moments whenever his strenuous duties to the Church would permit. Indeed, so abundant were his catches that he kept almost a dozen specialists (principally in the British Museum) busy describing his material, in addition to all the descriptions that he himself prepared for the press. A glance at the bibliography (pp.) will give a suggestion of the extent of these labors. The following specialists assisted him in publishing his material: Bormans (105) handled the Orthoptera; McLachlan (110, 111, 138) helped with the Neuroptera including the Odonata; White (71, 81, 88, 100) did part of the Hemiptera; Butler (74, 90, 96, 106, 108), Meyrick (112, 122, 131) and Tuely (79, 80) all worked on the Lepidoptera; Sharp (75, 76, 77, 78, 85, 93, 99, 119,

120, 124) and Waterhouse (87), part of the Coleoptera; while Smith (86) and Cameron (97, 109, 125, 127) helped with the Hymenoptera.

In 1882 J. E. Chamberlin published an interesting paper dealing with the devastating hordes of cutworms, or army worms, on Oahu (104). The outbreak of this pest is said to have extended from the sandy beach to the mountains. The land over which the worms had fed appeared bare, as if scorched; cattle starved to death. Blackburn identified the species as *Prodenia ingloria* Walker, a cutworm known in Australia; yet all evidence goes to show that this pest was an old resident in Hawaii. I was particularly interested in the following statement by Chamberlin: "Whenever a tract is burned, a great flight of moths appeared immediately; and an army of worms shortly followed, entirely destroying the tender grass." This was exactly my experience with a similar species in North Queensland. Whenever an accidental fire ran through the growing cane, a scurge of cutworms soon followed to wipe out the crop just as it was beginning to recover from the burn. The only explanation that I was able to offer was that those abnormal conditions in some way upset the natural controlling factors so that the development of the pest, for a time, was not hindered by them.

The investigations of the Challenger Expedition were primarily marine. Small attention apparently was given to land fauna and few references to insects appear in the published works. Kirby, in describing the Hymenoptera collected, mentioned only three from Hawaii. (This is the only reference that I have been able to find.) But among the pelagic insects belonging to the genus Halobates, monographed by White (114), are several species found in Hawaiian waters. These were described and figured in colored plates, making their determination easy.

As a young graduate just out of the University of Oxford, the indefatiguable worker, R. C. L. Perkins, came to the islands in 1892 (?). The results of his work of more than twenty years stand as a monument to the hardships that he endured and the efforts that he put forth. During these years numerous papers were published, but the general results from the study of the tremendous amount of material he collected appear in the three large volumes of the Fauna Hawaiiensis. Of this work the following parts were published previous to the year 1900: Macrolepidoptera by E. Meyrick; Hymenoptera Aculeata by R. C. L. Perkins; Formcidae by August Forel; Orthoptera, Neuroptera and Coleoptera Rhynchophora, Proterhinidae, Heteromera and Ciodae by R. C. L. Perkins; and the Coleoptera Phytophaga by David Sharp. Since the Fauna Hawaiiensis is available in the principal libraries, I have not taken space to list the numerous species described.

IMPORTANT IMMIGRANT INSECTS

Among the instroductions by European commerce was the night mosquito (*Culex quinquetasciatus* Say), a pest of first importance especially as a carrier of disease. Though it has been generally understood that these insects came to us from the coast of Mexico, it is interesting to read the following account by Osten Sacken (118):

> About 1828-30 an old ship from Mazatlan, Mexico, was abandoned on the coast of one of the Sandwich Islands. Larvae of Culex were probably imported in the water-tanks upon it. The natives soon became aware of the appearance round the spot of a—to them unknown—blood sucking insect; it so far excited their curiosity that they used to congregate in the evening in order to enjoy the novelty. Since then the species spread in different localities, and in some cases became a nuisance.
>
> This was related to me by Mr. T. R. Peale, the well known American entomologist and artist, who visited the Sandwich Islands a few years later with the United States Exploring Expedition under command of Captain C. Wilkes (1838-40). A distinguished American, who spent many years on the islands and whose acquaintance I made in Washington, confirmed the story to me, and told me that he remembered positively that there were no mosquitoes on the islands about 1823.
>
> This version is at any rate more probable than another which I read in the German periodical, "Die Natur," that gnats were intentionally imported into those islands by a mischiveous sea-captain, in vengeance against the inhabitants.

Another pest of importance in Hawaii is the sugar-cane borer, *Rhabdocnemis obscurus* Boisd., which was evidently introduced from some of the Pacific islands; Boisduval (20) in 1835 described the species from New Ireland and Fairmaire (32) later recorded it from Tahiti. This borer began to make inroads upon the sugar industry of Hawaii apparently during the early eighties (107, 113), rapidly spreading until brought under control by the introduced tachinid parasite (*Ceromasia sphenophori* Vill.). The species was recorded by Blackburn and Sharp (120) with a few brief systematic notes. The first careful study of the life history and economic relations was that by C. V. Riley (132), the specimens being sent to this celebrated entomologist at the request of his Majesty, King Kalakaua.

Another cosmopolitan insect found in Hawaii during recent years, though of little economic importance compared with the cane borer, is the milkweed butterfly, *Danaida archippus* Fab. This insect was not mentioned by any of the early voyagers and in fact the first reference to its presence in the islands is from Blackburn's material in 1878 (74). The geographical distribution of this species was reviewed in 1886 by Walker (126), who stated that these butterflies were abundant and well established in Hawaii at that date.

In the early nineties exotic scale insects began to command attention (134) and during the following decade fully fifty species had been re-

corded in Hawaii. *Icerya purchasi* Mask. is thought to have made its appearance in the islands during the spring of 1889. By 1890 it had become widely distributed in the gardens of Honolulu. During the following year, C. V. Riley (137) reported that it had been successfully controlled by the Vedalia beetle introduced from California. Nevertheless, other coccids began to make themselves felt, even attacking the coffee, which was so seriously affected that Mr. Albert Koebele, who had been so successful with the California State Board of Horticulture, was engaged in 1893 by the Hawaiian Government to search Australia for its natural enemies (143, 145). His work proved eminently successful and by 1895 there was a marked decrease in many of the scale insects owing to the natural enemies introduced (154). Chief among these friendly insects were lady bird beetles (Coccinellidae), fully three dozen species being in the list (153). As new scales continued to make their appearance in the islands, coming in on frequent plant and fruit importations, Koebele's valuable services were retained. By 1897 he had brought in fully 200 species of ladybird beetles besides many other natural enemies of various harmful insects (175).

The numerous scale insects were fairly well under control and Koebele began to turn his attention more seriously to other pests. In 1899 Koebele (202) wrote:

> About the middle of April my attention was called to a troublesome fly upon cattle and on the 26th of the same month, the first specimens were brought to me . . . and during the summer it spread over all the islands.

This pest later proved to be the European horn-fly, *Haematobia irritans* Linn. which had reached the mainland of the United States about ten years earlier. Koebele further relates: "The first flies were noticed on the island of Oahu during February 1898, by Mr. J. P. Mendonca of the Kaneohe ranch." During 1900, pests of various crops were studied and the introduction of natural enemies was continued (215). It was at this time that a tineid larva of cotton balls was first reported, which eventually was found to be the pink boll-worm, *Geleckia gossypiella* Sndrs.

The Japanese Beetle (*Adoretus sinicus* Burm.) is reported to have come into the islands about 1891, probably in soil from Japan (142). Four years later it had already become such a pest that serious consideration was given to the introduction of such natural enemies as moles, bats, and toads (153). In 1897, 600 bats were introduced from California but apparently they never became established (175). Better results were secured by the introduction of toads from California and frogs from Japan. These reproduced freely in the streams here. But the spread of the beetle was rapid and by 1897 it was also reported from Maui and Kauai. Koebele

introduced a fungus that proved destructive to the beetle under wet surroundings (175), but unfortunately it appeared immune to this disease in the drier portions of the islands. During 1900 the Japanese beetles were reported (215) from the island of Hawaii, thus extending their range throughout the group, injuring the foliage of a large variety of cultivated trees and other plants.

It is reported that previous to 1898, all forms of melons, cucumbers and squashes could be grown in Hawaii with comparative ease. About this time a new pest that has come to be known as the melon fly (*Dacus cucurbitae* Coq.) began to make itself felt. Mr. Byron O. Clark who was the first to observe the flies said that they made their appearance during the summer of 1897 and that by 1898 and 1899 the melon industry was practically destroyed. The first published reference to the subject is in the form of correspondence printed in a weekly newspaper in Honolulu. The original is now almost unobtainable and so it is fortunate that the complete account has been reproduced in at least two scientific papers dealing with this serious pest. (See 184.)

DEVELOPMENT OF QUARANTINE SYSTEM

The entrance of so many noxious pests naturally stimulated a desire to shut out further introductions of these undesirable immigrants. During the reign of King Kalakua we find the beginning of this system in an Act dated July 16, 1890, relating to the suppression of plant diseases, blights, and insect pests (134). Again, in 1892, similar regulations were adopted in an Act to establish a Bureau of Agriculture and Forestry (139).

No one recognized the need of such regulations better than Professor A. Koebele who had devoted many years to a study of these organisms in various parts of the world. As official entomologist of the Hawaiian islands, in a letter (191) to Dr. Maxwell, who was special agent of the United States here at the time, he said,

> Strict attention should be paid towards guarding against the introduction of melolontids, elaterid beetles, etc., destructive to living roots of plants, as well as to any fungoid diseases destructive to vegetation that are liable to reach the islands with soil or plants imported.

From these beginnings has grown up the efficient quarantine system that we find in the islands today.

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48. BOHEMAN, C. H., Coleoptera: Voyage de "l'Eugenie," Insecta, pp. 1-112, pl. 1, Stockholm, 1858. (BM)

The following species are described from Honolulu: *Calleida insularis*, p. 4, also found in Tahiti; *Calleida amoenula*, p. 4; *Lebia insularis*, p. 6, also found in Tahiti; *Selenophorus insularis*, p. 10; *Selenophorus picinus*, p. 11; *Trechus fasciatus*, p. 17; *Canthon balteatus*, p. 41; *Onthophagus muticus*, p. 48; *Ammophorus insularis*, p. 89.

49. VIRGIN, C. A., Voyage autour du monde sur la frègate Suédoise "l'Eugènie," . . . . 1851-53, sous le commandement de C. A. Virgin. . . . Zoologie I. Insecta, 617 pp., 9 Pls. Stockholm, 1858-68.

The following groups of insects are discussed: Coleoptera, by C. H. Boheman, pp. 1-218, 1858; Hemiptera, by C. Stal, pp. 219-298, 1859; Orthoptera, by C. Stal, pp. 299-350, 1860; Lepidoptera, by H. D. J. Wallengren, pp. 351-390, 1861; Hymenoptera, by A. E. Holmgren, pp. 391-442, 1868; Diptera, by C. G. Thomson, pp. 443-614, 1868.

50. BOHEMAN, C. H., Coleoptera: Voyage de "l'Eugènie," Insecta, pp. 113-218, Pl. 2, Stockholm, 1859. (BM)

The following genera and species described from Honolulu: *Oodemas* n. gen. (p. 138) created for *Oodemas aenescens*, p. 138; *Rhyncolus longulus*, p. 149; *Rhyncolus gracilis*, p. 150; *Megascelis subtilis*, p. 152; *Luperus insularis*, p. 182; *Graptodera verticalis*, also found in California and Tahiti, p. 187; *Crepidodera puberula*, also found in California and Tahiti, p. 196; *Hyperaspis annularis*, also found in California, p. 205; *Scymnus kinbergi*, p. 209.

51. STAL, C(ARL), Hempitera: Voyage de "l'Eugènie," Insecta, pp. 219-298, pls. 3 and 4, Stockholm, 1859. (BM)

The following species described from Honolulu: *Arma patruelis*, p. 220; *Arma pacifica*, p. 221; *Nysius coenosulus*, p. 243; *Capsus pellucidus*, p. 255; *Delphax pulchra*, p. 275; *Bythoscopus viduus*, p. 291.

52. STAL, C(ARL), Orthoptera: Voyage de "l'Eugènie," Insecta, pp. 299-350, Pl. 5, Stockholm, 1860. (BM)

Gomphocerus (Hyalopteryx) plebejus is described from Honolulu, p. 339.

53. OSTEN-SACKEN, Baron, Einfuhrung von Mucken (Culex) auf den Sandwich-Inseln: Stett. Ent. Zeit., vol. 22, pp. 51, 52, 1861. (HSPA)

Describes the introduction of mosquitoes (Culex), about 1828-30, in an old ship from Mazatlan, Mexico.

54. WALLENGREN, H. D. J., Lepidoptera, Voyage de "l'Engènie," Insecta, pp. 351-390, pls. 6 and 7, Stockholm, 1861. (BM)

The following species are described from Honolulu: *Colias ponteni*, p. 351; *Heliothis inflata*, p. 376; *Salbia continuatalis*, p. 381.

55. *HAGEN, H. A., Notizen beim Studium von Brauers Novara-Neuropteren: Verb. Zool. bot. Ges. Wien., vol. 17, p. 34, 1867.

From Oahu are recorded: *Anax strenuus* n.sp. and *Anax junius* n.sp. Specimens of 3 *junius* in Berlin Museum are labeled *A. ocellatus*, *A. severus*, and *Alschua prasina*.

56. HOLMGREN, A. E., Hymenoptera, Voyage de "l'Eugènie," Insecta, pp. 391-442, pl. 8, Stockholm, 1868. (BM)

The following species are described from Honolulu: *Echthromorpha maculipennis*, p. 406, and *Rhygchium nigripenne*, p. 441.

57. SCUDDER, S. H., A century of Orthoptera, Decade 1, Gryllides: Boston Soc. Nat. Hist. Proc., vol. 12, pp. 139-143, Boston, 1868. (BM)

Trigonidium pacificum is described from the Hawaiian Islands, p. 139.

58. THOMSON, C. G., Diptera. Voyage de "l'Eugènie," Insecta, pp. 443-614, pl. 9, Stockholm, 1868. (BM)

The following species are described from Honolulu: *Sarcophaga barbata*, p. 533; *Sarcophaga dux*, p. 534; *Sacrophaga pallinervis*, p. 535; *Catapicephala limbipennis*, p. 541; *Musca flavinervis*, var.? p. 547; *Lispe metatarsalis*, p. 562; *Trypeta crassipes*, p. 583.

59. *STAL, CARL, Ennumeratio Hemipterorum I: K. Svenska Vet.-Ak. Handl., vol. 9, pp. 1-121, 1870.

Dysdercus peruvianus Guer. is recorded from Hawaii.

60. WATERHOUSE, C. O., On a new genus and species of Coleoptera belonging to the family Lucanidae, from the Sandwich Islands: Ent. Soc. London Trans., p. 315, 1871.

Mr. Harper Pease sent two specimens of a new beetle from Honolulu, for which Waterhouse created the genus Apterocyclus, naming the new species *A. honoluluensis*. These specimens were from the mountains of Kauai.

61. BUTLER, A. G., List of the diurnal Lepidoptera of the South-Sea Islands: Zool. Soc. London Proc., pp. 274-291, pl. 44 (colored), May 5, 1874. (BM)

The following species from the Hawaiian islands are included: *Pyrameis tammeamea* Eschscholtz, p. 284; *Colais ponteni* Wallengren, p. 287; *Papilio sarpedon* Linnaeus, recorded from the Hawaiian islands by Beechey, p. 290. No mention is made of *Vanessa cardui* Linn, which was undoubtedly in the islands. (See 24, 27 and 37.)

62. MCLACHLAN, ROBERT, Note on some Odonata (dragon-flies) from the Hawaiian Islands . . . Ent. Month. Mag., vol. 11, p. 92, 1874. (A) (HSPA)

Anax junius Drury, *Pantala flavescens* Fab., and *Tremea lacerata* Hagen are noted as abundant, and said to prey on the produce of what the Hawaiians call the army worm, a species of Hadena, which occurs in multitudes.

63. *STAL, CARL, Ennumeratio Hemipterorum IV: Svensk. Vet. Ak. Handl., vol. 12, pp. 121 and 152, 1874.

Includes notes on *Nysius caenosulus* and *Pamera nigriceps* from Hawaii.

64. THRUM, THOMAS, Notes on the history of coffee culture in Hawaiian Islands: Haw. Ann. for 1876, pp. 46-52, 1875. (BM)

Refers to the coffee blight with a discussion of control measures, p. 49.

65. SCUDDER, S. H., A cosmopolitan butterfly, its birthplace and natural history: Amer. Nat., July, 1876. (AF)

Refers to the single citation of *Vanessa cardui* Linn. from the Hawaiian islands, which appeared in the first list of the British Museum Butterflies, where (p. 79) Mr. Doubleday credits four specimens to those islands, two brought by Captain Byron and two by Captain Beechey. Scudder states:

"I am informed by Mr. Butler that there is now only one specimen in the museum from the Sandwich Islands, and the reference upon the ticket is to the oldest manuscript register, not now to be found. Byron and Beechey were at the islands in 1825-27. Mr. W. T. Brigham informs me that *V. cardui* was not found by Mr. Mann and himself during a twelve month's residence at the islands ten years ago, and I can find no authority for its present existence. Dr. Pickering writes that it was unknown when the Wilkes expedition visited the islands 1840-41. The 'Vincennes,' to which Dr. Pickering was at-

tached, was at the islands from the end of September to the beginning of April. Byron and Beechey's visits were between the latter part of January and the middle of July. Mr. Butler does not consider the specimen in the British Museum, nor the record of Doubleday, sufficient authority to include this insect in his list of South Sea butterflies. Upon the whole, we cannot fairly accept the present authority for the presence of this insect in the Pacific Islands." (See also 24, 27, and 37.)

66. WALLACE, A. R., Geographical distribution of animals, 2 vols., London, 1876.

Contains a brief note on Apterocyclus (vol. 1, p. 446).

67. BLACKBURN, THOMAS, Insect-notes from the Sandwich Isles: Ent. Month. Mag., vol. 13, pp. 227-228, London, 1877. (AF)

In discussing his first impressions of the insect fauna of the islands, Blackburn states:

"Coleoptera are distinctly not common; Orthoptera, chiefly earwigs and cockroaches, in considerable variety; a fair number of Hymenoptera; too many Diptera of the mosquito type; a few Hemiptera; and many Lepidoptera, but only two butterflies, a large Papilio and *Vanessa kammeamea*."

68. BLACKBURN, THOMAS, Characters of a new genus and descriptions of two new species of Cossonidae from the Sandwich Islands: Ent. Month. Mag., vol. 14, pp. 4-5, London, 1827. (AF)

Anotheorus n.gen., *A. montanus* n.sp., *Oodemas halticoides*, n.sp. are described.

69. BLACKBURN, THOMAS, Characters of a new genus, and descriptions of new species, of Geodephaga from the Sandwich Islands, I: Ent. Month. Mag., vol. 14, pp. 142-148, London, 1877. (AF)

The following insects are described: Saronychium n.gen., *S. inconspicuum*, n.sp., *Anchomenus muscicola* n.sp., *A. epicurus* n.sp., *A. protervus* n.sp., *A scrupulosus* n.sp., *A. fraternus* n.sp., *A. meticulosus* n.sp., *A. cuneipennis* n.sp., *A. fossipennis* n.sp., *A oceanicus* n.sp., *A. bardus* n.sp., *A. fugitivus* n.sp., *A. mysticus* n.sp., *Dyscolus tantalus* n.sp., *D. palmae* n.sp., *D. mutabilis* n.sp., *D. caliginosus* n.sp.

70. BUTLER, A. G., List of heterocerous Lepidoptera recently collected by the Rev. T. Blackburn in the Hawaiian Islands: Ent. Month. Mag., vol. 14, pp. 47-50, London, 1877. (AF)

The forms described are: *Deilephila livornica* Esper., *Protoparce cingulata* Fab., *Leucania dislocata* Walker, *Prodenia ingloria* Walker, *Plusia verticillata* Guénée, *Hypena obsoleta* n.sp., *H. insignis* n.sp., *Herminia caeneusalis* Walker, *Botys blackburni* n.sp., *B. accepta* n.sp., *Pyralis achatina* n.sp., *Rhodaria despecta* n.sp., *Hymenia recurvalis* Fab., *Ephestia elutella* Hub., Argyresthia sp., Laverna sp.

71. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in Hawaiian Islands by Blackburn, No. 1: Annals and Mag. Nat. Hist., 4th ser., vol. 20, pp. 110-114, 1877. (HSPA)

The species described are Cydnidae: *Geotomus subtristis* n.sp., *G. jucundus* n.sp.—Anthrocoridae: *Tripleps persequens* n.sp., *Cardiasthethus mundulus* n.sp.—Nabidae: *Nabis innotatus* n.sp., *N. subrufus* n.sp., *N. lusciosus* n.sp.—Emesidae: *Luteva insolida* n.sp.—Hebridae: Merragata n.gen., *M. hebroides* n.sp.—Corixidae: *Corixa blackburni* n.sp.

72. BLACKBURN, THOMAS, Some observations on the genus Oodemas of the family Cossonidae with descriptions of new species: Soc. Ent. Belgique Ann., pp. 73-76, 1878. (AF)

The following species are described: *Oodemas nivicola* n.sp., *O. aenescens* Boh., *O. sculpturatum* n.sp., *O. insulare* n.sp., *O. robustum* n.sp., *O. obscurum* n.sp., *O. angustum* n.sp., *O. mauiense* n.sp., *O. borrei* n.sp., *O. halticoides* Blackb.

73. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian islands, II: Ent. Month. Mag., vol. 15, pp. 119-123 and 156-158, London, 1878. (AF)

The following are described: Atrachycnemis, n.gen., *A. sharpi n.sp.*, Disenochus n.gen., *D. anomalus*, n.sp., *Anchomenus insociabilis* n.sp., *A. erro* n.sp., *A. sharpi* n.sp., *A rupicola* n.sp., *Cyclothorax montivagus* n.sp., *C. micans* n.sp., *C. multipunctatus* n.sp., *C. brevis* Sharp, *C. oahuensis* n.sp., *C. simiolus* n.sp., *C. obscuricolor* n.sp.

74. BUTLER, A. G., On Lepidoptera from the Hawaiian islands: Ent. Month. Mag., vol. 14, p. 185, London, 1878. (AF)

Descriptions are given of the following species: *Danais archippus* Fab., *Leucania dislocata* Walk., *Plusia verticillata* Guénée, *Botys blackburni* Butler, *B. accepta* Butler.

75. SHARP, DAVID, Descriptions of some new species and a new genus of rhyncophorous Coleoptera from Hawaiian Islands: Ent. Soc. London, Trans., for 1878, pp. 15-26, 1878. (AF)

The following insects were collected by Thomas Blackburn: *Proterhinus vestitus* n.sp., *P. blackburni* n.sp., *P. simplex* n.sp., *P. obscurus* n.sp., *P. oscillans* n.sp., *P. debilis* n.sp, *Dryophthorus squalidus* n.sp., *D. gravidus* n.sp., *D. crassus* n.sp., *D. declivia* n.sp., *D modestus* nsp., *D. pusillus* n.sp., *D. insignis* n.sp., *Pentarthrum prolixum* n.sp., *P. obscurum* n.sp., *P. blackburni* n.sp.

76. SHARP, DAVID, On some Nitidulidae from the Hawaiian Islands: Ent. Soc. London, Trans. for 1878, pp. 127-140, 1878. (AF)

Descriptions are given of the following beetles collected by Blackburn: *Gonioryctus latus* n.sp., *G. blackburni* n.sp., *G. monticola* n.sp., *Brachypeplus discendens* n.sp., *B. puncticeps* n.sp., *B. robustus* n.sp., *B. reitteri* n.sp., *B. infirmus* n.sp., *B. impressus* n.sp. *B. inaequalis* n.sp., *B. omalioides* n.sp., *B. brevis* n.sp., *B. asper* n.sp., *Carpophilus hemipterus* Linn., *C. dimidiatus* Er., *C. maculatus* Murray, *Haptoncus tetragonus* Murray, and *H. mundus* n.sp.

77. SHARP, DAVID, On some longicorn Coleoptera from the Hawaiian islands: Ent. Soc. London, Trans. for 1878, pp. 201, 210, 1878. (AF)

Descriptions are given of the following beetles collected by Blackburn: *Parandra puncticeps* n.sp., *Stenocorus simplex* Gyll., Astrimus n.gen., *A. obscurus* n.sp., Sotenus n.gen., *S. setiger* n.sp., Clytarlus n.gen., *C. robustus* n.sp., *C. cristatus* n.sp., *Micracantha nutans* n.sp., *Oopsis nutator* Fab., and *Lagochirus araneiformis* Linn.

78. SHARP, DAVID, Description of new species probably indicating a new genus of Anchomenidae from the Sandwich Islands: Ent. Month. Mag., vol. 14, pp. 179-180, 1878. (AF)

Describes *Blackburnia insignis* n.sp.

79. TUELY, N. C., Description of new species of butterfly from Sandwich Islands: Ent. Month. Mag., vol. 15, pp. 9-10, 1878. (AF)

Describes *Holochila blackburni* n.sp.

80. TUELY, N. C., Description of the larvae of *Pyrameis hunteri*: Ent. Month. Mag., vol. 15, pp. 16-17, 1878. (AF)

81. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian islands by the Rev. T. Blackburn, No. 2: Ann. and Mag. Nat. Hist., 5th ser., vol. 1, pp. 365-374, 1878. (HSPA)

The Hemiptera described are Asopidae: *Oechalia patruelis* Stal.—Lygaeidae: *Nysius dallasi* n.sp., *N. delectus* n.sp., *N. arboricola* n.sp., *N. coenosulus* Stal, *Pamera nigriceps* Dall, *Clerada apicicornis* Sign., Reclada n.gen., *R. moesta* n.sp., Metrarga n. gen., *M. nuda* n.sp., *M. villosa* n.sp. Capsidae: *Capsus pellucidus* Stal.—Anthocordidae: *Cardiastethus sodalis* n.sp. Acanthiidae: *Acanthia lectularia* Linn.—Saldidae: *Salda exulans* n.sp. —Nabidae: *Nabis blackburni* n.sp.—Veliidae: *Microvelia vagans* n.sp.

82. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian islands, III: Ent. Month. Mag., vol. 16, pp. 104-109, London, 1879. (AF)

Blackburn describes Anchomenidae: *Anchomenus lucipetens* n.sp., *A. incendiarius* n.sp., *Cyclothorax pele* n.sp., *C. bembidioides* n.sp., *C. paradoxus* n.sp., *C. deverilli* n.sp., *C. vulcanus* n.sp.—Bembidiidae: *Bembidium* (*Lopha*) *ignicola* n.sp.

83. BLACKBURN, THOMAS, *Vanessa cardui* in Hawaii: Ent. Month. Mag., vol. 16, p. 161, London, 1879. (AF)

From the paper by Blackburn the following is quoted:

Referring to the paper headed "The Recent Abundance of *Vanessa cardui*," in the August number of this magazine, it may be of interest to note that I have observed the species in considerable abundance (but not in compact swarms) at various points on the Hawaiian Archipelago, between February and July this year (1879),—though I have not previously noticed it during the three years I have been living on the islands. Its near ally, *V. hunteri*, has occurred in about the usual numbers. The season has been here, probably, as much cloudier and more showery than usual as in Great Britain. *V. cardui* has been recorded, I believe, as occurring on the Hawaiian Islands, but I cannot at this moment lay my hands on the authority. (See 24, 27, 37, and 65.)

84. BUTLER, A. G., On heterocerous Lepidoptera collected in the Hawaiian islands by the Rev. T. Blackburn: Ent. Month. Mag., vol. 15, pp. 269-273, London, 1879. (AF)

The species described are Leucaniidae: *Leucania photophila* n.sp.—Noctuidae: *Agrotis suffusa* W.V., *A. arenivolans* n.sp.—Hydrocampidae: *Oligostigma curta* n.sp.—Botydidae: *Botys accepta* Butl., *B. continuatalis* (*Salbia continuatalis* Wllgr.), *B. demaratalis* Walk., *Mecyna exigua* n.sp.—Larentiidae: *Larentia insularis* n.sp., *Pseudocoremia paludicola* n.sp., *Scotosia rara* n.sp. —Phycidae: *Plodia interpunctalis* Hüb.—Tineidae: *Scardia lignivora* n.sp.

85. SHARP, DAVID, On some Coleoptera from the Hawaiian islands: Ent. Soc. Trans., pp. 77-105, London, 1879. (AF)

Descriptions are given of the beetles collected by Blackburn. They represent Hydrophilidae: Omicrus n.gen., *O. brevipes* n.sp., *Hydrophilus semicylin-*

dricus Esch., *Cyclonotum subquadratum* Fairm., *Sphaeridium abdominale* Fab. —Nitidulidae: *Brachypeplus tinctus* n.sp., *B. explanatus* n.sp., *B. protinoides* n.sp.—Cucujidae: Monanus n.gen., *M. crenatus* n.sp.—Colydiidae: Antilissus n.gen., *A. asper* n.sp.—Mycetophagidae: *Litargus vestitus* n.sp., Propalticus n.gen., *P. oculatus* n.sp.—Scarabaeidae: *Aphodius pacificus* n.sp.—Cioidae: *Cis alienus* n.sp., *C. pacificus* n.sp. *C. procatus* n.sp., *C. signatus* n.sp. *C. bicolor* n.sp. *C. tabidus* n.sp., *C. diminutivus* n.sp., *C. laeticulus* n.sp., *C. evanescens* n.sp.—Aglycyderidae: *Proterhinus nigricans* n.sp. *P. collaris* n.sp. *P. humeralis* n.sp. *P. pusillus* n.sp., *P. longulus* n.sp., *P. basalis* n.sp., *P. sternalis* n.sp., *P. lecontei* n.sp., *P. paradoxus* n.sp.—Scolytidae: *Hypothenemus maculicollis* n.sp.—Cerambycidae: *Clytarlus microgaster* n.sp., and *C. modestus* n.sp.

86. SMITH, FREDERICK, Descriptions of new species of aculeate Hymenoptera collected by the Rev. Thos. Blackburn in the Sandwich islands: Linn. Soc. London Journ., vol. 14, pp. 674-685, 1879. (BM)

The species described are as follows: Formicidae: *Camponotus sexguttatus* Fab., *Phenolepis clandestina* Mayr.— Poneridae: *Ponera contracta* Latr.—Myrmicidae *Tetramorium guineense* Fab., *Pheidole pusilla* Heer., *Solenopsis gemmata* Mayr. and Roger.—Sphegidae: *Pelopoeus flavipes* Fab.—Larridae: *Pison iridipennis* n.sp., *P. hospes* n.sp.—Crabronidae: *Crabro affinis* n.sp., *C. mandibularis* n.sp., *C. denticornis* n.sp., *C. unicolor* Smith.—Eumenidae: *Odynerus localis* n.sp., *O. maurus* n.sp., *O. rubritinctus* n.sp., *O. montanus* n.sp., *O. congruus* n.sp., *O. dubiosus* n.sp., *O. agilis* n.sp.— Vespidae: *Polistes aurifer* Sauss.—Andrenidae: *Prosopis blackburni* n.sp., *P. fuscipennis* n.sp., *P. facilis* n.sp., *P. hilaris* n.sp., *P. volatilis* n.sp.—Apidae: *Megachile diligens* n.sp., *Xylocopa aeneipennis* De Geer, and *Apis mellifica* Linn.

87. WATERHOUSE, C. O., Description of a new genus and species of heteromerous Coleoptera of the family Cistelidae from Honolulu: Ent. Month. Mag., vol. 15, pp. 267-268, London, 1879.

The genus and species described are: Labetis n.gen., *L. tibialis* n.sp.

88. WHITE, F. B., Descriptions of new Anthocoridae: Ent. Month. Mag., vol. 16, pp. 142-148, London, 1879.

The following are described from Hawaii: *Dilasia denigrata* n.sp., Hawaii, 3,000 feet; *D. decolor* n.sp., Honolulu; Lilia n.gen.; *L. dilecta* n.sp., Maui, 5,000 feet.

89. BLACKBURN, THOMAS, and KIRBY, W. F., Notes on species of aculeate Hymenoptera occurring in the Hawaiian islands: Ent. Month. Mag., vol. 17, pp. 85-89, London, 1880. (AF)

The following species are discussed: *Prosopis blackburni* Sm., *P. fuscipennis* Sm., *P. facilis* Sm., *P. hilaris* Sm., *P. volitalis* Sm., *P. flavifrons* n.sp., *Xylocopa aeneipennis* De G., *Apis melifica* Linn., *Pelopaeus flavipes* Fab., *Odynerus localis* Sm., *O. maurus* Sm., *O. rubritinctus* Sm., *O. blackburni* n.sp., *O. montanus* Sm., *O. congruus* Sm., *O. dubiosus* Sm., *O. agilis* Sm., *Crabro afinis* Sm., *C. mandibularis* Sm., *C. denticornis* Sm., *C. unicolor* Sm., *C. stigius* n.sp., *Pison irridipennis* Sm., *P. hospes* Sm., *Polistes aurifer* Sauss., *Camponotus sexguttatus* Mayr., *Prenolepsis clandestina* Mayr., *Ponera contracta* Latr., *Leptogenys insularis* Sm., *Tetramorium guineense* Fab., *Pheidole pusilla* Heer., *Solenopsis geminata* Fab., *Evania laevigata Latr.*

90. BUTLER, ARTHUR G., On two small consignments of Lepidoptera from the Hawaiian Islands: Ent. Month. Mag., vol. 17, pp. 6-9, London, 1880.

The following species collected by Blackburn are described: *Danais archippus* Fab., *Protoparce blackburni* n.sp., *Deilephila livornica* Esper., *Leucania dislocata* Walk., *L. extranea* Guen., *Prodenia ingloria* Walk., *Caradina venosa* n.sp., *Agrotis suffusa* Gmel., *Spaelotis lucicolens* n.sp., *S. cremata n.sp., Heliothis conferta* Walk., *Plusia verticillata* Guen., *Toxocampa noctivolans* n.sp., *Scotosia rara* Butl., *Hypena obsoleta* Butl., *H. insignis* Butl., *H. fascialis* Cram., *Scopula exigua* n.sp., *S. altivolans* n.sp.

91. HAROLD, E. VON, Einige neue Coleopteren: Münchener Ent. Ver. Mitth., vol. 4, pp. 148-181, 1880. (AF)

Von Harold describes *Clytarlus finschi* n.sp. von den Sandwich-Inseln (Finsch!) (p. 166). This species is now in the genus Plagithmysus. [J.F.I.]

92. RILEY, C. V., Note: Amer. Ent., vol. 3, p. 150, 1880. (HSPA)

Riley states: Mr. T. Blackburn of Honolulu communicated that *Vanessa cardui* appeared quite frequently in the year 1879, on the island of Hawaii, during the month of February till July. He never before observed the species on the island mentioned above.

93. SHARP, DAVID, On some Coleoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 37-54, 1880. (AF)

Th following species are described: *Falagria currax* n.sp., *Tachyusa pumila* n.sp. *Diestota plana* n.sp., *D. parva* n.sp., *D. latifrons* n.sp., *D. palpalis* n.sp., *D. puncticeps* n.sp., *D. carinata* n.sp., *D. rufescens* n.sp., *Phlaeopora cingulata* n.sp., *P. diluta* n.sp., *Oligota clavicornis* n.sp., *O. polita* n.sp., *O. glabra* n.sp., *O. mutanda* n.sp., *Liophaena gracilipes* n.sp., *L. flaviceps* n.sp., *Myllaena vicina* n.sp., *M. familiaris* n.sp., *M. curtipes* n.sp., *M. discidens* n.sp., *Pachycorynus discedens* n.sp., *Oxytelus advena* n.sp., *Trogophlaeus senilis* n.sp., *T. frontinalis* n.sp., *T. abdominalis* n.sp., *Glyptoma blackburni* n.sp., *G. brevipenne* n.sp., *Lispinodes explicandus* n.sp.

94. BLACKBURN, THOMAS, Description of four new species of Cossonidae from the Hawaiian Islands: Ent. Month. Mag., vol. 17, pp. 199-201, London, 1881. (AF)

The four species are: *Oodemas olindae* n.sp., *O. substrictum* n.sp., *O. infernum* n.sp., *O. ignavus* n.sp.

95. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian Islands, IV: Ent. Month. Mag., vol. 17, pp. 226-229, London, 1881. (AF)

The following are described: Anchomenidae: *Disenochus terebratus* n.sp., *Anchomenus putealis* n.sp., *Cyclothorax unctus* n.sp., *C. laetus* n.sp., *C. robustus* n.sp.—Bembidiidae: *Bembidium* (*Notaphus*) *spurcum* n.sp., *B. teres* n.sp.

96. BUTLER, A. G., On a collection of nocturnal Lepidoptera from the Hawaiian Islands: Annals and Mag. Nat. Hist., 5th ser., vol. 7, pp. 317-333, 1881. (AF) (HSPA)

Descriptions are given of the following species collected by Blackburn: Sphingidae: *Deilephila calida* n.sp.—Larentiidae: *Scotosia corticea* n.sp., *Eupithecia monticolens* n.sp.—Noctuidae: *Spoelotis crinigera* n.sp., *Apameidae chersotoides* n.sp., *A. cinctipennis* n.sp.—Heliothidae: *Heliothis ar-*

migera Hub.—Hypenidae: *Hypena obsoleta* Butl., *H. altivolans* Butl., var. *simplex*.—Hercynidae: *Boreophila minuscula* n.sp., *Aporodes micacea* n.sp.—Margarodidae: *Margaronia glauculalis* Guenee.—Botididae: *Anemosa aurora* n.sp., *Mecyna ennychioides* n.sp., *M. nigrescens* n.sp., *M. exigua* Butl., *M. virescens* n.sp.—Scopariidae: *Scoparia hawaiensis* n.sp., *S. jucunda* n.sp., var. *formosa*, *S. frigida* n.sp., *S. coarctata* Zeller, *S. venosa* n.sp.—Phycidae: *Ephestia humeralis* n.sp., *E. albosparsa* n.sp.

97. CAMERON, PETER, Notes on Hymenoptera, with descriptions of new species: Ent. Soc. London Trans., pp. 555-563, 1881. (AF)

The following species, collected by Blackburn, are described from Honolulu: *Sierola* n.gen., *S. testaceipes* n.sp.—Braconidae: *Chelonus carinatus* n.sp., *Monolexis palliatus* n.sp.—Chalcidae: *Chalcis polynesialis* n.sp., and Crabronidae: *Crabo polynesialis* n.sp.

98. KARSCH, F., Zur Käferfauna der Sandwich-Marshall-und Gilberts-Inseln: Berlin Ent. Zeit., vol. 25, pp. 1-14, pl. 1, 1881. (AF) (US)

The following species are recorded from Hawaii: *Acupalpus biseriatus* n.sp., *Platynus planus* n.sp., *Calpodes octoocellatus* n.sp., *Anisodactylus cuneatus* n.sp., *Promecoderus fossulatus* n.sp., *Corymbites coruscus* n.sp., *Elater humeralis* n.sp., *Trypopitys capucinus* n.sp., *Epitragus diremptus* n.sp., *Rhyncolus opacus* n.sp., *Aegosoma reflexum* n.sp., *Stasilea curvicornis* n.sp., *Clytarlus finschi Har.*, *C. pulvillatus* n.sp.

99. SHARP, DAVID, On some new Coleoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 507-534, 1881. (AF)

Descriptions are given of the following beetles collected by Blackburn: Nitidulidae: *Brachypeplus inauratus* n.sp., *B. affinis* n.sp., *B. bidens* n.sp., *B. vestitus* n.sp., *B. metallescens* n.sp., *B. varius* n.sp., *B. guttatus* n.sp., *B. sordidus* n.sp., *B striatus* n.sp, *B. obsoletus* n.sp., *B. blackburni* n.sp.—Anobiidae: Xyletobius n.gen., *X. marmoratus* n.sp., *X. nigrinus* n.sp., *X. osculatus* n.sp., Holcobius n.gen., *H. granulatus* n.sp., *H. glabricollis* n.sp., *H. major* n.sp., Mirosternus n.gen., *M. punctatus* n.sp., *M. obscurus* n.sp., *M. muticus* n.sp., *M. carinatus* n.sp., *M. glabripennis* n.sp., *M. debilis* n.sp., *M. bicolor* n.sp.—Aglycyderidae: *Proterhinus hystrix* n.sp., *P. dispar* n.sp., *P. gracilis* n.sp., *P. angularis* n.sp., *P. punctipennis* n.sp., *P. validus* n.sp.—Cerambycidae: *Clytarlus pennatus* n.sp., and *C. fragilis* n.sp.

100. WHITE, F. B., Descriptions of new species of heteropterous Hemiptera collected in the Hawaiian Islands by the Rev. T. Blackburn, No. 3: Annals and Mag. Nat. Hist., 5th ser., vol. 7, pp. 52-59, 1881. (HSPA)

The species described are: Scutelleridae: *Coleolichus blackburniae* n.sp.—Lygaeidae: *Nysius blackburni* n.sp., *N. nitidus* n.sp., *N. nemorivagus* n.sp., *N. rubescens* n.sp., *N. pteridicola* n.sp., *N. vulcan* n.sp., *Cymus calvus* n.sp., *C. criniger* n.sp.—Anthrocoridae: *Dilasia denigrata* White, *D. decolor* White, *Lilia dilecta* White.—Emesidae: Ploiariodes n.gen., *P. whitei* (Blk.M.S.)n.sp.

101. BLACKBURN, THOMAS, Descriptions of the larvae of Hawaiian Lepidoptera: Ent. Month. Mag., vol. 19, pp. 55-56, 1882. (AF)

The species discussed are: *Vanessa tammaemea* Eschscholtz, *Holochila blackburni* Tuely, *Agrotis cremata* Butler and *Rhodaria despecta* Butler.

102. BLACKBURN, THOMAS, Characters of new genera and descriptions of new species of Geodephaga from the Hawaiian Islands, V: Ent. Month. Mag., vol. 19, pp. 62-64, London, 1882. Continued from vol. 17, p. 229.

The following species are described Anchomenidae: *Cyclothorax harschi* n.sp., *Acupalpus biseriatus* Karsch, *Platynus planus* Karsch, *Colpodes octocellatus* Karsch, *Anisodactylus cuneatus* Karsch.

103. BLACKBURN, THOMAS, Hawaiian entomology: Haw. Ann. for 1882, pp. 58-61, Honolulu, 1881. (BM)

Blackburn says that Hawaii is a comparatively unexplored field of natural history. His statements may be summarized as follows: The Orthoptera are represented by few species; no true grasshoppers and no Mantidae are known; about 500 species of Coleoptera have been collected, 80 per cent of them apparently native; the Neuroptera (including Odonata) have been little studied; the order Hymenotera is richer than other orders; ants are numerous, the Madeira house ants, *Pheidole pusilla* Heer, being the most abundant; the Lepidoptera are little known, but about 100 species have been described—not a quarter of those that might be collected; Hemiptera and Homoptera are represented in collections by about 100 species; there are probably hundreds of species of Diptera, but scarcely 50 are represented in collections; mosquitoes, (house) flies, and fleas are pests. Blackburn's paper includes a bibliography of Hawaiian entomology.

104. CHAMBERLAIN, J. E., The *peelua* or army worm of the Hawaiian Islands: Haw. Ann. for 1883, pp. 44-50, Honolulu, 1882. (BM)

A valuable historical paper upon the activities of *Prodenia ingloria* Walk. as a pest of grasses.

105. BORMANS, AUG. DE, Faune orthopterologique des Iles Hawai ou Sandwich: Genoa Mus. Civ. di St. Nat. Ann., vol. 18, 11 Luglio, pp. 338-348, 1882. (AF) (US)

The following species collected by Blackburn are discussed: Forficularia: *Anisolabis littorea* White, *A. maritima* Bonelli, *Labia pygidiata* Dub., *Chelisoches morio* Fab., *Forficula hawaiensis* n.sp.—Blattaria: *Blatta hieroglyphica* Brunn., *Periplaneta decorata* Brunn., *P. ligata* Brunn., *P. americana* Linn., *Eleutheroda dytiscoides* Serv., *Panchlora surinamensis* Linn., *Oniscosoma pallida* Brunn., *Euthyrrapha pacifica* Coquebert.—Locustodea: *Elimaea appendiculata* Brunn., *Conocephalus blackburni* n.sp. Gryllodea: *Gryllus innotabilis* Walk., *Trigonidium pacificum* Scud.

106. BUTLER, A. G., On a small collection of Lepidoptera from the Hawaiian Islands: Ent. Soc. London Trans., pp. 31-45, 1882. (AF)

Descriptions are given of the following Lepidoptera collected by Blackburn: Lycaenidae: *Polyommatus boeticus* Linn.—Leucaniidae: *Leucania extranea* Guenee.—Gonopteridae: *Gonitis hawaiiensis* n.sp.—Hypocalidae: *Hypocala velans* Walk.—Pyralidae: *Locastra monticolens* n.sp.—Steniidae: *Metasia abnormis* n.sp., *Scotomera hydrophila* n.sp.—Botididae: Mestalobes n.gen., *M. aenone* n.sp., *M. simaethina* n.sp., *M. semiochrea* n.sp., *Scopula constricta* n.sp.—Scopariidae: *Scoparia coarctata* Zell.—Crambidae: *Eromene bella* Hubn.—Tortricidae: *Teras illepida* n.sp., *Proteopteryx walsinghamii* n.sp.—Tineidae: *Tinea simulans* n.sp.—Elachistidae: *Laverna parda* Butler, var. *montivolans, L. aspersa* n.sp.—Pterophoridae: *Platyptilus littoralis* n.sp.

107. WHITNEY, H. M., The cane borer: Haw. Planters' Monthly, vol. 1, pp. 145-146, Honolulu, 1882. (BM) (HSPA)

A popular economic article—recommends burning.

108. BUTLER, A. G., On a small series of Lepidoptera from the Hawaiian Islands: Ent. Month. Mag., vol. 19, pp. 176-180, London, 1883. (AF)

The following species are described: Scotorythra n.gen., *S. arboricolens* n.sp.,—Pyrales: *Scopula litorea* n.sp., *Orthomecyna* n.gen., *O. albicaudata* n.sp., *O. exigua,* var. *cupreipennis,* Melanomecyna n.gen., *M. stellata* n.sp., *Gesneria floricolens* n.sp.,—Tineina: Depressaria sp., *Azinis hilarella* Walk.

109. CAMERON, PETER, Descriptions of new genera and species of Hymenoptera: Ent. Soc. London Trans., pp. 187-193, 1883. (AF)

Descriptions are given of the following Hymenoptera collected by Blackburn: Chalcididae: *Epitranus lacteipennis* n.sp., Moranila n.gen., *M. testaceiceps* n.sp., Solindena n.gen., *S. picticornis* n.sp., *Eupelmus flavipes* n.sp. —Evaniidae: *Evania sericea* n.sp.—Ichneumonidae: *Limneria polynesialis* n.sp., *L. blackburni* n.sp., *Ophion lineatus* n.sp., *O. nigricans* n.sp.

110. MCLACHLAN, ROBERT, Neuroptera of the Hawaiian Islands: Annals and Mag. Nat. Hist., 5th ser., vol. 12, pp. 226-240, 1883. (HSPA)

Descriptions are given of the following neuropteroid insects collected by Blackburn: Termitidae: *Calotermes castaneus* Burm., *C. marginipennis* Latr.—Embidae: *Oligotoma insularis* n.sp.—Psocidae: Psocus sp., *Elipsocus vinosus* n.sp., Odonata, *Pantala flavescens* Fab., *Tramea lacerata* Hagen, *Lepthemis blackburni* n.sp., *Anax junius* Drury, *A. strenuus* Hagen, *Agrion xanthomelas* Selys., *A. hawaiiensis* n.sp., *A. pacificum* n.sp., *A. deceptor* n.sp., *A. calliphya* n.sp., Megalagrion n.gen., *M. blackburni* n.sp., *M. oceanicum* n.sp.

111. MCLACHLAN, ROBERT, Neuroptera of the Hawaiian Islands, Part II, Planipennia, with general summary: Annals and Mag. Nat. Hist., 5th ser., vol. 12, pp. 298-303, 1883. (HSPA)

This paper includes descriptions of neuropteroid insects collected by Blackburn: Hemerobiidae: Megalomus sp.—Chrysopidae: Anomalochrysa n.gen., *A. hepatica* n.sp., *A. rufescens* n.sp., *Chrysopa microphya* n.sp., *C. oceanica* Walk.—Myrmeleontidae: *Formicaleo perjurus* Walk.

112. MEYRICK, EDWARD, Notes on Hawaiian Microlepidoptera: Ent. Month. Mag., vol. 20, pp. 31-36, 1883. (AF)

Descriptions are given of the following moths collected by Blackburn: Conchylidae: *Heterocossa achroana* n.sp.—Gelechidae: *Depressaria indecora* Butl., Thyrocopa n.gen., *T.* (*Depressaria*) *usitata* Butl., Synomotis n.gen., *S. epicapna* n.sp., Automola n.gen., *A. pelodes* n.sp., *Parasia sedata* Butl., Diplosara n.gen., *D.* (*Sardia*) *lignivora* Butl.—Tineidae: *Blabophanes longella* Walk.

113. SMITH, W. O., Cane borer: Planters' Monthly, vol. 2, pp. 56-57, Honolulu, 1883. (HSPA)

This is a popular article, which includes suggestive discussion of control measures.

114. WHITE, F. B., Report on the pelagic Hemiptera procured during the voyage of H.M.S. "Challenger," in the years 1873-76: Rept. Voyage H.M.S. "Challenger," Zoology, vol. 7, 82 pp., 3 pls. (2 col.), London, 1883. (BM)

Describes *Holobates sericeus* Esch., the principal species occurring in the waters about Hawaii. (See pp. 47-48, Pl. 1, fig. 7.)

115. BLACKBURN, THOMAS, Notes on some Hawaiian Carabidae: Ent. Month. Mag., vol. 21, pp. 25-26, London, 1884. (AF)

Discusses Atrachynemis, *Anchomenus muscicola* Blackb., and Mauna n.gen. created for the insect hitherto called *Blackburni frigida* Blackb.

116. BLACHBURN, THOMAS, Notes on Hawaiian Neuroptera with descriptions of new species: Annals and Mag. Nat. Hist. 5th ser., vol. 14, pp. 412-421, 1884. (HSPA)

The species described are: Odonata: *Agrion satelles* n.sp., *A. oahuense* n.sp., *A. nigro-hamatum* n.sp., *A. koelense* n.sp., *A. pacificum* Macl.—Hemerobiidae: Megalomus spp.—Chrysopidae: *Anomalochrysa maclachlani* n.sp., *A. montana* n.sp., *A. ornatipennis* n.sp.

117. KIRBY, W. F., On the Hymenoptera collected during the recent expedition of H.M.S. "Challenger": Annals and Mag. Nat. Hist., 5th ser., vol. 13, p. 402, 1884. (HSPA)

This paper includes the following references to Hawaiian insects: Evaniidae *Evania laevigata* Latr. (p. 403).—Vespidae· *Polistes aurifer* Sauss. (p. 410), *P. carnifex* Fab. (p. 411).

118. OSTEN-SACKEN, C. R., Facts concerning the importation or non-importation of Diptera into distant countries: Ent. Soc. London Trans., pp. 489-496, 1884. (AF)

These interesting historical notes relate to the introduction of the night mosquito, *Culex quinquefasiatus* Say.

119. SHARP, DAVID, On some genera of the subfamily Anchomenini (Platynini Horn.) from the Hawaiian Islands: Ent. Month. Mag., vol. 20, pp. 217-219, London, 1884. (AF)

The following genera are discussed: Metromenus n.gen., Colpodiscus n. gen., Barypristus n.gen., Blackburni, Disenochus, Atrachycnemis and Cyclothorax.

120. BLACKBURN, THOMAS, and SHARP, DAVID, Memoirs on the Coleoptera of the Hawaiian Islands: Roy. Dublin Soc. Trans., 2d ser., vol. 3, pp. 119-290, pls. 4 and 5, 1885. (BM) (AF) (HSPA)

This resumé of knowledge of the Coleoptera of Hawaii includes descriptions of the following new genera and species: Dytiscidae: *Coplatus mauiensis* n.sp.—Staphylinidae: *Bolitochara impacta* n.sp., *Diestota montana* n.sp., *D. incognita* n.sp., *Myllaena pacifica* n.sp., *M. oahuensis* n.sp., *Oligota kauaiensis* n.sp., *O. longipennis* n.sp., *O simulans* n.sp., *O. variegata* n.sp., *O. prolixa* n.sp., *Lithocharis incompta* n.sp., *Oxytelus bledioides* n.sp., *Lispinodes quadratus* n.sp., *L. pallescens* n.sp.,—Corylophidae: *Corylophus rotundus* n.sp., *C. suturalis* n.sp., *Sericoderus basalis* n.sp., *S. pubipennis* n.sp., *Orthoperus aequalis* n.sp.—Histeridae: *Bacanius atomarius* n.sp., *B. confusus* n.sp., *Acritus insularis* n.sp., *Aeletes longipes* n.sp., *A. concentricus* n.sp., *A.*

monticola n.sp., *A. facilis* n.sp.—Nitidulidae: *Gonioryctus fugitivus* n.sp., *G. similis* n.sp., *Brachypeplus olinda* n.sp., *B. torvus*, n.sp., *B. koelensis* n.sp., *B. floricola* n.sp., *B. celatus* n.sp., *B. apertus* n.sp., *B. quadracallis* n.sp., *B. parallelus* n.sp., *B. expers* n.sp., *B. spretus* n.sp., *B. bicolor*, n.sp., *B. discedens* Sh.var., *kauaiensis* n.var., and *B. blackburni* Sh.var. *lanaiensis* n.var.—Colydiidae: *Eulachus hispidus* n.sp.,—Cucujidae: Brontolaemus n.gen., *B. elegans* n.sp., *Laemorphloeus aeneus* n.sp., *Monanus brevicornis* n.sp., *Telephanus insularis* n.sp., *T. pallidipennis* n.sp.—Crytophagidae: *Telmatophilus debilis* n.sp.—Erotylidae: *Euxestus minor* n.sp., Eidoreus n.gen., *E. minutus* n.sp.—Coccinellidae: *Scymnus vividus* n.sp., *S. ocellatus* n.sp., *S. discendens* n.sp.—Dermestidae: *Attagenus plebeius* n.sp., Labrocerus n.gen., *L. jaynei* n.sp., *L. concolor* n.sp., *L. obscurus* n.sp., *Cryptorhopalum brevicorne* n.sp., *C. terminale* n.sp.—Eucnemidae: *Fornax bonvouloiri* n.sp., *F. sculpturatus* n.sp., *F. parallelus* n.sp., *F. longicornis* n.sp., *F. obtusus n.sp.*—Elateridae: Eopenthes n.gen., *E. basalis* n.sp., *E. obscurus* n.sp., *E. debilis* n.sp., *E. konae* n.sp., *E. ambiguus* n.sp., *E. satelles* n.sp., Itodacnus n.gen., *I. gracilis* n.sp.—Malacodermidae: *Helcogaster pectinatus* n.sp.,Caccodes n.gen., *C. debilis* n.sp.—Ptinidae: *Xyletobius insignis* n.sp., *X. affinis* n.sp., *X. serricornis* n.sp., *X. lineatus* n.sp., *Catorama pusilla* n.sp., *Mirosternus acutus* n.sp.—Bostrichidae: *Bostrichus migrator* n.sp.—Cioidae: *Cis bimaculatus* n.sp., *C. nigrofasciatus* n.sp., *C. longipennis*, n.sp., *C. apicalis* n.sp., *C. setarius* n.sp., *C. concolor* n.sp., *C. chloroticus* n.sp., *C. calidus* n.sp., *C. insularis* n.sp., *C. roridus* n.sp., *C. attenuatus* n.sp., *C. ephistemoides* n.sp., *C. vagepunctatus* n.sp.—Tenebrionidae: *Platydema obscurum* n.sp., Sciophagus n.gen. for *Heterophaga pandanicola* Esch., *Labetes tibialis* Wat., *Cistela crassicornis* n.sp., *Anthicus mundulus* n.sp., *Ananca collaris* n.sp.—Aglyceleridae: *Proterhinus linearis* n.sp., *P. scutatus* n.sp., *P. similis* n.sp., *P. laticollis* n.sp., *P. tarsalis* n.sp., *P robustus* n.sp., *P. ineptus* n.sp., *P. integer* n.sp., *P. detritus* n.sp., *P. longicornis* n.sp., *P. insignis* n.sp.—Curculonidae: Rhyncogonus n. gen., *R. blackburni* n.sp., *R. vestitus* n.sp., *Acalles lateralis* n.sp., *A. duplex* n.sp., *A. angusticollis* n.sp., *A. mauiensis* n.sp., *A. ignotus* n.sp., *A. decoratus* n.sp., Chaenosternum n.gen., *C. konanum* n.sp., Hyperomorpha n.gen., *H. squamosa* n.sp., *Calandra remota* n.sp., *Oodemas tardum* n.sp., *O. aequale* n.sp., *O. crassicorne* n.sp., *Heteramphus* n.gen., *H. wollastoni* n.sp., *H. foveatus* n.sp., *H. hirtellus* n.sp., *H. cylindricus* n.sp., *Pseudolus* n.gen., for *Rhyncolus longillus* Boh., Dolichotelus n.gen., *D. apicalis* n.sp.—Scolytidae: *Xyleborus obliquus* n.sp., *X. truncatus* n.sp., *X. rugatus* n.sp., *X. insularis* n.sp., *X. immaturus* n.sp., *X. frigidus* n.sp., *Hypothenemus griseus* n.sp.—Anthribidae: Mauia n.gen., *M. satelles* n.sp.—Cerambycidae: *Clytarlus blackburni* n.sp., *C. filipes* n.sp.

121. HAGEN, H. A., Monograph of the Embidina: Can. Ent., vol. 17, pp. 141-155, 1885. (HSPA) (AF) (UH)

Records *Ologotoma insularis* McLachl., in alcohol, from Honolulu, taken in a private garden greenhouse. (See p. 143.)

122. MEYRICK, EDWARD, Descriptions of New Zealand Micro-lepidoptera VII, Tortricina: N. Zeal. Inst. Trans., vol. 17, pp. 141-149 (1885). (BM)

Chiloides straminea Butl., originally described from Hawaii, is here recorded also in New Zealand (p. 142).

123. *REUTER, O. M., Monographia anthocoridarum orbis terrestis: Acta Soc. Sci. Fenn., vol. 14, pp. 555-758, 1885.

124. SHARP, DAVID, Note on the genus Plagithmysus Motsch.: Soc. Ent. Belg. Bull. for 1885, pp. LXXIV-LXXV (Compt. rend.), 1885.

This paper clears up the synonomy of this genus.

125. BLACKBURN, THOMAS, and CAMERON, PETER, On the Hymenoptera of the Hawaiian Islands: Manchester Lit. Soc. Mem., ser. 3, vol. 10, pp. 194-244, 1886. (BM)

This excellent paper includes the following descriptions: Anthophila: Andrenidae: *Prosopis fuscipennis* Smith, *P. satellus* n.sp., *P. blackburni* Smith, *P. facilis* Smith, *P. flavifrons* Kirby, *P. kona* n.sp., *P. coniceps* n.sp., *P. rugiventris* n.sp., *P. hilaris* Smith, *P. volatilis* Smith, *P. anthracina* Smith, *P. flavipes* Smith.—Apidae: *Megachile diligens* Smith, *Xylocopa aeneipennis* De Geer.—Fossores: Vespidae: *Polistes aurifer* Sauss, *P. hebraeus* Fab., *Odynerus radula* Fab., *O. extraneus* Kirby, *O. nigripennis* Holmgren, *O. dromedarius* n.sp., *O. vulcanus* n.sp., *O. hawaiiensis* n.sp., *O. haleakalae* n.sp., *O. congruus* Smith, *O. dubiosus* Smith *O. rubritinctus* Smith, *O. blackburni* Kirby, *O. montanus* Smith, *O. cardinalis* n.sp., *O. pacificus* n.sp., *O. rubropustulatus* n.sp., *O. obscure-punctatus* n.sp., *O. diversus* n.sp., *O. agilis* Smith, *O. insulicola* n.sp.—Crabronidae: Crabro *affinis* Smith, *C. mauiensis* n.sp., *C. distinctus* Smith, *C. mandibularis* Smith, *C. polynesialis* Cameron, *C. abnormis*, n.sp., *C. unicolor* Smith, *C. stygius* Kirby, *C. adspectans* n.sp., *C. rubro-caudatus* n.sp.—Larridae: *Pison iridipennis* Smith, *P. hospes* Smith.—Sphegidae: *Pelopaeus caementarius* Drury, *Mimesa antennata* Smith.—Heterogena: Formicidae: *Camponotus sexguttatus* Fab., *Tapinoma melanocephala* Fab., *Prenolepis longicornis* Latr., *P. obscura* Mayr.—Poneridae: *Ponera contracta* Latr., *Leptogenys insularis* Smith.—Myrmicidae: *Monomorium specularis* Mayr, *Tetramorium guineense* Fab., *Pheidole megacephala* Fab., *Solenopsis geminata* Fab.—Oxyura: *Scleroderma polynesialis* Saunders, *Sierola testaceipes* Cameron, *S. monticola* n.sp., *S. leuconeura* n.sp.—Terebrantia: Ichneumonidae: Pimplides, *Echthromorpha maculipennis* Holmgren, *E. flavo-orbitalis* n.sp., *Pimpla hawaiiensis* n.sp.—Tryphonides: *Metacoelus femoratus* Grav.—Ophionides: *Ophion lineatus* Cameron, *O. nigricans* Cameron, *Limneria polynesialis* Cameron, *L. blackburni* Cameron, *L. hawaiiensis* n.sp.—Braconidae: *Chelonus blackburni* Cameron, *Monolexis? palliatus* Cameron.—Evaniidae: *Evania sericea* Cameron, *E. laevigata* Latr.—Chalcididae: *Epitranus lacteipennis* Cameron, *Chalcis polynesialis* Cameron, *Spalangia hirta* Haliday, *Moranila testaceipes* Cameron, *Solindenia picticornis* Cameron, *Eupelmus flavipes* Cameron, *Encyrtus insularis* n.sp.

126. WALKER, J. J., Anosia plexippus Linn. (*Danais archippus* Fabr.): A study in geographical distribution: Ent. Month. Mag., vol. 22, pp. 217-224, London, 1886. (AF)

Walker states that *Anosia plexippus*, "unobserved by the early voyagers to the Sandwich Islands, it is now abundant and firmly established there." (p. 219).

127. CAMERON, PETER, Note on the Hymenoptera of the Hawaiian Islands: Ent. Month. Mag., vol. 23, p. 195, London, 1887. (AF)

The species discussed are: *Odynerus nautarum=O. insulicola* Sm., *Odynerus sandwichensis=O. rubritinctus* Sm.

128. BAILEY, EDWARD, The flora and fauna of the Hawaiian Islands: Haw. Ann. for 1888, pp. 49-54, Honolulu, 1887.

Contains a brief interesting account of the insects of the islands.

129 *BIGOT, J. M. F., Diptères nouveaux ou peu connus, 3e partie, XLI, Tachinidae: Soc. Ent. France Ann., ser. 6, vol. 8, pp. 77-101, 1888.

Chaetogaedia monticola is described.

130. BLACKBURN, THOMAS, Notes on the Hemiptera of the Hawaiian Islands: Linn. Soc. N. S. W. Proc., 2d ser., vol. 3, pp. 343-354, 1888. (BM) (HSPA) (AF)

The following species are included: Scutatina: Aechalia sp., Coleotichus sp., *Geotomus subtristis* White, and *G. jucundus* White.—Lygaeina: *Nysius longicollis* n.sp., *N. mauiensis* n.sp., *N. whitei* n.sp., *Metrarga contracta* n.sp., *M. obscura* n.sp., *Capsina* sp.—Anthrocorina: *Acanthia lectularia* L., Cardiastethis sp., Lilia sp., Dilasia sp.—Emesidae: *Ploiariodes rubromaculata* n.sp., *P. pulchra* n.sp.—Nabina: *Nabis rubritinctus* n.sp., *N. oscillans*, n.sp., *N. innotatus* White, *N. koelensis* n.sp., *N. subrufus* White, *N. curtipennis* n.sp.—Saldina: *Salda oahuensis* n.sp.

131. MEYRICK, EDWARD, On Pyralidina of the Hawaiian Islands: Ent. Soc. London Trans., pp. 209-246, 1888. (AF) (US)

The material for this extensive list of moths was collected by Blackburn during his six-years' residence in the islands, 1877-1883. Some interesting notes on origin and distribution are included. The list follows: Pyralididae: *Asopia gerontialis* Walk.—Hydrocampidae: *Paraponyx linaelis* Gn.—Botydidae: *Margarodes exaula* n.sp., *Omiodes blackburni* Butl., *O.* (*Botys*) *accepta* Butl., *O.* (*Salbia*) *continuatalis* Wallgr., *O.* (*Botys*) *demaratalis* Walk., *O. monogona* n.sp., *O. liodyta* n.sp., *O.* (*Botys*) *localis* Butl., *Zinckenia recurvalis F.*, *Scopula eucrena* n.sp., *S.* (*Locastra*) *monticolans* Butl., *S.* (*Aporodes*) *micacea* Butl., *S.* (*Mecyna*) *nigrescens* Butl., *S.* (*Mecyna*) *ennychioides* Butl., *S.* (*Melanomecyna*) *stellata* Butl., *S. argoscelis* n.sp., *S.* (*Rhodaria*) *despecta* Butl., Protocolletis n.gen., *P.* (*Scopula*) *constricta* Butl., *Mecyna* (*Anemosa*) *aurora* Butl., *M. virescens* Butl., *Orthomecyna albicaudata* Butl., *O.* (*Mecyna*) *exigua* Butl., *O. aphanopis* n.sp., *Mestolobes* (*Metasia*) *abnormis* Butl., *M. semiochrea* Butl., *M. minuscula* Butl., *Eurycreon litorea* Butl.—Scopariadae: *Scoparia frigida* Butl., *Xerocopa venosa* Butl., *X. melanopis* n.sp., *X. ambrodes* n.sp., *X. demodes* n.sp., *X. ischnias* n.sp., *X. hawaiensis* Butl., *X. pachysema* n.sp., *X. mesoleuca* n.sp., *X.* (*Scoparia*) *formosa* Butl., *X.* (*Scoparia*) *jacunda* Butl.—Pterophoridae: *Trichoptilus* (*Aciptilia*) *hawaiensis* Butl., *Platyptilia rhynchophora* n.sp., *P. cosmodactyla* Hb., *P. brachymorpha* nsp., *P.* (*Platyptilus*) *littoralis* Butl.—Crambidae: *Eromene ocellea* Hw., *Hednota* (*Gesneria*) *floricolens* (rect. *floricolans*) Butl., *H.* (*Scotomera*) *hydrophila* Butl., *H. oxyptera* n.sp.—Phycitidae: *Ephestia* (*Plodia*) *interpunctella* Hb., *E. desuetella* Walk., *E. eulella* Hb., *Homoeosoma* (*Ephestia*) *humeralis* Butl., *Genophantis* n.gen., *G. iodora* n.sp.—Galleriadae: *Achroea grisella* F.

132. RILEY, C. V., A Sandwich Island sugar-cane borer, *Sphenophorus obscurus* Boisd.: Insect Life, vol. 1, pp. 185-189, illus., 1888. (HSPA) (UH) (BM)

This paper gives a description of the several stages of development with references to the literature.

133. DALLA TORRE, K. W. v., Hymenopterolgische Notizen: Wien. Ent. Zeit., vol. 8, p. 124, 1889. (HSPA)

Contains the following note: "*Odynerus cardinalis* Blackb. u. Cam. 1886) non Mor. (1885)=*O. rudolphi M.*"

134. KALAKAUA REX, An act relating to the suppression of plant diseases, blight, and insect pests: Laws of the Hawaiian Islands, chap. 2, 1890.

Section 2 relates to the prevention of introduction of any plant disease, blight, or insect pests injurious to vegetation, and extermination of such as

were already established. Section 3 deals specifically with the landing of plants or soil by the masters of vessels entering Hawaiian ports and makes provision for inspection. Section 4 provides for destruction of imported plants or other material found to be infested. Section 5 requires every person to immediately report infestation of vegetation wherever discovered. Section 6 provides for the enactment of further regulations preventing the introduction and spread of plant diseases, blight, and insect pests.

135. COQUILLETT, D. W., Icerya in Honolulu: Insect Life, vol. 3, p. 329, 1891.

Icerya is said to have made its appearance in the Hawaiian islands during the spring of 1889, but widely distributed in 1890—in about 50 gardens in Honolulu. The pest is thought to have come in on fruit from California. The predaceous Vedalia beetle was introduced from California, and by November, 1890, Icerya was rare.

136. RILEY, C. V., Rept. of the Ent., Rept. U. S. Dept. Agric. to Sec. Agric., p. 234, 1891.

Mr. Koebele left specimens of *Chilocorus bivulnerus* at Honolulu, while on his way from California to Sydney.

137. RILEY, C. V., and HOWARD, L. O., Introduction of Icerya into Honolulu: Insect Life, vol. 3, p. 307, 1891. (HSPA)

Refers to the introduction of Icerya from California and its successful control by introducing the Vedalia.

138. MCLACHLAN, ROBERT, Supplementary note on the Neuroptera of the Hawaiian Islands: Annals and Mag. Nat. Hist., 6th ser., vol. 10, pp. 176-178, 1892. (HSPA)

McLachlan suggests that *Deielia fasciata* Kirby is probably a mistaken locality—since this dragon fly does not occur in Hawaii (p. 177). A new Myrmeleonidae, *Formicaleo wilsoni n.sp.*, from Lanai, is described.

139. KALAKAUA REX, An act to establish a bureau of agriculture and forestry: Laws of the Hawaiian Islands, Chapter 81, Sec. 4, 1892.

The act provides for guarding against the introduction of plant diseases or insect pests and the suppression of those already affecting agricultural products and live stock.

140. WARREN, W., Description of new genera and species of Pyralidae: Annals and Mag. Nat. Hist. Ann., ser. 6, vol. 9, pp. 429-442, 1892.

A new genus, Loxocreon, is created for Meyrick's Omiodes of the Hawaiian islands. Type *L. continuatalis* Wllngrn. (Salbia).

140*a*. KOEBELE, ALBERT, Studies of parasitic and predaceous insects in New Zealand, Australia, and adjacent islands: U. S. Dept. Agric., [Report No. 51] Washington, 1893. (BM)

Work in Honolulu is referred to on page 5 and again on page 11, where the following pests are discussed: Dactylopius spp., *Pulvinaria psidii* Mask., *Lecanium acuminatum* Sign., *L. depressum* Sign., and *L. longulum* Dougl. The introduction of *Cryptolaemus montrousieri* Muls. and Rhizobius spp. is recommended. Koebele further states that a number of *Chilocorus bivulenerus* Muls. were turned loose in good condition. He also found internal parasites preying upon the various species of Lecanidae in

Honolulu, and one of these he took to California in considerable numbers, liberating them in an orange orchard infested with *Lecanium oleae* Burm. and *L. hesperidum* Linn. A few species of Scymnids and *Coccinella abdominalis* Say. were also found. These insects are discussed also on page 23, where it is stated that the *Coccinella abdominales* was sent to California and liberated on *Lecanium hesperidum* Linn.; and that three small Scymnids were found among the insects sent from Honolulu.

141. MASKELL, W. M., Further coccid notes: with descriptions of new species from Australia, India, Sandwich Islands, Demerara, and South Pacific: N. Zeal. Inst. Trans., vol. 25, pp. 201-252, pls. 11-18, 1893.

The following Hawaiian species are described: *Lecanium acuminatum* Sign., *L. longulum* Dougl., *Pulvinaria psidii* n.sp., *Sphaerococcus bambusae* n.sp.

142. RILEY, C. V., and HOWARD, L. O., An injurious Hawaiian beetle (*Adoretus umbrosus*): Insect Life, vol. 6, p. 43, 1893. (HSPA) (UH)

This species was first noticed in Hawaii about 1891 and in 1893 it had already become a serious pest, riddling the leaves of many trees and plants.

143. THRUM, THOMAS, Bureau of Agriculture and Forestry: Haw. Ann. for 1894, pp. 92-94, Honolulu, 1893. (BM) (PL) (UH)

Refers to the engagement of Prof. A. Koebele to study the blight and insect enemies of vegetation and to discover remedies for them. Mentions consignments of coccinellids and toads from California.

144. DYAR, H. G., Preparatory stages of *Lephygama flavimaculata* Harv., and other notes: Can. Ent., vol. 26, pp. 65-69, 1894. (HSPA) (AF) (UH)

Includes description of all stages.

145. COOPER, ELWOOD, Address of the president: Calif. Sta. Bd. Hort, 4th Bien. Rept. 1893-4, pp. 240-250, Sacramento, 1894. (HSPA) (AF)

Refers to the engagement of Koebele by the Hawaiian Government to search for parasites in Australia (p. 246).

146. CRAW, ALEXANDER, Entomology and quarantine: Calif. Sta. Bd. Hort., 4th Bien. Rept. 1893-4, pp. 79-109, Sacramento, 1894, (US) (HSPA) (AF)

Records oleanders from Honolulu infested with scale, Aspidiotus sp. (pp. 79-80).

147. THRUM, THOMAS, Coffee outlook in Hawaii: Haw. Ann. for 1895, pp. 65-68, Honolulu, 1894, (BM)

A brief discussion of coffee blight and its control by introduced insects.

148. BRUNNER, V. WATTENWYL, On the Orthoptera of the Sandwich Islands: Zool. Soc. London Proc., pp. 891-897, 1895. (BM) (AF) (US)

The following species are included: Dermaptera: *Anisolabis littorea* White, *A. maritima* Bon., *A. pacifica* Erichs., *A. annulipes* Luc., *Labia pygidiata* Dubr., *Chelisoches morio* Fab., *Forficula hawaiensis* Borm.—Blattodea: *Phyllodromia heiroglyphica* Brun., *P. obtusata,* n.sp., *Stylopyga decorata* Brun., *Methana ligata* Brun., *Periplaneta americana* L., *Eleutheroda dytiscoides* Serv., *Leucophaea surinamensis* Fab., *Oniscosoma pallida* Brun., *Euthyrrapha pacifica* Conqueb.—*Acridiodea*: *Oxya velox* Fab.—Locustodea: *Elimaea appendiculata* Brun., *Brachymetopa discolor* Redtenb., *B. blackburni* Borm., *B. deplanata* n.sp., *B. nitida* n.sp., *Xiphidium fuscum* Fab.—Gryllodea: *Gryllus innotabilis* Walk., *G. poeyi* Sauss., *Paratrigonidium pacificum* (Scudd.), *P. atroferrugineum* n.sp., Prognathogryllus n.gen. ex tribu Prodoscirtium, *P. alatus* n.sp., *P. forficularis* n.sp.; the last two figured.

149. COCKERELL, T. D. A., Notes on the geographical distribution of scale insects: U. S. Nat. Mus. Proc., vol. 17, pp. 615-625, 1895. (BM) (UH)

The following are included from Hawaii (p. 621): *Dactylopius citri, Lecanium hesperidum, L. depressum, L. oleae, L. acuminatum, Asterolecanium pustulans, Pulvinaria psidii,* and *Sphaerococcus bambusae.* Only the last two were originally described from Hawaiian specimens.

150. COCKERELL, T. D. A., Miscellaneous notes on Coccidae: Can. Ent., vol. 27, pp. 253-261, 1895. (HSPA) (US)

Mentions *Asterolecanium pustulans* (Ckll.) on oleander from Honolulu (p. 259).

151. DYAR, H. G., Preparatory stages of *Phlegethontius cingulata* (*Sphinx convolvuli*): Ent. News, vol. 6, p. 95, 1895. (AF) (UH) (HSPA)

Includes descriptions of all stages.

152. KOEBELE, ALBERT, Report of the entomologist: Republic of Hawaii, Min. of Interior, Rept. for 1894, pp. 98-104, Honolulu, 1894. (US)

The report discusses injurious insects in Hawaii. Koebele says that though these are numerous they may be controlled by introducing natural enemies. He mentions some of the principal scale pests and reviews the numerous species of ladybird beetles sent from California to prey upon them.

153. MARSDEN, JOSEPH, Blights and insect pests: Republic of Hawaii, Min. Int. Rept. for the nine months ending Dec. 31, 1894, pp. 31-38, Honolulu, 1895.

This paper lists about three dozen species of Coccinellidae which were successfully sent from Australia and liberated in Hawaii to prey upon plant lice, scale insects, and red spiders. Control measures are discussed for the Japanese beetle (Adoretus) with suggestions for the introduction of moles, bats, and toads. Notes a suggestion from University of California that the caneborer (*Rhabdocnemis obscurus* Boisd.) is a native of New Ireland, and that this island is the place to search for parasites. Discusses the damage done by this pest in Fiji.

154. MARSDEN, JOSEPH, Blights and insect pests: Report to commissioners of Agriculture and Forestry: Rept. Min. Int. Repub. Haw., for 1895, pp. 118-120, 1896.

Records a marked decrease in scale pests, due to the introduction of natural enemies. This is particularly true in regard to the coffee scale, which

is said to be a thing of the past. The Japanese beetle is reported troublesome, also the red spider (*Tetranychus telarius*) on coffee, and cutworms on the canaigre plant.

155. MASKELL, W. M., Synoptical list of Coccidae reported from Australasia and the Pacific Islands up to December, 1894: N. Zeal. Inst. Trans., vol. 27, pp. 1-35, 1895. (BM)

The following are mentioned from Hawaii: *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. nerii* Bouché, *Diaspis boisduvalii* Sign., *D. rosae* Sandb., *Mytilaspis flava* Targioni-Tozzetti, var. *hawaiiensis* Mask., *M. pallida* Green, var. (?) Mask., *M. pomorum* Bouché, *Chionaspis* (*?*) *biclavis* Comst., var. *detecta* Mask., *C. prunicola* Mask., *Lecanium acuminatum* Sign., *L. longulum* Dougl., *L. nigrum* Niet., var. *depressum* Targioni-Tozzetti, *L. oleae* Bern., *Pulvinaria mammeae* Mask., *P. psidii* Mask., *Dactylopius vastator* Mask., *Sphaerococcus bambusae* Mask., *Icerya purchasi* Mask.

156. MASKELL, W. M., Further coccid notes with description of new species from New Zealand, Australia, Sandwich Islands, and elsewhere, and remarks upon species already reported: N. Zeal. Inst. Trans., vol. 27, pp. 36-75, pls. 1-7, 1895. (BM)

The following species concern Hawaii: *Aspidiotus longispina* Morg., *Diaspis boisduvalii* Sign., *Mytilaspis pallida* Green, *M. flava* Targioni-Tozzetti, *Chionaspis prunicola* n. sp., *C. biclavis* Comst., var. *detecta* n. var., *Pulvinaria mammeae* n. sp., *Dactylopius vastator* n. sp.

157. SHARP, DAVID, Cambridge Natural History, vol. 5, Insects, part 1, pp. 83-584, and vol. 6, Insects part 2, pp. 1-625, London, 1895. (BM) (UH)

In part 1, reference is made to *Oligotoma insularis* (p. 354) and to the numerous chrysopides in Hawaii (p. 471). The pecularities of Hawaiian Odonata are discussed (pp. 425-426). In part 2, the Hawaiian bees (Prosopis, pp. 21-22) and the peculiarities of Hawaiian wasps (Odynerus, pp. 76-77) are discussed.

158. TRYON, HENRY, New cane varieties and new diseases: The Planters' Monthly, vol. 14, pp. 449-459, Honolulu, 1895.

Discusses the distribution of the beetle-borer (*Rhabdocnemis obscurus* Boisd.). This New Guinea borer is said to occur also in New Ireland, Tahiti, Fiji, and Hawaii.

159. ALFKEN, J. D., Zur Insectenfauna der Hawaiischen und Neuseelandischen Inseln. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-7): Zool. Jahrb., 19 Band, Heft 5 (1903). (BM) (HSPA)

Includes notes on the various insects collected on the Hawaiian islands, including Laysan.

160. ALFKEN, J. D., Neue Orthopteren von Neuseeland und der Hawaiischen Inseln, nebst kritischen Bemerkungen zu einigen bekannten Arten. Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-7): Abh. nat. Ver. Bremen, vol. 17, pp. 141-152 (1901). (BM)

Paranemobius n.gen. and *P. schauinslandi* n.sp. are described (p. 145).

161. COCKERELL, T. D. A., A check-list of the Coccidae: Ill. Sta. Lab. Nat. Hist. Bull. 4, pp. 318-339, 1896. (HSPA)

Lists the following from Sandwich Islands: *Dactylopius vastator* Mask. (p. 326), *Sphaerococcus bambusae* Mask. (p. 329), *Pulvinaria mammeae* Mask. (p. 330), *Mytilaspis flava*, var. *hawaiiensis* Mask. (p.336).

162. CRAW, ALEXANDER, A list of scale insects found upon plants entering the port of San Francisco: U. S. Dept. Agric. Div. Ent. Bull. 4, Tech. ser., pp. 40-41, 1896. (AF) (UH)

The following are listed from Honolulu: *Aspidiotus nerii* Bouché, on palms; *Asterolecanium pustulans* Ckll., on oleander; *Ceroplastes rubens* Mask., on Asplenium fern; *Diaspis patellaeformis* Sasak., on shrub; *Dactylopius albissiae* Mask., on orange; *Icerya purchasi* Mask., on rose; *Lecanium hesperidum* Linn., on orange; *Lecanium longulum* Dougl., on *Carica papaya; Lecanium perforatum* Newst., on palms; *Lecanium tessellatum* Sign., on ferns; *Lecanium oleae* Bern., on deciduous magnolia; *Pulvinaria psidii* Mask., on ferns, orange, coffee, pomegranate and avocado.

163. CRAW, ALEXANDER, Injurious insect-pests found on trees and plants from foreign countries: Calif. Sta. Bd. Hort., 5th Bien. Rept. for 1895-6, pp. 33-55, pls. 6-8, Sacramento, 1896. (US)

The following references to Hawaii: *Chionaspis delecta* Mask. (p. 37), *Diaspis patelliformis?* Sasak. (p. 39), *Planchonia* (*Asterolecanium*) *pustulans* Cock. (p. 43), *Ceroplastes rubens* Mask. (p. 44), *Lecanium nigrum* Niet., *L. perforatum* News, and *L. tesselatum* Sign. (p. 46), *Pulvinaria psidii* Mask., and *Adoretus umbrosus* Z. (p. 47).

164. CRAW, ALEXANDER, Entomology and quarantine: Calif. State Bd. Hort., 5th Bien. Rept. for 1895-6, pp. 127-135, Sacramento, 1896. (US)

Includes the following references to Hawaii: *Lecanium longulum* Doug., taken on papaws (*Carica papaya*), and *Ceroplastes rubens* Mask. on ferns (pp. 127-8), and the mongoose (p. 135).

165. HOWARD, L. O., and MARLATT, C. L., The San Jose scale: U. S. Dept. Agric., Div. Ent. Bull. 3, n. ser., pp. 1-80, 1896. (HSPA)

Mr. Koebele found this scale on the island of Kauai upon prune and peach trees imported from California, some trees having been utterly destroyed by the scale and others badly infested.

166. KORBELE, ALBERT, Report on insect pests: Haw. Planters' Monthly, vol. 15, pp. 590-598, Honolulu, 1896. (HSPA) (US)

The following pests are discussed and suggestions given for their control: the cane borer, *Sphenophorus obscurus* Boisd.; the coffee borer, *Aegosoma reflexum* Karsch.; the coconut pyralid, Botys sp.; the cut-worm, *Laphygma frugiperda* Hub.; the mole cricket, Gryllotalpa sp., the sugarcane mealy bug, *Dactylopius calceolaria* Mask.; and plant lice, Aphis sp.

167. MARLATT, C. L., Insect control in California: U. S. Dept. Agric. Yearbk., pp. 217-236, 1896. (BM)

Includes a reference to the introduction of *Cryptolaemus montrouzieri* Muls., which had been very successful in Hawaii in ridding coffee plantations of *Pulvinaria psidii* (p. 226).

168. PERKINS, R. C. L., A collecting trip on Haleakala, Maui, Sandwich Islands: Ent. Month. Mag., 2d ser., vol. 7, pp. 190-195, 1896. (BM) (AF)

169. SHARP, DAVID, On Plagithmysus, a Hawaiian genus of longicorn Coleoptera: Ent. Month. Mag., vol. 32, pp. 237-240, 241-245, 271-274, London, 1896.

The following species are described: *Plagithmysus vitticollis* n. sp., *P. newelli* n. sp., *P. concolor* n. sp., *P. solitarius* n. sp., *P. cuneatus* n. sp., *P. (Clytarlus) finschi* Har., *P. pulverulentus* Motsch., *P. bishopi n.* sp., *P. vicinus* n. sp., *P. bilineatus* n. sp., *P. lanaiensis* n. sp., *P. perkinsi* n. sp., *P. varians* n.sp., *P. darwinianus* n.sp., *P. (Clytarlus) blackburni* Sharp, *P. sulphurescenes* n. sp., *P. speculifer* n. sp., *P. aestivus* n. sp., *P. funebris* n. sp., *P. aequalis* n. sp., *P. arachnipes* n. sp., *P. (Clytarlus) cristalus* Sharp.

170. TOWNSEND, C. H. T., Some Mexican and Japanese injurious insects liable to be introduced into the United States: U. S. Dept. Agric. Div. Ent. Bull. 4, Tech. ser., pp. 9-25, 1896.

Includes several brief references to species occurring in the Sandwich Islands.

171. COCKERELL, T. D. A., San Jose scale and its nearest allies: U. S. Dept. Agric., Bur. Ent. Bull. 6, Tech. ser., 1897. (UH)

Morganella n. subg. is proposed for *maskelli* n. sp. (p. 22).

172. COCKERELL, T. D. A., Food plants of scale insects: U. S. Nat. Mus. Proc., vol. 19, pp. 725-785, 1897. (BM)

Most of the Hawaiian species are included in this extensive list.

173. COQUILLETT, D. W., Revision of the Tachinidae of America north of Mexico: U. S. Dept. Agric., Bur. Ent. Bull. 7, Tech. ser., 1897. (UH)

Chaetogaedia monticola Bigot is recorded from Hawaii, pp. 11 and 137.

173*a*. GUPPY, H. B., On the summit of Mauna Loa: Nature, vol. 57, p. 21, London, Nov. 4, 1897.

174. HAMPSON, G. F., On the classification of two subfamilies of moths of the family Pyralidae: the Hydrocampinae and Scoparianae: Ent. Soc. London, Trans., pp. 127-240, 1897. (HSPA)

The following references are given to Hawaiian species: on p. 227—*Xeroscopa melanopis* Meyr., *X. ombrodes* Meyr., *X. ichnias* Meyr., *X. demodes* Meyr., *X. pachysema* Meyr., *X. mesoleuca* Meyr., *X. venosa* Butl., *X. hawaiensis* Butl., *X. jucunda* Butl.; on p. 229—*Mestolobes abnormis* Butl., *M. minuscula* Butl., *M. semiochrea* Butl.; on p. 233—*Scoparia frigida* Butl., and *S. montana* Butl.

175. KOEBELE, ALBERT, Report of the entomologist of the Hawaiian Government: Haw. Planters' Month., vol. 16, pp. 65-85, Honolulu, 1897. (BM) (US) (HSPA)

This valuable paper deals with the work of Koebele from the time of appointment to December 31, 1896. Report is made upon the success of the introduced Australian ladybird beetle, *Crytolaemus montrouzieri* Muls., in controlling the following scale insects: *Dactylopius vastator* Mask., *D. ceri-*

ferus News., *D. chalceolariae* Mask., *D. adonidum Linn.*, and *Pulvinaria psidii* Mask. Other scale insects mentioned are: *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. duplex* Cock., *A. camelliae* Sign., *A. nerii* Bouché, and several species of this genus; *Parlatoria zizyphi* News., *P. pergandei* Comst., *Mytilaspis citricola* Pack., *M. gloverii* Pack., *M. pallida* Green, *M. flava* Targ.-Toz., *M. pomorum* Bouché, *Diaspis rosae* Sandb., *D. boisduvalii* Sign., *Chionaspis biclavis* Comst., *C. eugeniae* Mask., *C. prunicola* Mask., *Diaspis pateliiformis* Sasaki, *D. amygdali* Tryon, *Fiorinia camelliae* Comst., *Ceroplastes rubens* Mask., *C. ceriferus* Ander., *C. floridensis* Comst., *Lecanium acuminatum* Sign., *L. filicum* Boisd., *L. hemisphaericum* Targ.-Toz., *L. coffea* Niet., *L. hesperidum* Linn., *L. longulum* Doug., *L. mori* Sign., *L. nigrum* Niet., *L. oleae* Bern., *L. tessellatum* Sign., *Pulvinaria mameae* Mask, *Eryococcus araucariae* Mask., and *Icerya purchasi* Mask., also other undetermined coccids present in the islands. About 200 species of ladybirds had been introduced to prey upon the scale insects, also two species of fungi destructive to all the Lecanidae. Remarking upon the introduced Coccinellidae, Koebele says that only 3 species were present in Blackburn's time: *Coccinella abdominalis* Say, *Scymnus ocellatus* Sharp, and *S. vividus* Sharp, and that these were evidently introduced very early. Extensive notes are given upon the habits of the various other exotic species introduced by the author. Of the other introduced predators and parasites Koebele mentions syrphids and chrysopid flies as established, and says *Chalcis obscurata* Walk. is active against various pyralid and tortricid larvae. Mention is also made of the introduction of bats from California—600 of which reached Hawaii alive but were apparently not established. Toads from California and frogs from Japan reproduced freely. Among cutworms the *Agrotis ypsilon* Rott., *A. saucia* Hbn., *Lecania unipuncta Haw., Plusia verticillata* Guen., *Laphygma frugiperda* Hbn., are mentioned; these have few parasites. Coffee trees are reported badly infested by a white fly, Aleurodes sp.; natural enemies of these were introduced. *Adoretus umbrosus* F., probably introduced from Japan in soil, was reported from Oahu, Maui, and Kauai. These insects will be controlled by the fungus in the wet districts. Notes are given on life history, food plants, and natural enemies, with full discussion of the experiments with fungus. The small green tineid larvae destructive to the leaves of sweet potatoes (native "ponallo") and the somewhat allied *Plutella cruciferarum* Z. are mentioned briefly.

176. MASKELL, W. M., Further coccid notes with new species and discussion of points of interest: N. Zeal. Inst. Trans., vol. 29, pp. 293-331, pls. 18-22, 1897. (BM)

The species described which concern Hawaii are: *Chionaspis eugeniae* Mask and *Ceroplastes rubens* Mask.

177. MASKELL, W. M., On a collection of Coccidae, principally from China and Japan: Ent. Month. Mag., vol. 33, pp. 239-244, London, 1897. (AF) (HSPA)

The following species are recorded from Hawaii: *Aspidiotus cydoniae* Comst., on casuarina; same, var. *tecta*, n. var., on ohia trees; *Aspidiotus longispina* Morg., on kukui trees; *Lecanium hesperidum* Linn., on papaya and on ohia trees.

178. PERKINS, R. C. L., The introduction of beneficial insects in the Hawaiian Islands: Nature, vol. 55, pp. 499-500, 1897. (BM)

This article deals principally with scale insects and the reasons for the success of their introduced natural enemies. Perkins says: "Few countries have been more plagued by the importation of insect pests than the Hawai-

ian Islands; in none have such extraordinary results followed the introduction of beneficial species to destroy them."

179. PERKINS, R. C. L., Notes on *Oligotoma insularis* McLach. (Embiidae) and its immature conditions: Ent. Month. Mag., 2d ser., vol. 8, pp. 56-58, London, 1897. (BM) (AF)

Discusses development and habits.

180. *PERKINS, R. C. L., Notes on some Hawaiian insects: Phil. Soc. Cambridge Proc., vol. 9, pp. 373-380, 1897.

181. SHARP, DAVID, On Plagithmysus, a Hawaiian genus of longicorn Coleoptera: Ent. Month. Mag., vol. 33, suppl. p. 12, London, 1897. (AF) (HSPA)

Description given of *Plagithmysus albertisi* n. sp., collected in West Honolulu by Signor d'Albertis in 1874.

182. WALSINGHAM, LORD, Western equitorial African Microlepidoptera: Ent. Soc. London Trans., pp. 33-67, pls. 2, 3, 1897.

Describes *Monopis* Hb. (*Blabophanes Z.*) *longella* Wlk. recorded from the Hawaiian islands (Honolulu).

183. ALFKEN, J. D., *Megachile schauinslandi* n.sp. Eine neu Megachileart aus Honolulu: Ent. Nachr., vol. 24, pp. 340-341, 1898. (HSPA)

184. CLARK, B. O., Official bulletin of the Bureau of Agriculture: The Hawaiian, vol. 1, p. 6, Honolulu, Aug. 13, 1898.

The Hawaiian was a weekly newspaper which started February 12, 1898, its object being to advertise the islands. Mr. Clark, then secretary and commissioner of the Hawaiian Bureau of Agriculture, edited a page dealing with agricultural subjects. The only complete file, so far as known is owned by Mrs. B. J. Mesick, 2029 Beckley Street, Honolulu, widow of the editor, L. H. Mesick. This, the first reference dealing with the melon fly (*Dacus cucurbitae* Coq.) in Hawaii or elsewhere, consists of correspondence. A letter dated August 8, 1898, from L. C. Swain, Laupahoehoe, Hawaii, described this new pest, which he had observed affecting pumpkins, squashes, beans, tomatoes, and watermelons. Mr. Clark, in his reply gave the life history of the flies, which he had observed carefully the previous year near Honolulu; he also suggested measures of control.

A complete copy of this correspondence appears in Haw. Agric. Exp. Sta. Rept. for 1907, pp. 30-31, also in U. S. Dept. Agric. Bull. 491, pp. 57-58, 1917.

185. COCKERELL, T. D. A., The Coccidae of the Sandwich Islands: Ent., vol. 31, pp. 239-240, London, 1898.

The species described are: *Icerya purchasi* Mask., *Sphaerococcus bambusae* Mask., *Asterolecanium pustulans* Ckll., *Dactylopius citri* Risso., *D. albizziae* Mask., *D. vastator* Mask., *D. virgatus* Mask. (syn. *ceriferus* Newst.), *Ceroplastes rubens* Mask., *Lecanium nigrum* Nietn., *L. nigrum*, var. *depressum* Targ., *L. hesperidum* L., *L. oleae* Bern., *L. acuminatum* Sign., *L. longulum* Dougl., *Pulvinaria mammeae* Mask., *P. psidii* Mask., *Aspidiotus aurantii* Mask., *A. longispina* Morg., *A. hederae Vall.*, var. *nerii* Bouché, *A. cydoniae* Comst., *A. maskelli* Ckll., *A. persearum* n. sp. *A. perniciosus* Comst., *Mytilaspis gloverii* Pack., *M. hawaiiensis* Mask., (as var. of *flava*), *M. pomorum* Bouché, *M. pallida* Green, var. *maskelli* Ckll., *Howardia biclavis* Comst., var.

detecta Mask., *Chionaspis prunicola Mask.* (syn. of *Diaspis amygdali* Tryon), *C. eugeniae* Mask., *Fiorinia fioriniae* Targ., *Aulascaspis boisduvalii* Sign., *A. rosae* Bouché.

186. HAMPSON, G. F., A revision of the moths of the superfamily Pyraustinae and family Pyralidae: Zool. Soc. London Proc., pp. 590-761, 1898.

The following Hawaiian species are included: *Nacoleia blackburni* Butl., *N. accepta* Butl., *N. continentalis* Wllgrn., *N. demaratalis* Wlk., and *N. localis* Butl. (p. 699).

187 HOWARD, L. O., On some new parasitic insects of the subfamily Encyrtinae: U. S. Nat. Mus. Proc., vol. 21, pp. 231-248, 1898. (BM)

Blepyrus marsdeni n. sp. is described from Honolulu (p. 234).

188. KIRBY, W. F., Description of a new genus of Odonata: Annals and Mag. Nat. Hist., 7th ser., vol. 2, pp. 346-348, 1898. (HSPA)

Describes Nesogonia n.gen., *N. blackburni* McL. Also published in Haw. Planters' Mo. vol. 17. pp. 208-219 and 258-269, Honolulu, 1898. (BM) (US) (HSPA).

189. KOEBELE, ALBERT, Report of Prof. Albert Koebele, Entomologist of the Hawaiian Government: Rept. Min. Int. Repub. Haw. for 1897, pp. 105-137, Honolulu, 1898. (BM) (US) (HSPA)

Most of this report is a repetition of the valuable report presented by this author the previous year (see No. 175). New matter, starting on page 130, deals with natural enemies of pests observed in California, Arizona, and Mexico.

190. MASKELL, W. M., Further coccid notes with descriptions of new species and discussion of points of interest: N. Zeal. Inst. Trans., vol. 30, pp. 219-252, 1898. (BM)

Includes a discussion of *Aspidiotus cydomae* Comstock, var, *tecta* n. var., from Hawaii (p. 224).

191. MAXWELL, WALTER, The Hawaiian Islands: U. S. Dept. Agric. Yearbook for 1898, pp. 563-582, 1899.

Includes a brief note on quarantine against insect pests and plant diseases and a letter from Mr. Koebele (p. 574).

192. ALFKEN, J. D., Die Xylocopa-art der Hawaiian Islands: Ent. Nachr., vol. 25, pp. 317-318, 1899. (HSPA)

The introduced bee, commonly known in Hawaii as *Xylocopa aeneipennis* Deg., is here considered to be the Asiatic species, *X. chloroptera Lep.*

193. BRIGHAM, W. T., Hawaiian feather work: B. P. Bishop Mus. Mem., vol. 1, No. 1, Honolulu, 1899.

Contains interesting references to the development of kahilis and their relation to house flies.

194. COCKERELL, T. D. A., The Coccidae of the Sandwich Islands: Ent., vol. 32, pp. 93, 164, 1899. (AF)

Discussed the distribution of what were considered endemic Hawaiian species, namely: *Kermicus* (formerly *Sphaerococcus*) *bambusae,* which also

occurs in Ceylon, Mauritius, and Brazil; *Dactylopius vastator,* also found in Mauritius; and *Mytilaspis hawaiiensis,* which has been found at Amoy, China. The following are to be added to the Hawaiian list: *Aspidiotus (Evaspidiotus) transparens* Green, *A. (Hemiberlesia) greeni* Ckll., and a young Icerya, indeterminable. Cockerell adds the following species from Koebele's report to his list of Hawaiian coccids: *Dactylopius calceolariae* Mask., *D. adonidum* Linn. (but probably *citri*), *Eriococcus araucariae* Mask., *Ceroplastes ceriferus* Anders., *C. floridensis* Comst. (these two often introduced but not established), *Lecanium hemisphaericum* Targ., *L. mori* Sign., *L. tessellatum* Sign., *Parlatoria zizyphis* Luc., *P. proteus,* var. *pergandei* Comst., *Mytilaspis beckii* E. Newman (*M. citricola* Pack.), *Aspidiolus rapax* Comst., *A. duplex* Ckll. (p. 164). There are also mentioned two unidentified species of Pulvinaria.

195. *Cockerell, T. D. A., A check-list of the Coccidae. First supplement: Ill. Sta. Lab. Nat. Hist. Bull. 5, pp. 389-398, 1899.

196. Coquillett, D. W., A new trypetid from Hawaii: Ent. News, vol. 10, pp. 129-130, 1899.

Describes *Dacus cucurbitae* n.sp.: two males and two females bred by George Compere from larvae in green cucumbers.

197. Emery, Carlos, Ergebnisse einer Reise nach dem Pacific (Schauinsland 1896-97), Formiciden: Zool. Jahrb., vol. 12, Syst., pp. 438-440, 1899. (HSPA)

Describes four species of ants collected from Laysan: *Monomorium gracillimum* F.Sm., *Tetramorium guineense* Fabr., *Tapinoma melano-cephalum* Fabr., *Ponera punctatissima* Rog., *schauninslandi* n.subsp.

198. Forel, August, Heterogyna (Formicidae): Fauna Haw., vol. 1, pp. 116-122, 1899.

199. Haughs, David, Insect pests and diseases: Report Commissioner of Agriculture: Rept. Min. Int. Repub. Haw. for bien. period ending 1899, pp. 120-123, Honolulu, 1900. (US) (AF)

Consists of a report by Professor Koebele of a trip to Australia in search of parasites, primarily for the cane-borer. The Mediterranean fruit fly is noted as a bad pest in Australia, a condition which led to a quarantine of Australian fruit. Other exotic fruit flies are also discussed.

200. *Howard, L. O., Economic status of insects as a class: Sci., n.s., vol. 9, p. 241, 1899.

201. Kirkaldy, G. W., Eine neue hawaiische Fulgoriden-Gattung und Art: Ent. Nachr., vol. 25, p. 359, 1899. (HSPA)

Phalainesthes n.gen., P. *schauinslandi* n.sp., are described from Hilo.

202. Koebele, Albert, Report of the entomologist: Republic of Hawaii, Min. of Int., Rept. for 1898, pp. 84-87, Honolulu, 1899. (US) (AF)

Records the introduction of the hornfly, *Haematobia irritans* Linn.

203. *Koningsberger, J. C., Erste overzicht der schadelijke en nuttige Icesten van Java: Mededeelingen uit 's lands plantentuin, vol. 22, pp. 1-53, 1899.

204. MEYRICK, EDWARD, Macrolepidoptera: Fauna Hawaiiensis, vol. 1, pp. 123-275, pls. 3-7, 1899.

This is the most extensive work on this group; it includes descriptions of many new species.

205. PERKINS, R. C. L., Hymenoptera aculeata: Fauna Hawaiiensis, vol. 1, pp. 1-122, pls. 1, 2, 1899.

This is the most extensive work on this group; it contains descriptions of many new species.

206. PERKINS, R. C. L., Orthoptera: Fauna Hawaiiensis, vol. 2, pp. 1-30, pls. 1, 2, 1899.

This is the most extensive work on Orthoptera; it contains descriptions of many new species.

207. PERKINS, R. C. L., Neuroptera: Fauna Hawaiiensis, vol. 2, pp. 31-89, pls. 3-5, 1899.

This is the most extensive work on Neuroptera; it contains descriptions of many new species.

208. SCHAUINSLAND, H., Drei Monate auf einer Korallen-Insel (Laysan), Bremen, 1899. (HSPA)

The insects listed are Lepidoptera: Noctuidae: *Apamea chersotoides* Butl., *Spaelotis crinigera* Butl.—Pyralidae: *Zinckenia recurvalis* F., also an undetermined tineid.—Hemiptera: Nabis sp.—Hymenoptera: *Chelonus cameroni* D.T. (=*carinatus* Cam.).—Coleoptera: *Dermestes domesticus* Garm., *Clytus crinicornis* Chevr., *Silvanus surinamensis* Linn., *Tribolium ferrugineum* Fab., also an abundance of roaches, Periplaneta (pp. 102-103). The flies and ants are not included in this paper.

209. ASHMEAD, W. H., Notes on some New Zealand and Australian parasitic Hymenoptera: Linn, Soc. N.S.W. Proc., vol. 25, pp. 327-360, 1900.

Describes the Pteromalid, *Tomocera californica,* parasite for *Lecanium oleae,* p. 345.

210. DYAR, H. G., Larvae from Hawaii—a correction: Can. Ent., vol. 32, pp. 156-158. (HSPA) (AF) (UH)

Spodoptera mauritia Boisd. is described as *Laphygma flavimaculata* Harv. in Can. Ent., vol. 26, p. 65, 1894. Other caterpillars described are: *Lycaena boetica* Linn., *Plusia chalcites* Esp., and *Omiodes blackburni* Butl. It is also noted that *Sphinx convolvuli* is the insect described as *Phlegethontius cingulata* in Ent. News, vol. 6, p. 95.

211. *FRANK, A. B., and KRUEGER, F., Schildlausbuch . . . Berlin, p. 120, 1900.

Records *Aspidiotus pernicosus* from Hawaii, p. 70.

212. HOWARD, L. O., A dipterous enemy of cucurbits in the Hawaiain Islands: U. S. Dept. Agric., Div. Ent. Bull. 22, n.ser., pp. 93-94, 1900.

Specimens were received March 13, 1899, from George Compere, Honolulu, of what is locally known as the melon fly. This was pronounced by Coquillett to be a new species, to which he gave the name, *Dacus cucurbitae.*

213. KOEBELE, ALBERT, Report: Haw. Sugar Planters' Exp. Sta. Rept., pp. 40-42, 1900. (US)

Records an examination of the dying roots of sugarcane: no organic disease could be found, though the epidermis of roots had been broken, probably by wind.

214. KOEBELE, ALBERT, Diseases of the cane: The Planters' Monthly, vol. 19, pp. 519-524, 1900.

Discusses the distribution, food plants, habits, and control measures of the sugar cane beetle borer, *Rhabdocnemis obscurus*; also includes brief notes on the pyralid moth *Omiodes accepta* Butl.

215. KOEBELE, ALBERT, Report of Prof. Albert Koebele, entomologist: Rept. Comr. Agric. and Forestry for 1900, pp. 36-49, 1901. (US)

Koebele reports the introduction of parasites from California for *Pieris rapae, Plutella cruciferarum,* and various cutworms. Salamanders were also brought over. Notes Lecanidae kept in check now by many ladybirds; other predators and parasites sent from Fiji and Australia. A brief review of exotic fruit flies is included, with remedies. Fuller's rose beetle, *Aramigus fulleri* Horn, is found to be the same as the so-called Olinda bug. A tineid larva of cotton bolls (*Geleckia gossypiella* Sndrs.) is reported; a tortricid, also bred from cotton bolls, and a common beetle, *Araeocerus fasciculatus* De.G. Japanese beetles are reported from all parts of the islands. Suggestions on various phases of the production of silk as an industry for the islands terminates this paper.

216. KOEBELE, ALBERT, Destruction of forest trees: Rept. Comr. Agric. and Forestry Hawaii, for 1900, pp. 50-60, 1901. (US)

Discusses the depredation of insects on forest trees of Hawaii. *Icerya purchasi* Mask. is under control, the ladybird beetle, *Vedalia cardinalis,* being abundant. Other scale insects mentioned are *Lecanium nigrum* Neit., *L. longulum* Doug., and *Pulvinaria psidii* Mask. which are also well checked by introduced natural enemies. The same is said in regard to the mealy bugs, *Dactylopius ceriferus* News., on *Erythrina monosperma.* Notes on the span worm, *Scotorythra idolias,* a tortricid, and on a Bruchus destructive to the seed of the koa tree. The list of Cerambycid beetles noted includes: *Plagithmysus varians* Shp., *P. pulverulentus* Motsch., *P. cristatus* Shp., *P. aequalis* Shp., *P. arachnipes* Shp., *P. darwinianus* Shp., *P. blackburni* Shp., *P. funebris* Shp., *P. bilineatus* Shp., *P. bishopi* Shp. *P. vicinus* Shp., *P. collaris* Shp., *P. diana* Shp., *P. finschi* Har., *P. pulvillatus* Karsch, *P. lanaiensis Shp., P. aestivus* Shp., *P. concolor* Shp., *P. permundus* Shp., *P. perkinsi* Shp., *P. lamarckianus* Shp., *Clytarlus filipes* Shp., *C. mediocris* Shp., *C. debilis* Shp., *C. claviger* Shp., *C. nodifer* Shp., *C. modestus* Shp., *C. laticollis* Shp., *C. pennatus* Shp., *C. fragilis* Shp., *C. longipes* Shp., *C. annectens* Shp., and *Callithmysus microgaster* Shp. Koebele considers the worst pest of the native forest to be cattle (pp. 57-59).

217. KOEBELE, ALBERT, Notes on insects affecting the koa trees . . .: Rept. Bd. Comr. Agric. and Forestry, Hawaii, 1900, pp. 61-66, 1901, (US)

The insects noted are: *Parandra puncticeps* Sharp, *Aegosoma reflexum* Karsch in the dead wood of the decaying forest. The living trees affected by the "Olinda bug," *Pandamorus olindae* Perk., by tortricid and geometrid larvae, and by a fungoid disease.

218. KOEBELE, ALBERT, Hawaii's forest foes: Haw. Ann. for 1901, pp. 90-97, Honolulu, 1900.

Discusses causes of the disappearing forests of the islands, describing the various species of insects that attack trees, with their natural enemies.

219. MEYRICK, EDWARD, New Hawaiian Lepidoptera: Ent. Month. Mag., vol. 36, pp. 257-258, 1900. (HSPA) (AF)

The specimens described were collected by Professor Schauinsland. *Agrotis eremioides* n.sp. and *A. procellaris* n.sp., were obtained at Laysan, and *Scotorythra diceraunia* n.sp., *S. triscia* Meyr., *Phlyctaenia synastra* Meyr. came from Molokai.

220. *PERKINS, R. C. L., Introduction of beneficial insects into the Hawaiian Islands: Berlin Ent. Zeit., pp. 45-46, 1900.

This is a resumé of an article that appeared in Nature, vol. 55, pp. 499-500, 1897.

221. PERKINS, R. C. L., Coleoptera, Rhynchophora, Proterhinidae, Heteromera, and Cioidae: Fauna Hawaiiensis, vol. 2, pp. 117-270, pls. 7-10, 1900.

The most extensive work dealing with these groups; it contains descriptions of many new species.

222. SHARP, DAVID, Coleoptera Phytophaga: Fauna Hawaiiensis, vol. 2, pp. 91-116, pl. 6, 1900.

The most extensive work on this group; it contains descriptions of many new species.

223. THOMAS, W. B., Farming in Hawaii: Haw. Ann. for 1901, pp. 124-128, 1900. (BM)

Includes a brief reference to insect pests which are said to make it almost impossible to grow certain vegetables (p. 127).

224. VAN DINE, D. L., A partial bibliography of Hawaiian entomology: U. S. Dept. Agric., Office Exp. Stations Bull. 170, pp. 52-59, 1906.

225. BALL, S. C., Migration of insects to Rebecca Shoal Light-Station and the Tortugas Islands, with special references to mosquitoes and flies: Carnegie Inst. Wash., Pub. No. 252, pp. 193-212, 1918.

Contains an interesting note on the observation of house flies migrating long distances in a small boat (p. 208).

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