

melampus (Monte Roën), *E. mnestra* (Brenner), *E. manto* and ab. *cæcilia* (Brenner), *E. ceto*, *E. stygne*, *E. nerine* (Mendel), *E. glacialis* var. *alecto* (Campiglio), *E. lappona*, *E. tyndarus*, *E. gorge* var. *triopes*, *E. goante* (very rare), *E. pronoe*, *E. æthiops*, *E. ligea*, *E. euryale*; *Satyrus hermione*, *S. circe*? (Mendel), *S. semele*, *S. actæa* var. *cordula*; *Pararge mæra*, *P. megæra*, *P. egeria*, *P. achine* (Mendel only); *Epinephele lycaon*, *E. jurtina* (*E. tithonus* appeared to be entirely absent); *Aphantopus hyperanthus*; *Cænonympha arcania* and var. *satyrion*, *C. pamphilus*; *Hesperia cārthami*, *H. fritillum* var. *alveus*, *H. sao*, *Thanaos tages*, *Adopæa thaumas*, *A. lineola*, *Augiades sylvanus*, *A. comma*, and *Heteropterus morpheus* (Vienna only).

A LIST OF THE COCCIDÆ OF THE HAWAIIAN ISLANDS (HEMIPTERA).

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THIS supersedes my list in the 'Fauna Hawaiiensis.' The nomenclature is almost exactly that of Mrs. Fernald's Catalogue.

Sub-fam. COCCINÆ (MONOPHLEBINÆ).

1. ICERYA PURCHASI, Maskell.—Formerly destructive, but since the introduction of the ladybirds, *Vedalia cardinalis*, *Novius koebeli*, and *Rhodolia* spp., it is of little importance, only occurring sporadically.

Sub-fam. ORTHEZIINÆ.

2. ORTHEZIA INSIGNIS, Douglas.—For a report on this, see Koebele [7].* It has so often been stated that Prof. Koebele was responsible for the introduction of this pest into the Islands for the purpose of controlling Lantana, that it seems necessary to declare again that not only is the above statement untrue, the scale having slipped into Maui some years ago, but that it was in direct violation of the earnest warnings of Prof. Koebele, that it was introduced on the windward side of Oahu and on the Kona side of Hawaii, and with the mistaken idea of exterminating the Lantana.

Sub-fam. KERMINÆ.

3. ERIOCOCCUS ARAUCARIÆ, Maskell.—On *Araucaria*, alligator pear, fig, and guava, but now controlled by the ladybirds, *Cryptolæmus montrouzieri* and *Sticholotis punctatus*.

Dict X 4. TRECHOCORYS LONGISPINUS (Riley).—Formerly very destructive to coffee and samang, but practically wiped out by the ladybirds, *Cryptolæmus montrouzieri* and *Cryptogonus orbicularis*.

* The numbers in brackets refer to the brief bibliography at the end.

5. *T. ALBIZZIE* (Maskell).—In the early nineties, terribly destructive to all kinds of citrus, but wiped out by *Cryptolæmus montrouzieri*.

6. *T. CALCEOLARIE* (Maskell).—Formerly causing considerable destruction to sugar-cane, but of little importance now, being controlled by *Cryptolæmus montrouzieri* and *Scymnus debilis*.

7. *T. CITRI* (Risso).—On orange and coffee, but of little importance.

8. *T. FILAMENTOSUS* (Cockerell).—Introduced from Japan in the early nineties on citrus, from which it soon spread to coffee and other shrubs and trees. The citrus and coffee were so infested by it that their destruction in the near future seemed imminent; nevertheless it has been practically exterminated by *Cryptolæmus montrouzieri*.

9. *T. BROMELIE* (Bouché).—A consignment of pine-apples was recently inspected, slightly infested with this, but was fumigated and the mealy-bugs destroyed. It is possible, however, that it may have been introduced before systematic inspection was inaugurated. *T. bromeliæ* is also known from India, South Africa, and Massachusetts (under glass), on *Hibiscus*, *Canna*, and mulberry,

10. *T. NIPE* (Maskell).—The cause of considerable destruction to alligator pears, guava, &c., but largely preyed upon by *Cryptolæmus montrouzieri*. [10.]

11. *T. VIRGATUS* (Cockerell).—Leguminous trees were in some instances entirely destroyed in former years, but the scale has been rendered unimportant by *Cryptolæmus*.*

12. *ASTEROLECANIUM PUSTULANS* (Cockerell).—This is the *Planchonia* sp., formerly recorded by Prof. Koebele on *Jacaranda mimosifolia*, *Prosopis dulcis*, oleander, fig-tree, &c. It is controlled by a Chalcid parasite.

Sub-fam. CALYMMATINÆ (= COCCINÆ).

13. *CHAETOCOCCUS BAMBUSÆ* (Maskell). [= *kermicus*].—On bamboo. I have not seen it in the Islands.

14. *PULVINARIA MAMMEÆ*, Maskell.—Controlled by *Cryptolæmus montrouzieri*, *Vedalia cardinalis*, and *Hyperaspis* sp.

15. *P. PSIDII* (Maskell).—Prof. Koebele writes (5, pp. 107-8): "I myself must confess that nowhere have I ever seen a landscape so completely blackened by the fungoid growth, caused by the honey exudation of the *Pulvinaria* scale in which this grows [in the coffee districts], as that of North Kona on my visit in February, 1894. On my recent trip to the same place, all these

* The last eight species are listed as *Pseudococcus* by Mrs. Fernald, and were formerly known as *Dactylopius*; both these names are synonymous, and apply only to the cochineal insect of Mexico (*Dactylopius mexicanus*, *Coccus cacti* of many authors).

had changed, and the districts, to me, had the appearance of another country, all owing to the presence of the *Cryptolæmus* beetle that devours the eggs of the scale." *Rhyzobius ventralis* also assists in the control."*

16. *CEROPLASTES RUBENS* (Maskell).—Kept in check by four Chalcid flies.

17. *C. CERIFERUS* (Anderson).—Of no importance.

18. *C. FLORIDENSIS* (Comstock).—Of no importance; kept in check by a Chalcid.

19. *CALYMMATA ACUMINATUM* (Signoret).—Always badly parasitised by spp. of Chalcids.†

20. *C. HESPERIDUM* (Linné).—On citrus, apparently now very rare. I have seen one or two oranges from Japan slightly infested.

21. *C. LONGULUM* (Douglas).—One of the commonest species, but is kept in check to a certain extent by *Rhyzobius ventralis*, a ladybird.

22. *EULECANIUM MORI* (Signoret).—Of little importance.

23. *SAISSETIA HEMISPHERICUM* (Signoret).—Always kept in check by *Cryptolæmus* and by internal parasites.

24. *S. NIGRUM* (Nietner).

25. *S. OLEÆ* (Bernard).

26. *EUCALYMNATUS TESSELLATUM* (Signoret).

27. *E. PERFORATUM* (Newstead).

These last four are of little importance.

Sub-fam. DIASPINÆ.

28. *CHRYSOMPHALUS AURANTII* (Maskell).—Imported from Japan, but kept in check by the ladybird *Platynaspis nigra*.

29. *ASPIDIOTUS CYDONIÆ*, Comstock. [= *greenii*].—Of little importance; there is a well-marked variety—*tecta*, Maskell—apparently found so far only in these Islands.

30. *A. PERSEARUM*, Cockerell.—Of no importance.

31. *A. PERNICIOSUS*, Comstock.—This pest, so terrible on the mainland, is of no importance here, the conditions being apparently unsuitable. I have seen a few examples on imported Californian fruit.

32. *A. SIMILLIMUS*, var. *TRANSLUCENS*, Fernald.—Of no importance.

33. *A. RAPAX*, Comstock.—Prof. Koebele notes that it was formerly in such numbers on apple, pear, and peach trees imported from America, that some of the trees had died. Not now seen.

34. *A. HEDERÆ* (Vallot).—I have no recent information of this.

35. *MORGANELLA MASKELLI* (Cockerell).—Of no importance.

* Prof. Koebele mentions two other species of *Pulvinaria*, but they are unnamed, and I have no further information.

† *Coccus* is used for this by Mrs. Fernald (2), but applies properly to *cacti*, Linné.

Kept in check by a Chalcid parasite and by a ladybird, *Platynaspis nigra*.

36. *PSEUDAONIDIA DUPLEX* (Cockerell).—Repeatedly introduced from Japan, but apparently not established. I have recently seen it on camellia plants from Japan.

37. *AULACASPIS ROSE* (Bouché).—Very common on rose trees all around Honolulu.

38. *A. PENTAGONA* (Tozzetti). [*Howardia prunicola* and *Diaspis patelliformis*].—Of little importance.

39. *DIASPIS BOISDUVALII* (Signoret).—Of little importance.

40. *D. BROMELIÆ* (Kerner).—Collected by Dr. Reh, of Hamburg, in 1902 [9] in Honolulu, and recently discussed by Mr. Van Dine [11].

41. *HOWARDIA BICLAVIS*, Comstock.—Always badly parasitised.

42. *PHENACASPIS EUGENIÆ* (Maskell).—Kept in check by *Rhyzobius* sp. Often occurring in numbers on oleander leaves, but apparently doing little harm to the tree.

43. *FIORINIA FIORINÆ* (Boisduval).—Kept in check by *Rhyzobius* sp.

44. *ISCHNASPIS LONGIROSTRIS* (Signoret).—Near Honolulu on palms. If this scale has been previously recorded from these Islands, the notice must have been published in the daily press. "The most easily recognized of scales, appearing as a short black line on the leaf it infests" (Cockerell, 1897, Bull. Bot. Dep. Jamaica (N. S.) iv. p. 150).

45. *PARLATORIA PROTEUS* (ruricola). 46. *P. PERGANDII*, Comstock.

47. *P. ZIZYPHUS* (Lucas).

48. *LEPIDOSAPHES PINNÆFORMIS* (Bouché).

49. *L. PALLIDA* (Maskell). 50. *L. ULMI* (Linné).

These last six are apparently of little importance.

51. *L. GLOVERII* (Packard).—Does not seem of much importance.

52. *L. BECKII* (Newman). [*citricola*].—On various species of *Citrus* over all the Islands, but the damage is more apparent than real, in some places at least, as this species is almost always badly parasitised, and is also preyed on by the ladybird, *Platynaspis nigra*. It occurs sparingly on citrus fruits imported from the mainland. Occurred in large numbers with *L. gloverii* and *Calymmata longulum*, on citrus fruits from China and Japan. Thus, instead of the former widespread havoc caused by the scale-bugs, and especially by the mealy-bugs, we have now only three, or at most four, species that can be considered really destructive, except sporadically; so much so, that unless one secures examples of many of the species when they do appear for a short time, one has to wait often many months for their reappearance.

53. *L. CROTONIS* (Cockerell).—Honolulu, on *Croton*. Previously recorded only from Jamaica.

List of Works on Hawaiian Scales.

1. T. D. A. COCKERELL: "A Check-list of the Coccidæ" [Bull. Illinois St. Lab. Nat. Hist. iv. pp. 318-39 (1896)].
2. MRS. M. E. FERNALD: "A Catalogue of the Coccidæ of the World" [Bull. Mass. Agr. Coll. Exp. Sta., No. 88, pp. 1-360 (1903)].
3. G. W. KIRKALDY: "Hemiptera" [Fauna Hawaiiensis iii.; Coccidæ on pp. 102-12 (1902)]. (On page 174 is a Bibliography of some earlier writings).
- 3a. G. W. KIRKALDY: "A Preliminary List of the Insects of Economic Importance recorded from the Hawaiian Islands" [Hawaiian Forester i. pp. 152-9 (June, 1904)].
4. ALBERT KOEBELE: "Report of Entomologist" [Bienn. Rep. Minister Int. Provis. Gov. Hawaiian Isl. 1894, pp. 98-104 (1894)].
5. ALBERT KOEBELE: "Rep. Entom." [Rep. Int. Republic Hawaii for biennial period ending 1897, pp. 105-37 (1898)].
6. ALBERT KOEBELE: "Report" [Rep. Comm. Agr. for 1900, pp. 36-52 (1901)].
7. ALBERT KOEBELE: "Rep. on Lantana Scale" [Rep. Comr. Agr. for biennial period ending 1902, pp. 54-65 (1903)].
8. JOSEPH MARSDEN: "Rep. Commr. Agric." [Rep. Int. Repub. Hawaii for 1894, pp. 31-8 (1895)].
9. L. REH: "Zur Naturgeschichte Mittel- und nordeuropäischer Schildläuse" [Allg. Zeitschr. für Entom. ix. p. 30 (1904)].
10. D. L. VAN DINE: "The 'Mealy Bug,' or 'Pear Blight' of the Alligator Pear" [Press. Bull. U. S. Federal (Hawaiian) Exp. Sta. No. 8 (1903)].
11. D. L. VAN DINE: "The Pine-apple Scale (*Diaspis bromeliæ*, Kerner)" [Hawaiian Forester, i. pp. 111-4 (1904)].

RECENT LITERATURE ON BELGIAN FOREST INSECTS.

By G. W. KIRKALDY.

My good friend Mr. G. Severin, of the Brussels Museum, has been so kind as to send me copies of a number of his memoirs on the forest insects of Belgium, published in the 'Bulletin de la Société centrale forestière de Belgique.' These memoirs are economic in purport, and are occupied by a recital of the life-history of the insects in question, and are illustrated by coloured plates of the insect in various stages, its habitat, &c., as well as by text-figures. The Belgian fauna is so interesting to British entomologists, that an enumeration of these memoirs—published in a bulletin not readily accessible in Britain—will doubtless be acceptable to the readers of the 'Entomologist.'

1. "Projet de règlement sur les insectes nuisibles aux forêts résineuses, 1898, pp. 609-56."

2. "Projet de règlement sur les insectes nuisibles. Rapport