

Notes on the Egg-parasites of Insects in Hawaii

BY O. H. SWEZEY

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As a convenience for reference, an attempt is here made to assemble our present knowledge of those insects in Hawaii which pass their immature stages within the eggs of other insects, or otherwise destroy them. The list as given includes the native species as well as those purposely introduced, and natural immigrants. A few insects are also included which destroy eggs of spiders. The purposely introduced species are designated by an asterisk.

HYMENOPTERA

EVANIIDAE

Evania sericea Cameron

Trans. Ent. Soc. London, p. 191, 1883.

Evania appendigaster (Linn.)

Sys. Nat., Ed. X, I, 1758.

Both these species of *Evania* are generally distributed throughout the Hawaiian Islands. The larvae are parasitic in the egg capsules of roaches such as: *Periplaneta americana* (Linn.), *P. australasiae* (Fabr.), *Neostylopyga rhombifolia* (Stoll) and *Cutilia soror* (Brunn.). One adult parasite issues per egg capsule.

ICHNEUMONIDAE

Arachnoleter swezeyi Cushman

Proc. U. S. Nat. Mus., 64, No. 2494, p. 3, fig. 1, 1924.

The larvae of this insect feed on the eggs of spiders in their silken egg cocoons. There may be as many as three per egg cocoon. The brown cocoons of the parasites are constructed within the empty egg cocoon. The species is known on Oahu and Hawaii. The host spiders have not been determined.

Diplazon laetatorius (Fabr.)

Spec. Insect, I, p. 424, 1781.

A parasite of the two syrphid flies whose maggots prey on aphids: *Ischiodon scutellaris* (Fabr.) and *Allograpta obliqua* (Say). I have not made the observation myself, but Professor Essig states

Proc. Haw. Ent. Soc., VII, No. 2, Dec., 1929.

in Insects of Western North America, p. 794, that "The adults oviposit in the eggs of the hosts. The eggs hatch together and the larvae of the parasite do not fully mature until the pupal stage of the host is reached." The adult parasite issues from the puparium of the host.

BRACONIDAE

Chelonus blackburni Cameron

Proc. & Mem. Manchester Litt. & Phil. Soc., X, p. 242, 1886.

This insect oviposits in the eggs of its hosts, but does not develop until after the caterpillar hatches and develops to maturity. The caterpillar containing the developing parasite does not become fully normal size. However, it spins its cocoon for pupation, soon thereafter the parasite larva finishes its growth and issues from the host caterpillar to spin its own white cocoon within the host cocoon. One parasite develops per host. It is generally distributed in the Hawaiian Islands, including Midway, Laysan, Pearl and Hermes Reef, and has several hosts. Probably its most favorite host is *Hymenia recurvialis* (Fab.). Other hosts are: *Platyedra gossypiella* (Saund.), *Phthorimaea operculella* (Zell.), *Homoeosoma humeralis* (Butl.), *Plutella maculipennis* Curtis, *P. capparidis* Swezey, *Phlyctaenia despecta* (Butl.), *Lineodes ochrea* Walsm., *Batrachedra cuniculator* Busck, and *Petrochroa dimorpha* Busck.

SCELIONIDAE

***Phanurus beneficiens** (Zehnt.)

Arch. Java Suikerind., IV, p. 487, Pl. VI, Figs. 16-24, 1896.

Introduced from Japan in 1928 as an egg-parasite of the rice borer, *Chilo simplex* (Butl.). About 40,000 were reared and liberated. It has not yet been recovered in the field.

Telenomus rhopali Perkins

Fauna Hawaiiensis, II, Part VI, p. 618, 1910.

Telenomus paractias Perkins

Fauna Hawaiiensis, II, Part VI, p. 619, 1910.

These two species are parasitic in the eggs of a bug, *Rhopalus hyalinus* (Fab.) on Oahu. They are rarely met with, however.

Telenomus despiciendus Perkins

F. H., II, Part VI, p. 618, 1910.

Telenomus adelphus Perkins

F. H., II, Part VI, p. 619, 1910.

These two species also occur on Oahu, but are very rare. No doubt they are parasitic on bug eggs of some kind.

Telenomus vulcanus Perkins

F. H., II, Part VI, p. 619, 1910.

This species occurs at Kilauea, Hawaii. It has been reared from the eggs of *Nysius* sp. in the flower heads of *Raillardia* sp.

Telenomus nawai Ashmead

Journal N. Y. Ent. Soc., XII, p. 72, 1904.

This is parasitic in the eggs of *Spodoptera mauritia* (Boisd.). It is an immigrant from Japan, first discovered on the grounds of the Experiment Station of the Hawaiian Sugar Planters' Association in 1926. It was reared by thousands in the insectary and distributed widely on the other islands. It is known to have become well established all over Oahu of itself, and quite widely on Kauai from the colonies sent there. It has not yet been recovered from the other islands. It was described from Japan, where it was reared from undetermined Lepidoptera eggs. It has been reared from eggs of *Prodenia litura* (Fabr.) in Fiji. In Honolulu, attempts were made to rear it on various lepidopterous eggs, but with no success except on *Spodoptera mauritia*. On this species it commonly parasitizes all of the eggs of an egg cluster. One parasite issues per egg.

Baeus persordidus Perkins

F. H., II, Part VI, p. 622, 1910.

Pseudobaeus peregrinus Perkins

F. H., II, Part VI, p. 621, 1910.

Dyscritobaeus comitans Perkins

F. H., II, Part VI, p. 622, 1910.

These three species were described from Oahu. Dr. Perkins stated that he suspected them to be egg-parasites of bugs, but that theoretically they should be bred from eggs of spiders. More recently, one or more species have been reared from spider eggs at Pahala and Kilauea, Hawaii, and at Waiahole and Kaala, Oahu. The reared specimens have not been determined.

PLATYGASTERIDAE

***Aphanomerus pusillus** Perkins

Exp. Sta., H. S. P. A., Bul. I, Part 6, p. 203, 1905.

This insect was introduced from Queensland in 1904 as an egg-parasite of *Siphanta acuta* (Walker). It is now generally spread throughout the islands and quite effective in checking *Siphanta*.

EUPELMIDAE

Solendinia picticornis Cameron

Trans. Ent. Soc. London, p. 189, 1883.

Timberlake considers this an immigrant insect, though as yet not known elsewhere. It is parasitic in the egg capsules of a blattid, *Allacta similis* (Sauss.), and perhaps others of the smaller related roaches. It is generally distributed throughout the islands.

Anastatus koebelei Ashmead

Fauna Hawaiiensis, I, Part III, p. 320, 1901.

This is also considered as an immigrant. Is known on Oahu and Maui. Parasitic in the eggs of two locustids: *Elimaea punctifera* (Walk.) and *Holochlora japonica* Brunner.

Eupelmus rhyncogoni Perkins

Proc. Haw. Ent. Soc., I, Part 4, p. 132, 1907.

Parasitic on the eggs of a native weevil, *Rhyncogonus blackburni* Sharp. Known only on Mt. Tantalus, Oahu, where it was bred quite abundantly by Mr. Giffard in 1907.

Eupelmus axestops Perkins

Fauna Hawaiiensis, II, Part VI, p. 638, 1910.

Widely distributed on Oahu. Bred by F. W. Terry from eggs of *Banza parvula* (Walker).

Of the numerous endemic species of *Eupelmus* in Hawaii possibly several more are egg-parasites. One (an unidentified specimen) has been reared from a cricket egg in *Labordea* leaf.

PTEROMALIDAE

***Scutellista cyanea** Motsch.

Etud. Entom., VIII, p. 172, T. 1, F. 17, 1859.

Introduced from California in 1905 as a parasite of *Saissetia nigra* (Nieth.). The larva feeds on the eggs beneath the scale. The

adult parasite issues through a hole in the back of the scale. Often a great many of the scales are seen to have the holes from which the parasites have issued. It is a very valuable parasite.

EULOPHIDAE

***Ootetrastichus beatus** Perkins

Exp. Sta. H. S. P. A., Ent. Bul., I, Part 8, p. 263, Pl. XX, Fig. 8, 1906.

Introduced from Fiji in 1905 as a parasite of the sugar cane leafhopper, *Perkinsiella saccharicida* Kirkaldy. It became generally spread throughout the sugar plantations and was an active factor in the reduction of the leafhopper pest. It still maintains its existence even though the pest is scarce. Its larva feeds within one egg and after finishing it eats the remaining eggs of the cluster of leafhopper eggs. It pupates within the leaf, and when mature bores a little round hole for emergence through the epidermis of the leaf.

***Ootetrastichus formosanus** Timberlake

Proc. Haw. Ent. Soc., IV, p. 558, 1921.

Introduced from Formosa in 1916 as an egg-parasite on the sugar cane leafhopper. Has similar habits to *O. beatus* and has been about equally as valuable.

APHELINIDAE

Centrodora xiphidii (Perkins)

Exp. Sta. H. S. P. A., Bull. I, Pt. 8, p. 264, 1906.

Parasitic in the eggs of the locustid *Conocephalus saltator* (Sauss.). A very effective parasite occurring on all of the islands of the Hawaiian group. Not known elsewhere yet although it must be an immigrant. Nine to fourteen parasites develop per host egg. A fuller account is given in Exp. Sta. H. S. P. A., Bull. I, Pt. 7, p. 214, 1905.

TRICHOGRAMMATIDAE

Trichogramma minutum Riley

Third Ann. Rep. Insects of Missouri, p. 158, fig. 72, 1871.

Has been known for a long time in Hawaii, and is generally distributed. It is parasitic in the eggs of many species of Lepidoptera, especially *Omiodes blackburni* (Butl.), *O. meyricki* Swezey,

O. accepta (Butl.), *Amorbia emigratella* Busck, *Archips postvittatus* (Walk.), *Lycaena boetica* (Linn.), *Vanessa cardui* (Linn.), *V. tammieamea* Esch.

Trichogramma semifumatum (Perkins)

Fauna Hawaiiensis, II, Pt. VI, p. 659, 1910.

Parasitic in the eggs of Lepidoptera, having been reared from undetermined noctuid eggs on Haleakala, Maui; *Scotorythra* sp. eggs on Molokai; eggs of *Celerio calida* (Butl.), *C. lineata* (Fab.), *Herse cingulata* (Fab.), *Bactra straminea* (Butl.) and *Spheterista asaphopis* Meyrick on Oahu. It has also been collected on Hawaii.

***Neotrichogramma japonicum** (Ashmead)

Journ. N. York Ent. Soc., XII, p. 165, 1904; Girault, Tr. Am. Ent. Soc., 37, p. 40, 1911.

Introduced from Japan in 1928 as a parasite on the eggs of the rice borer, *Chilo simplex* (Butl.), which had recently become established as a bad pest in rice fields. Many thousands were reared for liberation. Parasitized Chilo eggs have been taken in the field, indicating that this parasite has become established.

Trichogramma sp.

Another species of *Trichogramma* was introduced and reared along with the preceding species. At present the identity of this species has not been determined.

***Uscana semifumipennis** Girault

Trans. Am. Ent. Soc., 37, p. 23, 1911.

Introduced from Texas in 1910 as a parasite on bruchid eggs. Is widely spread in the islands, and a valuable factor in control of the bruchids infesting algaroba pods. It has been recorded from the eggs of *Caryoborus gonagra* (Fab.), *Bruchus prosopis* Leconte, *B. sallaei* Sharp, *B. limbatus* (Horn), *B. pruininus* Horn, *B. chinensis* Linn. and *B. phaseoli* Gyll. Sometimes as high as 90 per cent of bruchid eggs have been found parasitized.

Brachistella lutea (Fullaway)

Proc. Haw. Ent. Soc., III, p. 22, 1914.

Parasitic in the eggs of *Draculacephala mollipes* (Say). Has also been reared from the eggs of *Conocephalus saltator* (Sauss.). Known only on Oahu. First collected in 1913.

Oligosita caeruleocephala (Fullaway)

Proc. Haw. Ent. Soc., III, p. 23, 1914.

Parasitic in the eggs of *Draeculacephala mollipes* (Say).
Known only on Oahu. First collected in 1912.

Oligosita hilaris (Perkins)

Fauna Hawaiiensis, II, Pt. VI, p. 658, 1910.

Known first in 1904 in Honolulu. Collected by Dr. Perkins in foreign grasses. It is probably parasitic on the eggs of some leaf-hopper occurring on the grass, but has not been actually reared.

Ittys perditrix (Gahan)

Proc. Ent. Soc. Washington, 20, p. 25, 1918.

There is only one record of this insect, reared by Timberlake from eggs of *Nesophrosyne maritima* Kirkaldy in Dodonaea leaves, Makua, Oahu, 1916. It was originally reared from eggs of *Stictoccephala festina* (Say) at Tempe, Arizona.

Aphelinoidea xenos Timberlake

Proc. Haw. Ent. Soc., V, p. 414, 1924.

Reared from eggs of *Sogata paludum* (Kirk.) in Honolulu in 1913 and 1914.

Ufens elimaeae Timberlake

Proc. Haw. Ent. Soc., VI, p. 525, 1927.

An egg-parasite of *Elimaea punctifera* (Walk.), first recorded in Honolulu in 1910. So far it is known only on Oahu, where it has been reared from eggs collected at such widely separated localities as: Honolulu, Mt. Tantalus, Barber's Point and Waianae. A dozen or more may issue from one egg. It has also been reared from eggs of *Holochlora japonica* Brunner.

Megaphragma mymaripenne Timberlake

Proc. Haw. Ent. Soc., V, p. 414, 1924.

This minute insect was first collected by Pemberton associated with thrips in the forest at Mountain View, Hawaii, Jan., 1920. The only other record is March 29, 1927, when the writer collected two specimens associated with thrips on a leaf of croton bush at the Experiment Station, H. S. P. A., Honolulu. It is suspected of being a parasite in the eggs of thrips.

MYMARIDAE

Alaptus immaturus Perkins

Exp. Sta. H. S. P. A., Ent. Bull., I, Pt. 6, p. 197, 1905.

This is a parasite of eggs of one or more undetermined psocids commonly occurring on cane leaves, but also occurring on leaves of other plants, especially ornamental shrubs. It was first reared on Oahu in 1905; and taken in Hilo, Hawaii, in 1913. It is probable that it occurs on all the other islands. Timberlake suggests that it was unintentionally introduced at the time of introduction of the cane leafhopper egg-parasites in 1904.

Alaptus globosicornis Girault

Ann. Ent. Soc. Am., I, p. 188, 1908.

Reared from eggs of the common psocid, *Atropis divinatoria* at Honolulu and other localities on Oahu. A single male was captured by Osborn at Hakalau, Hawaii, May, 1914. More recently collected on Maui by the writer. Perhaps it is well distributed in the islands.

Alaptus globosicornis var. **hawaliensis** Girault

Mem. Queensland Museum, I, p. 124, 1912.

This variety is based on a slide mount dated Honolulu, Aug. 3, 1900.

Alaptus sp.

An undetermined species has been collected at Hakalau, Hawaii, and at Honolulu on window. It may possibly be another parasite of psocid eggs.

Alaptus sp.

Apparently another different species was reared from eggs of a native psocid on dead twigs of the koa tree at Olinda, Maui, Feb. 10, 1927.

Leimacis peregrina Perkins

Fauna Hawaiiensis, II, Pt. VI, p. 661, 1910.

Described from material collected in Honolulu by Dr. Perkins. Habits not known, but it is possibly an egg-parasite.

Gonatocerus mexicanus Perkins

Exp. Sta. H. S. P. A., Ent. Bull., 10, p. 21, 1912.

First collected in Honolulu in 1914. Reared from eggs of *Draeculacephala mollipes* (Say) at Kapiolani Park, Honolulu, in 1915.

Gonatocerine

One specimen collected on window in Honolulu, Nov., 1915, and another one March, 1924.

***Anagrus frequens** Perkins

Exp. Sta. H. S. P. A., Ent. Bull., I, Pt. 6, p. 198, 1906.

Introduced from Queensland in 1904 as a parasite on the eggs of the sugar cane leafhopper. It became generally spread in the islands and was of value in checking the leafhopper pest. Each parasite larva fed within a leafhopper egg and when mature gnawed a tiny round hole out through the leaf epidermis. The cluster of these exit-holes in the cane leaves indicated where eggs had been destroyed by this parasite. It has been reared from other leafhopper eggs also, especially the corn leafhopper, *Peregrinus maidis* (Ashm.). Hosts of less importance are: *Sogata paludum* (Kirk.), *Kelisia sporobolicola* Kirk., *Ilburnia leahi* (Kirk.). At present, it is seldom found on the cane leafhopper eggs, the latter are scarce anyway, but is working more on the eggs of the corn leafhopper.

Anagrus sp.

Another species recorded as reared from eggs of *Peregrinus maidis* in Honolulu in 1916.

Paranagrus optabilis** PerkinsParanagrus perforator** Perkins

Exp. Sta. H. S. P. A., Ent. Bull., I, Pt. 6, p. 199, 1905.

These two species were introduced from Queensland in 1904 as egg-parasites of the sugar cane leafhopper. The former increased greatly and in a few years was established generally throughout the sugar cane plantations of the islands and was the most valuable factor in the reduction of the leafhopper pest. The parasitism of the eggs often was found to run as high as 50 per cent, and even to 75 and to 80 per cent. Since the introduction of

the bug *Cyrtorhinus mundulus* (Breddin) in 1920, which brought about still more effective reduction of the leafhopper, *P. optabilis* has become very scarce, corresponding to the scarcity of the leafhopper eggs. *P. perforator* never became of much importance, though it was established and met with for a time, after a few years was not noticed. It has been reared from the eggs of another leafhopper, *Aloha ipomoeae* Kirkaldy, on morning-glory vines.

****Paranagrus osborni* Fullaway**

Proc. Haw. Ent. Soc., IV, p. 53, 1919.

Introduced from the Philippines in 1916 as an egg-parasite of the corn leafhopper. It operated as an additional check on this pest. It is very difficult to distinguish this species from *P. optabilis*.

***Polynema reduvioli* Perkins**

Exp. Sta. H. S. P. A., Ent. Bull., I, Pt. 6, p. 196, 1905.

Reared from eggs of *Reduviolus capsiformis* (Germ.) in Honolulu in 1905; also collected on Kauai the same year. Recorded from Hawaii in 1910, and on Midway and Ocean Islands in 1923. Considered by Timberlake to be an immigrant insect.

***Polynema ciliata* Perkins**

Fauna Hawaiiensis, II, Pt. VI, p. 666, 1910.

Recorded from Oahu as parasitic in the eggs of a small delphacid.

***Polynema jassidarum* Perkins**

Fauna Hawaiiensis, II, Pt. VI, p. 666, 1910.

Recorded from Oahu as parasitic on eggs of a jassid.

Eleven other native species of *Polynema* are recorded in the Fauna Hawaiiensis, II, Pt. VI, pp. 661-667, 1910. No doubt all are egg-parasites either of native delphacids or jassids, or possibly some species of bugs. They are distributed as follows: *terrestris*, *scrutator*, *rubriventris*, *tantalea*, *oahuensis*, *triscia*, *apicalis* and *perforator* from Oahu; *gigas*, *pyrophila* and *nana* from Hawaii.

***Polynema saga* (Girault)**

Tr. Am. Ent. Soc., XXXVII, p. 296, 1911.

This species was discovered in Honolulu in 1928 as an egg-parasite of *Euscelis stactogalus* Am., whose presence in Honolulu was first made known at the same time.

Polynema sp.

A minute species, probably a *Polynema*, was reared from eggs of a native psocid on dead koa twigs, Olinda, Maui, by the writer in 1927.

DIPTERA

DROSOPHILIDAE

Titanochaeta ichneumon Knab

Insecutor *Inscitiae* Menstruus, II, p. 168, 1914.

Reared from spider egg cases at Pahala, Hawaii, in 1908 and 1918; and Mountain View, Hawaii, in 1912.

Drosophilid (Undetermined species)

Reared from spider egg cases at Hamakua, Hawaii, 1907; Kailua, Hawaii, 1909; Pahala, Hawaii, 1915, 1916, 1918; Mt. Tantalus, Oahu, 1915; Kalihi, Oahu, 1923; Manoa, Oahu, 1924.

HEMIPTERA

MIRIDAE

***Cyrtorhinus mundulus** (Breddin)

Deutsch. Ent. Zeit., p. 106, 1896.

Introduced from Queensland and Fiji in 1920 as an enemy to the sugar cane leafhopper. Both the young and the adult bugs live by sucking the contents of the leafhopper eggs. After its introduction it proved to be a very valuable check on the leafhopper, and completed its reduction to a scarcity by which it is no longer an injurious pest of any consequence.