

metacoxa; intervals convex, mostly narrower than the striae near the base, but broader behind, each bearing a single row of long, slender, decumbent, lanceolate setae. *Legs* with the femora dentate, the tooth on the fore femora smallest, especially in the female, coarsely reticulate, the punctures bearing curved, decumbent, lanceolate setae, the hind pair reaching to the posterior margin of the fourth ventrite in the female, and to about the middle of the fifth in the male; tibiae with recurved setae, all unarmed at the apex of the female, but the mid and hind pairs distinctly mucronate in the male; tarsi with the first segment not as long as 2 plus 3, 2 about two thirds as long and two thirds as broad as 3. *Sternum* with the prosternal canal with low side walls, the antecoxal cavity and the median postcoxal area densely set with plumose squamae, the coxae separated by less than the breadth of the club of the scape of the antenna; mesocoxae separated by slightly less than the breadth of a coxa; metasternum with three large punctures along the posterior margin between the metacoxae and a row along the anterior margin, and with numerous coarse punctures on the pleural areas, the ventral punctures bearing hair-like setae, those on the sides bearing elongate lanceolate setae, the distance between the mid and hind coxa as great as the longitudinal chord of a metacoxa; metepisternum with a single row of setiferous punctures. *Venter* with the fused first and second ventrites broadly and shallowly concave in the male, convex in the female, but with the base and apex of the first segment depressed in the female, with rather large scattered punctures bearing recurved setae; ventrites 3 and 4 each with a row of rather inconspicuous punctures; ventrite 5 at most minutely punctate. Length: 1.6-1.75 mm.; breadth: 0.8-1.0 mm.

Caroline Islands: Holotype male and two paratypes from Dublon Island, Truk Group, December 25, 1935, allotype female and one paratype from Melekeiok, Palao Group, April 7, 1936, collected by Z. Ono.

This species is closely allied to *Amblycnemus dentipes* Zimmerman (in press) from Guam, but *dentifer* is paler in color, it is shorter and broader, the rostrum is comparatively shorter, and the antennal club is almost as long as the preceding five segments, whereas it is only about as long as the four distal funicular segments in *dentipes*.

In addition to the type series there is a mashed specimen from Dublon in the collection that has transverse maculae on the elytra similar to those on *dentipes*, but it appears to be a color variety of *dentifer*.

The Rhynchophorinae Found in Hawaii (Coleoptera: Curculionidae)

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(Presented at the meeting of November 18, 1940)

All of the species of Rhynchophorinae (Calandrinae) found in Hawaii have been introduced. Most of them are common, widespread, readily recognized species of importance to agriculture, but a few of the smaller forms are not always easily recognized by students unfamiliar with the group. It is for that reason that this

paper has been prepared, and it is hoped that the report will enable anyone to determine the Rhynchophorinae that have become established in Hawaii.

There are more than 1,000 described species of Rhynchophorinae, and they are found in all of the major geographical regions. However, comparatively few are endemic to the Holarctic region. The Indo-Pacific regions have the greatest development of genera; the Ethiopian region comes next in numbers of genera, with the Neotropical region having about one half as many genera as the Ethiopian.

Palms, grasses, grains and various seeds are the preferred foods of a large number of the species of the subfamily. These habits make many of the species important pests of crops, stored produce and ornamental plants.

LIST OF THE SPECIES FOUND IN HAWAII

1. *Scyphophorus interstitialis* Gyllenhal.
2. *Rhabdocnemis obscura* (Boisduval).
3. *Polytus mellerborgi* (Boheman).
4. *Diocalandra taitensis* (Guérin-Méneville).
5. *Calandra rugicollis* Casey.
6. *Calandra granaria* (Linnaeus).
7. *Calandra linearis* (Herbst).
8. *Calandra oryzae* (Linnaeus).
- 8a. *Calandra oryzae* variety *zea-mais* Motschulsky.

KEY TO THE GENERA

1. Large species, at least 10 mm. long; apical antennal segment either truncate or wedge-shaped distad.....2
 Small species, always less than 8 mm. long; usually less than 5 mm. long; distal antennal segment rounded at apex, not truncate or wedge-shaped3
- 2 (1). Predominantly reddish to reddish brown in color, maculate; terminal antennal segment with the distal pilose part conspicuously wedge-shaped**Rhabdocnemis**.
 Entirely coal black in color, never maculate; terminal antennal segment with the distal part conspicuously truncate and the pilose area confined to the broad, shallowly concave apical truncate part**Scyphophorus**.
- 3 (2). Intercoxal process of the prosternum little more than one half as broad as the intercoxal process of the mesosternum; rostrum separated from the head by a deep, abrupt, transverse, conspicuous, dorsal constriction; body entirely coal black....**Polytus**.
 Intercoxal process of the prosternum obviously much more than one half as broad as the intercoxal process of the mesosternum; rostrum and head usually not separated by a transverse dorsal impression, but if an impression is present, then it is shallow and not conspicuously abrupt; body most often with some reddish coloration and usually maculate.....4

- 4 (3). Third tarsal segment less than twice as broad as the second and not distinctly bilobed, loosely setose beneath; second ventrite shorter than the third and fourth together.....**Calandra.**
 Third tarsal segment at least twice as broad as the second and deeply bilobed, densely pilose and spongy beneath; second ventrite as long or longer than the third and fourth together**Diocalandra.**

Genus **Scyphophorus** Schoenherr

Scyphophorus Schoenherr: Gen. Spec. Curc. 4(2) : 855, 1838.

This is an American genus containing two species. The one found in Hawaii is:

Scyphophorus interstitialis Gyllenhal: in Schoenherr's Gen. Spec. Curc. 4(2) : 856, 1838.

Scyphophorus acupunctatus Gyllenhal: op cit., p. 857.

Scyphophorus anthracinus Gyllenhal: op. cit., p. 858.

Scyphophorus asperulus Le Conte: Report of Exploration and Survey, Mississippi to Pacific 12(3) : 58, 1857.

Scyphophorus robustior Horn: Proc. Amer. Philos. Soc. 13 : 409, 1873.

This synonymy is that given by Csiki in Coleopterorum Catalogus, part 149, 1936. Le Conte in 1876 (Proc. Amer. Philos. Soc. 15 : 331) said "The species of this genus are parasitic on *Yucca*, and seem to me rather opinionative rather than actual." Champion [Biol. Centr. Amer., Coleopt., 4(7) : 152, 1910], gives the same synonymy except that he uses *acupunctatus* in place of *interstitialis* in spite of the fact that *interstitialis* has page priority.

This species, which has been known in Hawaiian literature as *Scyphophorus acupunctatus*, was first found in Honolulu by Muir in 1918. In 1927 [Proc. Haw. Ent. Soc. 6(3) : 403-404] Swezey published a paper "The Sisal Borer in Hawaii" in which he summarized the history of the beetle in Hawaii to that date. It is thought that the species was introduced to Honolulu in ornamental century plants. In Hawaii the species is found only on the island of Oahu where it can at times be found in abundance about Honolulu boring in stems and leaves of sisal, sometimes killing the plants, and it has been found damaging *Agave mexicana*, an ornamental species.

Cotton figures the larvae of this species in Proc. U. S. Nat. Mus., 66 : 8, pl. 8, figs. 1-7, pl. 10, fig. 7, 1924.

Because of its large size (12-15 mm.) and entirely black body, this species is easily recognized.

Genus **Rhabdocnemis** Faust

Rhabdocnemis Faust: Ann. Mus. Civ. Genova, 14 : 348, 1894.

The natural distribution of the eight described species of this genus is from Burma to New Guinea. The species found in Hawaii is the destructive New Guinea sugar cane borer:

Rhabdocnemis obscura (Boisduval).

Calandra obscura Boisduval: in d'Urville's Voyage de l'Astrolabe, Ent. 2: 448, 1835.

Sphenophorus insularis Boheman: Eugenes Resa, Ins., p. 148, 1859.

Sphenophorus nudicollis Kirsh: Mitt. Mus. Dresden, 2: 156, 1877.

Sphenophorus promissus Pascoe: Ann. Mus. Genova, 2: 300, 1885.

Sphenophorus tincturatus Pascoe: op. cit., p. 301.

Sphenophorus beccarii Pascoe: op. cit., p. 301.

Sphenophorus interruptecostatus Schaufuss: Horae Soc. Ent. Ross., 19: 204, 1885.

Williams in "The Insects and Other Invertebrates of Hawaiian Sugar Cane Fields", pp. 209-218, 1931, gives an excellent, extensive discussion of the beetle, its distribution, habits, life history, destructiveness with illustrations, and thus a detailed account need not be given here.

This insect not only does damage to sugar cane that has been estimated to be as great as \$200,000. a year on one plantation, but it has been found in Hawaii in *Pritchardia*, royal, coconut and probably other palms, and occasionally in papaya, banana and corn.

The weevil is thought to have been introduced to Hawaii from the south Pacific about the eighteen fifties, and it was damaging sugar cane in 1865.

Genus *Polytus* Faust

Polytus Faust: Ann. Mus. Civ. Genova, 14: 353, 1894.

This is a monotypic genus whose genotype is:

Polytus mellerborgi (Boheman).

Calandra mellerborgi Boheman: In Schoenherr's Gen. Curc., 4: 976, 1838.

Calandra remota Sharp: Trans. Royal Dublin Soc., (2)3: 184, pl. 5, fig. 29, 1885.

Polytus mellerborgi (Boheman) Faust: Ann. Mus. Civ. Genova, 14: 253, 1894.

Sphenophorus musaecola Fairmaire: Ann. Soc. Ent. Belg., 42: 489, 1898.

Marshall (Bull. Ent. Res. 31(2): 125, 1940) says that *Calandra mexicana* Champion, 1910, is not a synonym of this species as cited by Csiki in Coleopterorum Catalogus, part 149, p. 71, 1936, but a good species of *Calandra*.

This is a widely spread species found from Madagascar to southeastern Polynesia. It might be called the "lesser banana weevil", and it is often found in numbers in decaying trunks of bananas. Sometimes the larvae, pupae and adults live in an almost aquatic habitat in wet banana tissue. Blackburn (Trans. Royal Dublin Soc. (2)3: 183, 1885) records this species from "prickly pear" (*Opuntia*) also, but I have seen no other records of such a host.

This weevil can be easily recognized in the field by its black color and the deep, conspicuous notch between the head and rostrum.

Genus *Diocalandra* Faust

Diocalandra Faust: Ann. Mus. Civ. Genova, 14: 353, 1894.

This is essentially an Ethiopian and Oriental genus now containing four species. The one found in Hawaii is:

Diocalandra taitensis (Guérin-Ménéville).

Calandra taitensis Guérin-Ménéville: Iconogr. Règne Animal, p. 171, pl. 39, fig. 4, 1844.

This species has been found from the Solomons to Marquesas islands in the south Pacific, and it probably occurs farther west. Herms (Philippine Journ. Sci., 30(2): 243-274, 1926, illustrated) gives an account of the beetle, its larva and its work on coconuts in Fanning Island. Doane (Journ. Econ. Ent., 2(3): 220-223, 1909) discusses the species as he found it in Tahiti. Swezey (Proc. Haw. Ent. Soc. 4(2): 333, 1920) discusses the species in Hawaii in a paper entitled "The Tahiti Coconut Weevil, *Calandra taitensis* Guérin, in Hawaii".

The weevil was first found in the Hawaiian islands by Timberlake in 1919 at Honaunau, Hawaii. There are specimens in Bishop Museum from Oahu, Maui and Hawaii.

This weevil feeds in the living or injured tissue of the fronds, flower stalks and wounds of the coconut. Its presence can usually be detected by an amber colored exudation along the margins of the bases of the fronds or other places where the larvae are feeding. The species does not appear to be of economic importance in Hawaii.

Genus *Calandra* of authors

According to Sir Guy Marshall (Bull. Ent. Res., 31(2): 125, 1940) application has been made to the International Commission of Zoological Nomenclature to establish the long used name of *Calandra* in place of *Sitophilus* Schoenherr, 1838, and until this application is accepted or rejected, it is best to use *Calandra* in place of *Sitophilus*.

This is the genus of grain weevils. There are 20 or more described species, and representatives are found in all of the major geographical regions, with the greatest development being in the Oriental region. Four of the species have become widely spread by commerce.

Essig, 1929, says "The weevils can be killed in infested grain by heating for 6 hours at 120-130° F., or by fumigating with 4 to 6 pounds of carbon disulfide per 1,000 feet of space, or with hydrocyanic acid gas."

The species found in Hawaii may be separated as follows :

Key to the Species of *Calandra* found in Hawaii

1. Pronotum with conspicuous, sinuous, longitudinal carinulae, without round or ovate punctures, and with a distinct, narrow median carina.....*rugicollis* Casey.
Pronotum obviously punctate, without carinae.....2
- 2 (1). Metasternal episterna with only a single row of punctures; pronotum with conspicuously elongate punctures; elytral intervals obviously wider than the narrow intervals, and, except the first, convex and impunctate.....*granaria* (Linnaeus)
Metasternal episterna with at least two rows of punctures; pronotum with rounded punctures; elytral intervals punctate and narrower than the broad, coarsely punctate striae.....3
- 3 (2). The subbasal expansion of the rostrum poorly developed, not subbulbose; the downward part of the scrobe contiguous with the fore margin of the eye; pronotal punctures shallow and separated, the surface appearing smooth and shiny.....*linearis* Herbst.
The subbasal expansion of the rostrum well developed, subbulbose; the downward part of the scrobe separated from the eye, the narrow area between the fore margin of the eye and the scrobe punctate; pronotal punctures coarse, deep and close, tending to be longitudinally subconfluent on the sides and cephalad4
- 4 (3). Length, excluding the head and rostrum, less than 3 mm.....
.....*oryzae oryzae* (Linnaeus)
Length, excluding the head and rostrum, more than 3 mm.....
.....*oryzae zea-mais* (Motschulsky).

Calandra rugicollis Casey: Ann. New York Acad. Sci. 6: 686, 1892.

Calandra rugosicollis Hustache: Ann. Soc. Ent. France, 89: 192, 1921.

Calandra shoreae Marshall: Bull. Ent. Research, 11: 276, pl. 7, fig. 4, 1924.

Casey described this species from a unique female found in Florida. Hustache redescribed the species from Mauritius and Marshall redescribed it from India where it is known to breed in *Shorea robusta* and *Dipterocarpus turbinatus*. Swezey [Proc. Haw. Ent. Soc. 7(2): 279, 1929] recorded the species in Hawaii for the first time from a specimen collected in Honolulu in 1928. There is a unique specimen in Bishop Museum collected in Honolulu in 1930 by Bryan. There are four specimens in the Hawaiian Sugar Planters' Experiment Station collection from Honolulu, but none were bred. Nothing is known to me of the habits of this species in Hawaii.

Calandra granaria (Linnaeus).

Curculio granarius Linnaeus: Syst. Nat. 10th edition, p. 378, 1758.

Curculio segetis Linnaeus: Syst. Nat. 10th edition, p. 381, 1758.

Curculio pulicarius Panzer: In Voet's Besch. Ins., 4: 54, pl. 37, fig. 17, 1798.

Sitophilus unicolor Marshall: Ent. Brit. 1: 275, 1802.

Sitophilus granarius (Linnaeus) Gyllenhal, in Schoenherr's Gen. Spec. Curc., 4: 977, 1837.

Sitophilus remotepunctatus Gyllenhal: In Schoenherr's Gen. Spec. Curc., 4(2): 979, 1838.

This species is almost cosmopolitan and is known as the "granary weevil". Csiki, in Coleopterorum Catalogus, part 149, 1936, gives two pages of bibliography on this species.

This species has atrophied wings and cannot fly. It is said to complete a life cycle in about six weeks. It may attack many stored cereals and cereal products. I have no record of its first capture in Hawaii.

Cotton, Proc. U. S. Nat. Mus. 66: 6, 1924, gives illustrations of the larva in plate 3, figs. 1-7 and plate 10, fig. 1.

Calandra linearis (Herbst)

Rhychophorus linearis Herbst: Natursyst. Ins., Käffer, 7: 5, pl. 100, fig. 1, 1795.

Cordyle striatus Thunberg: In Nova Acta Upsala, 7: 112, 1815.

Calandra tamarindi Christy: Trans. Ent. Soc. London, 1: 36, 1834.

Sitophilus linearis (Herbst) Gyllenhal, in Schoenherr's Gen. Spec. Curc., 4: 979, 1837.

This is probably an Oriental species which has been distributed to Africa, South and North America. It is abundant in the seeds of tamarind throughout the Hawaiian islands where tamarind is grown. It is called the tamarind weevil. I do not know when the species first became established in Hawaii, but it was found widely distributed by Blackburn in the "eighties".

Calandra oryzae (Linnaeus).

Curculio oryzae Linnaeus: Amoen. Acad. 6: 395, 1763.

Curculio frugilegus De Geer: Mem. Ins., 5: 273, 1781.

Curculio granarius Stroem (not Linnaeus): Danske Vid. Selsk. Skrift., 2: 56, 1783.

Sitophilus oryzae (Linnaeus) Gyllenhal, in Schoenherr's Gen. Spec. Curc., 4: 981, 1837.

Cossonus quadrimaculatus Walker: Ann. Mag. Nat. His. (3)4: 219, 1859.

Sphenophorus quadriguttatus Montrouzier: Ann. Soc. Ent. France, (3)8: 910, 1860.

This Oriental species has become cosmopolitan and is known as the rice weevil. It attacks a great variety of stored grains, cereals and food products. It is common in populated areas throughout the islands.

Calandra oryzae variety *zea-mais* Motschulsky.

Calandra zea-mais Motschulsky: Etud. Ent., 4: 77, 1855.

This variety is always much larger and stouter than the typical form. It is occasionally found in abundance in corn in Hawaii.