



HOKKAIDO UNIVERSITY

| | |
|------------------|--|
| Title | A REVISION OF THE WORLD SPECIES OF CERATONEURA ASHMEAD (HYMENOPTERA, EULOPHIDAE) |
| Author(s) | Ikeda, Eiji |
| Citation | Insecta matsumurana. New series : journal of the Faculty of Agriculture Hokkaido University, series entomology., 58, 27-50 |
| Issue Date | 2001-12 |
| Doc URL | https://hdl.handle.net/2115/9904 |
| Type | departmental bulletin paper |
| File Information | 58_p27-50.pdf |



**A REVISION OF THE WORLD SPECIES OF CERATONEURA ASHMEAD
(HYMENOPTERA, EULOPHIDAE)**

By Eiji IKEDA¹⁾

ABSTRACT

IKEDA, E. 2001. A revision of the world species of *Ceratoneura* Ashmead (Hymenoptera, Eulophidae). *Ins. matsum. n. s.* 58: 27–50, 7 figs.

A total of eleven species of *Ceratoneura* Ashmead are dealt with. Six species, *C. goethei* (Girault), *C. indi* Girault, *C. mexicana* Ashmead, *C. pallida* Ashmead, *C. petiolata* Ashmead, and *C. pretiosa* Gahan, are redescribed. Three species from the New World, *C. petiolatoides* sp. n., *C. woolleyi* sp. n., and *C. gigantea* sp. n., and two species from Africa, *C. kalinzu* sp. n. and *C. infuscata* sp. n., are described. *C. miltoni* Girault is synonymized with *C. goethei* (Girault). A key to the females of these species is provided.

Key words: *Ceratoneura*, Eulophidae, Tetrastichinae, revision, new species.

Author's address. Systematic Entomology, Graduate School of Agriculture, Hokkaidō University, Kita 9 Nishi 9, Kita-ku, Sapporo, 060-8589 Japan

¹⁾ Research Fellow of the Japan Society for the Promotion of Science
Present address. Showamachi 3–38–28–101, Maebashi, 371-0034 Japan

INTRODUCTION

The genus *Ceratoneura* was erected by Ashmead in 1894, and seven species have hitherto been recognized from the New World, Australia, Asia, and Africa (Etienne & Delvare, 1987; Bouček, 1988; LaSalle & Schauff, 1992; LaSalle, 1994). Members of *Ceratoneura* have been reared from galls on several plant species, though their life histories are still covert. Bouček (1977, 1988) states that it is not surely known whether they are gall-causers, or parasites of Cecidomyiidae, or inquilines of gall-forming Cecidomyiidae. Etienne & Delvare (1987) indicate that *Ceratoneura* sp. developing in seeds of *Solanum aethiopicum* is phytophagous, for the first time. Narendran & Krishnakumar (1995) assert that *C. indi* is phytophagous, causing galls and damaging flowers and fruits of *Capsicum* sp. and *Solanum melongena*. However, there is actually no detailed information on the life histories of the other species.

In this study I revise the world species of *Ceratoneura*, redescribe six known species mostly on the basis of the type material, and describe three new species from the New World and two new species from Africa. A key to the females of these eleven species is also provided. There are many other species still undescribed, especially in the Neotropical region. I once have seen some of them, but none of them has been available for the present study.

Morphological terminology and measurements follow those of Graham (1987). The specimens examined are deposited in the following institutions (abbreviations in the parentheses):

Bishop Museum, Honolulu, Hawaii, USA (BIM). California Academy of Sciences, San Francisco, USA (CAS). Canadian National Collection of Insects, Ottawa, Canada (CNCI). Entomological Laboratory, Faculty of Agriculture, Meijō University, Nagoya, Japan (MU). John LaSalle Private Collection, London, UK (JLPC). Paul Hansson Private Collection, Escuela de Biología, Universidad de Costa Rica, Ciudad Universitaria “Rodrigo Facio”, San José, Costa Rica (PHPC). Queensland Museum, South Brisbane, Australia (QM). Systematic Entomology, Hokkaidō University, Sapporo, Japan (SEHU). Texas A&M University, Texas, USA (TAMU). The Natural History Museum, London, UK (BMNH). United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., USA (USNM).

THE GENUS *CERATONEURA* ASHMEAD

Ceratoneura Ashmead, 1894: 178. Type species: *Ceratoneura petiolata* Ashmead (subsequent designation by Ashmead, 1904: 347, 369).

Paraceratoneura Girault, 1915a: 260. Type species: *Paraceratoneura goethei* Girault (original designation). Synonymized by Bouček, 1988: 670.

Ceratotetrastichodes Girault, 1917a: 2. Type species: *Ceratoneura pretiosa* Gahan, 1914 (original designation).

Diagnosis

Face (Figs. 2A, 3A, 6A) with conspicuous striae radiating from mouth. Occipital carina (Figs. 3B, 6B) usually present behind ocellar triangle. Vertex with a weak transverse depression between lateral ocellus and eye. Torulus situated in or above the middle of head. Clypeus (Figs. 2B, 3D) medially incised. Both mandibles tridentate. Four anelli and 3-segmented funicle (Figs. 1A, 1B) present in female; fourth anellus (Figs. 5F, 5G)

sometimes enlarged, rarely having almost the same size and structure as funicular segment. Three anelli and 4-segmented funicle (Fig. 1E) present in male. Black setae of basal transverse band on male flagellar segments short, only slightly exceeding the level of the basal transverse band of the next segment. Apical part of female clava (Figs. 2C, 3F) with many seta-like processes which have no basal socket; terminal spine inconspicuous in female. Mesoscutum (Figs. 2E, 4B, 6E) without median line. Axilla only weakly advanced. Scutellum: submedian line (Figs. 2F, 4C, 6F) usually very weak or absent, rarely distinct; sublateral line weak, without costula. Lobe of callus (Figs. 2G, 4D, 7B) carinate, covering the outer rim of spiracle. Inner surface of hind coxa (Fig. 7C) with about 10 long setae in posterior half. Apex of marginal vein of hindwing swollen (Figs. 1D, 5C). Petiole distinct. Body strongly sclerotized.

Distribution. North and South America, India, Sri Lanka, Indonesia, New Caledonia, New Guinea, Australia, China, Japan, Senegal, South Africa, and Uganda.

Hosts. Members of *Ceratoneura* have been reared from galls of the following plants: *Capsicum* spp., *Eupatorium* sp., *Jussiaea* sp., *Mimosa* sp., *Portulaca oleracea*, *Sesbania aegyptiaca*, *Solanum melongena* (Bouček, 1988), *S. aethiopicum* (Etienne & Delvare, 1987), and *Sideroxylon inerme*.

Narendran & Krishnakumar (1995) state that *C. indi* is phytophagous. However, the feeding habits of the other species are not yet cleared. Three species of Cecidomyiidae, *Asphondylia sphaera* Monzen for *C. indi*, *Asphondylia ceanothi* Felt for *C. petiolatoides* sp. n., and *Cecidochares* sp. for *C. pallida*, are here recorded as hosts on the basis of labels of specimens, but these host records should be reexamined in the future. Further research on the biology of the species of *Ceratoneura* is needed.

Discussion. This genus is easily distinguished from other Tetrastichinae by the presence of the striae radiating from the mouth. In addition to this state, *Ceratoneura* has many other character states which are supposedly derivative in Tetrastichinae: such as the toruli situated in or above the middle of the head, the apical part of the female clava with many seta-like processes, the axilla only weakly advanced, the apex of the marginal vein in the hindwing swollen, and the petiole distinct. These character states are absent or rare in the other Tetrastichinae.

Most species from North and South America have the female fourth anellus which is distinctly longer than the third one. In a few of them the fourth anellus is very large and even has setae and sensilla. This enlargement of the fourth anellus is probably derivative in this genus, because in Tetrastichinae this character state is seen in only a few species of the genus *Aprostocetus* Westwood, which is apparently not the sister group of *Ceratoneura*.

Ceratoneura goethei (Girault)
(Fig. 1A)

Paraceratoneura goethei Girault, 1915a: 260. — Dahms, 1984: 655–656.

Ceratoneura goethei (Girault); Bouček, 1988: 670.

Ceratoneura miltoni Girault, 1920: 47. Syn. n.

I examined the holotypes of *Paraceratoneura goethei* and *Ceratoneura miltoni*, both of which are deposited in QM. The latter is darker in the body colour than the former, but agrees well with it in other characters. For the data of the holotypes, see Dahms, 1984:

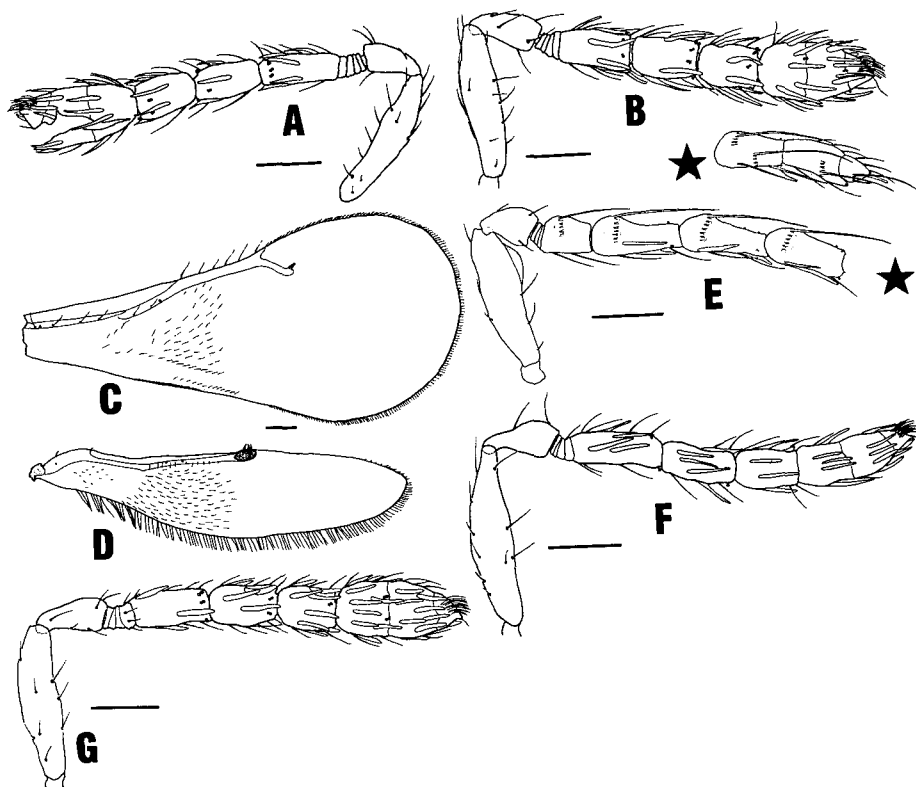


Fig. 1. A: *Ceratoneura goethei*, ♀, holotype, antenna. B: *C. indi*, ♀, antenna. C: Ditto, ♀, forewing. D: Ditto, ♀, hindwing. E: Ditto, ♂, antenna. F: *C. kalinzu* sp. n., ♀, antenna. G: *C. woolleyi* sp. n., ♀, antenna. Setae on apical halves of the wings of *C. indi* are omitted (C and D). Scale: 0.1 mm.

655–656 and 814.

Diagnosis (female)

Scape distinctly exceeding vertex. Fourth anellus (Fig. 1A) strongly transverse, as long as third anellus, about 0.1 times as long as F1. Petiole long, 0.9–1.0 times as long as propodeum, with a weak lateral spine.

Redescription

Female. Body length 1.8–2.3 mm. Head light brown. Thorax dark to light brown. Gaster dark brown to black, basally somewhat paler. Scape and pedicel pale brown; flagellum dark brown. Legs pale brown: coxae dark to light brown; tips of tarsi infuscate. Wings hyaline.

Head 2.1 times as wide as long, 1.3 times as wide as high, 1.1 times as wide as thorax: vertex and frons with extremely fine engraved reticulation, almost smooth. Occipital margin weakly carinate behind ocellar triangle. POL 2.2, OOL 1.6 length of median ocellus diameter. Vertex with relatively long, scattered black setae. Frons without median carina. Eye 1.6 times as high as malar space length. Malar sulcus weakly curved. Mouth 1.9 times as wide as malar space length. Antenna (Fig. 1A): scape 4.3–4.5 times as long as wide, distinctly

exceeding vertex; combined length of pedicel and flagellum 1.0–1.1 times as long as head width; pedicel 0.4 times as long as scape; fourth anellus strongly transverse, as long as third anellus, 0.1 times as long as F1; F1 2.5–2.8 times as long as wide, 1.3–1.4 times as long as pedicel; F2 2.0–2.5 times as long as wide, 0.8–0.9 times as long as F1; F3 1.5–1.6 times as long as wide, 0.8–0.9 times as long as F2; clava 2.0–3.0 times as long as wide, 1.8–2.3 times as long as F3.

Thorax 1.3–1.5 times as long as wide, very weakly engraved-reticulate. Mesoscutum with 3–4 pairs of adnotaular setae. Scutellum slightly wider than long: submedian line absent; sublateral line not carinate laterally; anterior pair of scutellar setae situated distinctly before the middle. Dorsellum without median line. Propodeum 2.5–3.0 times as long as dorsellum, with median carina in a depression; paraspiracular carina distinct in anterior part; callus with 2 setae. Forewing 2.1–2.3 times as long as wide: speculum large and closed below; costal cell about 7.0 times as long as wide; submarginal vein with 2 dorsal setae; costal cell:marginal vein:stigmatal vein = 3.5–3.8:2.0–2.2:1.0.

Petiole 0.9–1.0 times as long as propodeum, smooth, with a weak lateral spine. Gaster 1.6–1.7 times as long as wide, 1.0–1.1 times as long as thorax, with extremely fine engraved reticulation, almost smooth. The longest cercal seta 1.5 times as long as the next longest.

Male. Unknown.

Type material. See Dahms, 1984: 655–656.

Specimens examined. Australia: Queensland: 15°04'S 145°07'E, Mt. Webb National Park, 2 ♀, 20–27. IV. 1981 (I. D. Naumann) (BMNH), collected at light. This specimen was identified by Z. Bouček.

Distribution. Australia (Queensland).

Host. Unknown.

Ceratoneura indi Girault
(Figs. 1B–E, 2)

Ceratoneura indi Girault, 1917b: 10. — Bouček, 1988: 670. — Narendran & Krishnakumar, 1995: 47–49.

Ceratoneura indica Rohwer, 1921: 127–128. Synonymized by Bouček, 1988: 670.

Diagnosis (female)

Scape slightly to distinctly exceeding vertex. Fourth anellus (Fig. 1B) strongly transverse, as long as third anellus, 0.1 times as long as F1. Each funicular segment at most 2.0 times as long as wide. Petiole (Fig. 2G) 0.4–0.5 times as long as propodeum.

Redescription

Female. Body length 1.8–2.4 mm. Body black to dark brown. Scape and pedicel pale brown; flagellum dark brown. Legs pale brown: coxae dark brown; femora somewhat darker than tibiae; tips of tarsi infusate. Wings hyaline.

Head (Fig. 2A) 2.2–2.3 times as wide as long, 1.1–1.2 times as wide as high, about as wide as thorax: vertex and frons very weakly engraved-reticulate. Occipital carina distinct behind ocellar triangle. POL 2.0–2.3, OOL about 1.5 length of median ocellus diameter. Frons with weak median carina. Eye 1.4–1.5 times as high as malar space length. Malar sulcus weakly curved. Mouth (Fig. 2B) 1.5–1.6 times as wide as malar space length. Antenna (Fig. 1B): scape 3.8–4.0 times as long as wide, slightly to distinctly exceeding vertex;

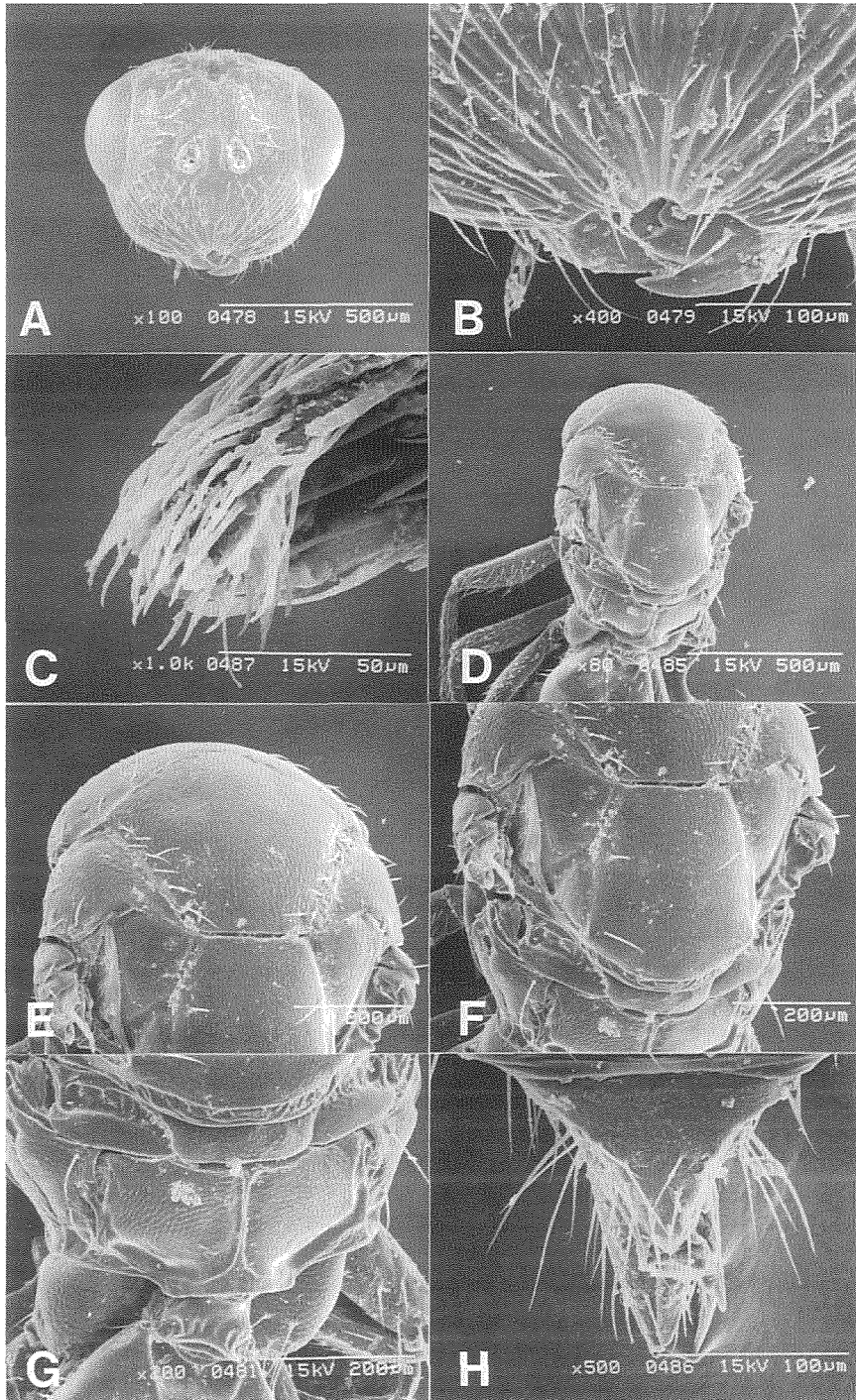


Fig. 2. *Ceratoneura indi*, ♀. — A: Head. B: Mouth. C: Apex of clava. D: Thorax. E: Pronotum and mesoscutum. F: Scutellum. G: Propodeum and petiole. H: Apex of gaster.

combined length of pedicel and flagellum 0.8 times head width; pedicel 0.4 times as long as scape; fourth anellus strongly transverse, as long as third anellus, 0.1 times as long as F1; F1 1.5–2.0 times as long as wide, 1.0–1.2 times as long as pedicel; F2 1.3–2.0 times as long as wide, 0.8–1.0 times as long as F1; F3 1.5–1.7 times as long as wide, about as long as or slightly shorter than F2; clava 2.0–2.5 times as long as wide, about 1.8 times as long as F3, rounded apically .

Thorax (Fig. 2D) 1.3 times as long as wide, engraved-reticulate. Mesoscutum (Fig. 2E) with a row of adnotaular setae. Scutellum (Fig. 2F) slightly wider than long: anterior pair of setae situated before the middle; sublateral line not carinate laterally. Dorsellum without median line. Propodeum (Fig. 2G) 2.6–3.0 times as long as dorsellum, with median carina in a depression; callus with 2 setae. Coxae engraved-reticulate. Forewing (Fig. 1C) 2.3 times as long as wide: speculum large and closed below; submarginal vein with 2–3 dorsal setae; costal cell:marginal vein:stigmatal vein = 5.0:2.5–2.7:1.0.

Petiole (Fig. 2G) 0.4–0.5 times as long as propodeum, with or without sculpture. Gaster 1.1–2.1 times as long as wide, 0.9–1.3 times as long as thorax, almost smooth. Cercal setae (Fig. 2H) subequal in length.

Male. Body length 1.6–1.7 mm (1.7–2.0 mm in Narendran & Krishnakumar (1995)). Differs from female as follows. Head about 1.3 times as wide as high. Antenna (Fig. 1E): scape about 2.9 times as long as wide; ventral plaque white or pale brown, about 0.3 length of scape in the upper part; combined length of pedicel and flagellum about 1.4 times as long as head width; pedicel about 0.3 times as long as scape; F1 about as long as pedicel; F2 about 2.3 times as long as wide, about 1.8 times as long as F1; F3 about 2.3 times as long as wide, about as long as F2; F4 about 2.2 times as long as wide, about 0.9 times as long as F3; clava about 4.3 times as long as wide, about 2.0 times as long as F4; each funicular segment with a basal transverse band of black setae on the upper surface; first claval segment with 2 transverse bands of black setae; second claval segment with a transverse band of black setae on the lower surface. Thorax 1.4–1.5 times as long as wide. Gaster 0.9–1.0 times as long as thorax, 1.7–2.2 times as long as wide, with pale basal spot.

Type material. Although I have not examined the holotype of this species which is deposited in USNM, I examined 20 female and 4 male specimens collected in India, Sri Lanka, and Australia, all of which are identified as *C. indi* by Z. Bouček.

Specimens examined. Australia: Northern Territory: Timba Creek, 120 km W., 3 ♂, 27. III. 1991 (J. D. Pinto) (CNCI, SEHU). Queensland: Mt. Tibrogargan, 1 ♀, 27. VII. 1976 (Z. Bouček) (BMNH). India: Hesaraghalta, 1 ♀, 4. IX. 1974, pan trap (CNCI); Karnataka, Bangalore, 4 ♀ 1 ♂, 25. III. 1984 (A. C. Tawari), ex egg plant midge on *Solanum melongena* (BMNH); M. S. Akola, 5 ♀, 29. X. 1985 (S. P. Ukey), ex bud of *Capsicum annuum* (BMNH); Tamil Nadu, Paramakudi, Agr. R. Sta. Univ., 5 ♀, 1988. ex galled flowers and fruits of *Capsicum annuum* (BMNH). Japan: Honshû: Kôridono, Ojiya, Niigata-ken, 1 ♂, 9. VIII. 1970 (K. Yamagishi) (MU); Eigo, Hachijô Is., Tôkyô-to, 1 ♀, 28. V. 1964 (Y. Hirashima & M. Shiga) (ELKU) / 3 ♀ 16 ♂, 2. VI. 1964 (Y. Hirashima & M. Shiga) (ELKU); Kyôto, 1 ♀, 26. IX. 1965 (H. Takada)(SEHU); Ôdaigahara, Nara-ken, 1 ♀, 29. VII. 1992 (S. Shiyake). Kyûshû: Kagoshima, 1 ♀, 29. V. 1975 (J. Yukawa), ex *Asphondylia sphaera* Monzen on *Ligustrum japonicum* Thunb. (SEHU). Indonesia: British N. Borneo, Sensuron, 1 ♀, 9–11. I. 1959 (BIM); Borneo, Tenompok, 1 ♀, 17–21. X. 1958 (BIM) / 3 ♀, 10–14. II. 1959 (BIM) / 25 ♀, 10–19. II. 1959 (BIM) / 4 ♀, 13. II. 1959 (BIM) / 9 ♀, 15. II. 1959 (BIM); Borneo, Ranau, 1 ♀, 30. IX – 5. X. 1958 (BIM). New Caledonia: Loyalty Is., Lifou I, Airport, 1 ♀, 26–27. III. 1968 (BIM). New Guinea: Neth. Guega, W. of Swart Val., 1200m, 1 ♀, 15. XI. 1958 (BIM); Wau, Morobe Distr., 1200m, 25–29. VII. 1961 (BIM). P. R. China: Hong Kong, N.T. Taipokau, Kowloon, 1 ♀, 4.

VIII. 1965, Malaise Trap (BIM). Sri Lanka: Maha Iluppallama, 3 ♀ 3 ♂, 1980 (P. M. Wijeratne), ex chilly pods (BMNH); Paradeja, Paradenuja, 1 ♀, 1949 (B. A. Bablist), from flowers and young fruits of *Capsicum annuum* (BMNH).

Distribution. India, Sri Lanka, Australia (Northern Territory, Queensland), Indonesia, New Caledonia, New Guinea, China, and Japan.

Host. This species was reared from galls of flower buds of *Sesbania aegyptiaca*, *Capsicum annuum*, *Capsicum* spp., galls of *Solanum melongena* (Solanaceae) (Bouček, 1988; Narendran & Krishnakumar, 1995), and fruits of *S. aethiopicum* (Etienne & Delvare, 1987). Although Narendran & Krishnakumar (1995) state that this species is phytophagous, one specimen was reared in Japan from a gall of *Asphondylia sphaera* Monzen (Diptera, Cecidomyiidae) on *Ligustrum japonicum* (Oleaceae).

Remarks. The male of this species is similar to the male of *C. petiolatoides* sp. n. in the body colour which is dark brown to black. However, it is distinguished from the latter in the smaller body size (1.6–1.7 mm), the callus with 2 setae, the ventral plaque which is pale brown and about 0.3 length of the scape, and F1 about as long as the pedicel.

Ceratoneura kalinzu sp. n.

(Fig. 1F)

Diagnosis (female)

Fourth anellus strongly transverse, as long as third anellus, 0.1 times as long as F1, with a seta dorsally. Hind coxa pale brown. Mouth 1.9 times as wide as malar space length. Scutellum with submedian line distinct, distinctly diverging cephalad and caudad. Propodeum coarsely raised-reticulate in the posterior half. Petiole 0.7 times as long as propodeum. Submarginal vein with 4 dorsal setae.

Description

Female. Body length 1.8 mm. Body dark brown to black: petiole and median part of the neck of pronotum paler than the remainder. Scape and pedicel pale brown; flagellum dark brown. Legs pale brown: fore and mid coxae darker; fourth tarsal segments infusate. Wings hyaline.

Head 2.1 times as wide as long, 1.3 times as wide as high, 1.1 times as wide as thorax: vertex and frons very weakly engraved-reticulate. Occipital carina distinct behind ocellar triangle. POL 2.4, OOL 1.6 length of median ocellus diameter. Frons with median carina. Eye 1.5 times as high as malar space length. Malar sulcus straight. Mouth 1.9 times as wide as malar space length. Antenna (Fig. 1F): scape 4.3 times as long as wide, slightly exceeding vertex; combined length of pedicel and flagellum as long as head width; pedicel 0.3 times as long as scape; fourth anellus strongly transverse, as long as third anellus, with a seta dorsally; F1 2.8 times as long as wide, 1.5 times as long as pedicel; F2 2.2 times as long as wide, 0.8 times as long as F1; F3 1.5 times as long as wide, 0.8 times as long as F2; clava 2.5 times as long as wide, 1.9 times as long as wide.

Thorax 1.3 times as long as wide, weakly engraved-reticulate. Mesoscutum with 3 pairs of adnotaular setae. Scutellum 0.8 times as long as wide: submedian line distinct, distinctly diverging cephalad and caudad; anterior pair of setae situated before the middle; sublateral line laterally carinate. Dorsellum without median line. Propodeum 2.3 times as long as dorsellum, coarsely raised-reticulate in the posterior half, with median carina thin and weak, and paraspiracular carina thin but distinct; callus with 2 setae. Forewing 2.2

times as long as wide: speculum large and closed below; submarginal vein with 4 dorsal setae; costal cell:marginal vein:stigmatal vein = 4.6:3.0:1.0.

Petiole 0.7 times as long as propodeum. Gaster 2.1 times as long as wide, 1.1 times as long as thorax. Cercal setae subequal in length.

Male. Unknown.

Holotype (♀) (deposited in CNCI). Uganda: Kalinzu Forest, 5000 feet., VII. 1972 (H. Falke).

Distribution. Uganda.

Host. Unknown.

Remarks. *C. kalinzu* sp. n. is similar to *C. indi* in having the body dark brown to black, and the fourth anellus strongly transverse. This species, however, is clearly distinguished from the latter in having the fourth anellus with a dorsal seta, the submarginal vein with 4 dorsal setae, the propodeum coarsely reticulate in the posterior half, and the petiole about 0.7 times as long as the propodeum.

Ceratoneura woolleyi sp. n.

(Fig. 1G)

Diagnosis (female)

Fourth anellus about 1.5 times as long as third anellus, about 0.2 times as long as F1, with several setae. Head thick, 1.8–1.9 times as wide as long. Petiole short, about 0.3 times as long as propodeum, without sculpture. Dorsellum and antenna pale brown.

Description

Female. Body length 1.9–2.0 mm. Body dark brown: head pale brown, vertex and occiput dark brown; mesoscutum, axilla, and propodeum black; dorsellum pale brown; petiole and gaster paler than thorax. Antenna pale brown. Legs pale brown: coxae brown, but paler than thorax; femora somewhat darker than tibiae; tips of tarsi infuscate. Wings hyaline.

Head thick, 1.8–1.9 times as wide as long, 1.1–1.2 times as wide as high, about 1.1 times as wide as thorax. Weak occipital carina present behind ocellar triangle. Temple 0.3–0.4 length of eye. POL 2.0–2.2, OOL 1.2 length of median ocellus diameter. Eye 1.6–2.0 times as high as malar space length. Frons with very weak median carina. Malar sulcus weakly curved. Mouth 1.6–1.7 times as wide as malar space length. Antenna (Fig. 1G): scape 3.7–4.0 times as long as wide, slightly exceeding vertex; combined length of pedicel and flagellum about as long as head width; pedicel about half as long as scape; fourth anellus about 1.5 times as long as third anellus, about 0.2 times as long as F1, and with several setae; F1 1.7–2.1 times as long as wide, slightly longer than pedicel; F2 about 1.6 times as long as wide, 0.9–1.0 times as long as F1; F3 1.1–1.3 times as long as wide, 0.8–0.9 times as long as F2; clava 2.1–2.2 times as long as wide, 2.1–2.3 times as long as F3.

Thorax 1.6–1.7 times as long as wide. Mesoscutum with 3–4 pairs of adnotaular setae. Scutellum as long as wide: submedian lines distinct and almost straight, enclosing area 2.5–2.6 times as long as wide; anterior pair of setae situated before the middle; sublateral line very weak, laterally not carinate. Dorsellum without median line. Propodeum 1.5–1.8 times as long as dorsellum, with distinct median carina in a depression; callus with 3–4 setae. Forewing about 2.1 times as long as wide: speculum large and open in the basal part; submarginal vein with 2 dorsal setae; costal cell:marginal vein:stigmatal vein = 3.8–4.2:2.0–2.2:1.0.

Petiole short, about 0.3 times as long as propodeum, without sculpture. Gaster about 1.6 times as long as wide, 1.2–1.3 times as long as thorax. Cercal setae subequal in length
Male. Unknown.

Holotype (♀) (deposited in TAMU). USA: Texas: Hidalgo Co., Bentson-Rio Grande St. Park, 20. IV. 1985 (J. B. Woolley). Paratypes (deposited in TAMU). USA: Texas: Hidalgo Co., Bentson-Rio Grande St. Park, 1 ♀, 20. IV. 1985 (J. B. Woolley); Starr Co., Falcon Lake St. Park, 1 ♀, 20. IV. 1985 (J. B. Woolley).

Distribution. USA (Texas).

Host. Unknown.

Remarks. *C. woollyi* sp. n. is similar to *C. pallida* and *C. mexicana* in having the fourth anellus 0.15–0.2 times as long as F1, especially to *C. pallida* in having the petiole 0.3 times as long as the propodeum, and the paraspicular carina indistinct and not complete, which are not seen in *C. mexicana*. This new species, however, differs from *C. pallida* in having the body dark brown, the fourth anellus with several setae, and speculum open in the basal part.

Ceratoneura pallida Ashmead

Ceratoneura pallida Ashmead, 1894: 179.—De Santis, 1979: 302.—LaSalle & Schauff, 1992: 29. — LaSalle, 1994: 168.

Diagnosis (female)

Body yellow: gaster with a few transverse brown bands. Fourth anellus distinctly longer than third anellus, 0.15–0.2 times as long as F1; F1 2.4 times as long as wide. Petiole about 0.3 times as long as propodeum. One cercal seta distinctly longer than the others and kinked.

Redescription

Female. Body length 2.0 mm. Body yellow: clypeus medially with black spot; gaster with a few transverse brown bands. Scape and pedicel pale brown; flagellum dark brown. Legs pale brown: tips of tarsi infusate. Wings hyaline.

Head about 2.0 times as wide as long, about 1.3 times as wide as high, about 1.2 times as wide as thorax: vertex and frons very weakly engraved-reticulate. Occipital carina very weak. POL about 3.0, OOL about 2.8 length of median ocellus diameter. Eye about 1.3 times as high as malar space length. Frons with median carina. Malar sulcus almost straight. Mouth 1.8 times as wide as malar space length. Antenna: scape 3.6 times as long as wide, slightly exceeding vertex; combined length of pedicel and flagellum about 1.2 times as long as head width; pedicel 0.3 times as long as scape; fourth anellus distinctly longer than third anellus, 0.15–0.2 times as long as F1; F1 2.4 times as long as wide, about 1.5 times as long as pedicel; F2 2.4 times as long as wide, about as long as F1; F3 2.0 times as long as wide, about 0.8 times as long as F2; clava 3.3 times as long as wide, 2.0 times as long as F3.

Thorax 1.5–1.6 times as long as wide, very weakly engraved-reticulate. Mesoscutum with 2–3 pairs of adnotaular setae. Scutellum slightly wider than long: submedian line absent or very weakly indicated; anterior pair of scutellar setae situated before the middle; sublateral line not carinate laterally. Dorsellum without median line. Propodeum about 3.0 times as long as dorsellum, very weakly raised-reticulate, with median carina; very weak paraspicular carina present anteriorly; callus with 2–3 setae. Coxae very weakly engraved-

reticulate. Forewing 2.1–2.2 times as long as wide: speculum large and closed below; submarginal vein with 2–3 dorsal setae; costal cell:marginal vein:stigmatal vein = 3.4–4.2:2.0–2.6:1.0.

Petiole about 0.3 times as long as propodeum, with very weak irregular longitudinal carinae. Gaster 1.5–2.4 times as long as wide, 0.9–1.5 times as long as thorax. One cercal seta distinctly longer than the others and kinked.

Male. Body length 1.6–2.0 mm. Differs from female as follows. Ocellar triangle partly blackish. Flagellum dark brown. Gaster dark brown, with pale basal spot longer than half length of gaster; apical part of gaster pale brown. Ocellar triangle surrounded by very weak suture. Eye about 1.6 times as high as malar space length. Frons without median carina. Antenna: scape 2.8 times as long as wide, with ventral plaque 0.3–0.4 length of scape in the upper part; combined length of pedicel and flagellum 1.6–1.7 times as long as head width; pedicel 0.4 times as long as scape; F1 1.3 times as long as wide, slightly longer than pedicel; F2 about 2.4 times as long as wide, 1.5–1.8 times as long as F1; F3 about 2.4 times as long as wide, about as long as F2; F4 about 2.2 times as long as wide, slightly shorter than F3; clava about 4.0 times as long as wide, about 2.2 times as long as F4. Mesoscutum with 3 pairs of adnotaular setae. Scutellum with very weak submedian line; anterior pair of setae situated slightly behind the middle. Petiole 0.6 times as long as propodeum. Gaster 1.8–2.3 times as long as wide, about as long as thorax.

Type material (σ^7) (deposited in BMNH). The holotype, mounted on a point, is in good condition, with labels: “Leeward side, St. Vincent, W. I., H. H. Smith, 228”, “W. Indies, 99–331”, “Holotype, σ^7 ”, “*Ceratoneura pallida* Ashm, Type, unique, σ^7 ”, and “B. M. TYPE, HYM, 5. 2346”.

Specimens examined. Bolivia: Santa Cruz, 1 ♀, V. 1971, from *Cecidochoares* larvae in stem gall on “*E. odoratum*” (BMNH). Mexico: Vera Cruz, Atoyac, 1 ♂, V. 1904 (Godman and Salvin) (BMNH). Costa Rica: Heredi, Chilamate, 75m, 1 ♀, VII–X. 1990 (Hanson & Godoy) (PHPC). The Bolivian and Mexican specimens were identified by Z. Bouček.

Distribution. West Indies, Bolivia, Costa Rica, and Mexico.

Host. *Cecidochoares* sp. (Diptera, Cecidomyiidae).

Remarks. The cercal setae of the Bolivian female are subequal in length.

The male of this species is similar to the male of *C. pretiosa* in the yellowish body colour, but differs from the latter in the thorax mostly yellow and without black marking, and the callus with 2–3 setae.

Ceratoneura mexicana Ashmead

Ceratoneura mexicana Ashmead, 1895: 554–555.—De Santis, 1979: 302.—LaSalle & Schauff, 1992: 29. — LaSalle, 1994: 168.

Diagnosis (female)

Scape distinctly exceeding vertex. Fourth anellus distinctly longer than third anellus, 0.15 times as long as F1. Sublateral line laterally carinate. Paraspircular carina distinct, and angularly turning to petiolar foramen in the posterior part. Petiole 0.6 times as long as propodeum.

Redescription

Female. Body length 2.5 mm. Head brown: occiput, scrobal groove, and clypeus dark brown. Antenna pale brown: funicle and clava slightly darker than pedicel and anelli. Thorax

and gaster dark brown with pronotum, dorsellum and basal part of gaster paler. Coxae brown; femora predominantly brown, apically and basally pale brown; tibiae and tarsi white; tips of tarsi infusate. Wings hyaline.

Head 2.1 times as wide as long, 1.3 times as wide as high, 1.1 times as wide as thorax. Occipital margin weakly carinate behind ocellar triangle. POL 2.3, OOL 2.2 length of median ocellus diameter. Frons with very weak median carina. Eye 1.2 times as high as malar space length. Malar sulcus almost straight. Mouth 1.4 times as wide as malar space length. Antenna: scape 5.6 times as long as wide, distinctly exceeding vertex; combined length of pedicel and flagellum as long as head width; pedicel 0.4 times as long as scape; fourth anellus about 3.0 times as long as third anellus, 0.15 times as long as F1; F1 2.6 times as long as wide, 1.3 times as long as pedicel; F2 2.3 times as long as wide, as long as F1; F3 1.8 times as long as wide, 0.8 times as long as F2; clava 2.0 times as long as wide, 1.5 times as long as F3.

Thorax 1.5 times as long as wide, weakly engraved-reticulate. Mesoscutum with 4 pairs of adnotaular setae. Scutellum as long as wide, with weak submedian line; anterior pair of setae situated distinctly before the middle; sublateral line wide, laterally carinate. Dorsellum without median line. Propodeum 3.3 times as long as dorsellum, with median carina having some short transverse branches, with distinct paraspiracular carina which angularly turns to petiolar foramen in the posterior part; callus with 3 setae. Coxae very weakly engraved-reticulate. Forewing 2.3 times as long as wide: speculum widely open below; submarginal vein with 2 dorsal setae; costal cell:marginal vein:stigmatal vein = 4.4:2.0:1.0.

Petiole 0.6 times as long as propodeum, with a few weak and short longitudinal carinae. Gaster 2.4 times as long as wide, 1.4 times as long as thorax. Cercal setae subequal in length.

Male. Unknown.

Type material (♀) (deposited in CAS). The holotype is in good condition and mounted on a card labelled: "Tepic, Mexico", "Ashmead Type", "Type", "Holotype, mexicana", "*Ceratoneura mexicana* Ashm., ♀", and "California Academy of Sciences, Type No. 232".

Distribution. Mexico.

Host. Unknown.

Ceratoneura pretiosa Gahan

Ceratoneura pretiosa Gahan, 1914: 165–166. — LaSalle, 1994: 168.

Diagnosis (female)

Body yellow: occiput, anterior two-thirds of mid lobe of mesoscutum except adnotaular area, anterior one-third of side lobe, outer half of axilla, sublateral line, anterior marginal area of propodeum, and petiole black to dark brown. Scape reaching or slightly exceeding vertex. Fourth anellus distinctly longer than third anellus, 0.3–0.4 times as long as F1. F1 2.4–2.7 times as long as wide.

Redescription

Female. Body length 2.0–2.1 mm. Body yellow: occiput, anterior two-thirds of mid lobe of mesoscutum except adnotaular area, anterior one-third of side lobe, outer half of axilla, sublateral line, anterior marginal area of propodeum, and petiole black to dark brown;

gaster yellow with 3 transverse bands dark brown, or dark brown with basal and apical areas pale brown. Antenna pale brown: flagellum dark brown. Legs pale brown: tips of tarsi infusate. Wings hyaline.

Head 1.9 times as wide as long, 1.3 times as wide as high, 1.1 times as wide as thorax. Very weak occipital carina present behind ocellar triangle. POL about 2.3, OOL about 1.7 length of median ocellus diameter. Frons without median carina. Eye 1.7 times as high as malar space length. Malar sulcus almost straight. Mouth 1.7 times as wide as malar space length. Antenna: scape 4.0–4.4 times as long as wide, reaching or slightly exceeding vertex; combined length of pedicel and flagellum 0.9–1.0 times as long as head width; pedicel 0.4 times as long as scape; fourth anellus slightly longer than wide, distinctly longer than third anellus, 0.3–0.4 times as long as F1, with several setae; F1 2.4–2.7 times as long as wide, 1.2–1.4 times as long as pedicel; F2 1.7–1.8 times as long as wide, 0.8–0.9 times as long as F1; F3 1.5–1.7 times as long as wide, 0.9–1.0 times as long as F2; clava about 2.3 times as long as wide, 1.8–2.0 times as long as F3.

Thorax 1.5 times as long as wide. Mesoscutum with 4 pairs of adnotaular setae. Scutellum slightly wider than long, with very weak submedian line; anterior pair of setae situated distinctly before the middle; sublateral line weakly or not carinate laterally. Dorsellum with weak median line. Propodeum 2.2–2.3 times as long as dorsellum, with median carina in a depression; paraspiracular carina distinct anteriorly; callus with 6–7 setae. Forewing 2.3–2.4 times as long as wide: speculum widely open below, extending to stigmal vein; submarginal vein with 2 dorsal setae; costal cell:marginal vein:stigmal vein = 4.6–4.8:2.7–2.9:1.0.

Petiole 0.4–0.5 times as long as propodeum, with a few irregular carinae. Gaster 1.5–1.6 times as long as wide, 1.1–1.2 times as long as thorax. Cercal setae subequal in length.

Male. Body length 2.0 mm. Differs from female as follows. Scape 2.9 times as long as wide, distinctly exceeding vertex; ventral plaque black, 0.4 length of scape in the upper part; combined length of pedicel and flagellum 1.7 times as long as head width; pedicel 0.3 times as long as scape; F1 1.3 times as long as wide, 1.3 times as long as pedicel; F2 2.7 times as long as wide, 1.6 times as long as F1; F3 2.7 times as long as wide, as long as F2; F4 2.5 times as long as wide, 1.1 times as long as F3; clava 5.0 times as long as wide, 2.5 times as long as F4. Gaster dark brown, apically pale brown, with pale basal spot, 2.3 times as long as wide, and 1.1 times as long as thorax.

Type material (♀) (deposited in USNM). The holotype, mounted on a card, is in good condition, but lacks the petiole and the gaster, with labels: “Bred from Mimosa, July 3. 1912”, “Brownsville, Tex, Exp 1”, “Webster, No 6480”, “Type No. 19337, U. S. N. M.”, and “*Ceratoneura pretiosa*, ♀ type”. The body length without the petiole and the gaster is 1.3 mm.

Specimens examined. Costa Rica: Guanacaste Pv. Sta. Rosa National Park, 1 ♂, 2–23. III. 1986 (Janzen & Gauld) (PHPC). Mexico: Baja California Sur Las Barracas, 1 ♀, 10. V. 1986 (P. Debach) pan trap (JLPC); Michoacan, 3 miles N. Nueva Itatica, 1 ♀, 8. VII. 1986 (J. Woolley & G. Zolnerowich) (TAMU).

Distribution. Costa Rica, Mexico, and USA (Texas).

Host. Unknown, but the holotype was reared from a gall on *Mimosa* sp. (Gahan, 1914).

Remarks. The male of this species is similar to the male of *C. pallida* in the yellowish body colour. However, it is distinguished from the latter in the thorax with some black markings, and the callus with 6–7 setae.

Ceratoneura petiolata Ashmead
(Figs. 3, 4, 5A–C)

Ceratoneura petiolata Ashmead, 1894: 179. — Howard, 1897: 177. — Girault, 1915b: 275. — Gahan, 1920: 243. — De Santis, 1979: 302. — LaSalle, 1994: 168.

Diagnosis (female)

Fourth anellus (Figs. 3E, 5A) distinctly longer than third anellus, 0.3–0.4 times as

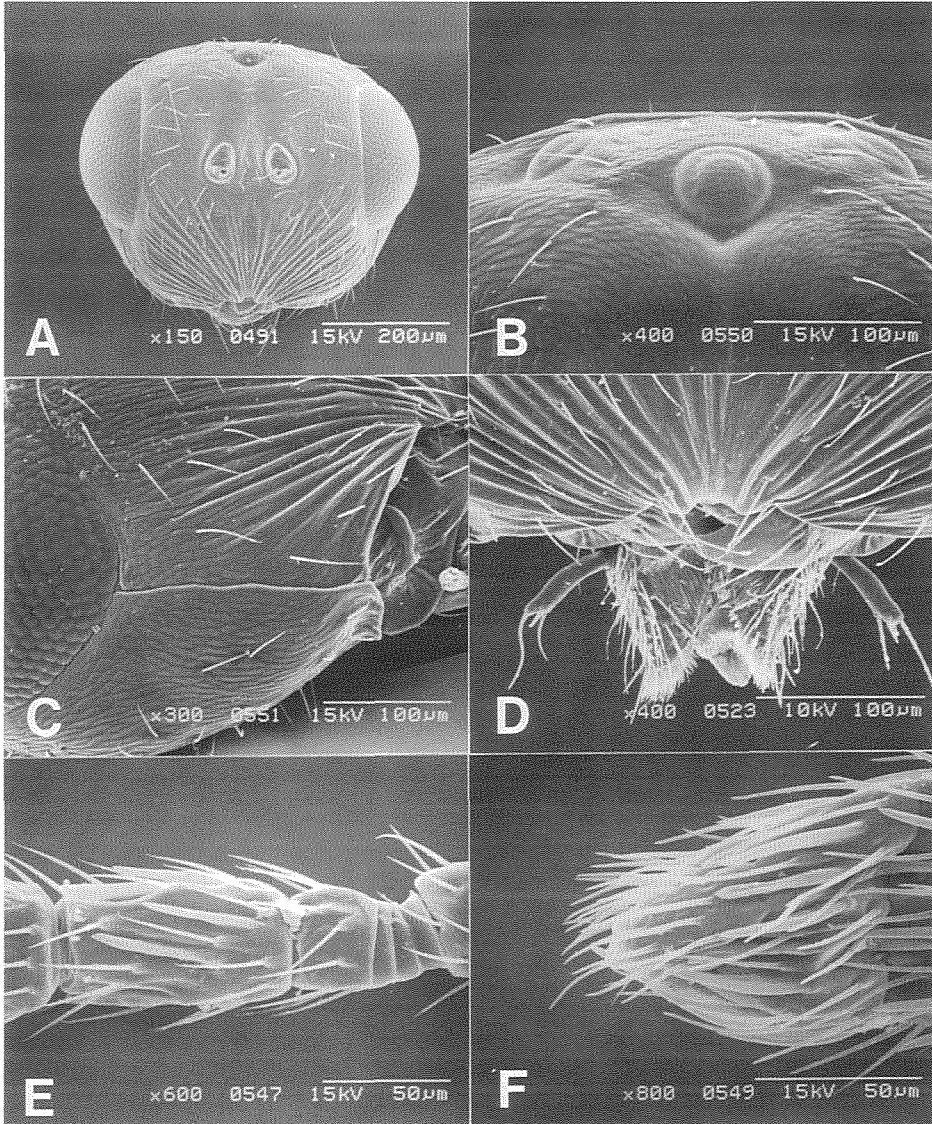


Fig. 3. *Ceratoneura petiolata*, ♀. — A: Head. B: Vertex. C: Malar area. D: Mouth. E: Anelli and F1. F: Apex of clava.

long as F1, with many setae and sensilla basiconicae; F1 1.4–2.0 times as long as wide; F2 1.5–2.0 times as long as wide. Petiole (Fig. 4D) 0.5–0.6 times as long as propodeum.

Redescription

Female. Body length 1.3–2.4 mm. Body dark brown to black: petiole usually somewhat paler than thorax. Scape pale brown; pedicel pale to dark brown; flagellum dark brown. Coxae dark brown, rarely pale brown; femora predominantly dark brown, rarely pale brown; tibiae pale brown, rarely dark brown; tarsi pale brown; fourth tarsal segments infuscate. Wings hyaline.

Head (Fig. 3A) about 2.1 times as wide as long, about 1.3 times as wide as high, about 1.2 times as wide as thorax: vertex and frons very weakly engraved-reticulate. Temple 0.2–0.3 length of eye. Occipital carina (Fig. 3B) distinct behind ocellar triangle, varying from weak to strong. POL 2.2–2.5, OOL 1.7–1.8 length of median ocellus diameter. Frons with median carina absent or very weak. Eye 1.7–1.8 times as high as malar space length. Malar sulcus (Fig. 3C) almost straight or weakly curved. Mouth 1.7 times as wide as malar space length. Antenna (Figs. 3E, 3F, 5A): scape 3.3–3.7 times as long as wide, slightly exceeding vertex; combined length of pedicel and flagellum about as long as head width; pedicel about 0.4 times as long as scape; fourth anellus quadrate, about 5.0 times as long as third anellus, 0.3–0.4 times as long as F1, with many setae and sensilla basiconicae; F1 1.4–2.0 times as long as wide, about as long as pedicel; F2 1.6–2.0 times as long as wide, as long as

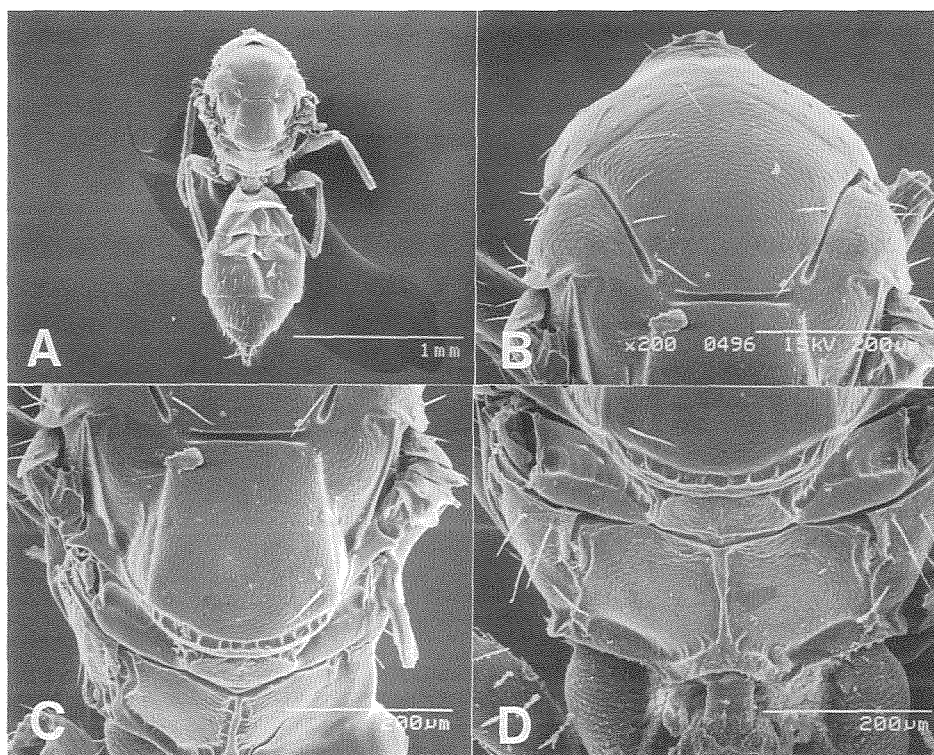


Fig. 4. *Ceratoneura petiolata*, ♀. — A: Body. B: Pronotum and mesoscutum. C: Scutellum. D: Dorsellum and propodeum.

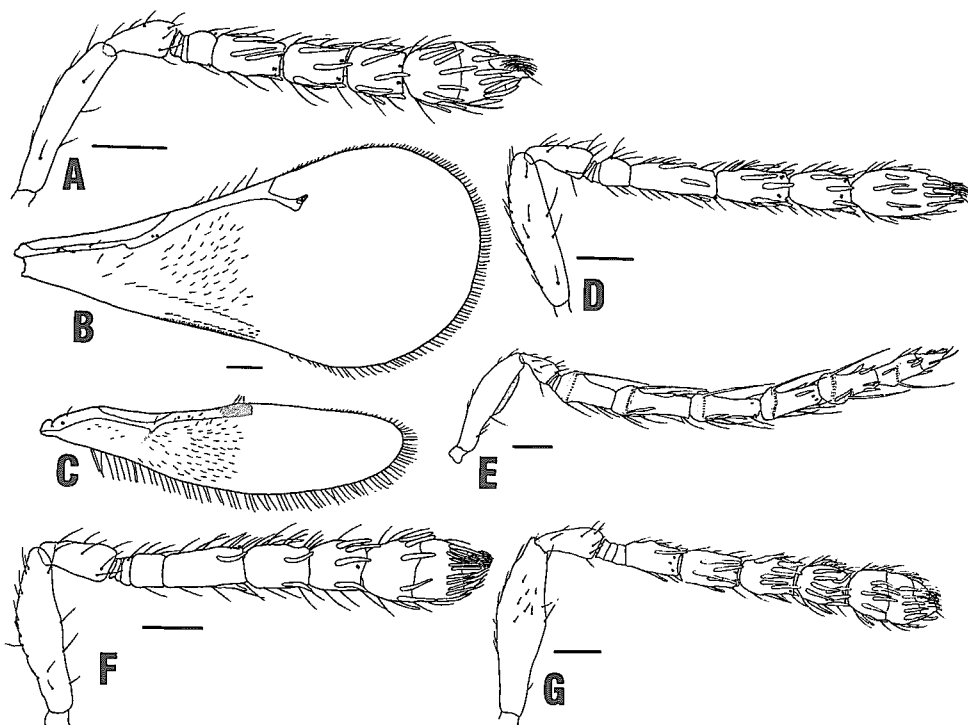


Fig. 5. A: *Ceratoneura petiolata*, ♀, antenna. B: Ditto, ♀, forewing. C: Ditto, ♀, hindwing. D: *C. petiolatoides* sp. n., ♀, antenna. E: Ditto, ♂, antenna. F: *C. infuscata* sp. n., ♀, antenna. G: *C. gigantea* sp. n., ♀, antenna. Setae on apical halves of the wings of *C. petiolata* (B and C) are omitted. Scale: 0.1 mm.

or slightly shorter than F1; F3 1.0–1.7 times as long as wide, about as long as F2; clava 1.8–2.3 times as long as wide, 1.7–2.3 times as long as F3.

Thorax (Fig. 4A) about 1.5 times as long as wide, weakly engraved-reticulate. Mesoscutum (Fig. 4B) with 3–4 pairs of adnotaular setae. Scutellum (Fig. 4C) slightly wider than long, with very weak submedian line which is sometimes indistinct; anterior pair of setae situated before the middle; sublateral line not carinate laterally. Dorsellum (Fig. 4D), rarely with median line. Propodeum (Fig. 4D) 2.0–2.7 times as long as dorsellum: median carina in a depression sometimes with short transverse branches; paraspicular carina distinct anteriorly; callus with 4 setae. Coxae weakly engraved-reticulate. Forewing (Fig. 5B) about 2.2 times as long as wide: speculum closed or open below; submarginal vein with 2–3 dorsal setae; costal cell:marginal vein:stigmatal vein = 3.7–4.4:2.4–2.8:1.0.

Petiole (Fig. 4D) 0.5–0.6 times as long as propodeum, with weak longitudinal carinae. Gaster (Fig. 4A) 1.4–2.1 times as long as wide, 1.1–1.2 times as long as thorax. Cercal setae subequal in length.

Male. Unknown.

Type material. Although I have not examined the holotype of this species which is deposited in USNM, I examined one female labelled: “St. Vincent, W. I., H. H. Smith, 210”, “W. Indies, 99–331.”, “paralectotype”, “♀ PLT. *Ceratoneura petiolata* Ashm. det. Z. Bouček, 1974”, and 19 female specimens which are identified as *C. petiolata* by Z. Bouček. These specimens are all deposited in BMNH.

Specimens examined. 157 ♀ from the following localities. These specimens are deposited in USNM, JLPC, TAMU, CNCI, BMNH, and PHPC.

Bahamas: Exuma, Simon's Point. Brasil: Jatai, Goias; Rio de Janeiro, R. J. Repressa Rio Grande. Costa Rica: Guanacaste Province. Dominica: Castle Comfort; Grande Savane; Portsmouth. Dominican Republic: San Christobal. El Salvador: Sta Tecla. Grenada: Grenada Is, Balthazar, Windward side. Jamaica: Kingston; St. Andrews. Leeward Is: Montserrat; Nevis. Mexico: Baja Cal., Sur Las Barracas; Chiapas, Palenque; Guerrero, 30 km N. Acapulco; Oaxaca, 3.9 miles NE. San Gabriel, Mixtepec; N. L. El Carmen; N. L., San Juan, Rio San Juan; Tabasco, Frontera; Tabasco, Teapa; Tamaulipas, Gomez Farias; Veracruz 3 miles N Cardel; Veracruz 18.6 miles S. Tampico. Nicaragua: Chinandega. St. Vincent Grenadines: St. Vincent Is. Trinidad-Tobago: Tobago Is, 1 miles ESE Adelphi; Torinidad Is., Cotton Station; Trinidad Is., Lopinot; Trinidad Is., St. Augustine; Trinidad Is., St. George, Tumpuna Reserve. USA: Arizona, Cochise Co., Portal; Arizona, Tucson; California, Siskiyou Co.; Pennsylvania, Berka Co.; Texas, Hidalgo Co., Benston Rio Grande St. Park; Virgin Islands, St. Thomas. Venezuela: Merida, 38 km SW. Merida; Merida, La Azulita, 77km NW. of Merida, 1250m; Tach. 5. km SE Sn. Cristobal, 1500 feet; Zulia, Los Angeles del Tucuco.

Distribution. North and South America.

Host. This species was reared from galls of *Lorrea* (LaSalle, 1994), flower bud galls on *Portulaca oleracea*, from *Stachytarpheta cayennensis*, and from *Sorghum* attacked by *Contarinia sorghicola* Coq.

Ceratoneura petiolatoides sp. n.

(Fig. 5D–E)

Diagnosis (female).

Differs from *C. petiolata* as follows. Body length 2.6–2.7 mm. Flagellum (Fig. 5D) slender: F1 3.0–3.5 times as long as wide, 1.8 times as long as pedicel. Gaster 2.1–2.6 times as long as wide.

Description

Female. Body 2.6–2.7 mm. Differs from *C. petiolata* as follows. Head about 1.2 times as wide as high, 1.0–1.1 times as wide as thorax. Temple about 0.3 length of eye. POL 2.5–2.7, OOL 2.0 length of median ocellus diameter. Frons with weak median carina. Eye about 1.3 times as high as malar space length. Antenna (Fig. 5D): F1 3.0–3.5 times as long as wide, 1.8 times as long as pedicel; F2 0.8 times as long as F1; F3 0.9 times as long as F2. Anterior pair of scutellar setae situated in or before the middle. Dorsellum with weak median carina. Gaster 2.1–2.6 times as long as wide.

Male. Differs from female as follows. Head 1.3 times as wide as high. Eye about 1.5 times as high as malar space length. Antenna (Fig. 5E): scape 2.6–3.2 times as long as wide, with ventral plaque 0.4–0.5 length of scape in the upper part; combined length of pedicel and flagellum about twice as long as thorax width; F1 about 1.7 times as long as wide, 1.5 times as long as pedicel; F2 2.5 times as long as wide, 1.3 times as long as F1; F3 about 2.3 times as long as wide, about 0.9 times as long as F2; F4 about 1.9 times as long as wide, 0.8 times as long as F3; clava about 4.2 times as long as wide, about 2.3 times as long as F4. Dorsellum without median carina. Gaster 1.1–1.2 times as long as thorax, with basal area paler than the remainder.

Holotype (♀) (deposited in CNCI). USA: California: Carson Ridge, Marin Co., em. 17. VI. 1968. Paratypes (deposited in CNCI). 1 ♀ 3 ♂, same data as the holotype.

Distribution. USA (California).

Host. *Asphondylia ceanothi* Felt (Diptera, Cecidomyiidae).

Remarks. The male of this species is similar to the male of *C. indi* in the body colour which is dark brown to black, but differs from the latter in the larger body size (2.6–2.7 mm), the callus with 4 setae, the ventral plaque of the scape which is dark brown and 0.4–0.5 length of the scape, and F1 which is about 1.5 times as long as the pedicel.

Ceratoneura infuscata sp. n.

(Fig. 5F)

Diagnosis (female).

Temple long, about half length of eye. Scape not reaching vertex. Fourth anellus quadrate, 3.0 times as long as third anellus, 0.4 times as long as F1, with many setae, and without sensilla basiconica. Scutellum without submedian line: sublateral line very weak. Propodeum long, 4.5 times as long as dorsellum. Forewing medially weakly infusate.

Description

Female. Body length 3.0 mm. Differs from *C. petiolata* as follows. Antenna pale brown: flagellum somewhat darker than scape and pedicel. Forewing medially weakly infusate. Head twice as wide as long, 1.2 times as wide as high, as wide as thorax. Temple long, half length of eye. POL 3.0 times as long as median ocellus diameter. Eye 1.5 times as high as malar space length. Frons with weak median carina. Malar sulcus distinctly curved. Mouth 1.5 times as wide as malar space length. Antenna (Fig. 5F): scape not reaching vertex; combined length of pedicel and flagellum 0.9 times as long as thorax width; fourth anellus quadrate, 3.0 times as long as third anellus, 0.4 times as long as F1, with many setae, and without sensilla basiconica; F1 2.1 times as long as wide, 1.2 times as long as pedicel; F2 1.6 times as long as wide, 0.8 times as long as F1; F3 slightly longer than wide, 0.8 times as long as F2; clava 1.9 times as long as wide, 2.3 times as long as F3. Thorax 1.4 times as long as wide. Scutellum without submedian line; sublateral line very weak, not carinate laterally. Dorsellum without median line. Propodeum 4.5 times as long as dorsellum. Forewing 2.4 times as long as wide: speculum large and open below; submarginal vein with 2 dorsal setae; costal cell:marginal vein:stigmatal vein = 4.0:2.1:1.0.

Petiole 0.4 times as long as propodeum, without carina. Gaster 2.2 times as long as wide, 1.5 times as long as thorax.

Male. Unknown.

Holotype (♀) (deposited in USNM). South Africa: Port Alfred, 18. X. 1952 (E. M. Cauon).

Distribution. South Africa.

Host. The holotype emerged from a stem gall of *Sideroxylon inerme*.

Remarks. *C. infuscata* sp. n. is similar to *C. petiolata* in having the fourth anellus about 0.4 times as long as F1, and the body dark brown to black. This new species, however, is easily distinguished from the latter in having the temple about half as long as the eye, the scutellum with no submedian line, the propodeum 4.5 times as long as the dorsellum, and the forewing medially infusate.

Ceratoneura gigantea sp. n.
(Figs. 5G, 6, 7)

Diagnosis (female)

Fourth anellus (Figs. 5G, 6C) about twice as long as wide, about 5.0 times as long as third anellus, 0.7–0.9 times as long as F1, with setae, sensilla basiconicae, and multiporous plate sensilla. Scutellum (Fig. 6C) distinctly longer than wide. Body large, about 4.0 mm.

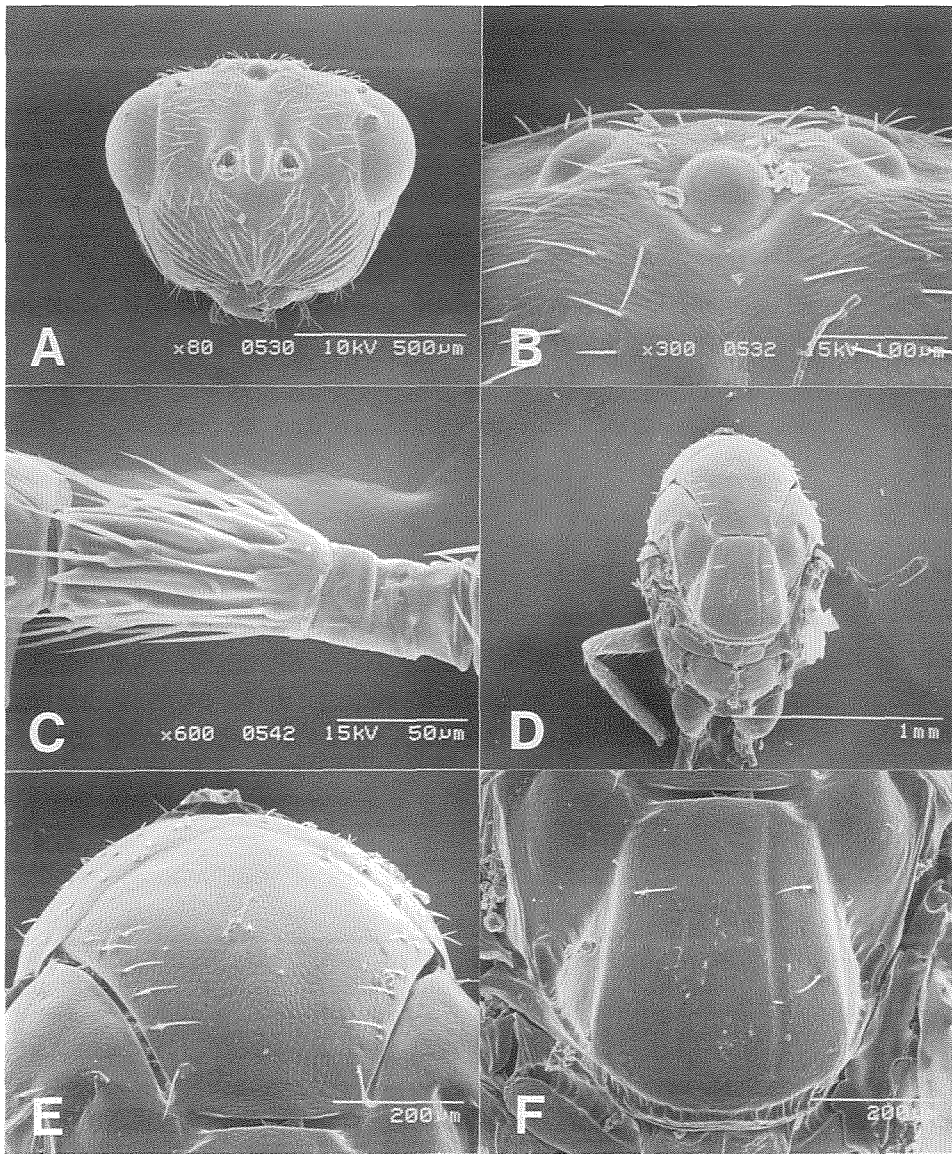


Fig. 6. *Ceratoneura gigantea* sp. n., ♀. — A: Head. B: Vertex. C: Anelli. D: Thorax. E: Pronotum and mesoscutum. F: Scutellum.

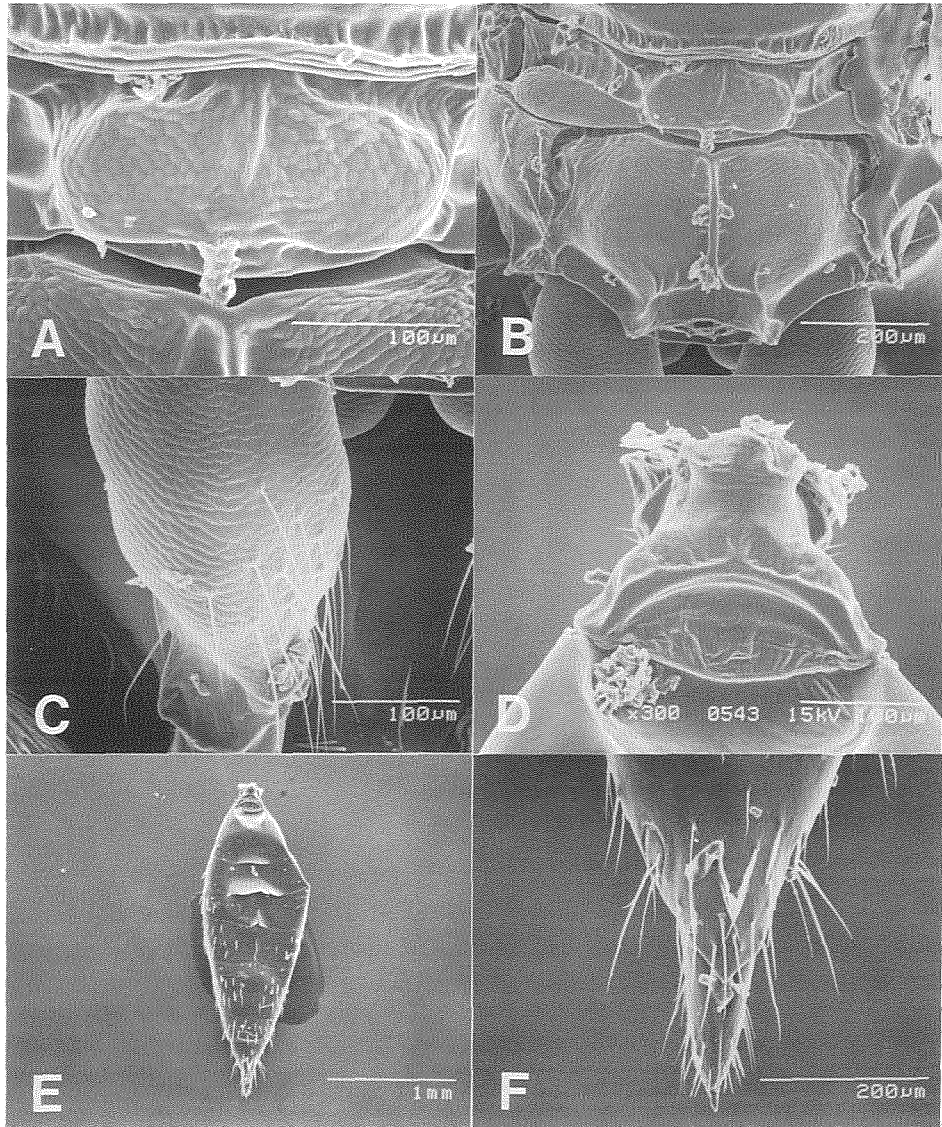


Fig. 7. *Ceratoneura gigantea* sp. n., ♀. — A: Dorsellum. B: Dorsellum and propodeum. C: Left hind coxa. D: Petiole. E: Gaster. F: Apex of gaster.

Description

Female. Body length 3.9–4.3 mm. Body dark brown: face pale brown; pronotum pale to dark brown. Scape, pedicel, and first to third anellus pale brown; fourth anellus and flagellum dark brown. Coxae dark brown; fore and hind femora predominantly dark brown; mid femur pale to dark brown; tibiae and tarsi pale brown; fourth tarsal segment dark brown with tip black. Wings hyaline.

Head (Fig. 6A) about 2.1–2.2 times as wide as long, 1.3 times as wide as high, about as wide as thorax: vertex and frons weakly engraved-reticulate. Occipital carina (Fig. 6B)

strong behind ocellar triangle. POL 2.0–2.3, OOL 1.6–1.9 length of median ocellus diameter. Frons with weak median carina. Eye about 1.2 times as high as malar space length. Malar sulcus almost straight. Mouth about 1.4 times as wide as malar space length. Antenna (Figs. 5G, 6C): scape 3.4–3.8 times as long as wide, slightly exceeding vertex; combined length of pedicel and flagellum about 0.9 times as long as head width; pedicel about 0.4 times as long as scape; fourth anellus about twice as long as wide, about 5.0 times as long as third anellus, 1.7 times as long as wide, 0.7–0.9 times as long as F1, with setae, sensilla basiconicae, and multiporous plate sensilla; F1 1.8–2.3 times as long as wide, 0.9–1.0 times as long as pedicel; F2 about 1.4 times as long as wide, 0.9–1.0 times as long as F1; F3 about 1.3 times as long as wide, 0.8–1.0 times as long as F2; clava about 2.0 times as long as wide, 1.9–2.0 times as long as F3.

Thorax (Fig. 6D) about 1.6 times as long as wide, weakly engraved-reticulate. Mesoscutum (Fig. 6E) with 5–7 pairs of adnotaular setae. Scutellum (Fig. 6F) 1.1 times as long as wide, with weak submedian line; anterior pair of setae situated before the middle; sublateral line not carinate laterally. Dorsellum (Fig. 7A) with weak median line. Propodeum (Fig. 7B) 2.0–2.3 times as long as dorsellum, with median carina in deep depression, with 2 short longitudinal carinae in front of petiolar foramen; paraspiracular carina distinct throughout; callus with 3–5 setae. Coxae weakly engraved-reticulate. Forewing 2.4 times as long as wide: submarginal vein with 2 dorsal setae; speculum widely open below; costal cell:marginal vein:stigmatal vein = 4.4:2.1–2.3:1.1.

Petiole (Fig. 7D) 0.4–0.5 times as long as propodeum, smooth. Gaster (Fig. 7E) about 2.7 times as long as wide, 1.6–1.7 times as long as thorax. One cercal seta (Fig. 7F) distinctly longer than the next longest.

Male. Body length 3.0 mm. Differs from female as follows. Fore coxa pale brown in apical half; femora pale brown. Scape 2.4 times as long as wide, with ventral plaque 0.7 length of scape in the upper part. Gaster 2.1 times as long as wide, 1.2 times as long as thorax.

Holotype (♀) (deposited in TAMU). Mexico: 16 km south of Huajuapán de León, Oaxaca. 10. VIII. 1967 (H. R. Burke & J. Hafernik), 5900 feet. Paratypes (deposited in TAMU). 11 ♀ 1 ♂ with same data as the holotype.

Distribution. Mexico.

Host. Unknown.

Remarks. The antennae of the male paratype except the scape were not visible, because they were covered with the skin of its pupa.

The female of this species has quite unique character states which are mentioned in the diagnosis, and is easily distinguished from the other species. The male is also easily distinguished from the other species in the large body size (3.0 mm), the ventral plaque which is 0.7 length of the scape.

KEY TO THE FEMALES OF THE WORLD SPECIES OF *CERATONEURA*

1. Fourth anellus (Figs. 1A, 1B, 1F) about as long as or only slightly longer than third anellus. 2
- Fourth anellus (Figs. 1G, 5A, 5G) distinctly longer than third anellus. 4
2. Fourth anellus (Fig. 1F) with a seta dorsally. Submarginal vein with 4 dorsal setae. Propodeum coarsely raised-reticulate in the posterior half. Mouth 1.9 times as wide as malar space length. Petiole about 0.7 times as long as propodeum. *C. kalinzu* sp. n.

- Fourth anellus without seta. Submarginal vein with 2 dorsal setae. Propodeum not coarsely raised-reticulate. Mouth and petiole variable. 3
- 3. Petiole 0.9–1.0 times as long as propodeum. F1 (Fig. 1A) 2.5–2.8 times as long as wide. F2 2.0–2.5 times as long as wide. Mouth 1.9 times as wide as malar space length. *C. goethei* (Girault)
- Petiole (Fig. 2G) 0.4–0.5 times as long as propodeum. F1 (Fig. 1B) 1.5–2.0 times as long as wide. F2 1.3–2.0 times as long as wide. Mouth 1.5–1.6 times as wide as malar space length. *C. indi* Girault
- 4. Fourth anellus (Fig. 1G) 0.15–0.2 times as long as F1. 5
- Fourth anellus 0.3–0.8 (Figs. 5A, 5G) times as long as F1. 7
- 5. Petiole 0.6 times as long as propodeum. Scape distinctly exceeding vertex. Paraspircular carina distinct, and angularly turning to petiolar foramen in the posterior part. *C. mexicana* Ashmead
- Petiole 0.3 times as long as propodeum. Scape only slightly exceeding vertex. Paraspircular carina indistinct and not complete. 6
- 6. Fourth anellus without seta. F1 and F2 2.4 times as long as wide. Callus with 2–3 setae. Speculum closed. *C. pallida* Ashmead
- Fourth anellus (Fig. 1G) with several setae. F1 1.7–2.1 times, F2 about 1.6 times as long as wide. Callus with 3–4 setae. Speculum open in the basal part. *C. woolleyi* sp. n.
- 7. Fourth anellus (Figs. 5G, 6C) 0.7–0.8 times as long as F1, with many setae and multiporous plate sensilla. Scutellum (Fig. 6F) longer than wide. Body large, about 4.0 mm. *C. gigantea* sp. n.
- Fourth anellus (Figs. 5A, 5D, 5F) at most 0.4 times as long as F1, without multiporous plate sensilla. Scutellum (Fig. 4C) at most as long as wide, usually wider than long. Body at most 2.5 mm. 8
- 8. Temple long, about half as long as eye. Scape not reaching vertex. Scutellum without submedian line. Sublateral line very weak. Propodeum long, 4.5 times as long as dorsellum. Forewing medially weakly infusate. *C. infuscata* sp. n.
- Temple short, much shorter than half length of eye. Scape slightly exceeding vertex. Scutellum with submedian line which is sometimes indistinct. Sublateral line distinct. Propodeum 2.0–2.7 times as long as dorsellum. Forewing hyaline. 9
- 9. Petiole 0.4–0.5 times as long as propodeum. Callus with 6–7 setae. *C. pretiosa* Gahan
- Petiole 0.5–0.6 times as long as propodeum. Callus with 4 setae. 10
- 10. Body 1.3–2.4 mm. F1 (Fig. 5A) 1.4–2.0 times as long as wide, about as long as pedicel. Gaster (Fig. 4A) 1.4–2.1 times as long as wide. *C. petiolata* Ashmead
- Body 2.6–2.7 mm. F1 (Fig. 5D) 3.0–3.5 times as long as wide, about 1.8 times as long as pedicel. Gaster 2.1–2.6 times as long as wide. *C. petiolatoides* sp. n.

ACKNOWLEDGMENTS

I deeply thank J. LaSalle (BMNH), Suzanne Lewis (BMNH), J. Huber (CNCI), M. Schauff (USNM), C. Burwell (QM), D. Ubick (CAS), K. Arakaki (BIM), K. Yamagishi (MU), and K. Kamijo (Bibai, Japan) for the loan of valuable specimens including the type material. I also thank J. LaSalle and M. Schauff for valuable information and advice, K. Kamijo (Bibai, Japan), M. Suwa (SEHU), and S. Takagi (Sapporo, Japan) for critical reading of the manuscript, and T. Ito (Electron Microscope Laboratory, Faculty of Agriculture, Hokkaidô University) for his help in taking SEM pictures.

This study was partly supported by Research Fellowships of the Japan Society for the Promotion of Science for Young Scientists.

REFERENCES

- Ashmead, W. H., 1894. Report on the parasitic Cynipidae, part of the Braconidae, the Ichneumonidae, the Proctotrypidae, and part of the Chalcidoidea. Part II. pp. 108–188 in Riley, C. V., Ashmead, W. H. & Howard, L. O., Report on the Parasitic Hymenoptera of the Island of St. Vincent. Journal of the Linnean Society of London, Zoology, 25: 56–254.
- Ashmead, W. H., 1895. Some parasitic Hymenoptera from Baja California and Tepic, Mexico. Proceedings of the California Academy of Sciences, 5: 539–555.
- Ashmead, W. H., 1904. Classification of the Chalcid flies or the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. Memoirs of the Carnegie Museum, 1: 225–551.
- Bouček, Z., 1977. Description of *Tachinobia* gen. n. and three new species of Tetrastichinae (Hymenoptera: Eulophidae), with a tentative key to genera. Bulletin of entomological Research, 67: 17–30.
- Bouček, Z., 1988. Australasian Chalcidoidea (Hymenoptera). A biosystematic revision of genera of fourteen families, with a reclassification of species. 832pp. C.A.B. International, Wallingford.
- Dahms, E. C., 1984. A checklist of the types of Australian Hymenoptera described by Alexandre Arsene Girault: III. Chalcidoidea species F–M with advisory notes. Memoirs of the Queensland Museum, 21(3): 579–842.
- De Santis, L., 1979. Catalogo de los Himenopteros Calcidoideos de America al sur de los Estados Unidos. Publicacion Especial. Comision de Investigaciones Cientificas de la Provincia de Buenos Aires. 488pp. La Plata, Argentina.
- Etienne, J. & Delvare, G., 1987. Insect pests of Diakhatou fruits (*Solanum aethiopicum*) in Casamanc (Senagal): entomofauna components and phenology of the principal pests. Agronomic Tropicales, 42(3): 194–205.
- Gahan, A. B., 1914. Descriptions of new genera and species, with notes on parasitic Hymenoptera. Proceedings of the United States National Museum, 48: 155–168.
- Gahan, A. B., 1920. On the identity of several species of Chalcidoidea (Hymenoptera). Proceedings of the Entomological Society of Washington, 22: 235–243.
- Girault, A. A., 1915a. Australian Hymenoptera Chalcidoidea – IV. Supplement. The Memoirs of the Queensland Museum. 3: 180–299.
- Girault, A. A., 1915b. Some new chalcidoid Hymenoptera from North and South America. Annals of the Entomological Society of America, 8: 272–278.
- Girault, A. A., 1917a. Speciosissima Genera Nova Eulophidorum. 4 pp. Washington.
- Girault, A. A., 1917b. Descriptiones Hymenopterorum Chalcidoidicarum variorum cum observationibus. V. pp. 1–10. (Girault: Glenndale, Maryland).
- Girault, A. A., 1920. New genera and species of chalcid-flies from Australia (Hymenoptera). Insector Inscitiae Menstruus, 8: 37–50.
- Graham, M. W. R. de V., 1987. A reclassification of the European Tetrastichinae (Hymenoptera: Eulophidae), with a revision of certain genera. Bulletin of the British Museum (Natural History), Entomological series, 55(1): 1–392.
- Howard, L. O., 1897. On the Chalcidoidea of the Island of Grenada, B.W.I. Journal of the Linnean Society, (Zoology), 26: 129–178.
- LaSalle, J., 1994. North American genera of Tetrastichinae (Hymenoptera: Eulophidae). Journal of Natural History, 28: 109–236.
- LaSalle, J. & Schauff, M. E., 1992. Preliminary studies on Neotropical Eulophidae (Hym. Chalci.), Ashmead, Camaron, Howard and Walker species. Contributions of the American Entomological Institute, 27(1): 1–47.
- Narendran, T. C. & Krishnakumar, N. K., 1995. Systematics of *Ceratoneura indi* Girault

(Hymenoptera: Eulophidae), a pest of sweet pepper and brinjal in India. *Journal of Tropical Agriculture*, 33: 47–49.

Rohwer S. A., 1921. Descriptions of new Chalcidoid flies from Coimbatore, South India. *Annals and Magazine of Natural History*, 7: 123–135.