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THE NORTH AMERICAN SPECIES OF *ARTHROLYTUS* THOMSON (HYMENOPTERA: PTEROMALIDAE)

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ABSTRACT—A history of the genus *Arthrolytus* Thomson in North America is given, with redescription of *A. fasciatus* (Provancher), occurring in northeastern states, and description of *A. muesebecki*, n. sp., from California, reared from cynipid galls on oak.

Arthrolytus Thomson has had a curious history in North America. It was a quite commonly used chalcidoid generic name in the Nearctic literature for about 40 years, but passed out of use, and very recently has again been used.

Several European species of *Arthrolytus* had been known since 1878, but no Nearctic species were described until 1893. In that year Ashmead recognized what he took to be this genus from Ohio and described *Arthrolytus apatela*. In 1894 he characterized another species, *A. pimplae*, from Virginia. Also in 1894 Ashmead transferred *Cleonymus clisiocampae* Fitch, described from New York state, to *Arthrolytus*. Thus, in the 1890's *Arthrolytus* had 3 Nearctic species, the names of which appeared in numerous economic reports, faunal lists, and catalogues, because they were often identified as primary or secondary parasites of common lepidopterous hosts. However, these names gradually disappeared from the literature.

In 1897 Howard synonymized *Arthrolytus clisiocampae* under the

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European *Dibrachys boucheanus* (Ratzeburg), although the name *clisiocampae* persisted for some years in papers based on old determinations. In 1911 Girault transferred *Arthrolytus pimplae* to *Dibrachys*. In 1920 Girault synonymized *pimplae* under *apatelae* and repeated that the species belonged in *Dibrachys*. This placed these 3 species of *Arthrolytus* elsewhere, but in the meantime Girault had described *Arthrolytus aeneoviridis* in 1911.

In his 1920 paper, Girault transferred *Habrocytus kansensis* Girault, 1917, to *Arthrolytus*. So by 1920 the genus, having lost its 3 original Nearctic species, had acquired 2 others. However, by the 1930's, A. B. Gahan, Division of Insect Identification of the U. S. Department of Agriculture, had decided that these 2 species did not belong in *Arthrolytus*, but should be placed in *Catolaccus* instead. Consequently he began sending out identifications of *Catolaccus aeneoviridis* and *Catolaccus kansensis*. As he was the only one making identifications of chalcid-flies in North America at that time, and workers needing names for use in publications relied entirely on him, the name *Arthrolytus* quickly disappeared from the current literature.

It should be mentioned that Mr. Gahan's decision to drop the name *Arthrolytus* from use in North America was a result of his study of the parasites of the Hessian fly, published in 1933. One of the well known European parasites of the Hessian fly is *Arthrolytus maculipennis* (Walker). After Mr. Gahan had studied this European species, it was obvious to him that the Nearctic species Girault had placed in *Arthrolytus* were not congeneric with it [unpublished Gahan manuscript notes in the U.S. National Museum]. Logically they had to be placed elsewhere, and he placed them in the genus *Catolaccus*, leaving *Arthrolytus* vacant for North America.

After the mid-1930's, the generic name *Arthrolytus* does not appear in North American publications. When the Catalog of Hymenoptera of America North of Mexico (Peck, 1951) was published, the name *Arthrolytus* did not appear in the index, although it had been a rather common generic name in Nearctic catalogues and indices of North American economic entomology in the early years of this century.

When I studied the Provancher types in Quebec in 1963, however, I saw that *Semiotellus fasciatus* Provancher, a species that had been unplaced for more than 80 years, was congeneric with the type-species of *Arthrolytus* and should be placed there. As I remarked in my report (1964) on the Provancher species of Chalcidoidea, "Several other North American species at various times have been referred to *Arthrolytus*, but all have subsequently been transferred to other genera. Thus *fasciatus* remains the only described North American species now referred to *Arthrolytus*."

Quite recently I have secured reared material in good condition

of an undescribed Nearctic species of *Arthrolytus* that was formerly represented in the U.S.N.M. collection only by fragmentary specimens. In this paper I describe this new species and redescribe Provancher's species. I also present a description of the genus *Arthrolytus*, because that generic name was misapplied in the Nearctic literature for 40 years.

Genus *Arthrolytus* Thomson

Pteromalus subg. *Arthrolytus* Thomson, 1878, Hym. Scand. 5: 147, 158. Type-species: (*Arthrolytus punctatus* Thomson) = *Pteromalus maculipennis* Walker. Desig. by Ashmead, 1904.

Girault (1911) published an extended dissertation on *Arthrolytus*, based entirely on the literature. He unfortunately had never seen the type-species, and his conclusions about the genus are largely mistaken. Authentic specimens of the type-species of *Arthrolytus* were secured for the U.S.N.M. collection by Mr. Gahan from the Mayr collection in Vienna in 1927.

Generic description.—Head and thorax dull, sculptured, gaster smooth and shining. Head with clypeal margin truncate or with 2 very obscure teeth; right mandible with 4 teeth, left mandible with 3, dorsal tooth of each mandible truncate, ventral teeth acute; maxillary palp with 4 segments, apical one long; labial palp with 3 segments, second segment short. Antennae inserted slightly below center of frons, but above level of ventral margins of compound eyes, face slightly produced anteriorly at level of antennal bases; antennal scapes not quite reaching level of anterior ocellus; female antenna with 2 ring segments and 6 funiculars, first funicular clavate, as long as or longer than pedicel, both elongate, apical funiculars semiquadrate or transverse; club small, subequal in length to pedicel; scrobe cavity shallow, margins ecarinate. Eyes large, ovate, bare. Occiput not carinate; vertex not broad; head transverse in dorsal aspect.

Pronotum with anterior margin ecarinate; dorsum of thorax not flattened; notaulices incomplete posteriorly. Forewing with stigmal vein long, from $\frac{2}{3}$ as long as to equal in length to marginal vein; postmarginal vein equal in length to marginal or slightly longer; in female dark shading usually present in area behind marginal vein, male wing hyaline; marginal fringe present or absent. Hindwing with prominent vestige of crossvein lr-m preserved. Legs with femora stout; hind tibia with 1 apical spur. Scutellum lacking frenal crossgroove.

Propodeum without apical neck and lacking dense hair laterally; median carina present, lateral carinae present, absent, or partially present. Gaster subflattened dorsally, usually lighter in color at base; in female, apex acute, with maximum width of gaster equal to or slightly greater than maximum width of thorax, length of gaster slightly greater than that of thorax and propodeum combined; male gaster blunt at apex, shorter than or equal in length to thorax, and with a prominent pale spot near base.

KEY TO NORTH AMERICAN SPECIES

Female forewing shaded behind marginal vein, marginal fringe of wing present; propodeum with a transverse ridge; antennal pedicel yellow, first funicular segment tan; gaster mostly black **fasciatus** (Provancher)

Female forewing hyaline, marginal fringe of wing absent; propodeum lacking a transverse ridge; antennal pedicel yellow or tan, first funicular segment brown; gaster mostly brown ----- **muesebecki**, n. sp.

***Arthrolytus fasciatus* (Provancher)**

Semiotellus fasciatus Provancher, 1881, Nat. Can. 12: 294, ♂, ♀; Dalla Torre, 1898, Cat. Hym., 5: 211; Gahan and Rohwer, 1918, Can. Ent. 50: 171 [lectotype designation]; Peck in Muesebeck *et al.*, 1951, USDA Agr. Monog. 2: 594; Burks in Krombein *et al.*, 1958, USDA Agr. Monog. 2, Sup. 1: 84; Peck, 1963, Can. Ent. Sup. 30: 901.

Arthrolytus fasciatus (Provancher) Burks, 1964, Can. Ent. 95: 1262; Burks in Krombein and Burks, 1967, USDA Agr. Monog. 2, Sup. 2: 265.

Female: Length, 3.4–4.5 mm. Black; antennal scape and pedicel and all legs beyond coxae yellow; first funicular segment tan; base of gaster tan or deep yellow; middle and hind coxae, propodeum, and base of gaster with iridescent blue or green sheen; submarginal vein of forewing yellow, other veins brown; wing shaded behind marginal vein, otherwise hyaline.

Head with clypeal margin truncate; minute, closely set, slightly irregular rugae converging on anterior mouth opening; width of malar space $\frac{1}{3}$ as great as eye height; ocellocular line $\frac{2}{3}$ as long as postocellar. Relative proportional lengths of parts of antenna—scape, 42; pedicel, 14; first funicular segment, 17; second, 11; third, 10; fourth, 9; fifth, 8; sixth, 6; club, 15.

Thoracic dorsum with minute alveolate sculpture and scattered, short, recumbent bristles; punctures in apical area of praescutum only moderately larger than those in median basal area of scutellum; forewing with submarginal vein $2\frac{1}{2}$ times as long as marginal, stigmal and marginal equal in length, postmarginal $\frac{1}{5}$ longer than marginal; marginal fringe well developed; wing bare in area behind submarginal vein.

Propodeum with lateral carinae interrupted in the middle, a transverse costula or ridge present midway between base and apex of propodeum; surface of propodeum anterior to this costula sculptured, surface posterior to costula smooth and shining; strong median carina present. Gaster $\frac{1}{3}$ longer than thorax and propodeum combined, its maximum width equal to that of thorax; gastral terga 1–4 completely bare dorsally, fifth tergum with a few setae near lateral margins, sixth and seventh with moderately dense dorsal bristles.

Male: Length, 3.0 mm. Head and thorax black with slight greenish cast, noticeably more hairy than female; gaster dark brown, shining, with yellow spot at base; antennal scape and pedicel yellow, flagellum dark brown; coxae, propodeum, and base of gaster with iridescent blue or green luster; femora mostly brown, tibiae and tarsi yellow; wings hyaline, veins tan.

Antenna with relative proportional lengths of parts—scape, 25; pedicel, 7; first funicular segment, 16; second, 10; third, 9; fourth, 9; fifth, 8; sixth, 8; club, 15. Gaster and thorax-propodeum equal in length.

Type locality: Quebec.

Type: Lectotype ♀, Provancher Collection, Laval University, Ste. Foy, P. Q.

Distribution: Que., N. H., Mass., Pa.

Host relationships: Unknown. The few available specimens of this species were taken by sweeping.

Arthrolytus muesebecki, n. sp.

This handsome species agrees with *fasciatus* in having the female thorax black and the gaster light colored at the base, with the antennal scape pale and the flagellum dark, but the two species differ in that this species lacks the marginal fringe of the forewing, and lacks the transverse costula of the propodeum that *fasciatus* has, and in having the female forewing hyaline, rather than clouded.

Female: Length, 3.5–5.0 mm. Head and thorax black, gaster dark brown, tan at base and with variable tan cross-stripes on dorsum; antennal scape pale yellow; pedicel and legs beyond coxae pale tan; wing veins tan, wings hyaline; middle and hind coxae, propodeum, and base of gaster with iridescent blue or green luster.

Head with clypeal margin obscurely bidentate; minute, closely set, slightly irregular rugae converging on anterior mouth opening; width of malar space $\frac{1}{2}$ height of compound eye; ocellocular line $\frac{2}{3}$ as long as postocellar. Relative proportional lengths of parts of antenna—scape, 47; pedicel, 14; first funicular segment, 19; second, 11; third, 10; fourth, 9; fifth, 8; sixth, 7; club, 18.

Thoracic dorsum with minute alveolate sculpture, short, scattered, recumbent bristles present, punctures in apical area of praescutum much larger than those in median basal area of scutellum; forewing with submarginal vein $2\frac{3}{5}$ times as long as marginal, stigmal and marginal veins equal in length, postmarginal slightly longer than marginal, stigmal knob enlarged; marginal fringe of wing absent; wing bare behind submarginal vein.

Propodeum with lateral carinae present only in apical third; median carina not so strongly developed as in *fasciatus*; transverse costula absent; surface in most of median area of propodeum smooth, sculptured only in a small area near each lateral margin midway between base and apex. Gaster $1\frac{2}{3}$ times as long as thorax and propodeum combined, its maximum width equal to that of thorax; gastral terga 1–3 dorsally completely bare, fourth tergum with a few setae near each lateral margin, fifth with 3 short rows of minute setae near each lateral margin, sixth and seventh covered with relatively sparse dorsal bristles.

Male: Length, 3.0–3.5 mm. Head and thorax dark green, gaster dark brown, shining, with a yellow cross-band near base; antennal scape yellow, pedicel tan, flagellum dark brown; all coxae, propodeum, and base of gaster with iridescent brassy or blue-green luster; legs beyond coxae pale tan; wings hyaline, veins tan.

Antenna with relative proportional lengths of parts—scape, 37; pedicel, 9; first funicular segment, 20; second, 12; third, 10; fourth, 10; fifth, 9; sixth, 8; club, 18. Gaster and thorax-propodeum equal in length.

Type locality: Folsom Lake, Placer Co., Calif.

Holotype: U.S.N.M. Catalog No. 70491.

Described from 6 female, 2 male specimens: Holotype ♀, allotype ♂, and 5♀, 1♂ paratypes all reared at Folsom Lake, Placer Co., Calif., June 1968, from gall of *Andricus brunneus* Fullaway on blue oak, *Quercus douglasii* by Charles Dailey. Four paratypes are deposited in

the University of California, Davis, collection; the other types are in the U.S.N.M.

In addition to the types, there are 2♀, 6♂ specimens in poor condition of this series in the U.S.N.M. collection. These are not included in the type species because they are fragmentary. They bear the data, Berkeley, Calif., Oct. 7, 1921, reared from *Callirhytis quercusagrifoliae* (Bassett), C. T. Dodd. Another female specimen, also in poor condition, was collected in the Santa Cruz Mountains, Calif. (no further data with the specimen). All this material was submitted for identification more than 45 years ago by E. O. Essig.

Host relationships: This parasite was reared from cynipid galls, but it is not certain that it was parasitic on the gall makers. Some of the galls from which specimens emerged showed evidence that lepidopterous larvae had also lived as inquilines in the galls.

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