Baeomyia n.g. (Diptera: Tachinidae): descriptions and notes about phylogenetic and zoogeographic relationships

JAMES E. O'HARA
Department of Entomology, University of Alberta, Edmonton, Alta., Canada T6G 2E3

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Baeomyia n.g. is described for a group of small (2–3 mm long) tachinids belonging to the *Siphona* group of the Siphonini. All known specimens were collected in western North America, with two species recorded from southern British Columbia (***Baeomyia xanthogaster*** n. sp. and ***Baeomyia juniperi*** n. sp.) and three species recorded from desert localities in the American Southwest (type-species *Baeomyia hurdi* (Reinhard), ***Baeomyia antennata*** n. sp. and ***Baeomyia sonorensis*** n. sp.). Keys to adult males and females are provided for separation of species. Systematics of the Siphonini and *Siphona* group are reviewed, including a discussion of the synapomorphies upon which each is defined. *Baeomyia* species are inferred to form a monophyletic taxon within the *Siphona* group on the basis of five synapomorphies, though the relationship between the genus and other *Siphona* group taxa is unresolved. The apparent disjunction of *Baeomyia* species into northern and southern ranges may be the result of relatively recent speciation events, because differences among species are slight. A detailed zoogeographic analysis of the distribution pattern must await further phylogenetic data.

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Baeomyia, un nouveau genre, est décrit pour inclure un groupe de petites mouches tachinidés (longueur 2–3 mm) appartenant au groupe *Siphona* de la tribu des Siphonini. Les espèces connues ont toutes été récoltées dans l'Ouest de l'Amérique du Nord, deux en Colombie-Britannique (***Baeomyia xanthogaster*** n. sp. et ***Baeomyia juniperi*** n. sp.) et trois en des localités situées dans le désert du Sud-Ouest américain (le génotype *Baeomyia hurdi* (Reinhard), ***Baeomyia antennata*** n. sp. et ***Baeomyia sonorensis*** n. sp.). Des tableaux d'identification permettent de séparer les espèces (mâles et femelles adultes). On trouvera ici une revue de la systématique des Siphonini et du groupe *Siphona* ainsi qu'une discussion des synapomorphies définissant chacun de ces taxons. Cinq synapomorphies suggèrent que les espèces de *Baeomyia* forment un taxon monophylétique à l'intérieur du groupe *Siphona*, mais les relations reliant le genre aux autres taxons du groupe *Siphona* ne sont pas élucidées. L'apparente séparation géographique des espèces de *Baeomyia* en deux groupes, un septentrional et un méridional, est peut-être le résultat d'évènements de spéciation relativement récents, puisque les différences entre les espèces sont faibles. Une analyse zoogéographique détaillée de la distribution des espèces doit attendre un apport supplémentaire de données phylogénétiques.

Introduction

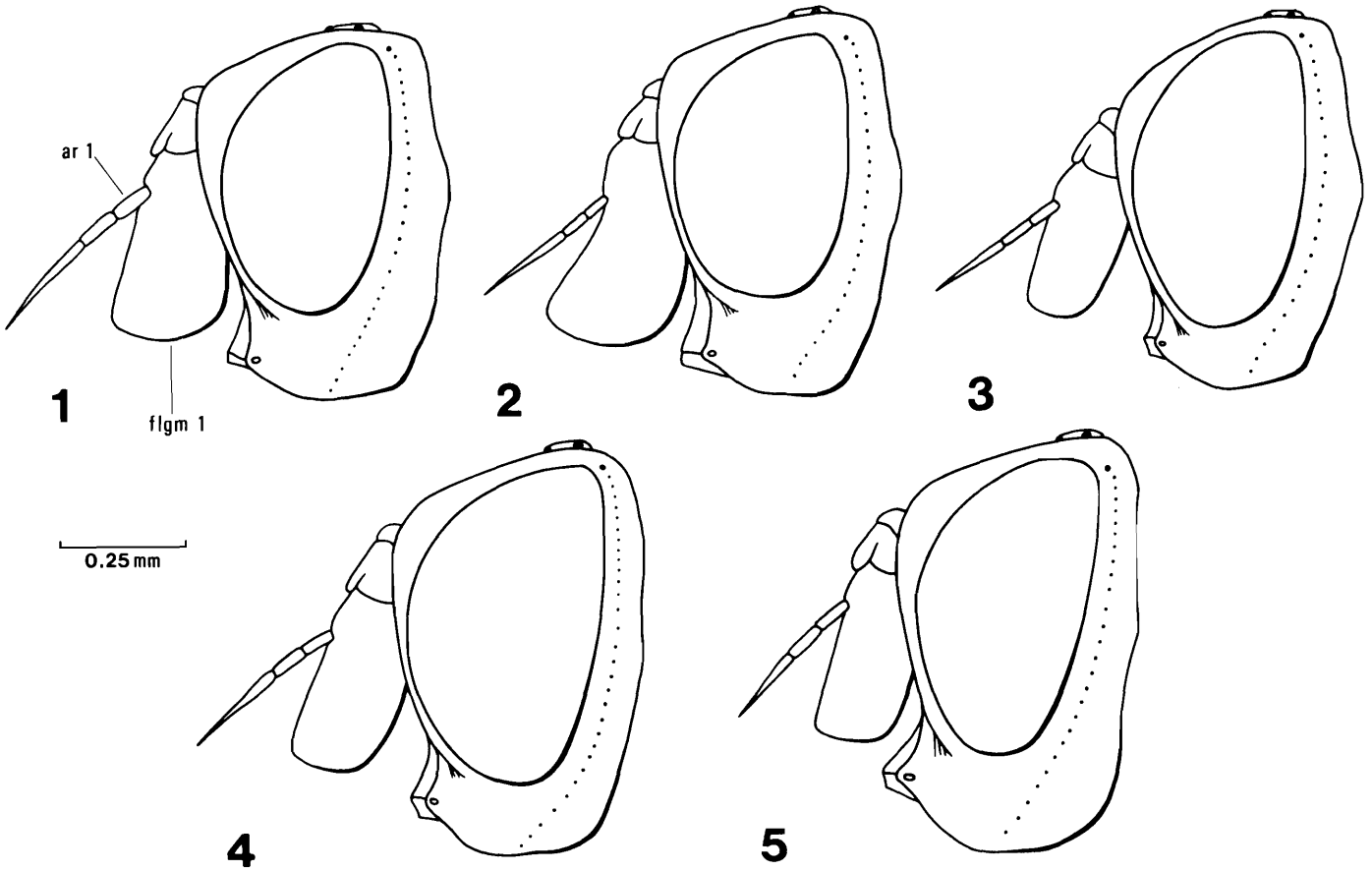
The history of siphonine taxonomy in the New World dates back about 150 years to the description of a Brazilian species by Wiedemann in 1830 (as *Tachina singularis*).There followed a long, virtually unbroken, hiatus until the 1890's when Coquillett began his studies on the Tachinidae of America north of Mexico (e.g. 1897). Subsequent workers, most notably Aldrich, Townsend, Curran, and Reinhard, made sporadic contributions through the years, but apart from Townsend's unsatisfactory attempt to redefine the "Siphonini" and "Actiini" in Part 10 of his *Manual of myiology* (1940) and his erection of numerous "genera", the higher classification of New World Siphonini was virtually ignored.

A degree of order was introduced into the classification of the New World Siphonini by Sabrosky and Arnaud with publication of their chapter on the Tachinidae in *A catalog of the Diptera of America north of Mexico* (1965). Following closely the lead of these authors, Guimarães (1971) produced his systematic scheme for the Siphonini south of the United States. Whereas Sabrosky and Arnaud arranged the siphonine genera into the subtribes Siphonina, Neaerina and Coronimyiina, Guimarães did not use the subtribal category. This has proved unfortunate and confusing, as most authors, myself included, now accept the Old World concept of the Siphonini (as exemplified most recently by Crosskey 1976 and Andersen 1983), which is roughly the equivalent of Sabrosky and Arnaud's Siphonina.

Even before a synapomorphy was discovered to support the monophyly of the Siphonini, Mesnil (1962) recognized the group (as Siphonina) on the basis of external similarities of adults. The tribe is now presumed to be monophyletic by the hypothesized synapomorphy of only two (rather than three) spermathecae in the female reproductive system (Andersen 1983; J. E. O'Hara, unpublished).

The *Siphona* group was proposed independently by Andersen (1983, p. 10) and O'Hara (1983, p. 314) for a monophyletic assemblage of genera within the Siphonini. It is recognized on the basis of two synapomorphies. (1) Female sternum 7 with a well-developed anterior apodeme. This synapomorphy was proposed by Andersen (1983) and was based upon his study of representative species of European Siphonini. It seems to have general applicability, though it has not been studied in detail for regions other than Europe. (2) Lower katepisternal (sternopleural) seta stronger than upper anterior one. Suggested as a synapomorphy by both Andersen (1983) and O'Hara (1983), this state is not without exceptions among taxa assigned to the *Siphona* group by these authors. Better known *Siphona* group taxa, such as *Siphona*, *Ceranthia* Robineau-Desvoidy s. str., *Siphonopsis* Townsend, and *Pseudosiphona* Townsend, possess the derived state, but other taxa, such as some species of *Ceranthia* s. lat. (sensu O'Hara 1983, p. 274), do not. In siphonines not belonging to the *Siphona* group, the lower katepisternal seta is almost universally weaker than the upper anterior one (as in species of *Actia* Rob.-Des. and *Ceromya* Rob.-Des.), yet both setae are usually of subequal strength in *Peribaea* Rob.-Des.[1] These data indicate that a more thorough

[1]For a discussion of relationships between the *Peribaea* group, *Actia* group, and *Siphona* group, see Andersen 1983.



FIGS. 1–5. Male head profiles of *Baeomyia* species. Vestiture and mouthparts omitted. Fig. 1. *Baeomyia xanthogaster*. Fig. 2. *Baeomyia antennata*. Fig. 3. *Baeomyia sonorensis*. Fig. 4. *Baeomyia juniperi*. Fig. 5. *Baeomyia hurdi*. *ar* 1, aristomere 1; *flgm* 1, flagellomere 1.

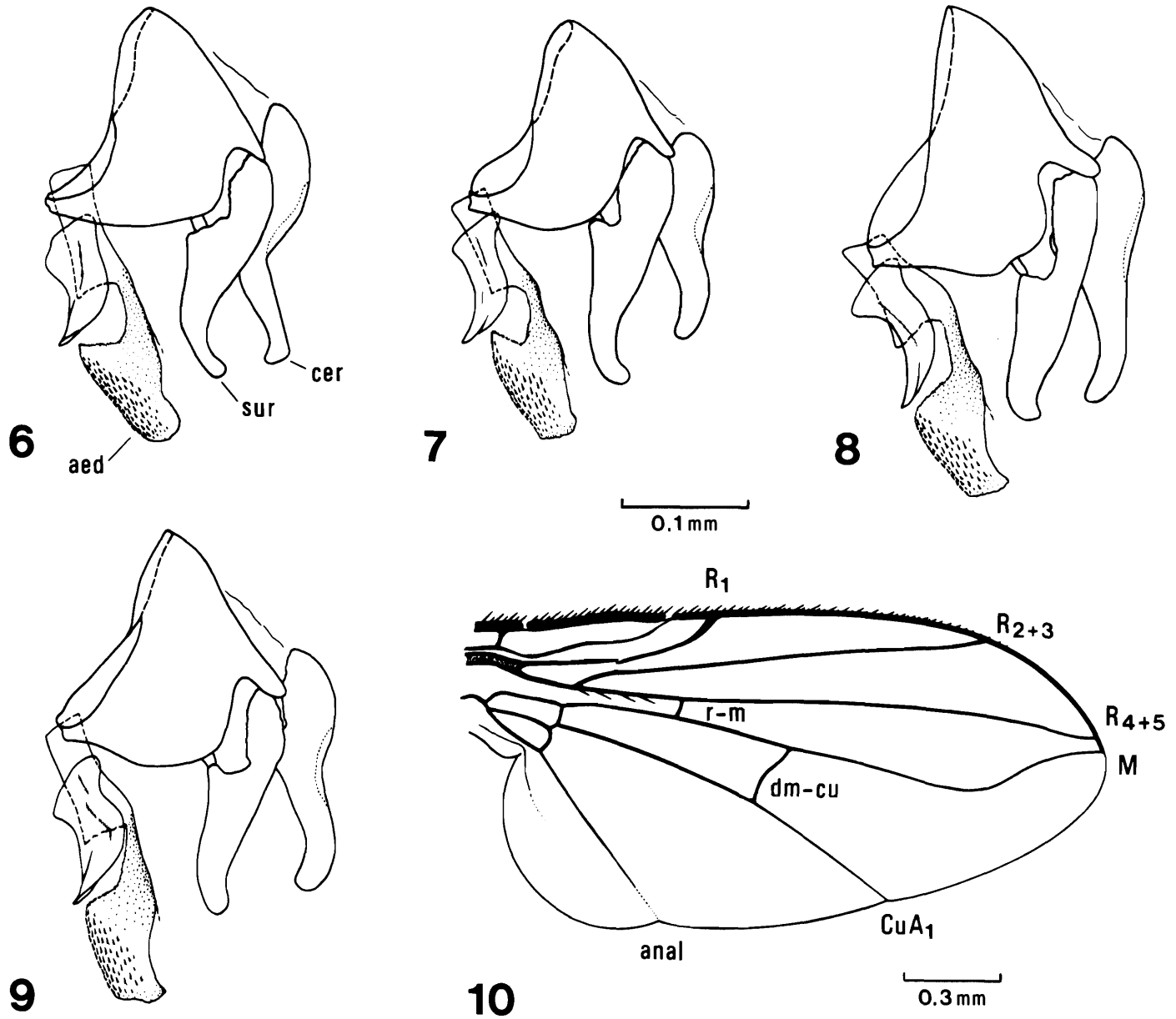
study of the katepisternum setal character is needed before its value in phylogenetic reconstructions can be fully interpreted. (This character will be explored in more detail in a future paper.)

Of still less certain significance is the character state of anal vein reaching the wing margin within *Siphona* group members. This state is shared by the *Siphona* group and *Peribaea* Rob.-Des. (a primitive taxon of the Siphonini), suggesting the state either arose twice (O'Hara 1983) or is basal to the Siphonini (with a reversal in the *Actia* group; Andersen 1983). The issue is left unresolved here, but of possible significance to the placement of *Baeomyia* is the observation that taxa other than *Peribaea* in which the anal vein reaches the wing margin are almost invariably referable to the *Siphona* group.

It is into the *Siphona* group that the new genus *Baeomyia*, described below, is placed. Females of *Baeomyia* have two spermathecae and a well-developed anterior apodeme on sternum 7. The anal vein reaches the wing margin, but unlike most other *Siphona* group taxa, the lower katepisternal seta is not stronger than the upper anterior one. In general habitus *Baeomyia* species are similar to other members of the *Siphona* group, so the weak lower katepisternal seta suggests two opposing interpretations (which are also valid for other taxa with this character state; see synapomorphy No. 2 above). Either *Baeomyia* is near the base of the *Siphona* group lineage, or a reversal has occurred in the katepisternum setal character, in which case *Baeomyia* occupies a higher position in the group. Both explanations remain equally possible until the phylogenetic position of *Baeomyia* is clarified by study of other characters.

Baeomyia possesses a suite of shared derived character states that signify the monophyletic nature of the taxon and distinguish it from other *Siphona* group taxa. Because its sister group is unknown, it must be included within the *Siphona* group at a rank sufficient to indicate its unresolved relationship there if a natural classification is to be produced. To indicate the divergence of *Baeomyia* from other *Siphona* group taxa and to produce a natural classification consistent with the present systematic arrangement of the Siphonini, the rank of genus is proposed for this taxon.

If not singly then at least collectively the following synapomorphies attest to the highly derived nature of *Baeomyia* and readily permit its recognition. They are roughly sequenced in an order from most to least reliable, based upon my perception of their value as indicators of monophyly. All are derived states within the Siphonini and occurrence of similar states elsewhere in the tribe are attributable to convergence (a common circumstance in the Tachinidae). With respect to No. 5, position of crossvein *dm-cu*, there may be a transformation series within the *Siphona* group from crossvein near the wing margin (most taxa) to crossvein far removed from the wing margin (*Baeomyia*), but if so then its detection is impeded by the convergent nature of this state in the Siphonini. The synapomorphies are the following: (1) loss of anterodorsal seta on middle of mid tibia; (2) aristomere 1 elongate, subequal in length to aristomere 2 (a rare condition found in a few unrelated siphonines; e.g. *Actia exoleta* (Meigen) and *Ceromya nigrohalterata* (Villeneuve)); (3) with individuals 2–3 mm in length, the entire group comprises very small siphonines that are otherwise rare in the Siphonini; (4) very short aristomere 3



FIGS. 6–9. Lateral views of male genitalia of *Baeomyia* species (male genitalia of *B. antennata* unavailable). Vestiture, aedeagal and hypandrial apodemes and postgonite omitted. All genitalia drawn to same scale. Fig. 6. *Baeomyia hurdi*. Fig. 7. *Baeomyia sonorensis*. Fig. 8. *Baeomyia xanthogaster*. Fig. 9. *Baeomyia juniperi*. Fig. 10. Right wing of *B. xanthogaster*, illustrating typical venation of genus. *aed*, aedeagus; *cer*, cerci; *sur*, surstylus.

(perhaps the shortest in the Siphonini); and (5) crossvein *dm-cu* far removed from the wing margin (a state closely approximated in some *Pseudosiphona* and *Aphantorhapha* species of the *Siphona* group, as well as some *Actia* and *Peribaea* species).

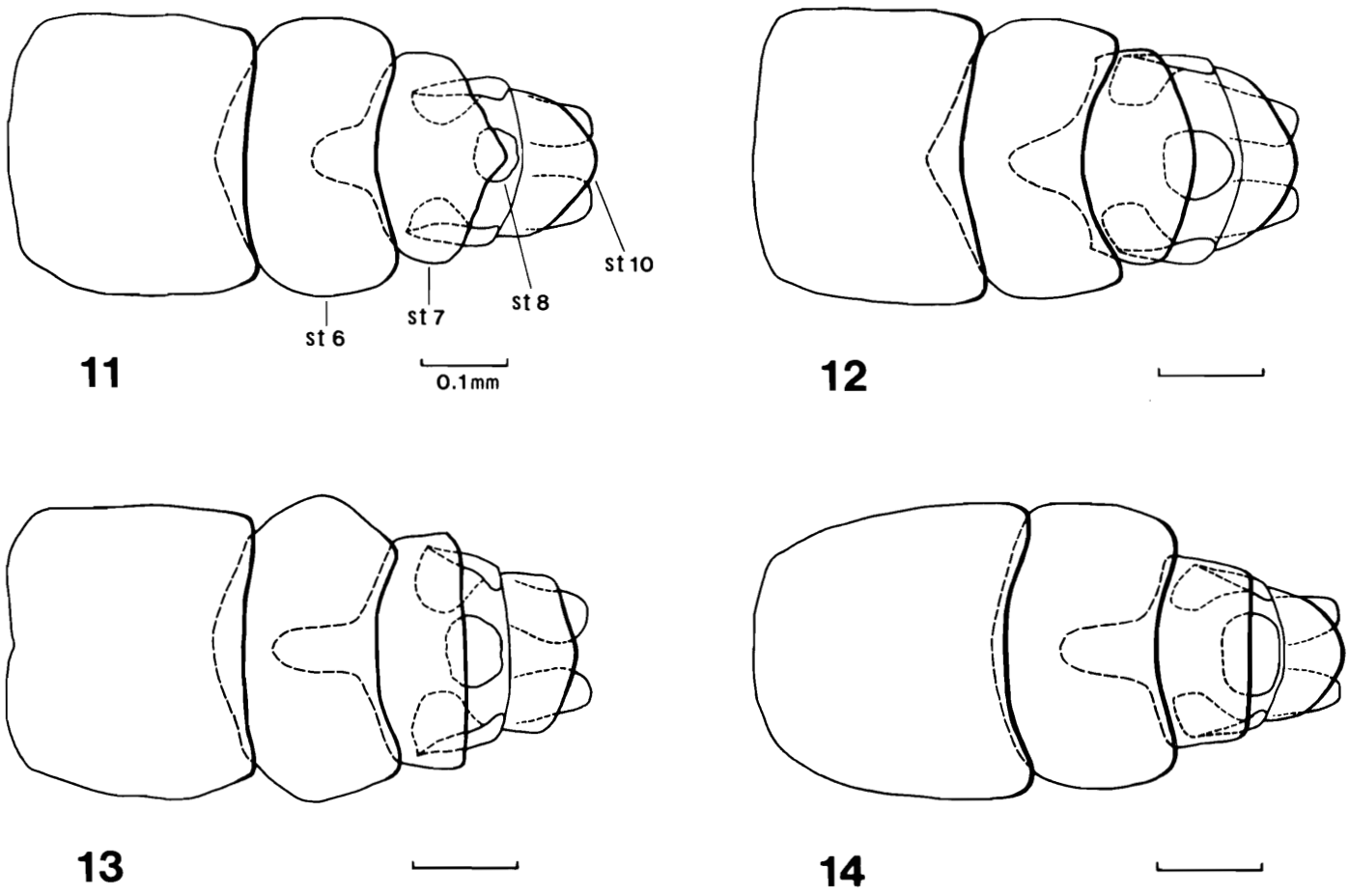
Five species are recognized within *Baeomyia*, four of which are new. All presently known species are confined to western North America. They and the genus are described below, and keys to species are provided. Aspects of phylogeny and zoogeography are considered in the discussion.

Materials and methods

This revision is based on the study of adult specimens of *Baeomyia* species collected by me or borrowed from the following curators and institutions. The following abbreviations are used in the text to designate deposition of specimens: CAS, Department of Entomology, California Academy of Sciences, Golden Gate Park, San Francisco, CA 94118 (P.H. Arnaud, Jr.); CNC, Biosystematics Research Institute, Agriculture Canada, Research Branch, Ottawa, Ontario K1A 0C6 (D. M. Wood); JEOH, Private collection of author; UAT, Department of Entomology, University of Arizona, Tucson, AZ 85721 (F. G. Werner); USNM, Systematic Entomology Laboratory, SEA, United States Department of Agriculture, United States National Museum, Washington, DC 20560 (C. W. Sabrosky).

Adult specimens were studied with a Wild M5 stereoscopic microscope at magnifications up to 100×. Male and female genitalia were prepared according to the method detailed in O'Hara (1983) and examined at 100× with a Leitz SM-LUX compound microscope. All drawings were made with the aid of a camera lucida.

Species descriptions follow closely the format used by O'Hara (1983). Terms are generally those of McAlpine (1981), but where different are explained in O'Hara (1983, pp. 269–270). Because of the small number of specimens available, measurements are given as ranges and followed by sample size (*n*). Measurement of head charac-



FIGS. 11–14. Ventral views of female genitalia of *Baeomyia* species (female of *B. juniperi* unknown). Vestiture omitted. Fig. 11. *Baeomyia hurdi*. Fig. 12. *Baeomyia sonorensis*. Fig. 13. *Baeomyia xanthogaster*. Fig. 14. *Baeomyia juniperi*. *st* 6–10, sterna 6–10.

ters is shown in O'Hara (1983, Fig. 1).

Complete label data are given for holotypes while data accompanying other specimens are abbreviated in a standard manner (i.e., locality, date, collector, and number of male and female specimens). For holotypes, labels are listed in the order they appear on the pin; data from each label are enclosed within quotation marks and label lines are demarcated by a diagonal slash (/).

Baeomyia n.g.

Type-species

Aphantorhapha hurdi Reinhard (1959, p. 161) is here designated type-species of *Baeomyia*.

Derivation of generic name

"*Baeomyia*" is derived from a combination of the Greek words *baios*, meaning small or little, and *myia*, meaning fly. The genus is so named because individuals of *Baeomyia* are the smallest in the Siphonini.

Description

Length, 2.0–3.0 mm.

Male

Head (Figs. 1–5)—FRONT: wider than high, 1.1–1.3 head height; clypeus broad, horseshoe-shaped; parafacial narrow; distance between vibrissae less than half head height (0.3–0.4). PROFILE: subquadrangular, higher than wide; front sloped posteriorly; lower portion of face protruded beyond vibrissal angle; eye bare, size small to medium (0.65–0.83 head height); flagellomere 1 varied in length (0.39–0.56 head height) and shape (Figs. 1–5); aristomeres 1 and 2 elongate and subequal in length (each 2.4–4.6 longer than wide); aristomere 3 short (0.19–0.39 head height), evenly tapered to tip or thickened to near tip; maxillary palpus short and slightly clavate apically; prementum short, length less than 0.5 head height; labella unspecialized and padlike. MACROTRICHIA (setae, setulae and hairs, as defined in O'Hara 1983, p. 270): 4 (rarely 5) medioreclinate frontals, 2nd and 4th stronger than 1st and 3rd; 2 reclinate orbitals, anterior one stronger and in line with frontals; 2 subequal proclinate orbitals; 2 verticals, inner much stronger than outer; 1 well-developed pair of lateroproclinate ocellars; vibrissa well-developed; facial ridge bare except for several setulae and hairs on vibrissal angle; aristomere 3 appearing bare (actually micropubescent); labella with long sensory hairs.

Thorax—MACROTRICHIA: 2–3 (presutural), 3–4 (postsutural) acrostichals; 2–3, 3 dorsocentrals; 1, 3 intra-alars; 3 supra-alars; 2 humerals; 1 posthumeral; 1 presutural; 2 notopleurals; 2 postalars; scutellum with strong basal, lateral and subapical, weak discal and apical (subapical pair and discal pair each crossed); prosternum bare or sparsely setulose; 3 katepisternals (sternopleurals), posterodorsal very strong, other 2 weak with lower seta in most specimens weaker than anterodorsal, in a few specimens subequal to anterodorsal. Legs with typical, though weak, siphonine setation (as described for *Siphona* in O'Hara 1983, p. 276), except for following differ-

ences: mid femur with 1 or 2 anterior setae at midpoint (in contrast to 2 in almost all other siphonines) and mid tibia without anterodorsal seta near midpoint (1 well-developed seta in virtually all other siphonines). ACROPOD: claws and pulvilli small. WING (Fig. 10): apices of R_{4+5} and M closely approximated at wing margin, slightly anterior to wing tip; anal vein reaching wing margin as fold; crossvein *dm-cu* far removed from wing margin (distal length of CuA_1:proximal length of CuA_1=0.64−1.04, average 0.85, n=34); R_1 dorsally bare or with 1 setula apically on bend; R_{4+5} dorsally with 3−6 setulae between bifurcation of R_{2+3} and R_{4+5} and crossvein *r-m*; 1 setula ventrally at bifurcation of R_{2+3} and R_{4+5}.

Abdomen—Relatively short and ovoid; middorsal depression extended to middle of T_{1+2}. MACROTRICHIA: T_{1+2} without median or lateral marginals; T_3 with 1 pair each lateral and marginal setae, varied from weakly to well developed; T_4 and T_5 each with 3 pair weakly to well-developed marginals.

Genitalia (Figs. 6−9)—Features generally unmodified. Sternum 5 slightly wider than long; U-shaped along posterior margin with rounded indentation medially; similar in form to *Siphona* species (see Fig. 10 in O'Hara 1983, p. 348). Cerci varied from short to almost length of surstylus; in profile sharply bent at midpoint to smoothly curved. Pregonite (gonite of McAlpine 1981) elongate, pointed apically. Distiphallus slightly bent downward from angle of basiphallus, somewhat truncate apically and with only minor variation interspecifically.

Female

As described for male except in *B. antennata*, in which flagellomere 1 is smaller than in male.

Genitalia (Figs. 11−14)—Very similar to unmodified form of most other *Siphona* group taxa. Terga 6 and 7, segment 9 and tergum 10 absent. Posterior portion of sternum 7 not raised or keeled as in some *Siphona* group taxa (e.g., most species of *Ceranthia* s. str.).

Keys to adults of *Baeomyia* species

Baeomyia species do not differ substantially interspecifically, making construction of a reliable and easy to use key very difficult. I have partially alleviated this problem by keying male and female specimens separately, but still have had to rely upon genital characters and slight differences in head measurements to key most species. Because of the few specimens of *Baeomyia* available, measurements given in the keys must be accepted with caution, though they are hopefully representative. Similarly, distributions mapped in Fig. 15 simply show the known range of each species, and actual ranges may be much more extensive. To offset these limitations and to aid in identifications, each species description is accompanied by a diagnosis section wherein characters considered of highest taxonomic value are reviewed, and these sections should be consulted for confirmation of a species determination should difficulty arise through use of the keys.

Key to males

1. Length of flagellomere 1 less than 0.45 head height (as in Figs. 3, 5) 2
1′. Length of flagellomere 1 greater than 0.45 head height (as in Figs. 1, 2) 4
(*B. juniperi*, known from a single specimen, keys through both halves of this couplet because its flagellomere 1 is probably medium sized)

2. Cerci in profile sharply bent at midpoint (Fig. 6); eye height less than 0.76 head height (Fig. 5); known from southeastern California (Fig. 15) ..... *B. hurdi* (Reinhard)
2′. Cerci in profile smoothly curved at midpoint (Figs. 7, 9); eye height greater than 0.76 head height (Figs. 3, 4) 3

3. Cerci short relative to length of surstylus (Fig. 7); known from southeastern Arizona (Fig. 15) ..... *B. sonorensis* n. sp.
3′. Cerci of average length relative to length of surstylus (Fig. 9); known from southern British Columbia (Fig. 15) ..... *B. juniperi* n. sp.

4. Abdomen predominantly yellow in ground colour; known from southern British Columbia (Fig. 15) .... *B. xanthogaster* n. sp.
4′. Abdominal terga 3 to 5 predominantly reddish brown in ground colour 5

5. Eye height less than 0.75 head height (Fig. 2); known from southeastern Arizona (Fig. 15) ..... *B. antennata* n. sp.
5′. Eye height greater than 0.75 head height (Fig. 4); known from southern British Columbia (Fig. 15) ..... *B. juniperi* n. sp.

Key to females

The female of *B. juniperi* is unknown.

1. Eye height less than 0.7 head height; width of sternum 8 more than half width of segment 8 (Fig. 14); known from southeastern Arizona (Fig. 15) ..... *B. antennata* n. sp.
1′. Eye height greater than 0.7 head height; width of sternum 8 less than half width of segment 8 (Figs. 11−13) 2

2. Length of flagellomere 1 greater than 0.45 head height; abdomen predominantly yellow in ground colour; sternum 7 transverse posteriorly, sternum 8 medium-sized (Fig. 13); known from southern British Columbia (Fig. 15) ..... *B. xanthogaster* n. sp.
2′. Length of flagellomere 1 less than 0.45 head height; abdomen varied in ground colour from yellow to reddish black; shape of sternum 7 varied posteriorly, sternum 8 small to medium-sized (Figs. 11, 12); known from deserts of American Southwest 3

3. Sternum 7 distinctly pointed posteriorly, sternum 8 small (Fig. 11); known from southeastern California (Fig. 15) ..... *B. hurdi* (Reinhard)
3′. Sternum 7 evenly rounded posteriorly, sternum 8 medium-sized (Fig. 12); known from southeastern Arizona (Fig. 15) ..... *B. sonorensis* n. sp.

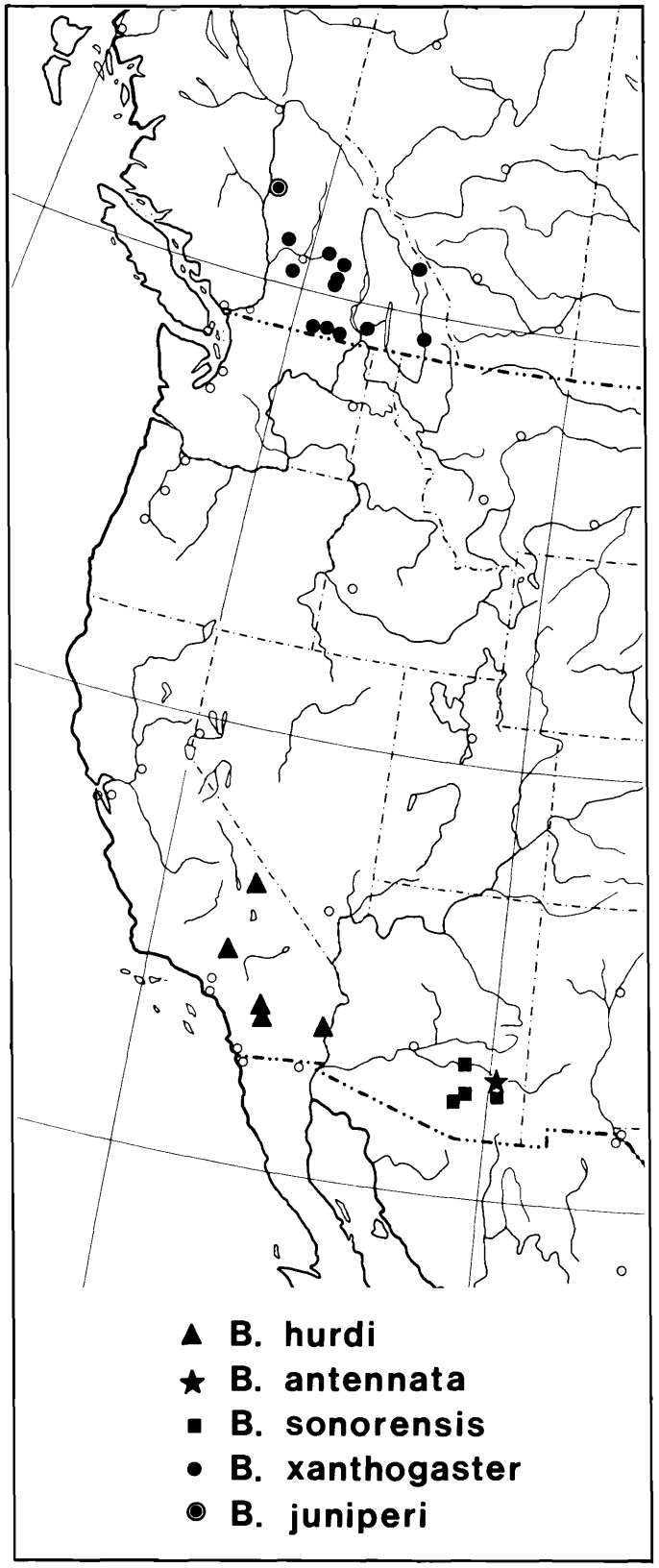


FIG. 15. Known distribution of *Baeomyia* species.

Baeomyia hurdi (Reinhard) n. comb.

Aphantorhapha hurdi Reinhard, 1959, p. 161; Sabrosky and Arnaud 1965, p. 1062.

Reinhard described *B. hurdi* in *Aphantorhapha* without commenting upon its placement there nor comparing it to other members of the genus. I examined the holotype of the type-species of *Aphantorhapha* Townsend, *A. arizonica* Townsend (1919), and was unable to recognize any shared derived character states between it and *B. hurdi* specimens beyond those already mentioned for the *Siphona* group in general. I infer from this that similarities between the two species are of a primitive nature and not indicative of a sister group relationship. There are, however, synapomorphies which identify *B. hurdi* and related species as members of a separate, highly derived, natural taxon. For reasons discussed in the introduction, this natural taxon is given generic rank.

Type material examined

Holotype, male, labelled "Surprise Cyn. Inyo/Co., Panamint Mts./Calif. IV-24-57"; "Eriogonum/inflatum"; "P. D. Hurd/Collector"; "[red label] Holotype/A./hurdi/Reinhard"; "Aphantorhapha/hurdi/Rnh./R [Reinhard determination label, handwritten]" (CAS, type No. 6546). Paratypes, 1 male, 1 female, same data as holotype except male collected by G. I. Stage and female by P. D. Hurd (CNC).

Diagnosis

Abdomen primarily reddish brown to reddish black in ground colour. Eye small, flagellomere 1 short and aristomere 1 shortest in genus (Fig. 5). Male genitalia unique in that cerci are sharply bent at midpoint and surstylus tightly curved near apex (Fig. 6). Sternum 7 of female genitalia distinctly pointed posteriorly and with short apodeme anteriorly; sternum 8 small (Fig. 11).

Description

Length, 2.3–2.6 mm (n = 7).

Male

Head (Fig. 5)—Eye small, 0.70–0.75 head height (n = 4); flagellomere 1 short (0.40–0.43 head height, n = 4) and relatively slender; aristomere 3 thickened to near tip, shorter than in other members of the genus (0.19–0.21 head height, n = 4). Scape, pedicel and portion of inner flagellomere 1 testaceous, rest of antenna reddish brown.

Thorax—Dorsum reddish black in ground colour except for light patch on apex of scutellum; surface with silver pruinosity. Legs primarily testaceous to reddish brown, with femora yellow basally.

Abdomen— Ground colour reddish brown to reddish black except for narrow, light yellow band along posterior margin of T_{1+2}, T_3 and T_4 (no median vitta); surface with moderate to heavy silver pruinosity.

Genitalia (Fig. 6)—Two examined. Reddish brown. Cerci of average length; in profile sharply bent at midpoint; slender along apical half and hooked at apex. Surstylus extended slightly beyond tip of cerci; tightly curved posteriorly near apex.

Female

As described for male, with following additions and differences.

Head—Eye, flagellomere 1 and aristomere 3 subequal to those of male, with the following ranges for each: eye 0.72–0.75 head height, first flagellomere 0.39–0.42 head height, and third aristomere 0.21–0.23 head height (n = 3).

Genitalia (Fig. 11)—Two examined. Sternum 7 with short anterior apodeme; posterior margin distinctly pointed. Sternum 8 smallest of examined species.

Geographical distribution

Recorded from several localities in eastern California (Fig. 15), where it is apparently restricted to the Lower Sonoran life zone. According to present data, *B. hurdi* is widely allopatric to *B. xanthogaster* and *B. juniperi* but only narrowly separated from the ranges of *B. antennata* and *B. sonorensis*.

Plant records

Holotype and female paratype from the Panamint Mountains, California, collected from *Eriogonum inflatum* Torr. and Frém. (Polygonaceae). A female specimen from Palm Springs was collected from *Chilopsis* sp. (Bignoniaceae).

Other material examined

One male, four females. U.S.A: *California*: Kern Co., Kramer Hills, Boron, 10.V.1955, W. R. M. Mason, 1 male (CNC); Riverside Co., Blythe, 1.V.1955, W. R. Richards, 1 female (CNC); Riverside Co., Palm Springs, 3.V.1955, W. R. M. Mason, 1 female (CNC); Riverside Co., Agua Caliente Indian Res., Palm Cyn., 24.II.1970, P. H. Arnaud, Jr., 2 females (CAS).

Baeomyia antennata n. sp.

Holotype

Male, labelled "ARIZONA, Graham Co./0.9 mi. along road/to Marijilda canyon/from Hwy. 666 Alt. 3860' 3.VIII.1965"; "COLLECTOR/H. B. LEECH" (CAS; genitalia and right half of abdominal tergum 5 missing).

Allotype

Female, same data as holotype (CAS).

Derivation of specific epithet

Baeomyia antennata is so named because males possess the largest antenna (specifically flagellomere 1) of *Baeomyia* species, and is the only species in the genus with substantial sexual dimorphism in antennal size.

Diagnosis

Abdomen primarily reddish brown in ground colour. Eye small and flagellomere 1 in male long and very broad (largest in genus; Fig. 2). Male genitalia unavailable for study. Sternum 7 of female genitalia transverse posteriorly, with long apodeme anteriorly; sternum 8 largest known in genus (Fig. 14).

Description

Length, 2.1–2.6 mm (n = 4).

Male

Head (Fig. 2)—Eye small (0.69 head height, n = 1); flagellomere 1 long (0.56 head height, n = 1) and broad apically; aristomere 3 evenly tapered to tip, of average length for genus (0.26 head height, n = 1). Scape, pedicel and portion of inner flagellomere 1 yellow, rest of antenna testaceous to reddish brown.

Thorax—Dorsum reddish black in ground colour except for light patch on apex of scutellum; surface with silver pruinosity. Femora and tibiae yellow, tarsi testaceous.

Abdomen—Ground colour primarily reddish brown with yellow patches on extreme lateral edges of T_{1+2} and anterolateral edges of T_3, and narrow yellow band posteriorly on T_{1+2}, T_3 and T_4; surface with moderate silver pruinosity.

Genitalia—Not examined (single male missing genitalia and right half of T_5).

Female

As described for male, with following additions and differences.

Head—Eye and aristomere 3 subequal to those of male, with following ranges for each: eye 0.65–0.67 head height and third aristomere 0.24–0.29 head height (n = 3). Flagellomere 1 distinctly shorter than in male, 0.41–0.43 head height (n = 3).

Genitalia (Fig. 14)—One examined. Sternum 7 with long anterior apodeme; posterior margin transverse. Sternum 8 largest of examined species.

Geographical distribution

Known only from the type series, collected in the desert east of the Pinaleno Mountains in Arizona (in transition region between Sonoran and Chihuahuan deserts) (Fig. 15). Sympatric with *B. sonorensis*, as discussed under that species.

Paratypes

Two females, same data as holotype except that 1 female carries note: "e. foot Pinaleno Mts."

Baeomyia sonorensis n. sp.

Holotype

Male, labelled "USA Ariz. Graham Co./2.4 km. w. on Hwy. 366/from Hwy. 666 1160 m./7–9.VIII.1983/J. E. O'Hara" (JEOH, on indefinite loan to the CNC). Genitalia in microvial on pin below specimen.

Allotype

Female, same data as holotype (JEOH, on indefinite loan to the CNC).

Derivation of specific epithet

Of the three species of *Baeomyia* inhabiting arid regions of the American Southwest, only this species is recorded from (though not restricted to) the Sonoran desert. It is because of this distribution that *B. sonorensis* is so named.

Diagnosis

Abdomen varied in colour. Eye medium to medium-large and flagellomere 1 short (Fig. 3). Male genitalia with smallest known cerci in genus (Fig. 7). Sternum 7 of female genitalia slightly convex posteriorly, with well-developed apodeme anteriorly; sternum 8 medium-sized (Fig. 12).

Description

Length, 2.0–2.3 mm (n = 11).

Male

Head (Fig. 3)—Eye size medium to medium-large, 0.77–0.83 head height (n = 11); flagellomere 1 short (0.38–0.43 head height, n = 10) and relatively slender; aristomere 3 evenly tapered to tip, of average length for genus (0.22–0.27 head height, n = 11). Scape, pedicel and portion of inner flagellomere 1 yellow to testaceous, rest of antenna reddish brown.

Thorax—Dorsum reddish black in ground colour except for light patch on apex of scutellum; surface with silver pruinosity. Tarsi, posterior surface of fore femur and distal portion of mid and hind femora reddish brown, rest of legs yellow to testaceous.

Abdomen—Colour varied from dark condition described for *B. hurdi*, to lighter abdomen in which ground colour is primarily reddish black but with yellow laterally on T_{1+2} and T_3 (median vitta faintly visible on specimens of latter colouration).

Genitalia (Fig. 7)—Four examined. Reddish brown. Cerci

smallest of examined species; smoothly curved in profile. Surstylus extended well beyond tip of cerci; tightly curved posteriorly near apex.

Female

As described for male, with following additions and differences.

Head—Eye, flagellomere 1 and aristomere 3 subequal to those of male, with following ranges for each: eye 0.80–0.83 head height, first flagellomere 0.39–0.41 head height, and third aristomere 0.24–0.25 head height (n = 3).

Abdomen—Colour darker than in male, and similar to that described for male of *B. hurdi*.

Genitalia (Fig. 12)—One examined. Sternum 7 with well-developed anterior apodeme, though slightly shorter than in *B. xanthogaster* and *B. antennata* in specimen examined; posterior margin slightly convex. Sternum 8 medium-sized.

Geographical distribution

All specimens of the type series were collected in southeastern Arizona in the Sonoran desert and in transition region between Sonoran and Chihuahuan deserts (Fig. 15). *B. sonorensis* is sympatric with *B. antennata* (their type localities are within 1 km of one another and in the same habitat), apparently allopatric to *B. hurdi* and far removed from ranges of *B. xanthogaster* and *B. juniperi*.

Plant records

Male specimen from near Christmas, Arizona, was collected by malaise trap near *Condalia* sp. (Rhamnaceae). Specimens collected by me in the type locality were caught either by sweeping mesquite (*Prosopis* sp., Mimosoideae) or by malaise trap beside mesquite. While collecting in the above locality I noted that adults were active throughout the day, unlike some other siphonines in the American Southwest which are basically crepuscular.

Paratypes

Ten males, two females. U.S.A.: *Arizona*: Pima Co., Tucson, 26–8.V.1979, F. G. Werner, 1 male (flight trap) (UAT); Pima Co., Santa Catalina Mts., Sabino Cyn., 11.V.1963, J. Burger, 1 male (ultra-violet light) (CAS); Pinal Co., Gila R., 3 mi SW Christmas, 5.VI.1962, F. Werner, 1 male (CNC); Graham Co., 2.4 km W on Hwy. 366 from Hwy. 666, 7–9.VIII.1983, J. E. O'Hara, 5 males, 1 female (JEOH); same location, 12–13.VIII.1983, J. E. O'Hara, 2 males, 1 female (JEOH).

Baeomyia xanthogaster n.sp.

Holotype

Male, labelled "No. 50.2985B/Date 28.IV/F.I.S. [Forest Insect Survey] 1951"; "S. [Semiothisa] granitata [host]/Vermillion [a mispelling of Vermilion, in Kootenay National Park]/B.C. [British Columbia]" (CNC). A puparium is pinned below specimen.

Allotype

Female, labelled "Bridesville B.C. [British Columbia]/27.VII.1949./F.I.S."; "BC48-3753"; "Host/S. [Semiothisa]/granitata." (CNC).

Derivation of specific epithet

The distinctive yellow abdomen of this species is alluded to by the Greek specific epithet, *xanthogaster*.

Diagnosis

Abdomen primarily yellow to testaceous in ground and surface colour. Eye small and flagellomere 1 long and broad (Fig. 1). Male genitalia yellow (reddish brown in other examined species); cerci smoothly curved and of average length; surstylus slightly thickened (Fig. 8). Sternum 7 of female genitalia transverse posteriorly, with long apodeme anteriorly; sternum 8 medium-sized (Fig. 13).

Description

Length, 2.5–2.9 mm (n = 15).

Male

Head (Fig. 1)—Eye small, 0.70–0.75 head height (n = 10); flagellomere 1 long (0.49–0.55 head height, n = 10) and broad; aristomere 3 thinly and evenly tapered to tip, slightly longer than in other members of genus (0.31–0.39 head height, n = 10). Antenna primarily yellow to slightly testaceous, tinged with reddish brown in most specimens.

Thorax—Dorsum primarily reddish brown to reddish black in ground colour, lighter laterally and on portions of scutellum; surface with silver pruinosity, lightly tinged with brown. Femora and tibiae yellow, tarsi testaceous.

Abdomen—Ground colour yellow to testaceous, in most specimens with a narrow reddish brown vitta medially on T_{1+2} to T_5; narrow, light yellow band along posterior margin of T_{1+2}, T_3, and T_4; surface with moderate silver pruinosity.

Genitalia (Fig. 8)—Three examined. Yellow. Cerci of average length; in profile slightly bent at midpoint to smoothly curved (latter illustrated). Surstylus extended slightly beyond tip of cerci; slightly thickened along length and only marginally curved posteriorly at apex.

Female

As described for male, with following additions and differences.

Head—Eye, flagellomere 1 and aristomere 3 subequal to those of male, with following ranges for each: eye 0.72–0.73 head height, first flagellomere 0.49–0.52 head height, and third aristomere 0.34–0.38 head height (n = 5).

Genitalia (Fig. 13)—Two examined. Sternum 7 with long anterior apodeme; posterior margin transverse. Sternum 8 medium-sized.

Geographical distribution

Since this species is only known from reared specimens from southern British Columbia, it is likely that the actual range of this species is more extensive than here documented (Fig. 15). *B. juniperi*, itself inadequately collected, is probably sympatric with *B. xanthogaster* but might be isolated from it on a microhabitat level based upon available plant and host records. Both *B. xanthogaster* and *B. juniperi* are sufficiently distant from the known ranges of *B. hurdi*, *B. antennata*, and *B. sonorensis* to be regarded as widely allopatric to them.

Host and plant records

Forest Insect Survey records that match code numbers accompanying pinned specimens of *B. xanthogaster* were available for 12 of the 16 collecting localities. Host larvae were in all instances collected by beating conifers, predominantly *Pseudotsuga menziesii* (Mirb.) Franco, but were found twice on *Larix* sp. and once on *Pinus contorta* Dougl. (all three trees in the Pinaceae). Collecting took place at elevations from 380 to 970 m on immature trees 3–15 m in height.

Host records, which are given below with paratype data, are evidently in error in citing *Semiothisa granitata* (Guenée) as a host of *B. xanthogaster*. *Semiothisa granitata* is now considered a strictly eastern species (Ferguson 1974), and it is more

probable that the actual species involved is *S. signaria dispuncta* (Walker) or *S. unipunctaria perplexa* (McDunnough). These are the only species belonging to the same species group as *S. granitata* (i.e., the *S. signaria* group) which inhabit southern British Columbia and feed upon Douglas fir. I have nevertheless left the F.I.S. records below stand as recorded so that no further confusion will be introduced into the matter should the nomenclature of *Semiothisa* species change in the future.

Several specimens of *B. xanthogaster* were recorded from *Semiothisa sexmaculata* (Packard) (also a member of the *S. signaria* group), collected from larch. These identifications of the host species are probably accurate, as the plant association and collection localities are consistent with those known for *S. sexmaculata* (Ferguson 1974).

Paratypes

Thirteen males, 11 females. All specimens listed below were laboratory reared from geometrid larvae by the Forest Insect Survey, and are now housed in the CNC, Ottawa. Dates given below are dates of emergence of adults and are not necessarily coincident with adult emergence under natural conditions. The Forest Insect Survey (F.I.S.) code number and recorded host species are given below for each paratype along with the usual locality and date data (see host record section above concerning misidentification of host species); collector name was lacking from all labels. Except where noted, a puparium is associated with each specimen. CANADA: *British Columbia*: 50.2894A, Bull River, 30.IV.1951, ex *S. granitata*, 1 male; 50.2836B, Larkin, 21.II.1951, ex *S. granitata*, 1 male; same locality, 24.III.1951, ex *S. granitata*, 2 females; BC51-2645A, Larkin, 31.III.1952, ex *S. granitata*, 2 females (one without associated puparium); BC48-3753, Bridesville, 4.VII.1949, ex *S. granitata*, 1 male (without puparium); same locality, 20.VII.1949, ex *S. granitata*, 1 male; same locality, 27.VII.1949, ex *S. granitata*, 1 male (without puparium); 50.2878, Wardner, 19.III.1951, ex *S. granitata*, 1 male; BC45-669A, Squilax, 29.III.1946, ex *Semiothisa* sp., 1 male; same locality, 1.IV.1946, ex *Semiothisa* sp., 1 male; BC49-3019, Rock Creek, 29.III.1950, ex *S. sexmaculata*, 1 male; 50.2985B, Vermilion [as Vermillion], 28.IV.1951, ex *S. granitata*, 1 male; same locality, 30.IV.1951, ex *S. granitata*, 1 female; 50.3311A, Snowball Creek, 16.IV.1951, ex geometrid larva, 1 male; same locality, 23.IV.1951, ex geometrid larva, 1 female; 50.2780, Mara, 12.III.1951, ex *S. sexmaculata*, 1 male; 50.2842, Lavington Gulch, 28.II.1951, ex *S. granitata*, 1 male; BC49-2075B, Westbridge, 20.III.1950, ex *S. granitata*, 1 female (without puparium); BC48-4032, Vernon, 20.VII.1949, ex *S. granitata*, 1 female; BC49-2924B, Stump Lake, 9.III.1950, ex *S. granitata*, 1 female; BC49-2938A, Bonnington Falls, 27.III.1950, ex *S. granitata*, 1 female; BC51-2777, Red Lake, 13.IV.1952, ex *S. granitata*, 1 female.

Baeomyia juniperi n. sp.

Holotype

Male, labelled "Williams/Lake, B.C. [British Columbia]/ Em. 21-V-58/F.I.S. [Forest Insect Survey]; "57-7276-03/Ex. Semiothisa/triviata"; "63-145/192" (CNC). Puparium pinned below specimen, and genitalia in microvial on pin below puparium.

Derivation of specific epithet

The single known specimen of this species was reared from a geometrid larva collected on *Juniperus scopulorum*, and it is in recognition of this plant association that *B. juniperi* is named.

Diagnosis

Abdomen primarily reddish brown in ground colour. Eye and flagellomere 1 medium in size (Fig. 4). Male genitalia with cerci smoothly curved and of average length; surstylus average (Fig. 9). Female of species unknown.

Description

Length of holotype, 2.8 mm.

Male

Head (Fig. 4)—Eye size medium (0.79 head height); flagellomere 1 intermediate in length (0.45 head height) and breadth between large flagellomere 1 of *B. xanthogaster* and *B. antennata* and small flagellomere 1 of *B. hurdi* and *B. sonorensis*; aristomere 3 evenly tapered to tip, average length for genus (0.26 head height). Scape, pedicel and portion of inner flagellomere 1 yellow to testaceous, rest of antenna reddish brown.

Thorax—Colour of dorsum and legs as described for *B. sonorensis*.

Abdomen—Reddish brown in ground colour except for narrow, light yellow band along posterior margin of T_{1+2}, T_3 and T_4 (no median vitta); surface with moderate to heavy silver pruinosity.

Genitalia (Fig. 9)—One examined. Reddish brown. Cerci of average length; in profile smoothly curved. Surstylus extended slightly beyond tip of cerci; slightly curved posteriorly at apex.

Female

Not known.

Geographical distribution

Known only from the holotype, which was collected at the south end of Williams Lake, B.C., at an elevation of about 610 m (Fig. 15). Also see notes under *B. xanthogaster*.

Host and plant records

Forest Insect Survey records indicate that the holotype was reared from a larva of *Semiothisa trivata* (Barnes and McDunnough) (Geometridae), which was collected on 15.VIII.1957 while beating *Juniperus scopulorum* Sarg. (Cupressaceae). *Semiothisa trivata* belongs to a different species group from the one containing the known hosts of *B. xanthogaster*.

Note about taxonomic status

Baeomyia juniperi is described from a single specimen collected adjacent to the known range of *B. xanthogaster* and does not differ significantly from that species in characters of the male genitalia. Nevertheless, I consider the differences in eye height, length of flagellomere 1, and especially abdominal colour a reliable indication of its separate identity. Because specimens of *B. xanthogaster* reared from different hosts and collected from numerous localities form a homogeneous assemblage, it is unlikely that the differences between them and the single specimen of *B. juniperi* are attributable simply to host or geographic (clinal) factors. It is upon this basis that I have chosen to describe *B. juniperi* as a valid species.

Notes about relationships and geographic distribution

The recognition of *Baeomyia* results from a continuing study on the systematics of the Siphonini. The genus, as inferred from examination of an extensive compilation of Old and New World material, seems confined to the New World and perhaps to western North America in particular. However, the meagre

number of *Baeomyia* specimens collected to date reflects the elusive nature of these tiny siphonines, and therefore raises the possibility of future discovery of specimens beyond the region from which they are presently known. Similarly, the absence of evidence (synapomorphies) about the sister group of *Baeomyia* (knowing only that it is a member of the cosmopolitan *Siphona* group, as discussed in the introduction) precludes any statement about region of origin of the taxon.

Little more is known about relationships within *Baeomyia* that is known for the genus, because synapomorphies have not been recognized upon which to reconstruct the phylogeny of *Baeomyia* species. Differences among species are generally minor, or restricted to such characteristics as eye and flagellomere 1 size and colouration which are among the most varied (and hence phylogenetically unreliable) within the Siphonini. I will therefore limit my comments about species relationships to several observations and inferences.

As mentioned earlier, *B. xanthogaster* and *B. juniperi* are morphologically similar in structure of male genitalia, though their external differences are comparable to those between other species. This, their habitat similarity, and proximity to one another regionally suggests a sister species relationship.

No such conclusions can be drawn for the southern species. *Baeomyia hurdi* has diverged most from other *Baeomyia* species, differing particularly in shape of male cerci and posterior margin of female sternum 7. Males of *B. antennata* and *B. sonorensis* differ substantially externally, but since the male genitalia of the former are unknown the relationship between these two species is indeterminable.

The most intriguing aspect of *Baeomyia* species in western North America is the disjunction between northern and southern species. Whether this disjunction is as wide as documented by present data or is an artifact of collecting bias, the fact remains that habitat differences are striking. From low desert to temperate forest, mesquite to Douglas fir, the profound contrast in habitats suggest concomitant differences in way of life, yet such are not accompanied outwardly by marked structural differences among *Baeomyia* species. Perhaps one can infer from this that speciation (?vicariant) events within the taxon were relatively recent (for environmental factors seem to have changed species little), yet the genus itself has diverged substantially from other *Siphona* group taxa and is therefore probably significantly older. It is still premature, in the absence of corroborative evidence, to speculate about which habitat (desert, temperate forest, or other) ancestral *Baeomyia* evolved in, or what events in earth history account for the present distribution pattern and ecological adaptations exhibited by *Baeomyia* species.

The New World siphonine fauna is still inadequately known, with numerous undescribed taxa. Perhaps as work on the tribe progresses and new character systems are studied the phylogenetic position of *Baeomyia* will become clear, permitting a zoogeographic analysis of the taxon and speculations about its habitat and place of origin.

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