

A NEW SPECIES AND CORRECTIONS IN THE *ATRICHOPOGON*
MIDGES OF THE SUBGENUS *MELOEHELEA* ATTACKING BLISTER
BEETLES (DIPTERA: CERATOPOGONIDAE)

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Abstract.—A revised diagnosis is given of the subgenus *Melochelea* Wirth of the genus *Atrichopogon* Kieffer, a group of biting midges which habitually suck blood from Meloidae and related beetles. A key is presented for the seven known species. *A. downesi* n.sp. is described from eastern North America. Diagnostic specific characters are described and figured, new distribution records are listed, and several previous misidentifications are noted.

Older taxonomists never fail to be amazed by how much their perception of characters and concepts of species may change with the passage of time and the repetition of examining new and fresh specimens of problem species. In 1956 I studied all the biting midge species known to suck blood from blister beetles (Coleoptera: Meloidae) and some other closely related beetles, for which I erected the subgenus *Melochelea* in the genus *Atrichopogon* Kieffer. I redescribed the Palaearctic species *A. meloesugans* (Kieffer) and *oedemerarum* Storå, gave North American records for the latter species, and described two new North American species, *A. epicautae* from Arizona and *A. farri* from Massachusetts. In 1964 I described *A. lindneri*, which attacks blister beetles in East Africa.

Correspondance and exchange of specimens with European workers and the accumulation of many additional North American specimens have since revealed misidentifications and other taxonomic problems that must be corrected. In 1956 I overlooked the European species *A. lucorum* (Meigen), which I did not recognize, and which had never been recorded from blister beetles; but I have since discovered that the specimens from Finland that I used to characterize *A. oedemerarum* in 1956 are *A. lucorum*. A new key is presented to the known species in which a selection of characters is used that I hope will provide a much more reliable separation of species.

Görnitz (1937) reported experiments with the drug cantharidin obtained

from meloid beetles. He found that *Atrichopogon brunnipes* (Meigen) was regularly attracted to exposed plates containing cantharidin powder. This species is a member of the section of the subgenus *Atrichopogon* with hairy eyes and has never been observed actually to feed on blister beetles. Fey (1954) reported studies similar to those of Görnitz in which *A. brunnipes* was attracted to cantharidin. But in 1959 Neindorff reported cantharidin studies in Berlin in which the identity of the *Atrichopogon* species was found to be *A. oedemerarum*. Neindorff referred to the *Atrichopogon* species taken by Fey (1954) as *A. oedemerarum* rather than *brunnipes*. Mayer (1962) reported further studies on the attraction of *Atrichopogon* to cantharidin and determined his collections as *A. oedemerarum*. But Mayer did state (p. 270): "Die Reaktion ist jedoch nicht artspezifisch, da auch die Männchen anderer *Atrichopogon* (*Kempia*) Arten, wenn auch nur in geringer Zahl, in den Köderfallen gefangen wurden."

This statement of Mayer's assumes importance in two contexts: 1) Dr. R. B. Selander of the University of Illinois in 1961 sent me for determination some *Atrichopogon* that he observed were attracted to caged live meloid beetles, *Epicauta fabricii*, in Cairo, Illinois. These midges were not *Meloehelea* as would be suspected, but were *Atrichopogon websteri* (Coquillett), a species closely related to the European *A. brunnipes*. 2) With this established, we must now review the earlier work of Görnitz and Fey, take it in context of Mayer's statement quoted above, and consider the possibility that *A. brunnipes* may have been present in some of the earlier cantharidin tests. This is another illustration of the necessity for accurate taxonomic knowledge and careful identifications when reporting the results of physiological experiments.

I have been greatly aided in my revised concepts by the 1961 paper by H. Remm of Tartu State University, Estonian SSR, on the *Atrichopogon* of European USSR, and by very generous and helpful comments in correspondence and by exchange of specimens with Dr. Remm. J. Antony Downes of Agriculture Canada, Ottawa, very generously turned over to me extensive collections he made in Canada (Canadian National Collection, abbreviated CNC in this paper), as well as detailed measurements, notes, and analyses of this material by Leo Forster and himself. I wish especially to thank Dr. Downes and Mr. Forster for this unselfish assistance. For the loan or gift of specimens and/or advice and suggestions I am also grateful to the following: Mohammed Abdullah, Nottingham University, England; Paul Freeman, British Museum (Nat. Hist.), London England; E. C. Pelham-Clinton, Royal Scottish Museum, Edinburgh, Scotland; and Richard B. Selander, University of Illinois, Urbana. I also wish to thank Niphan C. Ratanaworabhan of the Applied Scientific Research Corporation, Bangkok, Thailand, for the drawings of *Atrichopogon meloesugans*. For the other illustrations I am grateful to Molly Ryan.

KEY TO SUBGENERA OF *ATRICHOPOGON*

1. Two spermathecae present; wing with abundant macrotrichia; eyes bare 2
- One spermatheca present; wing macrotrichia absent to moderately abundant; eyes bare or pubescent 3
2. Proboscis elongate, as long as eye height; 3rd palpal segment with sensory pit located near apex; tarsal ratio more than 2.9
..... *rostratus* group of subgenus *Atrichopogon* Kieffer
- Proboscis short, shorter than 0.8 eye height; 3rd palpal segment with sensory pit located at or near midlength; tarsal ratio 2.3–2.7
..... *Melochelea* Wirth
3. Female abdomen with conspicuous armature on sterna 6 and/or 7; wing macrotrichia absent or a few at wing tip; eyes pubescent; male basistyles slender *Psilokempia* Enderlein
- Female abdomen without ventral armature; wing macrotrichia present or absent; eyes bare or pubescent; male basistyles stout 4
4. Fore and mid tibiae each with a single flexor series of short sharp spines along entire length, male dististyle with strong distal processes; large slender shining species usually with conspicuous blackish markings; costa long, costal ratio 0.84 in female
..... *Dolichohelea* Edwards
- Fore and mid tibiae without short flexor spines; male dististyle without distal processes; usually smaller duller species without conspicuous blackish markings; costa short, costal ratio usually about 0.70 in female *Atrichopogon* Kieffer (part)

Subgenus *Melochelea* Wirth

Atrichopogon subgenus *Melochelea* Wirth, 1956: 16. Type-species, *Atrichopogon meloesugans* Kieffer, by original designation.

Diagnosis.—Species attacking meloid or oedemerid beetles; female usually with upcurved proboscis (Fig. 1d). Eyes bare. Female antenna (Fig. 1a) with proximal flagellar segments short and usually disciform, last 5 segments elongated, antennal ratio (segments 11–15/3–10) 1.69–2.50. Palpal ratio (3rd segment length/breadth) 2.8–4.2; palpal pit usually deep, near middle of 3rd segment (Fig. 1b). Proboscis short to moderately elongate, stout to slightly tapering; mandible (Fig. 1f) with 17–27 teeth, the proximal teeth slightly to greatly enlarged, a few distal teeth minute to small. Mesonotum with distinct light-colored areas or fenestrae, just ahead of each end of scutellum, extending forward as narrower slightly impressed lines to anterior margin of mesonotum; scutellum with 4 long bristles. Wing (Fig. 1c) with abundant macrotrichia in female, reduced or bare in male; costa extending to 0.68–0.74 of wing length (costal ratio). Hind basitarsus 2.3–1.7 times as long as

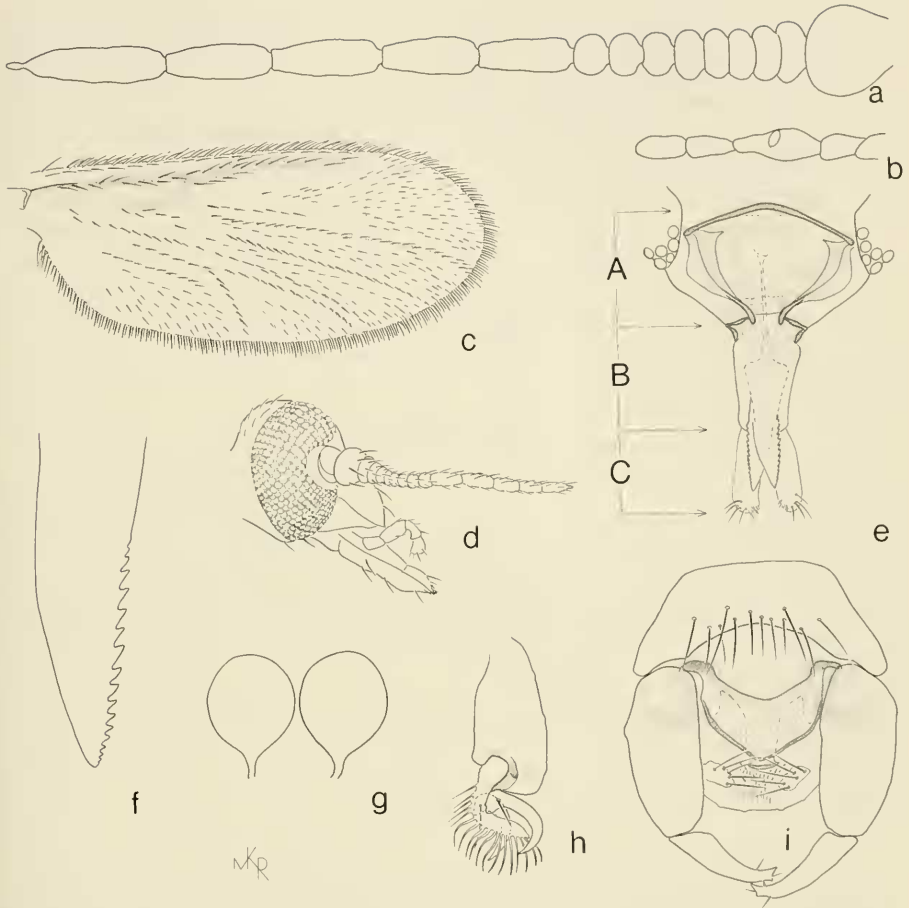


Fig. 1. *Atrichopogon downesi*. a-g, Female. i, Male. a, Antenna. b, Palpus. c, Wing. d, Lateral view of head showing upturned proboscis. e, Diagram of sections A-B-C of proboscis. f, Mandible. g, Spermathecae. h, Fifth tarsomere, claws, and empodium of hind leg, tenent hair of empodium enlarged. i, Male genitalia.

2nd tarsomere (tarsal ratio). Claws (Fig. 1h) simple (bifid at apices only in *A. lindneri*); empodium long, with many long tenent hairs with capitate apices. Female abdomen without ventral armature; 2 subequal spermathecae (Fig. 1g). Male genitalia (Fig. 1i) with simple aedeagus; 9th sternum without deep caudomedial excavation, bearing a transverse row of long setae.

Immature Stages.—The larva and pupa are known only for *A. meloesugans*; Saunders collected them on the underside of rotting logs in England.

They were well described and illustrated by Ewen and Saunders (1958). The larva is very similar to that of *A. (A.) minutus* (Meigen) in the subgenus *Atrichopogon*, having the same short head seta 7 and the same expanded laterodorsal processes, but differs in the size of the mediodorsal processes, body setae, and other details of chaetotaxy. The pupa is diagnostic, having well-developed processes and setae on the first four abdominal segments only.

CHECK LIST OF *MELOEHELEA* SPECIES

- downesi*, new species. Southeastern Canada and northeastern U.S.A.
epicautae Wirth. Northern and western North America.
farri Wirth. Southeastern Canada and northeastern U.S.A.
lindneri Wirth. East Africa.
lucorum (Meigen). Europe, British Columbia, New York.
meloesugans Kieffer. Europe, North Africa.
oedemerarum Storå. Europe, Ontario, Wirginia, West Virginia.

Relationships.—*Atrichopogon oedemerarum* stands apart from the other species, with moniliform antennal segments and subapical mandibular teeth not enlarged. *A. lindneri* is perhaps its African counterpart. *A. downesi* replaces *A. meloesugans* in North America, both species having comparatively slender proboscis and pale legs, and subapical mandibular teeth distinctly enlarged. The remaining three species are the most apotypic, with darker brown legs, relatively stout proboscis, and moderately to greatly enlarged subapical mandibular teeth. *A. farri* stands at the apex of this line of development with the proboscis shortened and the proximal mandibular teeth greatly enlarged and reduced in number.

KEY TO SPECIES OF SUBGENUS *MELOEHELEA* (FEMALES)

1. Proximal antennal segments (Fig. 6a) moniliform, about as broad as long (antennal ratio 1.64–1.94); mandible with nearly even sized teeth to apex (Fig. 6d) 2
- Proximal antennal segments broad and disciform (Fig. 1a), closely appressed (antennal ratio 2.00–2.50); proximal mandibular teeth enlarged, distal teeth usually much smaller (Fig. 1f) 3
2. Large species, wing length 1.65 mm; tarsal claws deeply bifid; 27 mandibular teeth, distal ones slightly smaller than proximals; East African species *lindneri* Wirth
- Smaller species, wing length 1.39 mm; tarsal claws simple; 20 mandibular teeth, distal ones slightly larger than proximals; Holarctic species *oedemerarum* Storå
3. Mandible with 11–13 teeth, proximal 6–7 teeth greatly enlarged (Fig. 4c); legs pale brown; halter pale *farri* Wirth

- Mandible with 14–25 teeth, those in midportion slightly to moderately enlarged (Fig. 2c) 4
- 4. Hind tarsal ratio 2.3; claws stout; proboscis short and stout, section B shorter than C or subequal to it; legs uniformly brownish; mandible with 15–20 teeth, proximal teeth large (Fig. 2e) *epicautae* Wirth
- Hind tarsal ratio 2.4–2.7; claws slender; proboscis longer and more slender, section B longer than C (Fig. 1e); mandible teeth various; legs various 5
- 5. Mandible with 25 fine teeth, those in midportion only slightly enlarged (Fig. 5e); 3rd palpal segment (Fig. 5b) slender, palpal ratio 4.0 or more; palpal sensory pit usually deep; halter pale; legs yellowish *meloesugans* Kieffer
- Mandible with 14–20 teeth, those in midportion large (Fig. 1f); 3rd palpal segment (Fig. 1b) shorter and stouter, palpal ratio 3.5 or less; palpal sensory pit usually shallow; legs and halter various 6
- 6. Legs yellowish, only extreme tips of femora brownish; halter pale; 3rd palpal segment (Fig. 1b) with sensory pit about as deep as pore opening; smaller species, wing length 1.42 mm . *downesi*, new species
- Legs dark brown; halter infuscated; 3rd palpal segment (Fig. 4b) with pit deeper than diameter of pore opening; large species, wing length 1.55 mm *lucorum* (Meigen)

Atrichopogon (Meloehalea) downesi Wirth, NEW SPECIES

Fig. 1

Atrichopogon (Meloehalea) oedemerarum Storå; of Wirth, 1956: 20 (misidentified; U.S.A. records).

Female Holotype.—Wing length 1.42 mm; breadth 0.62 mm.

Head: Brown, antenna and palpus paler. Antenna (Fig. 1a) with lengths of flagellar segments in proportion of 25-16-16-18-20-20-20-21-60-62-68-68-106; antennal ratio 2.33; proximal segments not as broadened or appressed as in *A. lucorum*. Palpus (Fig. 1b) with lengths of segments in proportion of 20-20-50-30-30; 3rd segment spindle shaped, moderately broad, palpal ratio 2.5 (up to 3.5 in paratypes); sensory pit about as deep as diameter of pore opening; segments IV and V combined much longer than III. Proboscis moderately long, tapering and rather slender distally; sections A-B-C with lengths as 40-40-28; mandible (Fig. 1f) with 15 rather large proximal teeth and 5 small distal teeth of decreasing lengths.

Thorax: Dark brown, mesonotum subshining, with minute appressed pale hairs; shoulders paler brown. Legs yellowish, femora brownish at apices; hind tarsal ratio 2.6; tarsal claws moderately slender. Wing (Fig. 1c) pale brownish hyaline, veins slightly yellowish brown; costal ratio 0.71; 2nd

radial cell $2.8 \times$ length of 1st; macrotrichia sparse, confined to distal $\frac{1}{2}$ of wing and caudad in distal 0.7 of anal cell. Halter pale.

Abdomen: Brownish; pleuron with basal tubercles of the fine microscopic hairs blackish, rather prominent. Spermathecae (Fig. 1g) 2, short-ovoid, nearly spherical, tapering slightly to slender necks; equal, each measuring 0.098 by 0.073 mm including neck.

Male.—Similar to female, with usual sexual differences. Genitalia as in Fig. 1i.

Distribution.—Minnesota to Quebec and Nova Scotia, south to western North Carolina and eastern Tennessee.

Types.—Holotype, ♀, allotype, ♂, Lost River State Park, Hardy Co., West Virginia, 8–14 July 1963, K. V. Krombein, Malaise trap (USNM Type no. 63251). Paratypes, 11 males, 114 females, as follows. MAINE: Millinocket, Penobscot Co., 2.vii.1968, D. M. Wood, swarming around *Epicauta*, 20 ♀ (CNC). MARYLAND: Montgomery Co., Colesville, 15.v.1975, W. W. Wirth, light trap, 1 ♂, 2 ♀; 15.v.1977, 1 ♀. MASSACHUSETTS: Amherst, 1.vii.1952, T. H. Farr, on meloid beetles, 2 ♀. MINNESOTA: Eaglenest, 1.vii.1957, W. V. Balduf, 1 ♀. NEW BRUNSWICK: Kouchibouguac National Park, 9–15.vii.1977, I. Smith, 3 ♀ (CNC); 11.vii.1977, J. R. Vockeroth, pan trap, Rankins Bog, 2 ♂, 2 ♀ (CNC); same, in shore drift on beach, 1 ♂, 4 ♀ (CNC). NEW HAMPSHIRE: Mt. Washington, summit 6100–6300 ft. 14.viii.1958, J. R. Vockeroth, 1 ♀ (CNC). NEW YORK: Albion, Orleans Co., Burma Woods, 11.vi.1963, W. W. Wirth, 1 ♀; Allegany State Park, 3.vi.1963, W. W. Wirth, mossy woods, 1 ♀; sphagnum bog, 1 ♀; Cranberry Lake, St. Lawrence Co., 24.vi.1963, W. W. Wirth, 3 ♀; Pine Grove, Watson, Lewis Co., 22.vi.1963, W. W. Wirth, light trap, 1 ♀; Whetstone Gulf, Lewis Co., 20.vi.1963, W. W. Wirth, 3 ♀. NORTH CAROLINA: Highlands, Macon Co., 21.vi.1958, J. L. Laffoon, 1 ♀. ONTARIO: Ancaster, 26.vi.1955, O. Peck, 1 ♀ (CNC); Marmora, 16.vi.1952, J. R. Vockeroth, 1 ♀ (CNC); Maynooth, 19.vii.1963, J. F. McAlpine, around *Epicauta*, 2 ♂, 4 ♀ (CNC); Ottawa, 17.vii.1955, J. R. Vockeroth, on garage window, 1 ♀ (CNC). QUEBEC: Beech Grove, 26.vi.1951, J. F. McAlpine, 2 ♀ (CNC); Cottage Beaulieu, 13.viii.1900, Beaulieu, 1 ♀ (CNC); Harrington Lake, Gatineau Park, 31.v.1954, R. McCondochie, 1 ♀ (CNC); Hull, 10.viii.1965, Malaise trap, 1 ♀. Lac Peche, 18.vii.1954, J. A. Downes, 2 ♀ (CNC); Old Chelsea, Summit King Mtn., 1150 ft., viii.1965, Malaise trap, 9 ♀; Rowanton Depot, 30.vii.1954, J. A. Downes, 3 ♀ (CNC); Wakefield, 9.vii.1946, G. E. Shewell, 1 ♀ (CNC). TENNESSEE: Sevier Co., Greenbrier Cove, Great Smokies Nat. Park, 2000 ft. 18.v.1957, J. R. Vockeroth, attacking meloids, 10 ♀ (CNC). VIRGINIA: Falls Church, Fairfax Co., 19, 23.v.1958, W. W. Wirth, light trap, 1 ♂, 1 ♀; Holmes Run, 17.v, 12.vi.1960, W. W. Wirth, light trap, 2 ♀; Vienna, Fairfax Co., 7.vii.1937, J. C. Bridwell,

on *Epicauta fabricii* (Leconte), 3 ♀. WEST VIRGINIA: Same data as types, 4 ♂, 24 ♀.

Discussion.—This species is named for J. Antony Downes in recognition of his important contributions to our knowledge of ceratopogonids, especially their feeding behavior. *Atrichopogon downesi* appears to be the American counterpart of the European *A. meloesugans*, from which it is distinguished by the characters given in the key.

Atrichopogon downesi has been taken several times at scattered localities attacking blister beetles in mixed swarms with other species of *Melochelea*, notably *farri* Wirth, *epicautae* Wirth, and *oedemerarum* Storå.

Atrichopogon (Melochelea) epicautae Wirth

Fig. 2

Atrichopogon (Melochelea) epicautae Wirth, 1956: 21 (♀; Arizona; on blister beetles).

Female Diagnosis.—Wing length 1.44 mm; breadth 0.59 mm. Dark brown species; mesonotum with sparse yellowish brown pubescence, 2 narrow pale brown lines extending forward from ends of scutellum; legs including coxae dull brownish, mid and hind pairs slightly darker. Antenna (Fig. 2a) with lengths of flagellar segments in proportion of 20-15-15-16-18-18-18-20-46-50-53-55-75; antennal ratio 2.00; proximal segments slightly broadened but not greatly appressed. Palpus (Fig. 2b) with lengths of segments in proportion of 25-20-60-28-28; 3rd segment slightly expanded in midportion, palpal ratio 3.2; sensory pit deep with a slightly smaller pore. Proboscis stout, not tapering; lengths of sections A-B-C as 40-25-30; mandible (Fig. 2e) with 11-15 large teeth plus 3-5 minute distal ones. Tarsal ratio 2.30; claws stouter and more curved than in related species. Wing (Fig. 2c) pale brownish; costal ratio 0.68; 2nd radial cell 2.5 times length of 1st; macrotrichia sparse, in cell R5 extending only from end of costa along wing margin to wing tip and filling intercalary fork, present only in distal halves of cells M1, M2, and M4 and well removed from veins; about 12 in midportion of anal cell. Halter with brown stem and white knob. Abdomen brown with yellowish brown pleural membrane, basal tubercles of the fine microscopic hairs blackish, rather prominent. Spermathecae (Fig. 2d) 2, slightly ovoid with short stout necks; equal, each measuring 0.080 by 0.058 mm including neck.

Male Genitalia.—As in Fig. 2f.

Distribution.—Northern and western North America.

New Records.—ARIZONA: Oak Creek at Pumphouse Wash, Coconino Co., 26.viii.1977, M. W. Sanderson, light trap, 1♀; Red Rock Crossing, Yavapai Co., 19.vii.1977, M. W. Sanderson, light trap, 1♀; Rustlers Park,

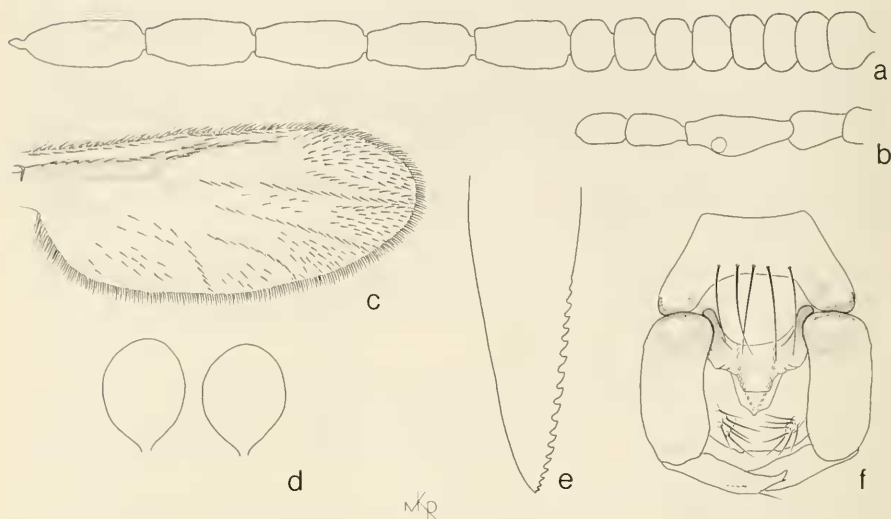


Fig. 2. *Atrichopogon epicautae*. a-e. Female. f. Male. a. Antenna. b. Palpus. c. Wing. d. Spermathecae. e. Mandible. f. Male genitalia.

Chiricahua Mts., 11.vii.1958, O'Brien and Ross, light trap, 2 ♂, 4 ♀. MAINE: Millinocket, Penobscot Co., 7.vii.1968, D. M. Wood, swarming around *Epicauta*, 20 ♀ (CNC). NEW YORK: Cranberry Lake, St. Lawrence Co., 25.vi.1963, W. W. Wirth, in swamp, 1 ♀. ONTARIO: Maynooth, 19.viii.1963, J. F. McAlpine, "aspirated from or around *Epicauta*, some apparently biting legs," 4 ♀ (CNC). WASHINGTON: Lee Forest, Monroe, Snohomish Co., 2.iii.1975, N. and M. Deyrup, emerged from Douglas Fir bark, tree dead several years, 1 ♂, 1 ♀.

Remarks.—The Ontario, New York and Maine records are a rather unexpected extension of the range of this species. These females agree in general with western *A. epicautae* although a Maine specimen differed slightly in measurements as follows: Slightly smaller, wing length 1.31 mm; antennal ratio 1.81; palpal ratio 2.4, the sensory pit only as deep as the diameter of the pore opening; costal ratio 0.72; second radial cell 3.0 times as long as first; lengths of proboscis sections A-B-C as 53-30-30; and mandible with about 16 large proximal teeth and four small distal ones.

Atrichopogon (Melochelea) farri Wirth

Fig. 3

Atrichopogon (Melochelea) farri Wirth, 1956: 22 (♀; Massachusetts; figs.).

Female Diagnosis.—Wing length 1.37 mm; breadth 0.59 mm. Mesonotum and scutellum subshining dark brown with faint grayish luster, pubescence

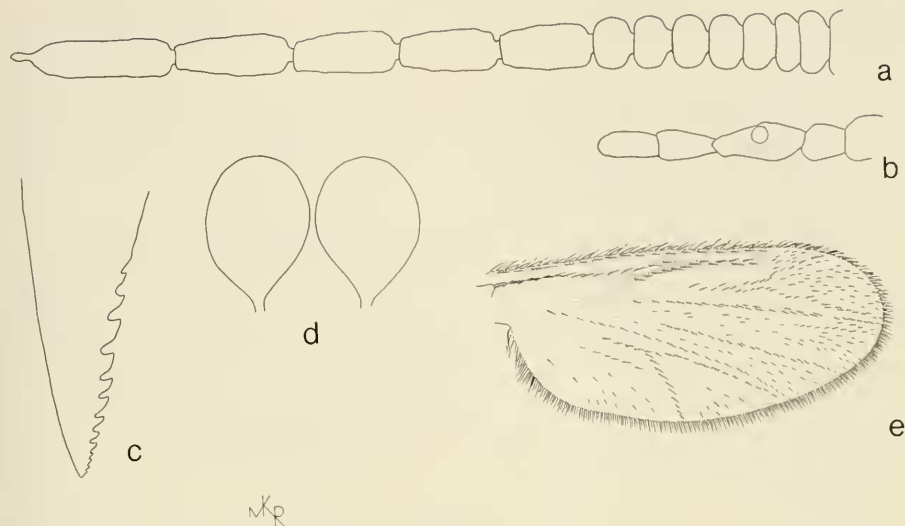


Fig. 3. *Atrichopogon farri*, female. a, Antenna. b, Palpus. c, Mandible. d, Spermathecae. e, Wing.

dark gray; pleuron and coxae dark brown; legs pale brown; abdomen dark brown, pleural membranes paler. Antenna (Fig. 3a) with lengths of flagellar segments in proportion of 20-15-15-18-18-20-20-22-50-52-54-60-90; antennal ratio 2.06; proximal segments broadened and shortened, appressed. Palpus (Fig. 3b) with lengths of segments in proportion of 10-25-30-20-20; 3rd segment slightly swollen, palpal ratio 2.8; pit about as deep as diameter of pore, the latter slightly smaller than diameter of pit itself. Proboscis short and stout, not tapering; sections A-B-C with lengths as 40-32-20; mandible (Fig. 3c) with 7 very large teeth, and 4-5 minute distal ones. Hind tarsal ratio 2.70. Wing grayish; costal ratio 0.70; 2nd radial cell $2.5-2.9 \times$ length of 1st; macrotrichia sparse and only a few on basal $\frac{1}{2}$ of wing except on veins, with 10-15 in midportion of anal cell. Halter with pale brown stem and white knob. Two short oval spermathecae (Fig. 3d) with short slender necks; equal, each measuring 0.095 by 0.058 mm.

Distribution.—Ontario, New York, Maine, Massachusetts.

New Records.—MAINE: 10 mi NW Millinocket, 7.vii.1968, D. M. Wood, swarming around *Epicauta*, 2 ♀ (CNC). NEW YORK: Cranberry Lake, St. Lawrence Co., 25.vi.1963, W. W. Wirth in swamp, 6 ♀; Pine Grove near Watson, Lewis Co., 22.vi.1963, W. W. Wirth, light trap, 12 ♀. ONTARIO: Algonquin Park, 7.vi.1960, W. W. Wirth, 1 ♀; Maynooth, 19.vi.1963, J. F. McAlpine, attacking *Epicauta* sp., 8 ♀ (CNC); Ottawa, 5, 17.vi.1959, J. A. Downes, attacking *Epicauta murina*, 30 ♀ (CNC).

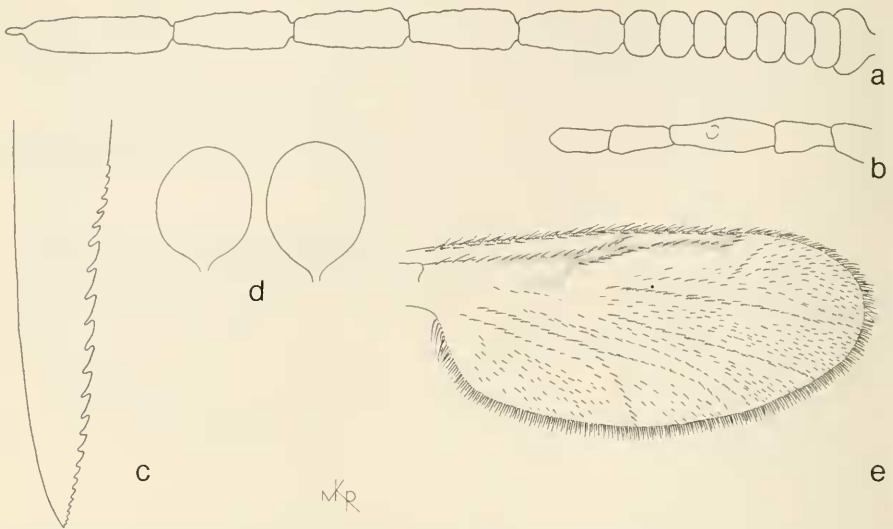


Fig. 4. *Atrichopogon lucorum*, female. a, Antenna. b, Palpus. c, Mandible. d, Spermathecae. e, Wing.

Atrichopogon (Meloehalea) lindneri Wirth

Atrichopogon (Meloehalea) lindneri Wirth, 1964: 2 (♀; Tanganyika; sucking blood of *Epicauta*).

Notes.—A diagnosis is not given because the original description is adequate to recognize the species. This species differs from other *Meloehalea* species in having the female tarsal claws bifid apically and the proboscis not upcurved, but these features are now given less importance than others in diagnosing the subgenus.

Atrichopogon (Meloehalea) lucorum (Meigen)

Fig. 4

Ceratopogon lucorum Meigen, 1818: 72 (♂, ♀; Europe); Winnertz, 1852: 30 (redescribed; figs.).

Atrichopogon lucorum (Meigen); Kieffer, 1919a: 193 (combination); Kieffer, 1919b: 26 (redescribed; fig. antenna); Goetghebuer, 1920: 30 (♂; Belgium); Kieffer, 1925: 52 (♂; in key; France); Edwards, 1926: 400 (notes; Britain); Goetghebuer and Lenz, 1933: 20 (diagnosis; fig. antenna); Zilahi-Sebess, 1940: 44 (notes; Hungary; fig. ♂ genitalia); Remm, 1961: 926 (in key; figs.; Estonia); Havelka, 1976: 215 (diagnosis; figs.; Germany).

Atrichopogon oedemerarum Storå; Wirth, 1956 (in part; description and figures of Finland specimens).

Atrichopogon meloesugans Kieffer; Abdullah, 1964: 22 (misident. [in part]; Scotland records).

Female Diagnosis.—Wing length 1.55 mm; breadth 0.72 mm. Dark brown species including antenna, palpus and legs; wing brownish gray, veins brownish; halter infuscated. Antenna (Fig. 4a) with lengths of flagellar segments in proportion of 20-15-16-16-18-20-20-20-61-63-68-70-100; antennal ratio 2.50; basal segments greatly expanded disciform and closely appressed, 5-8 gradually narrowed and lengthened. Palpus (Fig. 4b) with lengths of segments in proportion of 15-35-60-38-32; 3rd segment slender and spindle shaped, palpal ratio 3.0; a deep sensory pit opening by a slightly smaller round pore. Proboscis long, slightly tapering, lengths of sections A-B-C as 40-50-35; mandible (Fig. 4c) with 18-20 teeth, about 8-10 proximal teeth large, distal teeth progressively decreasing in size. Hind tarsal ratio 2.50. Wing (Fig. 4e) with macrotrichia numerous, covering nearly entire wing except in costal and basal cells; costal ratio 0.72; 2nd radial cell $3.7\times$ as long as 1st. Spermathecae (Fig. 4d), 2 oval with moderately long slender necks; equal, each measuring 0.101 by 0.073 mm.

Distribution.—Europe; British Columbia, New York.

Specimens Examined.—BRITISH COLUMBIA: Vancouver Island, 6.v.1974, N. A. Williams, 1 ♀. DENMARK: Frederiksdalskov ved Kulhus, 22.v.1937, H. Anthon, on *Meloe violaceus* Marshan, 1 ♀. ENGLAND: Seaton, South Devon, v.1937, G. S. Blair, sucking blood of *Meloe proscarabeus* L., 1 ♀. Wylan, N. Bank Tyne, Northumberland, 6.v.1960, D. A. Humphries, attacking *Meloe* beetles, 2 ♀. ESTONIA: Tartu, 20.vi.1954, H. Remm, 2 ♂, 2 ♀. GERMANY: München, v-191, Frank. Mus. in Würzburg, 1938, 1 ♀. NEW YORK: Cranberry Lake, St. Lawrence Co., 25.vi.1963, W. W. Wirth, swept in swamp, 1 ♀. SCOTLAND: Aberlady Bay, 6.vi.1964, M. Abdullah and R. & E. Crowson, at cantharidin, 3 ♀; Gale, 9.vi.1964, R. & E. Crowson, at cantharidin, 3 ♀.

Notes.—In 1956 I misdetermined the female from South Devon, England, as *A. meloesugans*, and the females from Denmark and Germany as *A. oedemerarum*. *A. lucorum* is closely related to *A. farri* and *A. epicautae*, from which it is readily separated by the characters given in the key.

Atrichopogon (Meloehela) meloesugans Kieffer

Fig. 5

Atrichopogon meloesugans Kieffer, 1922: 495 (♀; Algeria; fig. antenna); Wirth, 1956: 17 (redescribed; notes, in part); Ewen and Saunders, 1958: 701 (all stages; figs.; England).

Female Diagnosis.—Wing length 1.47 mm; breadth 0.58 mm. A brown species with yellowish legs; halter pale. Antenna (Fig. 5a) with lengths of flagellar segments in proportion of 20-12-12-15-15-16-18-18-60-65-70-65-86;

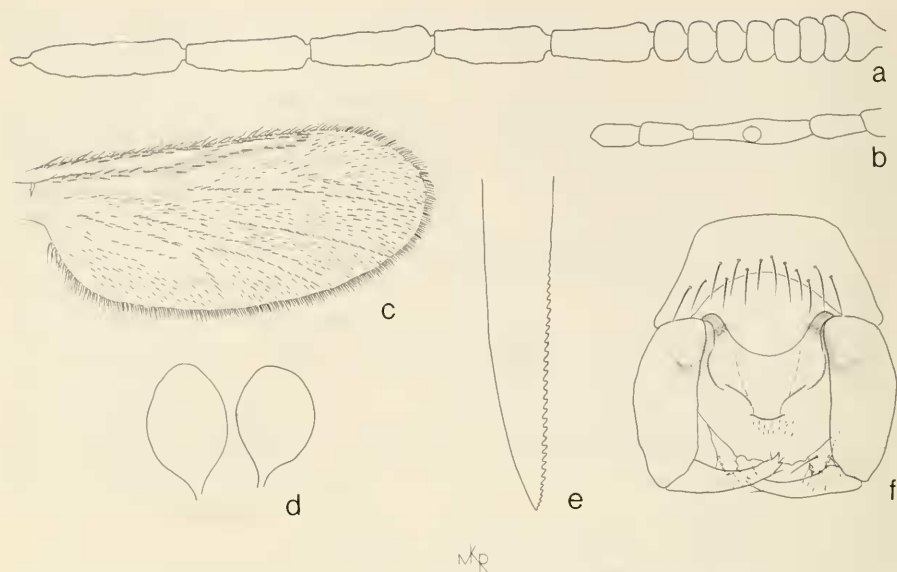


Fig. 5. *Atrichopogon meloesugans*. a-e, Female. f, Male. a, Antenna. b, Palpus. c, Wing. d, Spermathecae. e, Mandible. f, Male genitalia.

antennal ratio 2.50; basal segments greatly expanded disciform and closely appressed, 5-8 gradually narrowed and lengthened. Palpus (Fig. 5b) with lengths of segments in proportion of 25-35-68-25-30; 3rd segment unusually slender, palpal ratio 4.2, the sensory pit usually deep. Proboscis slender and tapering, moderately long; mandible (Fig. 5e) with about 25 fine teeth, those in midportion slightly enlarged. Hind tarsal ratio 2.40. Wing (Fig. 5c) grayish, the anterior veins pale brown; macrotrichia numerous, covering entire wing except a narrow area behind radial cells in cell R5 and in basal and costal cells; costal ratio 0.72; 2nd radial cell 2.5 times as long as 1st. Spermathecae (Fig. 5d) 2, ovoid with short slender necks: equal, each measuring 0.104 by 0.067 mm.

Male Genitalia.—As in Fig. 5f.

Distribution.—Europe; Algeria.

Material Examined.—ENGLAND: Strelley, Nottinghamshire, 3.xi.1922, L. G. Saunders, from larvae on underside of rotting logs, 1 ♂, 1 ♀. YUGOSLAVIA: Slovenia, Postojina, 13.vii-1.viii.1958, R. L. Coe, highland meadow and edge of mixed forest, 3 ♀.

Notes.—The species Abdullah (1964) reported as *A. meloesugans* Kieffer attracted to cantharidin in experiments performed on 6.vi.1964 at Aberlady Bay, Scotland, was misdetermined. Specimens from these tests later sent to me for identification proved to be *A. lucorum* (Meigen). I have also

identified specimens taken by Abdullah in July and August 1964, in tests in Berkshire, England, as *A. oedemerarum* and not *A. meloesugans*, as Abdullah (1964) reported from earlier tests in June at Frilford Heath, Berkshire. The anthicid beetle, *Notoxus monoceros* (L.) was the primary insect attracted to cantharidin in these tests. Abdullah explained that cantharidin probably developed in a common ancestor of the Anthicidae and Meloidae, and became a defense secretion in Meloidae and a sex attractant in Anthicidae. *Atrichopogon* midges that come to meloid beetles to seek a blood meal seem to have developed receptors which can also detect this pheromone.

Atrichopogon (Melochelea) oedemerarum Storå

Fig. 6

Atrichopogon oedemerarum Storå, 1939: 16 (♀; Finland; figs.); Neindorff, 1959: 32 (Germany; attracted to cantharidin and sucking blood of *Anthomyia pluvialis* [L.]; fig. wing); Remm, 1961: 926 (in key; Estonia); Mayer, 1962: 257 (Germany; flight activity; incidental parasite of *A. pluvialis*; fig. ♂; biological notes); Havelka, 1976: 216 (diagnosis; figs.; Germany).
Atrichopogon meloesugans Kieffer; Abdullah, 1964: 23 (misident. [in part]; Berkshire records).

Female Diagnosis.—Wing length 1.39 mm; breadth 0.56 mm. Thorax shining blackish, with sparse grayish hairs; scutellum dull black; halter whitish; antenna, palpus and legs brownish; abdomen blackish, with gray hairs. Antenna (Fig. 6a) with lengths of flagellar segments in proportion of 26-18-18-18-20-20-20-21-55-60-62-62-93; antennal ratio 1.94; segments 3-10 subspherical, not broadened or appressed, distal 5 segments elongate. Palpus (Fig. 6b) with lengths of segments in proportion of 15-25-45-30-25; 3rd segment slender, fusiform; palpal ratio 3.0; small deep pit opening by a smaller pore at midlength. Mandible (Fig. 6d) with approximately 20 small teeth, their size gradually increasing distad in series. Wing (Fig. 6c) with costal ratio 0.74; first radial cell short and narrow, 2nd radial cell $2.6 \times$ length of 1st; macrotrichia numerous on entire wing except in basal cell and in base of cell R5; subcosta without setae. Hind tarsal ratio 2.50. Spermathecae (Fig. 6e) 2, oval with short slender necks; equal, each measuring 0.087 by 0.058 mm.

Male Genitalia.—As in Fig. 6f.

Distribution.—Europe, Ontario, Virginia, West Virginia.

Specimens Examined.—ENGLAND: Burghfield, Berkshire, 30.vi.1964, C. Reardon, at cantharidin, 2 ♀; Ufton Nervet, Berkshire, 4.viii.1964, C. Reardon, at cantharidin, 6 ♂, 4 ♀. ESTONIA: Elva, Rannakuta, 11.viii.1954, H. Remm, 2 ♀; Viluvere, 29.vii.1962, H. Remm, 1 ♂ (det. H. Remm). GERMANY: Berlin, cantharidin captures, K. Mayer, 2 ♀. NEW

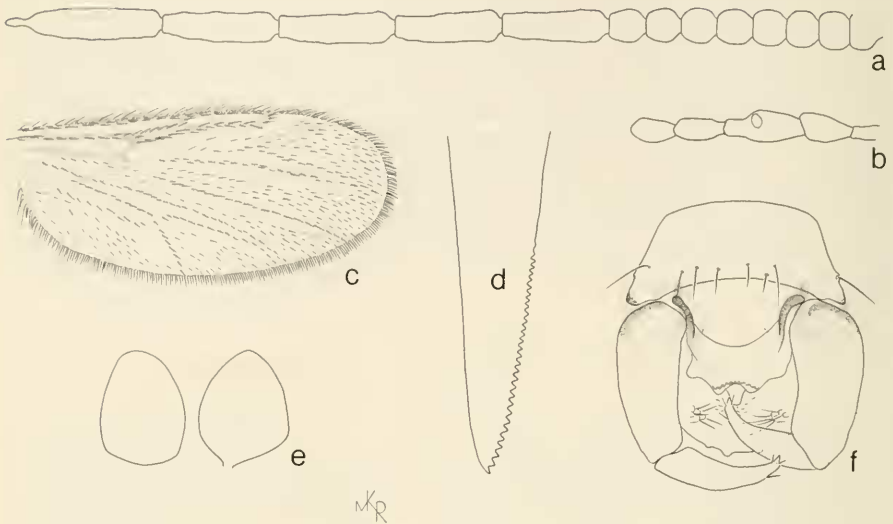


Fig. 6. *Atrichopogon oedemerarum*. a-e, Female. f, Male. a, Antenna. b, Palpus. c, Wing. d, Mandible. e, Spermathecae. f, Male genitalia.

BRUNSWICK: Kouchibouguac National Park, I. Smith, 11-17.vii.1977, 1 ♀; 16.vii.1979, 1 ♂; 2.vii.1978, J. R. Vockeroth, 1 ♂; 6.vii.1978, J. A. Downes, 1 ♂. ONTARIO: Maynooth, 19.vi.1963, J. F. McAlpine, on *Epicauta* sp., 2 ♀ (CNC). VIRGINIA: Alexandria, 15.vi.1952, W. W. Wirth, from *Osmunda* fern bog, 1 ♀. WEST VIRGINIA: Lost River State Park, Hardy Co., 8-14.vii.1963, K. V. Krombein, Malaise trap, 1 ♀.

Notes.—I am grateful to E. C. Pelham-Clinton of the Royal Scottish Museum in Edinburgh for first calling my attention to my misidentification of this species in my 1956 paper. The specimens I received in 1956 from the Helsinki Museum under the name *A. oedemerarum* (localities: Siilinjaroi and Kurkijoki, Tiensuu, Finland) were not *oedemerarum* but were *A. lucorum* (Meigen).

This species is easily separated from the other species of *Melochelea* by the proximal flagellar segments which are subspherical, not flattened, broadened, or appressed, by the shallow pit on the third palpal segment, and by the uniform-sized, moderately small mandibular teeth. The proboscis is not upcurved as in most other species of *Melochelea*. *A. lindneri* from East Africa has similar antennae and mandibles, but is a much larger species with deeply bifid tarsal claws.

Abdullah (1964) reported *A. meloesugans* Kieffer attracted to cantharidin in experiments made at Frilford Heath, Berkshire, England, on 17 and 25 June 1964. The material listed above taken in similar captures in Berkshire

in July and August and sent to me for identification was not *meloesus* but *oedemerarum*.

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