

Systematics of the Nearctic species of the genus *Cephalops* FALLÉN (Diptera, Pipunculidae).

by Marc DE MEYER

Abstract.

The Nearctic species of *Cephalops* FALLÉN (including *Cephalosphaera* ENDERLEIN) are revised. 22 species are recognized including 13 new species. Four species groups are distinguished: the *Cephalosphaera* group: *C. maximus* (HARDY), *C. reductus* sp. nov., *C. appendiculatus* (CRESSON), *C. acuminatus* (CRESSON), *C. filicerus* sp. nov., *C. biscaynei* (CRESSON), *C. brevis* (CRESSON); the *aeneus* group: *C. longistylis* sp. nov., *C. grootaerti* sp. nov., *C. pallidivittipes* sp. nov., and *C. furnaceus* sp. nov.; the *semifumosus* group: *C. mainensis* (CRESSON), *C. varius* (CRESSON), *C. longiductulis* sp. nov., *C. curvarmatus* sp. nov., *C. pallipes* (JOHNSON), *C. digitatus* sp. nov., and *C. hardyi* sp. nov. The *vestitus* group: containing *banksi* (ACZÉL), *griseus* sp. nov., *floridae* sp. nov., and *parafloridae* sp. nov. is considered as a separate genus: *Microcephalops* gen. nov., in order to ensure monophyly of the genus group *Cephalops-Beckerias-Wittella*. *C. eronis* (CURRAN) is considered to be synonymous with *C. appendiculatus* (CRESSON). This species, formerly placed in *Parapipunculus* RAFAEL, is found to be a true *Cephalops* sp. and has to be replaced in this genus. The geographic distribution of all species is given, and their phylogenetic relationship to the West-Palaearctic *Cephalops* spp. is discussed.

Key Words: Pipunculidae - Nearctic region - taxonomy - phylogeny - zoogeography.

Résumé.

Dans cet article, les espèces néarctiques du genre *Cephalops* FALLÉN (*Cephalosphaera* ENDERLEIN inclus) sont révisées. 22 espèces ont été reconnues dont 13 sont des nouvelles espèces. Quatre groupes d'espèces ont été distingués: le groupe *Cephalosphaera*: *C. maximus* (HARDY), *C. reductus* sp. nov., *C. appendiculatus* (CRESSON), *C. acuminatus* (CRESSON), *C. filicerus* sp. nov., *C. biscaynei* (CRESSON), *C. brevis* (CRESSON); le groupe *aeneus*: *C. longistylis* sp. nov., *C. grootaerti* sp. nov., *C. pallidivittipes* sp. nov. et *C. furnaceus* sp. nov.; le groupe *semifumosus*: *C. mainensis* (CRESSON), *C. varius* (CRESSON), *C. longiductulis* sp. nov., *C. curvarmatus* sp. nov., *C. pallipes* (JOHNSON), *C. digitatus* sp. nov. et *C. hardyi* sp. nov. Le groupe *vestitus* contenant les espèces: *banksi* (ACZÉL), *griseus* sp. nov., *floridae* sp. nov. et *parafloridae* sp. nov. est considéré comme genre à part: *Microcephalops* gen. nov., pour assurer la monophylie du groupe des genres *Cephalops-Beckerias-Wittella*. *C. eronis* (CURRAN) est mis en synonymie avec *C. appendiculatus* (CRESSON). Cette espèce, jadis mise dans le genre *Parapipunculus* RAFAEL, appartient au genre *Cephalops*. La distribution géographique de toutes les espèces est donnée et leur phylogénèse est comparée avec les espèces ouest-paléarctiques.

Mots-clés: Pipunculidae - région néarctique - taxonomie - phylogénèse - distribution géographique.

Introduction and taxonomic history.

Representatives of the family Pipunculidae are usually small, inconspicuous flies. They can be easily identified by the large compound eyes occupying most of the hemispherical or subhemispherical head. The larvae are known as parasitoids of Auchenorrhyncha (Homoptera). About 600 species are known, and more than 100 are recorded from the Nearctic region.

This is the second paper in a series on a systematic revision of the *Cephalops* genus group, including *Cephalops* FALLÉN, 1810, *Cephalosphaera* ENDERLEIN, 1936, *Beckerias* ACZÉL, 1939, and *Wittella* HARDY, 1950. *Cephalops* is considered here as a separate genus, and including *Cephalosphaera*. In this we follow most of the European authors (COLLIN, 1956; COE, 1966; KOZÁNEK & LAUTERER, 1987), in contrast to HARDY (1975, 1980) who considers *Cephalops* and *Cephalosphaera* as two separate subgenera of *Pipunculus* LATREILLE, 1802. For further discussion we refer to the earlier revision of the West-Palaearctic species (DE MEYER, 1989).

Most Nearctic *Cephalops* spp. have been described by CRESSON (1911, 1912), and also by JOHNSON (1903), BANKS (1915) and HARDY (1943). The monograph of HARDY is the major work on Nearctic Pipunculidae and includes a complete revision of the entire fauna of this family in the region. After 1943 only a few articles on Nearctic pipunculids have been published, mainly of faunistic and taxonomic interest (HARDY, 1947, 1948a, 1954; RAPP & CHATHAM, 1944). A check list of the Nearctic Pipunculidae was compiled by HARDY (1965).

Material and methods.

Approximately 1,200 Nearctic specimens were examined. Type specimens and other material were obtained from the following Institutions and curators: AMNH: American Museum of Natural History, New York (D.A. Grimaldi); ANSP: Academy of Natural Sciences, Philadelphia (D. Azuma); CAS: California Academy of Sciences, San Francisco (P.H. Arnaud, Jr.); CNC: Canadian National Collections, Biosystematics Research Centre, Ottawa (B.E.

Cooper); MCZ : Museum of Comparative Zoology, Cambridge, Massachusetts (C. Vogt); OSU : Ohio State University, Columbus (C.A. Triplehorn); SEM : Snow Entomological Museum, University of Kansas, Lawrence (G.W. Byers); UOG : University of Guelph (S.A. Marshall); USNM : United States National Museum, Washington (F.C. Thompson).

All material examined, was preserved dry and pinned. Preparation of male genitalia, measurements used, and discussion regarding the orientation of the genitalia, have been explained in a previous article (DE MEYER, 1989). For the cladistic processing of the character states data, we used PHYLIP computer package of Felsenstein (1986), version 2.9 : MIX program with global, outgroup and ancestral state options. Character states of the West-Palaeartic species have been discussed in DE MEYER (1989). The character states of those West-Palaeartic species that show a phylogenetic relationship to the Nearctic ones, are included in the tables in order to allow a comparison.

The geographical distribution is only based on material personally examined. No literature references are included.

Keys to the Nearctic species of *Cephalops* and *Microcephalops* gen. nov.

Small species (body length < 3 mm), with abdominal terga 1-4 usually densely pubescent. Face distinctly narrower than lower portion of frons. Frons inflated. Third antennal segment small, only slightly larger than second antennal segment (Fig. 19g) *Microcephalops* gen. nov.

Larger species (length > 3 mm), with abdominal terga usually subshining. Face equal or subequal in width to lower portion of frons. Frons not inflated. Third antennal segment larger (Fig. 12g) *Cephalops*

Microcephalops gen. nov.

Note : only males can be identified; females are not included.

- 1a) Membranous area large; in distal view, occupying more than half of sternum 8. Surstyli long and slender; ejaculatory duct distinctly longer than surstyli (Fig. 19) *banksi*
- b) Membranous area smaller; in distal view, occupying less than half of sternum 8. Surstyli broadly shaped; ejaculatory duct not longer than surstyli (Figs. 20-22) 2
- 2a) Thorax and abdomen with greyish blue dusting along lateral margins. Surstyli asymmetrical; ejaculatory duct unifid, membranous (Fig. 20a-e) *griseus* sp. nov.

- b) Thorax and abdomen completely brownish dusted. Surstyli symmetrical or subsymmetrical; ejaculatory duct trifid (Figs. 21, 22) 3
- 3a) Lateral margins of abdomen with long hairs; terga 2-4 partly shining. Third costal section of wing about as long as fourth section. *floridae* sp. nov.
- b) Lateral margins of abdomen with short hairs; terga 2-4 completely dusted. Third costal section of wing longer than fourth section. *parafloridae* sp. nov.

Cephalops.

Note : Females of *C. maximus*, *C. longiductulis* and *C. digitatus* sp.nov. are unknown, or could not be studied (they are not included in the key).

- 1a) Vein M1+2 with appendix in apical part (often reduced in *C. reductus* sp.n.) (Fig. 23). (*Cephalosphaera*-group) 2
- b) Vein M1+2 without an appendix (Fig. 24, 25) 14
- 2a) Males 3
- b) Females 9
- 3a) Membranous area reaching epandrium (Figs. 3e, 5e). Hind tibiae without spur-like structure apically 4
- b) Membranous area not reaching epandrium (Fig. 1e). Hind tibiae with spur-like structure apically (Fig. 1f) 7
- 4a) Membranous area not reaching tergum 5 dorsally (Fig. 5d). Third antennal segment long filiform, bright yellow *filicerus* sp. nov.
- b) Membranous area reaching tergum 5 dorsally (Fig. 3d). Third antennal segment not long filiform and bright yellow, at most acuminate 5
- 5a) Scutellum with row of long hairs along margin. Trochanters with tuft of long hairs underneath. Ejaculatory duct very long, coiled; apical part of aedeagus simple (Fig. 6) *maximus*
- b) Scutellar margin with short hairs. Trochanters without tuft of hairs. Ejaculatory duct shorter, not coiled; apical part of aedeagus complicated structure (Figs. 3c, 4c) 6

- 6a) Femora mainly yellow, only slightly darkened dorsally *biscaynei*
- b) Femora dark with only apices narrowly yellow *brevis*
- 7a) Surstyli not bifurcated, apically elongated with clavate ends (Figs. 2c, 7c) 8
- b) Surstyli bifurcated with upper protuberance more elongated (Fig. 1c) *acuminatus*
- 8a) Larger species (> 3.5 mm). Appendix of M1+2 well developed. Surstyli broad (Fig. 2a) *appendiculatus*
- b) Smaller species (< 3.5mm). Appendix of M1+2 often reduced. Surstyli long, slender (Fig. 7a) *reductus* sp. nov.
- 9a) Ovipositor piercer straight (Figs. 30, 31) 10
- b) Ovipositor piercer downcurved (Figs. 27-29, 32) 11
- 10a) Legs mainly yellow. Piercer slightly longer than base (Fig. 30) *biscaynei*
- b) Legs femora with dark median part. Piercer as long as base (Fig. 31) *brevis*
- 11a) Base broad; piercer stout, broad (Fig. 32). Third antennal segment yellow, long filiform *filicerus* sp. nov.
- b) Base slender, long; piercer slender (Figs. 27-29). Third antennal segment not yellow and long filiform, at most acuminate 12
- 12a) Small species. Appendix of M1+2 often reduced. Piercer about as long as base (Fig. 29) *reductus* sp. nov.
- b) Larger species. Appendix of M1+2 well developed. Piercer longer than base (Figs. 27, 28) 13
- 13a) Piercer slightly downcurved (Fig. 27). Frons shining for upper third *acuminatus*
- b) Piercer more distinctly downcurved (Fig. 28). Frons almost completely pubescent *appendiculatus*
- 14a) Vein r-m placed at basal part of discal cell (Fig. 24). Third antennal segment obtuse below. Male: membranous area not reaching epan-drium; ejaculatory duct bifid and with small teeth; ejaculatory apodema tubiform (Fig. 8). Female: abdomen long and slender; front and mid tibia with distinct apical spines; hind tarsi flattened laterally (Fig. 8h). (*aeneus*-group) . . . 15
- b) Vein r-m placed near middle of discal cell (Fig. 25). Third antennal segment acute or acuminate below. Male: membranous area reaching epan-drium; ejaculatory duct trifid; ejaculatory apodema fan shaped (Fig. 12). Female: abdomen short and broad; front and mid tibiae with small hairs or short bristles apically but no distinct spines; hind tarsi simple (*semifumosus*-group) 18
- 15a) Pterostigma shorter. Male: in dorsal view, sternum 8 longer than half of tergum 5; surstyli long and slender (Figs. 10, 11). Female: ovipositor with base long (Figs. 35, 36) 16
- b) Pterostigma longer. Male: in dorsal view, sternum 8 shorter than half of tergum 5; surstyli short (Figs. 8, 9). Female: ovipositor with base short (Figs. 33, 34) 17
- 16a) Vein M1+2 almost straight. Male: surstyli very long; symmetrical (Fig. 11a). Female: piercer about as long as base (Fig. 36) *longistylis* sp. nov.
- b) Vein M1+2 undulating (Fig. 24). Male: surstyli shorter; asymmetrical, inner surstylus with median protuberance (Fig. 10a-c). Female: piercer shorter than base (Fig. 35) *grootaerti* sp. nov.
- 17a) Humeri and legs darker; abdomen without yellow spots laterally. Male: surstyli less distinctly bent (Fig. 9b-c). Female: base ovipositor convex but not globose; protuberances indistinct (Fig. 34) *furnaceus* sp. nov.
- b) Humeri and legs completely yellow; abdomen usually with yellow spots laterally. Male: surstyli more bent (Fig. 8b-c). Female: base ovipositor globose; distinct protuberances (Fig. 33) *pallidivittipes* sp. nov.
- 18a) Hind tibiae anteriorly in median part with long, erected, bristly hairs (Fig. 16g). Male abdomen almost completely dusted, only tergum 5 shining for posterior half *mainensis* sp. nov.
- b) Hind tibiae anteriorly in median part with shorter bristly hairs or no erected hairs. Male abdomen more shining 19
- 19a) Males 20
- b) Females 25

- 20a) Legs mainly yellow; femora yellow or at most with faint brownish patch in median part. Ejaculatory duct with cupular ends; surstyli in lateral view broadly shaped (Figs. 17b-c) . . . *pallipes*
- b) Legs femora with broad dark median ring, occupying at least half of entire length. Ejaculatory duct tubiform or with cupular ends; surstyli broadly shaped or otherwise 21
- 21a) Ejaculatory duct tubiform (Fig. 18c) 22
- b) Ejaculatory duct with cupular ends (Fig. 14c) 23
- 22a) Ejaculatory duct long, reaching well beyond surstyli (Fig. 15c). Frons with shining patch occupying half of entire width
. *longiductulis* sp. nov.
- b) Ejaculatory duct shorter, not reaching beyond surstyli (Fig. 18c). Frons with shining patch occupying at most one-third of entire width *varius*
- 23a) Aedeagus ankyroid, hook long, curved and directed laterally (Figs. 12c, f)
. *curvarmatus* sp. nov.
- b) Aedeagus ankyroid, hook short, straight (Figs 13c, f) 24
- 24a) Aedeagus, hook pointed dorsally (Fig. 13f)
. *digitatus* sp. nov.
- b) Aedeagus, hook pointed dorsolaterally (Fig. 14f) *hardyi* sp. nov.
- 25a) Legs, femora completely yellow, at most slightly darkened dorsally 26
- b) Legs, femora darkened 27
- 26a) Ovipositor base broad, stout, abruptly narrowing at apical end; piercer as long as base (Fig. 40) *pallipes*
- b) Ovipositor convex below, concave above; piercer longer than base (Fig. 38) . . *hardyi* sp. nov.
- 27a) Legs coloration variable; usually femora with small median ring. Ovipositor base broad (Fig. 41) *varius*
- b) Legs with femora darker. Ovipositor base more slender shaped (Fig. 37) . . *curvarmatus* sp. nov.

Cephalops FALLÉN

Cephalops FALLÉN, 1810: 10. Type species: *Cephalops aeneus* FALLÉN, 1810 by monotypy.

Cephalops spp. can be differentiated from other Pipunculidae by the combination of the following characters: pterostigma coloured, propleural fan present, mesonotum without bristles but with two dorsocentral lines of hairs, moderate or large size, face equal or subequal in width to lower part of frons. Vein M1+2 with or without an appendix; anal vein present.

Synonymy and detailed description of generic characters has been given in DE MEYER (1989). Specific differences between *Cephalops* and *Microcephalops* gen. nov. will be discussed under chapter of phylogeny.

Cephalops acuminatus (CRESSON, 1911)

(Figs. 1a-f, 23, 27)

Pipunculus acuminatus CRESSON, 1911: 297-298.

Body length: 3.1-4.3 mm.

Male.

Frons silver-grey pubescent. Third antennal segment short acuminate below; dull; pale colour, darker near base. Second antennal segment brown; approx. 3 long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 10 long, pale hairs. Mesonotum subshining black; brownish dusted, greyish along margins. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin; posteriorly longer hairs. Halteres yellowish brown. Pleura greyish dusted.

Legs mainly yellow, with femora dark. Coxae brown, narrowly yellow apically; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish. Femora shining ventrally and hind femora shining posteroventrally; dark with only apices narrowly yellow. Front femora ventrally with double row of approx. 4 spines at apical fourth, basally with few long pale hairs; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with anterior row of 6 spines over apical half and posterior row of 10 spines almost over entire length; otherwise like front femora but posterodorsal row with long pale hairs. Hind femora ventrally with double row of 6 spines over apical half, continued basally as row of long, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly a few longer but not erected bristly hairs; apically with spurlike protuberance. Tarsi yellow; all segments with short, pale hairs. Pulvilli approx. as long as last tarsal segment; claws slightly longer.

Wings (Fig. 23). Length 3.3-4.7 mm. M 1+2 furcated. Pterostigma fully coloured. Third costal section approx. 1.5 times as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen subshining brown, mainly brownish dusted. Tergum 1 greyish dusted; lateral fan with approx. 6 long pale hairs. Terga 2-4 anteriorly narrowly blackish brown dusted, otherwise sparser brownish dusted with lateral sides greyish. Tergum 5 as above but greyish dusting spreading towards middle. All terga furthermore with sparse, short, dark hairs, laterally longer hairs. Sterna dull, brown. Sternum 8 small; in dorsal view occupying less than half the length of tergum 5 (Fig. 1d). Membranous area oval shaped, in distal view occupying less than half of sternum 8; not reaching epandrium (Fig. 1e).

Male terminalia (Figs. 1a-c). Surstyli symmetrical; long; bifurcate with upper protuberance more elongated. Apical part of aedeagus simple, blunt end; symmetrical. Ejaculatory duct trifid; short tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in middle; shining for upper third. Third antennal segment long acuminate, yellowish. Abdomen more greyish dusted.

Female terminalia. Ovipositor long and slender, slightly curved downwards. Piercer longer than base (Fig. 27).

Distribution : USA : mountain ranges of southern Arizona, and New Mexico.

Holotype : ♀, USA : New Mexico, Alamogordo, 12.v.1902 (Cresson) (ANSP, Nr 5025), condition good.

Other type material examined : 1 ♀ paratype, same locality as holotype 8.v.1902; 1 ♀ paratype, same locality 30.iv.1902 (both ANSP).

Other material examined : USA : Arizona, 8 ♂♂, Ruby, 27.vii.1941 (Beamer) (SEM, USNM); 3 ♂♂, Baboquivari Mts, 24.vii.1941 (Beamer) (SEM); 2 ♀♀, Chiricahua Mts, 4.vii.1940 (Beamer) (SEM).

***Cephalops appendiculatus* (CRESSON, 1911)**

(Figs. 2a-e, 28)

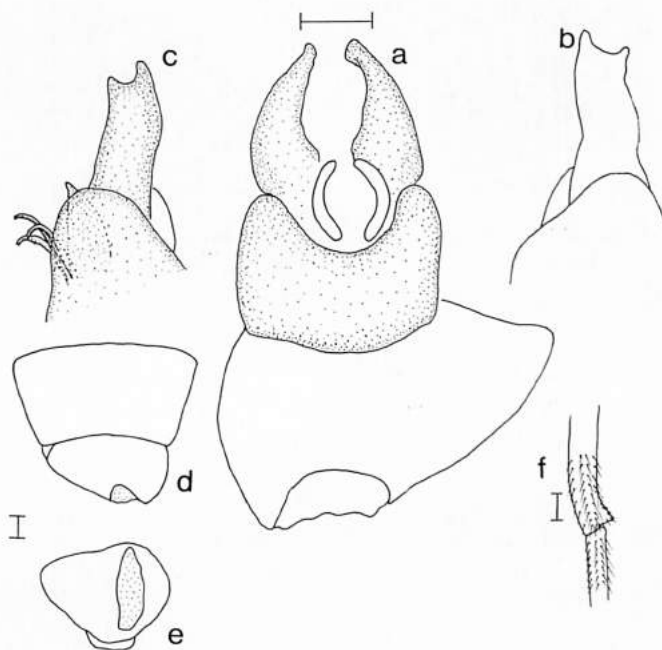
Pipunculus appendiculatus CRESSON, 1911 : 296-297.

Pipunculus eronis CURRAN, 1927 syn. nov.

Body length : 3.7-5.1 mm.

Male.

Frons silver-grey pubescent. Third antennal segment moderately long acuminate below; dull; pale yellowish colour, darker near base. Second antennal segment brown; approx. 3 long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons. Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 8-10 long, pale hairs. Mesonotum subshining black; brownish dusted, greyish

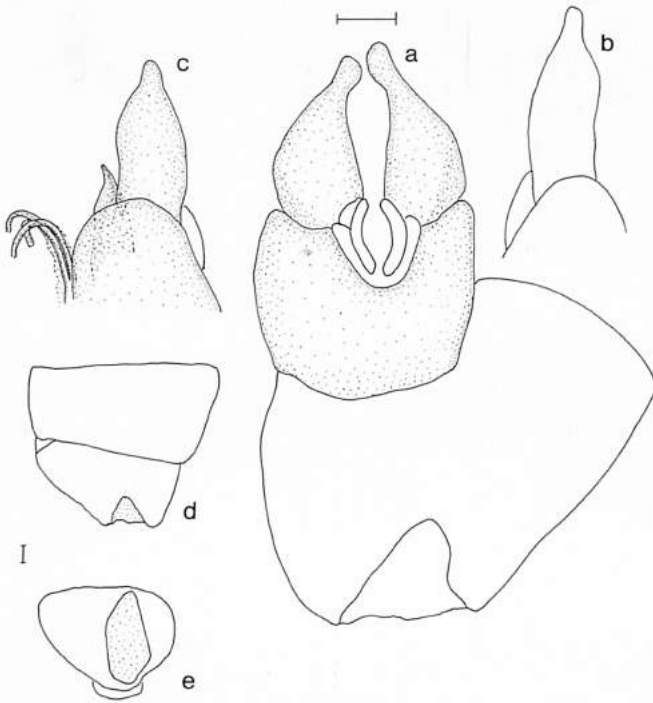


Figs. 1a-f. - *C. acuminatus*, male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, hind tibia apical part (scale 0.1 mm; pilosity not shown).

along margins. Scutellum same colour and dusting as centre mesonotum; with row of fine, longish, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted. Legs mainly yellow, with femora dark. Coxae yellowish brown; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish, below with few long pale hairs. Femora shining ventrally and hind femora shining posteroventrally; light brown with apices yellow. Front femora ventrally with double row of 3-6 spines at apical fourth, basally with few long pale hairs; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 8-12 spines over apical half; otherwise like front femora but posterodorsal row with long pale hairs. Hind femora ventrally with double row of 8 spines over apical half, continued basally as row of long, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, darkened in the middle; with dispersed rows of short, pale hairs, mid tibiae apically with longer hairs. Hind tibiae thickened in the middle with anteriorly a few longer, suberected bristly hairs; apically with spurlike protuberance. Tarsi yellowish brown, last tarsal segment darker; all segments with short, pale hairs. Pulvilli approx. as long as last tarsal segment; claws slightly longer.

Wings. Length 4.3-5.1mm. M 1+2 furcated. Pterostigma fully coloured. Third costal section 1.3 times longer than fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen subshining brown, mainly brownish dusted. Tergum 1 greyish dusted; lateral fan with approx. 6 long pale



Figs. 2a-e. - *C. appendiculatus*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

hairs. Terga 2-4 anteriorly narrowly blackish brown dusted, otherwise sparser brownish dusted with lateral sides greyish. Tergum 5 as above but greyish dusting spreading towards middle. All terga furthermore with sparse, short hairs, laterally longer hairs. Sterna dull, brown. Sternum 8 in dorsal view occupying about half the length of tergum 5 (Fig. 2d). Membranous area oval shaped, in distal view occupying less than half of sternum 8; not reaching epandrium (Fig. 2e).

Male terminalia (Figs. 2a-c). Surstyli symmetrical; broad base and apical ends slightly clavate. Apical part of aedeagus simple, blunt end; symmetrical. Ejaculatory duct trifid; short tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in middle; almost completely greyish pubescent. Third antennal segment longer acuminate. All legs less pilose. All femora dull except for hind femora shining posteroventrally. Tibiae more yellowish; hind tibiae without suberected bristles and spur.

Female terminalia. Base moderately broad. Piercer much longer than base; downcurved, near base truncated (Fig. 28).

Discussion: RAFAEL (1986) has placed this species in the newly erected genus *Parapipunculus*. However, study of the type material has shown that *C. appendiculatus* is a true *Cephalops* sp.: the dorsocentral hairs are arranged in

two lines. HARDY (1943) considered *C. eronis* to be synonymous with *C. brevis*. He mentioned that the new synonymy was based upon comparison of type of *brevis* with the original description of *eronis* and upon descriptive notes on *eronis*, made by W.J. Brown. After study of the holotype of *eronis* it has been concluded that *eronis* should be synonymised with *appendiculatus* and not with *brevis*.

Distribution: Canada, USA.

Holotype, ♂ USA: Vermont, Manchester, 9.vi.1910 (Johnson) (MCZ), good condition.

Other type material examined: paratypes: 1 ♀, USA, New York, Sea Cliff, Long Island (Banks) (MCZ, Nr 13560); 2 ♀, USA, Vermont, Mt. Equinox, 5.vi.1910. (MCZ) (ANSP).

Holotype *P. eronis*: ♀, CANADA: British Columbia, Lillooet, Seton Lake, 13.vi.1926 (McDunnough) (CNC, Nr 2421).

Other material examined: 51 specimens from the following areas. CANADA: British Columbia, New Brunswick, Ontario, Quebec. USA: Arizona, California, Georgia, Kansas, New Jersey, New York, North Carolina, Ohio, Texas, Vermont, Virginia.

***Cephalops biscaynei* (CRESSON, 1912)**

(Figs. 3a-e, 30)

Pipunculus biscaynei CRESSON, 1912: 453-454.

Body length: 3.2-4.2 mm.

Male.

Frons silver-grey pubescent. Third antennal segment moderately long acuminate; dull; pale colour. Second antennal segment brown, 1 short and 2 long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 6 hairs. Mesonotum subshining brownish black; brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish. Pleura greyish dusted.

Legs mainly yellow. Coxae brown, apically narrowly yellow, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish. Femora dull except for hind femora shining posteroventrally; yellow, sometimes slightly darkened dorsally. Front femora ventrally with double row of 4-5 spines over apical third; posterodorsal row of pale hairs over entire length; furthermore with dispersed short, pale hairs. Mid femora ventrally with double row of approx. 8 spines nearly over entire length; posterodorsal row of long pale hairs over entire length, otherwise like front femora. Hind femora ventrally with double row of 3 spines over apical fourth, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed rows

of short, pale hairs. Hind tibiae thickened in the middle with anteriorly a few longer but not erected hairs. Tarsi yellow; last tarsal segment darkened; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer.

Wings. Length 3.4-4.5 mm. M 1+2 furcated. Pterostigma fully coloured. Third costal section about as long as fourth costal section. r-m placed at basal two-fifths of discal cell. Abdomen subshining brown, partly dusted. Tergum 1 black brown dusted, greyish on posterolateral sides; lateral fan poorly developed with 3 dark hairs. Terga 2-4 in anterior part densely dark brown dusted; posteriorly sparser brownish dusted, subshining; laterally greyish dusted. Tergum 5 same but greyish dusting more extensive and spreading towards middle. Terga furthermore with sparse, dark hairs. Sterna dull, brown. Sternum 8 brownish dusted; long, in dorsal view more than half the length of tergum 5 (Fig. 3d). Membranous area large, dividing sternum in two parts; reaching tergum 5, broadened in distal part, below reaching epandrium (Fig. 3e).

Male terminalia (Figs. 3a-c). Surstyli symmetrical, broad with upper protuberance elongated. Apical part of aedeagus complicated structure with apical end membranous, and with spines. Ejaculatory duct trifid, long tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in middle; shining for upper half. Third antennal segment longer acuminate. Third costal section slightly shorter than fourth section. Abdomen more greyish dusted. In general less pilose.

Female terminalia. Base moderately broad. Piercer straight, slightly longer than base (Fig. 30).

Distribution: Mainly northeastern part of USA, also from Florida and Kansas.

Holotype, ♀ USA: Florida, Biscayne Bay, (Slosson) (ANSP, Nr 5255). Condition good.

Other material examined: 18 specimens from the following areas. USA: Florida, Kansas, Maryland, Michigan, New York, North Carolina, Pennsylvania, Virginia.

Cephalops brevis (CRESSON, 1911)

(Figs. 4a-e, 31)

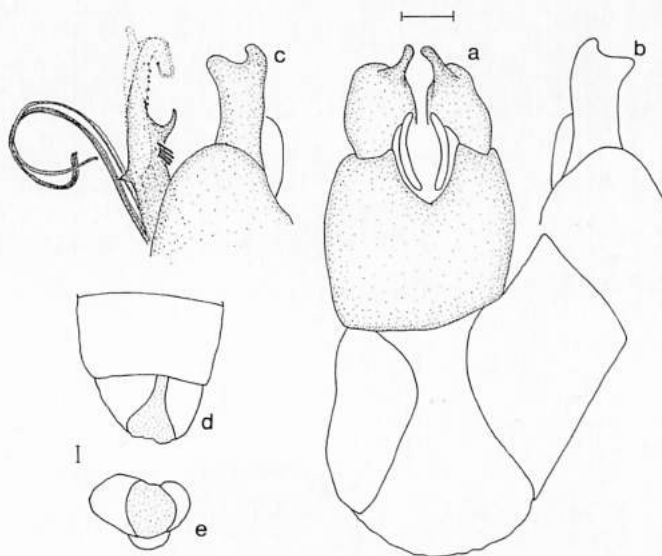
Pipunculus brevis CRESSON, 1911: 303-304.

Body length: 3.1-3.8 mm.

Male.

Frons silver-grey pubescent. Third antennal segment acuminate; dull; yellowish colour or pale brownish. Second antennal segment brown; 1 short and 2 long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 8 long hairs. Mesono-



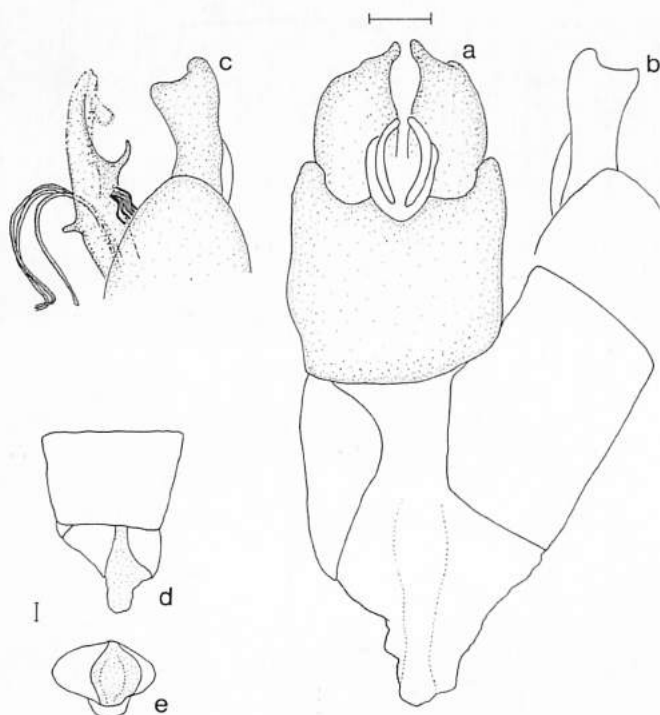
Figs. 3a-e. - *C. biscoynei*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

tum subshining black; brownish dusted, greyish along margins. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs. Coxae brown, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish brown. Femora dull except for hind femora shining posteroventrally; dark with only apices narrowly yellow (occasionally more extensive yellow). Front femora ventrally with double row of 4-5 spines at apical third; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed, short hairs. Mid femora ventrally with anterior row of 6 spines over apical half and posterior row of approx. 10 spines nearly over entire length, basally few long pale hairs; otherwise like front femora but posterodorsal row of moderately long pale hairs. Hind femora ventrally with double row of 5 spines over apical third, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow darkened in the middle; with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly few suberected, dark, bristly hairs. Tarsi yellow; last tarsal segment darkened; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer.

Wings. Length 3.1-3.9 mm. M 1+2 furcated. Pterostigma fully coloured. Third costal section as long as or slightly longer than fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen subshining black-brown, partly dusted. Tergum 1 greyish dusted; lateral fan poorly developed with 2-3 short hairs. Terga 2-4 anteriorly densely blackish dusted; posterior part sparser brownish dusted, subshining; late-



Figs. 4a-e. — *C. brevis*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

rally greyish. Tergum 5 idem but greyish dusting more extensive and spreading towards middle. Terga furthermore with sparse, dark hairs. Sterna dull, brown. Sternum 8 brownish dusted; large, in dorsal view longer than half the length of tergum 5 (Fig. 4d). Membranous area large, dividing sternum in two parts; reaching tergum 5, broadened in distal part and usually with distinct keel, below reaching epandrium (Fig. 4e).

Male terminalia (Figs. 4a-c). Surstyli symmetrical; broad, bifurcate. Apical part of aedeagus complicated structure, apically membranous with spines. Ejaculatory duct trifid, long tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in middle; in upper half shining black. Third antennal segment slightly longer acuminate. Margins on mesonotum more greyish dusted. Legs more yellowish. Hind tibiae without erected bristly hairs. Third costal section shorter. Abdomen more greyish dusted.

Female terminalia. Base moderately broad. Piercer straight, about as long as base (Fig. 31).

Distribution : Canada, USA.

Holotype : ♀, USA, Vermont, Norwich, 8.vii.1908 (Johnson) (MCZ, Nr 26984), condition good.

Material examined : 388 specimens from the following areas. CANADA : Alberta, Manitoba, Ontario, Quebec,

Saskatchewan. USA : Arizona, California, Colorado, Georgia, Idaho, Indiana, Minnesota, New Jersey, North Dakota, Oregon, Pennsylvania, Texas, Utah, Vermont.

Cephalops filicerus sp. nov.

(Figs. 5a-e, 32)

Body length : 4.5-4.8 mm.

Male.

Frons silver-grey pubescent. Eyes separated above for length approx. twice ocellar triangle. third antennal segment brightly yellow; long filiform below. Second antennal segment brownish; long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark. Propleural fan well developed with approx. 6 long hairs. Mesonotum brown pubescent. Scutellum same colour and dusting as centre mesonotum; with row of long bristly hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs dark. Coxae dark brown, with few dispersed hairs; mid coxae anterodistally with long bristly hairs. Trochanters yellowish brown; ventrally with long hairs. Femora dull except for hind femora shining posteroventrally; dark with only apices narrowly yellowish. Front femora ventrally with double row of 4-5 spines at apical third, basally long hairs; posterodorsal row of moderately long hairs; furthermore with dispersed short hairs. Mid femora ventrally with double row of 10 spines nearly over entire length; otherwise as front femora but posterodorsal row with longer hairs. Hind femora ventrally with double row of 5 spines over apical third, continued basally as long hairs; anterodorsal and posterodorsal row of short hairs. Tibiae dark yellowish, browned in the middle; with dispersed rows of short, pale yellowish hairs. Hind tibiae thickened in the middle with anteriorly few long suberected pale hairs. Tarsi yellowish brown; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment, claws approx. as long as segment.

Wings. Length 4.7-4.9 mm. M 1+2 not furcated. Pterostigma fully coloured. Third costal section long, approx. twice as long as fourth section. r-m placed at basal two-fifths of discal cell.

Abdomen brown, with sparse dusting. Tergum 1 greyish dusted; lateral fan well developed with 4-5 long darkish hairs. Terga 2-5 anteriorly black brown dusted; posteriorly greyish dusted, laterally brownish. All terga furthermore with sparse, short hairs. Sternum 8 brownish grey dusted; in dorsal view more than half the length of tergum 5 (Fig. 5d). Membranous area nearly reaching tergum 5; below reaching epandrium, small indistinct keel present (Fig. 5e). Male terminalia (Figs. 5a-c). Surstyli symmetrical; long and slightly bifurcate. apical part of aedeagus distally with short, furcated structure; furthermore with hooklike protuberances. Ejaculatory duct trifid; long, tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in the middle; shining for upper third. Thorax and abdomen more greyish dusted. Legs more yellowish. No suberected hairs on hind tibiae.

Female terminalia. Base short, stout. Piercer long, distinctly downcurved apically (Fig. 32).

Discussion : This species seems to be very closely related to *Cephalops mocaensis* (HARDY, 1948b) from the West Indies. Both show a bright yellow, filiform third antennal segment and a stout, downcurved piercer. However, according to the original description, the piercer of *C. mocaensis* seems to be longer than in *filicerus* specimens. Unfortunately, only the female of *mocaensis* is known.

Etymology : Referring to the long filiform third antennal segment.

Distribution : Western part of North America : Washington, British Columbia.

Holotype, ♂ CANADA : British Columbia, U.B.C. Forest near Haney, Garibaldi Pk, 6-7.vii.1953, (Mason) (CNC).

Allotype, ♀ CANADA : British Columbia, Mt Thornbill near Terrace, 30.vii.1960 (Heming) (CNC).

Paratype : 1 ♀, USA, Washington, Quilcene, 20.viii. (Shannon) (USNM).

Other material : 1 ♀, USA : Washington, same date and locality as paratype (USNM).

***Cephalops maximus* (HARDY, 1943)**

(Figs. 6a-e)

Cephalosphaera maxima HARDY, 1943 : 50-51.

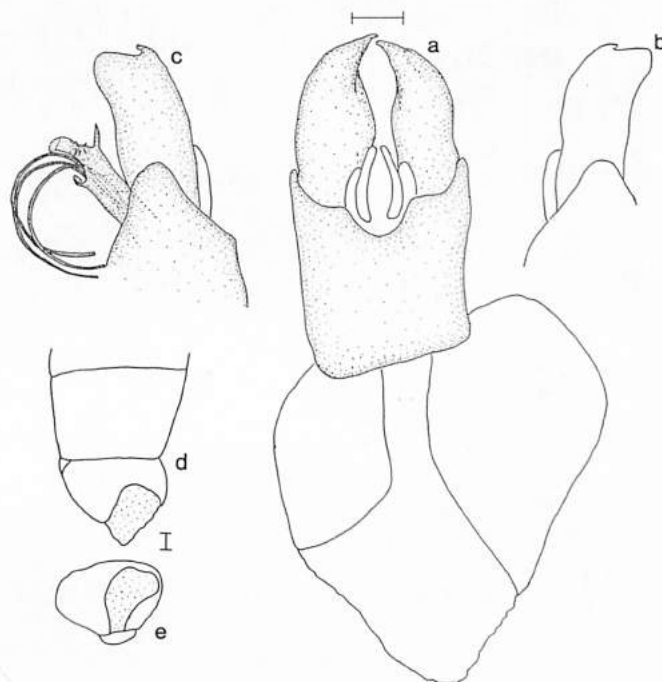
Body length : 6.5 mm.

Male.

Frons silver-grey pubescent. Third antennal segment moderately long acuminate; dull; pale brownish colour, lighter in colour than second segment. Second antennal segment dark brown; 4 long ventral bristles, all longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 11 long hairs. Mesonotum subshining black-brown; dusted (dusting discoloured in holotype). Lateral margins anteriorly with tuft of longish hairs. Scutellum same colour and dusting as centre mesonotum; with row of long pale hairs along margin. Halteres dark. Pleura greyish dusted.

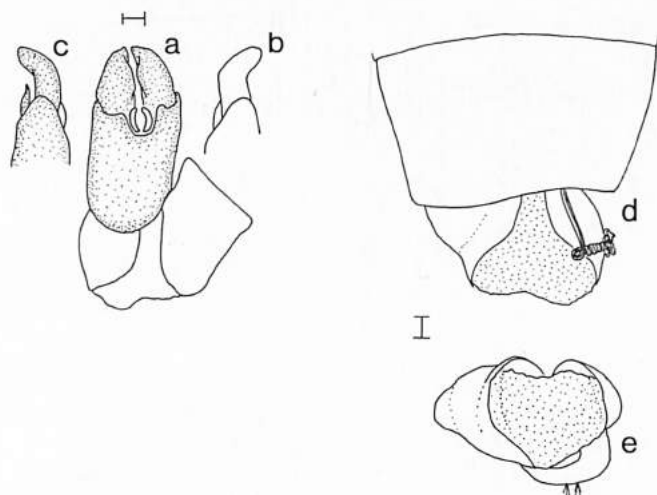
Legs dark. Coxae black-brown, with few dispersed pale hairs, mid and hind coxae anterodistally with few long hairs. Trochanters blackish; all with tuft of long hairs underneath. Femora dull except for hind femora shining posteroventrally; dark with extremities narrowly yellow. Front femora ventrally with double row of approx. 7 spines



Figs. 5a-e. - *C. filicerus* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

at apical half, continued basally as row of pale hairs; posterodorsal row of moderately long pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 10-15 spines nearly over entire length, basally with tuft of long, pale hairs; otherwise like front femora, but posterodorsal row with longer hairs. Hind femora ventrally with double row of approx. 7 spines over apical third, continued basally as row of long, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae dark yellow, apically browned, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with few longer and darker but not erected bristly hairs anteriorly. Tarsi brownish; all segments with short, pale hairs. Pulvilli about as long as last tarsal segment; claws slightly longer. Wings. Length 6.2 mm. M 1+2 furcated. Pterostigma fully coloured. Third costal section about as long as fourth costal section. r-m placed near middle of discal cell. Anal vein present.

Abdomen completely dull with brownish black dusting. Tergum 1 mainly greyish brown dusted, posterolaterally dark brown dusted; lateral fan well developed with 7-10 darkish hairs. Terga 2-5 anteriorly with dark brown dusting, posteriorly paler brown; posterolaterally small greyish dusted, tergum 5 more greyish dusted. Terga furthermore with short, pale hairs; along lateral margins with moderately long pale hairs. Sterna brown, dull. Sternum 8 greyish brown dusted; in dorsal view larger than half the length of tergum 5 (Fig. 6d). Membranous area very large, occupying most of sternum 8, dividing it in two parts. Reaching



Figs. 6a-e. - *C. maximus*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

tergum 5 above, broadened in the middle and narrowly elongated downwards, reaching epandrium (Fig. 6e).

Male terminalia (Figs. 6a-c) (not dissected, studied in situ). Surstyli symmetrical, broad with blunt end apically; in lateral view slightly bent ventrally. Apical part of aedeagus appears to be simple. Ejaculatory duct trifid (?), very long and strongly coiled apically.

Female

As male except for the following characters. Frons not broadened in the middle; silver-grey pubescent, weakly subshining black in upper part. Abdomen with greyish patches larger, occupying most of the lateral sides.

Female terminalia. Base broad, distinct protuberance near basal portion of piercer. Piercer long, stout, slightly down-curved.

Distribution : USA : Arizona.

Holotype, ♂ USA : Arizona, Chiricahua Mts. 4.vii.1940 (Lipovsky) (SEM); good condition, most legs have last tarsal segments missing.

Cephalops reductus sp. nov.

(Figs. 7a-e, 29)

Body length : 2.6-3.5 mm.

Male.

Frons silver-grey pubescent. Third antennal segment moderately long acuminate; dull; yellowish colour. Second antennal segment brown; 3 long ventral bristles, longer than segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 6 long hairs. Mesono-

tum subshining black; brownish dusted, greyish along lateral margins. Scutellum same colour and dusting as centre mesonotum; posteriorly with some fine, long, pale hairs along margin, laterally with short hairs. Halteres brown. Pleura greyish dusted.

Legs. Coxae brown, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish brown. Femora shining ventrally, hind femora posteroventrally; dark with only apices narrowly yellow. Front femora ventrally with double row of 4 spines at apical third, basally continued as row of short pale hairs; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of approx. 8 spines over apical half, continued basally as moderately long hairs; otherwise like front femora but posterodorsal row with moderately long pale hairs. Hind femora ventrally with double row of 8 spines over apical half, continued basally as moderately long, pale hairs; anterodorsal row of short and posterodorsal row of moderately long pale hairs; furthermore dispersed short, pale hairs. Tibiae yellowish, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 2 suberected bristles. Tarsi yellow; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer.

Wings. Length 3-4 mm. M 1+2 usually furcated; appendix very short and sometimes missing. Pterostigma fully coloured. Third costal section long, more than 1.5 times longer than fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen subshining black-brown, completely dusted. Tergum 1 greyish dusted; lateral fan with approx. 4 short pale hairs. Terga 2-4 brownish dusted in median part; laterally extensive greyish dusted. Tergum 5 idem but greyish dusting more extensive and spreading towards middle. Terga furthermore with sparse, dark hairs. Sterna dull, brown. Sternum 8 subshining, brownish dusted; large, in dorsal view longer than half the length of tergum 5 (Fig. 7d). Membranous area oval shaped; in distal view occupying less than half of sternum; not reaching epandrium (Fig. 7e). Male terminalia (Figs. 7a-c). Surstyli symmetrical; long with moderately elongated ends. Apical part of aedeagus simple, symmetrical and blunt end. Ejaculatory duct trifid; simple, short tubiform. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in middle; completely greyish pubescent except for small shining patch in front of ocellar triangle. Third antennal segment longer acuminate. Femora more yellowish and with shorter hairs. Hind tibiae without suberected bristly hairs and spur less developed. Third costal section about twice as long as fourth section.

Female terminalia. Base long, slender. Piercer about as long as base, moderately downcurved apically, truncated near base (Fig. 29).

Etymology : Referring to the often reduced appendix in vein M1+2.

Distribution : Canada : Ontario.

Holotype, ♂ CANADA : Ontario, 5 mi. east of Ottawa, Mer blue, 7.vii.1966, (Munroe, Malaise trap) (CNC).

Allotype, ♀ CANADA : same locality and date as holotype (CNC).

Paratypes, CANADA : same locality as holotype, 1 ♂ 23.vi.1966; 1 ♂ 1 ♀ 29.vi.1966; 1 ♂ 5.vii.1966; 1 ♂ 7.vii.1966; 1 ♀ 16.vii.1966. Two paratypes deposited in collections KBIN, others in CNC.

***Cephalops pallidivittipes* sp. nov.**

(Figs. 8a-h, 33)

Body length : 3.7-4.6 mm.

Male.

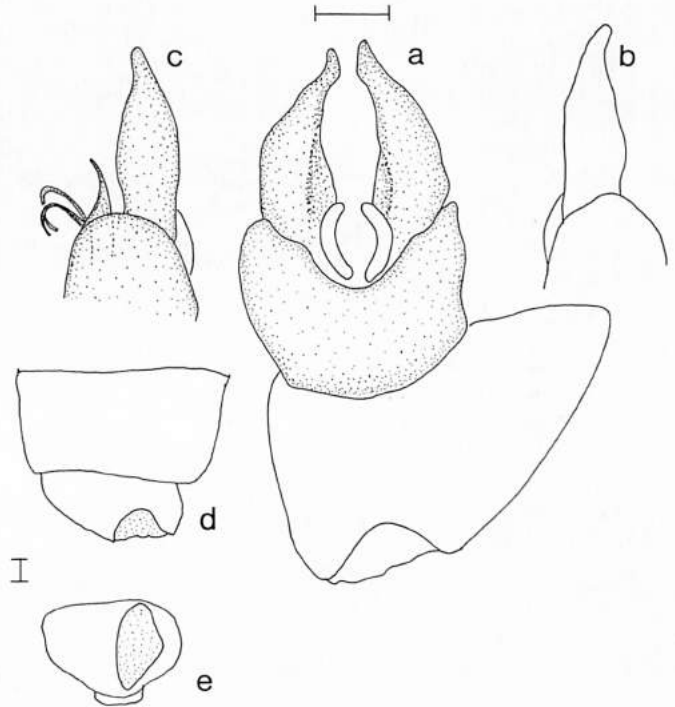
Frons silver-grey pubescent. Third antennal segment obtuse below; dull; bright yellow. Second antennal segment brownish; 2-3 ventral bristles, shorter than or as long as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri yellow. Propleural fan well developed with 6-8 long hairs. Mesonotum subshining black; greyish dusted in anterior part, otherwise brownish. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs yellow. Front coxae brown with apical margin yellowish; mid coxae more extensive yellow; hind coxae completely yellow; all with few dispersed pale hairs, mid coxae anterodistally with few distinct bristly hairs. Trochanters yellow. Femora dull except for hind femora shining posteroventrally; completely yellow. Front femora without ventral spines, at most a few bristly hairs apically, otherwise dispersed short pale hairs; posterodorsal row of short, pale hairs over entire length; furthermore with few dispersed short, pale or darkish hairs. Mid femora ventrally with double row of approx. 15 spines nearly over entire length; otherwise like front femora. Hind femora ventrally with double row of 6-7 spines over apical third, posterior row continued basally as short, pale hairs; anterodorsal row of darkish hairs, posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 1-2 erected bristles. Tarsi yellow, last tarsal segment sometimes darkened; all segments with short hairs. Pulvilli as long as last tarsal segment; claws slightly longer.

Wings. Length 4.2-5.3 mm. M 1+2 not furcated, almost straight in apical part. Pterostigma fully coloured. Third costal section very long, about twice as long as fourth costal section. r-m placed at basal fourth of discal cell.

Abdomen subshining pale brown, sparsely dusted, last segments more extensively so. Tergum 1 greyish dusted; lateral fan well developed with 7 long, darkish hairs. Terga 2-4 pale brown, posterolaterally with yellow patches of variable size; sometimes barely present, or extending till



Figs. 7a-e. - *C. reductus* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

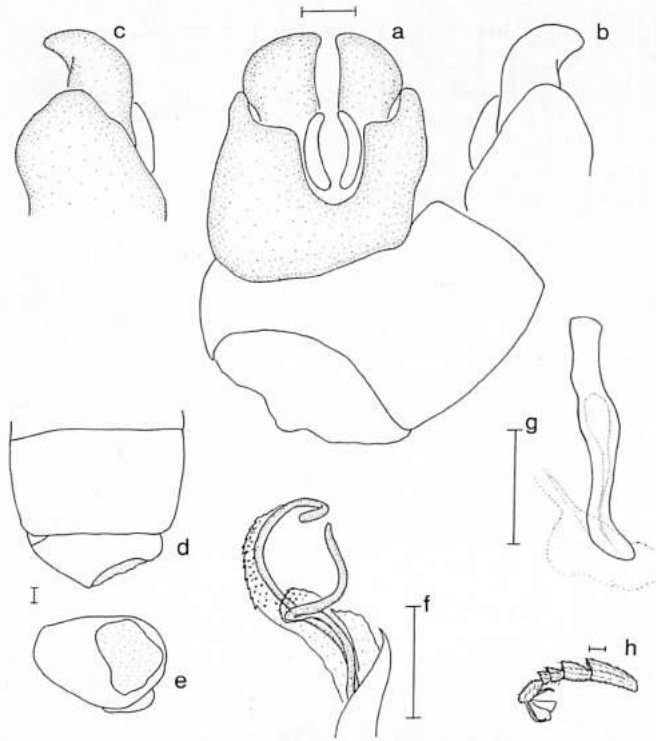
median part. Yellow patches covered with greyish dusting. Tergum 5 brownish grey dusted. All terga with dispersed, dark hairs. Sterna brownish yellow; dull, bare. Sternum 8 brownish; in dorsal view about half the length of tergum 5 (Fig. 8d). Membranous area of moderate size, in distal view not occupying more than half of sternum 8; reniform (Fig. 8e).

Male terminalia (Figs. 8a-c, f). Epandrium yellowish. Surstyli yellowish, broad, symmetrical; with bluntly pointed end bent ventrally. Apical part of aedeagus simple. Ejaculatory duct bifid, tubiform; with longitudinal row of minute teeth in terminal part. Ejaculatory apodema tubiform (Fig. 8g).

Female.

As male except for following characters. Frons slightly broadened in middle; silver-grey pubescent except in upper part shining for length equal to ocellar triangle. Third antennal segment short acute. Mesonotum more greyish dusted. Front and mid tibiae with distinct apical spurs. Hind tibiae with median bristles suberected. Pulvilli and claws larger. Hind tarsi flattened laterally (Fig. 8h). Wings with third costal section about 1.5 times as long as fourth. Abdominal terga more greyish dusted along lateral margins.

Female terminalia. Base broad, short; straight above, globose below. Distinct protuberances near apex. Piercer straight, stout; very short, in lateral view triangular in shape (Fig. 33).



Figs. 8a-h. — *C. pallidivittipes* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus and ejaculatory duct lateral; g, ejaculatory apodema; h, female, hind tarsi (scale 0.1 mm; pilosity not shown).

Discussion: *pallidivittipes* is very closely related to the European species *vittipes*. The former can be differentiated by the yellow spots on the abdominal terga (although they are also sometimes present in *vittipes* specimens, but not so outspoken), and the yellow humeri in the males. The male genitalia are identical but the female ovipositor has a different shape: in *pallidivittipes* the base is shorter and more globose, and the protuberances near the basal part of the piercer are more developed.

Etymology: Refers to the resemblance with *vittipes* with the apparent distinction in colour.

Distribution: Mainly eastern part of USA and Canada; few records from western states.

Holotype, ♂ USA: Maryland, Laurel, 14.vi.1965 (malaise trap) (CNC).

Allotype, ♀ USA: same date and locality as holotype (CNC).

Paratypes: CANADA: Quebec, 1 ♀, Gatineau county, Masham Twp, 10-20.vii.1974 (Wood); Old Chelsea, Summit King Mt., 1 ♂, 16.vi.1961; 1 ♀, 8.vi.1964; 1 ♀, 16.vi.1971; 1 ♂, 3.vi.1972 (Vockeroth); Hull, 1 ♀, 5.vi.1959; 1 ♂, 14.vi.1959 (Vockeroth); Duncan Lake, near Rupert, 1 ♂, 10.vi.1971; 1 ♀, 17.vi.1971 (Mc Alpine); 1 ♂, Pink's Lake G.P., 15.vi.1961 (Clark); Mt St. Hilaire, 1 ♀, 4.vi.1963; 1 ♀, 14.vi.1964 (Vockeroth); 1 ♀, Wake-

field, 9.vii.1946 (Skewell); 1 ♀, Kam. County, Parke Reserve, 8.vii.1957 (Shewell); Ontario, 2 ♂♂ 3 ♀♀, Merivale, 20.vi.1957 (Chillcott); 1 ♂ 2 ♀♀, Midland, 2.v.1959 (Chillcott); Ottawa, 1 ♂ 1 ♀, 8-10.viii.1946 (Shewell); 1 ♂, 6.vi.1958 (Shewell); 1 ♀, 27.vi.1966 (Munroe); 1 ♂, Vernon, 3.vi.1957 (Chillcott); 1 ♂, Shetland, 18.vii.1962 (Clark); 1 ♀, Wallaceburg, 3.vi.1957 (Chillcott); 1 ♂, Saskatchewan, Scout Lake, 17.vi.1955 (Vockeroth) (all CNC). USA: 3 ♀♀, same locality and date as holotype; 1 ♂, same locality as holotype, 9.vi.1965 (CNC); 1 ♀, Michigan, Berrien county, St. Joseph, 19.vi.1975 (Wilder) (CAS); 3 ♂♂ 1 ♀, Connecticut, Avon, 15-19.vi.1929, (Curran) (AMNH); Pennsylvania, 1 ♀, Center county, State College, 24.vii.1972 (Wilder) (CAS); 1 ♀, Lycoming county, Ralston, 8.vi.1962 (Vockeroth) (CNC); 1 ♀, Roxborough, v.1903; 1 ♂, Swarthmore (ANSP); Tennessee, 1 ♂, Memphis (Hull); 1 ♀, Great Smokey Mt N.P., 18.v.1957 (Vockeroth) (CNC); 2 ♀♀, Vermont, Essex county, Bloomfield, 28.vi.1972 (Teskey) (CNC); 1 ♀, Virginia, Rockbridge, 7.vi.1962 (Vockeroth). Holotype and allotype in CNC, paratypes deposited in AMNH, ANSP, CAS, CNC and KBIN.

Other material examined: 59 specimens from the following areas. CANADA: Alberta, British Columbia, New Brunswick, Ontario, Quebec. USA: Idaho, Indiana, Maine, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Rhode Island, Virginia, Wyoming.

Cephalops furnaceus sp. nov.

(Figs. 9a-f, 34)

Body length: 4.2-4.9 mm.

Male.

Frons silver-grey pubescent. Third antennal segment obtuse below; dull; brownish colour, same colour or slightly paler than second segment. Second antennal segment brown; approx. 3 ventral bristles, as long as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 7 hairs. Mesonotum subshining black; sparsely brownish dusted. Scutellum same colour and dusting as mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs yellow with dark patches; variable coloration. Coxae brown, apical part yellowish, hind coxae more extensive yellowish; with few dispersed pale hairs, mid coxae anterodistally with few distinct bristly hairs. Trochanters yellow. Femora dull except for hind femora shining posteroventrally; of variable coloration, usually yellow with brown patch in upper basal part, sometimes extending over entire dorsal length and along basal lateral sides. Front femora ventrally with poorly developed double row of approx. 4 spines at apical third, sometimes only bristly hairs; postero-dorsal row of short, pale hairs over entire length; further-

more with dispersed short, hairs. Mid femora ventrally with double row of approx. 15 spines nearly over entire length; otherwise like front femora. Hind femora ventrally with double row of 6 spines over apical part, front row continued basally as short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow with brown markings of variable size, all with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 1-2 erected bristles. Tarsi yellowish brown, last tarsal segment darker; all segments with short, pale hairs. Pulvilli as long as last tarsal segment; claws slightly longer.

Wings. Length 4.6-5.6 mm. M 1+2 not furcated, almost straight in apical part. Pterostigma fully coloured. Third costal section very long, about twice as long as fourth costal section. r-m placed at basal fourth of discal cell.

Abdomen subshining black brown, moderately dusted. Tergum 1 greyish dusted; lateral fan well developed with 6-8 long dark hairs. Terga 2-4 subshining with brownish dusting on median part, greyish dusted along posterior third, more so laterally. Terga furthermore with sparse, dark hairs. Sterna brownish; dull. Sternum 8 brownish dusted; in dorsal view very small, less than half the length of tergum 5 (Fig. 9d). Membranous area of moderate size, in distal view not occupying more than half of sternum 8; irregularly oval shaped, not reaching epandrium (Fig. 9e).

Male terminalia (Figs. 9a-c, f). Surstyli broad, symmetrical; with bluntly pointed end bent ventrally. Apical part of aedeagus simple, pointed. Ejaculatory duct bifid, tubiform; with longitudinal rows of minute teeth in terminal part. Ejaculatory apodema tubiform.

Female.

As male except for following characters. Frons slightly broadened in middle; silver-grey pubescent except for shining part in front of ocellar triangle. Third antennal segment short acute. Humeri yellowish; mesonotum more greyish dusted along margins. Front and mid tibiae with distinct apical spurs. Hind tibiae with median bristles suberected. Pulvilli and claws larger. Hind tarsi flattened laterally. Third costal section 1.3 times fourth section. Abdomen long and slender; more greyish dusted.

Female terminalia. Base broad, short; straight above, rounded below. Small protuberance near apex. Piercer straight, stout; slightly shorter than or as long as base (Fig. 34).

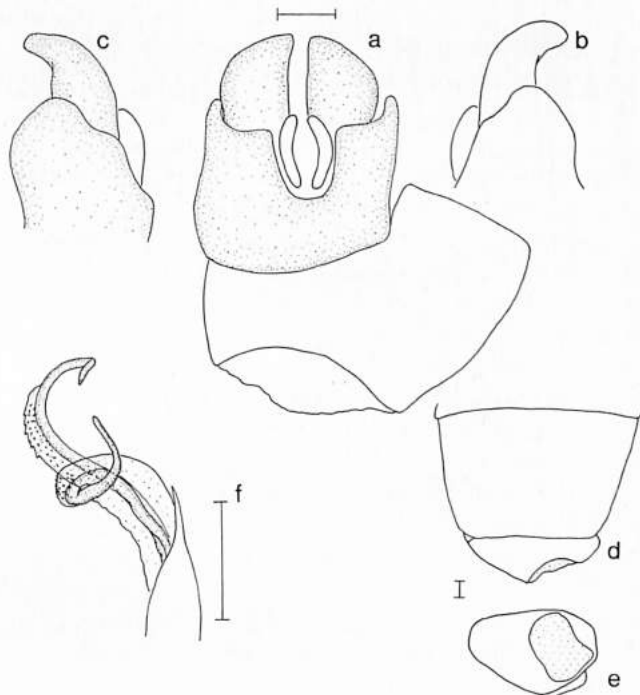
Etymology: From the Latin for "baked", referring to the darkened or "baked" appearance.

Distribution: Canada and Alaska.

Holotype ♂ CANADA: British Columbia, 5 mi W of Terrace, 3.vi.1960 (Chillcott) (CNC).

Allotype ♀ USA: Alaska, Isabel Pass, Richardson Hwy, 18.vii.1962 (Skiteko) (CNC).

Paratypes CANADA: 1 ♂, Alberta, Waterton Lakes N.P., 7-12.vii.1980 (Teskey); British Columbia, 3 ♂♂ 2 ♀♀, Lakelse Lake, near Terrace, 14.vi.1960 (Shewell, Pilfrey);



Figs. 9a-f. - *C. furnaceus* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus and ejaculatory duct lateral (scale 0.1 mm; pilosity not shown).

1 ♂, 32 mi SW of Terrace, 4.vi.1960 (Shewell); 1 ♀, Terrace, 11.vi.1960 (Chillcott); 6 mi W of Terrace, Cagnon Rd, 2 ♀♀, 8.vi.1960; 1 ♀, 29.vi.1960 (Chillcott); 1 ♀, 14 mi E of Terrace, 17.vi.1960 (Mann); 1 ♂, Mission City, 9.vi.1953 (Mason) (all CNC). USA: Alaska: 1 ♂ 2 ♀♀, same locality and date as allotype; 2 ♂♂ 1 ♀, Unakleet, 11.viii.1961 (Madge) (CNC). Four paratypes deposited in KBIN, all other type material in CNC.

Other material examined: CANADA: Alberta, 1 ♂, Frank, 15.vi.1962 (Mason); 1 ♂, 20 mi W of Calgary, Jumping Pd., 23.vi.1962 (Mason); 1 ♂, British Columbia, Revelstoke, 2.vii.1973 (Teskey); 1 ♂, Saskatchewan, Saskatoon, 1.vi.1949 (Vockeroth) (all CNC).

Cephalops grootaerti sp. nov.

(Figs. 10a-f, 24, 35)

Body length: 3.5-4.6 mm.

Male.

Frons silver-grey pubescent. Third antennal segment obtuse below; dull; yellowish brown, same colour as or slightly lighter than second segment. Second antennal segment light brown; 2 long and 1-2 short ventral bristles, the longest equal in length to segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri yellow. Propleural fan well developed with approx. 9 long hairs. Mesonotum subshining black; sparsely brownish dusted. Scutellum same colour and dust-

ing as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish with brownish tinge. Pleura greyish dusted.

Legs mainly yellow. Coxae brown, apical part yellowish; with few dispersed pale hairs, mid coxae anterodistally with few distinct bristly hairs. Trochanters yellow. Femora dull except for hind femora shining posteroventrally; yellow. Front femora ventrally with double row of approx. 9 spines at apical part; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, pale and darkish hairs. Mid femora ventrally with double row of spines nearly over entire length, except basally with few pale hairs; otherwise like front femora. Hind femora ventrally with double row of approx 9 spines over apical half, continued basally as row of short, pale hairs; anterodorsal row of short, darkish and often bristly hairs, posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed row of short, slightly darkened hairs. Hind tibiae thickened in the middle with anteriorly 1-2 erected bristles, as long as width of tibia. Front and mid tibiae apically with indistinct spur. Tarsi yellow; last tarsal segment brownish; all segments with short, darkish hairs. Pulvilli as long as last tarsal segment; claws slightly longer.

Wings (Fig. 24). Length 3.9-5.4 mm. M 1+2 not furcated, strongly undulating. Pterostigma fully coloured. Third costal section approx. 1.5 times as long as fourth costal section. r-m placed at basal fourth of discal cell.

Abdomen shining brown, only sparsely dusted. Tergum 1 greyish dusted; lateral fan well developed with 6-8 long darkish hairs. Terga 2-5 mainly shining brown, very sparsely brownish dusted on median part, along lateral margins more greyish. Furthermore all terga with sparse, dark hairs. Sterna brownish dusted, bare. Sternum 8 brown; in dorsal view about half the length or somewhat longer than tergum 5 (Fig. 10d). Membranous area large, irregular reniform shape; not reaching epandrium (Fig. 10e).

Male terminalia (Figs. 10a-c, f). Epandrium yellowish. Surstyli yellowish, long; asymmetrical, in dorsal view outer surstylus longer and more elongated at apical part; in lateral view inner surstylus with distinct protuberance in middle. Apical part of aedeagus simple, bluntly pointed. Ejaculatory duct bifid (with small remainder of third ductulus), tubiform; ductuli in terminal part with approx. 3 well developed teeth along margin. Ejaculatory apodema tubiform.

Female.

As male except for following characters. Frons slightly broadened in middle; completely silver-grey pubescent except for small patch in front of ocellar triangle. Third antennal segment short acute. Hind coxae more yellowish. Ventral spines on femora less developed. Front and mid tibiae with distinct apical spurs; median bristles on hind tibiae shorter. Pulvilli larger. Hairs on tibiae and tarsi paler. Third costal section about 1.2 times as long as fourth. Abdomen long and slender; terga more greyish dusted along lateral margins.

Female terminalia. Base large, flattened above; without

distinct protuberance. Piercer shorter than base, shining, straight (Fig. 35).

Discussion : *C. grootaerti* is very similar to its Palaearctic sister-species *C. aeneus* FALLÉN. Males can be distinguished by the yellowish epandrium and surstyli, by the less clavate and elongated ends of the surstyli, by the stronger developed median protuberance on inner surstylus and fewer teeth on the aedeagal ductuli. Females can be differentiated by the flattened base of ovipositor.

Etymology : Named after Dr. P. Grootaert, head of entomology department of the KBIN and specialist on Empidoidea, who has encouraged this study.

Distribution : Canada and USA.

Holotype, ♂ CANADA : Ontario, Ottawa, Mer Blue, 1.ix.1966 (Munroe) (CNC).

Allotype, ♀ CANADA : Same locality as holotype, 1.vii.1966 (CNC).

Paratypes : CANADA : Ontario, same locality as holotype, 1 ♂ 1 ♀, 3.vii.1966; 4 ♂, 30.viii.1966; 4 ♂, 1.ix.1966; 2 ♂♂, 8.ix.1966; 2 ♂♂ 1 ♀, Midland, 20.viii.1955 (Chilcott); 1 ♂, Ottawa, 23.vi.1963 (Chilcott); 1 ♂, Ottawa (Vockeroth); 1 ♂, Stittsville, 21.ix.1963 (Mason); 2 ♀♀, Maynooth, 9-10.vii.1965 (McAlpine); 1 ♂, Alberta, Banff, Johnson Canyon, 30-31.vii.1962 (Herrmann); Manitoba, 1 ♂, Ninette, 12.v.1958 (McAlpine); 1 ♀, Clear Lake, Riding Mountain N.P., 12.viii.1958 (Chilcott); Quebec, Old Chelsea, 1 ♂, 25.vi.1959 (Chilcott); 1 ♂, 11.vi.1959, 1 ♂, 20.ix.1961 (Vockeroth); 1 ♀ Duncan Lake, near Rupert, 20.vii.1969 (McAlpine); 1 ♀ Breckenridge, 11.vi.1959 (Mann); 1 ♀, kam. county, Parkke Reserve, 14.viii.1957 (Mason); Saskatchewan, 1 ♀, St. Victor, 27.vi.1955 (Vockeroth) (all CNC); British Columbia, 1 ♀, Liard, Hot Springs, 5.viii.1959 (Kessel) (CAS). USA : Alaska, 3 ♀♀, Anchorage, 22.vii.1951 (Bigelow) (CNC); 1 ♂ 1 ♀, Dry Creek Campground, Glenn Highway, 3.viii.1978 (Arnaud) (CAS); Arizona, Cochise county, 5 mi W of Portal, southwestern Res. sta., 1 ♀, 10.ix.1966; 1 ♂ 1 ♀, 1-5.x.1966 (Arnaud) (CAS); California, Marin county, Mill Valley, Blithedale Ridge, 1 ♀, 6-9.vi.1965; 1 ♀, 9-12.vii.1965; 1 ♀, 19-22.vii.1965; 1 ♂, 23-25.vii.1965; 1 ♂, 29.vii-1.viii.1965; 1 ♀, 20-23.viii.1965; 1 ♂, 24-27.viii.1965; 2 ♂♂ 1 ♀, 25.ix. (Arnaud); Marin County, Umdhlemnyoni Novato, 1 ♂, 11.iv.1948 (Arnaud); San Mateo County, Redwood City 2 ♂♂ 1 ♀, 21.ii.1960 (Arnaud); San Bernardino County, Thurman flats picnic area, 2 ♂♂, 20-22.x.1965 (Arnaud); Fresno County, west of Huntington Lake, 1 ♀, 1971 (Leach) (all CAS); New Mexico, 1 ♂, Tajiye, 25.vi.1940 (Beamer) (SEM); 1 ♀, Estancia, 24.vi.1940 (Lipovsky) (SEM); 4 ♂♂, Grant County, Pinos altos Mts, 28.viii.1951 (Kessel) (CAS); New York, 1 ♀, Lake Essex county, Upper Ausable, 30.vii.1920 (AMNH); 1 ♂, Taghanic Ithaca, 21.vi.1920 (Leonard) (SEM); Pennsylvania, 1 ♂, Schuylkill county, Summit sta., 13.vi.1964 (Chilcott) (CNC); 1 ♂, Beaver county, Darlington, 17.ix.1972 (Carter) (CAS).

Holo- and allotype in CNC; paratypes deposited in AMNH, CAS, CNC, KBIN and SEM.

Other material: 22 specimens from the following areas. CANADA: Alberta, British Columbia, Manitoba, Ontario, Quebec, Yukon territory. USA: Alaska, Arizona, California, Nevada, New Mexico, New York, Pennsylvania, Utah, Washington.

***Cephalops longistylis* sp. nov.**
(Figs. 11a-f, 36)

Body length: 3.3-4.2 mm.

Male.

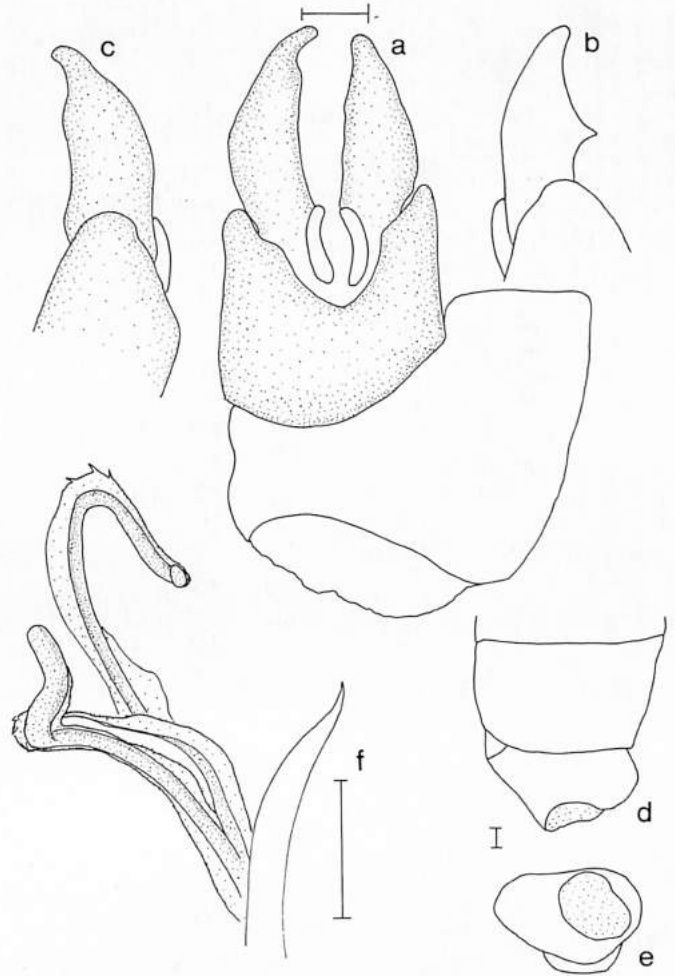
Frons silver-grey pubescent. Third antennal segment obtuse below; dull; bright yellow. Second antennal segment bright yellow; 3-4 ventral bristles, longest equal in length to segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri yellow. Propleural fan well developed with 6-8 long hairs. Mesonotum subshining black; sparsely brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellow. Pleura greyish dusted.

Legs yellow. Front coxae brownish, apically yellow; mid coxae more extensive, and hind coxae completely yellow. All with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellow. Femora dull except for hind femora shining posteroventrally; completely yellow and almost entirely deprived of pilosity. Front femora ventrally with double row of 5-6 spines at apical third, basally a few pale hairs; posterodorsal row of short, pale hairs over entire length; furthermore almost totally bare except for a few scattered pale hairs. Mid femora ventrally with double row of approx. 10 spines nearly over entire length; otherwise like front femora but slightly more pilose. Hind femora ventrally with double row of approx. 7 spines over apical half, continued basally as irregular row of short, pale hairs; anterodorsal row of black bristly hairs for apical half continued as finer and paler hairs, posterodorsal row of short, pale hairs; furthermore as front femora. Tibiae yellow, with dispersed row of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 2 erected bristles. Tarsi yellow; all segments with short, pale hairs. Pulvilli as long as last tarsal segment; claws slightly longer.

Wings. Length 3.9-4.2 mm. M 1+2 not furcated, almost straight in apical part. Pterostigma fully coloured. Third costal section approx. 1.5 times longer than fourth costal section. r-m placed at basal fourth of discal cell.

Abdomen shining black-brown, sparsely brownish dusted. Tergum 1 greyish dusted; lateral fan well developed with approx. 5 long dark hairs. All terga mainly shining; only sparsely brownish in centre, narrowly greyish along lateral margins. Terga furthermore with sparse, dark hairs. Sterna brown, dull. Sternum 8 brownish grey dusted; in dorsal view about half the length of tergum 5 (Fig. 11d). Membra-



Figs. 10a-f. – *C. grootaerti* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus and ejaculatory duct lateral (scale 0.1 mm; pilosity not shown).

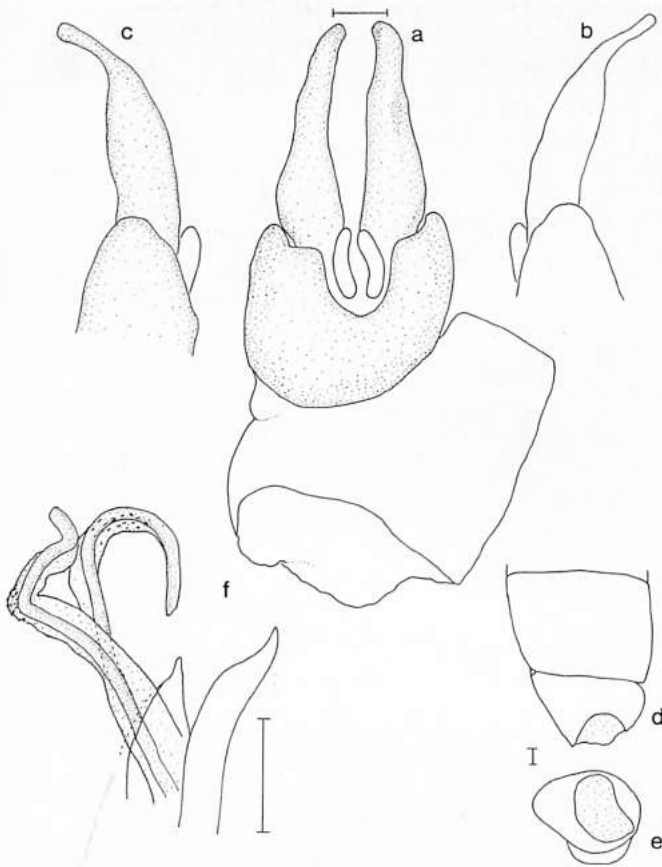
nous area not reaching epandrium; in distal view large, irregular oval or roundish shaped (Fig. 11e).

Male terminalia (Figs. 11a-c, f). Epandrium dark yellowish. Surstyli yellowish; symmetrical; very long and slender, and with elongated apical ends. In lateral view elongated ends slightly bent ventrally. Apical part of aedeagus simple, bluntly pointed. Ejaculatory duct bifid; tubiform; in apical part with several lines of minute, hardly detectable teeth. Ejaculatory apodema tubiform.

Female.

As male except for following characters. Frons slightly broadened in middle; completely silver-grey pubescent. Third antennal segment short acute. Thorax more greyish dusted. Front and mid tibiae with apical spurs; claws and pulvilli longer. Hind tarsi flattened laterally. Third costal section approx. as long as fourth section. Abdomen long and slender; subshining and moderately brownish dusted, posterolaterally more greyish dusted.

Female terminalia. Base yellowish and rounded in upper part, convex below. Piercer about as long as base; elongated, yellowish; straight (Fig. 36).



Figs. 11a-f. – *C. longistylis* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus and ejaculatory duct lateral (scale 0.1 mm; pilosity not shown).

Etymology : Referring to the long surstyli.

Distribution : Eastern part of USA.

Holotype ♂ USA : Missouri, Williamsville, 14.vii.1969 (CNC).

Allotype ♀ USA : Iowa, Ames, 25.v.1947 (Brooks) (CNC).

Paratypes USA : 1 ♂, Missouri, same date and locality as holotype; Mississippi, Oxford, 1 ♂, 14.vii.1934 (Hull); 1 ♂ 1 ♀, v.1940 (Hull); Tennessee, 2mm, Memphis, 7.vi.1922 (Hull); 1 ♀, Knoxville, Univ. farm, 20.v.1957 (Mason) (all CNC). Two paratypes deposited in KBIN, all other type material in CNC.

Other material examined : USA : 1 ♂, Maryland, Bay Ridge, 26.viii (Banks) (MCZ); 1 ♂ 1 ♀, Virginia, Falls church, 9.vii. (Banks) (SEM, USNM).

***Cephalops curvarmatus* sp. nov.**
(Figs. 12a-h, 37)

Body length : 3.2-4.1 mm.

Male.

Frons brownish grey pubescent; with small inconspicuous

median shining patch. Third antennal segment acute below; dull; brownish colour (Fig. 12g). Second antennal segment brown; approx. 3 ventral bristles, at most as long as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed. Mesonotum subshining black; brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres brown. Pleura greyish dusted.

Legs dark. Coxae brown black, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters brown, sometimes more yellowish. Femora dull except for hind femora shining posteroventrally; completely darkish except for apical and sometimes basal end narrowly yellowish. Front femora ventrally with double row of 7 spines at apical half; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 14 spines over entire length; otherwise like front femora. Hind femora ventrally with double row of 6 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae brown with extremities yellowish, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly few suberected bristles. Tarsi darkish; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment; claws about as long as segment.

Wings. Length 3.6-4.1 mm. M 1+2 not furcated. Pterostigma fully coloured. Third costal section approx. 1.5 times as long as fourth costal section. r-m placed near middle of discal cell.

Abdomen subshining black-brown, with brownish dusting. Tergum 1 greyish dusted; lateral fan well developed with approx. 6 hairs. Tergum 2 completely brownish dusted. Tergum 3 brownish dusted with posterolaterally shining patches. Tergum 4 with anterior half brown dusting; otherwise shining, more so along lateral sides. Tergum 5 mainly black-brown shining, except narrowly dusted along anterior margin. Terga furthermore with sparse, dark hairs. Sterna brown, dull. Sternum 8 greyish brown dusted; in dorsal view more than half the length of tergum 5 (Fig. 12d). Membranous area reaching epandrium; in distal view occupying less than half of sternum 8; rounded above, elongated towards epandrium (Fig. 12e).

Male terminalia (Figs. 12a-c, f). Surstyli; symmetrical; bifurcate, in lateral view broadly shaped. Apical part of aedeagus long; slightly bent dorsally; ankyroid with curved hook, directed laterally. Ejaculatory duct trifid; ductuli approx. of same length, one ductule slightly shorter, all with long cupular ends. Ejaculatory apodema fan shaped in apical part (Fig. 12h).

Female.

As male except for following characters. Frons slightly broadened in middle; completely silver-grey except for upper part shining for length equal to ocellar triangle. Third antennal segment longer acute; light brown. Mesonotum

more greyish dusted. Legs sometimes broader yellowish at apices. Third costal section as long as fourth section. Abdomen completely dusted, brownish in median part, greyish laterally.

Female terminalia. Base rounded above. Piercer straight and about as long as base (Fig. 37).

Etymology : Referring to the curved apical part of the aedeagus.

Distribution : Alaska.

Holotype, ♂, USA : Alaska, Unakleet, 11.viii.1961 (Madge) (CNC).

Allotype, ♀, USA : same locality and date as holotype.

Paratypes : USA : Alaska, same locality as holotype, 1 ♂ 1 ♀, 15.vi.1961; 2 ♂♂, 6.viii.1961; 1 ♂, 8.viii.1961; 1 ♂ 1 ♀, 10.viii.1961; 4 ♂♂ 3 ♀♀, 11.viii.1961 (CNC).

***Cephalops digitatus* sp. nov.**

(Fig. 13a-f)

Body length : 3.4-3.6 mm.

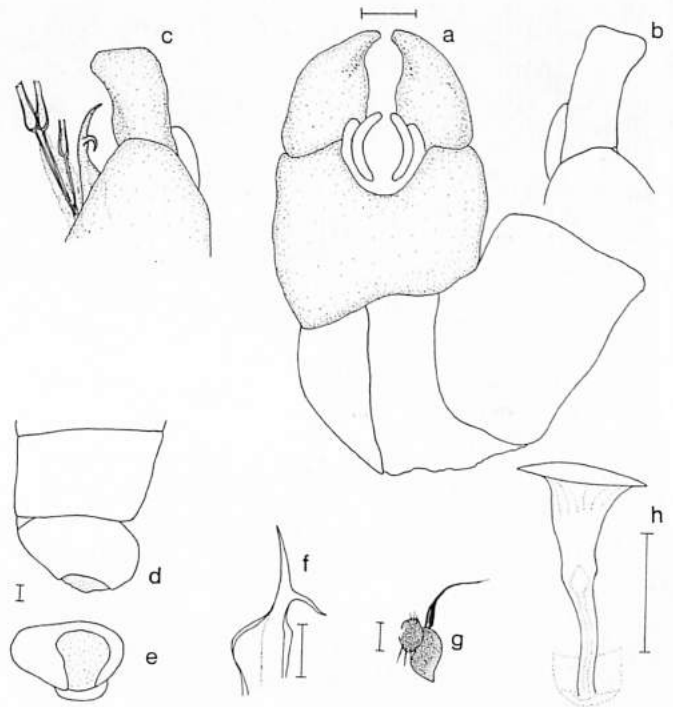
Male.

Frons silver-grey pubescent, below with black shining patch occupying one third of total width. Third antennal segment short acute; brown, same colour as second segment. Second antennal segment brown; 3 ventral bristles, as long as segment. Face silver-grey pubescent; equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with 7 long pale hairs. Mesonotum subshining black, brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs. Coxae brown, apically narrowly yellowish; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish. Femora dull except for hind femora shining posteroventrally; yellow with broad dark ring occupying most of length. Front femora ventrally with double row of 6 spines at apical third; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 10-12 spines nearly over entire length; otherwise like front femora. Hind femora ventrally with double row of 8 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs over entire length; furthermore with dispersed rows of short, pale hairs. Tibiae yellow, slightly darkened in the middle; with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly few suberected bristles. Tarsi yellow, last tarsal segment darkened; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment, claws slightly longer.

Wings. Length 3.4-3.8 mm. M1+2 not furcated. Pterostigma fully coloured. Third costal section 1.3 times as



Figs. 12a-g. - *C. curvarmatus* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral; g, third and second antennal segment; h, ejaculatory apodema (scale 0.1 mm; pilosity not shown).

long as fourth costal section. r-m placed near basal two-fifths of discal cell.

Abdomen black brown, with brownish dusting. Tergum 1 greyish dusted; lateral fan well developed. Tergum 2 completely brownish dusted. Tergum 3 brownish dusted; posterolaterally narrowly shining. Tergum 4 with variable dusting, restricted to anterior margin or almost completely brownish dusted. Tergum 5 completely shining or narrowly dusted along anterior margin. All terga furthermore with sparse, dark hairs. Sterna dull, brown. Sternum 8 brownish dusted; in dorsal view smaller than half the length of tergum 5 (Fig. 13d). Membranous area reaching epandrium (Fig. 13e).

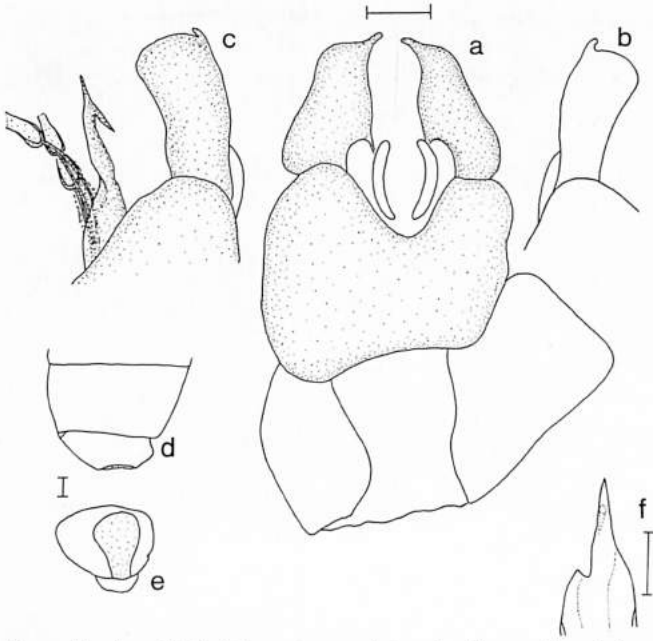
Male terminalia (Figs. 13a-c, f). Surstyli subsymmetrical; bifurcated at apical end. Aedeagus ankyroid, hook pointed dorsally. Ejaculatory duct trifid, ductuli approx. of same length and with cupular ends. Ejaculatory apodema fan shaped.

Female unknown.

Etymology : From the Latin for "furnished with fingers", referring to the fingerlike processes on the surstyli.

Distribution : Western coastal states of USA.

Holotype, ♂, USA : California, San Mateo county, Montara, 18.iv.1964 (Arnaud) (CAS).



Figs. 13a-f. — *C. digitatus* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral (scale 0.1 mm; pilosity not shown).

Paratypes : USA, California, 1 ♂, same locality and date as holotype; 1 ♂, San Francisco, 3.xi.1947 (Kessel); 1 ♂, San Francisco, 23.x.1948 (Kessel); 1 ♂, Pygmy Forest, 4 mi E of Bragy, 14.vi.1948 (Kessel) (all CAS); 1 ♂, Washington, Silver Fir campground, Mt. Baker Hwy 542, 24.vii.1968 (Peterson) (CNC). Two paratypes deposited in KBIN, one paratype in CNC, all other type material in CAS.

Cephalops hardyi sp. nov.

(Figs. 14a-f, 38)

Body length : 2.6-3.6 mm.

Male.

Frons silver-grey pubescent; below with shining patch occupying one third of total width. Third antennal segment short acute, dull, light brown. Second antennal segment brown, with 3 ventral bristles, same length as segment. Face silver-grey pubescent; equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with 7 long pale hairs. Mesonotum subshining black; brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres pale brown. Pleura greyish dusted.

Legs. Coxae dark brown, apical margin narrowly yellow; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish, sometimes with brownish patch. Femora dull except for hind femora

shining posteroventrally; yellow with broad dark median ring occupying almost entire length. Front femora ventrally with double row of 6 spines over apical half; posterodorsal row of short pale hairs over entire length; furthermore with dispersed short, pale hairs. Mid femora ventrally with double row of 9-11 spines over nearly entire length; otherwise like front femora. Hind femora ventrally with double row of 7 spines along apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short pale hairs over entire length; furthermore with dispersed short, pale hairs. Tibiae yellow, darkened in the middle and apically; with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly a few longer, bristly hairs, hardly suberected. Tarsi yellow, last tarsal segment dark brown; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment; claws slightly longer.

Wings. Length 2.7-3.3 mm. M1+2 not furcated. Pterostigma fully coloured. Third costal section approx. 1.2 times as long as fourth section. r-m placed near middle of discal cell.

Abdomen. Black brown shining; with brownish dusting. Tergum 1 brownish dusted, posterolaterally narrowly greyish dusted. Lateral fan well developed. Terga 2-3 brownish dusted; posterolaterally shining, tergum 3 more so. Tergum 4 anteriorly brownish dusted, posterolaterally shining black brown. Tergum 5 completely shining. All terga with sparse, short dark hairs. Sterna brown, dull. Sternum 8 brownish dusted; in dorsal view about as long as half the length of tergum 5 (Fig. 14d). Membranous area reaching epandrium; in distal view occupying less than half of sternum 8 (Fig. 14e).

Male terminalia (Figs. 14a-c, f). Surstyli broad, bifurcated, with broad ventral lobe. Aedeagus ankyroid, hook directed dorsolaterally. Ejaculatory duct trifid, ductuli of approx. the same length and with cupular ends. Ejaculatory apodema fan shaped.

Female.

As male except for following characters. Frons slightly broadened in the middle, shining for upper third. Third antennal segment bright yellow. Thorax and abdomen more greyish dusted. Legs almost completely yellow; only femora darkened dorsally. Third costal section as long as fourth section.

Female terminalia. Base ovipositor convex below, concave above; short. Piercer slender, slightly curved downwards, longer than base (Fig. 38).

Etymology : Named after Prof. D.E. Hardy, leading specialist on Pipunculidae.

Distribution : Canada, USA.

Holotype, ♂, USA : New York, Ulster county, Cherrytown, 4 mi NNW of Kerhonkson, 8-18.viii.1971 (Wygodzinsky) (AMNH).

Allotype, ♀, USA : same locality and date as holotype (AMNH).

Paratypes : USA : same locality as holotype, 4 ♀♀, 15-30.vi.1971; 3 ♂♂ 8 ♀♀, 8-18.viii.1971; 1 ♂ 2 ♀♀, 19.viii-12.ix.1971; 1 ♀, 2-4.vi.1972 (AMNH). Five paratypes deposited in KBIN, all other type material in AMNH. Other material examined : 20 specimens from the following areas. CANADA : British Columbia, Quebec, Yukon Territory. USA : Alaska, Massachusetts, Michigan, Nevada.

***Cephalops longiductulis* sp. nov.**
(Fig. 15a-f)

Body length : 2.9-3.2 mm.

Male.

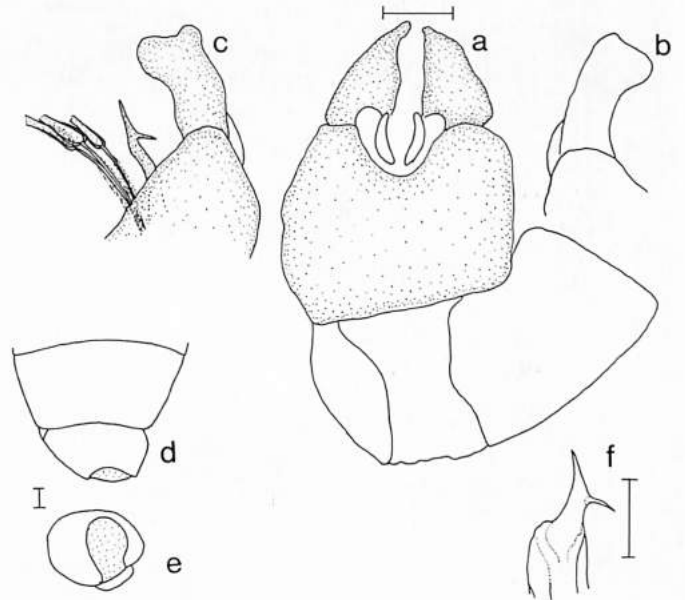
Frons brownish grey pubescent; with large shining median patch occupying about half of total width. Third antennal segment acute below; dull; yellowish with basal part darker. Second antennal segment brown; 2-3 ventral bristles, at most same length as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark. Propleural fan well developed with approx 6 hairs. Mesonotum subshining black-brown; brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres brownish. Pleura greyish dusted.

Legs. Coxae brown, apical part narrowly yellowish; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish, slightly darkened. Femora dull except for hind femora shining posteroventrally; yellow with brownish ring in median part. Front femora ventrally with double row of approx. 5 spines at apical half; posterodorsal row of short, pale hairs; furthermore with sparsely dispersed short, hairs. Mid femora ventrally with double row of 8 spines nearly over entire length; otherwise like front femora, but posterodorsal row more distinct. Hind femora ventrally with double row of 6 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed rows of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 2-3 hardly erected bristles. Tarsi yellow; last tarsal segment brownish; all segments with short, pale hairs. Pulvilli as long as last tarsal segment; claws slightly longer.

Wings. Length 2.7-3.2 mm. M 1+2 not furcated. Pterostigma fully coloured. Third costal section approx. 1.3 times as long as fourth costal section. r-m placed near middle of discal cell.

Abdomen brownish. Tergum 1 greyish brown dusted; lateral fan well developed. Tergum 2 completely brownish dusted. Tergum 3 brownish dusted, shining posterolaterally. Terga 4-5 brownish dusted along anterior margin, otherwise brown black shining. Terga with sparse, dark hairs. Sterna brown, dull. Sternum 8 in dorsal view almost as long as tergum 5 (Fig. 15d); with large membranous area; in distal view occupying more than half of sternum. Reaching epandrium (Fig. 15e).



Figs. 14a-f. — *C. hardyi* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral (scale 0.1 mm; pilosity not shown).

Male terminalia (Figs. 15a-c, f). Surstyli broad; symmetrical; bifurcate at apical end, in lateral view lower protuberance well developed. Apical part of aedeagus asymmetrical but not ankyroid. Ejaculatory duct trifid, tubiform, ductuli very long.

Female unknown.

Etymology : Referring to the long ejaculatory duct.

Distribution : Eastern part of USA.

Holotype, ♂, USA : Mississippi, Lafayette county, Spring 1943 (F. Hull) (CNC).

Paratypes : USA : 1 ♂, Florida, Gainesville, 25.iv.1952 (Peck) (CNC); Virginia, 1 ♂, Falls Church, 18.vii (Banks) (MCZ); 1 ♂, Glencarlyn, 7.vii. (Banks) (MCZ). Two paratypes deposited in MCZ, all other type material in CNC.

***Cephalops mainensis* (CRESSON, 1911)**
(Figs. 16a-g, 39)

Pipunculus mainensis CRESSON, 1911

Pipunculus varius var. *mainensis*

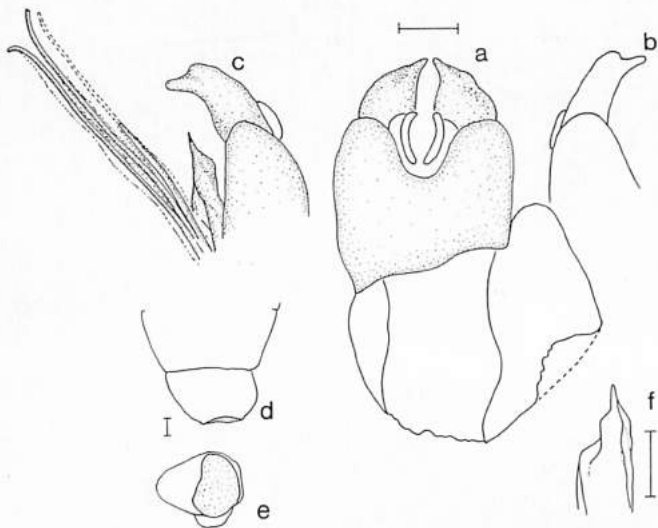
(CRESSON, 1911) : HARDY, 1943

Pipunculus trichaetus MALLOCH, 1913 : 296 syn. nov.

Body length : 3.2-4.1 mm.

Male.

Frons greyish brown pubescent; with shining patch in median part, occupying one fifth till one third of entire width, narrowly elongated upwards. Third antennal seg-



Figs. 15a-f. — *C. longiductulis* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral (scale 0.1 mm; pilosity not shown).

ment acute below; dull; dark brown. Second antennal segment dark brown; 3-4 long ventral bristles, at least as long as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark. Propleural fan well developed with 6-8 hairs. Mesonotum subshining black; brownish dusted. Dorsocentral and marginal rows of hairs well developed, especially anteriorly. Scutellum same colour and dusting as centre mesonotum; with row of moderately long, bristly hairs along margin. Halteres dark brown. Pleura greyish dusted.

Legs dark. Coxae dark brown, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish, sometimes dark. Femora dull except for hind femora shining posteroventrally; dark with only apices yellowish; sometimes more yellowish. Front femora ventrally with double row of 3-4 spines at apical part, occasionally poorly developed or reduced; basally few pale hairs; well developed posterodorsal row of moderately long, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 10-12 spines nearly over entire length; otherwise like front femora, but posterodorsal row with longer hairs. Hind femora ventrally with double row of 7 long spines over apical half, continued basally as row of bristly hairs; anterodorsal row of bristly hairs, posterodorsal row of long, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow with darkened patches, all with dispersed rows of short, darkish hairs. Hind tibiae thickened in the middle with anteriorly 3 long, well developed suberected bristles (Fig. 16g). Tarsi dark; all segments with short, hairs. Pulvilli shorter than last tarsal segment; claws as long as segment.

Wings. Length 3-4.2 mm. M1+2 not furcated. Pterostigma fully coloured. Third costal section approx. 1.3 times as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen completely dark brownish dusted, laterally greyish dusted along posterior margin. Tergum 1, lateral fan well developed with 6 dark hairs. Tergum 5 shining for posterior half. All terga furthermore with sparse, short, dark hairs, along lateral margins sometimes slightly longer hairs. Sterna brown, dull. Sternum 8 greyish brown dusted; in dorsal view less than half the length of tergum 5 (Fig. 16d). Membranous area reaching epandrium; rounded above, very narrowly elongated towards epandrium (Fig. 16e).

Male terminalia (Figs. 16a-c, f). Surstyli bifurcate at apical end, lower protuberance well developed; asymmetrical, inner surstylus more elongated. Apical part of aedeagus asymmetrical but not ankyroid. Ejaculatory duct trifold, tubiform. Ejaculatory apodema broadly fan shaped at apical end.

Female.

As male except for following characters. Frons slightly broadened in middle; completely silver-grey pubescent or shining in upper part for length twice as long as ocellar triangle. Third antennal segment short acuminate. Mesonotum more greyish dusted. Legs sometimes more yellowish. Third costal section shorter than fourth section. Abdomen with shorter hairs along lateral margins. Laterally completely greyish dusted, spreading towards middle posteriorly. Female terminalia. Base rounded below, concave above; in dorsal view abruptly constricted near base of piercer. Piercer straight, basally flattened laterally; about as long as base (Fig. 39).

Discussion : After study of type material *C. mainensis* is considered as a distinct species and not as a subspecies of *varius*. It can be differentiated by the diagnostic characters, given above.

Distribution : Mainly western part of Canada and USA. Few records from eastern part.

Holotype : ♂, USA; Maine, Fort Kent, 17.viii.1911 (Johnson) (MCZ, Nr 26897).

Paratype : ♀, same locality and date as holotype (MCZ). Holotype *P. trichaetus* : ♂, USA, New Hampshire, Mount Washington (USNM).

Other material examined : 42 specimens from the following areas. CANADA : Alberta, British Columbia, Ontario. USA : Alaska, Arizona, Colorado, Maine, Nevada, North Carolina.

Cephalops pallipes (JOHNSON, 1903)

(Figs. 17a-f, 25, 40)

Pipunculus pallipes JOHNSON, 1903 : 107.

Body length : 3.2-3.7 mm.

Male.

Frons completely silver-grey pubescent, at most inconspicuous shining patch. Third antennal segment acute below; dull; yellowish, lighter in colour than second segment. Second antennal segment brown; 2-3 ventral bristles, of same length as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri pale light brown, slightly lighter than mesonotum. Propleural fan well developed with approx. 9 hairs. Mesonotum subshining brownish black; brownish dusted, greyish along margins. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs mainly yellow. Coxae brown, with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellow. Femora dull except for hind femora shining posteroventrally; yellow with faint brownish patch in median part. Front femora ventrally with double row of approx. 6 spines at apical third; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 12 spines over two-thirds of entire length; otherwise like front femora. Hind femora ventrally with double row of approx. 8 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, with dispersed rows of short, pale hairs. Hind tibiae thickened in middle with anteriorly few suberected bristles; dorsally with row of short, distinctly erected hairs. Tarsi yellow; last tarsal segment darkish; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment; claws longer.

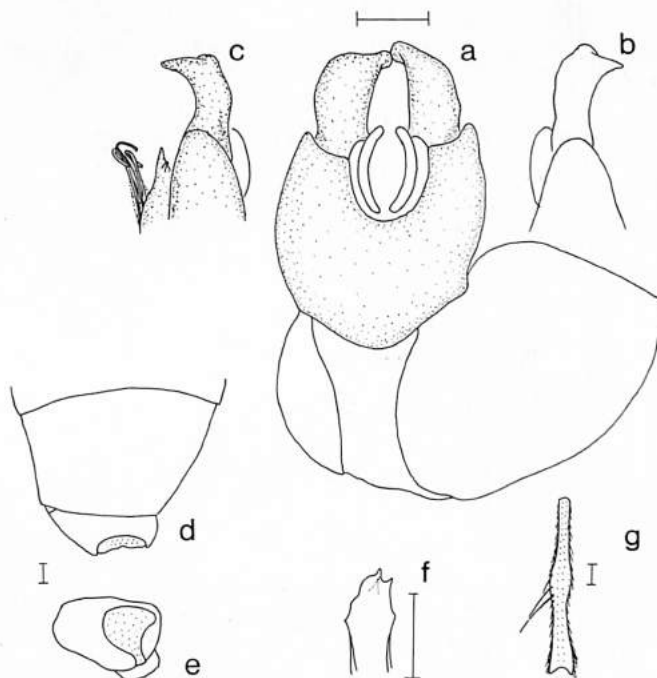
Wings (Fig. 25). Length 3.3-4.2 mm. M1+2 not furcated. Pterostigma fully coloured. Third costal section about as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen shining black-brown, with brownish dusting. Tergum 1 greyish dusted; lateral fan well developed with approx. 6 hairs. Terga 2-3 brownish dusted, shining posterolaterally. Tergum 4 mainly shining, brownish dusting restricted to anterior margin. Sometimes terga 2-4 narrowly yellowish along posterolateral margin. Tergum 5 completely shining. All terga furthermore with sparse, short hairs. Sterna brown, dull. Sternum 8 brownish grey dusted; in dorsal view longer than half the length of tergum 5 (Fig. 17d). Membranous area reaching epandrium, in distal view occupying less than half of sternum 8; rounded above, elongated towards epandrium (Fig. 17e).

Male terminalia (Figs. 17a-c, f). Surstyli symmetrical, bifurcated at apical end, in lateral view broadly shaped. Apical part of aedeagus asymmetrical; long; straight; ankyroid, hook directed laterally. Ejaculatory duct long, trifid; with one ductule shorter than other two; ends cupular. Ejaculatory apodema fan shaped at apical end.

Female.

As male except for following characters. Frons slightly broadened in middle; silver-grey pubescent except for



Figs. 16a-g. - *C. mainensis*, male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral; g, hind tibia (scale 0.1 mm; pilosity not shown).

shining in upper part for length equal to one or two times ocellar triangle; distinct supraantennal tubercle. Third costal section slightly shorter than fourth section. Abdomen completely dusted; brownish on median part, greyish posterolaterally, sometimes yellowish shining laterally.

Female terminalia. Base broad, short, abruptly truncated at apical end. Piercer yellowish, as long as base (Fig. 40).

Discussion : Most material previously identified as *pallipes* belongs to species of the *aeneus* group. Although the humeri are sometimes slightly paler than the mesonotum and the lateral sides of the terga might have some palish markings, *pallipes* undoubtedly belongs to the *semifumosus* group.

Distribution : Canada, USA.

Holotype, ♂, USA : New Jersey, Wildwood, 27.viii.1901 (Johnson) (MCZ, Nr 7673) condition good.

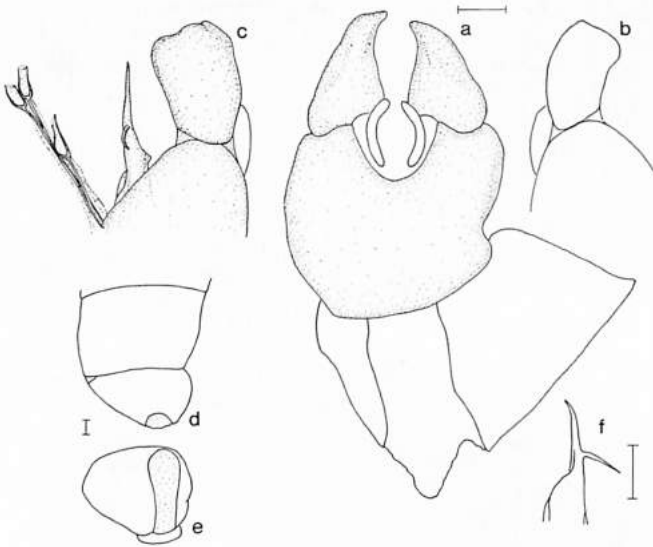
Other material examined : 48 specimens from the following areas. CANADA : Alberta, British Columbia, Manitoba, Nova Scotia, Yukon Territory. USA : California, Colorado, Florida, Michigan, Nebraska, New York, Oregon, Tennessee.

***Cephalops varius* (CRESSON, 1911)**

(Figs. 18a-f, 41)

Pipunculus varius CRESSON, 1911 : 309.

Body length : 3.1-3.8 mm.



Figs. 17a-f. – *C. pallipes*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral view (scale 0.1 mm; pilosity not shown).

Male.

Frons silver-grey pubescent; usually small shining median patch occupying about one-third of entire width, sometimes missing. Third antennal segment acute below; dull; brown or yellowish brown, same colour or slightly paler than second segment. Second antennal segment brown; 3 ventral bristles of same length as segment. Face silver-grey pubescent, equal in width to lower portion of frons.

Thorax. Humeri dark, same colour as mesonotum. Propleural fan well developed with approx. 6 hairs. Mesonotum subshining brownish black; brownish dusted. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish dusted.

Legs. Coloration very variable. Coxae brown, apical margin narrowly yellow; with few dispersed pale hairs, mid coxae anterodistally with few bristly hairs. Trochanters yellowish, slightly darkened. Femora dull except for hind femora shining posteroventrally; usually yellow with broad median dark ring, occupying more than half of femur; basally sharply defined, apically gradually diffusing; sometimes more or less darkened. Front femora ventrally with double row of 5 spines at apical half; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of approx. 13 spines nearly over entire length; otherwise like front femora. Hind femora ventrally with double row of 7-8 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae yellow, slightly darkened, especially apically; with dispersed row of short, pale hairs. Hind tibiae thickened in the middle with anteriorly 3 suberected bristles. Tarsi yellow, upper part darkened; all segments with short, pale hairs. Pulvilli shorter than last tarsal segment; claws approx. as long as last segment.

Wings. Length 3.3-3.7 mm. M 1+2 not furcated. Pterostigma fully coloured. Third costal section approx. as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen black-brown, with variable brownish dusting. Tergum 1 greyish dusted; lateral fan well developed with 7-8 hairs. Usually tergum 2 completely brownish dusted. Tergum 3 brownish dusted except for posterolateral margins. Tergum 4 dusted narrowly along anterior margin, otherwise shining. Tergum 5 shining, brownish dusted narrowly along anterior margin. All terga furthermore with sparse, dark hairs. Sterna brown, dull. Sternum 8 greyish brown dusted; in dorsal view longer than half the length of tergum 5 (Fig. 18d). Membranous area reaching epandrium; in distal view occupying more than half of sternum 8; roundish above, broadly elongated towards epandrium (Fig. 18e).

Male terminalia (Figs. 18a-c, f). Surstyli symmetrical; bifurcate at apical end with lower protuberance well developed. Apical part of aedeagus asymmetrical but not ankyroid. Ejaculatory duct trifid, tubiform. Ejaculatory apodema fan shaped at apical end.

Female.

As male except for following characters. Frons slightly broadened in middle; silver-grey pubescent except for upper part shining for length twice ocellar triangle; small supraantennal tubercle present. Third antennal segment lighter in colour. Legs more yellowish; median ring on femora smaller. Abdomen completely dusted, brownish in median part, greyish posterolaterally.

Female terminalia. Ovipositor variable shape. Base broad; short; rounded. Piercer straight, as long as base (Fig. 41).

Discussion: This species shows considerable variation in colour, abdominal dusting as well as shape of ovipositor. However shape of male terminalia is constant among all specimens studied. We prefer to consider all the studied material as belonging to one single species.

Distribution: Widespread in USA and Canada.

Holotype, ♂, USA: Pennsylvania, Harrisburg, 8.viii., (Walton) (MCZ, Nr 13369).

Paratype: ♂, USA; same locality and date as holotype (MCZ).

Other material examined: 270 specimens from the following areas. CANADA: Alberta, British Columbia, Labrador, Manitoba, Ontario, Quebec, Yukon Territory. USA: Alaska, Arizona, California, Idaho, Kansas, Maine, Massachusetts, Michigan, Nevada, New Jersey, New York, Oregon, Pennsylvania, South Carolina, Tennessee, Virginia, Wyoming.

Microcephalops gen. nov.

Type species *Microcephalops banksi* (ACZÉL, 1940) comb. nov.

Generic characters. Small size. Third antennal segment obtuse or very short acute, not much larger than second antennal segment. Second antennal segment dorsally with few short bristles, shorter than segment, and ventrally with slightly longer bristles. Ocellar and frontal bristles absent. Frons usually brownish pubescent with large median shining patch or line; inflated, broadened in lower part and usually wider than upper portion of face. Eyes in males holoptic, in females dichoptic. Face greyish or greyish brown pubescent. Thorax with well developed antepnotum en cervical plates. Humeri not swollen and at most with short hairs. Propleural fan present but often strongly reduced. Mesonotum with two dorsocentral rows of hairs and with marginal rows of hairs; mesonotal bristles absent. Scutellum with short hairs. Legs dark. Femora all shining posteroventrally or only hind femora posteroventrally; ventral spines absent or present. Tarsi short. Pterostigma colour but usually not fully coloured. Vein M1+2 simple. Third costal section as long as, or twice as long as fourth costal section. Anal vein present. Abdominal first tergum with lateral fan of hairs, often reduced. Most abdominal terga strongly pubescent. Five abdominal terga well developed, usually without obvious pilosity; sixth and seventh tergum partly reduced. Seventh and eighth sternum separate. Surstyli symmetrical or asymmetrical, covered with microtrichia. Ejaculatory duct trifid or unifid; tubiform or membranous. Ejaculatory apodema usually broadly fan or umbrella shaped apically.

Included in *Microcephalops* gen. nov. are the following species: *M. banksi* (ACZÉL) comb. nov., *M. floridae* sp. nov., *M. parafloridae* sp. nov., *M. griseus* sp. nov., all of the Nearctic region and *M. vestitus* (Becker) comb. nov. of the West-Palaearctic region. Probably it will also be present in other zoogeographical regions.

For discussion on the validity of erecting this new genus, we refer to the chapter on phylogeny.

***Microcephalops banksi* (ACZÉL, 1940) comb. nov.**

(Figs. 19a-g, 26)

Pipunculus banksi ACZÉL, 1940 : 152

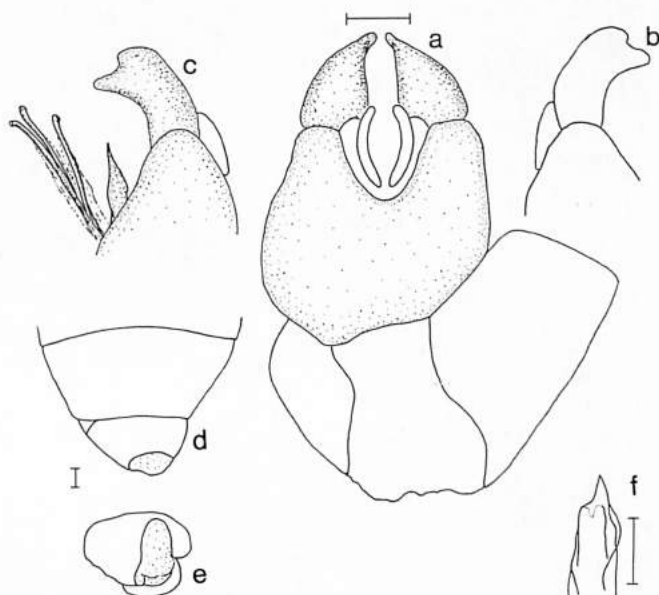
Pipunculus terminalis BANKS, 1915

(junior homonym of *Pipunculus terminalis* Thompson, 1869)

Body length : 2.5-2.8 mm.

Male.

Frons brownish black pubescent, shining black patch occupying approx. one-third of total width, narrowing upwards; slightly inflated. Third antennal segment small, obtuse below; only slightly larger than second segment (Fig. 19g); dull; dark brown, same colour as second antennal segment. Second antennal segment dark brown; with 2 long ventral bristles of approx. the same length as segment. Face greyish brown, narrower than lower portion of frons. Thorax. Humeri dark. Propleural fan poorly developed with



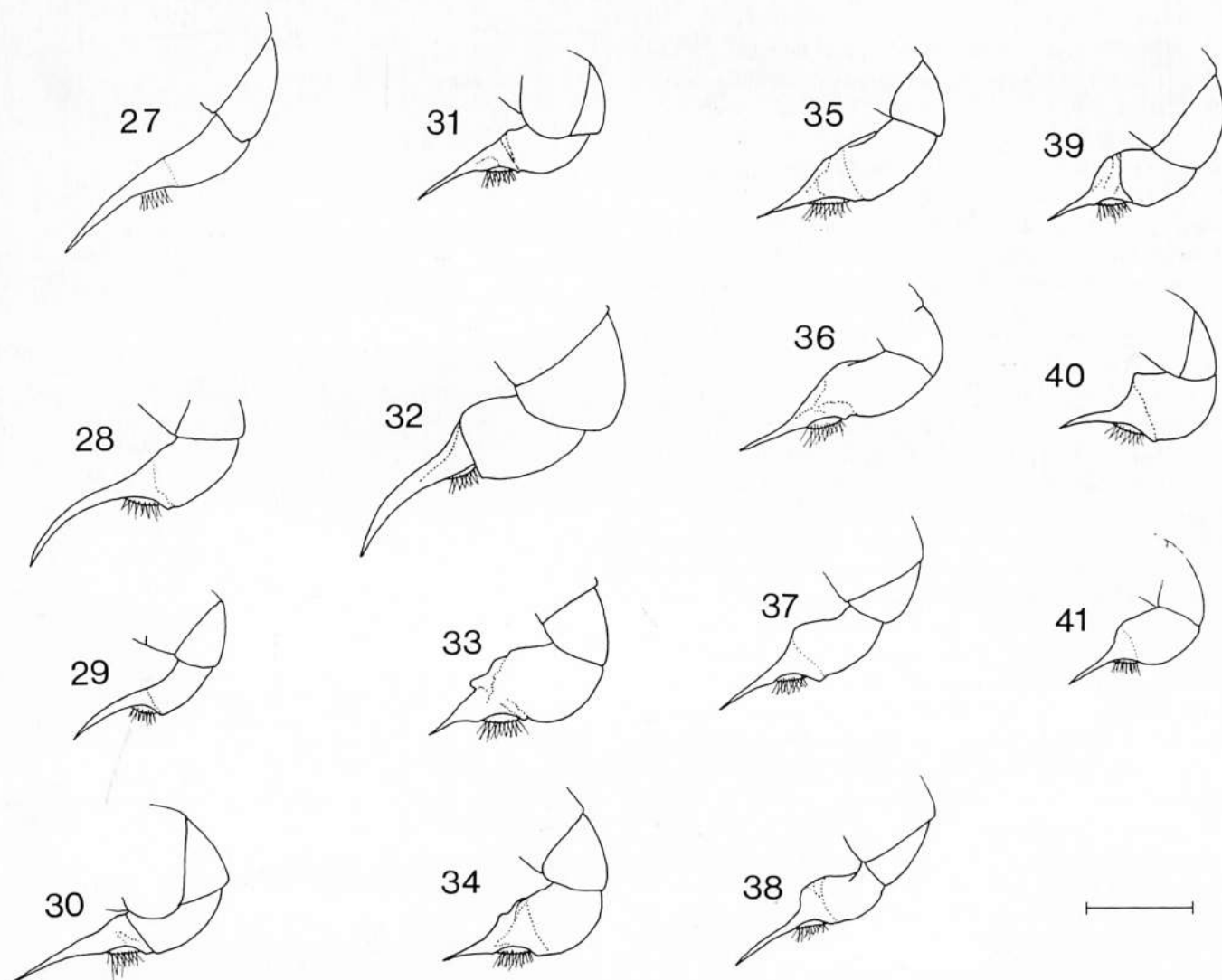
Figs. 18a-f. – *C. varius*, male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, aedeagus ventral (scale 0.1 mm; pilosity not shown).

approx. 3 short hairs. Mesonotum subshining black-brown; brownish dusted, anteriorly less so. Scutellum same colour and dusting as centre mesonotum; without a developed row of hairs along margin, only few dispersed, inconspicuous hairs. Halteres darkish brown. Pleura greyish brown dusted.

Legs dark. Coxae black brown, mid coxae anterodistally with few bristly hairs, otherwise all coxae bare. Trochanters brown. Femora dull except for hind femora shining posteroventrally; dark except for apical extremities narrowly yellowish. Front femora ventrally without spines, at most with few fine hairs posteriorly at apical half; otherwise almost entirely bare. Mid femora ventrally with double row of 8-10 small spines almost over entire length; posterodorsal row of short, pale hairs; otherwise like front femora. Hind femora ventrally with double row of 6 spines over apical half; incomplete anterodorsal row and fully developed posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae darkish brown, with yellow apices; all with dispersed rows of short, pale hairs. Hind tibiae slightly thickened in the middle without any suberected bristles. Tarsi yellowish brown; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer.

Wings (Fig. 26). Length 2.7-3 mm. M 1+2 not furcated. Pterostigma almost fully coloured. Third costal section twice as long as fourth costal section. r-m placed at basal two-fifths of discal cell. Anal vein present.

Abdomen mainly darkish brown dusted. Tergum 1 brownish pubescent, lateral fan poorly developed with 3 short darkish hairs. Terga 2-4 completely darkish brown dusted. Tergum 5 shining for posterior half or third. Sterna dull, brown. Sternum 8 small, subshining brown; in dorsal view



Figs. 27-41. – *Female ovipositor, lateral view*; 27, *C. acuminatus*; 28, *C. appendiculatus*; 29, *C. reductus* sp.n.; 30, *C. biscaynei*; 31, *C. brevis*; 32, *C. filicerus* sp.n.; 33, *C. flavomaculatus* sp.n.; 34, *C. furnaceus* sp.n.; 35, *C. grootaerti* sp.n.; 36, *C. longistylis* sp.n.; 37, *C. curvarmatus* sp.n.; 38, *C. hardyi* sp.n.; 39, *C. mainensis*; 40, *C. pallipes*; 41, *C. varius* (Scale 0.5 mm).

about as long as half the length of tergum 5 (Fig. 19d). Membranous area large; not reaching epandrium; in distal view roughly triangular in shape; occupying most of sternum (Fig. 19e).

Male terminalia (Figs. 19a-c). Surstyli subsymmetrical; longish; with moderately long setae along margins. Apical part of aedeagus simple, pointed. Ejaculatory duct trifid, long tubiform. Ejaculatory apodema umbrella shaped (Fig. 19f).

Female unknown (cfr. discussion).

Discussion: No differences could be detected among the female specimens in the collections. They are all similar to the European *M. vestitus*. Therefore we consider females of these species unknown until characters can be found to differentiate them and appoint them to the respective males. *Microcephalops* spp. females can be differentiated from *Cephalops* spp. by the generic characters stated above.

Distribution: Canada, USA.

Holotype, ♂, USA: Virginia, Falls Church (Banks) (MCZ, Nr 13536), condition good.

Paratypes: USA, same locality as holotype, 1 ♂, 28.vi.; 2 ♂♂, 9.viii. (Banks) (all MCZ).

Other material examined: 25 specimens from the following areas. CANADA: British Columbia, Manitoba. USA: Colorado, Georgia, Idaho, Maryland, Montana, New York, North Carolina, Ohio, Tennessee, Washington.

***Microcephalops griseus* sp. nov.**

(Fig. 20a-e)

Body length: 2.2-2.3 mm.

Male.

Frons greyish pubescent; small shining patch occupying

one fourth of total width, narrowly elongated upwards. Third antennal segment missing. Second antennal segment dark brown; 2 long ventral bristles. Face greyish pubescent with shining median line; narrower than lower portion of frons.

Thorax. Humeri dark. Propleural fan well developed with approx. 6 hairs. Mesonotum subshining black-brown; brownish dusted; along margins extensively and distinctly greyish dusted. Scutellum same colour and dusting as centre mesonotum; with poorly developed row of fine, short, pale hairs along margin. Halteres darkish brown. Pleura greyish dusted.

Legs dark. Coxae black brown, mid coxae anterodistally with few bristly hairs, otherwise all coxae bare. Trochanters yellowish brown. Femora dull except hind femora shining posteroventrally; dark except for apical extremities narrowly yellowish. Front femora ventrally obscured below; mainly bare. Mid femora ventrally with double row of 6 spines at apical half; posterodorsal row of short, pale hairs. Hind femora ventrally with double row of 4-5 spines over apical third, continued basally as row of short, pale hairs; incomplete anterodorsal row and fully developed posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae darkish brown, with yellow apices; all with dispersed rows of short, pale hairs. Hind tibiae slightly thickened in the middle without any suberected bristles. Tarsi yellowish brown; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer.

Wings. Length 2.6-2.8 mm. M 1+2 not furcated. Pterostigma almost fully coloured. Third costal section approx. 1.5 times as long as fourth costal section. r-m placed at basal two-fifths of discal cell. Anal vein present.

Abdomen mainly darkish brown dusted. Tergum 1, lateral fan with 3 long darkish hairs. Terga 2-4 darkish brown; with distinct grey spots posterolaterally. Tergum 5 shining for posterior half. Sterna dull, brown. Sternum 8 small, subshining brown; in dorsal view about as long as tergum 5 (Fig. 20d). Membranous area not reaching epandrium; in distal view roughly triangular in shape with base directed upwards, occupying about half of sternum (Fig. 20e).

Male terminalia (Figs. 20a-c). Surstyli asymmetrical; broad with curved elongated apical ends. Apical part of aedeagus with numerous, hooklike appendages. Ejaculatory duct unifid, completely membranous.

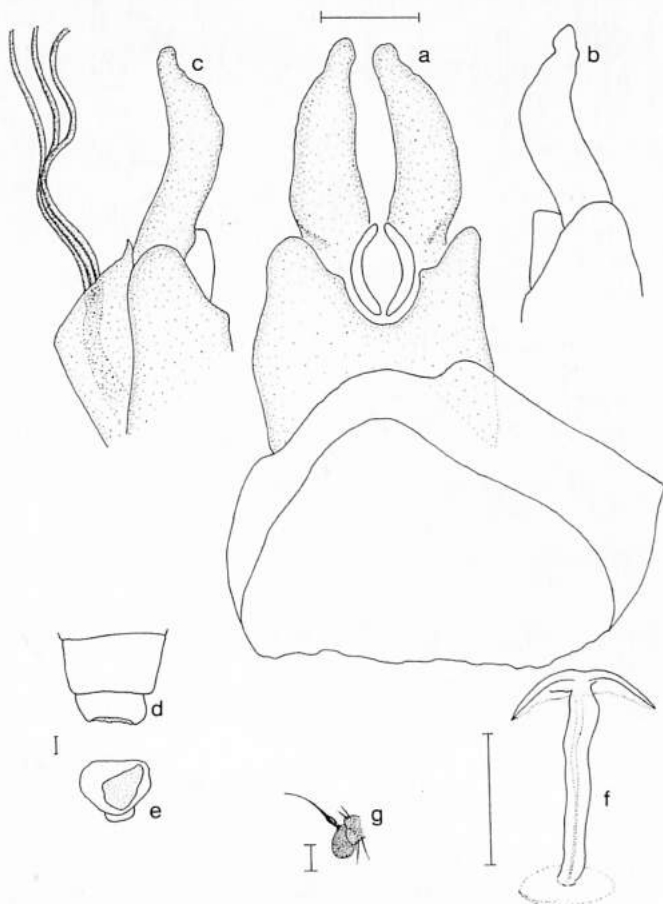
Female unknown (cfr. discussion *C. banksi*).

Etymology : Referring to the greyish dusting of thorax and abdominal terga.

Distribution : Canyons in mountain ranges of southern Arizona.

Holotype, ♂, USA : Arizona, Huachuca Mts, Sunnyside Canyon, 9.vii.1940 (Beamer) (SEM).

Paratypes : USA : Arizona, 1 ♂, same locality and date as holotype (SEM); 1 ♂, Huachuca Mts, S of Sierra Vista, Ramsey Canyon, 30.ix.1967 (Sternitsky) (CNC).



Figs. 19a-g. – *M banksi*, male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal; f, ejaculatory apodema; g, second and third antennal segment (scale 0.1 mm; pilosity not shown).

***Microcephalops floridae* sp. nov.**

(Figs. 21a-e)

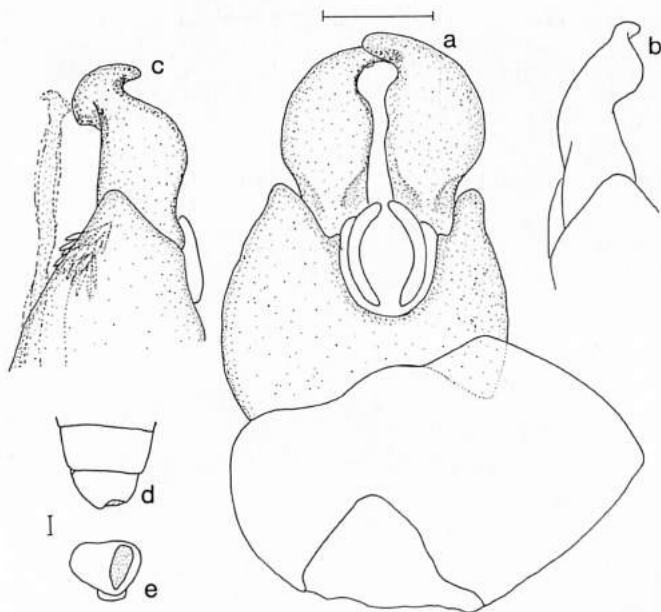
Body length : 2.1 mm.

Male.

Frons mainly shining black, only brownish black dusted along lateral margins; slightly inflated. Third antennal segment small, only slightly larger than second segment; obtuse below; dull; dark brown. Second antennal segment dark brown; 1 short and 2 long ventral bristles. Face dark subshining, narrower than lower portion of frons.

Thorax. Humeri dark. Propleural fan well developed with approx. 6 hairs. Mesonotum subshining black-brown; brownish dusted; almost completely deprived of pilosity, dorsocentral and lateral row of hairs poorly developed. Scutellum same colour and dusting as centre mesonotum; with poorly developed row of fine, short, pale hairs along margin. Halteres darkish brown. Pleura greyish brown dusted.

Legs dark. Coxae black brown, mid coxae anterodistally with few bristly hairs, otherwise all coxae bare. Trochanters yellowish brown. Femora all shining posteroventrally;



Figs. 20a-e. – *M. griseus* sp.n., male terminalia : a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

dark except for apical extremities narrowly yellowish. Front femora ventrally with single row of 5 spines posteriorly at apical half; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 6 spines at apical half; otherwise like front femora. Hind femora ventrally with double row of 6 spines over apical half, continued basally as row of short, pale hairs; incomplete anterodorsal row and fully developed posterodorsal row of short, pale hairs; furthermore dispersed short, pale hairs. Tibiae darkish brown, with yellow apices; all with dispersed rows of short, pale hairs. Hind tibiae slightly thickened in the middle without any suberected bristles. Tarsi yellowish brown; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer. Wings. Length 2.4 mm. M 1+2 not furcated. Pterostigma almost fully coloured. Third costal section approx. as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen mainly darkish brown dusted. Tergum 1, lateral fan with 3 long darkish hairs. Terga 2-4 darkish brown; except along posterior margin shining black. Tergum 5 more extensive shining for posterior half. Terga furthermore with sparse, dark hairs, along margins slightly longer hairs. Sterna dull, brown. Sternum 8 small, subshining brown; in dorsal view distinctly less than half the length of tergum 5 (Fig. 21d). Membranous area not reaching epandrium; in distal view roughly triangular in shape with base directed upwards, occupying less than half of sternum (Fig. 21e).

Male terminalia (Figs. 21a-c). Surstyli symmetrical, broad with pointed ends. Apical part of aedeagus simple; with curved point. Ejaculatory duct trifold, short tubiform.

Female unknown (cfr. discussion *C. banksi*).

Etymology : Named after the type locality.

Distribution : USA, Florida.

Holotype, ♂, USA : Florida, Orange Park, 25.iii.1952 (O. Peck) (CNC).

***Microcephalops parafloridae* sp. nov.**
(Fig. 22a-e)

Body length : 2.2 mm.

Male.

Frons brownish black pubescent; large median shining patch occupying about half of entire width, narrowly elongated upwards; slightly inflated. Third antennal segment small, only slightly larger than second segment; short acute below; dull; brown, slightly paler than second segment. Second antennal segment dark brown; 1 short and 2 long ventral bristles. Face greyish brown pubescent; narrower than lower portion of frons.

Thorax. Humeri dark. Propleural fan poorly developed with approx. 3 short hairs. Mesonotum subshining black-brown; brownish dusted; marginal row anteriorly with few longer hairs. Scutellum same colour and dusting as centre mesonotum; with row of fine, short, pale hairs along margin. Halteres yellowish brown. Pleura greyish brown dusted. Legs dark. Coxae black brown, mid coxae anterodistally with few bristly hairs, otherwise all coxae bare. Trochanters yellowish brown. Femora all shining posteriorly; dark except for apical extremities narrowly yellowish. Front femora ventrally with single row of 5 poorly developed spines posteriorly at apical third; posterodorsal row of short, pale hairs over entire length; furthermore with dispersed short, hairs. Mid femora ventrally with double row of 6 spines at apical half; otherwise like front femora. Hind femora ventrally with double row of 6 spines over apical half, continued basally as row of short, pale hairs; anterodorsal and posterodorsal row of short, pale hairs over entire length; furthermore dispersed short, pale hairs. Tibiae darkish brown, with yellow apices; all with dispersed rows of short, pale hairs. Hind tibiae slightly thickened in the middle without any suberected bristles. Tarsi yellowish brown; all segments with short, pale hairs. Pulvilli subequal in length to last tarsal segment; claws slightly longer. Wings. Length 2.3-2.4 mm. M 1+2 not furcated. Pterostigma almost fully coloured. Third costal section about as long as fourth costal section. r-m placed at basal two-fifths of discal cell.

Abdomen mainly darkish brown dusted. Tergum 1, lateral fan with 3 long darkish hairs. Terga 2-4 completely darkish brown dusted. Tergum 5 more shining for posterior half. Sterna dull, brown. Sternum 8 small, subshining brown; in dorsal view distinctly less than half the length of tergum 5 (Fig. 22d). Membranous area not reaching epandrium;

in distal view oval shaped, occupying less than half of sternum (Fig. 22e).

Male terminalia. Surstyli symmetrical, broad with elongated apical ends. Apical part of aedeagus simple; pointed with apical end curved. Ejaculatory duct trifold, short tubiform.

Female unknown (cfr. discussion *C. banksi*).

Etymology: "Para" from the latin for similar, and "floridae" after the previous new species; referring to the phylogenetic relationship between the two species.

Distribution: South-eastern part of USA.

Holotype, ♂, USA: North Carolina, Highlands (3800'), 12.vii.1957 (Chillcot) (CNC).

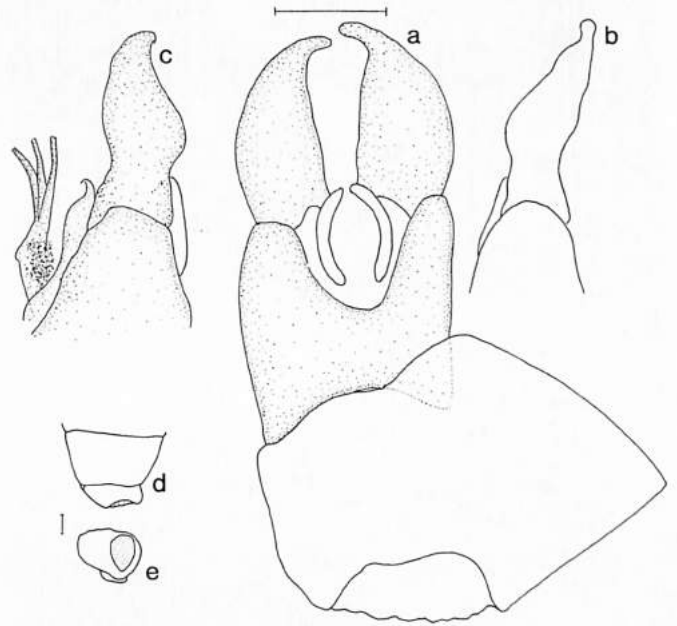
Paratype: 1 ♂, USA, Georgia, Pine Mtn (3000'), 12.vii.1957 (Chillcot) (CNC). Both types in CNC.

Character analysis.

Polarity of the character states is designated on the principle of outgroup comparison. *Pipunculus* is chosen as outgroup. For discussion of outgroup choice, see DE MEYER (1989). No weighting of characters is done. To facilitate comparison with the West-Palaeartic species, some character states are included to separate specific groups from this region.

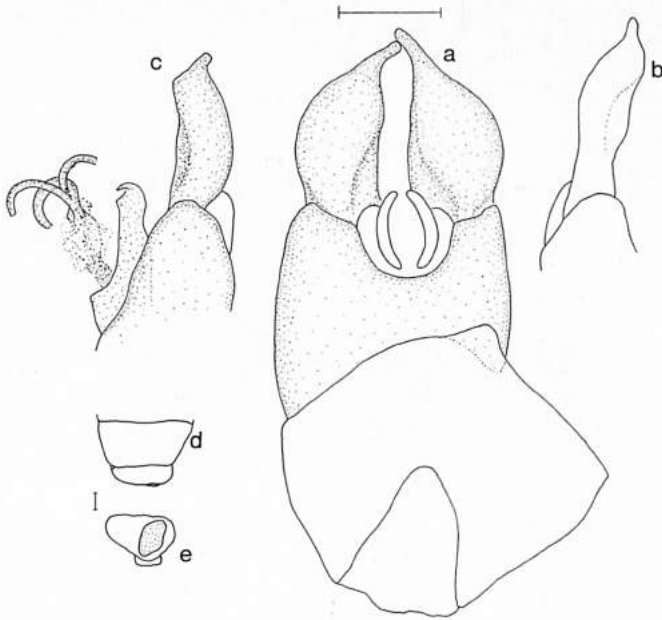
Postulated apomorphic character states.

1. Size small.
2. Frons inflated.
3. Abdominal terga 1-4 densely pubescent.
4. Third antennal segment only slightly larger than second segment (Fig. 19g).
5. Abdominal terga vi and vii further reduced (Fig. 43).
6. Vein M1+2 without appendix (Figs. 24, 25).
7. Scutellum with short, pale hairs along posterior part of margin.
8. Hairs along posterodorsal row on mid femora short.
9. Membranous area on sternum 8 "key-hole" shape, reaching epandrium (Fig. 12e).
10. Aedeagus with apical part sub- or asymmetrical (Figs. 12f, 18f).
11. Female hind tarsal segments flattened laterally (Fig. 8h).
12. Ejaculatory duct bifid (Fig. 8f).
13. Ejaculatory duct with teeth (Fig. 8f).
14. Vein r-m placed basally from discal cell (Fig. 24).
15. Female abdomen long and slender.
16. Aedeagus in lateral view strongly broadened (Fig. 19c).
17. Ejaculatory duct extending well beyond surstyli (Fig. 19c).
18. Large membranous area on sternum 8, in distal view occupying more than half of sternum (Fig. 19e).



Figs. 21a-e. – *M. floridae* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

19. Ejaculatory duct with membranous part (Figs. 20c, 21c).
20. Lateral margins of thorax and abdomen with greyish pubescence.
21. Ejaculatory duct completely membranous, unifold (Fig. 20c).
22. Surstyli strongly asymmetrical (Fig. 20b, c).
23. Aedeagus with curved tip (Figs. 21c, 22c).
24. All femora shining posteroventrally.
25. Surstyli elongated with clavate apical ends (Figs. 1a, 2a).
26. Mid tibiae apically with longer hairs.
27. Ejaculatory duct elongated (Figs. 3c, 6d).
28. Sternum 8 almost divided in two parts by large membranous area, reaching the epandrium (Fig. 4e).
29. Ejaculatory duct coiled (Fig. 6d).
30. Aedeagus with spurlike protuberance and spines (Fig. 3c).
31. Pilosity on lateral sides of abdominal terga reduced.
32. Aedeagus with large membranous structure apically (Fig. 3c).
33. Surstyli with elongated dorsal protuberances (Fig. 3a).
34. Third antennal segment long filiform.
35. Surstyli bifurcate (Fig. 1b, c).
36. Base ovipositor suddenly truncated at apical end (Figs. 28, 29).
37. Vein M1+2 strongly undulating (Fig. 24).
38. Inner surstylus with median protuberance (Fig. 10b).
39. Ejaculatory duct with many teeth (Fig. 8f).
40. Surstyli elongated (Fig. 11a).
41. Sternum 8 shorter than half the length of tergum 5 (Fig. 8d).



Figs. 22a-e. – *M. parafloridae* sp.n., male terminalia: a, dorsal view; b, inner surstylus lateral; c, outer surstylus with aedeagus and ejaculatory duct lateral; d, tergum 5 and sternum 8; e, sternum 8 distal (scale 0.1 mm; pilosity not shown).

42. Surstyli broad, bent ventrally (Figs. 8c, 9c).
43. Ovipositor with base short, rounded (Figs. 33, 34).
44. Legs and humeri darkened.
45. Surstyli stronger bent (Fig. 8c).
46. Ejaculatory duct with cupular ends (Fig. 12c).
47. Ejaculatory duct narrowed apically.
48. Surstyli with lower protuberance well developed (Fig. 18b, c).
49. Aedeagus asymmetrically pointed (Figs. 15f, 18f).
50. Hind tibiae with long bristly hairs in median part (Fig. 16g).
51. Aedeagus ankyroid (Figs. 12c, 14c).
52. Aedeagus specific shape, long and pointed on one side.
53. Hook of ankyroid aedeagus long (Figs 12c, 17c).
54. Apical end aedeagus specific type, with double protuberance (Fig. 13f).
55. Apical end aedeagus broad (Fig. 14f).
56. Surstyli with fingerlike protuberances (Figs. 13a-c).
57. Hook curved in lateral view (Fig. 12c).
58. Surstyli broadly shaped (Figs. 17b, c).
59. Ovipositor base short, broad (Fig. 40).

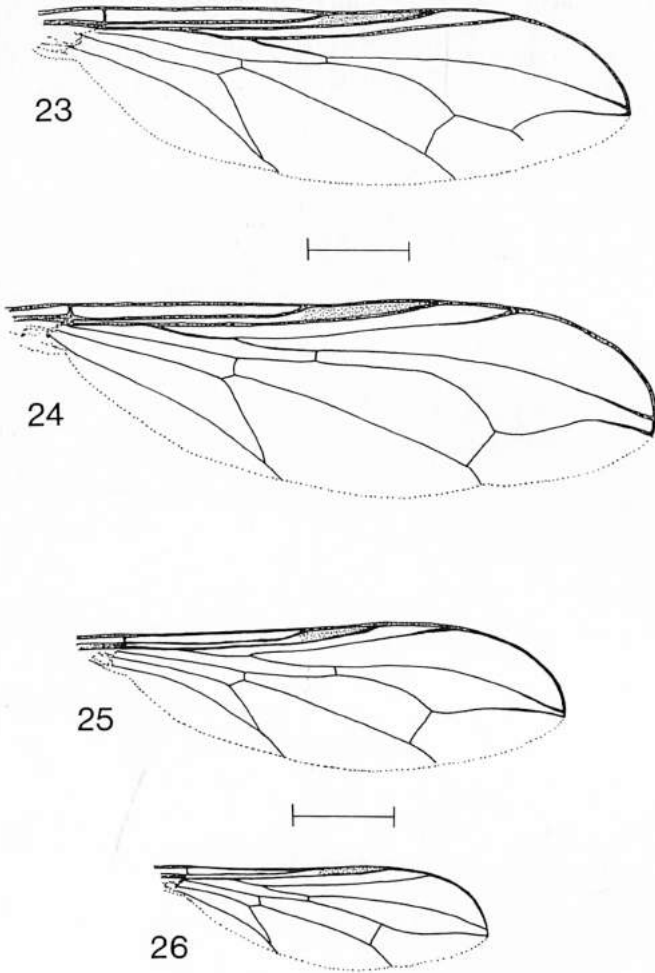
Phylogeny of Nearctic *Cephalops* and their relationship to West-Palaeartic species.

Four groups could be distinguished (Fig. 45) among the Nearctic species: the *Cephalosphaera* group, the *aeneus* group, the *semifumosus* group, and the *vestitus* group (the latter three groups are named after related species from the West-Palaeartic region (see DE MEYER, 1989). The *vestitus* group is presented here as a separate genus:

Microcephalops gen. nov. Study of Holarctic *Cephalops* s.l. species, as well as related genera like *Pipunculus* and *Eudorylas*, has shown that the former (including *Cephalosphaera*) have a clear synapomorphy: a further reduction of abdominal terga 6 and 7. Tergum 6 is reduced to a small line, except for a plate protecting part of the genitalia (Fig. 43); whereas in *Pipunculus* and *Eudorylas* this is still present as a broad band (Fig. 42). Tergum 7 is strongly reduced in *Cephalops*, and sometimes hardly distinguishable. In the other genera it is still present as a well developed sclerotized structure, and distinctly connected with sternum 7. The character states as described for the Holarctic *Cephalops* species are also present in *Beckerias* and *Wittella*, placing them in a monophyletic group. However, species of the *vestitus* group do not show these synapomorphies. Here terga 6 and 7 are less reduced (Fig. 44). Moreover, the *vestitus* group shows some autapomorphies like the small size, the relatively small third antennal segment and the inflated frons. In general *Microcephalops* seems to take a transition place between the *Cephalops* group on one and *Eudorylas* on the other side, especially because of characters like the reduction of the propleural fan and the extensive pubescence on the abdominal terga.

thin *Microcephalops*, the cladistic relationship is well defined (Fig. 46). *M. banksi*, together with the West-Palaeartic sister-species *vestitus*, are characterised by the long ejaculatory duct, the large membranous area, and the, in lateral view broadened aedeagus. *M. floridae*, *M. parafloridae* and *M. griseus* are distinguished as a second subgroup by the broader surstyli. *M. griseus* shows a number of autapomorphic characters like the unifold, membranous ejaculatory duct and the greyish pubescence. *M. floridae* and *M. parafloridae* show synapomorphies like the curved tip of the aedeagus.

Within the Nearctic true *Cephalops* spp., there are three groups. *Cephalosphaera* is probably the most plesiotypic because of the presence of an appendix in vein M1+2, and the stronger pilosity of the scutellar margin and the legs in most species (presence or absence of an appendix in vein M1+2 has often been used in this family to separate certain groups, like *Jassidophagha* - *Verrallia*, *Pipunculus* - *Parapipunculus*, *Dorylomorpha* - *Claraeomorpha*. See ACZÉL (1948), RAFAEL (1986) and KAPOOR, et. al. (1987) respectively for further details on these groups). Also, the longer size and heavier build of the ovipositor, which resembles these of *Pipunculus* species, can be considered as a plesiomorphic character. However, no apomorphic characters could be distinguished so the monophyly of this group remains questionable. Also the relationship among the species is still partly unclear (Fig. 47). The characters found for differentiating species complexes within the group can certainly not be considered as "high weight characters" although the option of weighting in the processing of the data was not used (see MARSHALL, 1987 for discussion of weighting of characters and categories of characters of increasing weight). Only *C. brevis* and *C. biscaynei* (and partly *C. filicerus*) show synapomorphic



Figs. 23-26. – Wings male: 23, *C. acuminatus*; 24, *C. grootaerti* sp.n.; 25, *C. pallipes*; 26, *M. banksi* (scale 1 mm).

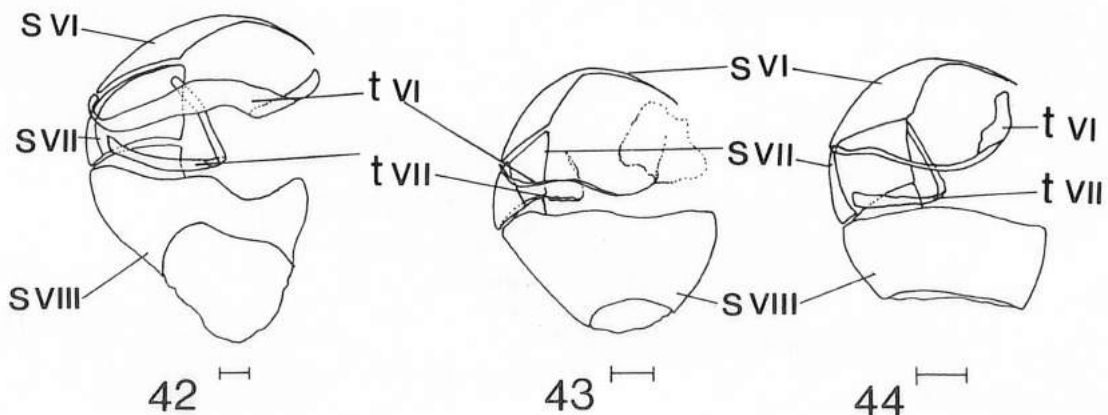
complex characters in the shape of the aedeagus. Consequently the relation between the West-Palaeartic and the Nearctic spp. is not clear cut. *C. germanicus* apparently belongs to the *reductus*, *appendiculatus*, *acuminatus* series. The position of *C. furcatus* is uncertain, it seems to be related to *C. maximus* but it does not have the membranous area reaching the epandrium and/or the tergum 5. Further study of *Cephalosphaera* spp. from other regions might alter this position.

The *aeneus* group is well defined (Fig. 48) and can be distinguished by a set of synapomorphies, the most important being the bifid and dentated ejaculatory duct. *C. pallidivittipes* and *C. furnaceus* are closely related. A comparison with the West-Palaeartic species, shows a remarkable similarity. Phenetically speaking, *C. grootaerti* and *C. aeneus* on one hand, and *C. furnaceus*, *C. pallidivittipes* and *C. vittipes* on the other hand, are very similar, and they can only be differentiated with certainty by a number of small morphological differences in the genital structures (cfr discussion in species descriptions). Undoubtedly they represent closely related vicariants. Within this scope it is interesting to notice the fact that *C. aeneus* and *C. vittipes* are the only two species of all European *Cephalops* spp. to be relatively widespread in the boreal region (see DE MEYER & BACKELJAU, in press). Also the Nearctic vicariants have a fairly northerly distributional limit but not as outspoken as in the European species.

The *semifumosus* group is characterised mainly by the membranous area on sternum 8, which reaches the epandrium, is rounded above, and in general is more or less key-hole shaped. Two main species subgroups are found (Fig. 49): those without a hook on the aedeagus and the entirely tubiform ejaculatory duct: *mainensis*, *varius*, *longiductulis*; and those with an ankyroid aedeagus and ejaculatory duct with cupular ends: *pallipes*, *curvarmatus*, *hardyi*, *digitatus*. The latter two species can be distinguished by the shorter hook on the aedeagus from the other two. The West-Palaeartic *C. chlorionae* belongs to the *varius-longiductulis* series, *subultimus* is related to *pallipes*; and *semifumosus* and *perspicuus* to *hardyi-digitatus*. Relation between other species is uncertain.

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I would like to thank the various curators who provided me with material from the collections of their institutions. Special thanks to Dr. P. Grootaert (KBIN) for providing working facilities and discussing the manuscript.



Figs. 42-44. – Male terminalia, dorsal view; 42, *Pipunculus* sp.; 43, *Cephalops* sp.; 44, *Microcephalops* sp. (Scale 0.1 mm).

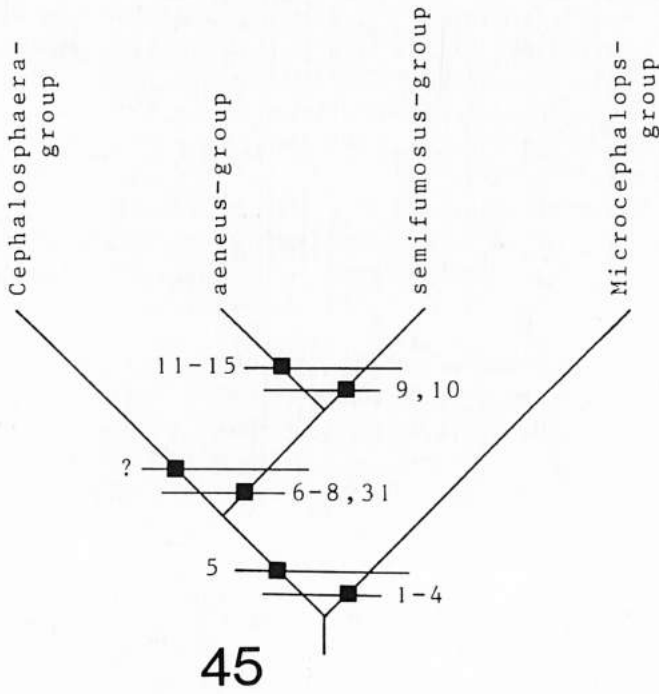


Fig. 45. - Cladogram for Nearctic *Cephalops* species groups and *Microcephalops* gen.n., based on character states 1-15 and 31.

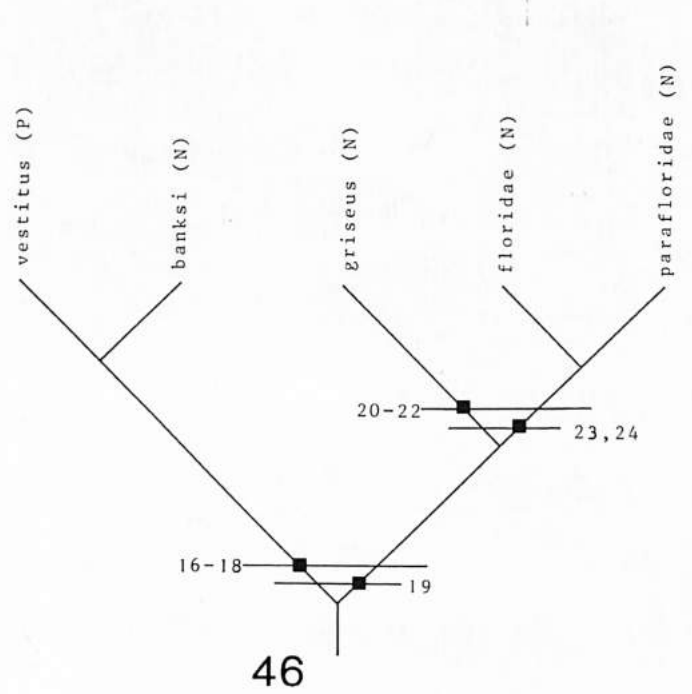


Fig. 46. - Cladogram for Holarctic *Microcephalops* gen.n. species.

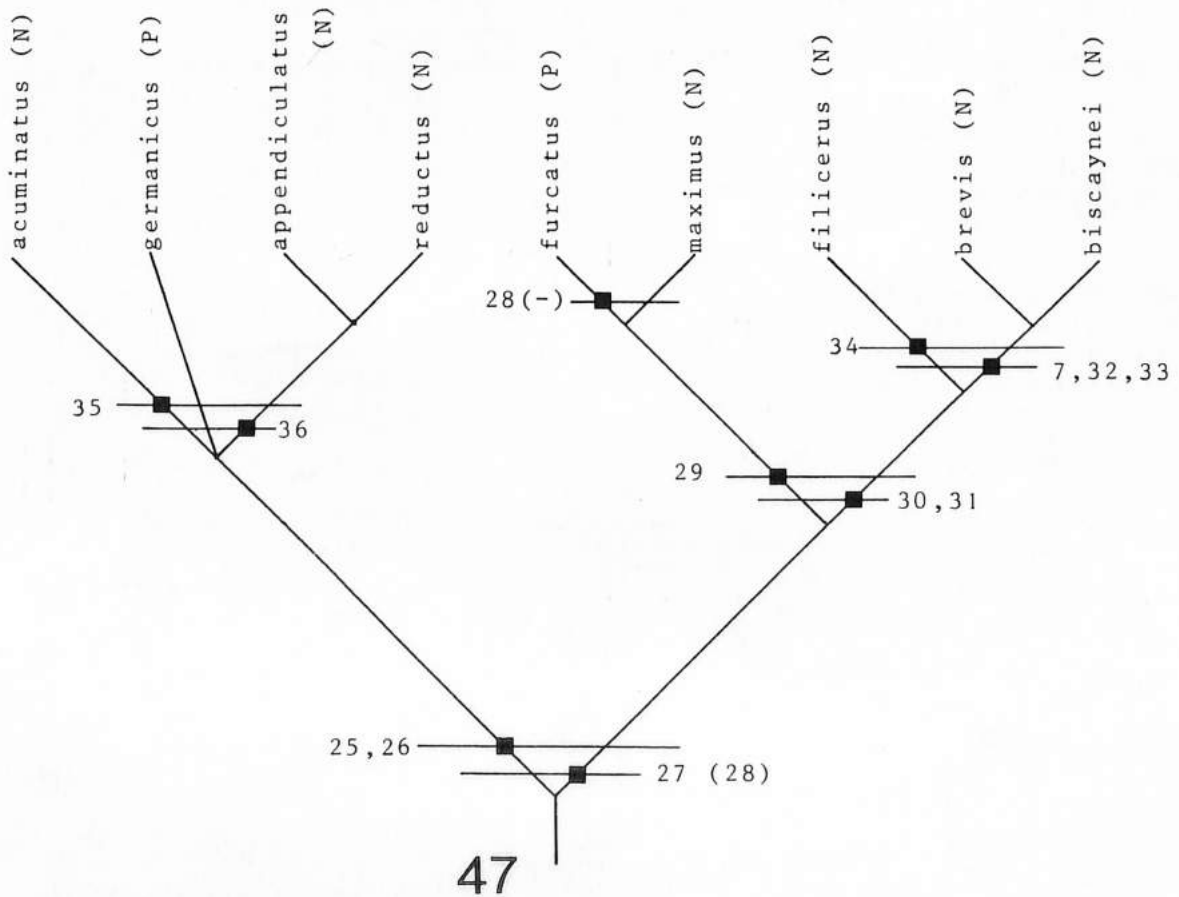


Fig. 47. - Cladogram for Holarctic *Cephalops* species of the Cephalosphaera group.

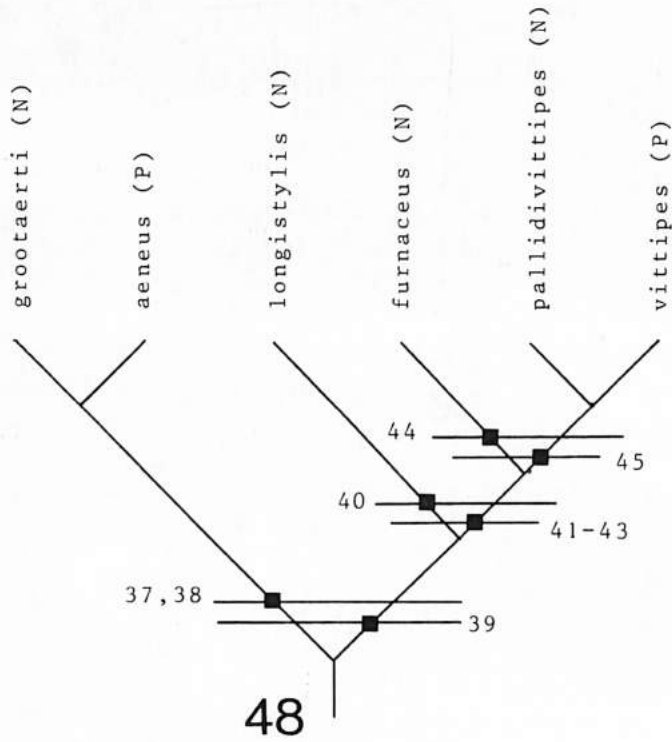


Fig. 48. - Cladogram for Holarctic Cephalops species of the aeneus group.

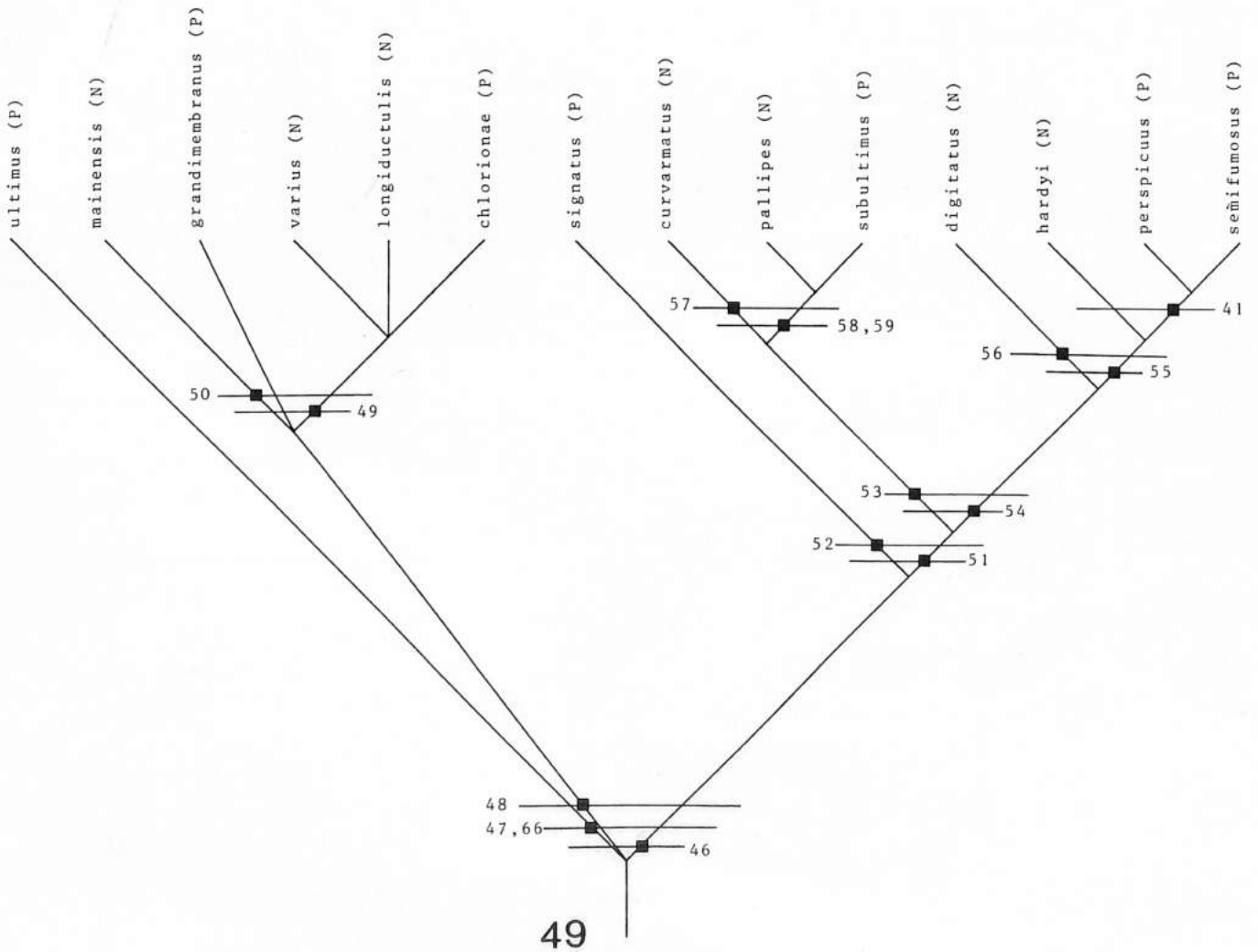


Fig. 49. - Cladogram for Holarctic Cephalops species of the semifumosus group.

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