

# The systematics and phylogeny of *Coelosia* Winnertz, 1863 (Diptera, Mycetophilidae)

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The world fauna of *Coelosia* Winnertz, 1863 is revised. Descriptions and diagnoses of the genus and all 24 known species are given, together with keys to males and associated females. A hypothesis of the phylogenetic relationship among the species is presented based on a cladistic analysis. The two genera *Boletina* and *Gnoriste* combined were used as outgroup in the analysis. The monophyly of the genus is well supported by the data. Despite much homoplasy, two species groups can be recognised.

All available type material of species assigned to *Coelosia* have been studied. In addition, identified and unidentified specimens were borrowed from 22 museums and institutions. All known species are redescribed, and lectotypes designated for *bicornis* Stackelberg, 1946, *flava* Staeger, 1840, *modesta* Johannsen, 1912, *sapporoensis* Okada, 1939, *tenella* (Zetterstedt, 1852) and *truncata* Lundström, 1909. *Coelosia fusca* Bezzi, 1892 was found to be a senior synonym of *silvatica* Landrock, 1918, *modesta* Johannsen, 1912 of *quadricornis* Stackelberg, 1942, and *pygophora* Coquillett, 1904 of *lepida* Johannsen, 1912. Three species are transferred from *Coelosia* to *Coelophthiria* Edwards, 1941, namely *flavithorax* Freemann, 1951, *neotropica* Lane, 1959 and *accita* Plassmann & Vogel, 1990. Thirteen new species are described, *burmacola* and *distylata* from the Oriental region, and *brevilobata*, *huizilopochlii*, *longilobata*, *quetzalcoatl*, *scopariata*, *succinea*, *tezcatlipocai*, *tlaloci*, *vockerothi*, *xochiquetzali* and *xolotli* from the Nearctic region.

Of the 24 species in the genus, 13 are Nearctic, 6 Palaearctic, 3 Holarctic and 2 Oriental. The northernmost and southernmost records originate from 79°N and 16°N, respectively. Judged from the revealed phylogeny and present distribution of the species, an Eurasian origin of the genus appears most likely. The evolution and diversification of the genus is likely to coincide with the Tertiary palaeogeological development of Eurasia and North America.

Key words: Fungus gnats, Diptera, Mycetophilidae, *Coelosia*, new species, phylogeny, morphology, biogeography.

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## Introduction

Fungus gnats of the genus *Coelosia* in the family Mycetophilidae are delicate small gnats with an average wing length of 4–7 mm (Fig. 1). As are most species in this family, they are common in shady, wet to moderately wet forest habitats, and large samples are readily obtainable by use of sweep nets or Malaise traps.

The genus *Coelosia* was erected by Winnertz (1863) to include *Boletina flava* Staeger, 1840 and *Coelosia flavicauda* Winnertz, 1863 (= *tenella* Zetterstedt, 1852). After this all valid species have been described as *Coelosia*, with a possible exception for *Euryschalis spectralis* Brunetti, 1912 (see later).

The only paper dealing exclusively with *Coelosia* is Stackelberg (1946), revising the Palaearctic species, including *flava* (Staeger, 1840), *tenella* (Zetterstedt, 1852), *fusca* Bezzi, 1894 (as *silvatica* Landrock, 1918), *truncata* Lundström, 1909, *bicornis* Stackelberg, 1909 and *modesta* Johannsen, 1912 (as *quadricornis* Stackelberg, 1946). The Nearctic species were treated by Johannsen (1912), namely *flava* (Staeger, 1840) (misidentified), *pygophora* Coquillett, 1904, *tenella* (Zetterstedt, 1852) (as *flavicauda* Winnertz, 1863), *gracilis* Johannsen, 1912, *lepida* Johannsen, 1912 (a junior synonym of *pygophora* Coquillett, 1904) and *modesta* Johannsen, 1912.

Another genus, *Coelophthinia*, was erected by Edwards (1941) to include *thoracica* Winnertz, 1863, originally described as *Phthinia*, later included in *Coelosia* by Edwards (1925) in his revision of the Mycetophilidae. Likewise, the Nearctic *Coelophthinia curta* (Johannsen, 1912) was described as *Phthinia*. Subsequently all species of *Coelophthinia* have been described as *Coelosia*, namely *C. flavithorax* (Freeman, 1951), *C. neotropica* (Lane, 1959), and most recently *C. accita* (Plassmann & Vogel, 1990).

*Coelosia* was mentioned by Vockeroth (1981) as one genus in need of further studies. Due to the great diversity in the structure of the male genitalia Vockeroth suggested that the species may form a complex of genera.

The present study provides keys, descriptions and figures of all known *Coelosia* species, and discusses the phylogenetic relationship among the species.

## Material

The material consists of dry, pinned specimens, specimens preserved in alcohol and some slide mounted specimens from the following museums, institutions and private collections:

- AMNH — American Museum of Natural History, New York, USA
- BMNH — British Museum (Natural History), London, England
- CAL — California Academy of Sciences, San Francisco, USA
- CNC — Canadian National Collection, Ottawa, Canada
- COR — Cornell University Insect Collection, New York, USA
- HOK — Hokkaido University, Hokkaido, Japan
- HUN — Hungarian Natural History Museum, Budapest, Hungary
- IOW — Iowa State Insect Collection, Ames, USA
- JEC — James Entomological Collection, Pullman, USA

- JPD — Jose P. Duret (priv. coll.), Buenos Aires, Argentina
- MNHN — Muséum National d'Histoire Naturelle, Paris, France
- MOR — Moravian Museum, Brno, Czechia
- MOSC — A. N. Severtzov Institute of Ecology and Evolution, Moscow, Russia
- MIL — Natural History Museum of Milan, Milan, Italy
- PJC — Peter J. Chandler (priv. coll.), Maidenhead, England
- USNM — US National Museum, Smithsonian Institution, Washington, USA
- ZIAS — Zoological Institute of Academy of Sciences, St. Petersburg, Russia
- ZMBN — Museum of Zoology, Bergen, Norway
- ZMC — Museum of Zoology, Copenhagen, Denmark
- ZMH — Zoological Museum, Helsinki, Finland
- ZML — Zoological Museum, Lund, Sweden
- ZSM — Zoologische Staatssammlung München, Germany
- ZMO — Zoological Museum, Oslo, Norway

## Slide mounting

Several characters used in the descriptions and in the phylogenetic analysis, demand slide mounted specimens. However, as slide mounting reduce the applicability of the specimens for other purposes, restrictions were put upon the treatment of some of the borrowed material. Where available, 5 males and 5 females of each species were mounted and measured. The specimens were dissected in alcohol or water. Head, one antennae, thorax and abdomen were cleared in 8% KOH, then successively transferred to acetic acid, 100% alcohol, cedar wood oil plus 100% alcohol, and finally to pure cedar wood oil. The remaining parts, one antennae, wings and the legs of one side, were transferred directly from 70 to 100% alcohol. Terminalia, if necessary, were dissected in cedar wood oil, and figured. All parts were then mounted in Canada balsam on one slide under 5 separate cover slips: wings, head and antennae, thorax with attached legs, detached legs, and abdomen plus terminalia.

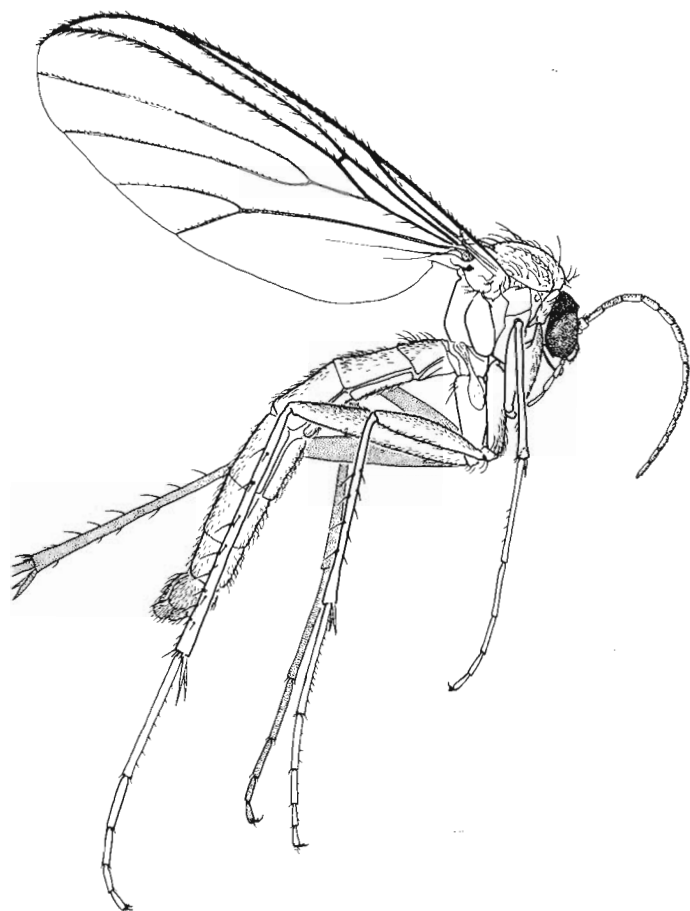


Fig. 1. *Coelosia tenella* (Zetterstedt), lateral view

## Morphology

The present interpretations and morphological terminology follows Söli (present volume), and is mainly in accordance with McAlpine (1981) and Vockeroth (1981).

## Measurements and ratios

Most measurements were made on slide mounted specimens; for some the mean value is given in brackets when 5 or more specimens were measured.

The ocellar ratio is used to describe the position of the ocelli, and is given as the distance from the centre of median ocellus to upper corner of compound eye, over shortest distance from centre of median ocellus to border of lateral ocellus. The width of front is given as the shortest distance between the eyes above the antennal sockets.

The total wing length is measured from the distal median plate to apex of wing (Fig. 2). Subcosta 1 is measured from humeral to point where Sc1 meets costa, and R5 from the radial sector (rs) to the point where R5 meets costa. The basal transversal (tb) and the CuA-petiole are both measured from the distal median plate. M1- and M2-ratios are given as length of M-petiole to the length of M1 and M2, respectively; CuA1- and CuA2-ratios as length of CuA-petiole to the length of CuA1 and CuA2, respectively. Otherwise, most wing measurements and ratios are self-evident.

Four leg ratios are used: leg ratio (LR) – length of first tarsomere to length of tibia; "Schenkel-Schiene-Verhältnis" (SV) – length of femur plus tibia, to length of first tarsomere (Pagast 1947); "Beinverhältnis" (BV) – combined length of femur, tibia and first tarsomere to combined length of tarsomeres 2–5 (Pa-

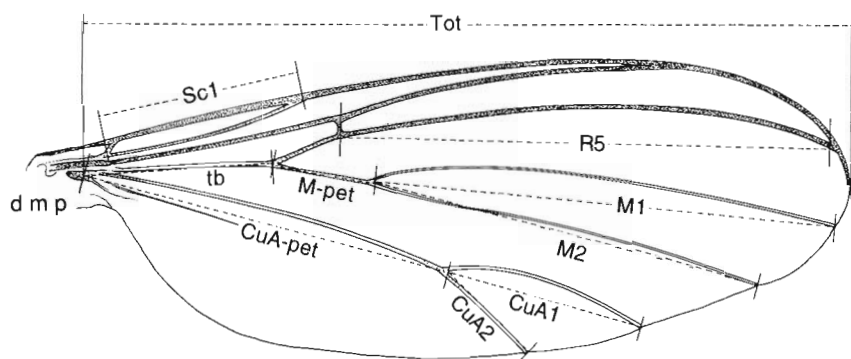


Fig. 2. Wing of *Coelosia tenella* (Zetterstedt), showing the points and orientation for measurements.

Abbreviation: d m p = distal median plate.

gast 1947), and finally, tarsus ratio (TR) – length of first tarsomere to length of second tarsomere.

Structures with a similar outline in both sexes are not commented upon in the description of the female.

## *Coelosia* Winnertz

*Coelosia* Winnertz, 1863: 796.

Type species. *Boletina flava* Staeger, 1840: 237, designated by Johannsen, 1909: 86.

**Diagnostic characters.** Frons bare; frontal tubercle simple and pointed. Labrum well developed, with or without setae. Third palpomere without distinct sensory pit. Mesopleuron, laterotergite and mediotergite all bare. Wing surface with small, irregularly arranged trichia only. Costa produced well beyond tip of R<sub>5</sub>. Sc<sub>1</sub> usually with some setae, ending in costa. Neither Sc<sub>2</sub> nor R<sub>4</sub> present. Point of furcation of cubital fork distinctly beyond level of point of furcation of media; both cubital branches straight or nearly so. Tibiae with well developed setae. Male gonostylus usually with distinct, well developed interior appendage.

## Description

Total length 3.6–6.6 mm. Wing length 2.7–4.6 mm or 3.3–4.3x the length of profemur.

**Coloration.** Highly variable within genus and within species. At least three species dimorphic, with brown and yellow morphs. In most species, even light

coloured, frons and top of head brown to dark brown. Scutum usually with three more or less distinct brown longitudinal bands, very vague in some species, which tend to fuse anteriorly and posteriorly. Abdominal tergites and sternites, particularly those of segments 3–6, sometimes with light or dark posterior margins.

**Head** (Figs. 3, 4, 5). Length of flagellum 2.0–3.0 mm in males, 1.4–2.1 in females. Flagellum with 14 well separated flagellomeres; each cylindrical, usually more compressed in females than in males, and articulating with neighbouring flagellomere along a somewhat oblique line. First two flagellomeres often longer than succeeding ones. Each flagellomere with numerous trichia, sensilla chaetica, and sensilla coeloconica as small depressions; first flagellomere sometimes with small setae.

Usually three ocelli arranged in shallow triangle; median ocellus absent in one species, *C. distylata* sp. n. When present, median ocellus encircled by medio-cellular suture together with small plate above ocellus; latter occasionally with 1 to 3 setae. Lateral ocelli usually distinctly larger than median, in most species with weak to well developed interior edge below anterolateral border, sometimes strongly developed, semi-circular, reaching medio-cellular suture medially (Fig. 4). Distance between lateral ocellus and margin of compound eye about 2x diameter of ocellus. Compound eye slightly invaginated above antenna, made up of about 300 ommatidia; each ommatidium usually surrounded by 2–3 small setae, usually as long as or

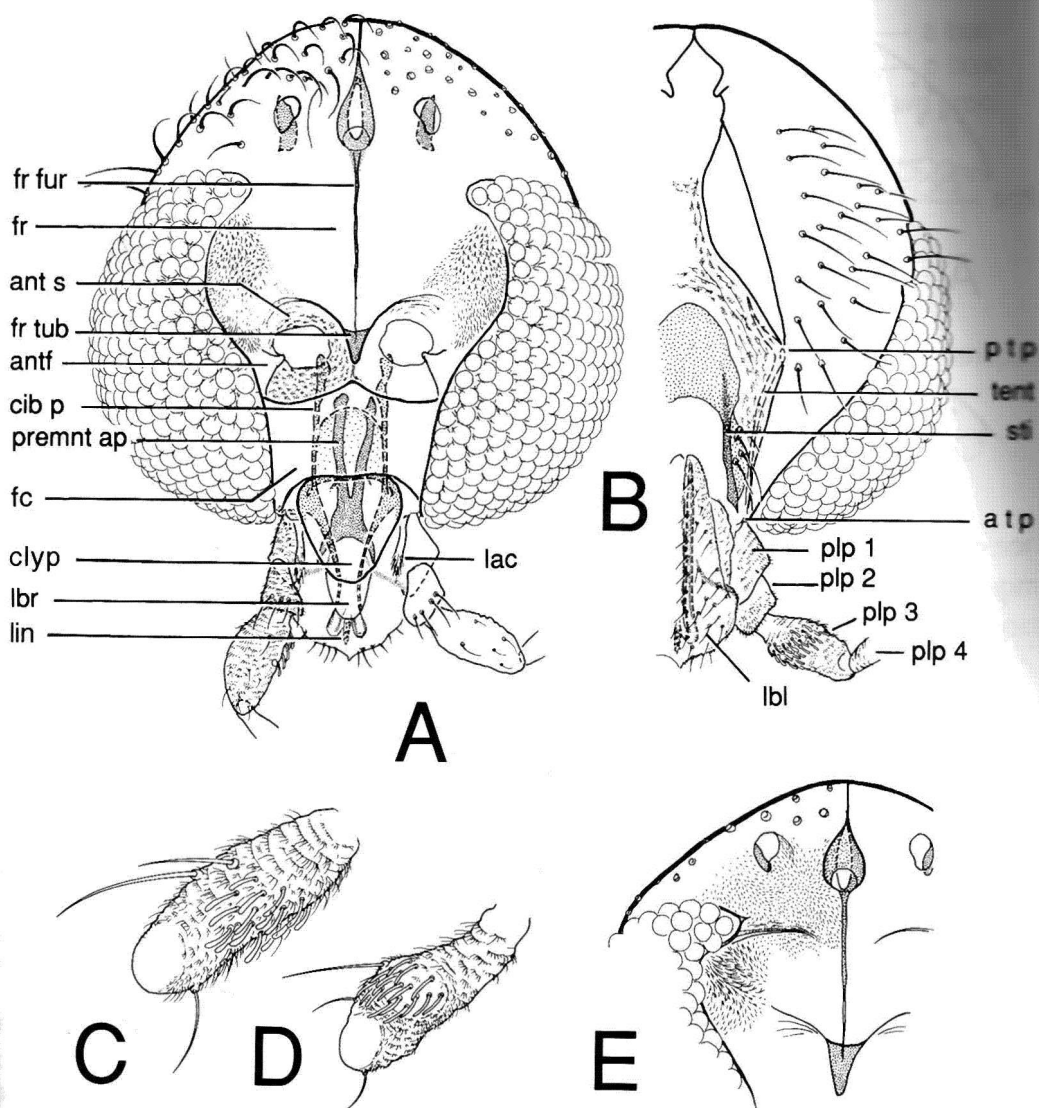


Fig. 3. A, B. Head of *C. fusca* Bezzi. A. Frontal view; B. Caudal view; C, D. Third palpomere. — C. *C. succinacea* sp. n. — D. *C. huitzilopochtlii* sp. n. — E. Top of head of *C. brevilobata* sp. n.

**Abbreviations:** antf = antennifer; ant s = antennal socket; a t p = anterior tentorial pit; cib p = cibarial pump; clyp = clypeus; fc = face; fr = frons; fr fur = frontal furrow; fr tub = frontal tubercle; lac = lacinia; lbl = labella; lbr = labrum; lin = lingua; plp = palpomere; premnt ap = premental apodeme; p t p = posterior tentorial pit; sti = stipes; tent = tentorium.

slightly longer than width of ommatidium.

Distinct frontal suture running from median ocellus to frontal tubercle. In several species an additional suture, usually broken, can be traced as a line running from anterior part of median ocellus to anteromedial corner of compound eye. Anterior border of frons weak and more weakly sclerotized towards antennal socket, covered with fine trichia, very long immediate-

ly above antennal socket, giving a somewhat shaggy appearance. Frons medially produced into simple frontal tubercle. A vague interantennal furrow runs from frontal tubercle to median portion of face.

Face weakly to moderately sclerotized, evenly covered with microtrichia and 12–16 setae, lower part moderately arched.

Clypeus as a distinct ovate sclerite below face,

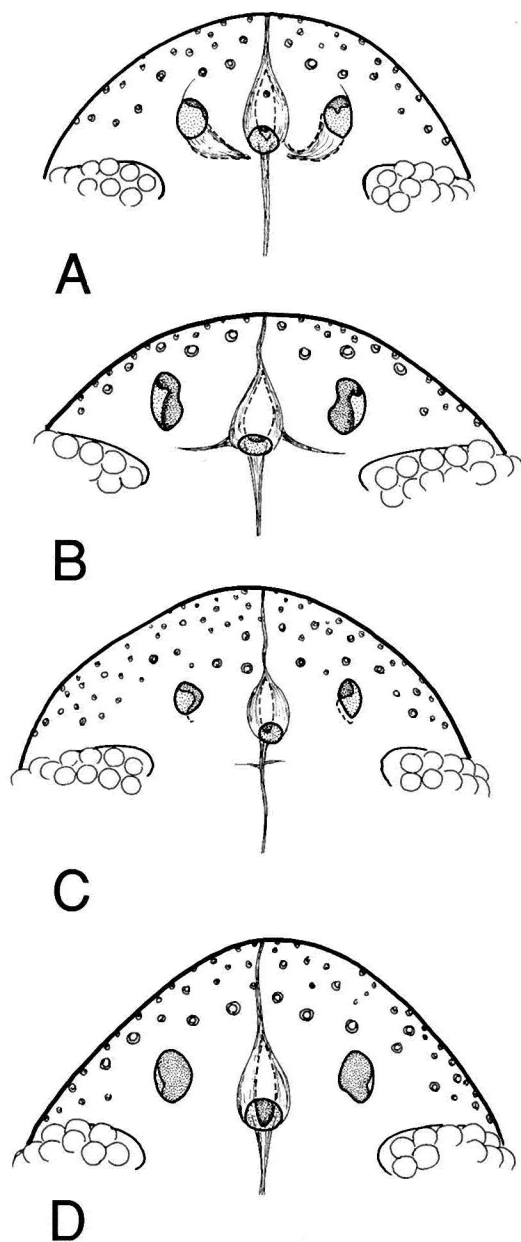


Fig. 4. A–D. Top of head, showing position of ocelli and internal ridges. — A. *C. truncata* Lundström. — B. *C. pygophora* Coquillett. — C. *C. vockerothi* sp. n. — D. *C. sapporoensis* Okada.

sometimes 1.5x as long as wide, with 4–28 setae. Cibarial pump connected to clypeus by means of interior, lateral apodemes.

Labrum distinct, weakly to moderately sclerotized, bearing both microtrichia and setae. In most species

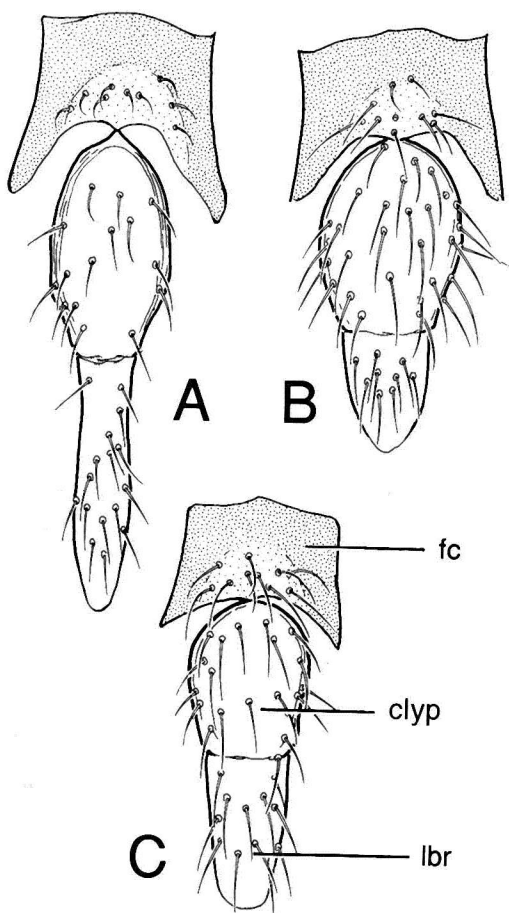


Fig. 5. Face, clypeus and labrum. — A. *C. bicornis* Stackelberg. — B. *C. huitzilopochlii* sp. n. — C. *C. xolotli* sp. n. Abbreviations: see Fig. 3.

labrum distinctly shorter than clypeus, but sometimes 1.6x as long.

Cardo apparently reduced. Stipes distinctly sclerotized distally, each with 2–8 setae; proximally fused, but median portion frequently weak, thus difficult to observe. Distally stipes bearing lacinia and palpus. Lacinia usually easily recognisable, in most species with some apical setae and/or microtrichia. Palpus with 5 palpomeres, all bearing both microtrichia and setae. Relative lengths of palpomeres highly variable, especially the length of palpomere 5. Palpomere 3 with several sensory sensilla, sensilla cochleariformis, along median and/or ventral surface (Figs. 3C, D), sometimes arranged in a more or less well delimited, rounded area situated basally, medially or distally.

Two-segmented labellum covered with both mi-

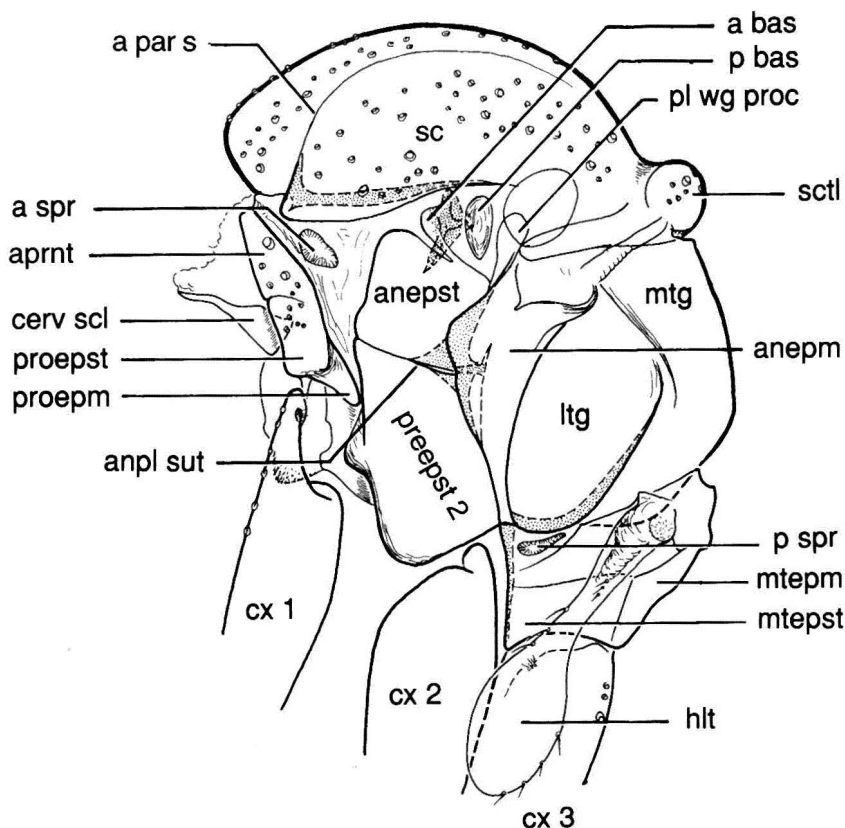


Fig. 6. *Coelosia limpida* Plassmann, thorax in lateral view. **Abbreviations:** a bas = anterior basalare; anepm = anepimeron; anepst = anepisternum; anpl su t = anapleural suture; a par s = anterior parapsidal suture; apmnt = anteprenotum; a spr = anterior spiracle; cerv scl = cervical sclerite; cx = coxa; hlt = halter; ltg = laterotergite; mtepm = metepimeron; mtepst = metepisternum; mtg = mediotergite; p bas = posterior basalare; pl wg proc = pleural wing process; preepst 2 = preepisternum 2; proepm = proepimeron; proepst = proepisternum; p spr = posterior spiracle; sc = scutum; sctl = scutellum.

crotrichia and setae. Two distinct pseudotracheae radiating from food canal into segment 2 of labellum. Several prestomal teeth present along pseudotrachea. Prementum reduced. Premental apodeme broad with 2 long, well sclerotized posterior processes; anteriorly articulating with lateroventrally projecting, sclerotized bands comprising first segments of labial palpi.

Inner skeleton of head formed by tentorium, consisting of posterior and anterior tentorial arms which meet in an obtuse angle to form an internal list, just below medioventral borders of compound eyes. Anterior tentorial arm much shorter and wider than posterior.

**Thorax** (Fig. 6) Lateral cervical sclerite large and triangular, bare. Anteprenotum distinct, with two long,

curved setae and several smaller; postpronotum bare and weakly developed. Proepisternum fused with anteprenotum along inclined line, with one long and several short setae. Proepimeron more obliterate, bare, located medioventrally of proepisternum. Mesoscutum covered by mixed long and short acrostichal and sublateral setae; anterior and lateral parapsidal sutures well developed. Scutellum usually with 2–4 strong, erect setae and numerous smaller, sometimes of equal length. Anepisternum and preepisternum 2 bare. Anapleural suture declining posteriorly. Laterotergite, mediotergite, metapleuron all bare.

**Wings** (Fig. 2). Hyaline or with brownish tint, sometimes with obscurely clouded tip. Brown shadings frequently present along median and cubital veins.

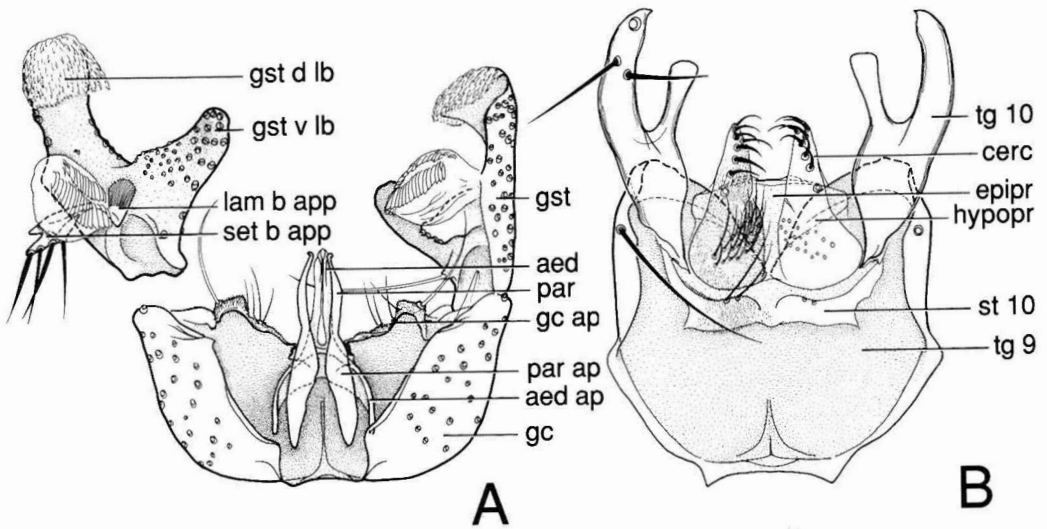


Fig. 7. Male terminalia. — A. *C. pygophora* Coquillett, dorsal view, tergite 9 removed. — B. *C. modesta* Johannsen, tergite 9 and associated structures, ventral view. **Abbreviations:** aed = aedeagus; aed ap = aedeagal apodeme; cerc = cercus; epipr = epiproct; gc = gonocoxite; gc ap = gonocoxal apodeme; gst = gonostylus; gst d lb = gonostylus, dorsal lobe; gst v lb = gonostylus = ventral lobe; hypopr = hypoproct; lam b app = lamella-bearing appendage; par = paramere; par ap = parameral apodeme; set b app = seta-bearing appendage; st, sternite; tg = tergite.

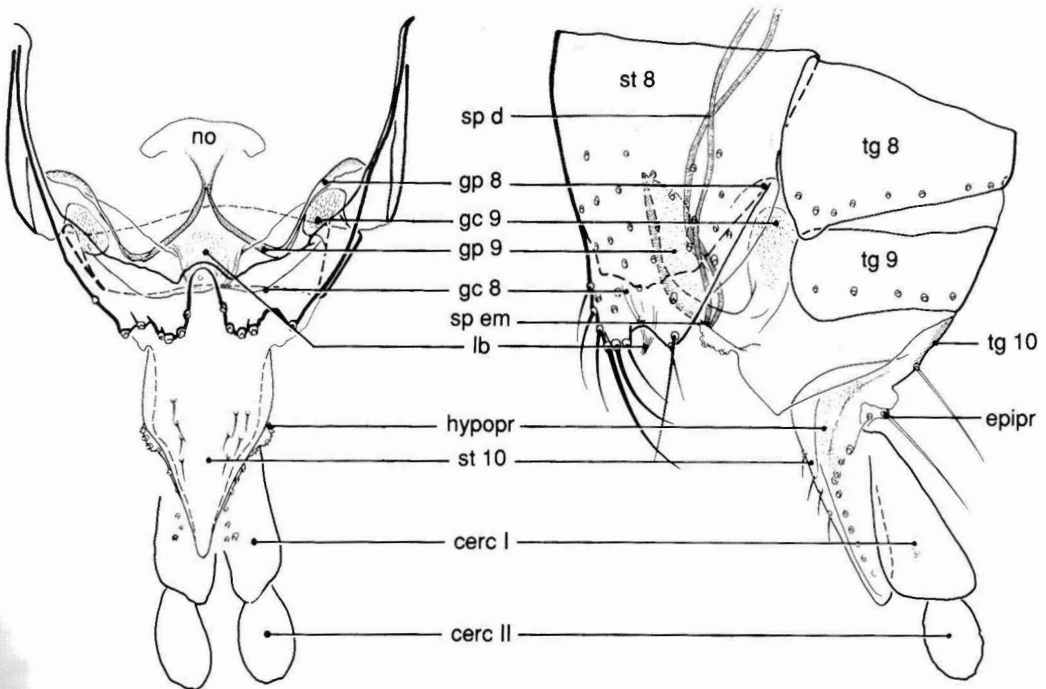


Fig. 8. Female terminalia in *C. tenella* (Zetterstedt), in dorsal and lateral views. **Abbreviations:** cerc = cercus; epipr = epiproct; hypopr, hypoproct; lb = labia; sp d = spermathecal duct; sp em = spermathecal eminence; gc = gonocoxite; gp = gonapophysis; st = sternite; tg = tergite.

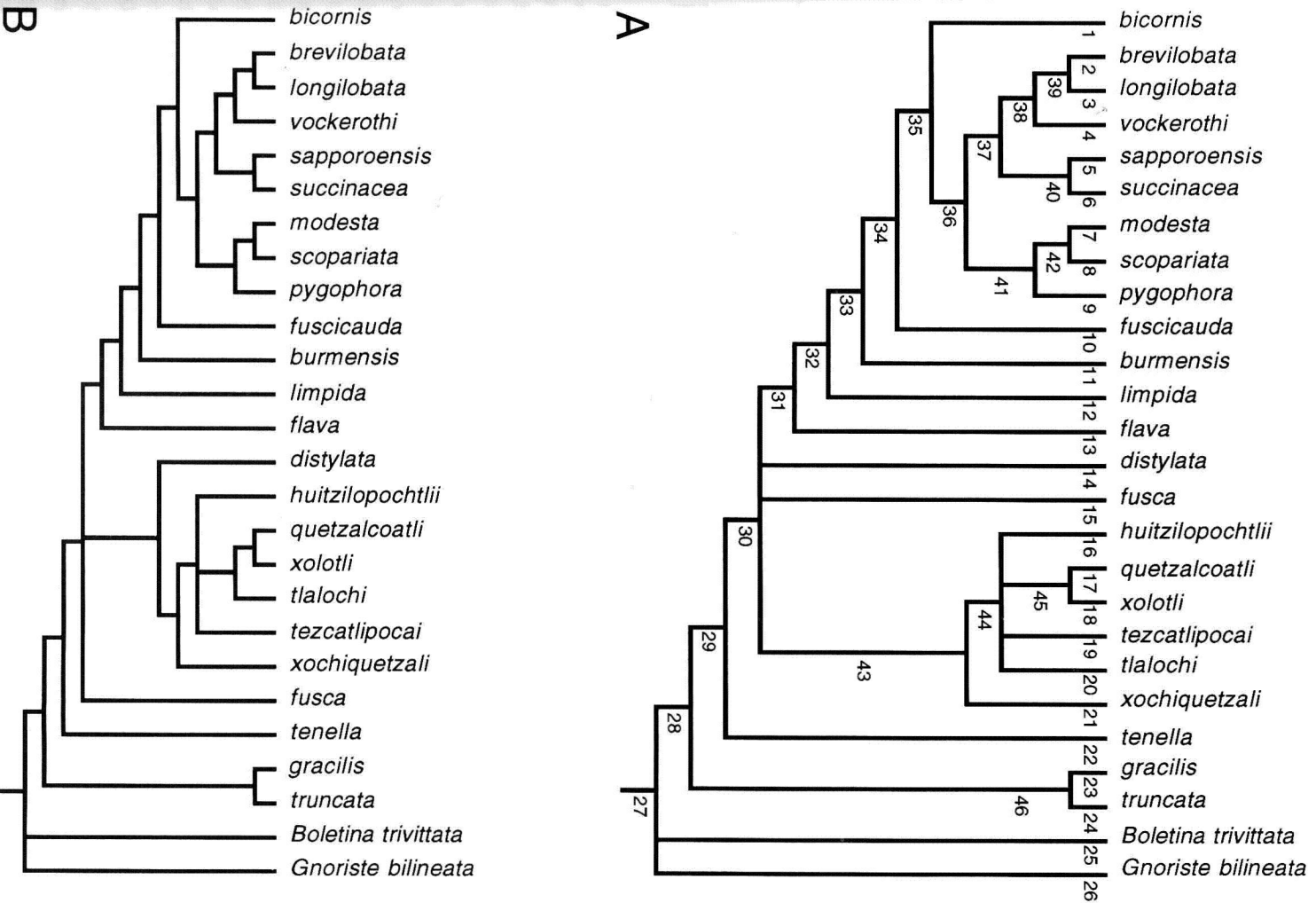


Fig. 9. A. Strict consensus tree of 19 equally parsimonious hypotheses for the interspecific relationship among all known species of *Coelosisia* (length 137, CI = 0.518, RI = 0.747). — B. Majority Rule consensus tree of the same 19 trees.

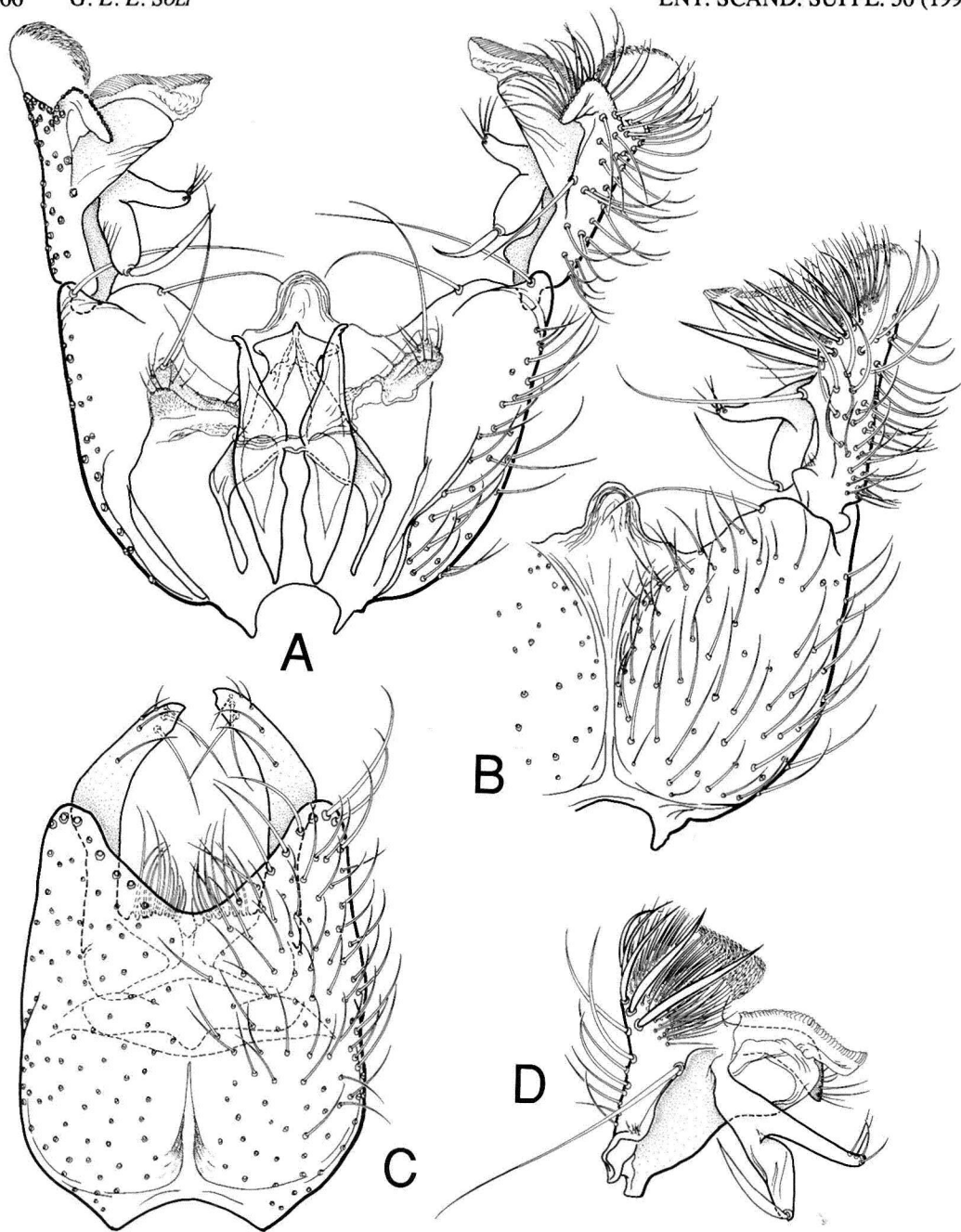


Fig. 10. *Coelusia bicornis* Stackelberg, male terminalia. — A. Tergite 9 and associated structures. — B. Ventral view. — C. Dorsal view, tergite 9 removed. — D. Gonostylus, interior view.

Wing membrane covered by irregularly arranged microtrichia only. Costa produced well beyond tip of R5. Sc1 ending in costa, and, except for *C. distylata*, with at least some setae. Sc2 absent. R1 and R5 with both

dorsal and ventral setae, ventral setae most numerous towards apex. Basal portion of radius sometimes with few ventral setae. Crossvein anterior transversal, ta, bare, or with dorsal and/or ventral setae; about 0.6 to

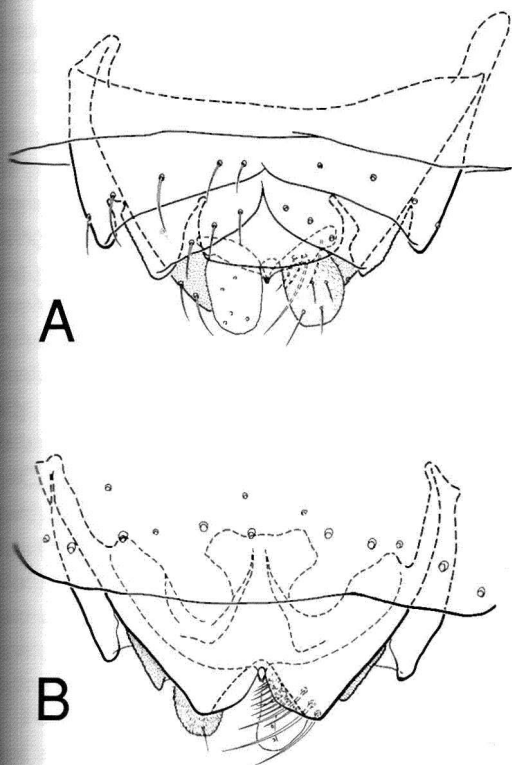


Fig. 11. *Coelusia bicornis* Stackelberg, female terminalia. — A. Dorsal view. — B. Ventral view.

1.4x as long as stem of median fork. Stem, or petiole of median fork bare; M1 and M2 bare or one or both with dorsal setae. Crossvein basal transversal, tb, usually with dorsal setae, sometimes with ventral setae. Common stem of CuA1 and CuA2, CuA-petiole, 1.5 to 2.6x as long as tb. CuA1 and CuA2 only slightly curved, rarely with dorsal setae. Anal vein, A1, usually distinct, bare, sometimes with some dorsal setae; A2 reduced. Relative length of veins vary considerably within species, but CuA1 and CuA2 always much shorter than their common stem.

**Legs.** Long and slender. All coxae with dorsal setae. Hind coxa with proximal group of one strong, and one to several smaller, posterodorsal setae; distal group with numerous mixed long and short setae. Anteroapical depressed area of fore tibia well developed, semi-circular and equipped with numerous, irregularly arranged trichia. Tibial spurs well developed, each with one serrated longitudinal keel. Fore tibia with a few strong setae, rarely bare, mid- and hind tibia both with

numerous setae. Dorsal setae on hind tibia tending to form a continuous row on apical half. Length of tibial setae usually less than 2x width of tibia. All tarsomeres densely covered by irregularly arranged trichia and small setae. Tarsal claws each with one large, and one smaller basal tooth. Empodium well developed.

Male abdomen and terminalia (Fig. 7). Abdominal segments 1–6 unmodified, though posterior margin of tergite 6 (tg 6) sometimes with a small median incision. Segments 7 and 8 strongly reduced, retractable. Lateral portion of tergite 8 usually with some setae. Terminalia not rotated.

Gonopods of segment 9, each consisting of proximal gonocoxite and distal gonostylus, proximally fused with strongly reduced, hardly traceable sternite 9 (st 9). Gonocoxites partly or entirely fused ventrally, sometimes forming continuous apicoventral border, or — more commonly — gonocoxites only fused for short distance proximally, with or without connecting membranes. Sometimes distal portion of gonocoxite distinctly prolonged (e.g. *modesta*, Fig. 29). Gonocoxal apodeme as lobe protruding from dorsomedial rim of gonocoxite; proximally with one strong curvate seta, but sometimes with additional median group of setae. Distally each gonocoxal apodeme connects to posterolateral portion of aedeagus and to basal portion of paramere.

Aedeagal guide commonly reduced, but well developed in *flava* (Fig. 17B); modified aedeagal guide present in *distylata*, with 2 very long and strong megasetae (Fig. 15D).

Shape of aedeagus rather variable, with complex, folded structure apically. Proximally aedeagus produced cephalad in 2, usually well developed, aedeagal apodemes. Pair of parameres situated above, and attached to strengthened proximal part of aedeagus. Except in *distylata*, parameres separated or at most medially fused, for very short distance proximally. Shape of parameres relatively constant within genus, but may vary in length and width. Paramere usually with long parameral apodemes; minute, lateral incision sometimes present between paramere and parameral apodeme.

Shape of gonostylus highly variable. Pronounced

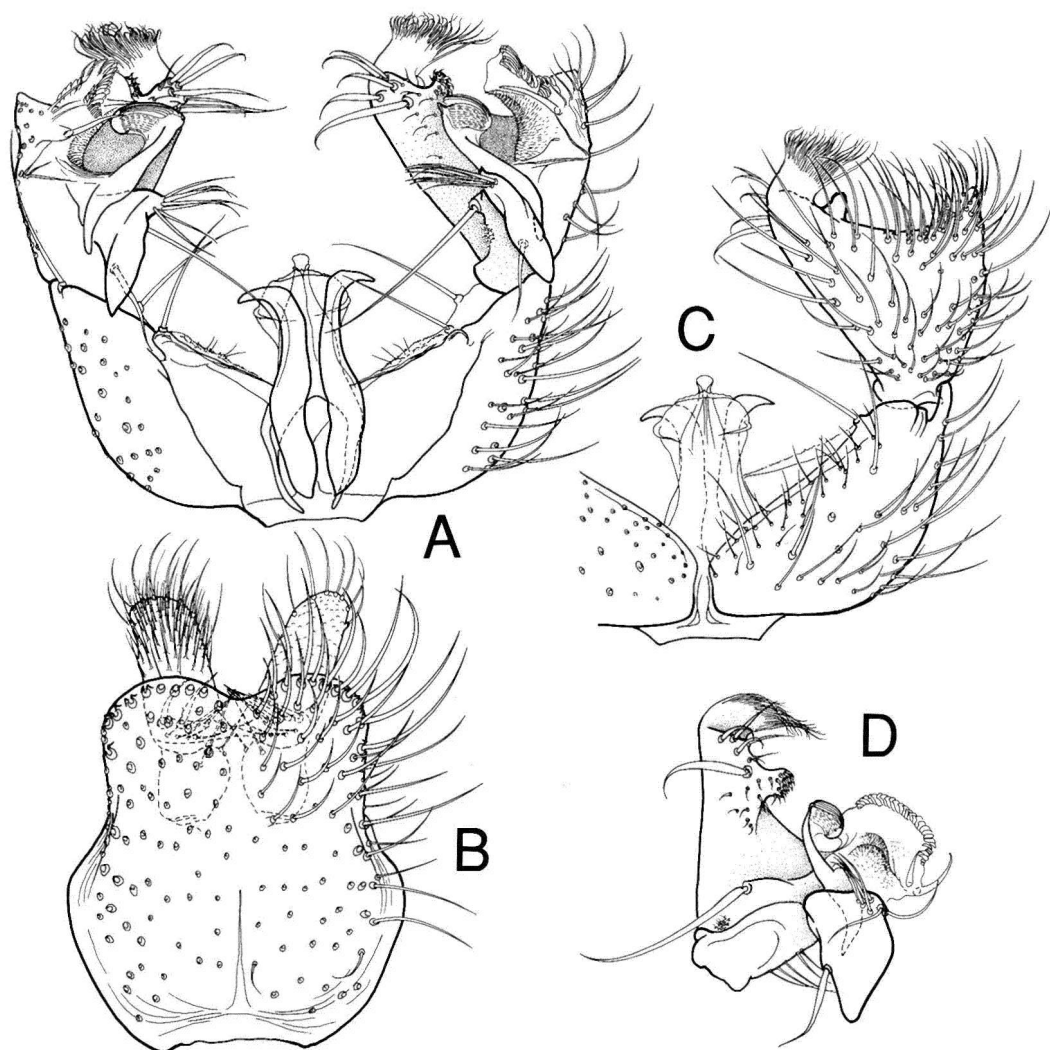


Fig. 12. *Coelosia brevilobata* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

interior appendage nearly always present, probably originating from outgrowths of median surface, consisting of 2 parts, a setae bearing appendage and a lamella-bearing appendage, one branching out from the other. Setae bearing appendage strongly sclerotized, frequently shallow to deeply bilobate, with 3 to several strong setae. Proximal portion of lamella-bearing appendage short or long, stem-like; distal portion with at least one row of lamellae; lamellae secondarily reduced in two species (*sapporoensis* and *succinacea*). In most species main portion of gonosty-

lus can be divided in four primary lobes, a dorsal, a median, an apicoventral and a ventral lobe. One or more of these lobes are frequently reduced or coalesced with neighbouring lobes. Distal portion of median lobe often membranous, clothed by fine trichia or lamellae (e.g. *flava*, *limpida*). Dorsal lobe sometimes distinct and finger-like; apicoventral lobe usually reduced.

Tergite 9 (tg 9) loosely connected to proximal part of gonocoxites and distally ending free, usually slightly longer than broad, with numerous strong, dorsal

setae. Posterior border of tergite 9 rounded, straight, concave or with deep median incision.

Tergite 10 (tg 10) and proctiger attached inside posterior half of tergite 9, seemingly loosely connected to gonocoxal apodemes and accessory copulatory appendages by means of thin membranes. Medially divided hypoproct always recognisable. Epiproct, bearing a pair of cerci, situated posterodorsally to hypoproct, with anus ending in between. Tergite 10 reduced or well developed; when present, always medially divided, and usually strongly produced laterally, thus forming two well developed, simple or bifurcated lobes posteriorly of tergite 9 (e.g. Figs. 7B, 14C, 29D, 47C). Basal portion of tergite 10 may fuse partly or completely with epiproct and cerci; if so, lobes often appear clothed with numerous fine setae along median border (Figs. 21C, 39B). In two species lateral lobe of tergite 10 and cercus completely fused, giving rise to structure resembling simple, elongated cercus (Figs. 12C, 28D).

Female abdomen and terminalia (Fig. 8).—Abdominal segment 1–7 unmodified in all species.

Segment 8 with well developed tergite and sternite. Sternite 8 (st 8) with two rounded invaginations, or lobes caudally, representing a pair of gonocoxites 8 (gc 8); outlining variable, but always medioventrally connected and entirely fused with sternite 8 along their lateral and ventral border. In a few species each of two gonocoxites tend to be secondarily divided (e.g. *tenella*, Fig. 42B). Ventral surface of gonocoxite bare, or more commonly with setae, sometimes lanceolate, long or short; apical portion always with at least some strong, or numerous smaller setae. Two gonapophyses 8 (gp 8) situated between gonocoxites, distinctly attached to basal, lateral border of gonocoxites; distal portion weakly sclerotized, apparently partly fused with gonapophyses of succeeding segment, gonapophysis 9 (gp 9). A pair of partly fused labia situated ventrally, between gonocoxites 8 and below gonapophysis 8.

Tergite 8 less modified, but caudolateral parts sometimes slightly invaginated. A pair of air sacs, probably outgrowths of tracheal system, situated just inside mediolateral border of tergite. These air sacs

may be operating during oviposition, thus enforcing extortion of eggs.

Tergite 9 large and well developed, usually equipped with at least some setae. Posterior border entire or with distinct median incision; in latter case lateral portion sometimes strongly developed, with several strong setae. In its primitive condition tergite 9 is bearing a pair of reduced and weakly sclerotized gonocoxites 9 (gc 9) laterally.

Sternite 9 strongly modified and laterally fused with gonapophyses 9, but distinct connections to sternite 8 also retained. Ventral border of gonapophyses fused medially, forming thin membranous plate, notum. Lateral portions of sternite 9 seemingly fairly well sclerotized, intimately connected with dorsal border of gonapophyses.

Two spermatheca, each consisting of spermathecal duct and membranous, sac-like seminal capsule, hardly visible in slide mounted specimens. Spermathecal duct usually long and more or less coiled, with striated appearance due to strong ridges whirled around the duct, in several species also surrounded by spike-like secretory cells. Spermathecal eminence easily recognisable, situated between proximal portion of gonapophyses 9. Neither spermathecal nor accessory glands demonstrated.

Tergite and sternite of 10th abdominal segment often laterally fused. Sternite 10 present as a plate, large and triangular to small and shallow, setose or completely bare. This plate is termed postgenital plate by Matile (1990), and probably serves as egg-guide during oviposition. In one species, *flava*, sternite 10 bears a small, median protrusion, bordered with small setae. Tergite 10 rather small, sometimes partly or totally fused with epiproct; in several species present as ovate, bare sclerite. Laterally tergite 10 often tends to fuse with the proximal parts of sternite 10.

Proctiger with epiproct and hypoproct laterally fused. Epiproct often intimately fused with preceding tergite; hypoproct well developed and surrounding apical and lateral portion of sternite 10. Posteriorly, epiproct bears cerci. Cerci 1- or 2-segmented; in several species, the cerci I medially fused for most of their length.

## Species transferred to other genera

Three species of *Coelophthinia* Edwards, 1941 have hitherto been included in *Coelosia*. They are, however, all typical members of the genus *Coelophthinia*.

### *Coelophthinia flavithorax* (Freeman) n. comb.

*Coelosia flavithorax* Freeman, 1951:64.

*Types. Holotype* (studied): ♂ ARGENTINA: Rio Negro, L. Gutierrez, 3–14.09.1926, F. & M. Edwards (BM: 1927–63; BMNH).

### *Coelophthinia accita* (Plassmann & Vogel) n. comb.

*Coelosia accita* Plassmann & Vogel, 1990:126.

*Types. Holotype* (studied): ♂ CHILE: Peninsula de Brunswick, 23.01–06.02.1985, M. Vogel (Type no. 18.439, ZSM).

### *Coelophthinia neotropica* (Lane) n. comb.

*Coelosia neotropica* Lane 1959:111.

*Type locality*: BRAZIL: Amapa, Serra do Navia.

I have not seen the holotype or any other material of *C. neotropica*, but according to the description and the drawings given by Lane (1959), there can be no doubt about its systematic position.

## Phylogeny reconstruction

Few attempts have been made to outline the phylogeny within the Sciaroidea (e.g. Munroe 1974, Matile 1990), and none of these applies to the family Mycetophilidae (s. s.). Consequently, any phylogenetic analyses at the species level will suffer strongly by a restricted knowledge of the phylogeny within any selected outgroup.

## Outgroup considerations

Edwards (1925) recognised four tribes in the subfamily Sciophilinae, namely Sciophilini, Gnoristini,

Mycomyini and Leiini, of which *Coelosia* was assigned to the Gnoristini. Up to present this classification has been the subject of little criticism, though some genera have shifted their position from one tribe to another (e.g. Väisänen 1986). Moreover, some authors have treated these tribes as subfamilies (e.g. Tuomikoski 1966, Väisänen 1984, Matile 1989).

Among genera commonly included in the Gnoristini, *Coelosia* appears most closely related to *Boletina* and *Gnoriste*, which were used as outgroup in the present analysis. Three possible synapomorphies suggest an arrangement of these three genera in a common clade: palpomere 3 with reduced sensory pit, male abdominal segments 7 and 8 strongly reduced, and labrum well developed.

## Analysis

Due to great variability within the species, numerous presumably good characters had to be left out, as they could not be scored in discrete groups. This holds in particular for characters referring to the number of setae and to the outlining of the mouthparts. Likewise, most of the calculated ratios were omitted from the analysis as they feature a continuous distribution and hardly could be scored in discrete groups (see e.g. Chappill 1989). Much emphasis had thus to be put on characters dealing with structures in the male and female terminalia. Of the 49 characters used, as much as 24 and 10 apply to the male and female terminalia, respectively. The characters and character states used in the present analysis are shown in Tab. 1. Of these, 32 are binary and 16 multistate. All characters and character states were coded without any implication of polarity, pending a review of character polarity later in the analysis. The data matrix (Tab. 2) was built up by using the computer programme MacClade 3.02 (Maddison & Maddison 1992). Missing data and inapplicable characters were both entered as '?' in the matrix, while uninformative characters, i.e. unique autapomorphies, were excluded.

## Results of the cladistic analysis

The maximally parsimonious resolution was

Table 1. List of characters used to infer the interspecific relationship. The consistency index (ci) and retention index (ri) in the most parsimonious trees are given.

- 1 INTERNAL RIDGES OF LATERAL OCELLI (0) broad; (1) distinct, or at least traceable as sutures; (2) minute or absent. (ci=0.25, ri=0.57).
- 2 SMALL PLATE BEHIND MEDIAN OCELLUS (0) with setae; (1) bare. (ci=1.00, ri=1.00).
- 3 FRONTAL FOLD LINE (0) absent; (1) well developed; (1) weakly sclerotized. (ci=1.00, ri=1.00).
- 4 LABRUM VS. CLYPEUS (0) shorter; (1) subequal or longer. (ci=1.00, ri=1.00).
- 5 LABRUM (0) with setae; (1) bare. (ci=0.33-0.50, ri=0.0-0.50).
- 6 POSITION OF SENSORY SENSILLA ON THIRD PALPOMERE (0) medioventrally, on basal half; (1) lateroventrally, on posterior half. (ci=1.00, ri=1.00).
- 7 BASISTERNUM (0) with setae; (1) bare. (ci=0.50, ri=0.50).
- 8 SUBCOSTA 2 (0) present; (1) absent. (ci=1.00, ri=1.00).
- 9 MEDIA 1 (0) with dorsal setae; (1) bare. (ci=0.50, ri=0.83).
- 10 MEDIA 2 (0) with dorsal setae; (1) bare. (ci=1.00, ri=1.00).
- 11 CUBITUS 1 (0) with dorsal setae; (1) bare. (ci=1.00, ri=1.00).
- 12 CUBITUS 2 (0) with dorsal setae; (1) bare. (ci=0.50, ri=0.80).
- 13 POINT OF FURCATION OF CUBITAL FORK (0) before, below or scarcely beyond point of furcation of median fork; (1) distinctly beyond. (ci=1.00, ri=1.00).
- 14 POSTERIOR BORDER OF MALE TERGITE 6 (0) even; (1) with a median incision. (ci=0.33, ri=0.67).
- 15 MALE TERGITE 8 (0) with lateral setae; (1) at most two median setae. (ci=1.00, ri=1.00).
- 16 OUTLINING OF MALE GONOCOXITES (0) short; (1) distinctly elongated. (ci=1.00, ri=1.00).
- 17 POSTERIOR, VENTRAL BORDER OF FUSED MALE GONOCOXITES (0) membranous; (1) weakly sclerotized; (2) well sclerotized. (ci=0.40, ri=0.67).
- 18 MALE GONOCOXITES (0) fused along half of their length; (1) fused along most of length; (2) fused basally only. (ci=0.40, ri=0.73).
- 19 DISTAL PORTION OF GONOCOXAL APODEME (0) without protrusions; (1) with one finger-like protrusion; (2) with several protrusions. (ci=1.00, ri=1.00).
- 20 GONOSTYLUS (0) without 4 primary lobes; (1) with 4 distinct, primary lobes, even if small (ci=0.33-0.50, ri=0.75-0.88).
- 21 GONOSTYLUS, MEDIAN AND VENTRAL LOBE (0) separable, or median lobe absent; (1) entirely fused, not separable (ci=0.50, ri=0.67).
- 22 GONOSTYLUS, MEDIAN LOBE (0) not recognisable, or coalesced with neighbouring lobe; (1) broad and short; (2) long and narrow (ci=0.50, ri=0.67).
- 23 GONOSTYLUS, MEDIAN LOBE (0) with setae or lamella; (1) with long, filiform trichia (ci=0.50, ri=0.67).
- 24 GONOSTYLUS, APICOVENTRAL LOBE (0) not recognisable, or intimately fused with ventral or median lobe; (1) as distinct knob near base of median lobe. (ci=1.00, ri=1.00).
- 25 INTERIOR APPENDAGES OF GONOSTYLUS (0) absent; (1) present, two; (2) present, one. (ci=0.67, ri=0.50).
- 26 GONOSTYLAR LAMELLA-BEARING APPENDAGE (0) attached close to the interior surface of gonostylus; (1) shafted. (ci=0.50, ri=0.88).
- 27 GONOSTYLAR LAMELLA-BEARING APPENDAGE (0) small; (1) broad; (2) reduced. (ci=0.67, ri=0.90).
- 28 GONOSTYLAR SETA-BEARING APPENDAGE (0) with several setae; (1) with few setae; (2) with a brush like collection of setae. (ci=0.29-0.33, ri=0.38-0.50).
- 29 PARAMERES (0) fused basally, near basiphall-

- lus; (1) fused along half of their length; (2) entirely separated. (ci=0.50, ri=0.71).
- 30 APICES OF PARAMERES (0) broad, angled; (1) rounded, broad; (2) evenly tapered; (3) sickle-shaped; (4) abruptly narrowed. (ci=0.80, ri=0.83).
- 31 LENGTH OF PARAMERES (0) long; (1) short; (2) reduced. (ci=0.50, ri=0.0).
- 32 RELATIVE POSITION OF PARAMERES (0) parameres more or less parallel along most of their length; (1) apices pointing outwards; (2) apices pointing inwards. (ci=0.67, ri=0.86).
- 33 AEDEAGAL APODEMES (0) straight; (1) evenly curved inwards. (ci=1.00, ri=1.00).
- 34 APICAL PORTION OF AEDEAGUS (0) wide; (1) narrow; (2) with a very small, abruptly tapered apex. (ci=0.50, ri=0.78).
- 35 APICAL PORTION OF AEDEAGUS (0) medially weakly sclerotized, thus leaving an ovate, translucent window; (1) evenly sclerotized. (ci=0.50, ri=0.90).
- 36 APICAL PORTION OF AEDEAGUS (0) dorsal lips absent; (1) present. (ci=0.50, ri=0.0).
- 37 APICAL PORTION OF AEDEAGUS (0) no ventral outgrowths; (1) distinct ventral outgrowths; (2) large ventral outgrowths. (ci=0.67, ri=0.88).
- 38 POSTERIOR BORDER OF TERGITE 9 (0) more or less straight; (1) distinct median incision; (2) median cleft. (ci=0.67, ri=0.90).
- 39 TERGITE 10 (0) absent; (1) produced into two lateral, usually well developed lobes; (2) reduced. (ci=0.50, ri=0.78).
- 40 OUTLINING OF FEMALE GONOCOXITE 8 (0) a simple lobe; (1) a secondarily divided lobe. (ci=0.50, ri=0.50).
- 41 SETAE ON FEMALE GONOCOXITE 8 (0) normal; (1) lanceolate. (ci=1.00, ri=1.00).
- 42 DISTRIBUTION OF SETAE ON FEMALE GONOCOXITE 8 (0) on most of surface; (1) on apical parts only; (2) no ventral setae. (ci=0.40, ri=0.40).
- 43 POSTERIOR BORDER OF FEMALE TERGITE 9 (0) even; (1) with a median incision; (2) deeply bilobate; (3) two sublateral incisions. (ci=0.38-0.43, ri=0.50-0.60).
- 44 SETAE ON LATERAL PARTS OF FEMALE TERGITE 9 (0) numerous; (1) few; (2) none. (ci=0.33, ri=0.43).
- 45 OUTLINING OF FEMALE TERGITE 10 (0) subquadrate; (1) ovate; (2) reduced. (ci=0.25, ri=0.40).
- 46 SURFACE OF FEMALE TERGITE 10 (0) even; (1) with to sublateral fold-lines. (ci=1.00, ri=1.00).
- 47 FEMALE STERNITE 10 (0) with setae; (1) bare. (ci=0.50, ri=0.86).
- 48 FEMALE CERCUS (0) two segmented; (1) one segmented. (ci=0.33, ri=0.71).
- 49 CLEFT BETWEEN FEMALE CERCUS (0) evenly rounded; (1) with a small median process. (ci=1.00, ri=1.00).

searched for after exporting the data matrix to the data programme PAUP 3.1 (Swofford 1993) run on a Macintosh IISi with 18MB RAM. All characters were treated as unordered. The heuristic search option were used with random stepwise addition (tree bisection-reconnection). The run yielded 19 equally parsimonious trees of 137 steps with an ensemble consistency index of 0.518 and an ensemble retention index of 0.747. 100 replicates were run but no more trees were found.

The strict consensus tree (Fig. 9A) reveals two polytomies, one above Branch 30 and one above Branch 44. Of the 19 equally parsimonious trees, 1

shows *distylata* and *fusca* together as a sister group to all species above Branch 31; 6 more show *fusca* as a sistergroup to all species above Branch 31 and *distylata* as a sistergroup to the species above Branch 43; another 6 show *fusca* as a sistergroup to *distylata* and the species above Branch 43 combined; the last 6 trees show *distylata* as a sister group to the species above 43 and *fusca* as a sister species to all species above Branch 30. In comparing the 19 trees, the one with *distylata* and *fusca* in a common clade was 2 steps shorter for character 5 and 28, while all other trees were shorter for characters 20 and 43.

Concerning the 5 species above Branch 44, 6

Table 2: Character matrix.

	1111111111222222222233333333334444444444
	1234567890123456789012345678901234567890123456789
<i>bicornis</i>	11000011111111110010101001011220111102110011200110
<i>brevilobata</i>	21100011111111010020102111101230112102110101110101
<i>burmacola</i>	2100001111111101002010210101122001010011??????????
<i>distylata</i>	2?001011111111010110100001001121000010000001000000
<i>flava</i>	01000011111111010110101002???010001000000000000110
<i>fusca</i>	0100101111111101001010000101122000000000000000000
<i>fuscicauda</i>	11000011111111010020101001110222111100110003200110
<i>gracilis</i>	0000000100001000001100001000220000000000000000000
<i>huitzilopochtlii</i>	11010111111111010210000001011020001000000001000000
<i>limpida</i>	21000011111111010110101002???1222011101120011210110
<i>longilobata</i>	211000111111111002010211110023011210211??????????
<i>modesta</i>	21000?1100111111020110001102220011101210012010110
<i>pygophora</i>	1100001111111110110100001101220011102100022010110
<i>quetzalcoatli</i>	11010111111111010210000001011040201000001002201100
<i>sapporoensis</i>	21000011111111010000110001120200111102120111100100
<i>scopariata</i>	21000?1100111111020110001102220011101110012010110
<i>succinea</i>	2100001111101110000110001121200111102210103210100
<i>tenella</i>	0100001100001010112100001000220000000001000100000
<i>tezcacatlipocai</i>	1101011111111101021000000101002000100000??????????
<i>tlalochi</i>	1101011111111101021000000101104000010000??????????
<i>truncata</i>	0000000100001000001100001000220000000000000000000
<i>wockerothi</i>	1100001111111110020102111101230112102110110100111
<i>xochiquetzali</i>	1100011111111101021000000101002000001000??????????
<i>xolotli</i>	11010111111111010210000001011040201000001002001100
<i>Boletina trivittata</i>	00001010000000000000000000???0000???000000000000
<i>Gnoriste bilineata</i>	20000000000000000000000000???2?2???000000000000

different arrangements occur among the initial 19 trees. The majority rule consensus tree (Fig. 9B) is close to the strict consensus tree, except for *distylata* which here forms a sistergroup to the species above Branch 43, and *tlalochi* which forms a sistergroup to the two species above Branch 45.

Successive reweighting gave 9 trees with a strict consensus tree identical to the majority rule consensus tree above – no matter whether the characters were reweighted according to the consistency indices, the retention indices or the rescaled consistency indices. Moreover, the heaviest tree were search for using the data programme PeeWee (Goloboff 1993a, 1993b) run on an Olivetti M4 64. This gave 5 trees with a fit value of 368.4, tree lengths varying from 137 to 140 steps. In examining the 19 most parsimonious trees it was found that 10 had a fit value equal to 368.4. The

strict consensus tree of these 10 trees was identical to the strict consensus tree, except for *tlalochi* which forms a sister group to the two species above Branch 45 – like in the Majority rule consensus tree.

Support for particular groups in the minimum-length tree was assessed using bootstrap analysis (Felsenstein 1985, Swofford 1993) and Bremer support (BS) (Källersjö et al. 1992). The Bootstrap analyses was performed with 100 replicates (Tab. 4). As could be suspected from the rather low consistency index, the support for most branches was fairly low.

### Character polarity

Of the 49 characters used in the analysis 39 show state 0 at the outgroup node in the strict consensus tree, 8 are equivocal for state 0 and 1, and 2 equivocal for

Table 3. Reconstructed unambiguous changes in character states along branches in the 19 most parsimonious trees. Numbers refer to the branches in Fig. 9B.

Branch No.	Char-acter states	Branch No.	Char-acter states	Branch No.	Char-acter states	Branch No.	Char-acter states
1	18: 2>1	12	31: 0>2	28	8: 0>1	36	22: 1>0
2	14: 1>0		37: 0>1		13: 0>1		27: 1>0
3	28: 1>0		45: 0>1		20: 0>1	37	41: 0>1
4	43: 1>0	13	30: 2>1		25: 0>1	38	22: 0>2
5	14: 1>0	14	31: 0>1	29	2: 0>1		23: 0>1
	28: 1>0	15	None		15: 0>1		24: 0>1
	39: 1>2	16	None		18: 0>1		34: 1>2
6	12: 1>0	17	44: 0>2	30	9: 0>1		49: 0>1
	38: 1>2	18	None		10: 0>1	39	3: 0>1
	42: 1>0	19	None		11: 0>1	40	18: 2>0
	43: 1>3	20	35: 0>1	31	12: 0>1		21: 0>1
7	38: 1>2	21	36: 0>1		22: 0>1		27: 0>2
8	None	22	19: 0>2		34: 0>1	41	32: 1>0
9	17: 0>1		40: 0>1		47: 0>1		43: 1>2
	18: 2>1		44: 0>1	32	48: 0>1	42	9: 1>0
	39: 1>0	23	None		33: 0>1		16: 0>1
	42: 1>2	24	None		35: 0>1		21: 0>1
10	28: 1>0	25	5: 0>1	33	38: 0>1		28: 1>2
	31: 0>2	26	1: 0>2	34	44: 0>2		37: 2>1
	43: 1>3		31: 0>2	35	17: 1>0	43	6: 0>1
11	22: 1>2	27	None		18: 1>2		17: 1>2
	23: 0>1				32: 0>1	44	4: 0>1
	34: 1>0				14: 0>1	45	32: 0>2
					37: 0>2	46	19: 0>1

Table 4. Support for particular groups in the minimum-length tree assessed revealed after using Bremer support and Bootstrap analysis.

Branch No.	Bremer	Bootstrap	Branch No.	Bremer	Bootstrap
28	3	81	38	3	85
29	3	92	39	1	67
30	4	95	40	2	65
31	1	51	41	1	<50
32	4	79	42	13	100
33	1	<50	43	1	64
34	1	<50	44	1	<50
35	1	<50	45	1	89
36	2	<50	46	2	71
37	1	<50			

states 0 and 2. For all these characters state 0 is likely to represent the plesiomorphic character state.

## The monophyly of *Coelosia*

The branch comprising the genus *Coelosia* (Branch 28) has a Bremer support of 3, and occurs in 84 per cent of the Bootstrap replicates. From this, the monophyly of the *Coelosia* must be regarded as well supported by the data, and the genus is diagnosed by four synapomorphies: Sc2 absent (character 8); point of furcation of Cu-fork well beyond that of median fork (character 13); gonostylus with 4 primary lobes (character 20); and gonostylus with interior appendages (character 25). Of these, character no. 20 shows reversal in *distylata* and in the six Mexican species, while character no. 25 shows reversal in *flava* and *limpida*. Absence of Sc2 is, however, common also in the subfamily Sciophilinae, though not present in neither *Boletina* nor *Gnoriste*; a comparable short cubital fork as that observed in *Coelosia* is rare, though present in e. g. *Sciophila*, *Phthinia*, *Coelophthinia* and *Docosia*. The outlining of gonostylus appears unique for *Coelosia*. Correctly, interior appendages – with or without lamella-like structures – are present also in other genera (e. g. *Acnemia*, *Phronia*), but their outlining differ markedly from that in *Coelosia*.

The two very closely related species *gracilis* and *truncata* together form a sistergroup to all remaining species in the genus. The two species possess some character states not found in any other species in the genus, like a setose basisternum (character 7), presence of a few setae immediately beyond median ocellus (character 2) and a setose tergite 8 in males (character 15). Together with *tenella*, the two species also have the median and cubital branches densely clothed by setae (characters 9–12). These character states are likely to represent the plesiomorphic condition.

## Species groups

Two larger species groups can be recognised, the *limpida*-group above Branch 32, and the *xochiquetzali*-

*li*-group above Branch 43. Of these, the *limpida*-group is best supported, and attained high values in both the Bremer support and the Bootstrap analyses (Tab. 4).

The *limpida*-group is supported by 4 unambiguous changes in character states (see Tab. 3). Of these, the most important are the evenly inwards curving aedeagal apodemes (character 33); aedeagus with apical portion evenly sclerotized (character 35); male tergite 9 with a distinct median incision or cleft (character 38); and the presence of a well developed tergite 10 in males (character 39), appearing as simple or bilobate posterolateral protrusions below tergite 9 (supposed to be secondarily reduced in *limpida* and *sapporoensis*, and probably also in *pygophora*). A strong relationship between *flava* and the *limpida* group is indicated by the presence of 1-segmented females cerci (character 48) in most species above Branch 31 (with a noteworthy reversal in *brevilobata*, *succineae* and *sapporoensis*).

Members of the *xochiquetzali*-group have the sensory sensilla on third palpomere situated lateroventrally on the apical half (character 6); and the posterior border between the fused gonocoxites well sclerotized (character 17). In addition all species in the group have a distinctly prolonged labrum (character 4), though not as pronounced in *xochiquetzali* as in the remaining 5 species. According to the present data *distylata* most likely is the sister group of the *xochiquetzali*-group as the seven species comprise a monophyletic clade in 18 of the 19 most parsimonious trees. One character supporting such an arrangement is the absence of 4 primary lobes in the gonostylus (character 20).

## Key to males of *Coelosia* Winnertz

1. 2 ocelli ..... 4. *distylata* sp.n.  
— 3 ocelli ..... 2
2. Both M and CuA with numerous dorsal setae.. 3  
— M and CuA bare, or one of them with a few dorsal setae ..... 5
3. Male with tg 9 nearly 2x as long as wide, cerci fused ..... 18. *tenella* (Zetterstedt)  
— Male with tg 9 about as long as wide ..... 4
4. Cerci fused ..... 8. *gracilis* Johannsen

- Cerci separate ..... 21. *truncata* Lundström
- 5 M1 or CuA2 with some dorsal setae ..... 6
- M and Cu completely bare ..... 7
- 6 M1 with some dorsal setae on apical half, CuA2 bare ..... \*16. *scopariata* sp.n.
- M1 without setae; CuA2 with some dorsal setae ..... \*17. *succinaceae* sp.n.
7. Cerci fused; tg 10 not present ..... 8
- Cerci separate; tg 10 present or absent. (When tg 10 is present, cerci may be difficult to observe) ..... 15
8. Gonostylus deeply bilobate ..... 9
- Gonostylus at most slightly bilobate ..... 10
9. Gonocoxites and gonostyli strongly setose, posterior border of tg 9 with distinct incision ..... 13. *pygophora* Coquillett
- Gonocoxites and gonostyli less setose; posterior border of tg 9 slightly concave ..... 15. *sapporoensis* Okada
10. Gonostylus nearly triangular; seta-bearing appendage with 3 strong setae ..... 6. *fusca* Bezzi
- Gonostylus longer than broad; seta-bearing appendage with more than 3 strong setae ..... 11
11. Gonostylus 3x as long as broad .. 20. *tlaloci* sp.n.
- Gonostylus as most 2x as long as broad ..... 12
12. Gonostylus with 7–8 strong blunt setae along apical, dorsal margin ..... 23. *xochiquetzali* sp.n.
- Gonostylus without strong setae along apical margin ..... 13
13. Distal portion of gonostylus distinctly bilobate; lamella-bearing appendage nearly as broad as gonostylus ..... 9. *huitzilopochtlii* sp.n.
- Distal portion of gonostylus evenly rounded; lamella-bearing appendages much narrower than gonostylus ..... 14
14. Posterior border of the fused gonocoxites with 2 submedian protrusions; gonostylus about as long as wide ..... 14. *quetzalcoatl* sp.n.
- Posterior border of the fused gonocoxites even; gonostylus distinctly elongated ... 24. *xolotli* sp.n.
15. Tg 10 present as 2 distinct lobes, attached postero-ventrally on tg 9 ..... 16
- Tg 10 usually absent, if present, intimately fused with cerci and not as above ..... 23
16. Lobes of tg 10 biforked .. 12. *modesta* Johannsen
- Lobes of tg 10 simple ..... 17
17. Lobes of tg 10 long and slender, about as long as tg 9 ..... 18
- Lobes of tg 10 at most half as long as tg 9 ..... 19
18. Each lobe of tg 10 with numerous setae medially ..... 17. *succinacea* sp.n.
- Lobes of tg 10 bare, except for some apical setae ..... 22. *vockerothi* sp.n.
19. Seta-bearing appendage entire, with a brush-like group of setae ..... 16. *scopariata* sp.n.
- Seta-bearing appendage 2-lobed, without a brush-like group of setae ..... 20
20. The 2 lobes of the seta-bearing appendage with 1 and 25–30 setae respectively; parameres not reaching to apex of aedeagus ..... 7. *fuscicauda* Okada
- The two lobes of the seta-bearing appendage with 1 and 5–6 setae respectively; parameres about as long as aedeagus ..... 21
21. Paramere and parameral apodeme subequal in length; apical portion of aedeagus triangular .. 1. *bicornis* Stackelberg
- Paramere distinctly longer than parameral apodeme; aedeagus evenly tapered towards apex ..... 3. *burmacola* sp.n.
22. Posterior border of tg 9 with a deep incision ..... 10. *limpida* Plassmann
- Posterior border of tg 9 even, or at most slightly curved inwards ..... 23
23. Cerci with 2 very broad apical setae ..... 19. *tezcatlipocai* sp.n.
- Cerci with normal setae only ..... 24
24. Cerci rounded, about as long as broad, each with 1 strong, curved setae posterolaterally ... 5. *flava* (Staeger)
- Cerci elongated, at least 2x as long as broad, with numerous smaller or larger setae posteriorly ..... 25
25. Gonostylus with a distinct knob basal to ventral lobe; ventral lobe very long, with short apical trichia ..... 11. *longilobata* sp.n.

\*For separating these two species, see also couplets 18 and 19.

- Gonostylus with a more blunt knob basal to ventral lobe; ventral lobe shorter, with long, filiform apical trichia ..... *2. brevilobata* sp.n.

### Key to examined females of *Coelosia* Winnertz

1. 2 ocelli ..... *4. distylata* sp.n.
- 3 ocelli ..... 2
2. Cerci 2-segmented ..... 3
- Cerci 1-segmented ..... 10
3. Both medial and cubital fork with numerous dorsal setae ..... 4
- Medial and cubital fork bare ..... 5
4. Gc 8 distinctly bilobate . 18. *tenella* (Zetterstedt)
- Gc 8 not bilobate .....  
\*8. *gracilis* Johannsen & \*21. *truncata* Lundström
5. Mouthparts elongate, labrum about as long as clypeus ..... 6
- Mouthparts not elongate, labrum distinctly shorter than clypeus ..... 8
6. Gc 8 evenly rounded; st 10 with setae .....  
..... 9. *huizilopochtlii* sp.n.
- Gc 8 with sharp lateral corners; st 10 bare ..... 7
7. Tg 9 bare; lateral corners of gc 8 very pronounced ..... 14. *quetzalcoatl* sp.n.
- Tg 9 with numerous setae; lateral corners of gc 8 not pronounced ..... 24. *xolotli* sp.n.
8. Cerci protruding well beyond the apical borders of gc 8; st 10 with numerous setae ..... 6. *fusca* Bezzi
- Cerci distinctly shorter than gc 8; st 10 bare ..... 9
9. Posterior border of tg 10 rounded; gc 8 with .. normal setae ..... *2. brevilobata* sp.n.
- Posterior border of tg 10 straight; gc 8 with numerous short, lanceolate setae .....  
..... 15. *sapporoensis* Okada
10. M1 or CuA2 with some dorsal setae ..... 11
- M and CuA completely bare ..... 13
11. M1 without setae, CuA2 with some dorsal setae; abdominal segments with dark posterior

- margins ..... 17. *succinacea* sp.n.
- M1 with some dorsal setae on apical half, CuA2 bare; abdominal segments with dark or pale posterior margins ..... 12
12. Abdominal segments with dark posterior margins ..... \*16. *scopariata* sp.n.
- Abdominal sternites with pale posterior margins ..... \*12. *modesta* Johannsen
13. St 10 with a median group of 5—6 minute setae .....  
..... 5. *flava* (Staeger)
- St 10 completely bare ..... 14
14. Gc 8 with several curved setae on most of ventral surface ..... 7. *fuscicauda* Okada
- Gc 8 with setae on apical halves only, or bare ....  
..... 15
15. Gc 8 with some lanceolate setae .....  
..... 22. *vockerothi* sp.n.
- Gc 8 with normal setae only, or bare ..... 16
16. Tg 9 with a few setae along posterior margin 17
- Tg 9 with numerous setae along posterior margin ..... 18
17. Tg 9 with 2 median setae; gc 8 with some lateral setae ..... 10. *limpida* Plassmann
- Tg 9 with 6 setae; gc 8 without lateral setae ...  
..... 1. *bicornis* Stackelberg
18. Tg 9 with several small, straight setae; lateral lobes ending in a sharp angle .....  
..... 13. *pygophora* Coquillett
- Tg 9 with at least some strong, curved setae in addition to several smaller; lateral lobes evenly rounded ..... 19
19. Lateral lobes of tg 9 broad, with strong setae along posterior border only; abdominal segments with dark posterior margins .....  
..... 16. *scopariata* sp.n.
- Lateral lobes of tg 9 usually distinctly tapered, always with strong setae along and just within the posterior border; abdominal segments with pale posterior margins ... 12. *modesta* Johannsen

\*For separating these two species, see also couplet 19

\*Based on present knowledge, females of the two latter species can not be satisfactorily separated.

## The species

### 1. *Coelosia bicornis* Stackelberg

Figs. 5B, 10, 11.

*Coelosia bicornis* Stackelberg, 1946:78.

*Types.* Lectotype, by present designation: ♂ RUSSIA: Luga district, Tolmachevo, 28.08.1937, Stackelberg (ZIAS). — *Paralectotypes:* 2♂♂ 28.08.1937, otherwise as holotype. — *Additional material studied:* See Appendix.

*Diagnostic characters.* Male terminalia with broad, well developed lateral lobes of tg 10, each with 6–7 apical setae. Gonocoxites fused medioventrally for about 2/3 of their length. Gonostylus with an interior, deeply bilobate seta-bearing appendage, each of the two finger-like lobes with 1 and 4–5 apical setae.

*Remarks.* The studied female was in a very bad condition, strongly bleached, with both wings broken and only 2 legs intact. Only a few measurements thus could be made.

### Description

**MALE** (n=1, except where otherwise stated). Total length 4.99 mm. Wing length 3.65–3.73 mm (n=2), or 3.5–3.7x as long as profemur (n=2).

*Coloration.* Face and top of head dark brown. Palpi and mouthparts light brown. Scape, pedicel, first flagellomere and basal half of second flagellomere yellowish, remaining flagellomeres brown. Pronotum, scutum and scutellum light brown, scutum with 3 broad longitudinal stripes, partly fused posteriorly. Humeral areas yellow. Thoracic sclerites brown. Halter yellow. Legs yellow. Abdominal segment 1, 5 and 6 entirely brown, segments 2–4 brown with light brown posterior margins. Terminalia yellowish.

*Head* (Fig. 5B). Total length of flagellum 2.60 mm. First flagellomere 4.8x as long as wide, and 1.1x as long as second. Ocellar ratio 1.4. Front rather narrow, 1.5x as long as broad. Face with 11, clypeus with 28, and labrum with 10 setae. Clypeus 1.5x as long as labrum. Palpomere ratio 1 : 0.9 : 1.2 : 1.5 : 3.2. Only distal portion of stipes traceable, seemingly basally connected, each with 4–5 setae.

*Thorax.* Total length 0.80–0.90 mm (n=2). Scutellum with 4 setae.

*Wings.* Hyaline. Sc with 10 and ta with 6 dorsal setae, tb with 6 ventral setae, and M and CuA both bare.

Total length 3.12x the length of Sc, and 1.65x the length of R5. CuA-petiole 2.10x as long as tb. M-ratios 0.31 and 0.38, CuA-ratios 2.15 and 4.42.

*Legs.* Fore tibia with 2–4 short, ventral setae only. Posterior setae on hind tibia forming straight line towards apex. Leg ratios given for fore, mid and hind leg: LR 0.86, 0.71, 0.55; SV 2.26, 2.50, 3.09; BV 2.00, 3.31, 4.59; TR 1.39, 2.26, 3.06.

*Terminalia* (Fig. 10). Tg 9 about 1.2x as long as wide, apical margin concave. Lateral lobes of tg 10 strongly developed, with several ventral and dorsal setae on apical third. Hypoproct subquadrate. Epiproct large, with numerous ventral setae. Cercus rather small with numerous long apical setae. Gonocoxites ventrally fused along most of their length, with membranous median protuberance caudally. Gonostylus bilobate; dorsal lobe small, with several curved setae; ventral lobe more rounded with numerous setae, some of them very strong. Median part of ventral lobe membranous, densely clothed by nearly transparent setae and trichia. Seta-bearing appendage slender and bilobate, dorsal and ventral lobe with 1 and 4 setae, respectively. Lamella-bearing appendage broad, with one row of rather small lamellae. Paramere broad, distinctly narrowed towards apex. Parameral apodeme slightly longer than paramere. Aedeagus short with broad, triangular apex.

**FEMALE** (n=1).

*Head.* First flagellomere 3.3x as long as wide, and 1.1x as long as second. Palpomere ratio 1 : 1.0 : 1.5 : 1.6 : 2.9.

*Thorax.* Total length 0.75 mm.

Leg ratios for fore leg (mid and hind leg lost): LR 0.72, SV 2.68, BV 2.05 and TR 1.41.

*Terminalia* (Fig. 11). Gc 8 small, but distinctly separated. No ventral setae, but several long setae along dorsal border. St 10 small, triangular, bare. Tg 8 large, with several setae along posterior margin. Posterior border of tg 9 with 6 setae and with distinct median incision. Tg 10 ovate, without setae. Epiproct small. Cercus 1-segmented.

*Biology.* Unknown.

*Distribution.* Western Palearctic. Finland and Russia.

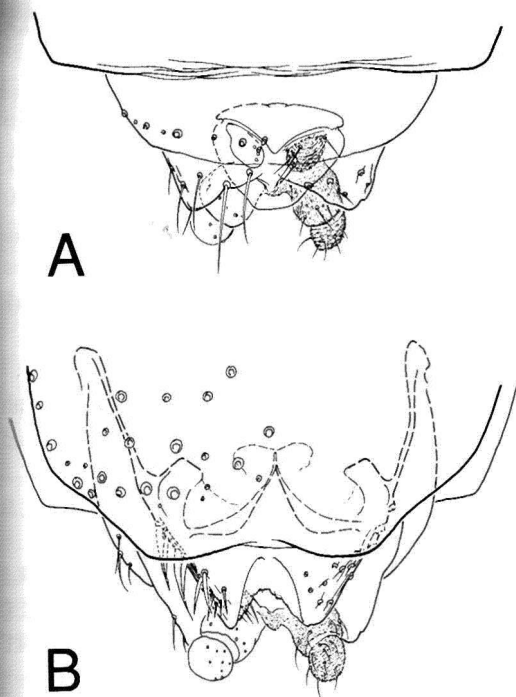


Fig. 13. *Coelosia brevilobata* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

## 2. *Coelosia brevilobata* sp. n.

Figs. 3E, 12, 13.

**Types.** *Holotype*: ♂ U.S.A.: WASHINGTON, Pierce County, Fort Lewis, 06.01.1946 (IOW). — *Paratypes*: 8 ♂♂ 06.01.1946, otherwise as holotype; CALIFORNIA, Alameda Co., Strawberry Canyon, ♀ 02.1949, W. W. Wirth (USNM); Marin Co., Lily Pond, Alpine Lake (1500'), 3 ♀♀ 18.02.1969, ♂ 21.02.1969, 7 ♀♀ 27.02.1969, ♀ 05.03.1969, 2 ♂♂ 2 ♀♀ 22.01.–17.02.1971, 6 ♀♀ 22.01.1971, 2 ♀♀ 22.04.1971, D. D. Munroe (CNC); Marin Co., Copper Mine Gulch, ♂♀ 15.02.1977, 1 ♂ 3 ♀♀ 17.02.1977, D. Dee Wilder (CAL); Marin Co., Inverness, ♂ 23.02.–06.03.1964, P. H. Arnaud Jr. (CAL); Marin Co., Mill Valley, ♀ 13.02.1966, P. H. Arnaud Jr. (CAL); San Mateo Co., Jasper Ridge, 6 ♂♂ 18.01.1948, P. H. Arnaud Jr. (IOW); San Mateo Co., Redwood City, ♀ 26.12.1949, P. H. Arnaud Jr. (IOW); San Mateo Co., San Bruno Mts., Guadalupe Canyon Park, ♀ 16.04.1977, P. H. Arnaud Jr. (CAL); Woodside, 15 ♂♂ 18.01.1947, P. H. Arnaud (IOW); San Francisco, Lake Merced, ♂ 24.01.1966, P. H. Arnaud Jr. (CAL); Moraga, 2 ♀♀ 04.1937, (E. S. Ross Coll.) (CAL); Oakland, ♂ 08.04.1937, E. S. Ross (CAL); Stanford U., ♀ (in poor cond.) 1906 (USNM).

**Diagnostic characters.** Tg 10 in males entirely fused with cerci, seen as two setose appendages posterior to tg 9. Median lobe of gonostylus tapered, with several short, filiform apical setae which are distinctly shorter than in the very closely related *C. longilobata*. Differs from this species also in the uniform brown abdominal tergites. Female gc 8 rather pointed, with some very strong, lanceolate setae laterally; cerci 2-segmented.

**Etymology.** From Latin, *brevis*, short, and *lobatus*, lobed, referring to the shape of the ventral lobe of gonostylus.

## Description

**MALE** (n=4). Total length 4.5–4.7, 4.6 mm. Wing length 3.50–3.96, 3.70 mm, or 3.6–4.3, 3.8x as long as profemur.

**Coloration.** Head brown, mouthparts and antennae light brown. Thoracic sclerites brown. Scutum brown with 3 diffuse, darker longitudinal stripes, humeral areas light brown. Legs light brown. All abdominal segments evenly brown. Gonocoxite brown.

**Head** (Fig. 3E). Total length of flagellum 2.67–2.99 mm. First flagellomere 2.9–3.9x as long as wide, and 0.8–1.0x as long as second. Lateral ocelli about 2x as large as median. Ocellar ratio 1.4–1.5. Front 0.9–1.0x as long as broad. Face with 7–14, clypeus with 20–27, and labrum with 2–8 setae. Clypeus 1.4–1.6x as long as labrum. Palpomere ratios 1 : 0.8 : 1.5–1.6 : 1.7–1.9 : 3.2–4.1. Stipes proximally fused, forming a thin plate, each with 4–6 setae.

**Thorax.** Total length 0.92–0.97, 0.94 mm.

**Wings.** Hyaline, with brownish tint on posterior half. Sc with 6–12 and ta with 7 dorsal setae, tb with 4–10 ventral setae, M and CuA both bare. Total length 3.35–3.53x as long as Sc, and 1.59–1.69x as long as R5. M-ratios 0.30–0.36 and 0.36–0.44, CuA-ratios 1.50–1.84 and 3.00–3.76.

**Legs.** Fore tibia with minute, yellow setae only. Leg ratios given for fore, mid and hind leg: LR 0.78–0.86, 0.61–0.67, 0.51–0.53; SV 2.30–2.49, 2.78–3.00, 3.20–3.42; BV 1.86–2.07, 2.76–3.18, 3.56–4.09; TR 1.40–1.54, 1.85–2.05, 2.32–2.59.

**Terminalia** (Fig. 12). Tg 9 nearly as wide as long, posterior border with shallow median incision. Tg 10 completely fused with cerci and epiproct, forming two elongated appendages with numerous thin, nearly transparent, dorsal setae. Epiproct medially divided, seen as heavily sclerotized basal portion of appendages described above. Hypoproct subquadrate. Gonocoxite broad and shallow, gonocoxites fused only basally. Gonostylus bilobate, bowl-shaped. Ventral lobe tapered, finger-like; apex with very long, filiform setae. Small knob-like protuberance, present at basis

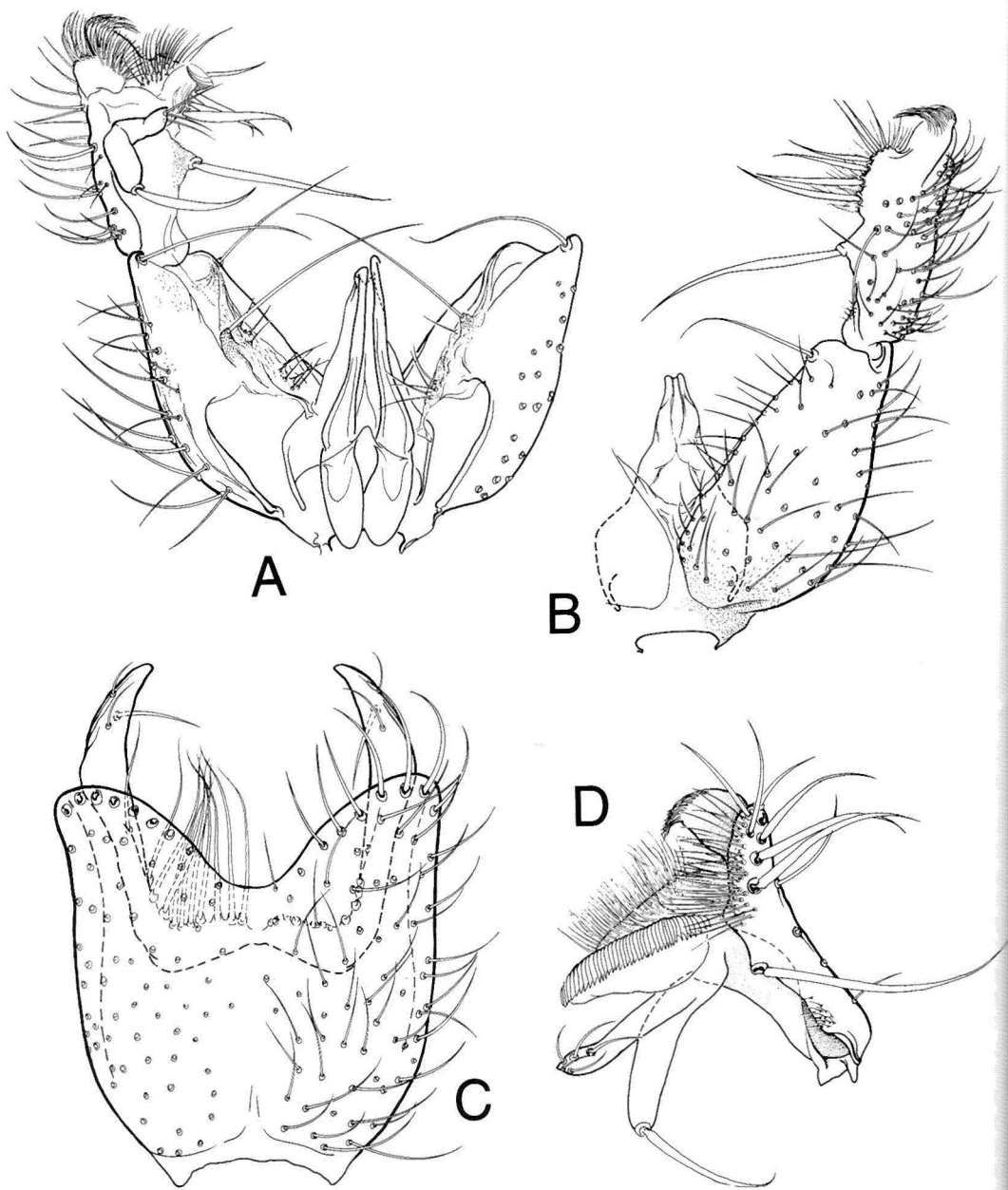


Fig. 14. *Coelosia burmacola* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

of finger-like lobe, with numerous short setae. Dorsal lobe less pronounced, apicodorsal margin membranous with some unevenly distributed rows of lamellae. Interior seta-bearing appendage broad, flattened, with 1 strong dorsal and a group of 7–8 ventral setae.

Lamella-bearing appendage with thick stalk and row of long, thin lamellae. Apex of paramere hook-like. Parameral apodeme long and broad. Aedeagus broad.

FEMALE (n=5). Total length 3.75–4.21, 3.91 mm. Wing length 3.34–4.05, 3.61 mm. Wing length 3.9–

4.0 (4.0)x as long as profemur.

*Coloration.* As in males, except somewhat lighter.

*Head.* Total length of flagellum 1.47–1.75 mm. First flagellomere 3.0–3.3x as long as wide, and 1.0–1.1x as long as second. Ocellar ratio 1.4–1.8. Front 0.9–1.0x as long as wide. Face with 7–13, clypeus with 18–28, and labrum with 3–7 setae. Clypeus 1.9–2.2x as long as labrum. Palpomere ratios 1 : 0.9–1.0 : 1.5–1.8 : 1.8–2.0 : 3.4–4.1. Stipes each with 4–5 setae.

*Thorax.* Total length 0.86–1.00, 0.90 mm.

*Wings.* Hyaline. Sc with 7–14 and ta with 4–6 dorsal setae, tb with 1–8 ventral setae, M and CuA both bare. Total length 3.10–3.72x as long as Sc, and 1.69–1.73x as long as R5. M-ratios 0.22–0.29 and 0.25–0.34, CuA-ratios 1.65–2.03 and 3.43–4.29.

*Legs.* Leg ratios given for fore, mid and hind leg: LR 0.73–0.76, 0.58–0.62, 0.51; SV 2.59–2.70, 3.06–3.22, 3.34–3.39; BV 2.11–2.24, 3.01–3.22, 3.94–4.21; TR 1.55–1.61, 1.89–2.03, 2.44–2.60.

*Terminalia* (Fig. 13). Gc 8 pointed, with several rather narrow, lanceolate setae, some very large situated laterally. St 10 reduced, bare. Tg 9 tending to be medially divided, with few apical setae. Tg 10 ovate, evenly rounded posteriorly, medially smoothly fused with tg 9. Cerci 2-segmented. Epiproct with small median process.

*Biology.* Unknown.

*Distribution.* Western Nearctic. U. S. A.: Washington and California. Judged from the present records, the species appears to have a more southern distribution than the closely related *C. longilobata*.

### 3. *Coelosia burmacola* sp. n.

Fig. 14.

*Types.* Holotype: ♂ BURMA: Achin State, Kambaiti (7,000 ft), 30.04.1934, R. Malaise (BMNH).

*Diagnostic characters.* Male terminalia very similar to those in *C. bicornis*, but the species has slender parameres, and the gonocoxites are fused medioventrally for a much shorter distance.

*Etymology.* From Burma, the country of origin, and from Latin, *-cola*, inhabitant.

#### *Description*

MALE (n=1). Total length 3.89 mm. Wing length

3.25 mm. Wing length 3.3x as long as profemur.

*Coloration.* Head, including mouthparts and antennae light brown. Thorax and abdomen light brown, scutum with 3 broad, brown longitudinal stripes. Legs yellowish brown.

*Head.* Total length of flagellum 2.21 mm. First flagellomere 3.6x as long as wide, and about as long as second. Lateral ocelli about the same size as median. Ocellar ratio 1.8. Front 1.1x as long as wide. Face with 7, clypeus with 20, and labrum with 6 setae. Clypeus 1.4x as long as labrum. Palpomere ratios 1 : 0.8 : 1.4 : 1.5 : 3.3. Stipes proximally fused, forming a thin plate, each with 5–6 setae.

*Thorax.* Total length 0.92 mm.

*Wings.* Hyaline, with a faint brownish tint. Sc with 1 and ta with 9 dorsal setae, tb with 1 ventral setae, and M and CuA both bare. Total length 3.53x as long as Sc and 1.67x as long as R5. M-ratios 0.21 and 0.25, CuA-ratios 1.84 and 3.78.

*Legs.* Fore tibia with minute, yellow setae only. Leg ratios given for fore, mid and hind leg: LR 0.91, 0.66, –; SV 2.16, 2.70, –; BV 2.03, 3.05, –; TR 1.45, 1.98, –.

*Terminalia* (Fig. 14). Tg 9 about as wide as long, posterior border with distinct median incision. Lateral lobes of tg 10 strongly developed, each with one ventral and 2 dorsal apical setae. Hypoproct subquadrate. Epiproct large, with numerous ventral setae. Cerci rather small with numerous long apical setae. Gonocoxites ventrally fused for a rather short distance only. Gonostylus bilobate; dorsal lobe with numerous thin, hair-like trichia. Ventral lobe with several setae, some of them very strong; median part of lateral lobe elongate with several filiform trichia distally. Seta-bearing appendage slender and bilobate, dorsal and ventral lobe with 1 and 5 setae, respectively. Lamella-bearing appendage broad, with one row of rather small lamellae. Paramere slender, evenly tapered. Parameral apodeme distinctly shorter than paramere; but longer than aedeagal apodeme. Aedeagus rather broad, evenly tapered towards apex.

FEMALE. Unknown

*Biology.* Unknown.

*Distribution.* Oriental. Burma.

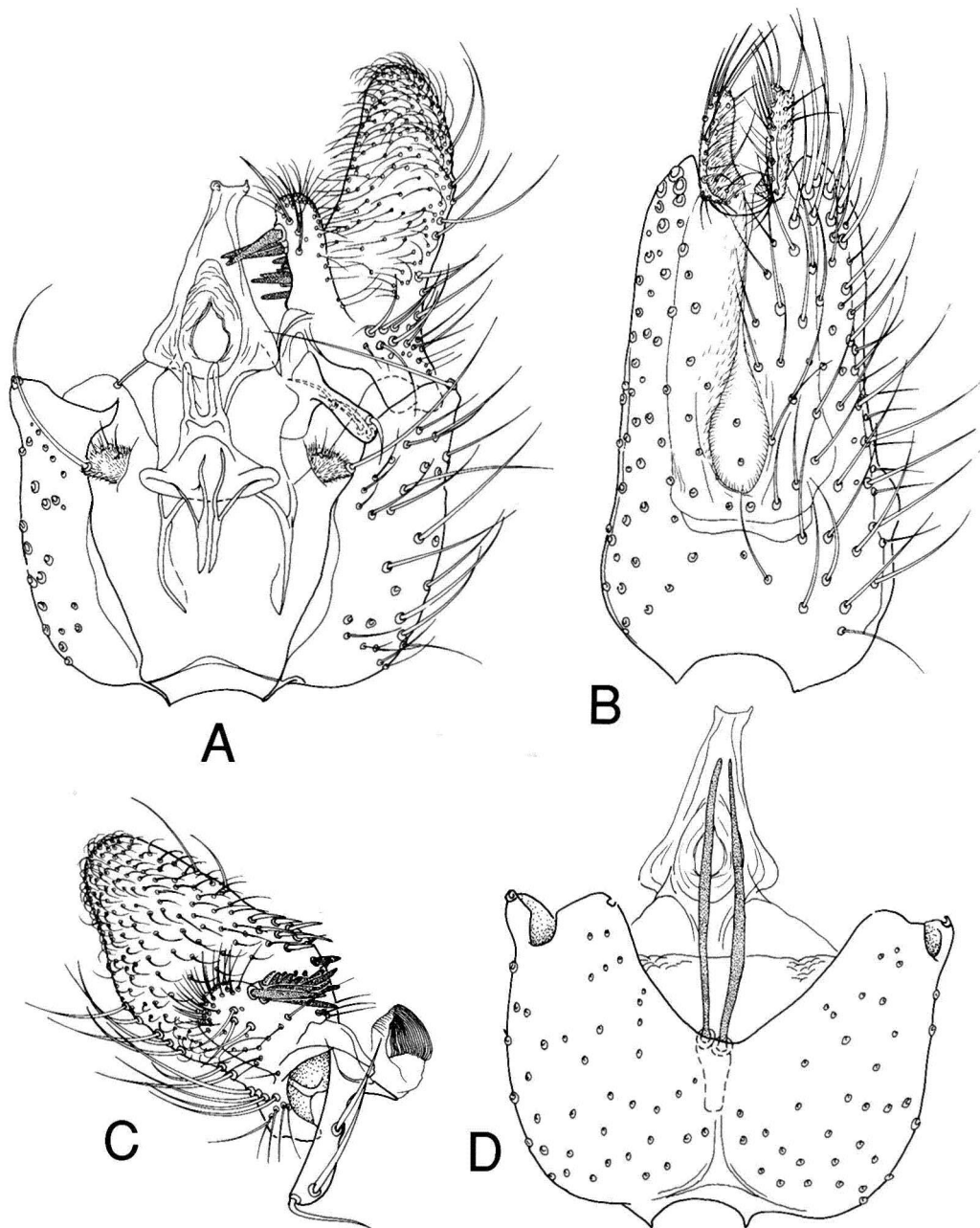


Fig. 15. *Coelosia distylata* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ventral view.

#### 4. *Coelosia distylata* sp. n.

Figs. 15, 16.

*Types. Holotype:* ♂ NEPAL: Kathmandu, Godavari (6,000'), 02.08.1967, Can. Exp. (Malaise trap) (CNC Type no. 21612). — *Paratypes:* ♀ 30.07.1967, ♀ 17.08.1967, otherwise as holotype;

Godavari (5,000'), ♀ 06.08.1967; Kathmandu, Pulchauki (7,300'), 1♂ 18♀ 01.08.1967, ♂ 06.08.1967; Pulchauki (6,800'), ♀ 14.07.1967; Pulchauki (6,600'), ♀ 16.08.1967, all Can. Exp. (Malaise traps) (CNC).

*Diagnostic characters.* Both sexes are readily identified in having median ocellus entirely reduced, and a bare subcosta.

**Etymology.** From Greek *di-*, two, and *stylos*, a style, referring to the two strong megasetae between the two fused male gonocoxites.

### Description

**MALE** ( $n=2$ , except where otherwise stated). Total length 3.96 mm. Wing length 2.85–2.95 mm, or 3.4x as long as profemur.

**Coloration.** Top of head and frons brown. Mouthparts brownish. Scape, pedicel, first, second and basal third of flagellomere 3 yellow. Scutum and thoracic sclerites pale greyish brown. Halter yellow. Legs whitish to pale brown. Abdominal segments pale brown, segments 2–5 with yellow posterior margins. Gonocoxite and tg 9 yellow, gonostylus brown.

**Head** ( $n=1$ ). Two ocelli, median ocellus entirely reduced. Length of flagellum 1.96 mm. First flagellomere 4.6x as long as wide, and 1.3x as long as second. Front 2.0x as long as wide. Face with 14, and clypeus with 20 setae; labrum bare. Clypeus 1.6x as long as labrum. Palpomere ratios 1 : 1.0 : 2.1 : 2.3 : 4.5. Stipes each with 3–4 setae, proximal parts weak.

**Thorax** ( $n=2$ ). Total length 0.74–0.75 mm.

**Wings** ( $n=1$ ). Hyaline. Sc bare, ta with 3 dorsal setae, and M and CuA both bare. Total length 4.43x as long as Sc, and 1.57x as long as R5. M-ratios 0.21 and 0.25, CuA-ratios 2.21 and 4.57.

**Legs.** Hind tibia with rows of very long setae, some of them more than 2x as long as width of tibia. Leg ratios given for fore, mid and hind leg: LR 0.89, 0.70, 0.54; SV 2.21, 2.46, 3.22; BV 2.10, 3.07, 4.22; TR 1.62, 2.17, 2.73.

**Terminalia** (Fig. 15). Tg 9 elongated, about 1.7x as long as wide, posterior border concave. Hypoproct very long, about 2/3 as long as tg 9, medially divided except basally. Epiproct medially divided, fused with cerci. Cerci ovate, separate. Posterolateral borders of tg 9 invaginated, with one strong setae on each side. Gonocoxites fused along 1/2 of their lengths. Small plate equipped with two very long, style-like megasetae, loosely attached between fused gonocoxites, possibly representing reduced st 9. Gonostylus setose, with large ventral and smaller dorsal lobe. Dorsal lobe broad rounded, pointing medially, with several very strong and blunt apicomedial megasetae. Ventral lobe more

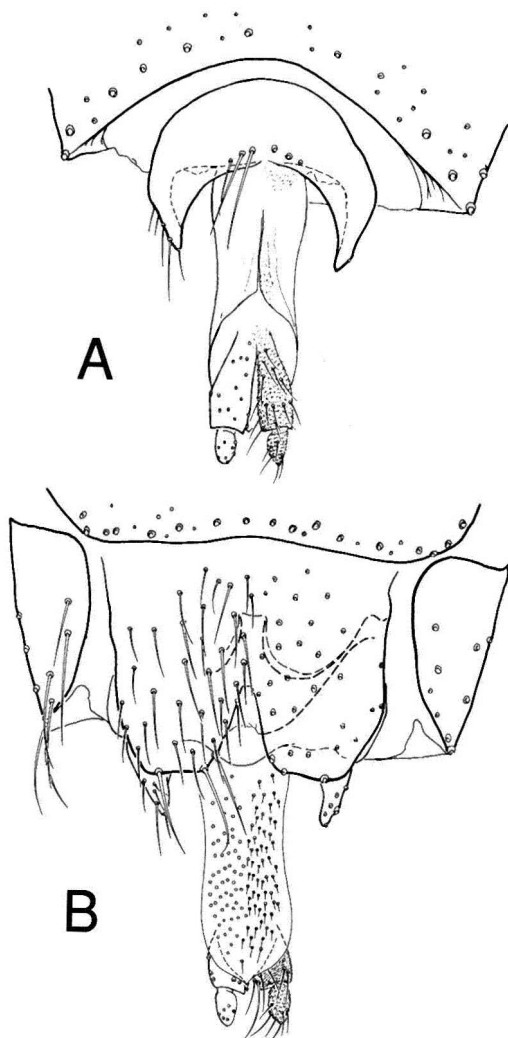


Fig. 16. *Coelosia distylata* sp. n., female terminalia. - A. Dorsal view. - B. Ventral view.

flattened, with numerous fine, interior setae. Pronounced interior appendage attached proximally, made up of finger-like process with 3 strong setae, and membranous sack-like outgrowth with single row of lamellae. Parameres small, with wide proximal part, dorsomedially fused. Parameral apodemes thin, situated close together. Aedeagus long, and rather broad, with conspicuous, weakly sclerotized "window" situated medially at about half of its length.

**FEMALE** ( $n=5$ , except where otherwise stated). Total length 2.75–3.15, 3.03 mm. Wing length 2.83–3.24 mm, or 3.6–3.8 (3.7)x as long as profemur.

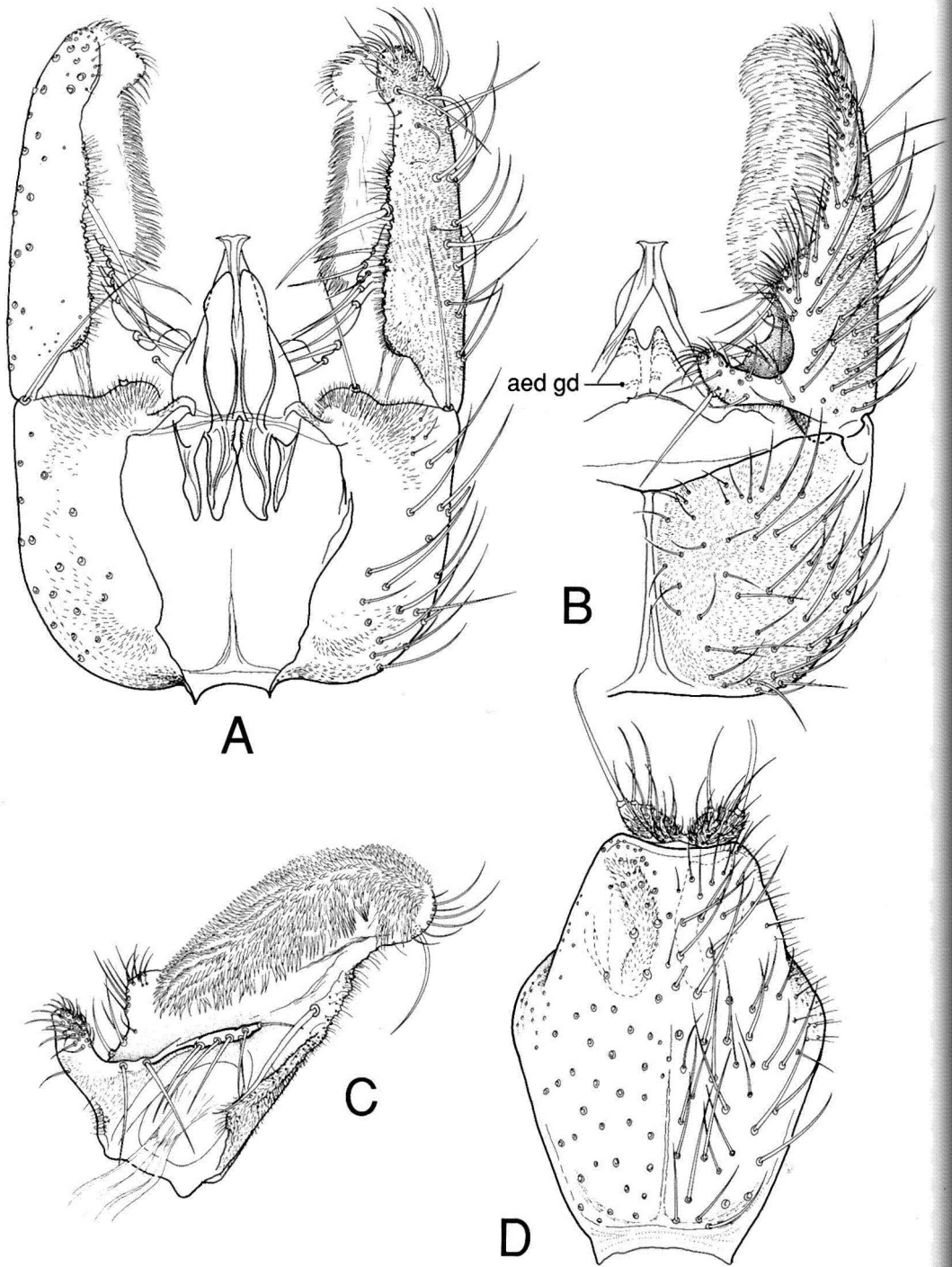


Fig. 17. *Coelosia flava* (Staeger, 1840), male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view. — Abbreviation: aed gd = aedeagal guide.

**Coloration.** As for male, except abdominal segments with very narrow posterior, yellow margins.

**Head** (n=2). Length of flagellum 1.43–1.68 mm. First flagellomere 3.8–5.5x as long as wide, and 1.6–1.7x as long as second. Front 1.4–1.9x as long as wide. Face with 8–11, and clypeus with 24–29 setae; labrum bare. Clypeus 1.7–2.3x as long as labrum. Palpomere ratios 1 : 0.9 : 1.7–1.8 : 2.0–2.3 : 4.1–4.3.

**Thorax** (n=5). Total length 0.68–0.81, 0.75 mm.

**Wing** (n=2). Crossvein ta with 4–6 dorsal setae. Total length 3.81–4.41x as long as Sc, and 1.58–1.59x as long as R5. M-ratios 0.19–0.27 and 0.23–0.32, CuA-ratios 1.65–2.13 and 3.30–4.53.

**Legs** (n=2). Leg ratios given for fore, mid and hind leg: LR 0.85–0.87, 0.68–0.70, 0.54; SV 2.26–2.29, 2.67–2.76, 3.20–3.23; BV 1.95–2.04, 2.80–2.86, 3.87–3.94; TR 1.48–1.55, 1.90–1.95, 2.39–2.44.

**Terminalia** (Fig. 16). Gc 8 large and broad, distinctly separated, each with numerous ventral and a few apical setae. St 10 long and narrow, evenly clothed by minute setae. Tg 8 very large. Tg 9 with pronounced lateral lobes, with some median and lateral setae. Tg 10 modified, apparently fused with epiproct. Combined structure elongated, with median fold line. Cerci 2-segmented, cerci II small.

**Biology.** Unknown.

**Distribution.** Oriental/South-eastern Palearctic. Nepal.

### 5. *Coelosia flava* (Staeger)

Figs 17, 18.

*Boletina flava* Staeger, 1840: 237.

*Coelosia flava*: Winnertz 1863; Lundström 1906; Edwards 1925; Landrock 1927; 1940; Séguy 1940; Stackelberg 1946; Hutson et al. 1980; Hackman et al. 1988 (Palearctic catalogue).

*Coelosia flava* Walker 1837, sensu Winnertz, 1863 (Type not available).

Nec *Coelosia flava*: Johannsen, 1912.

**Types.** Lectotype, by present designation: ♂ DENMARK: Spjalland, Copenhagen, Charlottenlund (labelled "Charlitt. A.").

— Paralectotype: ♀, otherwise as holotype; 2♀♀ without labels, probably from the same series. (Staeger's collection was re-arranged about 1880, and all original labels destroyed (Edwards (1924b)). All ZMC. — Additional material studied: See Appendix.

**Diagnostic characters.** Both sexes are easily identified by their

bright yellow colour. Ventral lobe of male gonostylus, small, stout and finger-like. Female with strongly setose, large gc 8; st 10 bearing a median, small and setose eminence.

### Description

**MALE** (n=5). Total length 4.74–6.56 (5.35) mm. Wing length 3.54–4.05 (3.77) mm, or 3.4–3.8 (3.6)x as long as profemur.

**Coloration.** Head light brown to yellowish, palpus and mouthparts yellow. Antennae light brown, scape, pedicel, first and most of second flagellomere yellow. Thorax entirely yellow. Scutum and scutellum yellow. Thoracic sclerites all yellow. Halteres yellow. Legs yellow. Abdominal segments 1 to 6 light brown to

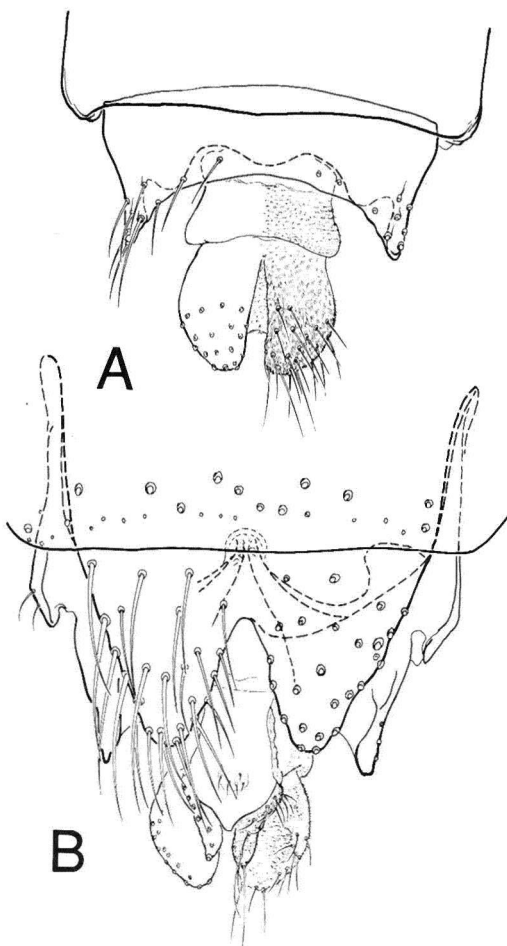


Fig. 18. *Coelosia flava* (Staeger), female terminalia. — A. Dorsal view. — B. Ventral view.

yellowish. Terminalia yellow.

**Head.** Total length of flagellum 2.69–3.33 mm. First flagellomere 5.9–7.2x as long as wide, and 1.2–1.4x as long as second. Median and lateral ocellus of about equal size. Thick and broad interior ridge stretching from anterior border of lateral ocellus to anterior border of median ocellus. Ocellar ratio 2.0–2.4. Front 1.0–1.3x as long as wide. Face with 8–12, clypeus with 19–26, and labrum with 2–7 setae. Clypeus 1.5–1.6x as long as labrum. Palpomere ratios 1 : 0.9–1.1 : 1.3–1.6 : 1.3–1.8 : 2.6–3.0. Stipes distinctly fused proximally, forming thin, membranous plate, stipes with 3–5 setae.

**Thorax.** Total length 0.78–1.15 (0.93) mm. Scutellum with 2 strong, erect setae.

**Wings.** Hyaline. Sc with 0–1 dorsal seta; ta with 5–7 dorsal and 0–2 ventral setae; tb with 0–7 ventral setae; M and CuA both bare. Total length 3.24–3.95x as long as Sc, and 1.57–1.68x as long as R5. M-ratios 0.17–0.21 and 0.20–0.26, Cu-ratios 1.56–1.67 and 3.12–3.50.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.86–0.94, 0.62–0.69, 0.51–0.55; SV 2.06–2.16, 2.52–2.74, 3.09–3.35; BV 1.80–1.91, 2.72–3.05, 4.11–4.28; TR 1.38–1.42, 1.85–2.00, 2.57–2.67.

**Terminalia** (Fig. 17). Tg 9 elongated, about 1.5x as long as wide, posterior margin slightly concave. Tg 10 reduced. Hypoproct elongated, nearly about 0.5x as long as tg 9. Epiproct medially divided, fused with cerci. Cercus with one long, curved lateral seta. Hypoproct elongated. Gonocoxites ventrally fused along most of their length. Bare, moderately sclerotized plate with bilobate apex situated ventrocaudally, beyond aedeagus. Gonostylus bilobate and longer than wide. Ventral lobe small, finger-like, with several setae. Dorsal lobe large, rounded, with membranous flange attached along apicoventral margin; flange densely clothed with rows of transparent, flattened setae. Gonostylus with distinct, interior ridge stretching from basal portion of ventral lobe across most of median surface; ridge with some erect setae. Parameres broad, situated close together. Parameral apodeme about 0.5 as long as paramere. Aedeagus evenly tapered.

**FEMALE** (n=5). Total length 4.44–5.82 (5.12)

mm. Wing length 3.86–4.60 (4.06) mm, or 3.7–3.9 (3.8)x as long as profemur.

**Coloration** as for males.

**Head.** Total length of flagellum 1.72–1.98 mm. First flagellomere 4.8–5.7x as long as wide, and 1.3–1.5x as long as second. Ocellar ratio 1.7–2.0. Front 0.9–1.2x as long as wide. Face with 5–11, clypeus with 19–31, and labrum with 0–2 setae. Clypeus 1.4–1.8x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.4–1.7 : 1.3–1.7 : 2.5–3.3. Stipes with 3–7 setae.

**Thorax.** Total length 0.97–1.22 (1.05) mm.

**Wings.** Sc bare, ta with 5–10 dorsal and 0–2 ventral setae, M basis with 0–5 dorsal and 0–7 ventral setae. Total length 3.47–3.91x as long as Sc, and 1.58–1.66x as long as R5. M-ratios: 0.15–0.24 and 0.18–0.28. CuA-ratios 1.36–1.79 and 2.74–4.00.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.78–0.91, 0.60–0.66, 0.49–0.54; SV 2.17–2.50, 2.76–2.94, 3.16–3.45; BV 1.78–1.97, 2.74–2.97, 4.02–4.19; TR 1.41–1.50, 1.88–1.95, 2.56–2.78.

**Terminalia** (Fig. 18). Gc 8 large, with numerous strong setae. St 10 elongated, with median, rounded eminence. Eminence with group of 3–5 small setae. Rami broad, notum not developed into a membranous plate. Posterior border of tg 9 even. Tg 10 apparently reduced or fused with epiproct. Cerci 1-segmented, fused 2/3 along their length.

**Biology.** Unknown.

**Distribution.** Western Palearctic. Austria, Denmark, England, Finland, France, Germany, Hungary, Ireland, Italy, Norway, Russia, Sweden, Switzerland. Also reported from Holland, Poland and the former Czechoslovakia (Hackman et al. 1988).

## 6. *Coelosia fusca* Bezzi

Figs. 3A–B, 19, 20.

*Coelosia fusca* Bezzi, 1892:68.

*Coelosia silvatica*: Landrock, 1918; 1927; 1940; Edwards 1925; Séguy 1940; Stackelberg 1946; Hutson et al. 1980; Hackman et al. 1988 (Palearctic catalogue). *syn.n.*

**Types.** *Holotype* (studied): ♂ ITALY: Pavia, 26.11.1890 (MIL). In Bezzi's original description a more detailed description of the type locality is given, "sotto i portici dell'Università di Pavia". The type-locality given by Hackman et al. (1988:249), "forse commune nell'alta Italia", is thus not correct. — *Additional material studied*: See Appendix.

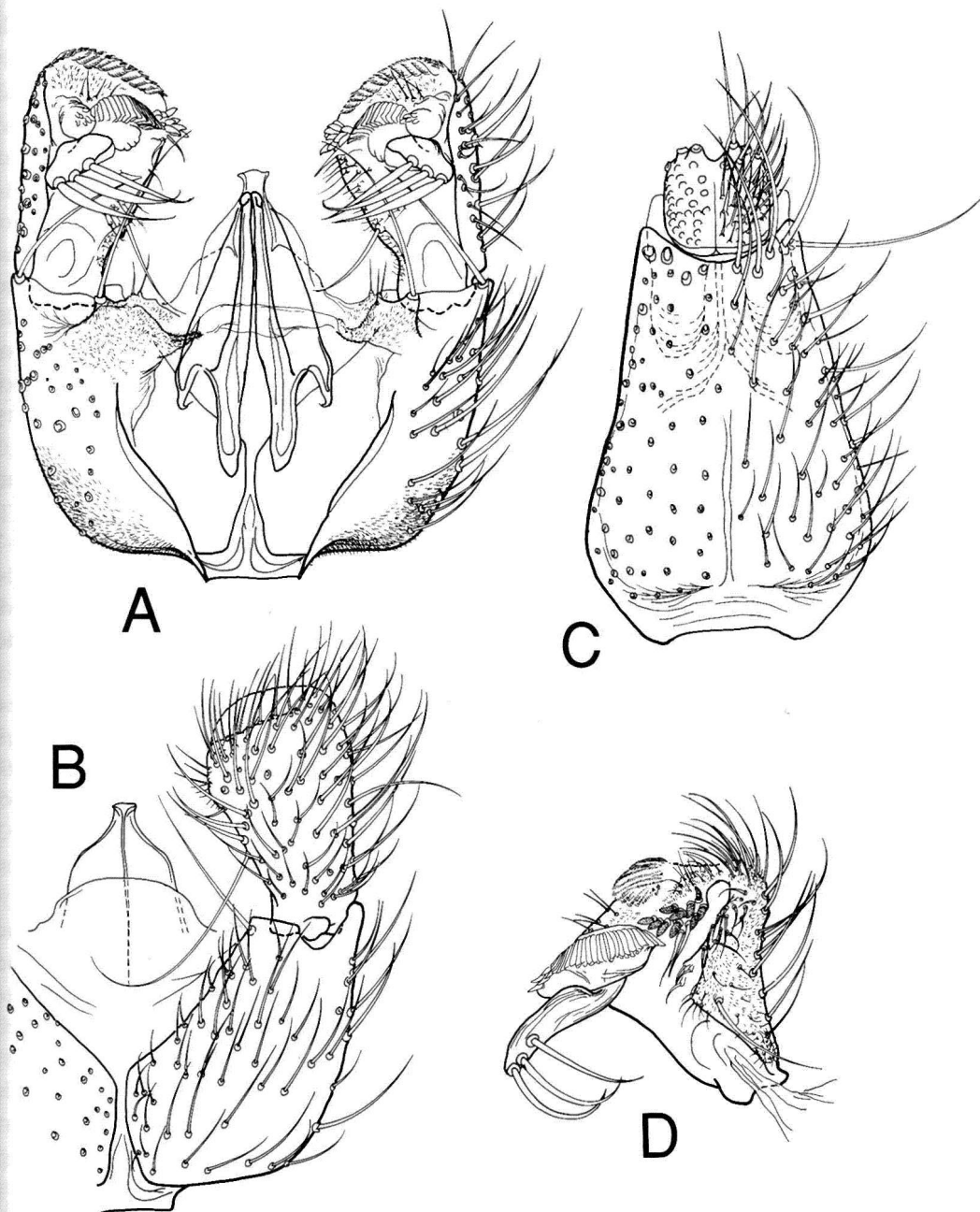


Fig. 19. *Coelosia fusca* Bezzi, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Ventral view. — D. Gonostylus, interior view.

**Diagnostic characters.** Male gonostylus subtriangular. Interior appendage attached apicodorsally, having 3 very strong, curved setae. Female with apical portion of the two gc 8 well separated, each with 2–3 very strong, apical setae.

#### Description

**MALE** (n=5). Total length 4.58–5.13 (4.90) mm. Wing length 3.59–4.35 (3.90) mm, or 3.8–4.4 (4.1)× as

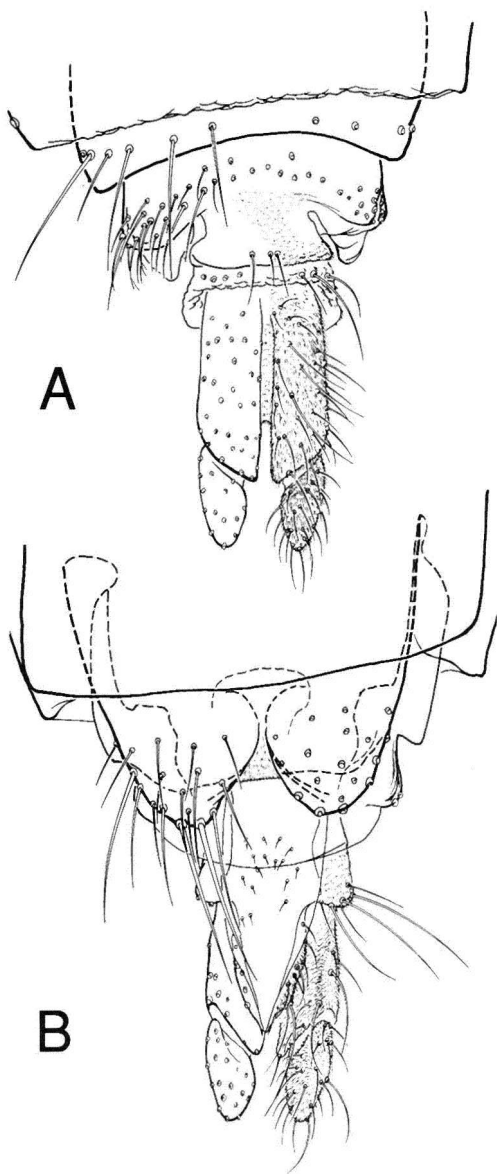


Fig. 20. *Coelosia fusca* Bezzi, female terminalia. — A. Dorsal view. — B. Ventral view.

long as profemur.

**Coloration.** Face and top of head dark brown. Palpus and mouthparts yellowish. Antennae brown; scape light brown, pedicel and basal third of flagellomere 1 yellow. Scutum and scutellum brown, former with 3 somewhat darker, diffuse longitudinal stripes. Humeral areas pale brown. Other thoracic

sclerites brown. Coxa yellow, femur yellowish to pale brown, most pronounced along dorsal margin, tibia and tarsi brownish. Abdominal segments all blackish brown. Terminalia brown.

**Head** (Fig. 3A–B). Flagellomere 2.37–2.69 mm. First flagellomere 4.4–5.0x as long as wide, and 1.1–1.2x as long as second. Median and lateral ocelli of about equal size. Lateral ocellus with interior process along the lateral border. Ocellar ratio 1.2–1.3. Front as long as wide. Face with 7–14, clypeus with 21–26 setae; labrum bare. Clypeus 1.9–2.7x as long as labrum. Palpomere ratios 1 : 0.8–0.9 : 1.5–1.6 : 1.5–1.7 : 2.5–3.4. Stipes distinctly connected proximally by thin membranous plate, each with 1–4 setae.

**Thorax.** Total length 0.85–1.10 (1.00) mm. Scutellum with 2 strong and 4 smaller setae.

**Wings.** Hyaline. Sc with 3–10 and ta with 3–7 dorsal setae; M and CuA both bare. Total length 3.11–3.57x as long as Sc, and 1.60–1.81x as long as R5. M-ratios 0.24–0.30 and 0.28–0.36, CuA-ratios 1.36–1.63 and 2.439–2.88.

**Legs.** Fore tibia with 3–4 dorsal and 2–4 ventral setae. Leg ratios given for fore, mid and hind leg: LR 0.78–0.84, 0.61–0.65, 0.50–0.54; SV 2.32–2.50, 2.76–2.95, 3.16–3.40; BV 2.14–2.21, 3.20–3.35, 4.22–4.56; TR 1.50–1.61, 2.00–2.21, 2.58–2.81.

**Terminalia** (Fig. 19). Tg 9 about 1.3x as long as wide, posterior margin concave. Tg 10 reduced. Hypoproct elongated. Epiproct well developed, fused with cerci. Cerci completely fused along median line, each with several strong setae. Gonocoxites fused basally. Gonostylus subtriangular, bowl shaped. Apical, median margin of gonostylus membranous with several short rows of lamella. Apicoventral margin with knob-like outgrowth, equipped with several short, blunt setae. Seta-bearing appendage with 3 very strong, curved setae. Lamella-bearing appendage close to base of seta-bearing appendage, with single row of lamellae. Paramere thin and slender, not protruding beyond aedeagus. Parameral apodeme about half as long as paramere. Aedeagus broad, apically tapered.

**FEMALE** (n = 5). Total length 4.3–5.1 (4.7) mm. Wing length: 4.1–4.5 (4.2) mm, or 4.1–4.4 (4.2)x as long as profemur.

**Coloration.** As for males, except somewhat darker.

**Head.** Flagellomere 1.68–1.82 mm. First flagellomere 4.0–5.0x as long as wide, and 1.3–1.5x as long as second. Ocellar ratio 1.9–2.3. Front 0.9–1.1x as long as wide. Face with 16–20, and clypeus with 6–13 setae. Palpomere ratios 1 : 0.8–1.1 : 1.3–1.7 : 1.4–1.7 : 2.8–3.1. Stipes with 3–4 setae.

**Thorax.** Total length 1.04–1.15 (1.10) mm.

**Wings.** Sc with 5–13, and ta with 2–6 dorsal setae. Total length 3.20–3.60x as long as Sc, and 1.60–1.68x as long as R5. M-ratios 0.25–0.30 and 0.30–0.34, Cu-ratios 1.41–1.58 and 2.44–3.00.

Leg ratios given for fore, mid and hind leg: LR 0.76–0.82, 0.62–0.64, 0.50–0.55; SV 2.35–2.47, 2.88–2.94, 3.18–3.46; BV 2.14–2.27, 3.18–3.34, 4.19–4.42; TR 1.57–1.63, 2.05–2.11, 2.56–2.78.

**Terminalia** (Fig. 20). Gc 8 widely separated, connected by thin membranous area. Each lobe with 3 strong apical, and numerous smaller setae. St 10 elongated, pointed, with several small setae. Tg 9 entire, but smoothly fused with tg 10. Tg 10 weakly sclerotized, with 2–4 apical setae. Epiproct well developed, with some lateral setae. Cercus 2-segmented; first segments fused along 3/4 of their length.

**Biology.** Reared from *Cortinarius trivialis* Lge., *Omphalotus olearius* (DC ex Fr.) Sing. and *Lepista nuda* (Bull. ex Fr.) Cke. (Ribeiro 1990).

**Distribution.** Western Palaearctic. Denmark, England, Finland, France, Italy, Norway, Spain (Canary Island, Tenerife), Switzerland and Russia. Also reported from the former Czechoslovakia, Germany, Poland (Hackman et al. 1988), Portugal (Ribeiro 1990), Cyprus, Greece and Israel (Chandler 1994, *in litt.*).

## 7. *Coelosia fuscicauda* Okada

Figs. 21, 22.

*Coelosia fuscicauda* Okada, 1939: 309; Hackman et al. 1988 (Palaearctic catalogue).

**Types.** *Holotype* (studied): ♂ JAPAN: Hokkaido, Sapporo, 29.04.1934, I. Okada (HOK). — *Allotype*: ♀, otherwise as holotype. — *Additional material studied*: See Appendix.

**Diagnostic characters.** Male with broad lateral lobes of tg 10. Cerci partly fused with these lobes, bearing numerous very long setae. Interior, seta-bearing appendage of gonostylus bilobate, with one finger-like and one blunt lobe; finger-like lobe with one

apical setae, the other with numerous setae. Female with apical portion of the two gc 8 well separated, equipped with numerous curved setae.

## Description

**MALE** (n=1). Total length 4.83 mm. Wing length 4.49 mm, or 3.8x as long as profemur.

**Coloration.** As the type material is very bleached and in a rather bad condition, the description is translated from Okada (1939: 309): Body velvet, blackish brown. Antennae, including basal segments, and palpi brown. Mesonotum blackish brown, with indistinct blackish stripes; shoulders somewhat darkened.

**Head.** Total length of flagellum 2.88 mm. First flagellomere 3.0x as long as wide, and as long as second. Median and lateral ocellus of about equal size. Weak sutures running from anterior border of lateral ocellus to anterior border of median ocellus, and between lateral ocellus and compound eye. Ocellar ratio 1.6. Front 1.2x as long as wide. Face with 4, clypeus with 26, and labrum with 17 setae. Clypeus 1.6x as long as labrum. Palpomere ratios 1 : 0.9 : 1.3 : 1.3 : 2.4. Stipes fused proximally, each with 4–6 setae.

**Thorax.** Total length 1.20 mm. Scutellum with 4 strong setae and numerous smaller.

**Wings.** Hyaline. Sc with 16 dorsal setae, ta with 6 dorsal and 1 ventral setae, tb with 2 ventral setae, M and CuA both bare. Total length 2.87x as long as Sc, and 1.74x as long as R5. M-ratios 0.25 and 0.31, Cu-ratios 2.06 and 3.97.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.82, 0.71, 0.69; SV 2.33, 2.60, 3.00; BV 1.82, 2.71, 3.88; TR 1.35, 1.83, 2.48.

**Terminalia** (Fig. 21). Tg 9 subquadrate, posterior margin with deep median incision. Tg 10 well developed, divided in two lateral lobes; each lobe broad, with 5 curved, ventral setae along medial margin. Hypoproct subquadrate. Epiproct narrow, with several strong ventral setae, intimately connected with cerci and tg 10. Cerci with numerous long, erect setae, completely fused with basal half of lobes of tg 10. Gonocoxites medially fused for short distance ventrally. Gonostylus more or less triangular. Ventral border with numerous setae. Median and apicodorsal margin

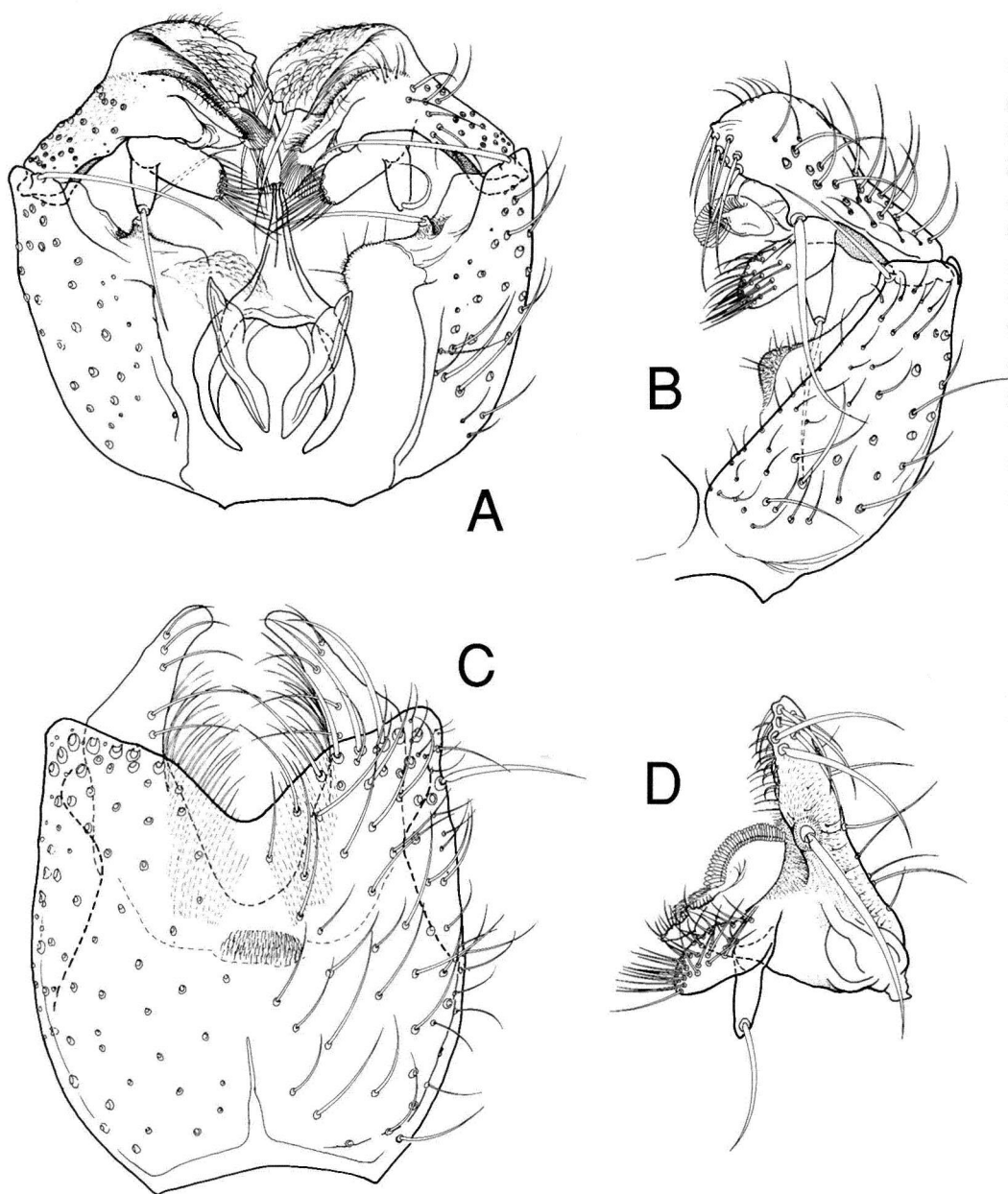


Fig. 21. *Coelosia fuscicauda* Okada, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

membranous, with nearly transparent setae. Seta-bearing appendage bilobate, ventral lobe finger-like with one strong apical seta, dorsal lobe broad with numerous setae. Lamella-bearing appendage with one long row of lamellae. Parameres very short. Parameral apodeme well developed; distinctly longer than

paramere. Aedeagus narrow, tapered.

**FEMALE** (n=1). Total length 4.32 mm. Wing length 4.32 mm, or 4.1x as long as profemur.

**Head.** Total length of flagellum 1.68 mm. First flagellomere 2.8x as long as wide, and 1.7x as long as second. Front 1.2x as long as wide. Sutures running

between ocelli and the compound eye weaker than in males. Ocellar ratio 1.3. Face with 12, clypeus with 57, and labrum with 16 setae. Clypeus 1.9x as long as labrum. Palpomere ratios 1 : 1.0 : 1.7 : 1.4 : 2.1. Stipes with 7 setae.

**Thorax.** Total length 1.15 mm.

**Wings.** Sc with 9 and ta with 6 dorsal setae, tb with 5 ventral setae. Total length 2.69x as long as Sc, and 1.72x as long as R5. M-ratios 0.20 and 0.24.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.78, 0.66, 0.55; SV 2.46, 2.76, 3.07; BV 1.80, 2.85, 3.67; TR 1.39, 2.04, 2.50.

**Terminalia** (Fig. 22). Gc 8 widely separated, with several curved ventral setae and numerous smaller dorsomedial setae. St 10 small. Tg 9 with small sublateral incision, median part with 4 apical setae. Posterior border of tg 10 straight, bare. Cerci 1-segmented.

**Biology.** Unknown.

**Distribution.** Eastern Palaearctic. Japan (Hokkaido and Honshu) (Okada 1940).

### *Coelosia gracilis* Johannsen

Fig. 23.

*Coelosia gracilis* Johannsen, 1912: 294; Laffoon 1965 (Nearctic catalogue).

**Types.** *Holotype* (studied): ♂ U. S. A., CALIFORNIA, 30.08.1908, J. C. Bradley ("O. A. Johannsen Lot. 461"). Right wing and one leg mounted on one slide (Type no. 1998, CORN). *Holotype* without terminalia, but as the specimen has both M and CuA with numerous setae, only *C. truncata* and *C. gracilis* have to be taken into consideration. Furthermore, the closely related *C. truncata* has not been recorded as far south as Colorado and California. — *Additional material studied:* See Appendix.

**Remarks.** In her unpublished thesis, Fisher (1937) described a "new" species called *Coelosia pectens*. The "types" which are kept in the Cornell University Insect Collection, have been studied and proved to be conspecific with *gracilis*.

**Diagnostic characters.** All major veins with numerous setae. Together with *C. truncata*, the only species with one seta immediately behind the median ocellus. Male tg 9 subquadrate. Though very similar to *C. truncata*, males can be identified on the ventromedial, setose lobe of the gonostylus, and on the broader and more rounded apex. Cerci medially fused, in contrast to *C. truncata*. Female with st 10 setose, and apical portion of the two gc 8 evenly rounded, with 2–3 erect, apical setae. Females can at present not be satisfactorily separated from females of *C. truncata*.

### Description

**MALE** (n=5). Total length 3.66–5.01 (4.22) mm.

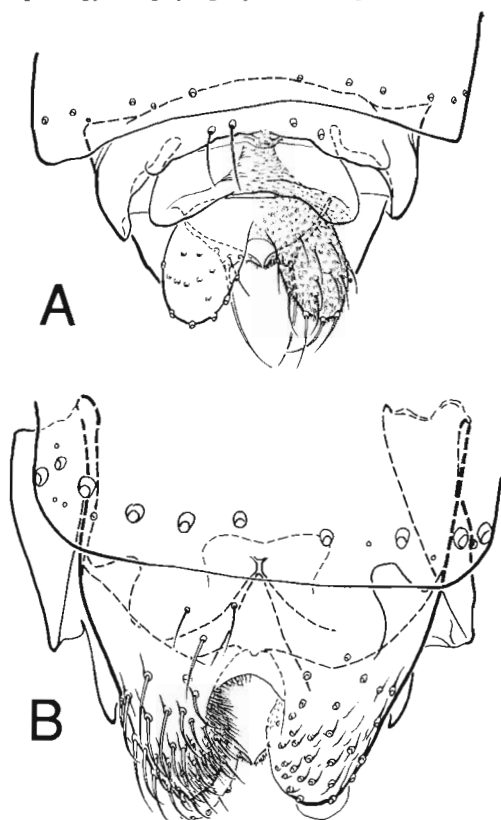


Fig. 22. *Coelosia fuscicauda* Okada, female terminalia. — A. Dorsal view. — B. Ventral view.

Wing length 3.15–3.59 (3.31) mm, or 3.8–4.2 (4.0)x as long as profemur.

**Coloration.** Polymorphic, yellow or brown. Yellow variety: head and most of antennae brown, scape, pedicel, first flagellomere and mouthparts yellow. Mesonotum yellowish with weak light brown median stripe, remaining parts of thorax yellowish. Halteres and legs yellow. Abdomen, including terminalia light brown to yellowish. Brown variety: head, including antennae dark brown, mouthparts light brown. Thorax brown to dark brown. Halteres and legs brown. Abdomen dark brown, terminalia brown.

**Head.** Total length of flagellum 2.3–2.5 mm. First flagellomere 4.1–4.8x as long as wide, and 1.1–1.2x as long as second. Lateral ocellus somewhat larger than median ocellus. Pronounced interior ridge stretching from lateral border of lateral ocellus to frontal suture, in front of median ocellus. Small plate behind median ocellus with 1 seta. Ocellar ratio 1.8–2.2. Front 0.9–

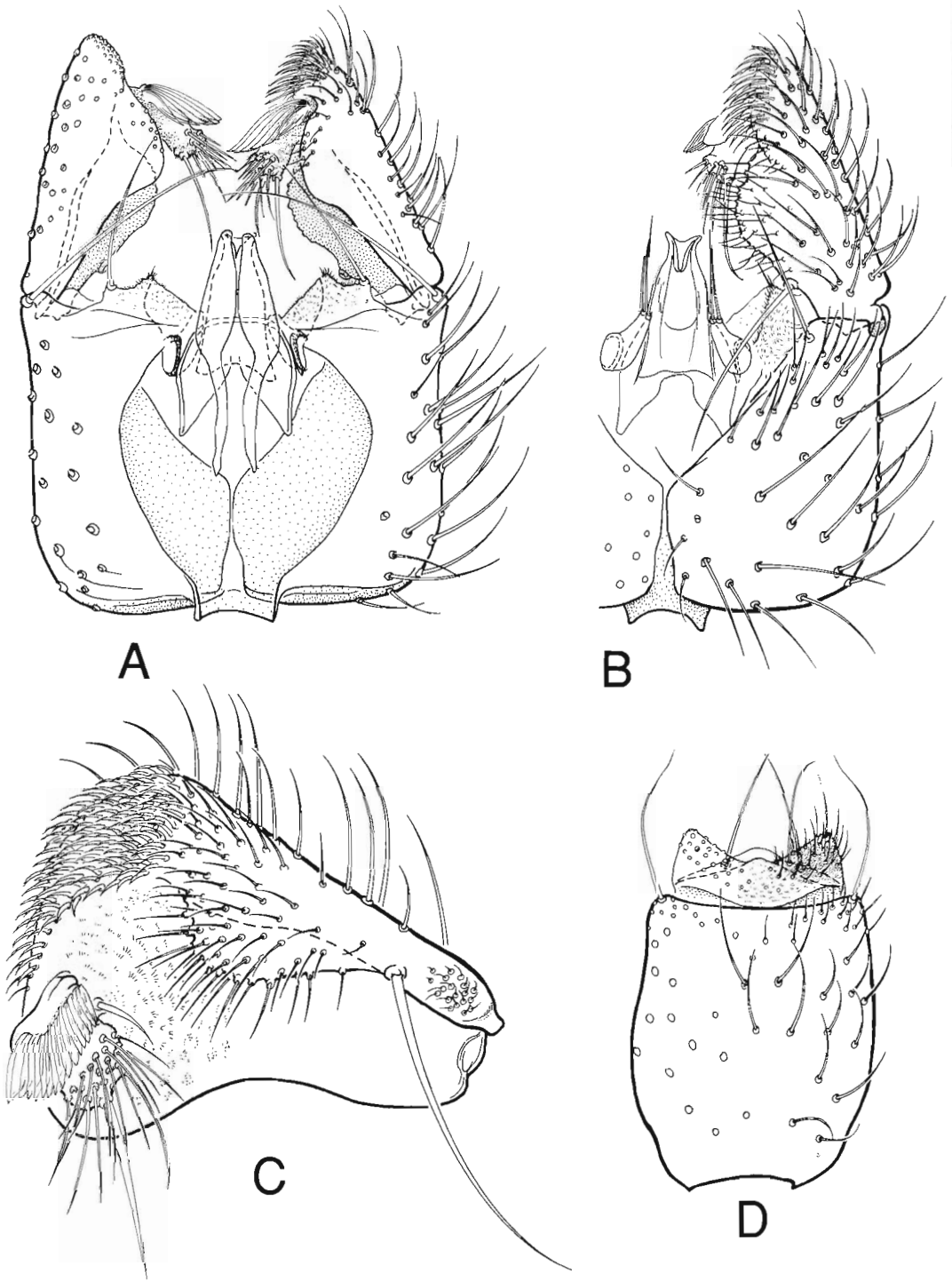


Fig. 23. *Coelosia gracilis* Johanssen, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view, right half Tergite 9 and associated structures. — D. Gonostylus, interior view.

1.1x as long as wide. Face with 10–15, clypeus with 23–28, and labrum with 4–8 setae. Clypeus 1.7–2.2x as long as labrum. Palpomere ratios 1 : 0.9–1.0 : 1.4–1.6 : 1.4–1.8 : 2.9–3.5. Stipes broad and rather weakly sclerotized, fused proximally and forming thin plate, each with 4–7 setae.

**Thorax.** Length 0.69–0.87 (0.76) mm. Scutellum with 2 strong setae.

**Wings.** Hyaline. Sc with 4–9 and ta with 2–5 dorsal setae; tb and M-petiole bare, M1 with 14–40 and M2 with 1–16 dorsal setae; CuA-petiole with 0–2, CuA1 with 1–8 and CuA2 with 5–7 dorsal setae. Total length 3.47–4.03x as long as Sc, or 1.60–1.67x as long as R5. M-ratios 0.24–0.29 and 0.29–0.34, CuA-ratios 1.70–1.82 and 2.88–2.52.

**Legs.** Fore tibia usually with 2–4 ventral, 1 posterodorsal and 1 dorsal setae. Leg ratios given for fore, mid and hind leg: LR 0.71–0.79, 0.62–0.67, 0.50–0.55; SV 2.47–2.72, 2.77–2.95, 3.15–3.37; BV 1.93–2.12, 3.22–3.42, 4.25–4.48; TR 1.14–1.50, 2.05–2.19, 2.53–2.73.

**Terminalia** (Fig. 23). Tg 9 about 1.2x as long as wide. Tg 10 reduced. Hypoproct nearly subquadrate. Epiproct large, entire. Cerci small, medially fused, intimately connected with the epiproct. Gonocoxites ventrally fused for short distance. Gonocoxal apodeme produced into distinct, finger-like protuberance medially, with 2 apical setae. Gonostylus subtriangular, apicodorsal margin evenly rounded. Medioventral border with distinct, curved fold, variable in shape. Internal appendages attached to apicoventral part of gonostylus. Seta-bearing appendage with one strong and several smaller setae. Lamella-bearing appendage with 1 row of long, distinctly pointed lamellae. Paramere broad, about as long as aedeagus. Parameral apodeme as long as paramere, slender. Aedeagus broad, apex wide.

**FEMALE** (n=4). Total length 3.91–4.78 mm. Wing length 3.54–4.05 mm, or 3.6–4.1x as long as profemur.

**Coloration.** As for males.

**Head.** Total length of flagellum 1.50–1.73 mm. First flagellomere 3.8–4.3x as long as wide, and 1.2x as long as second. Ocellar ratio 1.8–2.3. Front 1.0–1.1x as long as wide. Face with 10–18, clypeus with 24–33,

and labrum with 5–9 setae. Clypeus 1.5–2.0x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.5–1.7 : 1.5–1.8 : 3.1–3.5. Stipes fused proximally, each with 5–8 setae.

**Thorax.** Total length 0.81–0.97 mm.

**Wings.** Hyaline. Sc with 5–9 and ta with 4–7 dorsal setae; tb with 0–1 dorsal and 0–4 ventral setae, M-petiole bare, M1 with 28–42 and M2 with 7–14 dorsal setae; CuA-petiole with 0–1, CuA1 with 2–7 and CuA2 with 7–10 dorsal setae. Total length 3.21–4.08x as long as Sc, and 1.61–1.65x as long as R5. M-ratios 0.23–0.28 and 0.27–0.34, CuA-ratios 1.33–1.71 and 2.56–3.21.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.68–0.75, 0.58–0.67, 0.51–0.54; SV 2.58–2.89, 2.78–3.18, 3.21–3.43; BV 2.02–2.14, 3.02–3.36, 4.08–4.59; TR 1.39–1.56, 1.86–2.22, 2.47–3.00.

**Terminalia.** Can not be satisfactorily separated from *C. truncata*, see this species.

**Biology.** Unknown.

**Distribution.** Nearctic. Canada: British Columbia, Alberta, Saskatchewan, Northwest Territories, Manitoba, Quebec; U. S. A., Alaska, California, Colorado, New Hampshire, Oregon. The species appears more common in the western parts of North America than does *C. truncata*.

### 9. *Coelosia huitzilopochtlii* sp. n.

Figs. 3D, 5B, 24, 25.

**Type material.** *Holotype*: ♂ MEXICO: Mexico, Popocatepetl, N. Slope (13,000'), 11.08.1954, J. G. Chillcott (CNC Type no. 21613). — *Paratypes*: 4♀♀, otherwise as holotype; Oaxaca, Km 134 Tuxtepac Rd., ♂ 24.07.1984, G. S. Jamieson (CNC). **Diagnostic characters.** Mouthparts elongated. Among the Mexican species the only species with the combination tb setose and labrum longer than clypeus. Male with a shallow bilobate gonostylus. Female with some setae on st 10, and tg 9 with numerous lanceolate setae.

**Etymology.** Named after the Aztec god of war and sun, Huitzilopochtli.

### Description

**MALE** (n=2). Total length 4.58–4.72 mm. Wing length 3.61–3.91 mm, or 3.8–4.3x as long as profemur.

**Coloration.** Head, antennae and mouthparts all

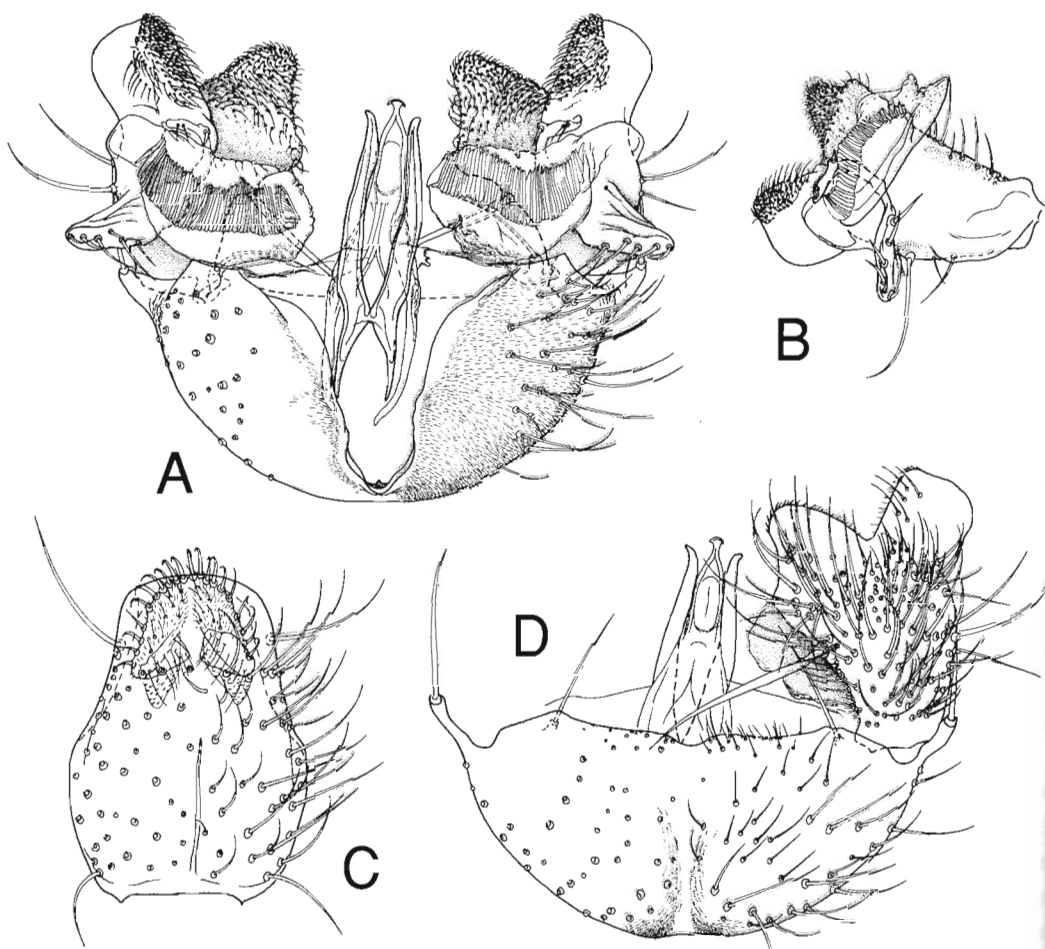


Fig. 24. *Coelosia huitzilopochtli* sp. n., male terminalia. — A) Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Ventral view. — D. Gonostylus, interior view.

brown. Thorax entirely brown. Legs light brown to yellowish, apical dorsal half of femora somewhat darker. Abdominal segments entirely brown. Gonocoxite light brown with darker posterolateral margins, gonostylus brown.

**Head** (Figs. 3D, 5B). Length of flagellum 2.83–2.94 mm. First flagellomere 4.9–5.3x as long as wide, and 1.2–1.4x as long as second. Ocellar ratio 1.7–1.8. Frontal suture running from median ocellus to the basis of the frontal tubercle. One specimen with trace of suture between lateral ocelli and compound eyes. Front 1.0–1.2x as long as wide. Face with 8–16, clypeus with 23–25, and labrum with 11–15 setae. Clypeus 0.8–1.1x as long as labrum. Third palpomere club-shaped, relative lengths of palpomeres 1 : 1.1 : 1.9

: 1.7 : 2.1 (n=1). Stipes each with 3–5 setae.

**Thorax.** Total length 0.90–0.92 mm. Scutellum with 2 moderately strong, and several small setae

**Wings.** Hyaline, with brownish tint on apical half. Sc with 7–9 and ta with 7 dorsal setae, tb with 2 ventral setae, M and CuA bare. Total length 3.27–3.86x as long as Sc, and 1.59–1.63x as long as R5. M-ratios 0.21–0.23 and 0.24–0.27, CuA-ratios 1.67–1.87 and 3.23–3.35.

**Legs.** Fore tibia with 2 ventral and 1 posterior setae. Leg ratios given for fore, mid and hind leg: LR 0.86–0.89, 0.66–0.70, 0.51–0.54; SV 2.15–2.19, 2.58–2.69, 3.16–3.50; BV 1.85–1.96, 2.70–2.91, 3.67–3.91; TR 1.43–1.48, 1.87–1.96, 2.25–2.30.

**Terminalia** (Fig. 24). Tg 9 ovate, about 1.2x as long

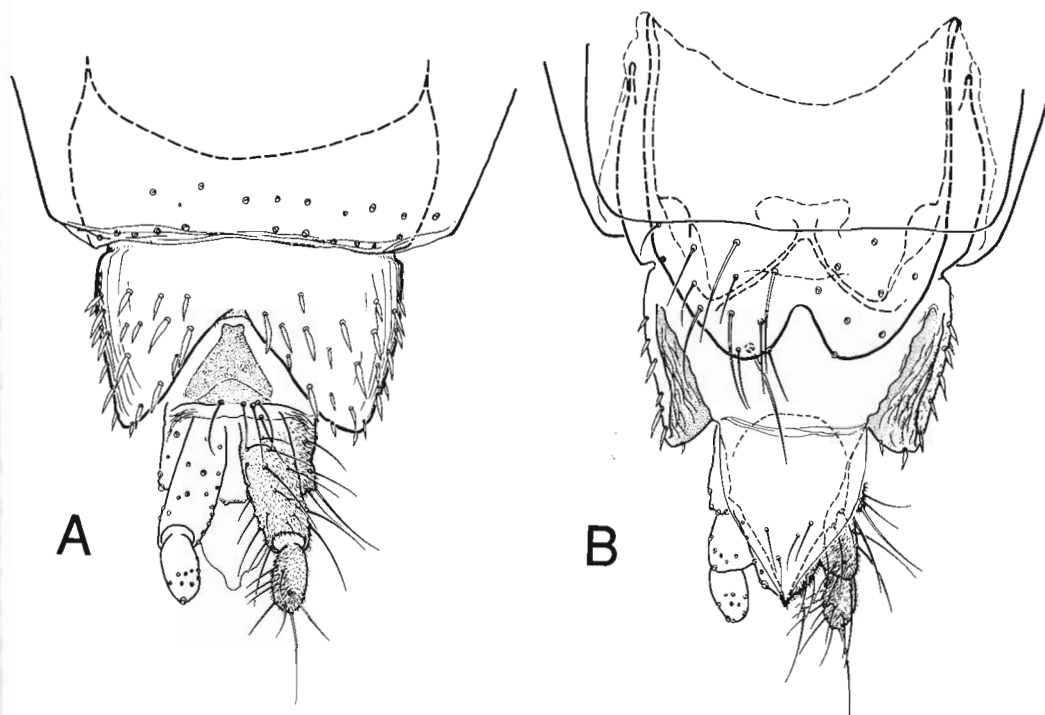


Fig. 25. *Coelosia huitzilopochtlii* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

as wide, posterior border rounded. Median suture present along basal half. Tg 10 reduced. Hypoproct short, wider than long. Epiproct narrow with strong ventral setae, intimately fused with cerci. Cerci with several curved, apical setae, fused. Gonocoxite broad and shallow, entirely fused ventrally. Gonostylus broad, apically bilobate. Internal, apical surface of gonostylar lobes with numerous small setae. Seta-bearing appendage with 5–6 strong setae. Lamella-bearing appendage large, with 1 row of long, rather narrow lamellae. Paramere long and slender. Parameral apodeme short, about 1/3 as long as paramere. Aedeagus slender, tapered, with ovate, subapical transparent area.

**FEMALE** ( $n=4$ ). Total length 4.12–4.55 mm. Wing length 3.80–4.21 mm, or 4.4–4.6x as long as profemur.

**Coloration.** As for males.

**Head.** Length of flagellum 1.73 mm ( $n=1$ ). First flagellomere 2.7–3.8x as long as wide, and 1.1–1.3x as long as second. Ocellar ratio 1.6–1.9. Front 0.9–1.1x as long as wide. Face with 5–12, clypeus with 23–30, and labrum with 7–11 setae. Clypeus 1.1x as long as

labrum. Relative lengths of palpomeres 1 : 1.2–1.3 : 2.0–2.2 : 1.8–2.1 : 3.1–3.6. Stipes each with 3–5 setae.

**Thorax.** Total length 0.94–0.99 mm.

**Wings.** Sc with 3–9 and ta with 5–6 dorsal setae, tb with 0–5 ventral setae, M and CuA bare. Total length 3.68–4.13x as long as Sc, and 1.63x as long as R5. M-ratios 0.21–0.24 and 0.23–0.28, CuA-ratios 1.37–1.65 and 2.53–3.17.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.85–0.90, 0.61–0.67, 0.52–0.56; SV 2.19–2.32, 2.73–2.97, 3.02–3.28; BV 2.01–2.19, 2.85–2.96, 3.79–3.96; TR 1.48–1.55, 1.81–1.94, 2.35–2.50.

**Terminalia** (Fig. 25). Gc 8 evenly rounded, not widely separated. St 10 elongated, pointed, with few well developed setae. Tg 9 well developed, medially divided, with numerous lanceolate setae. Tg 10 small, triangular and situated between lateral lobes of tg 9. Posterior border of tg 10 apparently fused with epiproct, with 4–5 setae. Cerci 2-segmented, apical segment small.

**Biology.** Unknown.

**Distribution.** Southern Nearctic. Mexico.

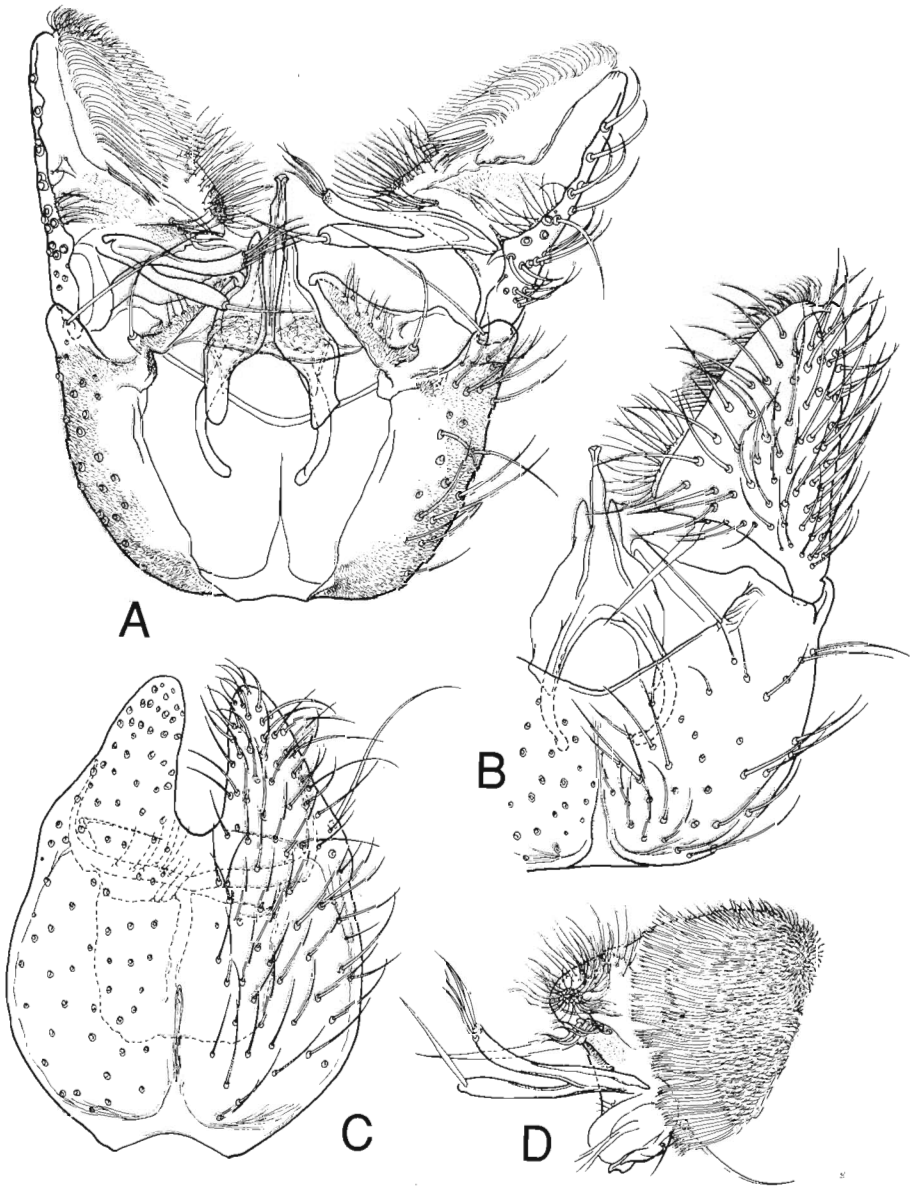
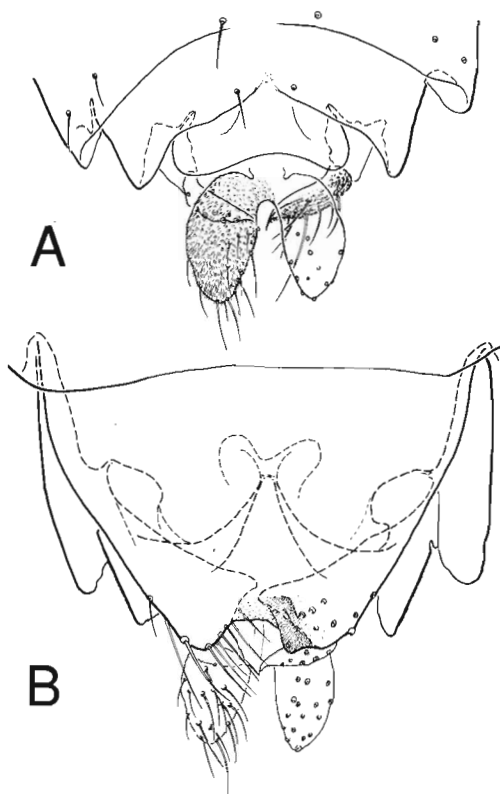


Fig. 26. *Coelosia limpida* Plassmann, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

**10. *Coelosia limpida* Plassmann**

Figs. 6, 26, 27.

*Coelosia limpida* Plassmann, 1986:144.*Types. Holotype* (studied): ♂ SWEDEN: Abisko, 28.08–01.09. 1975 (LF8), K. Müller (Type no. 12.422, ZSM). — *Additional material studied*: See Appendix.*Diagnostic characters.* Males are readily identified on the outlining of tg 9, with a deep apical incision, and the reduced lateral lobes of tg 10. Female tg 9 well developed, with a few sublateral, posterior setae only. Female tg 10 evenly rounded, and cerci 1-segmented.**Description****MALE** (n=5) Total length 3.89–4.65 (4.39) mm. Wing length 3.38–3.65 (3.52) mm, or 3.9–4.0 (4.0)x as long as profemur.**Coloration.** Face and top of head brown. Scape, pedicel, basal half of first flagellomere and mouthparts light brown, remaining parts brown. Thorax brown. Legs yellowish. Abdominal segments 1 to 4 brown, 5 and 6 dark brown. Terminalia light brown.**Head.** Length of flagellum 2.37–2.42 mm. First flagellomere 3.9–4.5x as long as wide, and as long as second flagellomere. Ocellar ratio 1.6–1.9. Front 0.9x as long as wide. Face with 9–13, clypeus with 27–30, and labrum with 5–9 setae. Clypeus 1.9–3.2x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.5–1.7 : 1.5–1.8 : 2.8–3.5. Stipes each with 1–3 setae.**Thorax** (Fig. 6). Total length 0.74–0.87 (0.82) mm.**Wings.** Hyaline. Sc with 0–3 dorsal setae, ta with 7–11 dorsal and 0–1 ventral setae, tb with 0–2 dorsal and 0–3 ventral setae, M and CuA bare. Total length 3.10–3.59x as long as Sc, and 1.66–1.72x as long as R5. M-ratios 0.24–0.29 and 0.27–0.34, CuA-ratios 1.59–1.93 and 3.33–4.00.**Legs.** Fore tibia without setae, except for apicals. Leg ratios given for fore, mid and hind leg: LR 0.76–0.81, 0.62–0.67, 0.52–0.58; SV 2.38–2.55, 2.70–2.90, 3.04–3.23; BV 1.95–2.08, 3.09–3.26, 4.07–4.44; TR 1.41–1.48, 2.05–2.22, 2.75–2.93.**Terminalia** (Fig. 26). Tg 9 about 1.3x as long as wide, with deep apical incision. Tg 10 fused with epiproct, lateral lobes very small, pointed, with at most 1 median seta. Hypoproct subquadrate. Epiproct narrow, medially divided, with strong ventral setae. Cerci as shallow lobes, medially fused, clothed with smallFig. 27. *Coelosia limpida* Plassmann, female terminalia. — A. Dorsal view. — B. Ventral view.

trichia. Cerci appear intimately fused with tg 10. Gonocoxite entirely fused ventrally. Gonostylus broad, subtriangular. A membranous flange attached to apical border of gonostylus. Flange densely clothed with rows of transparent, flattened setae, which tend to form lamellae towards margin. Apicoventral, interior surface of gonostylus with small knob, equipped with several thin setae. Seta-bearing appendage with two finger-like lobes with 1 and 4 apical setae, respectively. Lamella-bearing appendage not present. Paramere rather small, tapered, not reaching apex of aedeagus. Parameral apodeme short and broad, about as long as paramere. Aedeagus formed into narrow tube.

**FEMALE** (n=3). Total length 4.49–4.60 mm. Wing length 3.73–4.03 mm, or 4.3x as long as profemur.**Coloration.** As in males, except all abdominal segments light brown.**Head.** Length of flagellum 1.43–1.66 mm. First flagellomere 2.8–3.4x as long as wide, and 1.0–1.2x as long as second. Ocellar ratio 1.7–1.8. Front 0.8–0.9x as

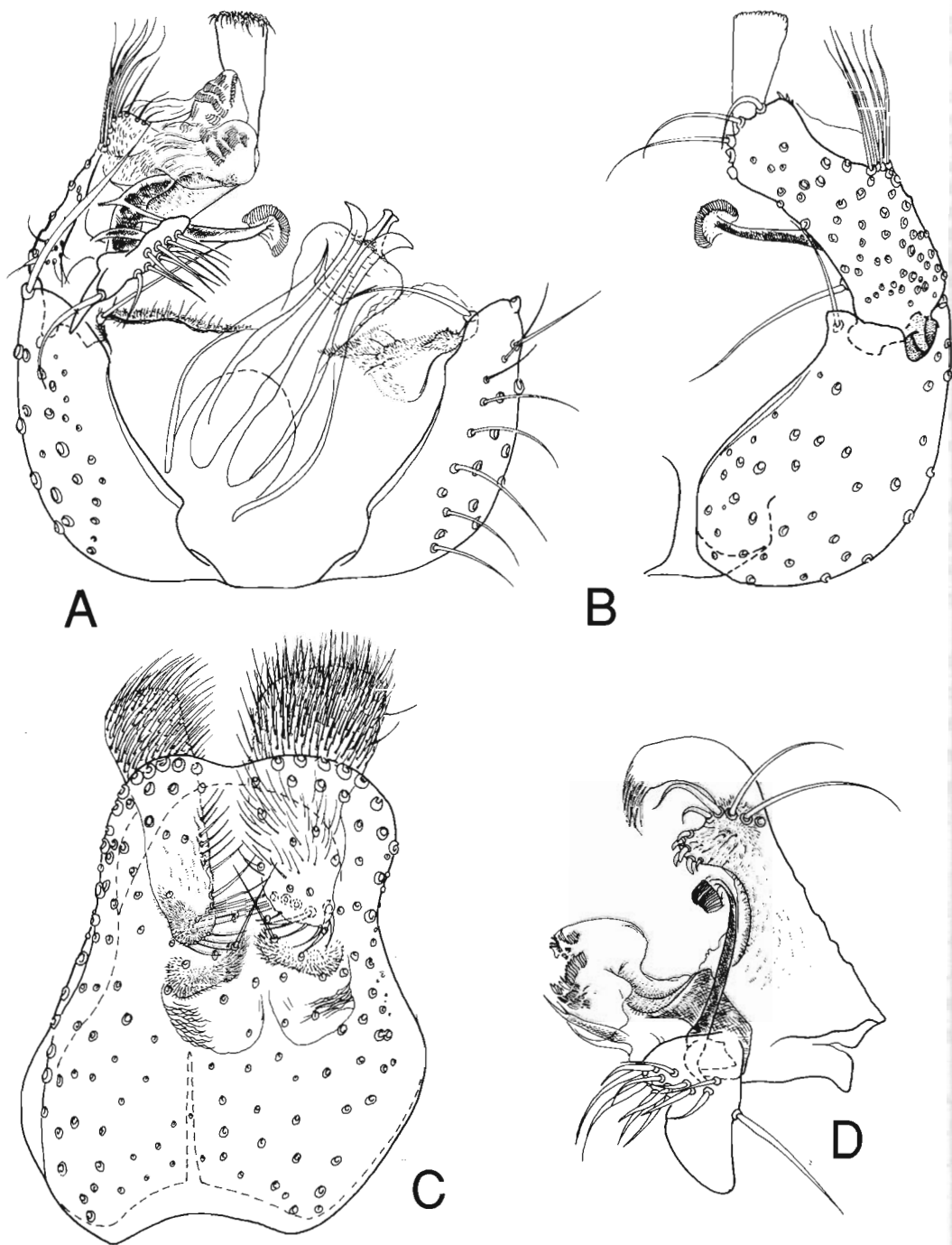


Fig. 28. *Coelosia longilobata* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Gonostylus, interior view. — D. Tergite 9 and associated structures.

long as wide. Face with 12–15 setae, clypeus with 29–40 setae, and labrum with 5–8 setae. Clypeus 2.0–2.7x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.4–1.9 : 1.5–1.8 : 2.6–2.8. Stipes each with 1–2 setae.

*Thorax.* Total length 0.92–1.04 mm.

*Wings.* Sc with 1–5 and ta with 7–12 dorsal setae, tb with 0–6 dorsal and 0–1 ventral setae. Total length 3.13–3.32x as long as Sc, and 1.59–1.68x as long as R5. M-ratios 0.24–0.26 and 0.29–0.31, CuA-ratios 1.66–1.80 and 3.39–3.76

*Legs.* Leg ratios given for fore, mid and hind leg: LR 0.68–0.76, 0.56–0.63, 0.53–0.56; SV 2.58–2.82, 2.87–3.13, 3.11–3.22; BV 2.07–2.23, 3.13–3.23, 4.02–4.31; TR 1.45–1.56, 2.00–2.19, 2.71–2.80.

*Terminalia* (Fig. 27). Gc 8 situated close together, each with some apical and lateral setae, very few ventrals. St 10 small, bare. Tg 9 with small median incision, 2–4 apical setae. Tg 10 bare, ending in a more or less straight line. Cercus 1-segmented, broad.

*Biology.* Collected by sweep net in moist birch forest along rivers and small ponds in northern Norway.

*Distribution.* Western Palearctic. Norway and Sweden.

### 11. *Coelosia longilobata* sp. n.

Fig. 28.

*Types.* *Holotype*: ♂ U. S. A., OREGON, Baker County, 9 mi. W. Unity (4500'), 02.07.1965, Malaise trap (CNC Type no. 21614). — *Paratypes*: ♂ 02.07.1965, otherwise as holotype; Baker Co., Wetmore Campground (4500'), ♂ 29.06.–05.07.1965 (CNC); U. Goose Crk., 34 mi SE Union (4160'), ♂ 13.–19.07.1975, E. J. Davis (JEC); Marion Co., Silver Falls State Park, ♂ 23.06.1974, P. H. Arnaud Jr. (CAL); WASHINGTON, Clallam Co., Sappho, Tumbling Rapids Recreation Area, Soleduck River, 2♂♂ 30.06.1974, P. H. Arnaud Jr. (CAL); Grays Harbor Co., Rayonier Park, 5 km. N. Humptulips, ♂ 27.06.1974, P. H. Arnaud Jr. (CAL); Pacific Co., Ft. Canby St. Prk., 2♂♂ 11.–13.06.1971, W. J. Turner (JEC); Skagit Co., Rockport St. Park, 7 mi. E. Concrete, ♂ 16–17.06.1971, W. J. Turner (JEC); Stevens Co., 5 mi. NE Deer Lake (3200'), ♂ 18.07.1975, W. J. Turner (JEC); Vancouver, ♂ 19.05.1970 (CAL).

*Diagnostic characters.* Male with two long, setose appendages posteriorly. Ventral lobe of gonostylus tapered, long, with several filiform apical setae. Ventral lobe longer than in the very closely related *C. brevilobata*. Abdominal tergites 2–4 with yellowish posterior margin; in contrast to *C. brevilobata* with uniform, brown abdomen.

*Etymology.* From Latin, *longus*, long, and *lobatus*, lobed, referring to the outlining of the ventral lobe of the gonostylus.

### Description

*MALE* (n=5). Total length 3.45–4.42 (3.98) mm. Wing length 3.08–3.22 (3.15) mm, or 3.3–3.6 (3.4)x as long as profemur.

*Coloration.* Face and top of head brown, mouthparts light brown. Scape, pedicel, first and most of second flagellomere yellowish. Scutum and scutellum light brown, former with 3 extended brown stripes. Thoracic sclerites light brown. Legs yellowish. Abdominal segment 1–4 light brown with yellowish apicolateral margins, segment 5 and 6 entirely brown, 5th at most with a narrow yellowish margin. Terminalia yellowish.

*Head.* Total length of flagellum 2.05–2.16 mm. First flagellomere 2.5–2.7x as long as wide, and 0.9–1.0x as long as second. Ocellar ratio 1.4–1.5. Front 1.0–1.1x as long as wide. Face with 12–18, clypeus with 23–30, and labrum with 3–6 setae. Clypeus 1.2–1.8x as long as labrum. Palpomere ratios: 1 : 0.7–0.9 : 1.3–1.7 : 1.5–1.9 : 2.7–3.7. Stipes weakly sclerotized, each with 4–8 setae.

*Thorax.* Total length 0.83–0.97 (0.88) mm.

*Wings.* Hyaline. Sc with 5–9 dorsal setae, ta with 3–6 dorsal and 0–1 ventral setae, tb with 0–1 dorsal and 5–10 ventral setae, M and CuA bare. Total length 3.61–3.70x as long as Sc, and 1.69–1.73x as long as R5. M-ratios 0.29–0.30 and 0.35–0.37, CuA-ratios 1.71–1.89 and 2.90–3.40.

*Legs.* Basis of fore coxa with 6–7 distinct setae. Fore tibia with 1 small, posterior seta only. Leg ratios given for fore, mid and hind leg: LR 0.77–0.90, 0.62–0.66, 0.48–0.53; SV 2.25–2.61, 2.83–3.08, 3.40–3.62; BV 2.17–2.29, 3.15–3.26, 4.00–4.30; TR 1.57–1.64, 1.95–2.22, 2.50–2.73.

*Terminalia* (Fig. 28). Tg 9 nearly as wide as long, posterior border with shallow median incision. Tg 10 completely fused with cerci and epiproct, forming two elongated appendages with numerous thin, nearly transparent, dorsal setae. Epiproct medially divided, seen as heavily sclerotized basal portion of appendages described above. Hypoproct subquadrate. Gonocoxite broad, only fused basally. Gonostylus bilobate,

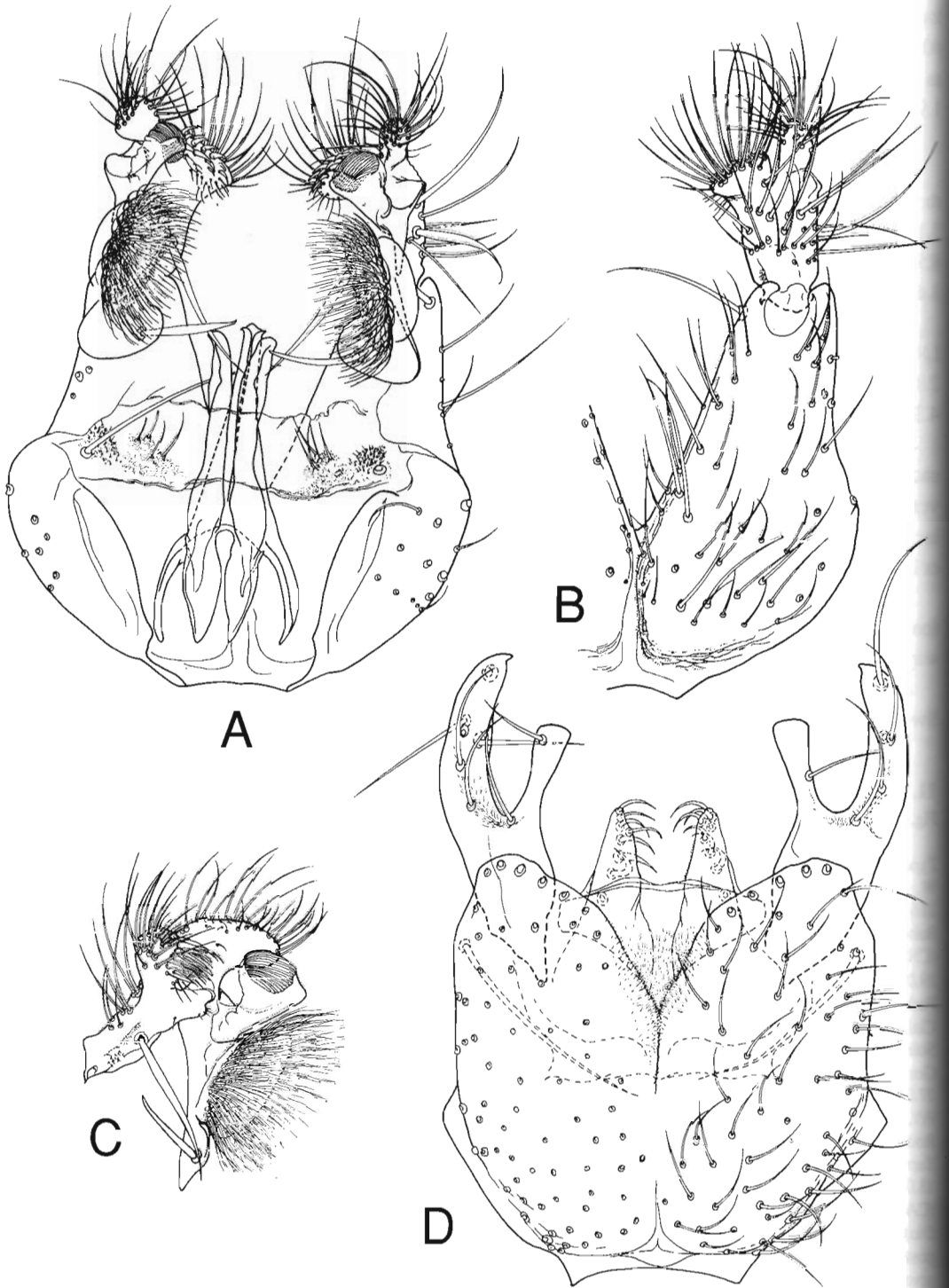


Fig. 29. *Coelosia modesta* Johannsen, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Gonostylus, interior view. — D. Tergite 9 and associated structures.

bowl-shaped. Ventral lobe long, tapered, finger-like with long filiform setae apically. A knob-like protuberance, present at basis of finger-like lobe, with few short and stout setae. Dorsal lobe less pronounced, apicodorsal margin membranous with some unevenly distributed rows of lamellae. Seta-bearing appendage broad, flattened, with 1 strong dorsal and 10–15 ventral setae. Lamella-bearing appendage stalked, with row of long, thin lamellae. Apex of paramere narrow, curving outwards. Parameral apodeme long and broad. Aedeagus broad.

**FEMALE.** Unknown.

**Biology.** Unknown.

**Distribution.** Western Nearctic. Oregon and Washington.

## 12. *Coelosia modesta* Johannsen

Figs. 7B, 29, 30.

*Coelosia modesta* Johannsen, 1912: 294; Laffoon 1965 (Nearctic catalogue).

*Coelosia quadricornis* Stackelberg, 1946: 79; Hackman et al. 1988 (Palearctic catalogue), *syn. n.*

*Coelosia flavicauda*: Johannsen, 1912 (females, in part), *syn. n.*

**Types.** *Lectotype*, by present designation: ♂ U. S. A., CALIFORNIA, Berkeley, 22.03.1897, W. M. Wheeler collection. Labelled "Coelosia modesta Co-type; Am. Mus. Nat. Hist. Dept. Invert. Zool. No. 205292" (AMNH). Terminalia lost. — *Additional material studied:* See Appendix.

**Diagnostic characters.** Female, sometimes even males, with at least some setae along M1. Males with a distinct medially divided tg 10, each part bilobate. Interior appendage of the gonostylus with a rounded, brush-like collection of long setae. Female with tg 9 strongly produced laterally, bearing several long, curved setae.

## Description

**MALE** (n=5). Total length 4.14–5.45 (4.90) mm. Wing length 2.90–4.09 (3.55) mm, or 3.5–4.3 (3.7)x as long as profemur.

**Coloration.** Face and top of head brown, mouthparts yellowish. Scape, pedicel and basal parts of first flagellomere yellowish, remaining flagellomeres brown. Scutum and scutellum brown to yellow, scutum with 3 diffuse brown stripes in yellow specimens. Legs light brown to yellow. Abdominal segments all entirely brown, or segments 1–4 light brown with yellowish apicolateral margins. Terminalia brownish to yellow-

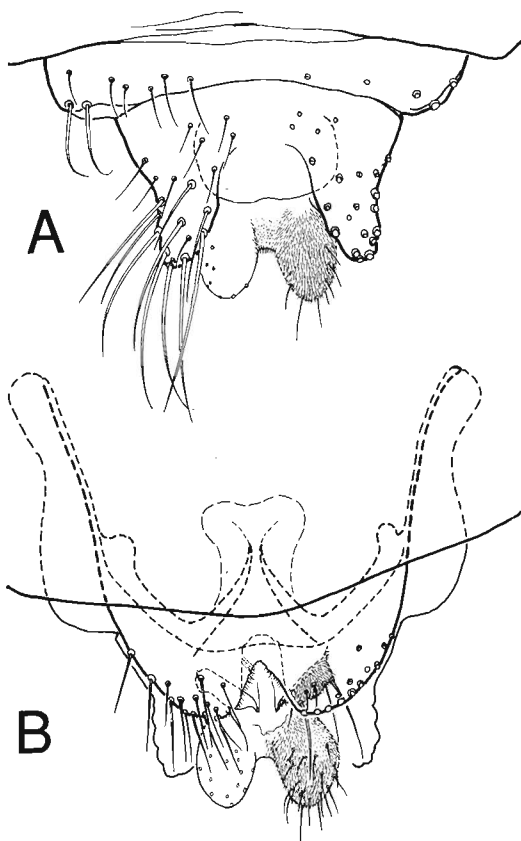


Fig. 30. *Coelosia modesta* Johannsen, 1912, female terminalia. — A. Dorsal view. — B. Ventral view.

ish, darkened apically. Lateral lobes of tg 10 brown.

**Head.** Total length of flagellum 1.70–2.62 mm. First flagellomere 3.4–4.1x as long as wide, and 1.0–1.2x as long as second. Lateral ocelli about 1.5x as wide as median. Ocellar ratio 1.6–1.8. Front 1.0–1.2x as long as wide. Face with 6–12, clypeus with 22–34, and labrum with 5–9 setae. Clypeus 1.4–2.1x as long as labrum. Palpomere ratios 1 : 0.9–1.1 : 1.6–2.0 : 1.7–2.5 : 2.6–4.7. Except for distal part, stipes weakly sclerotized, each bearing 5–8 setae.

**Thorax.** Total length 0.87–1.06 (0.97) mm.

**Wings.** Hyaline, distal half with brownish shadings along veins, even between CuA and anal vein. Sc with 3–16 dorsal setae, ta with 6–8 dorsal and 1–6 ventral setae, tb with 0–2 dorsal and 6–9 ventral setae, M and CuA bare. Total length 3.30–3.82x as long as Sc, and 1.71–1.75x as long as R5. M-ratios 0.28–0.36 and 0.32–0.44, CuA-ratios 1.62–2.38 and 3.23–4.89.

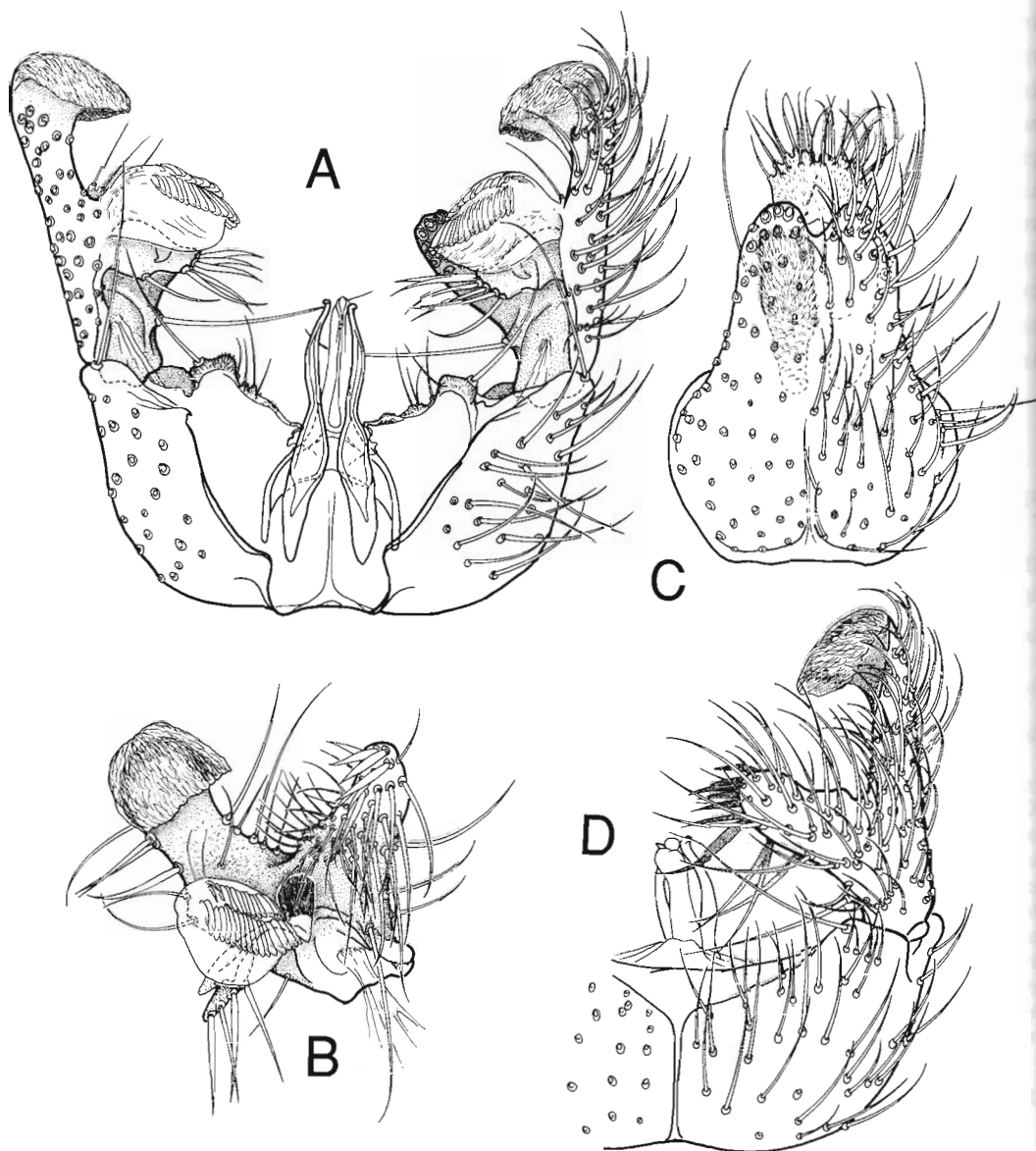


Fig. 31. *Coelosia pygophora* Coquillett, 1904, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ventral view.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.72–0.84, 0.60–0.67, 0.49–0.53; SV 2.20–2.68, 2.76–3.09, 3.25–3.56; BV 2.31–2.45, 3.20–3.65, 4.43–4.89; TR 1.58–1.78, 2.00–2.35, 2.57–2.86.

**Terminalia** (Figs. 7B, 29). Tg 9 nearly as wide as long, posterior border with very deep median incision. Tg 10 produced into two heavily sclerotized, forked, lateral lobes, protruding well outside posterior border

of tg 9. Each lobe with 5–6 dorsal and 2 ventral setae. Hypoproct wider than long. Epiproct tending to be medially divided, large with several ventral setae. Epiproct separated from cerci by small median cleft. Cerci well separated, protruding between lateral lobes of tg 9. Each cercus with ventral row of 8–9 curved setae. Gonocoxite ventrally fused along short median suture. Gonostylus small, bilobate; dorsal and ventral

lobe rounded, setose. Ventral lobe of gonostylus with some large, nearly transparent, flattened setae. Seta-bearing appendage pronounced, bilobate. Dorsal lobe rounded, flattened, with 1 strong seta, ventral lobe rounded, clothed by numerous, long and thin setae. Lamella-bearing appendage with short, thick stem and 1 row of long lamellae. Paramere long, rather slender. Parameral apodeme broad, about half as long as paramere. Aedeagus slender, tapered.

**FEMALE** (n=5). Total length 4.28–5.22 (4.76) mm. Wing length 4.28–4.55 (4.43) mm, or 4.1–4.6 (4.3)x as long as profemur.

**Coloration.** Usually somewhat darker than males. Brown shadings on wings more pronounced than in males. Abdominal segments always with pale posterior margins.

**Head.** Total length of flagellum 1.63–2.07 mm. First flagellomere 3.4–4.4x as long as wide, and 1.3x as long as second. Lateral ocelli 1–2x as wide as median. Ocellar ratio 1.4–1.6. Front 1.0–1.1x as long as wide. Face with 5–8, clypeus with 19–29 setae, and labrum with 3–6 setae. Clypeus 1.5–1.9x as long as labrum. Palpomere ratios 1 : 0.9–1.1 : 1.6–2.0 : 1.9–2.5 : 2.9–4.1. Except for distal part, stipes weakly sclerotized, each bearing 3–9 setae.

**Thorax.** Total length 1.04–1.20 (1.10) mm.

**Wings.** Sc with 6–13 dorsal setae, ta with 7–13 dorsal and 1–8 ventral setae, tb with 0–4 dorsal and 5–9 ventral setae. Total length 3.10–3.47x as long as Sc, and 1.65–1.75x as long as R5. M-ratios 0.26–0.30 and 0.31–0.36, CuA-ratios 1.68–2.00 and 3.21–3.76.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.80–0.85, 0.59–0.64, 0.50–0.55; SV 2.33–2.47, 2.87–3.18, 3.15–3.56; BV 2.29–2.42, 3.29–3.41, 4.18–4.40; TR 1.64–1.76, 2.00–2.14, 2.37–2.72.

**Terminalia** (Fig. 30). Gc 8 broad, not widely separated, with several straight setae on extreme apical parts. St 10 small. Tg 9 medially divided, very pronounced lateral parts with long, slightly curved setae. Tg 10 bare, ovate, situated between the lateral lobes of tg 9. Cerci 1-segmented, evenly rounded and fused along half of their length.

**Biology.** Unknown.

**Distribution.** Holarctic (Western Nearctic and East-

ern Palaearctic). British Colombia, Alaska, California, Idaho, Oregon, Washington; Russia (Kamchatka).

### 13. *Coelosia pygophora* Coquillett

Figs. 4CB, 7A, 31, 32.

*Coelosia pygophora* Coquillett, 1904: 170. Johannsen 1912; Laffoon 1965 (Nearctic catalogue).

*Coelosia lepida* Johannsen, 1912: 294; Laffoon 1965 (Nearctic catalogue). *syn. n.*

**Types.** *Holotype* (studied): ♂ U. S. A., CALIFORNIA, San Mateo Co., Baker. (USNM Type No. 8032).

**Remarks.** The holotype of *lepida* present in the American Nat.-Hist. Mus. has been studied, and its synonymy with *pygophora* is beyond doubt. Johannsen apparently did not study the holotype of *pygophora*, as his description of this species (Johannsen 1912: 293) is taken from Coquillett's original description in its entirety. — *Additional material examined:* See Appendix.

**Diagnostic characters.** Males with strongly setose, deeply bilobate gonostylus. Females with very small, ventrally bare Gc 8; Tg 9 rounded, with a deep median incision.

### Description

**MALE** (n=4). Total length 3.78–4.05 mm. Wing length 3.11–3.27 mm, or 3.8–3.9x as long as profemur.

**Coloration.** Face and top of head brown, mouthparts brown. Scape and flagellum brown, pedicel yellowish. Scutum and thoracic sclerites all brown. Halteres light brown. Legs light brown. Abdominal segment entirely brown. Terminalia brown.

**Head** (Fig. 4B). Total length of flagellum 2.37–2.53 mm. First flagellomere 3.3–3.9x as long as wide, and as long as second. Ocellar ratio 1.5–1.6. Front 0.9–1.0x as long. Face with 4–11, clypeus with 18–37, and labrum with 2–5 setae. Clypeus 2.0–2.2x as long as labrum. Palpomere ratios: 1 : 0.9–1.0 : 1.6–1.7 : 1.8–1.9 : 3.1–3.5. Except for distal part, stipes weakly sclerotized, each with 2–5 setae.

**Thorax.** Total length 0.76–0.78 mm.

**Wings.** Hyaline. Sc with 2–9 and ta with 2–5 dorsal setae, tb with 0–3 dorsal and 4–6 ventral setae, M and CuA bare. Total length 3.59–4.09x as long as Sc, and 1.59–1.65x as long as R5. M-ratios 0.26–0.28 and 0.31–0.34, CuA-ratios 2.00–2.12 and 4.12–4.38.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.76–0.81, 0.60–0.62, 0.49–0.52; SV 2.47–2.55, 3.00–3.10, 3.37–3.46; BV 2.08–2.29, 3.02–3.14, 3.95–

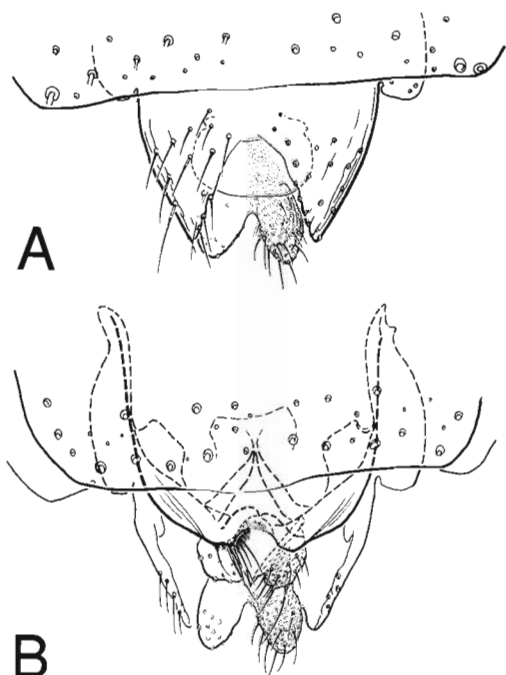


Fig. 32. *Coelosia pygophora* Coquillett, female terminalia. — A. Dorsal view. — B. Ventral view.

4.38; TR 1.50–1.61, 1.94, 2.47–2.71.

**Terminalia** (Figs. 7A, 31). Tg 9 elongated, about 1.2x as long as wide, posterior border with distinct apical incision. Tg 10 reduced. Hypoproct broad, elongated. Epiproct apparently medially divided, fused with the lateral parts of cerci. Cerci fused, with several strong, apical and ventral setae. Gonocoxite ventrally fused along median line. Gonostylus deeply bilobate, external surface strongly setose. Ventral lobe with very strong medial setae. Apical margin of dorsal lobe, invaginated, membranous, densely clothed by nearly transparent, flattened lamellae of irregular shape. Seta-bearing appendage simple, with 5–6 apical setae. Lamella-bearing appendage with short stem. Paramere long and slender, apex curved outwards. Parameral apodeme broad, about half as long as paramere. Aedeagus slender.

**FEMALE** (n=1). Total length 3.73 mm. Wing length 3.20 mm, or 4.0x as long as profemur.

**Coloration.** As for males.

**Head.** Total length of flagellum about 1.3 mm. Ocellar ratio 1.5. Front as long as wide. Face with 11,

clypeus with 37 setae, and labrum with 5 setae. Clypeus 2.2x as long as labrum. Palpomere ratios 1 : 1.1 : 1.6 : 1.8 : 3.2. Except for distal part, stipes weakly sclerotized, each with 3 setae.

**Thorax.** Total length 0.85 mm.

**Wings.** Sc with 9 and ta with 6 dorsal setae, tb with 2 dorsal and 3 ventral setae, M and CuA bare. Total length 3.56x as long as Sc, and 1.67x as long as R5. M-ratios 0.29 and 0.34, CuA-ratios 1.70 and 3.30.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.70, 0.58, 0.50; SV 2.77, 3.28, 3.51; BV 2.23, 3.10, 4.27; TR 1.63, 2.07, 2.69.

**Terminalia** (Fig. 32). Gc 8 small, ventral surface bare. Some strong and numerous small setae mediodorsally. St 10 small, triangular. Tg 9 deeply bilobate with well developed lateral corners, setose. Tg 10 ovate. Cercus 1-segmented.

**Biology.** Unknown.

**Distribution.** Western Nearctic. California.

#### 14. *Coelosia quetzalcoatl* sp. n.

Figs. 33, 34.

**Types.** *Holotype*: ♂ MEXICO: Sinaloa, 4.5 mi. W. El Palmito (6300'), 15.07.1964, J. F. McAlpine (CNC Type No. 21619). — *Paratypes*: 15 ♂♂ 3 ♀♀ 15.07.1964, otherwise as holotype; ♀ 25.07.1964; Sinaloa, 4.5 mi. W. El Palmito (6500'), ♂ 04.08.1964, V. R. M. Mason (All CNC).

**Etymology.** Named after the Aztec god of learning and priesthood, Quetzalcóatl.

**Diagnostic characters.** Mouthparts elongated. Posterior, ventral border of male gonocoxite with two submedian, bare protuberances, and a median depression. Female with a completely bare, medially divided tg 9.

#### Description

**MALE** (n=5, except when otherwise stated). Total length 0.76–0.81 (0.78) mm. Wing length 2.92–2.99 (2.95) mm, or 3.5–3.7x as long as profemur (n=4).

**Coloration.** Head brown, including mouthparts. Pedicel, scape and first flagellomere yellowish, remaining flagellomeres brown. Thorax and abdomen brown. Wings with brownish tint, slightly darkened apically. Halteres and legs yellow. Gonocoxite yellowish, darkened apically. Gonostylus and tg 9 brown.

**Head.** Length of flagellum 2.07–2.30 mm. First flagellomere 3.5–3.7x as long as wide, and 1.0–1.1x as

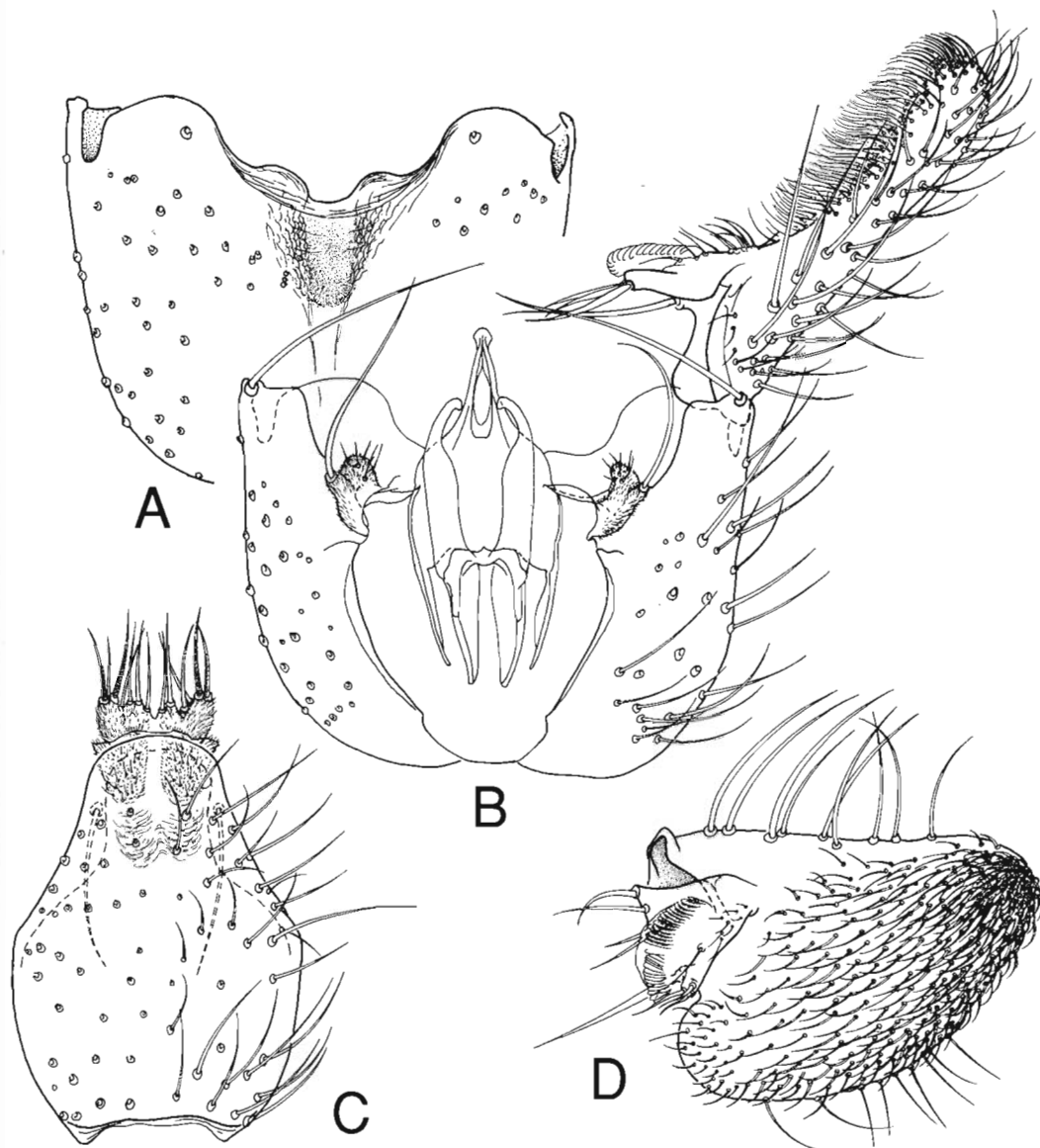


Fig. 33. *Coelosia quetzalcoatl* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Ventral view — C. — D. Gonostylus, interior view.

long as second. Frontal suture running from median ocelli to apex of frontal horn. Ocellar ratio 1.6–2.0. Front 1.3–1.4x as long as wide. Face with 6–10, clypeus with 16–23, and labrum with 9–15 setae. Clypeus 0.6–0.9x as long as labrum. Relative lengths of palpomeres 1 : 1.0–1.1 : 1.8–2.2 : 1.8–2.4 : 3.2–3.7. Stipes weakly connected, distal parts well sclerotized, each with 2–7 setae.

*Thorax.* Total length 0.76–0.81 (0.78) mm.

*Wings.* Sc with 2–5 and ta with 3–4 dorsal setae, M and CuA bare, including basal portion of M. Total length 3.60–4.10x as long as Sc, and 1.69–1.74x as long as R5. M-ratios 0.23–0.28 and 0.27–0.33, CuA-ratios 1.70–1.89 and 3.15–3.71.

*Legs.* Leg ratios given for fore, mid and hind leg: LR 0.87–0.90, 0.65–0.71, 0.53–0.58; SV 2.09–2.26, 2.54–2.73, 3.00–3.18; BV 1.88–1.96, 3.11–3.29, 4.17–4.41; TR 1.38–1.48, 2.17–2.24, 2.73–3.08.

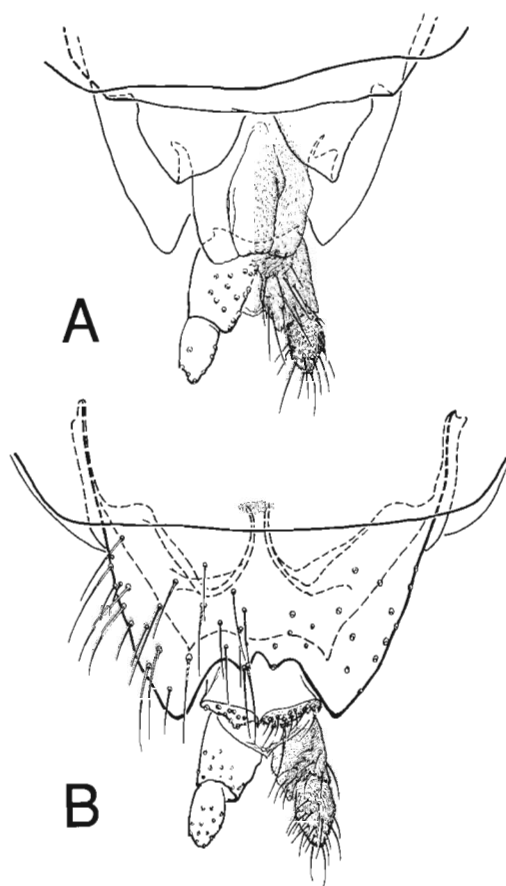


Fig. 34. *Coelosia quetzalcoatl* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

**Terminalia** (Fig. 33). Tg 9 ovate, narrowed toward apex, about 1.4x as long as wide, posterior margin evenly rounded. Tg 10 reduced. Hypoproct broad, elongated. Epiproct large, laterally with strong ventral setae. Cerci small, fused, with numerous strong apical setae. Gonocoxites fused ventrally. Posterior, ventral border of fused gonocoxites with 2 submedian, shallow protrusions and median depression. Gonostylus very broad, evenly rounded dorsally, interior surface clothed with numerous curved setae. Seta-bearing appendage rather small, with 4 strong, apical setae. Lamella-bearing appendage attached to proximal part of seta-bearing appendage. Ventral surface of lamella-bearing appendage with some large and several smaller setae. Paramere long, rather slender, apex curved inwards. Parameral apodeme distinctly shorter than paramere. Aedeagus evenly tapered.

**FEMALE** (n=4). Total length 3.45–3.80 mm. Wing length 2.88–3.06 mm, or 3.7–3.9x as long as profemur.

**Coloration.** As for males.

**Head.** Total length of flagellum 1.43–1.56 mm. First flagellomere 3.5–4.6x as long as wide, and 1.1–1.4x as long as second. Ocellar ratio 1.7–1.9. Front 1.1–1.4x as long as wide. Face with 6–10, clypeus with 21–25, and labrum with 11–16 setae. Clypeus 0.9–1.1x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.7–1.9 : 1.7–1.9 : 3.0–3.2. Stipes each with 4–6 setae.

**Thorax.** Total length 0.81–0.85 mm.

**Wings.** Sc with 3–6 and ta with 3–5 dorsal setae. Total length 3.79–4.23x as long as Sc, and 1.62–1.71x as long as R5. M-ratios 0.22–0.25 and 0.26–0.29, CuA-ratios 1.61–1.81 and 3.21–3.61.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.83–0.89, 0.65–0.71, 0.53–0.63; SV 2.18–2.32, 2.64–2.80, 2.85–3.24; BV 1.93–2.02, 2.98–3.26, 3.95–4.35; TR 1.45–1.61, 2.12–2.19, 2.64–2.86.

**Terminalia** (Fig. 34). Each gc 8 shallow bilobate, median lobe small, lateral much wider and larger. St 10 rather small, ending in nearly straight line with small median point. Tg 9 deeply bilobate, bare. Tg 10 elongated with 2 sublateral fold lines, bare. Cercus 2-segmented.

**Biology.** Unknown.

**Distribution.** Southern Nearctic. Mexico.

### 15. *Coelosia sapporoensis* Okada

Figs. 4D, 35, 36.

*Coelosia flava* var. *sapporoensis* Okada, 1939:309.

*Coelosia sapporoensis*: Hackman et al. 1988 (Palearctic catalogue).

**Types.** *Lectotype*, by present designation: ♂ JAPAN: Hokkaido, Sapporo, 18.06.1938, I. Okada (HOK). — *Paralectotypes*: 1♀ 18.06.1938, 19 ♀♀ 25.06.1935, otherwise as lectotype.

**Diagnostic characters.** Male gonostylus very broad, bilobate; dorsal lobe with a pronounced submedian, interior protuberance, bearing 5 strong, apical setae. Male cerci completely fused. Apex of paramere broad. Female with broad gc 8, each with several very thick, lanceolate setae.

### Description

**MALE** (n=1; not slide mounted). Wing length 3.63 mm, or 3.2x as long as profemur.

**Coloration.** Face and top of head brown. Clypeus

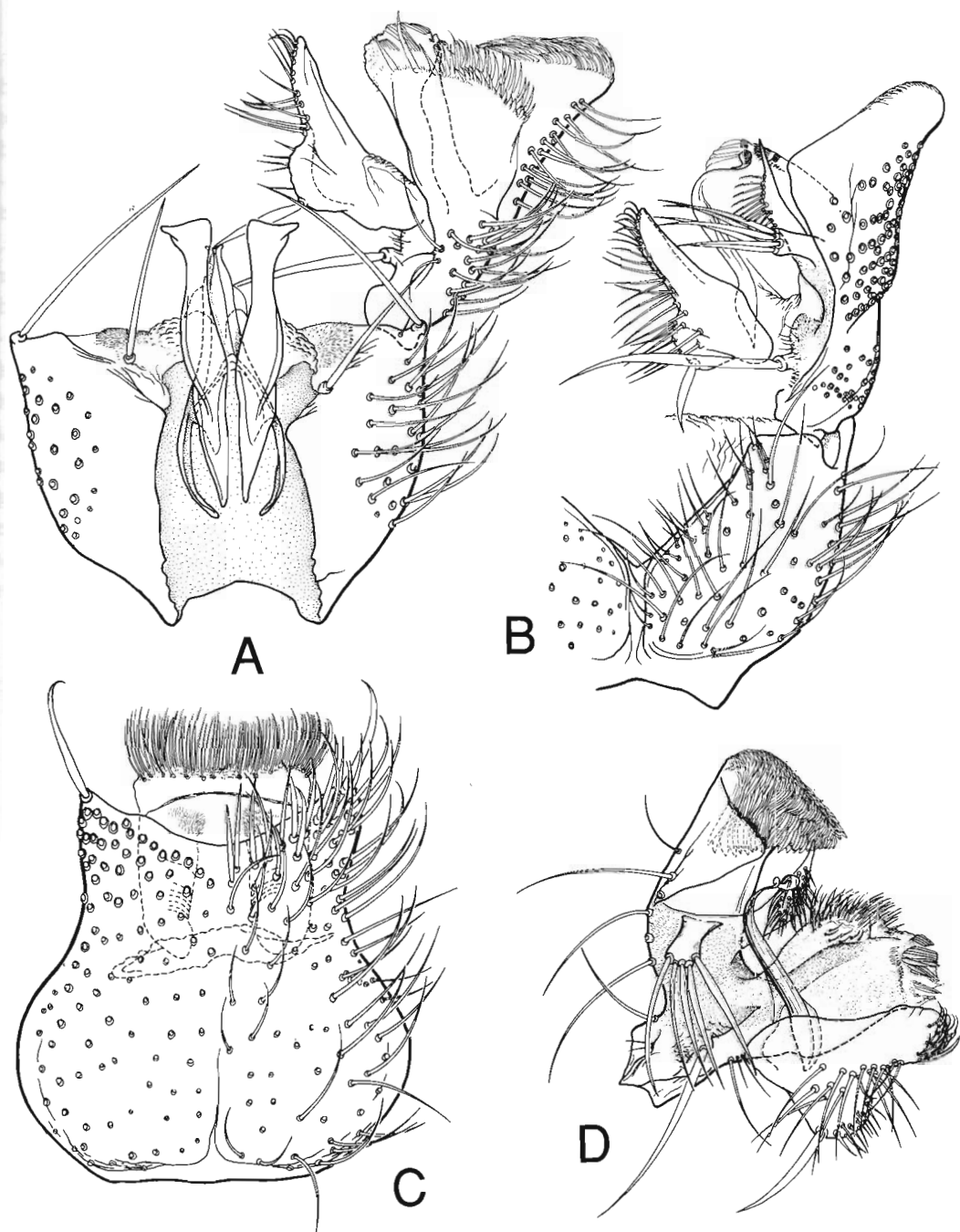


Fig. 35. *Coelosia sapporoensis* Okada, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

and mouthparts brownish. Scape, pedicel, first and most of second flagellomere yellowish, remaining flagellomeres light brown. Scutum and scutellum light

brown to yellowish, the former with 3 weak longitudinal, brown stripes. Remaining thoracic sclerites brownish. Halteres yellow. Legs evenly brownish to yellow-

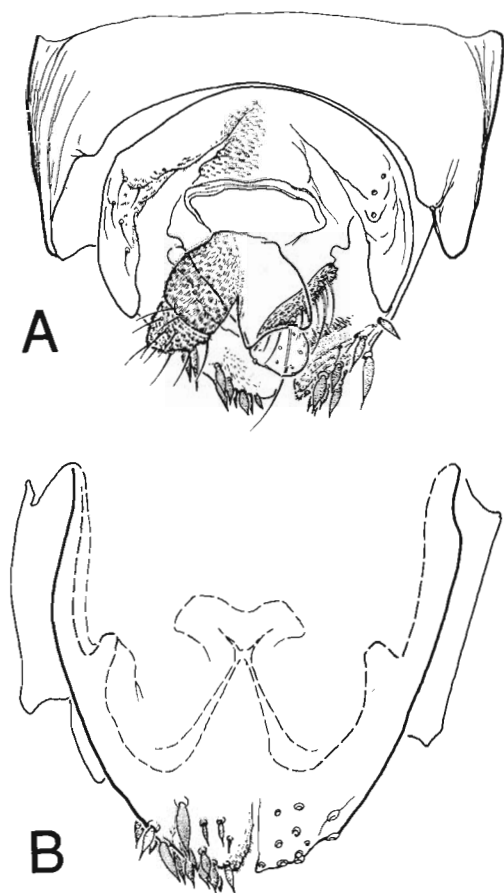


Fig. 36. *Coelosia sapporoensis* Okada, female terminalia. — A. Dorsal view. — B. Ventral view.

ish. Abdominal segments 1–4 yellowish, 2–4 with brown posterior margin; segments 5 and 6 light brown. Terminalia yellowish, darkened posteriorly.

**Head** (Fig. 4D). Length of flagellum 1.98 mm. First flagellomere 3.2x as long as wide, and 1.1x as long as second. No trace of suture between lateral ocelli and compound eyes. Ocellar ratio 1.7.

**Thorax.** Total length 1.02 mm. Scutellum with 4 strong setae.

**Wings.** Hyaline. Sc with 10 dorsal setae, ta with 7 dorsal and 5 ventral setae, tb with 2 dorsal and 9 ventral setae, M and CuA bare. Total length 3.22x as long as Sc, and 1.73x as long as R5. M-ratios 0.29 and 0.35, CuA-ratios 2.00 and 3.60.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.89, 0.67, 0.51; SV 2.25, 2.82, 3.41; BV 2.11,

3.08, 4.11; TR 1.57, 2.00, 2.47.

**Terminalia** (Fig. 35). Tg 9 about as long as wide, posterior margin concave. Hypoproct broad. Fused structure posteriorly of tg 9 supposed to represent fusion of elements representing tg 10, epiproct and cerci. Cercus with numerous apical setae. Gonocoxites ventrally fused for short distance. Gonostylus large and wide, distinctly bilobate. Dorsal lobe wide, distal parts weakly sclerotized, apicodorsal border with several flattened, nearly transparent setae and lamellae. Ventral lobe with interior, median protuberance with 5–6 very strong setae. Apical margin of ventral lobe invaginated, membranous, with rows of very long lamellae. Seta-bearing appendage slightly bilobate, dorsal lobe with 1 strong and several smaller setae, ventral lobe with several setae. Lamella-bearing appendage with long stem; lamellae minute. Paramere broad, including apex. Parameral apodeme evenly tapered, distinctly shorter than paramere. Aedeagus slender, tapered.

**FEMALE** (n=3, where nothing else is stated). Wing length 4.08–4.42 mm (n=4), or 3.5–3.6x as long as profemur (n=4).

**Coloration.** More extensively yellowish than males, abdominal segments yellow.

**Head.** Length of flagellum 1.61–1.68 mm. First flagellomere 2.5–3.1x as long as wide, and 1.1–1.2x as long as second. Ocellar ratio 1.4–1.6. Front 1.1x as long as wide. Face with 14–21, clypeus with 45–47, and labrum with 8–11 setae. Clypeus 1.7x as long as labrum. Relative lengths of palpomeres 1:1.2:1.6–1.7:1.7–2.0:3.6–3.9. Stipes each with 6–7 setae.

**Thorax.** Total length 1.20–1.31 mm.

**Wing.** Sc with 12–15 dorsal setae, ta with 9–10 dorsal and 1–5 ventral setae, tb with 1–3 dorsal and 5–8 ventral setae, M and CuA bare. Total length 3.17–3.37x as long as Sc, and 1.58–1.65x as long as R5. M-ratios 0.24–0.32 and 0.29–0.37, CuA-ratios 1.74–1.92 and 3.48–4.00.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.83–0.85, 0.62–0.64, 0.49–0.51; SV 2.36–2.44, 2.92–2.98, 3.44–3.60; BV 2.18–2.27, 3.23–3.50, 4.25–4.57; TR 1.48–1.62, 2.00–2.20, 2.60–2.74.

**Terminalia** (Fig. 36). Gc 8 not widely separated,

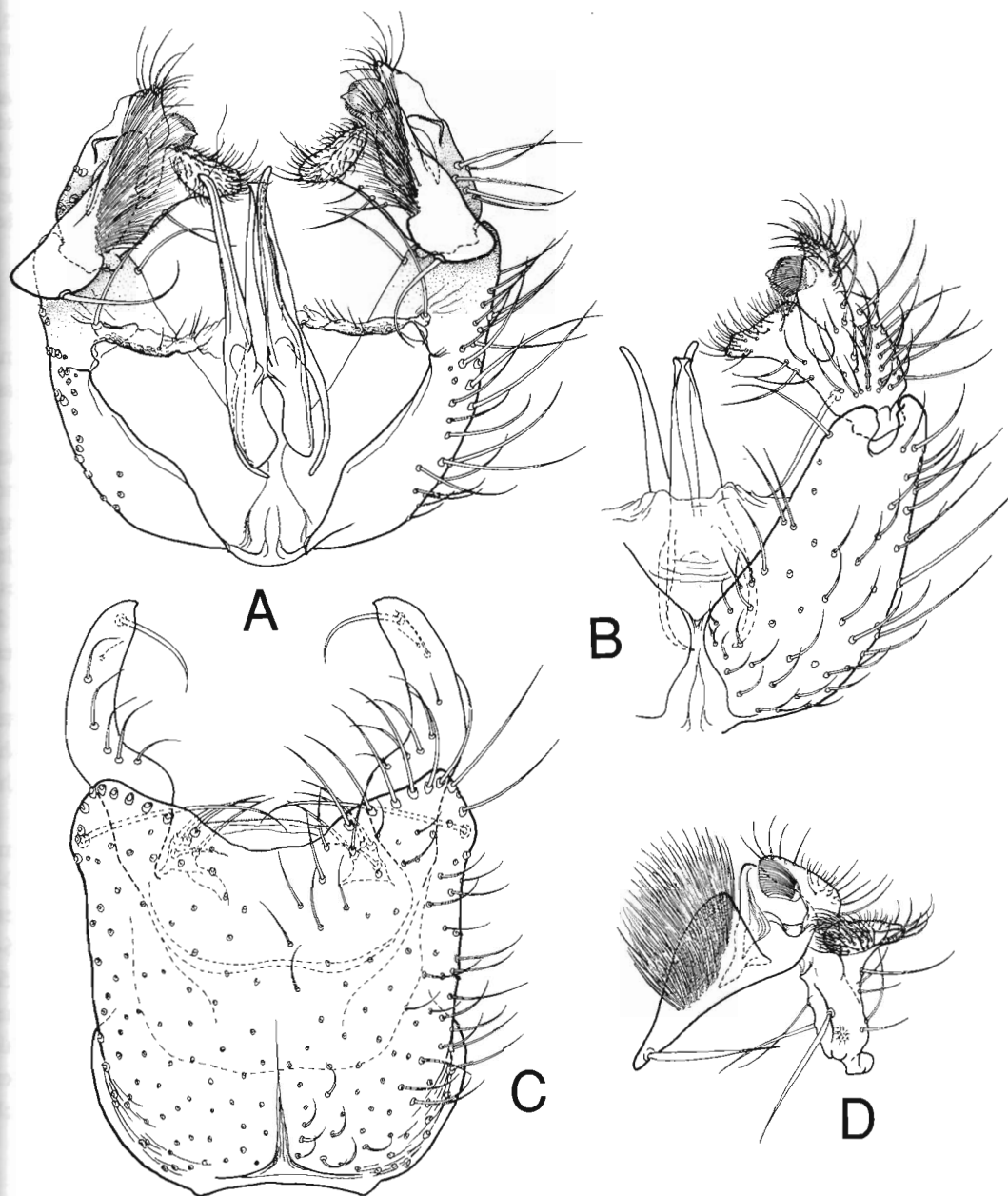


Fig. 37. *Coelosia scopariata* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

equipped with several very thick, lanceolate setae towards apex. St 10 small, triangular. Tg 9 medially divided, with some setae on lateral parts. Posterior border of tg 10 straight, possibly fused with epiproct.

Cercus broad, 2-segmented.

*Biology.* Unknown.

*Distribution.* Eastern Palaearctic. Japan (Hokkaido).

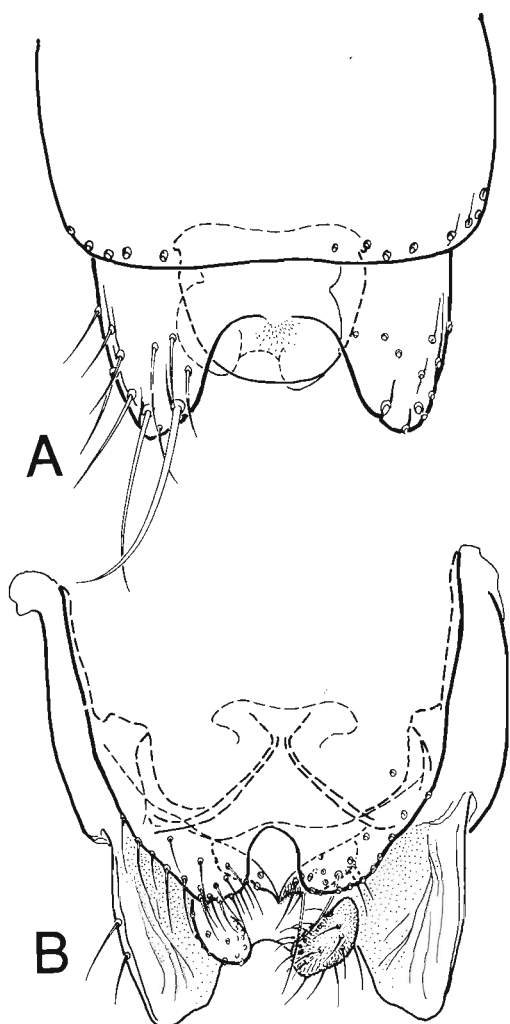


Fig. 38. *Coelosia scopariata* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

### 16. *Coelosia scopariata* sp. n.

Figs. 37, 38.

**Types.** *Holotype*: ♂ CANADA, ALBERTA, Waterton Lakes Nat. Pk., 7.–12.07.1980, H. J. Teskey (CNC Type No. 21616). — *Paratypes*: CANADA, ALBERTA, Waterton Lakes Nat. Pk., ♂ 03.–07.07.1980, H. J. Teskey (CNC); ♀ 24.07.1946, G. L. Knowlton (IOW); BRITISH COLUMBIA, Robson, ♀ 03.07.1947, H. R. Foxlee (CNC); Kaslo, ♀ 22.06., R. P. Currie (USNM), ♀ 20.07, H. G. Dyar (USNM). U. S. A., OREGON, Baker Co., Wetmore Campground (4.500'), 2♂♂ 29.06.–05.07.1965 (CNC); Baker Co., 9 mi. W. Unity (4.500'), ♂ 02.07.1965 (CNC); WASHINGTON, Stevens Co., 5 mi. NE Deer Lake (3.200'), ♂♀ 11.–13.07.1975, Malaise trap with dry

ice (JEC); Stevens Co., 5 mi. NE Deer Crk., ♀ 27.–28.07.1973, W. J. Turner & D. Corridor (JEC); Whitman Co., Pullman (nr. SCS Pond), 2♂♂ 05.06.1972, J. F. Mac Donald (CNC).

**Diagnostic characters.** Female, sometimes even males, with at least some setae along M1. Males with broad, well developed lateral lobes of tg 10. Interior appendage of gonostylus with a rounded, brush-like collection of long setae. Lateral part of female tg 9 large, evenly rounded, with a few long, apical setae.

**Etymology.** From Latin, *scopa*, broom or brush, referring to the outlining of the internal appendage of the gonostylus.

### Description

**MALE** (n=5). Total length 4.12–4.39 (4.28) mm. Wing length 3.04–3.29 (3.11) mm, or 3.1–3.3 (3.2)x as long as profemur.

**Coloration.** Front and top of head brown. Clypeus and mouthparts yellowish. Scape, pedicel, first and most of second flagellomere yellowish, remaining flagellomeres light brown. Scutum and scutellum light brown, former with 3 longitudinal, brown stripes. Anepisternum very light brown; preepisternum 2 brown. Mediotergite, laterotergite brown. Halteres and legs yellow. Abdominal segments 1, 5 and 6 brown, tergites 2–4 yellow with brown apicolateral margins, sternites 2–4 yellow. Terminalia yellowish, darkened posteriorly. Lateral lobes of tg 10 light brown.

**Head.** Length of flagellum 2.17–2.36 (2.24) mm. First flagellomere 3.3–3.9x as long as wide, and 1.0–1.2x as long as second. No trace of suture between lateral ocelli and compound eyes. Ocellar ratio 1.6–1.9. Front 1.1–1.2x as long as wide. Face with 9–15, clypeus with 19–25, and labrum with 4–9 setae. Clypeus 1.4–1.9x as long as labrum. Relative lengths of palpomeres 1: 0.9–1.0: 1.3–1.6: 1.5–1.9: 3.2–4.0. Stipes weakly sclerotized, tends to be connected basally, each with 2–4 ventral setae.

**Thorax.** Total length 0.87–0.92 (0.90) mm.

**Wings.** Hyaline. Sc with 4–11 dorsal setae, ta with 3–6 dorsal and 0–4 ventral setae, tb with 3–11 ventral setae, M1 with 0–2 dorsal setae, M2 and CuA bare. Total length 3.19–3.55x as long as Sc, and 1.57–1.63x as long as R5. M-ratios 0.24–0.29 and 0.29–0.33, CuA-ratios 1.59–1.97 and 2.86–4.06.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.80–0.86, 0.60–0.68, 0.48–0.51; SV 2.29–2.44,

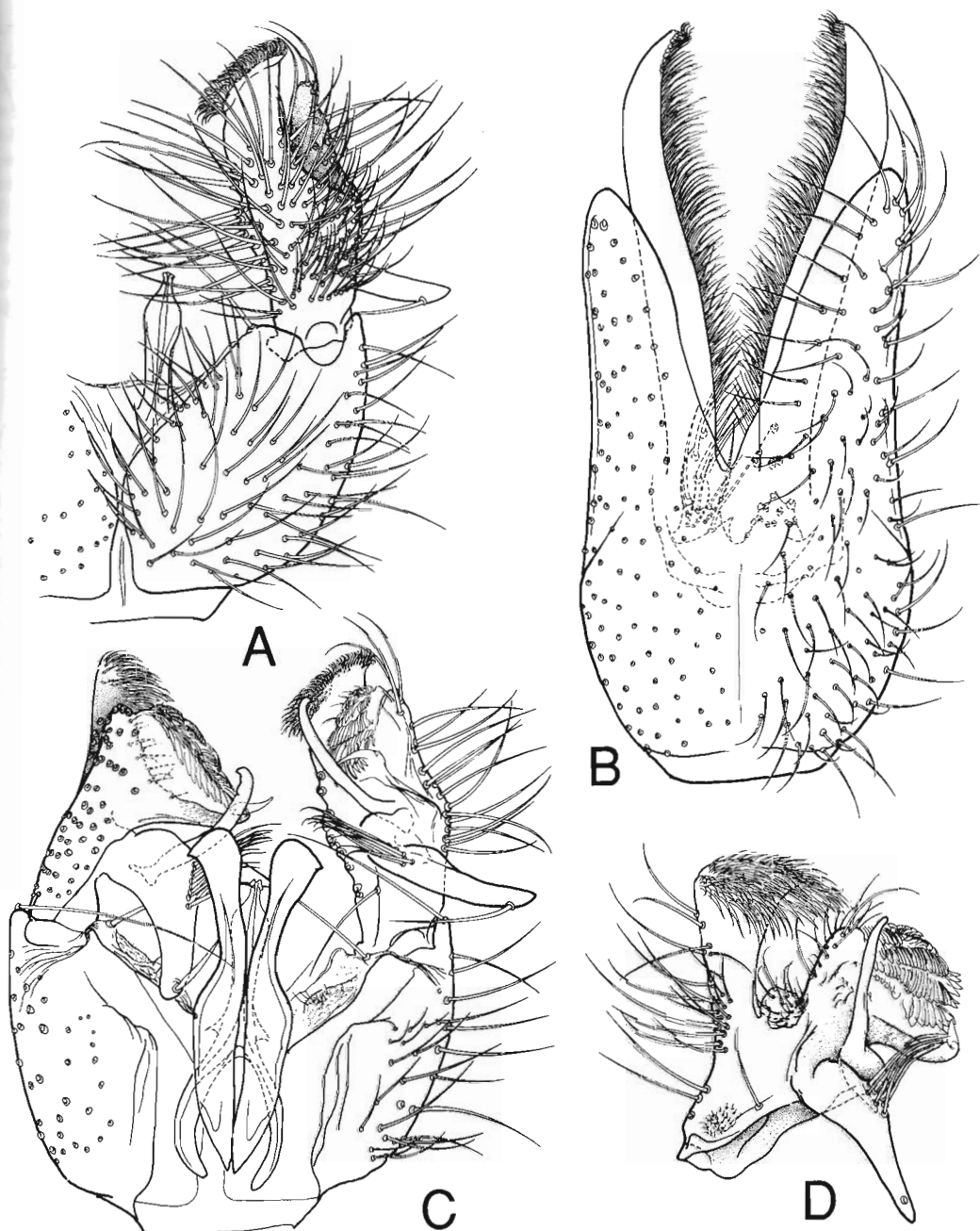


Fig. 39. *Coelosia succinacea* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ventral view.

2.73–3.05, 3.44–3.56; BV 2.21–2.29, 3.31–3.34, 4.45; TR 1.50–1.65, 2.00–2.28, 2.87.

**Terminalia** (Fig. 37). Tg 9 subquadrate, slightly longer than broad, posterior margin concave. Lateral

lobes of tg 10 heavily sclerotized, protruding well beyond posterior border of tg 9, each with 5–6 dorsal and 2–3 ventral setae. Hypoproct wider than long. Epiproct entire, large with several ventral setae. Cer-

cus small, with 4 strong ventral setae. Gonocoxite fused basally. Gonostylus small, bilobate. Both dorsal and ventral lobe rounded, setose. Ventral lobe of gonostylus with some nearly transparent, flattened setae. Seta-bearing appendage pronounced, dorsal portion rounded, flattened, with 1 strong seta; ventral lobe rounded, clothed by numerous, long and thin setae. Lamella-bearing appendage with short, thick stem and 1 row of long lamellae. Paramere long and slender. Parameral apodeme broad, about half as long as paramere. Aedeagus slender, tapered.

**FEMALE** (n=3). Total length 3.96–4.19 mm. Wing length 3.34–4.12 mm, or 3.6–3.7x as long as profemur.

**Coloration.** As in males, except all abdominal tergites with a thin, dark posterior margin.

**Head.** Length of flagellum 1.38–1.52 mm. First flagellomere 3.2–3.8x as long as wide, and 1.1–1.3x as long as second. Ocellar ratio 1.6–1.9. Front 1.0–1.1x as long as wide. Face with 9–14, clypeus with 19–26, and labrum with 5–7 setae. Clypeus 1.5–1.7x as long as labrum. Relative lengths of palpomeres 1 : 1.0 : 1.5–1.8 : 1.5–2.0 : 2.9–4.1. Stipes weakly sclerotized, each with 2–5 ventral setae.

**Thorax.** Total length 0.92–0.99 mm.

**Wings.** Sc with 9–11 dorsal setae, ta with 5–7 dorsal and 0–2 ventral setae, tb with 0–1 dorsal and 7–8 ventral setae, M1 with 3–15 dorsal setae. Total length 3.08–3.58x as long as Sc, and 1.65–1.74x as long as R5. M-ratios 0.23–0.24 and 0.26–0.28, CuA-ratios 1.69–1.81 and 2.96–3.25.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.77–0.83, 0.58–0.59, 0.49–0.51; SV 2.38–2.56, 3.08–3.13, 3.42–3.50; BV 2.33–2.42, 3.33–3.68, 4.32–4.66; TR 1.62–1.79, 2.05–2.31, 2.69–2.86.

**Terminalia** (Fig. 38). Gc 8 evenly rounded, distinctly separated, setose. St 10 small. Tg 9 medially divided, lateral parts pronounced, each with 2–3 strong apical setae and several smaller laterals. Tg 10 bare, ovate, situated between lateral lobes of tg 9. Cerci 1-segmented, fused along basal half. Terminalia are very similar to those in *C. modesta*, but lateral lobes of tg 9 wider and less setose.

**Biology.** Unknown.

**Distribution.** Western Nearctic. Alberta, British Colombia; Oregon, Washington.

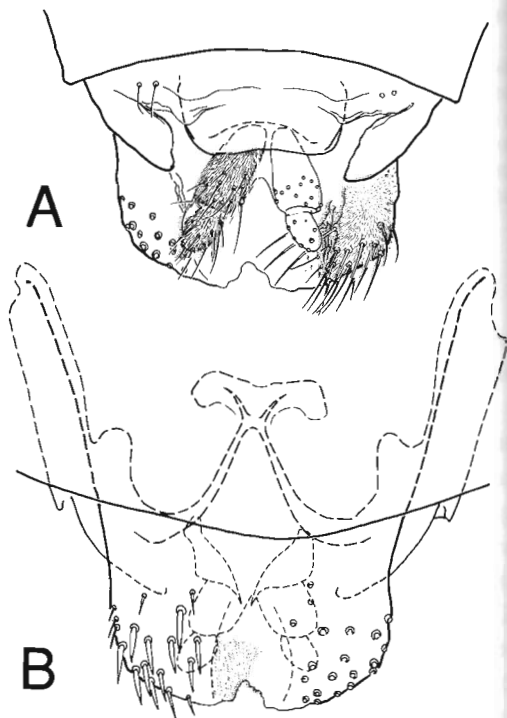


Fig. 40. *Coelusia succinacea* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

### 17. *Coelusia succinacea* sp. n.

Figs. 3C, 39, 40.

**Types.** *Holotype*: ♂ U. S. A., MARYLAND, Laurel, 14.06.1965, Malaise trap. (CNC Type No. 21617). — *Paratypes*: CANADA, MANITOBA, Winnipeg, U. Man. Campus, 16♂♂ 1♀ 07.1984, R. E. Roughley (CNC); ONTARIO, Pelee Is., 3♂♂ 2♀♀ 18.06.1974, D. M. Wood (CNC). U. S. A., INDIANA, Brown Co., ♂♀ 25.06.1961, J. C. Schaffner (IOW); IOWA, Boone Co., Ledges State Park, ♀ 27.06.1948, ♀ 20.06.1949, 5♂♂ 19♀♀ 21.06.1950, 4♂♂ 14♀♀ 25.06.1950, 3♂♂ 6♀♀ 12.06.1952, ♀ 23.06.1953, 3♂♂ 23♀♀ 23.06.1961, 4♀♀ 03.07.1961, J. Laffoon (IOW), ♂ 01.06.1957, M. Menns (IOW), 6♀♀ 23.06.1961, ♀ 23.07.1961, R. J. Gagné (IOWA); Ames, ♂ 31.05.1949, ♀ 18.06.1949, J. A. Slater (IOW), ♀ 17.06.1949, E. Thorsrud (IOW), 3♂♂ 1♀ 06.06.1957, W. S. Craigh (IOW); Sioux City, ♀ 10.06.1949, 1♂ 3♀♀ 11.06.1949, Slater & Laffoon (IOW); Mc.Gregor, 1♂ 4♀♀ 01.07.1950, Hicks & Slater (IOW); Decorah, ♀ 02.07.1950, Hicks & Slater (IOW); Webster Co., Dolliver Mem. St. Prk., 2♀♀ 30.06.1950, J. Laffoon (IOW); Linn Co., Palisades-Kepler St. Pk., ♀ 08.07.1950, Laffoon, Slater & Hicks (IOW); Jacksons Co., Maquoketa Caves St. Pk., ♀ 03.07.1949, J. Laffoon (IOW); MARYLAND, Bowie, 29♂♂ 11♀♀ 29.05, ♀ 30.05, ♀ 01.06, 2♀♀ 07.06.1945, DDT Exp. (USNM); Laurel, ♀ 07.06.1965, ♀ 09.06.1965,

2♂♂ 1♀ 14.06.1965, ♀ 25.06.1965, ♀ 28.06.1965 (CNC); near Laurel, ♂ 24.05.1967, 6♂♂ 01.06.1967, 6♂♂ 1♀ 04.06.1967, D. R. Smith (USNM); MASSACHUSETTS, Shrewsbury 2♂♂ 04.06.1950, W. L. Downes (IOW); TENNESSEE, Nashville, ♂ 28.05.1931, R. H. Adams (USNM).

**Diagnostic characters.** The only species with the combination Mbare and CuA2 setose. Male tg 9 with a deep, median incision. Tg 10 well developed, present as two distinct lobes, each with numerous fine setae medially. Female gc 8 large, with several thin, lanceolate setae.

**Etymology:** From Latin, *succinum*, amber, referring to the overall coloration of the species.

### Description

**MALE** (n=5). Total length 3.16–4.31 (3.81) mm. Wing length 2.50–3.39 (3.12) mm, or 2.7–3.0x as long as profemur.

**Coloration.** Top of head brown, face light brown. Mouthparts yellowish. Scape, pedicel, first and, usually, second flagellomeres yellow, remaining flagellomeres light brown. Scutum and scutellum amber to light brown, scutum with 3 longitudinal brown stripes. Anepisternum and preepisternum 2 yellowish to amber. Mediotergite and laterotergite brown to reddish brown. Halteres yellow. Legs yellow to amber. Abdominal tergites 1–4 brown, at most with yellowish basal corners, tergites 5 and 6 entirely brown to reddish brown, sternites 1–4 yellowish. Terminalia yellow to amber, darkened apically.

**Head** (Fig. 3C). Total length of flagellum 2.21–2.72 mm. First flagellomere 2.5–3.0x as long as wide, and 0.9–1.0x as long as second. No trace of suture between lateral ocellus and compound eyes. Ocellar ratio 1.2–1.6. Front 1.0–1.2x as long as wide. Face with 9–22, clypeus with 22–28 setae, and labrum with 4–11 setae. Clypeus 1.6–2.1x as long as labrum. Relative lengths of palpomeres 1 : 1.0–1.1 : 1.4–1.7 : 1.8–2.0 : 3.7–4.7. Stipes weakly sclerotized, tends to be connected basally, each with 2–6 setae.

**Thorax.** Total length 0.81–1.12 (1.00) mm.

**Wings.** Hyaline with brownish tint. Sc with 5–10 dorsal setae, ta with 5–10 dorsal and 7–8 ventral setae, tb with 0–1 dorsal and 7–13 ventral setae, CuA-petiole with 1–7 dorsal setae, CuA2 with 2–5 dorsal setae, M and CuA1 bare. Total length 3.20–3.77x as long as Sc, and 1.69–1.87x as long as R5. M-ratios 0.22–0.24 and 0.26–0.29, CuA-ratios 2.00–2.31 and 3.37–4.63.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.80–0.84, 0.59–0.66, 0.48–0.52; SV 2.38–2.51, 2.93–3.22, 3.39–3.65; BV 2.37–2.53, 3.32–3.90, 4.23–4.81; TR 1.59–1.82, 1.95–2.41, 2.35–2.88.

**Terminalia.** (Fig. 39). Tg 9 elongated, about 1.8x as long as wide, posterior border with deep apical incision, about half as long as length of entire tergite. Tg 10 very long, intimately fused with cerci; combined structure protruding well beyond posterior margin of tg 9. Hypoproct wider than long. Epiproct medially divided, laterally with some strong ventral setae. Cerci fused with median portion of tg 10, evenly clothed by ventral and median setae. Gonocoxites fused basally. Gonostylus broad, deeply bilobate. Dorsal lobe of gonostylus with apicodorsal margin membranous, with rows of nearly transparent lamellae. Ventral lobe of gonostylus wider towards apex, apical portion with numerous, flattened interior setae. Seta-bearing appendage with 1 dorsal, and 7–9 more ventral setae. Lamella-bearing appendage with long stem, lamellae entirely reduced. Paramere broad, apex rounded, broader than median parts. Parameral apodeme broad, shorter than paramere. Aedeagus slender.

**FEMALE** (n=5). Total length 2.96–4.20 (3.43) mm. Wing length 3.08–4.04 (3.63) mm, or 3.3–3.5x as long as profemur.

**Coloration.** As for males, except abdominal segments always with dark posterior margins. Gc 8 often somewhat reddish.

**Head.** Total length of flagellum 1.63–1.73 mm. First flagellomere 2.4–3.0x as long as wide, and 1.0–1.2x as long as second. Ocellar ratio 1.4–1.6. Front 1.0–1.2x as long as wide. Face with 9–14, clypeus with 29–37 setae, and labrum with 5–7 setae. Clypeus 1.7–2.5x as long as labrum. Relative lengths of palpomeres 1 : 0.8–1.3 : 1.6–2.0 : 2.1–2.4 : 3.9–4.9. Stipes each with 3–6 setae.

**Thorax.** Total length 1.00–1.23 (1.12) mm.

**Wings.** Sc with 6–10 dorsal setae, ta with 5–7 dorsal and 6–10 ventral setae, tb with 0–1 dorsal and 7–12 ventral setae, CuA-petiole with 0–2 dorsal setae, CuA1 with 0–1 and CuA2 with 1–5 dorsal setae. Total length 3.15–3.60x as long as Sc, and 1.60–1.70x as long as R5. M-ratios 0.17–0.24 and 0.21–0.29, CuA-ratios 1.58–1.84 and 2.86–3.61.

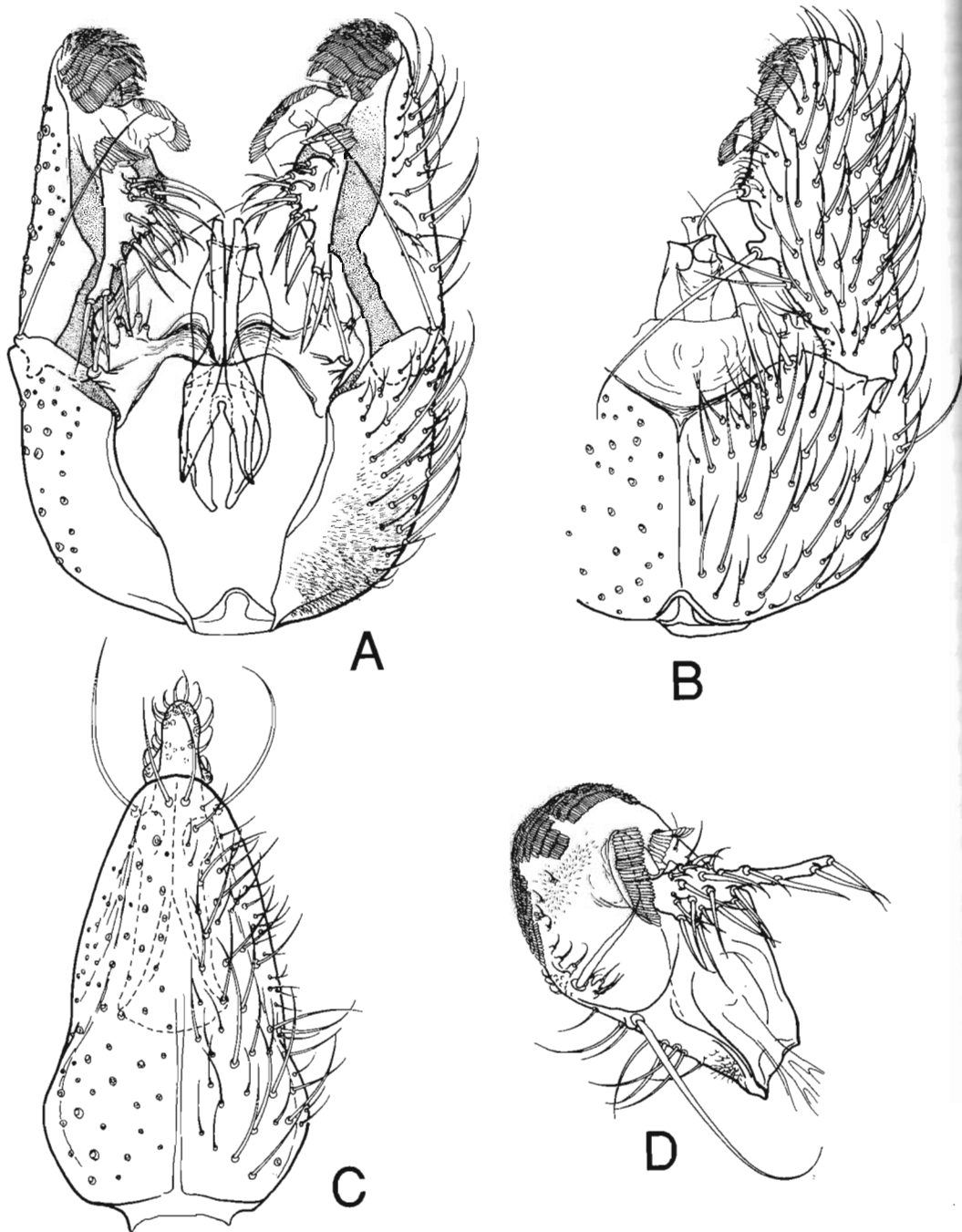


Fig. 41. *Coelosia tenella* (Zetterstedt), male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ventral view.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.78–0.93, 0.59–0.63, 0.48–0.52; SV 2.33–2.54, 3.05–3.22, 3.45–3.67; BV 2.26–2.57, 3.33–3.63, 4.27–

4.46; TR 1.73–1.90, 2.05–2.26, 2.37–2.61.

**Terminalia** (Fig. 40). Gc 8 very large, with numerous rather thick lanceolate setae. St 10 small, triangu-

lar. Tg 9 with 2 sublateral incisions, median part weakly sclerotized, lateral parts distinct, bare. Tg 9 bare, except for 2–3 sublateral setae. Tg 10 subquadrate. Cercus 2-segmented, distal segment small.

**Biology.** Unknown.

**Distribution.** Eastern Nearctic. Manitoba, Ontario, Indiana, Iowa, Maryland, Massachusetts, Tennessee.

### 18. *Coelosia tenella* (Zetterstedt)

Figs. 1, 2, 8, 41, 42.

*Boletina tenella* Zetterstedt, 1852:4165.

*Coelosia flavicauda* Winnertz, 1863:798; Lundström 1909; Edwards 1924b.

*Boletina setipennis* Holmgren, 1869 sensu Edwards 1933; Landrock 1940; Seguy 1940.

*Coelosia tenella*: Lundström 1906; 1912; 1914; Edwards 1925; Landrock 1927; 1940; Seguy 1940; Stackelberg 1946; Hutson et al. 1980; Hackman et al. 1988 (Palearctic catalogue); Laffoon 1965 (Nearctic catalogue).

**Types.** *Lectotype*, by present designation: ♂ SWEDEN: Jämtland, Mulfjället, 30.07. (ZML) (labelled "Mulfj., 30 Jul."). According to Zetterstedt's original description, collected in the period 20.–30.07.1840 ("in Jemtlandia ad alpem Mulfjellet"). Two syntypes were originally present in the collection of Lund, the other being a male of *C. truncata* Lundström, 1909, labelled "*B. tenella* Zett. ♂ Mulfjellet". In Zetterstedt's original description the terminalia is described as "anus paullo exsertus, lutescens" (anus slightly protruding, clay yellowish). As the specimen of *C. truncata* labelled "*B. tenella*" has brown genitalia, Zetterstedt probably used the specimen of *C. tenella*, at least for parts of his description.

**Remarks.** I have not managed to trace the type material of *Boletina setipennis* Holmgren, 1869, described from Svalbard (Adventfjorden), but its synonymy with *tenella* is likely as it is the only species of *Coelosia* recorded from Svalbard. — *Additional material studied.* See Appendix.

**Diagnostic characters.** Together with *C. gracilis* and *C. truncata*, the only species with numerous dorsal setae on veins M and CuA. In contrast to these species, male with tg 9 ovate, elongated, and female with bilobate gc 8, each with strongly curved apical setae.

### Description

**MALES** (Fig. 1) (n=5). Total length 4.42–4.85 (4.58) mm. Wing length 3.38–3.68 (3.50) mm, or 3.6–3.7 (3.6)x as long as profemur.

**Coloration.** Polymorphic, yellow or brown. Yellow variety: head brown, mouthparts yellowish. Antennae light brown, except for yellow scape, pedicel, first two, and most of third flagellomere. Mesonotum

yellow with 3 weak, light brown median stripe, remaining parts of thorax yellowish. Halteres and legs yellow. Abdominal segment 1, 5 and 6 light brown, usually with yellow posterior margin, segments 2–4 and terminalia yellowish. Brown variety: head, including antennae dark brown, mouthparts light brown. Thorax light to dark brown. Halteres and legs light brown. Abdominal segment 1, 5 and 6 dark brown, usually with light brown posterior margin, segments 2–4 and terminalia light brown.

**Head.** Total length of flagellum 2.07–2.48 mm. First flagellomere 3.2–4.5x as long as wide, and 1.1–1.2x as long as second. Lateral ocelli about as wide as median. Ocellar ratio 1.8–2.0. Front 1.1x as long as wide. Face with 11–20, clypeus with 31–36, and labrum with 4–7 setae. Clypeus 1.8–3.5x as long as labrum. Palpomere ratios 1:0.9–1.1:1.5–1.7:1.8–2.1:3.4–4.5. Stipes distinct, connected basally through well sclerotized plate, each with 3–5 ventral setae.

**Thorax.** Total length 0.78–0.92 (0.84) mm. Scutellum with 2 strong setae and several smaller.

**Wings** (Fig. 2). Sc with 2–5 dorsal setae, ta with 4–8 dorsal and 0–1 ventral setae, tb with 1–6 dorsal and 0–6 ventral setae, M and CuA both with numerous dorsal setae. Total length 3.75–4.00x as long as Sc, and 1.57–1.69x as long as R5. M-ratios 0.18–0.26 and 0.21–0.30, CuA-ratios 1.77–1.97 and 3.30–3.62.

**Legs.** Fore tibia with 3–4 ventral, 1 dorsal and 1 anterior setae. Leg ratios given for fore, mid and hind leg: LR 0.73–0.90, 0.60–0.65, 0.48–0.52; SV 2.24–2.66, 2.76–2.97, 3.28–3.51; BV 2.16–2.48, 3.15–3.36, 4.19–4.52; TR 1.45–1.70, 1.86–2.05, 2.50–2.72.

**Terminalia** (Fig. 41). Tg 9 ovate, evenly narrowed towards apex, about 1.6x as long as wide. Tg 10 reduced. Hypoproct elongated. Epiproct with some strong ventral setae laterally. Cerci with several ventral setae, completely fused, protruding well beyond posterior border of tg 9. Gonocoxites fused ventrally along median line. Gonostylus rounded, elongated, wider towards apex; apical margin of gonostylus membranous, slightly invaginated with several rows of small lamellae. Seta-bearing appendage attached beyond middle of gonostylus, elongated, tapered, with numerous strong setae. Lamella-bearing appendage

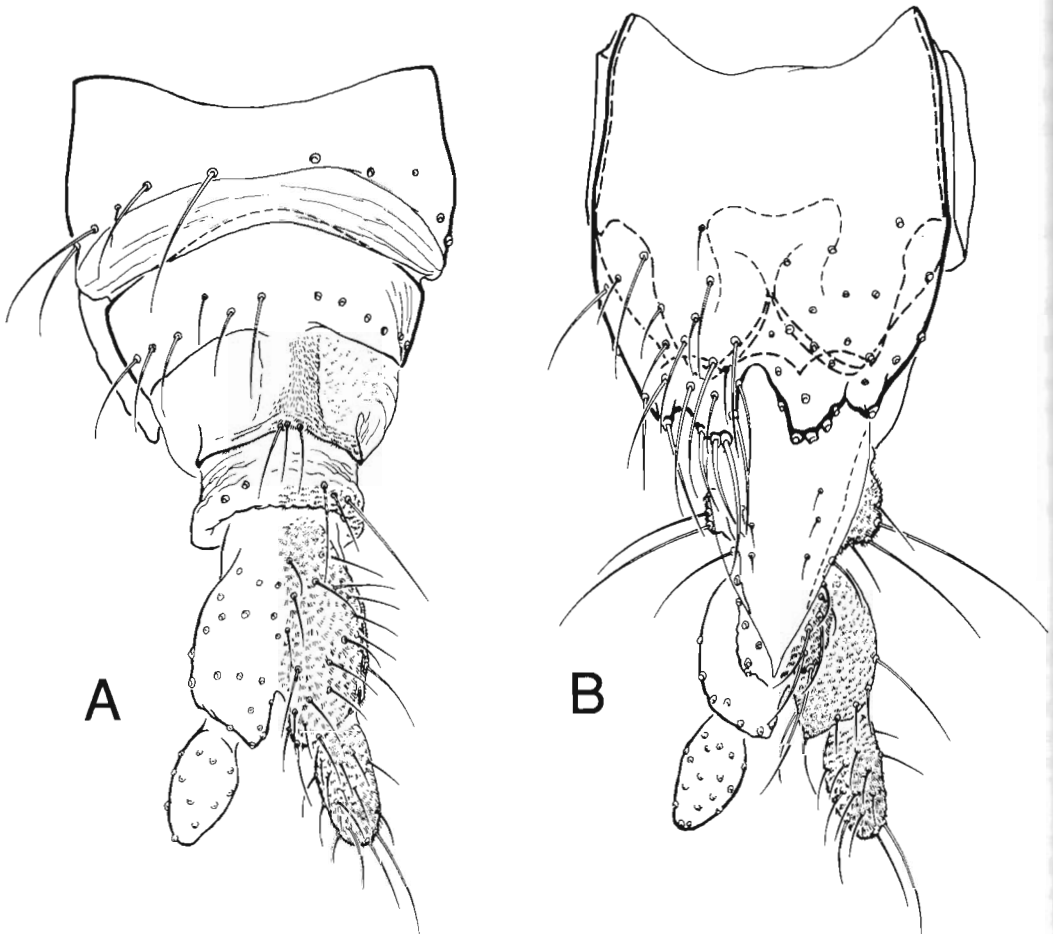


Fig. 42. *Coelosia tenella* (Zetterstedt), female terminalia. — A. Dorsal view. — B. Ventral view.

with 1 row of rather long lamellae; additional row of lamellae situated close to basis. Paramere long and slender. Parameral apodeme broad, pointed, about half as long as paramere. Aedeagus broad.

**FEMALE** (n=5). Total length 4.16–5.64 (5.03) mm. Wing length 3.17–4.49 (4.00) mm, or 3.5–4.0 (3.9)x as long as profemur.

**Coloration** as in males, except for abdominal tergites 2–6 which all have pale posterior margins.

**Head.** Total length of flagellum 1.38–2.00 mm. First flagellomere 1.2–1.3x as long as second. Ocellar ratio 2.1–2.6. Frontal ratio 1.0–1.2. Face with 11–18, clypeus with 35–41, and labrum with 2–7 setae. Clypeus 1.9–3.1x as long as labrum. Palpomere ratios 1 : 0.9–1.0 : 1.3–1.8 : 1.7–1.8 : 2.6–4.1. Stipes with 3–5 setae.

**Thorax.** Total length 0.83–1.08 (0.98) mm.

**Wings.** Sc with 3–4 dorsal setae, ta with 8–11 dorsal and 0–5 ventral setae, tb with 1–8 dorsal and 5–8 ventral setae, M-petiole with 0–3 ventral setae, CuA-petiole with 2–4 dorsal setae, M and CuA both with numerous dorsal setae. Total length 3.52–3.90x as long as Sc, and 1.55–1.64x as long as R5. M-ratios 0.20–0.21 and 0.23–0.25, CuA-ratios 1.52–1.84 and 2.84–3.40.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.74–0.76, 0.59–0.61, 0.49–0.52; SV 2.60–2.65, 2.98–3.14, 3.31–3.56; BV 2.37–2.55, 3.07–3.33, 4.02–4.52; TR 1.65–1.79, 1.83–2.10, 2.29–2.63.

**Terminalia** (Figs. 8, 42). Gc 8 bilobate, median lobe with 3–4, and lateral with 1 strong setae, curving dorsally. St 10 well developed, elongated and pointed, with some setae in 2 sublateral rows. Tg 9 with several

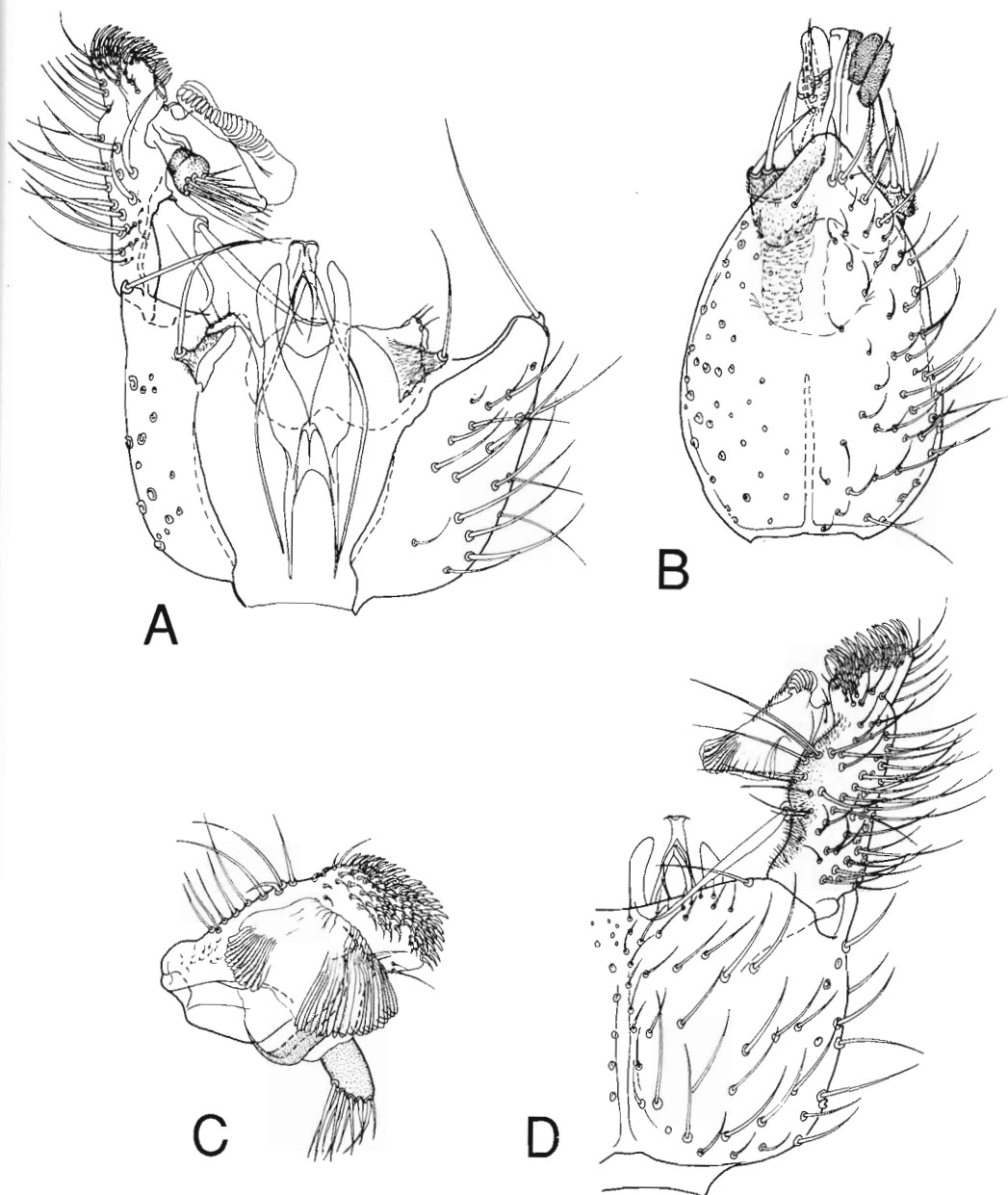


Fig. 43. *Coelosia tezcailipocai* sp. n., male terminalia. — A. Tergite 9 and associated structures. — B. Ventral view. — C. Dorsal view, tergite 9 removed. — D. Gonostylus, interior view.

apical setae, median part indistinct and partly fused with tg 10. Tg 10 with 3–5 apical setae. Epiproct well developed, with few sublateral setae. Cerci 2-segmented, proximal segments fused along most of their length.

**Biology.** The species has been reared from several

species of fungi, e.g. *Stereum hirsutum* (Stereaceae) (Chandler 1978), species in the *Boletus edulis*- and the *Leccinum versipelle*-groups, *Suillus luteus* (Fr.) S. F. Gray, *S. variegatus* (Fr.) Kuntze, *Russula* spp. and *Gyromitra/Discina* spp. (Yakovlev & Osipova 1985) and *Lactarius* (Yakovlev & Zaitzev 1990).

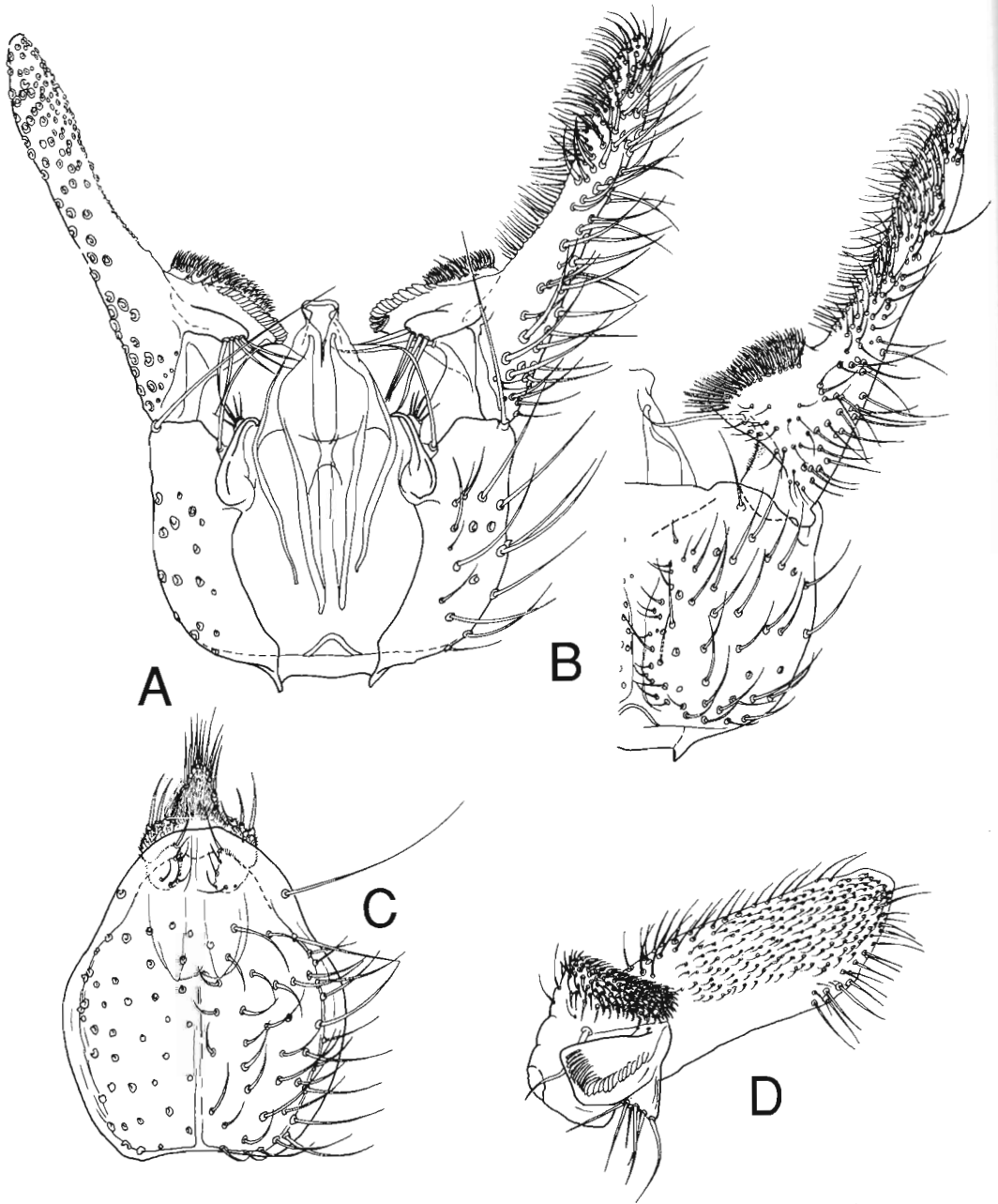


Fig. 44. *Coelosia tlalochi* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

The species have been recorded as far north as Spitsbergen (Coraholmen, Ekmanfjorden) 78°40'.

**Distribution.** Holarctic. Denmark, England, Finland, France, Ireland, Norway, Russia, Sweden; Brit-

ish Columbia, Manitoba, Northwest Territories, Ontario, Quebec, Yukon Territory; Alaska, Colorado. Also reported from Mongolia and China (Hackman et al. 1988).

**19. *Coelosia tezcattlipocai* sp. n.**

Fig. 43.

*Types. Holotype:* ♂ MEXICO: Km 134 Oaxaca-Tuxtpec Rd. (Ulex) 24.07.1984, G. S. Jamieson (CNC Type No. 21618). *Paratype:* Oaxaca, 142 km S. Tuxtpec (Rte. 175, 9,000') ♂ 14.08.1962, H. E. Milliron (CNC).

*Diagnostic characters.* Mouthparts elongated. Male tg 9 ovate, evenly, but distinctly pointed apically. Cerci not fused, each with 2 apical, dark brown, blunt megasetae.

*Etymology.* Named after the Aztec god Tezcattlipoca – chief of the pantheon.

*Description*

**MALES** (n=2). Total length 3.89–4.21 mm. Wing length 3.29 mm, or 3.7x as long as profemur.

*Coloration.* Head brown, including mouthparts. Scape brown, pedicel and first flagellomere yellowish, remaining flagellomeres brown. Thorax brown. Legs yellow. Abdomen brown, tergites 2–4 with yellowish posterior margin. Gonocoxite yellowish, gonostyli brown. Tg 9 yellowish, apically darkened.

*Head.* Total length of flagellum 2.80 mm (n=1). First flagellomere 5.4x as long as wide, and 1.1x as long as second. Ocellar ratio 1.9–2.0. Front 1.2–1.3x as long as wide. Face with 9–11, clypeus with 16–20, and labrum with 16–18 setae. Clypeus 0.9–1.0x as long as labrum. Relative lengths of palpomeres 1 : 1.1–1.2 : 1.8–1.9 : 1.8 : 2.7–3.3.

*Thorax.* Total length 0.76–0.78 mm.

*Wings.* Sc with 2–3 and ta with 1–3 dorsal setae, M and CuA bare, including basal portion of M. Total length 3.40–4.21x as long as Sc, and 1.63x as long as R5. M-ratios 0.22–0.26 and 0.25–0.32, CuA-ratios 1.60–1.75 and 3.05–3.18.

*Legs.* Leg ratios given for fore, mid and hind leg: LR 0.85–0.86, 0.70–0.80, 0.54–0.55; SV 2.29, 2.43–2.44, 3.09–3.11; BV 1.77, 2.72–2.88, 4.39; TR 1.29–1.30, 1.91–2.05, 2.93.

*Terminalia* (Fig. 43). Tg 9 ovate, evenly narrowed towards apex, about 1.5x as long as wide. Tg 10 reduced. Hypoproct broad. Epiproct with strong lateral setae. Cercus elongate with 2 blunt, flattened, very dark megasetae apically. Gonocoxites entirely fused ventrally. Gonostylus entire, apical margin with numerous, nearly transparent setae. Seta-bearing ap-

pendage knob-like with several long, apical setae. Lamella-bearing appendage large, with 1 row of very long lamellae. Paramere long, evenly narrowed towards apex. Parameral apodeme very thin, shorter than paramere. Aedeagus evenly tapered.

**FEMALE.** Unknown.

*Biology.* Unknown.

*Distribution.* Southern Nearctic. Mexico.

**20. *Coelosia tlaloci* sp. n.**

Fig. 44.

*Types. Holotype:* ♂ MEXICO: Sinaloa, 4.5 mi. W. El Palmito (6300'), 15.07.1964, J. F. McAlpine (CNC Type No. 21615). — *Paratypes:* 7 ♂♂, otherwise as holotype; El Palmito (6,500'), 3 ♂♂ 04.08.1964, W. R. M. Mason (CNC).

*Diagnostic characters.* Mouthparts elongated. Male with tg 9 ovate. Cerci fused, tapered. Gonostylus narrow, elongate, distinctly longer than the gonocoxite.

*Etymology.* Named after the Aztec rain god, Tláloc.

*Description*

**MALE** (n=5). Total length 3.89–4.07 (3.97) mm. Wing length 2.71–2.90 (2.81) mm. Total length 3.4x as long as profemur.

*Coloration.* Head dark brown. Scape and flagellum brown, pedicel and first flagellomere light brown. Scutum, scutellum and thoracic sclerites dark brown. Halteres and legs yellow. Abdominal segments dark brown. Terminalia light brown, darkened apically.

*Head.* Total length of flagellum 2.09–2.39 mm. First flagellomeres 3.4–4.2x as long as wide, and 1.0–1.2x as long as second. Ocellar ratio 1.5–1.9. Front 1.2–1.4x as long as wide. Face with 5–10, clypeus with 14–25, and labrum with 10–16 setae. Clypeus 1.0–1.1x as long as labrum. Palpomere ratio 1 : 0.9–1.0 : 1.6–1.7 : 1.5–1.8 : 2.6–3.3. Stipes weakly sclerotized, probably not connected basally, each with 3–6 setae.

*Thorax.* Total length 0.74–0.83 (0.78) mm.

*Wings.* Hyaline. Sc with 2–3 and ta with 5–7 dorsal setae, M and CuA bare. Total length 3.88–4.06x as long as Sc, and 1.65–1.71x as long as R5. M-ratios 0.27–0.30 and 0.33–0.36, CuA-ratios 1.62–1.90 and 3.06–3.69.

*Legs.* Leg ratios given for fore, mid and hind leg: LR 0.84–0.89, 0.67–0.69, 0.54–0.58; SV 2.22–2.32,

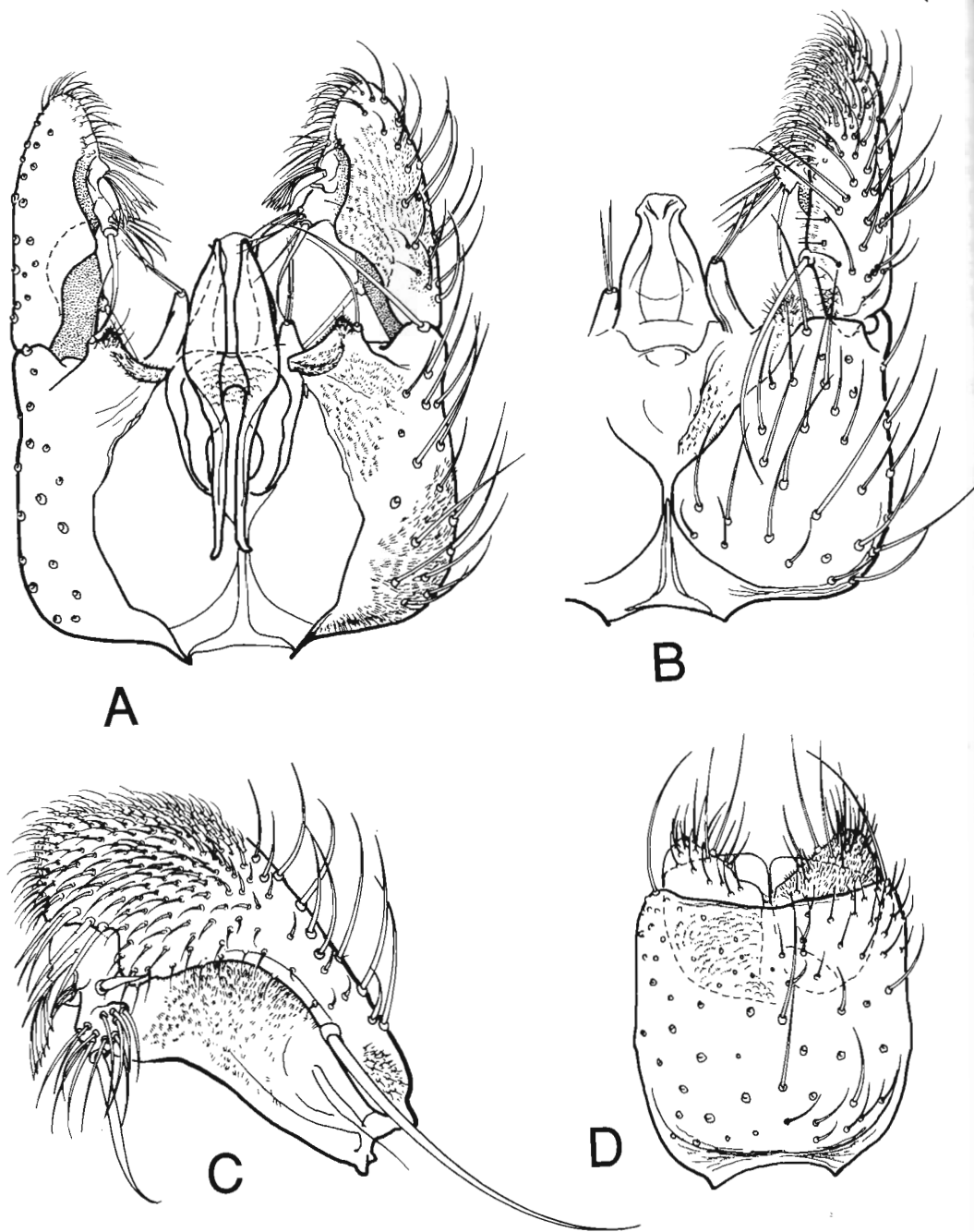


Fig. 45. *Coelosia truncata* Lundström, male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ditto, ventral view.

2.61–2.69, 3.05–3.24; BV 1.86–2.06, 3.28–3.52, 4.26–4.60; TR 1.42–1.52, 2.29–2.56, 2.93–3.17.

*Terminalia* (Fig. 44). Tg 9 ovate, about 1.1–1.2x as

long as wide, posterior margin evenly rounded. Tg 10 reduced. Hypoproct broad. Epiproct medially divided, with strong lateral setae. Cerci with several erect,

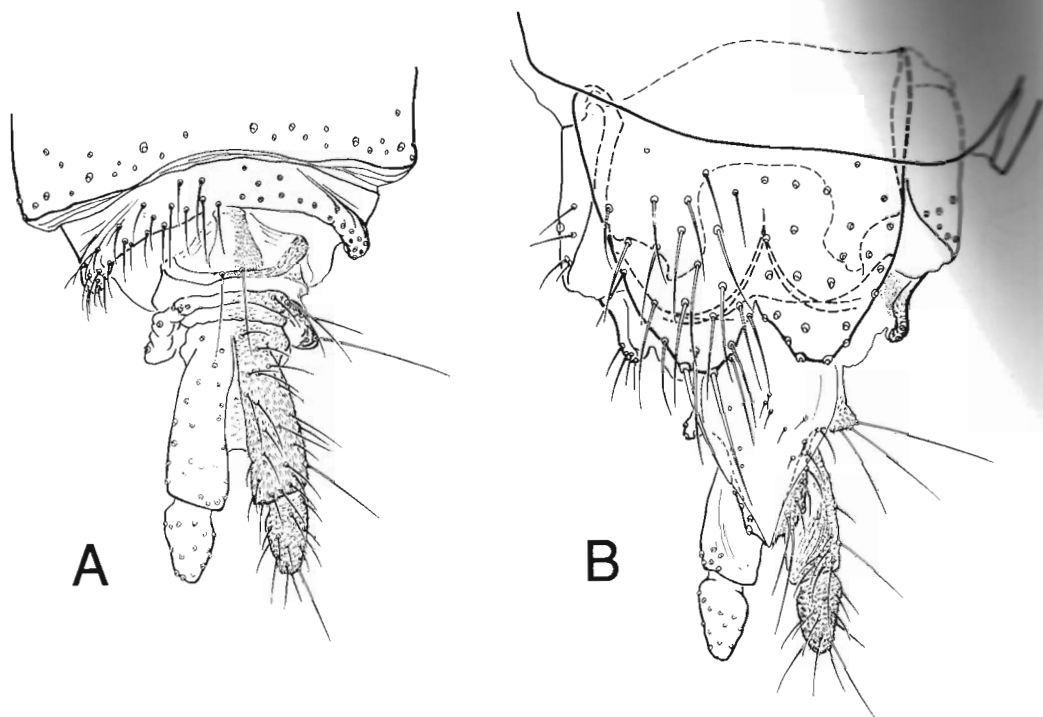


Fig. 46. *Coelosia truncata* Lundström, female terminalia. — A. Dorsal view. — B. Ventral view.

apical setae, fused, forming a median point. Gonocoxites ventrally fused along most of length. Gonocoxal apodemes heavily sclerotized, bare, except for 1 proximal and 5–6 distal setae. Gonostylus elongated, distinctly longer than gonocoxite, slightly bilobate, with very long dorsal and much wider and shorter ventral lobe. Seta-bearing appendage short, with 4–6 apical setae. Lamella-bearing appendage with 1 row of short lamellae. Paramere broad, apex distinctly tapered. Parameral apodeme slender, about as long as, or slightly longer than paramere. Aedeagus wide.

**FEMALE.** Unknown.

**Biology.** Unknown.

**Distribution.** Southern Nearctic. Mexico.

## 21. *Coelosia truncata* Lundström

Figs. 4A, 45, 46.

*Coelosia truncata* Lundström, 1909:18, 1912, 1914; Landrock 1927, 1940; Stackelberg 1946; Hackman et al. 1988 (Palaeartic catalogue).

**Type locality.** FINLAND: "Ab: Kuustö, in einer schattigen Grube am Fusse eines Berges".

**Types.** *Lectotype*, by present designation: ♂ FINLAND: Ab., Kuustö, Lundström (labelled "Mus. Zool. H:fors Spec typ. No. 4229") (ZMH). — *Paralectotypes*: ♀ ("No. 4228"), otherwise as holotype; Ab., Karislojo, Forsius, ♂ (1380) (No. 4230); N. Kyrkslätt, ♂, R. Frey (No. 4231); Vasa, ♂, R. Frey, (1898) (No. 4233) (All ZMH). — *Additional material examined*, see Appendix.

**Diagnostic characters.** All major veins with numerous setae. Together with *C. gracilis*, the only species with one seta immediately behind the median ocellus. Male tg 9 subquadrate. Very close to *C. gracilis*, but gonostylus with ventral border even, and cerci distinctly separated. Female with st 10 setose, and gc 8 evenly rounded, with 2–3 erect, apical setae. Females of *C. gracilis* and *C. truncata* can at present not be satisfactorily separated.

## Description

**MALE** (n=5). Total length 4.03–5.50 (4.78) mm. Wing length 3.36–4.12 (3.75) mm, or 3.7–4.0 (3.9)x as long as profemur

**Coloration.** Polymorphic, yellow or brown. Yellow variety: head and most of antennae brown, scape, pedicel, first flagellomere and mouthparts yellowish. Mesonotum yellowish with faint brown median stripe, remaining parts of thorax yellowish. Halteres and legs

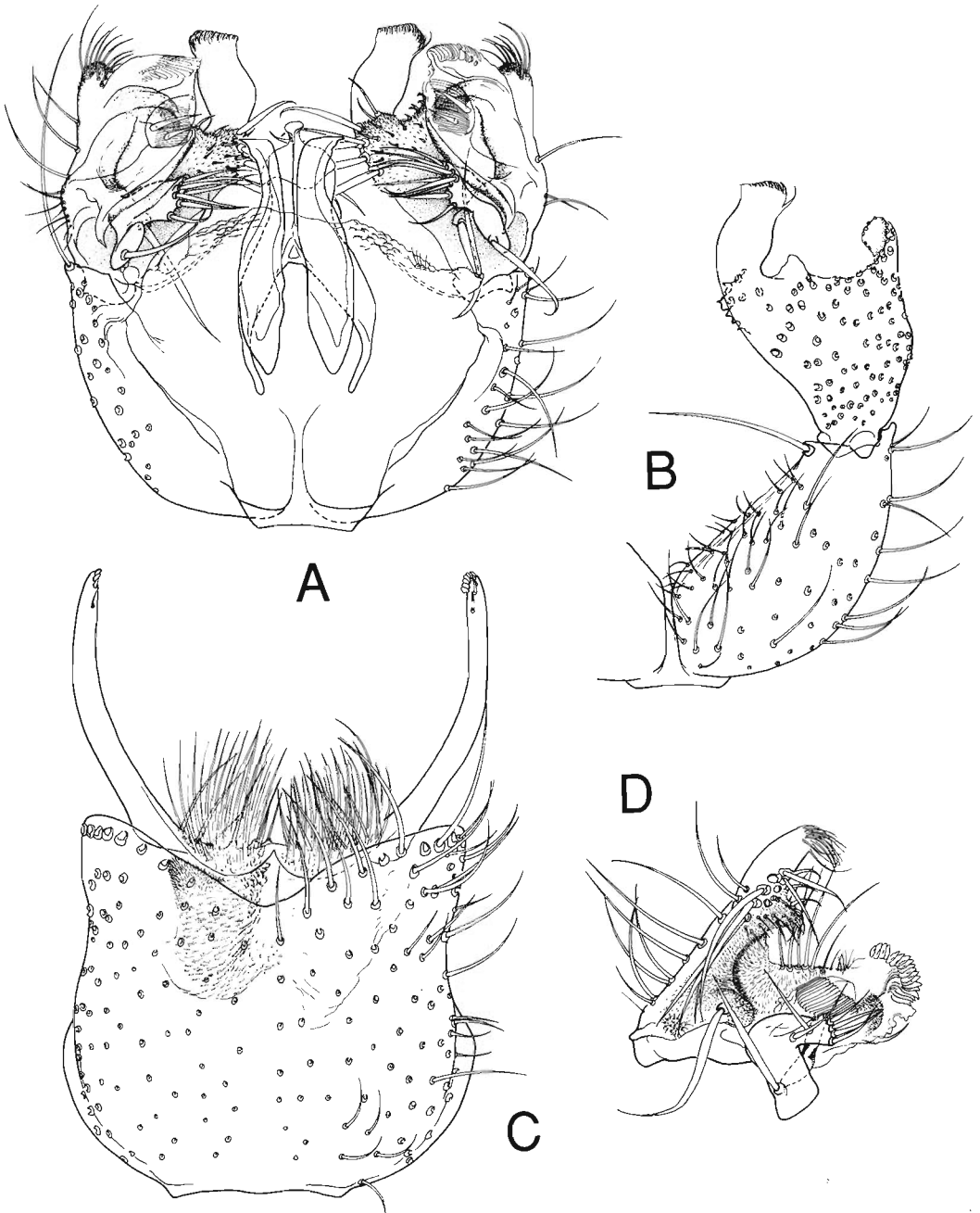


Fig. 47. *Coelosia vockerothi* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Ventral view. — C. Tergite 9 and associated structures. — D. Gonostylus, interior view.

yellow. Abdomen, including terminalia light brown to yellowish. Brown variety: head, including most of antennae brown, pedicel, most of first flagellomere and mouthparts light brown. Thorax brown to dark

brown. Halteres and legs light brown to brown. Abdomen brown to dark brown, terminalia light brown.

*Head* (Fig. 4A). Total length of flagellum 2.19–3.11 mm. First flagellomere 3.9–4.9x as long as wide,

and 1.0–1.2x as long as second. Lateral ocelli somewhat larger than median. Pronounced interior ridge stretching from outer border of lateral ocellus to anterior part of median ocellus. Small plate encircled by frontal suture, behind median ocellus, with 1 seta. Ocellar ratio 1.6–1.9. Front 1.0–1.3x as long as wide. Face with 11–20, clypeus with 21–35, and labrum with 1–6 setae. Clypeus 1.3–1.8x as long as labrum. Relative lengths of palpomeres 1 : 0.9–1.0 : 1.4–1.6 : 1.4–1.6 : 3.0–3.5. Stipes broad, rather weakly sclerotized, each with 3–5 setae.

**Thorax.** Total length 0.74–0.90 (0.83) mm. Scutellum with 2 strong setae.

**Wings.** Sc with 2–9 dorsal setae, ta with 4–8 dorsal, and 0–2 ventral setae, tb with 0–2 dorsal and 1–5 ventral setae. M-petiole bare, CuA-petiole with 0–1 dorsal seta, M and CuA both with numerous dorsal setae. Total length 3.22–3.74x as long as Sc, and 1.55–1.61x as long as R5. M-ratios 0.23–0.30 and 0.27–0.35, CuA-ratios 1.46–1.75 and 2.52–3.11.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.80–0.85, 0.65–0.75, 0.52–0.56; SV 2.25–2.40, 2.47–2.74, 3.10–3.30; BV 1.86–1.96, 2.98–3.29, 4.00–4.37; TR 1.38–1.45, 2.05–2.27, 2.59–2.75.

**Terminalia** (Fig. 45). Tg 9 subquadrate, about 1.2x as long as wide. Tg 10 reduced. Hypoproct nearly subquadrate. Epiproct large, entire. Cerci small, separate, partly fused with epiproct. Gonocoxites ventrally fused for short distance. Gonocoxal apodeme produced into distinct, finger-like protuberance medially, with 2 apical setae. Gonostylus subtriangular, apicodorsal margin more or less angled. Medioventral border even. Interior appendage attached apicoventrally. Seta-bearing appendage knob-like, with 1 strong and several smaller setae. Lamella-bearing appendage with 1 row of long, distinctly pointed lamellae. Paramere broad, about as long as aedeagus. Parameral apodemes as long as paramere, slender. Aedeagus broad with wide apex.

**FEMALE** (n=5). Total length 4.44–5.87 (5.06) mm. Wing length 3.80–4.78 (4.14) mm, or 3.7–4.1 (3.9)x as long as profemur.

**Coloration.** As for males.

**Head.** Total length of flagellum 1.75–1.91 mm.

First flagellomere 2.9–4.0x as long as wide, and 1.0–1.3x as long as second. Ocellar ratio 1.7–2.5. Front 1.1–1.3x as long as wide. Face with 13–17, clypeus with 19–30, and labrum with 2–6 setae. Clypeus 1.5–2.1x as long as labrum. Palpomere ratios 1 : 1.0–1.1 : 1.5–1.7 : 1.6 : 3.2–4.0. Stipes, each with 5–7 setae.

**Thorax.** Total length 0.83–1.15 (0.97) mm

**Wings.** Sc with 3–14 dorsal and 0–2 ventral setae, ta with 6–9 dorsal and 0–2 ventral setae, tb with 0–5 dorsal and 0–4 ventral setae, M-petiole bare, M1 with 33–50 dorsal and 0–5 ventral setae, M2 with 15–28 dorsal and 0–1 ventral setae, CuA-petiole with 0–3 dorsal setae, CuA1 and CuA2 with 5–15 and 6–14 dorsal setae, respectively. Total length of wing 3.10–3.43x as long as Sc, and 1.55–1.59x as long as R5. M-ratios 0.23–0.32 and 0.27–0.37, CuA-ratios 1.42–1.76, 2.61–3.35.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.77–0.82, 0.64–0.69, 0.48–0.55; SV 2.33–2.53, 2.68–2.89, 3.15–3.51; BV 1.90–2.08, 3.05–3.19, 3.93–4.56; TR 1.38–1.57, 2.07–2.19, 2.50–2.97.

**Terminalia** (Fig. 46). Gc 8 evenly rounded, broad, meeting in sharp angle. Each lobe with 2–3 strong apical and numerous ventral setae. St 10 well developed with varying number of small setae. Tg 9 with numerous setae. Tg 10 with 2–3 apical setae. Epiproct well developed, with several lateral setae. Cerci 2-segmented; proximal part fused along 2/3 of their length. The species can not be satisfactorily separated from *C. gracilis* on structures in the female genitalia.

**Biology.** The species has been reared from *Hygrophorus olivaceoalbus* (Hackman & Meinander 1979).

**Distribution.** Holarctic. Austria, Finland, Italy, Norway, Sweden; Alberta, British Columbia, Manitoba, Northwestern Territories, Saskatchewan; Maine, New York. The species has also been reported from Germany, former Czechoslovakia (Hackman et al. 1988), Siberia and from Primorskiy Kray in East Russia (Ostroverkhova 1979).

## 22. *Coelosia vockerothi* sp. n.

Figs. 4C, 47, 48.

**Types.** *Holotype*: ♂ CANADA, NOVA SCOTIA, Cape Breton Highlands National Park, Mackenzie Mt. (300m, PG645851,

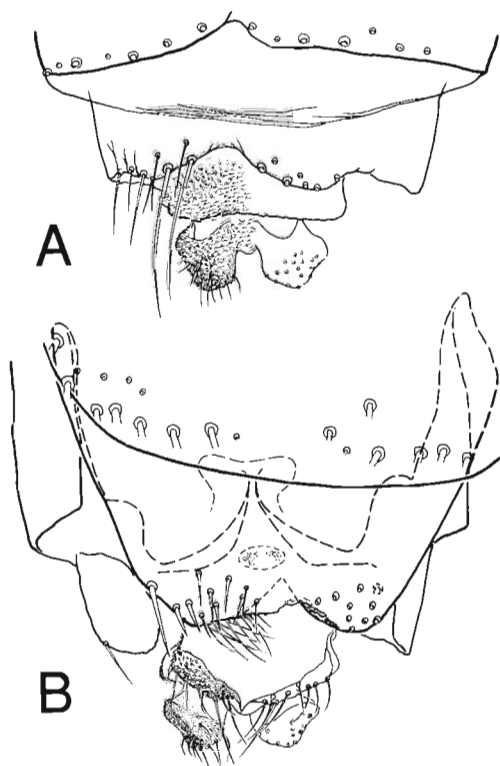


Fig. 48. *Coelusia vockerothi* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

*Picea-Betula* woods), 29.08.1983. (CNC Type No. 21620). — *Paratypes*: 2♂♂ 1♀, otherwise as holotype; NOVA SCOTIA, Cape Breton Highlands National Park, North Mt. (400 m, PG766864, damp *Sphagnum* fen), 2♂♂ 24.08.1983, (CNC); ALBERTA, Slave Lake, 2♂♂ 17.08.1924, O. Bryant (CAL); MANITOBA, Audy Lake, Riding Mtn. Nat. Pk., ♀ 12.08.1958, J. G. Chillcott (CNC); QUEBEC, Beechgrove (45°39', 76°8'), ♀ 02.10.1964, J. R. Vockeroth (CNC). U. S. A., COLORADO, ♂ (labelled "*C. flavicauda* Winnertz") (USNM); WASHINGTON, Everett, ♀ 19.06.1920, A. L. Melander (USNM); Pacific Co., Ft. Canby St. Prk., ♀ 11–13.06.1971, W. J. Turner (JEC); Pierce Co., Alder Lake Public Recreation Area, 2♀♀ 02.07.1974, P. H. Arnaud Jr. (CAL); Stevens Co., 5 mi NE Deer Lake (3200'), ♀ 18.07.1975, W. J. Turner (JEC); OREGON, Viento, ♀ 01.07.1917, A. L. Melander (USNM); NORTH CAROLINA, Mt. Mitchell (6800'), ♂ 12.08.1957, J. G. Chillcott (CNC). *Diagnostic characters*. Males with lateral lobes of tg 10 long and slender, about as long as tg 9. Gonostylus with ventral lobe tapered, finger-like. Female gc 8 broad and shallow, with some thin, lanceolate setae. Cercus 1-segmented, apex slightly angular.

*Etymology*. Named in honour of Dr. J. R. Vockeroth, Canada.

### Description

**MALE** (n=5, except when otherwise stated). Total

length 4.26–4.85 (4.63) mm (n=4). Wing length 3.15–3.50 (3.28) mm, or 3.2–3.5 (3.4)x as long as profemur.

*Coloration*. Front and top of head brown. Scape, pedicel, first and basal half of second flagellomere yellowish, remaining flagellomeres brownish. Scutum light brown, with 3 diffuse, dark longitudinal stripes. Thoracic sclerites light brown to brown. Halteres and legs yellow. Abdominal tergites 1–4 with yellowish apicolateral corners, sternites 2–4 yellow, segments 5–6 entirely brown. Gonocoxites and gonostyli yellowish. Tg 9 light brown.

*Head* (Fig. 4C). Length of flagellum 2.14–2.21 mm. First flagellomere 2.8–3.0x as long as wide, and as long as second. Weak suture running from median ocelli to upper corner of compound eyes. Ocellar ratio 1.3–1.4. Front 1.0–1.2x as long as wide. Face with 8–28, clypeus with 29–41, and labrum with 4–7 setae. Clypeus 1.4–1.8x as long as labrum. Relative lengths of palpomeres 1: 0.8–1.1 : 1.4–1.7 : 1.6–2.1 : 2.8–3.7. Stipes well sclerotized, distinctly connected basally, each with 5–7 setae.

*Thorax*. Total length 0.92–1.01 (0.95) mm.

*Wings*. Wings with a brownish tint. Sc with 8–11 dorsal setae, ta with 3–8 dorsal and 0–1 ventral setae, tb with 1–3 dorsal and 5–7 ventral setae, M and CuA bare. Total length 3.41–3.59x as long as Sc, and 1.63–1.65x as long as R5. M-ratios 0.22–0.29 and 0.26–0.35, CuA-ratios 1.65–2.03 and 3.21–3.83.

*Legs*. Leg ratios given for fore, mid and hind leg: LR 0.81–0.86, 0.66–0.72, 0.50–0.86; SV 2.33–2.46, 2.67–2.82, 3.20–3.48; BV 2.03–2.30, 3.14–3.63, 4.20–4.48; TR 1.46–1.62, 2.10–2.29, 2.75–2.93.

*Terminalia* (Fig. 47). Tg 9 subquadrate with numerous setae, posterior margin concave. Lateral lobes of tg 10 long and slender with apical row of 5–6 small, blunt setae. Hypoproct wider than long. Lateral portions of medially divided epiproct with few strong setae. Cercus with numerous long, erect setae, completely fused with proximal, median parts of tg 10. Gonocoxites ventrally fused for short distance. Gonostylus bilobate, bowl-shaped. Ventral lobe tapered, finger-like, apex with short filiform setae. A knob-like protuberance basally of knob-like lobe, with several setae. Dorsal lobe less pronounced, apicodorsal mar-

gin membranous with row of broad lamellae. Interior seta-bearing appendage bilobate, dorsal lobe broad, flattened, with 1 strong seta, ventral lobe with 7–10 setae. Lamella-bearing appendage stalked, with 1 row of long lamellae. Apex of paramere broad, curving outwards. Parameral apodeme broad. Aedeagus broad.

**FEMALE** (n=4). Total length 3.99–4.32 mm. Wing length 3.34–3.73 mm, or 3.7–4.1x as long as profemur.

**Coloration.** As for males, except abdominal sternites all with narrow yellowish apical margin.

**Head.** Length of flagellum 1.29–1.59 mm. First flagellomere 2.4–2.9x as long as wide, and 1.1x as long as second. Ocellar ratio 1.4–1.5. Front 0.9–1.1x as long as wide. Face with 9–16, clypeus with 28–37 setae, and labrum with 2–5 setae. Clypeus 1.4–2.0x as long as labrum. Relative lengths of palpomeres 1 : 0.9 : 1.5 : 1.6–1.8 : 3.0–3.6. Stipes weakly sclerotized, tends to connect basally, each with 3–7 ventral setae.

**Thorax.** Total length 0.94–0.99 (0.98) mm.

**Wings.** Sc with 7–11 dorsal setae, ta with 5–8 dorsal and 0–2 ventral setae, tb with 0–5 dorsal and 6–11 ventral setae, M1 with 0–1 dorsal seta, M and CuA bare. Total length 3.38–3.92x as long as Sc, and 1.60–1.61x as long as R5. M-ratios 0.21–0.24 and 0.24–0.29, CuA-ratios 1.63–1.67 and 2.92–3.26.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.75–0.81, 0.61–0.67, 0.51–0.58; SV 2.41–2.63, 2.80–3.06, 3.04–3.46; BV 2.07–2.32, 3.14–3.62, 4.23–4.77; TR 1.50–1.65, 2.00–2.28, 2.75–3.00.

**Terminalia** (Fig. 48). Gc 8 evenly rounded, rather small, with several thin lanceolate setae apically. St 10 small. Tg 9 with varying number of sublateral, apical setae, median part indistinct, partly fused with tg 10. Tg 10 ending in straight line, bare. Cercus 1-segmented.

**Biology.** Unknown.

**Distribution.** Nearctic. Alberta, Manitoba, Nova Scotia, Quebec; Colorado, Oregon, North Carolina, Washington.

### 23. *Coelosia xochiquetzali* sp. n.

Fig. 49.

**Types.** *Holotype*: ♂ MEXICO: Oaxaca, 142 km S. Tuxtpec (Rte 175, 9.000'), 14.08.1962, H. E. Milliron (CNC Type No.

21621).

**Diagnostic characters.** Among the Mexican species, the only with the combination tb with setae and labrum not longer than clypeus. Male tg 9 elongated, posterior border slightly concave. Gonostylus tapered apicodorsally, with some dark, blunt megasetae.

**Etymology.** Named after the Aztec goddess of flowers, Xochiquetzal.

### *Description*

**MALE** (n=1). Total length 4.44 mm. Wing length 3.36 mm, or 3.7x as long as profemur.

**Coloration.** Front and top of head brown, mouthparts light brown. Scape, pedicel and first flagellomere yellowish. Thorax brown. Halteres and legs yellowish. Abdominal segments brown. Gonocoxite yellowish, darkened posterolaterally. Gonostyli and tg 9 brownish.

**Head.** (Flagellomeres lost.) Median and lateral ocelli of about equal size. Ocellar ratio 1.6. Front 1.1x as long as wide. Face with 11, clypeus with 25, and labrum with 7 setae. Clypeus 1.3x as long as labrum. Relative lengths of palpomeres 1 : 0.9 : 1.7 : 1.4 : 2.9. Stipes each with 6–8 setae.

**Thorax.** Total length 0.85 mm.

**Wings.** Sc with 6 and ta with 7 dorsal setae, tb with 6 ventral setae, M and CuA bare. Total length 3.65x as long as Sc, and 1.64x as long as R5. M-ratios 0.21 and 0.25, CuA-ratios 1.82 and 3.55.

**Legs.** Fore tibia with 2 dorsal and 6 ventral setae. Leg ratios given for fore, mid and hind leg: LR 0.90, 0.67, 0.54; SV 2.16, 2.67, 3.16; BV 2.02, TR 1.48, 2.33, 3.00.

**Terminalia** (Fig. 49). Tg 9 elongated, about 1.5x as long as broad, posterior border shallow concave. Tg 10 reduced. Hypoproct broad. Epiproct medially divided, with distinct lateral setae. Cerci partly fused, each with few apical setae. Gonocoxite broad and shallow, completely fused ventrally, posterior ventral margin even. Gonostylus more or less triangular, apicodorsally tapered, with 6–7 stout, blunt, apical setae. Apicoventral margin of gonostylus evenly rounded, with numerous interior setae. Interior seta-bearing appendage entire, rather broad with 1 thick and numerous weaker, apical setae. Lamella-bearing appendage large, with 1 row of

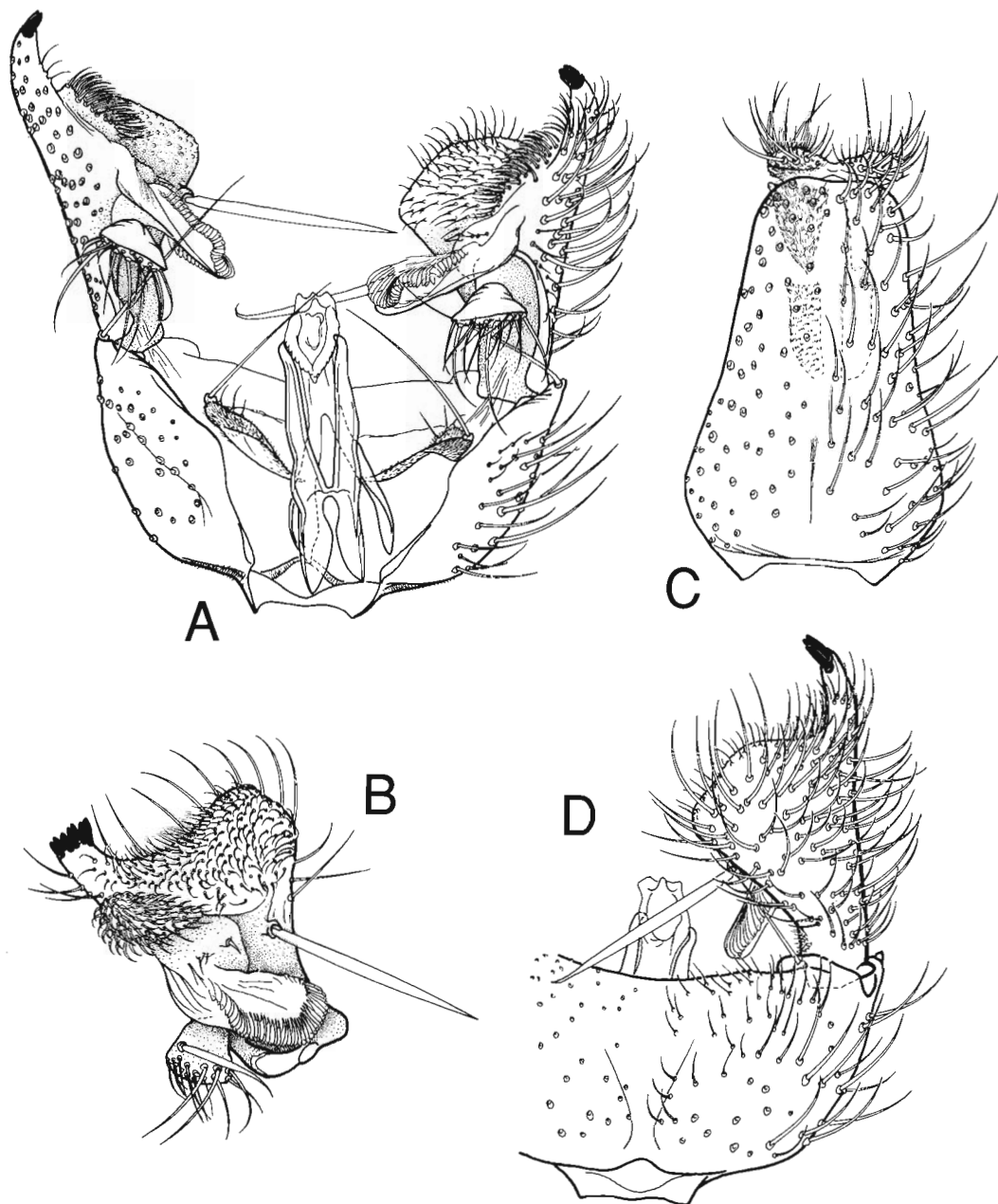


Fig. 49. *Coelosia xochiquetzali* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Gonostylus, interior view. — D. Ventral view.

lamellae. Paramere long and slender. Parameral apodeme wide, about half as long as paramere. Aedeagus elongated, with conspicuous serrated border along apicodorsal surface.

FEMALE. Unknown.

*Biology*: Unknown.

*Distribution*. Southern Nearctic. Mexico.

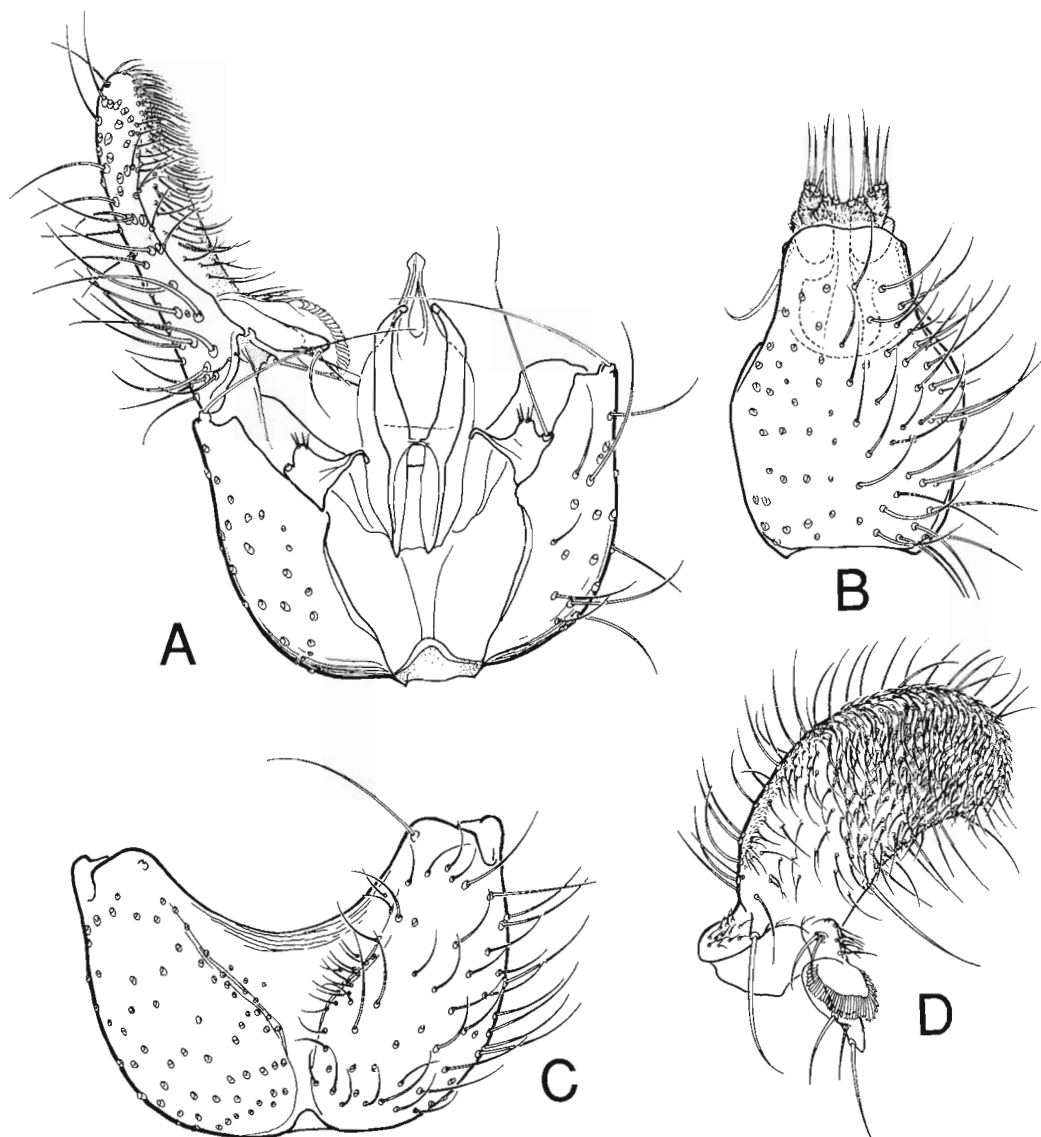


Fig. 50. *Coelosia xolotli* sp. n., male terminalia. — A. Dorsal view, tergite 9 removed. — B. Tergite 9 and associated structures. — C. Ventral view. — D. Gonostylus, interior view.

#### 24. *Coelosia xolotli* sp. n.

Figs. 5C, 50, 51.

**Type material.** Holotype: ♂ MEXICO: Sinaloa, 15 mi. W. El Palmito (5.000'), 03.08.1964, W. R. M. Mason (CNC). — Paratypes: 2♂♂ 3♀♀, otherwise as holotype; Sinaloa, Portrerillos (5.000'), 15 mi. W. El Palmito, ♂ 16.07.1964, ♀ 11.07.1964, J. F. McAlpine (CNC); Oaxaca, 134 km Tuxtépéc Rd., ♀ 24.07.1984, G. S. Jamieson (CNC).

**Etymology.** Named after the Aztec god Xolotl, the twin of Quetzalcoatl.

**Diagnostic characters.** Mouthparts elongated. Very similar to

*C. quetzalcoatl*. Males can be identified on their slender gonostyli and the two submedial protuberances along the apicoventral border of the fused gonocoxites. Abdominal segments 2–4 with yellow posterior margins, in contrast to *C. quetzalcoatl*, with uniform brown segments.

#### Description

**MALE** (n=2). Total length 3.20–3.38 mm. Wing length 2.55–2.58 mm, or 3.4x as long as profemur

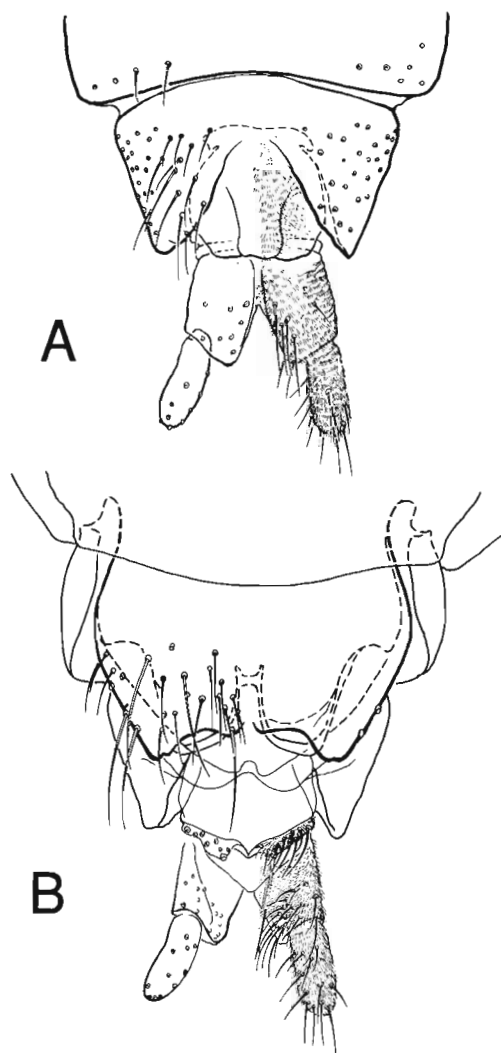


Fig. 51. *Coelosia xolotli* sp. n., female terminalia. — A. Dorsal view. — B. Ventral view.

(n=1).

**Coloration.** Front and top of head brown. Clypeus brown, mouthparts light brown. Scape, pedicel, first and most of second flagellomere yellowish, remaining flagellomeres light brown. Thorax brown. Halteres and legs yellow. Abdomen brown, abdominal segment 2–4 with yellow posterior margins, very narrow in segment 2. Gonocoxite yellowish, darkened apico-laterally. Gonostyli and tg 9 light brown.

**Head** (Fig. 5C). Length of flagellum 1.96–2.00 mm. First flagellomere 3.3–3.7x as long as wide, and 1.1–1.2x as long as second. Ocellar ratio 1.6–1.8. Front 1.5x as long as wide. Face with 9–10, clypeus with 20–

21, and labrum with 11–16 setae. Clypeus 1.0–1.1x as long as labrum. Relative lengths of palpomeres 1 : 1.0 : 1.7–1.8 : 1.8–1.9 : 3.3. Stipes well sclerotized distally, each with 2–6 setae.

**Thorax.** Total length 0.78 mm.

**Wings.** Wings with brownish tint. Sc with 2–3 and ta with 4–7 dorsal setae, M and CuA bare, including basal portion of M. Total length 4.15–4.63x as long as Sc, and 1.73–1.81x as long as R5. M-ratios 0.30–0.33 and 0.37–0.40, CuA-ratios 1.83–2.00 and 3.53–4.00.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.89, 0.65–0.67, 0.51–0.53; SV 2.19, 2.74, 3.26–3.33; BV 2.13, 3.10–3.20, 4.14–4.22; TR 1.48, 2.13–2.19, 2.69–2.77.

**Terminalia** (Fig. 50). Tg 9 ovate, narrowed toward apex, about 1.4x as long as wide, posterior margin evenly rounded. Tg 10 reduced. Hypoproct broad. Epiproct medially divided, with distinct lateral setae. Cerci partly fused, each with some apical setae. Gonocoxites ventrally fused. Posterior, ventral border of fused gonocoxites even. Gonostylus elongated, somewhat curved; interior surface clothed with numerous curved setae. Seta-bearing appendage rather small, with 3–4 strong, apical setae. Lamella-bearing appendage attached to proximal part of seta-bearing appendage. Ventral surface of lamella-bearing appendage with some large and several smaller setae. Paramere long, rather slender, apex curved inwards. Parameral apodeme distinctly shorter than paramere. Aedeagus evenly tapered.

**FEMALE** (n=5). Total length 3.34–3.59 (3.50) mm. Wing length 2.76–3.04 (2.89) mm, or 3.6–3.7 (3.6)x as long as profemur (n=4).

**Coloration.** As in males, except abdominal segments 3–6 with distinct yellow posterior margins.

**Head.** Total length of flagellum 1.29–1.50 mm. First flagellomere 3.2–3.5x as long as wide, and 1.2–1.3x as long as second. Ocellar ratio 1.6–1.8. Front 1.3–1.5x as long as wide. Face with 3–7, clypeus with 14–20, and labrum with 11–14 setae. Clypeus 1.1–1.2x as long as labrum. Palpomere ratios 1 : 1.0 : 1.7–1.9 : 1.8–2.1 : 2.9–3.3. Stipes each with 3–6 setae.

**Thorax.** Length 0.81–0.85 (0.83) mm.

**Wings.** Sc with 2–5 and ta with 4–6 dorsal setae, M and CuA bare, including basal portion of M. Total

length 3.88–4.17x as long as Sc, and 1.71–1.82x as long as R5. M-ratios 0.22–0.29 and 0.26–0.36, CuA-ratios 1.69–1.94 and 3.21–4.00.

**Legs.** Leg ratios given for fore, mid and hind leg: LR 0.83–0.89, 0.63–0.70, 0.51–0.57; SV 2.21–2.33, 2.65–2.94, 3.15–3.33; BV 2.00–2.13, 3.07–3.15, 4.03–4.22; TR 1.50–1.58, 2.00–2.18, 2.57–2.77.

**Terminalia** (Fig. 51). Gc 8 shallow bilobate, each with small median lobe and much wider lateral lobe. St 10 rather small, ending in nearly straight line with small median point. Tg 9 deeply bilobate, setose. Tg 10 elongated with 2 sublateral fold lines, bare. Cerci 2-segmented, cerci II elongated.

**Biology.** Unknown.

**Distribution.** Southern Nearctic. Mexico.

## Unrecognized species

### *Coelosia spectralis* (Brunetti)

*Euryschalis spectralis* Brunetti, 1912: 560.

**Type locality:** Kurseong, India. Unfortunately, it has not been possible to trace the type specimen, and it is probably lost.

According to Edwards (1924a) the species "is a typical member of the genus *Coelosia*". At that time, however, Edwards still regarded the two genera *Coelosia* and *Coelophthiria* as congeneric so Brunetti's species may well have been a *Coelophthiria*. Details in Brunetti's original description are in favour of such an assumption: thorax "highly arched" and the branches of CuA "very widely diverging". — These are both characteristics most typical for species in *Coelophthiria*.

### *Coelosia strigosa* Ostroverkhova

*Coelosia strigosa* Ostroverkhova, 1979: 98.

**Type locality:** Two localities are given, Irkutskaya oblast, okr. Bodajbo and Tomskaya oblast, Kolpatshevskiy rayon, both in Russia.

As with most of Ostroverkhova's type material, the holotype is inaccessible (Zaitzev, pers. com.), and the original drawings do not provide a basis for any conclusive remarks.

## Distribution

The genus is so far known only from the Oriental and the Holarctic regions. The northernmost records originate from Norway, Svalbard (79°N) and Canada, Inuvik region (68°N), both applying to *tenella*. The southernmost records are from Burma, Kambaiti (25°N), *burmacola*, and Mexico, Oaxaca (16°N), *tezcatlipocai* and *xochiquetzali*.

Three species, *tenella*, *truncata* and *modesta*, are found both in the Nearctic and the Palaearctic region. Of these *tenella* and *truncata* seemingly have a circumpolar-boreal, or more correctly, a boreo-montane-alpine distribution, found in an area stretching from Alaska and British Columbia in the west, across North America, to Scandinavia and Svalbard, and probably across Russia and Asia. The last species, *modesta*, has been recorded from the Kamchatka Peninsula in the Palaearctic, but is a common species west of the Rocky Mountains, recorded from Alaska southwards to California.

Of the 7 Palaearctic species, *flava* and *fusca* appear to be widespread in West Palaearctic, while *bicornis* and *limpida* have only been recorded from a few northern locations in the West Palaearctic. Two species, *fuscicauda* and *sapporoensis*, have not been recorded outside Japan, but the information on the distribution of Eastern Palaearctic species is very scarce.

The two Oriental species, *burmacola* and *distylata*, both originate from high altitudes, between 1.500 and 2.200 masl in the northern parts of the region.

Among the 13 species known from the Nearctic region *gracilis* and *vockerothi* are both found east and west of the Rocky Mountains. Four species, *brevilobata*, *longilobata*, *pygophora*, and *scopariata*, apparently have their distribution restricted to the areas west of the Rocky Mountains (inclusive), recorded from British Columbia to California. One species only, *succinea*, is restricted to the Great Plains (Eastern Nearctic). Six more species are entirely restricted to the South (Mexico), *huitzilopochtlii*, *quetzalcoatl*, *tezcatlipocai*, *tlaloci*, *xochiquetzali* and *xoloitli*. These are all montane species, recorded at very high altitudes.

Interestingly, all southern records originate from

high altitudes. In Mexico, a transitory area between the Nearctic and the Neotropical region, the mountainous fauna is largely regarded as being Nearctic. Likewise, a strong affinity exists between the northern, mountainous fauna in the Oriental and Palaearctic regions. The situation evidently points to an Holarctic origin of the genus.

## Biogeographical studies of fungus gnats

Only a few studies dealing with the biogeography of mycetophilids have been published, among them Munroe (1974), Gagné (1975, 1981), Väisänen (1984) and Matile (1990).

In his revision of the Holarctic representatives of the two genera *Trichonta* Winnertz and *Phronia* Winnertz (Mycetophilidae, Mycetophilinae), Gagné (1975, 1981) found that 43 (*Trichonta*) and 50 (*Phronia*) per cent of the studied species were recorded from both the Palaearctic and the Nearctic region. Furthermore, the European fauna had 7 species (11 per cent) of *Trichonta* in common with the Eastern Nearctic fauna, while only 3 species (5 per cent) in common with the fauna in Western Nearctic. In *Phronia* the numbers were 0 and 1 (1 per cent), respectively. Based on these results, and information from two other sources (Laffoon 1957, Munroe 1974), Gagné (1978, 1981) predicted the fauna of mycetophilids in Eastern Nearctic to be more similar to the European fauna than to the western Nearctic fauna. This is explained by the presence of an early Eocene (55 mill. yrs. BP) land connection between North America and Europe, presenting a more favourable route of dispersal than the simultaneous Beringean passage. Although Gagné did not outline the phylogeny of the species involved, the distribution of several supposed sister-species could be deduced from this theory. So also the distribution of the two subgenera *Psilosymmerus* and *Symmerus* of the genus *Symmerus* (Ditomyiidae) as shown by Munroe (1974).

A correspondingly large number of Holarctic species was not demonstrated in the genus *Mycomya* Rondani (Väisänen 1984). Among the 164 species studied by Väisänen, only 18 per cent were found to be Holarctic. However, the vicariance relationship ob-

served between some of the supposed sister species were, according to Väisänen (1984), in favour of Gagné's hypothesis.

Except for Matile (1990), previous attempts to outline the zoogeography of various mycetophilid genera undoubtedly suffer by lack of information on the eastern Palaearctic fauna, and by insufficient information on the phylogenetical relationship of the species dealt with. Gagné (1981) regrets the want of records of *Trichonta* from most of Asia, including Japan. Väisänen's (1984) revision, however, includes several Asian species, but as their sistergroup relationships remain unresolved they are not commented on in the zoogeographical discussion. Matile, however, in his revision of the Keroplatidae (Matile 1990) gives a detailed review and discussion of possible routes of dispersal.

## The biogeography of *Coelosia*

Sciaroidea is an ancient group of nematocerous Diptera, and one of the oldest known fossils is a species of Sciophilinae from Canadian Upper Cretaceous amber (Vockeroth 1981), i.e. nearly 100 million years old. Early tertiary Baltic amber is very rich in Sciaroidea, hundreds of species have been identified, of which numerous belong to recent genera. The processes underlying present distribution patterns are thus likely to be very ancient.

Representatives of *Coelosia* are known from North America and Eurasia only, consequently, their common ancestor is likely to be Laurasian in origin. The separation of Laurasia from the more southern continents dates back to the Cretaceous (Briggs 1987). At that time the first representatives of the genus might well have been in existence. Hence, the evolution and diversification of the genus probably coincide with the Tertiary development of North America and Eurasia.

Due to a scanty knowledge of the distribution of *Coelosia*, it is, of course, not possible to give any conclusive remarks on the origin and later dispersal of the genus. Some of the revealed sistergroup relationships may be artificial due to less intensive collecting in the eastern and central parts of the Palaearctic, and

in the western parts of the Nearctic. Accumulation of faunistic information and the inclusion of new species may strongly alter the phylogeny and interpretation present below.

Judged from the revealed phylogeny, the ancestor of the genus may just as well have originated in North America as in the eastern part of Eurasia; both alternatives appear likely parsimonious. Ultimately, the choice will very much depend on the interpretation of the distribution of the two species above Branch 46 in the strict consensus tree (Fig. 9), viz. *gracilis* and *truncata*.

If the genus originated in the present North America, the Holarctic, circum-polar distribution of *truncata* and *tenella* must be explained by a recent, quaternary dispersal to Eurasia. Contrary, if the genus had an Eurasian origin, the formation of *gracilis* must be ascribed an early vicariance event, succeeded by a later dispersal of *truncata* and *tenella*; or *gracilis* must be the result of a recent, quaternary speciation event. The latter interpretation is consistent with the few autapomorphies found in *gracilis*, and appears to be the most probable interpretation judged from the present knowledge on the phylogeny and distribution of the genus.

Except for *gracilis* and the six Mexican species above Branch 43, all species below Branch 36 in the strict consensus tree (Fig. 9) are Palaearctic or Oriental; moreover, 18 of the 19 most parsimonious trees, have either *fusca* or *distylata*, or both, located more basally than the six Mexican species. That means, 18 of the 19 most parsimonious trees go in favour of an Eurasian origin of the genus.

Leaving out the question about *gracilis* and *truncata*, an interpretation of the revealed phylogeny above Branch 30 calls for, at least, two major vicariance or long dispersal events. One leading to the formation of the ancestor of the Mexican species above Branch 43, alternatively to the formation of the ancestor of the remaining species above Branch 30; the other to formation of the ancestor of the species above Branch 36.

Provided the genus had an Eurasian origin, the ancestor of the six Mexican species above Branch 43 most likely reached North America across a Tertiary Beringean land bridge. These species are today found in the high mountains of southern Mexico, an area

exposed to pronounced climatic fluctuations in the time spanning from the arrival of their common ancestor. It thus seems likely that peripheral isolation has been involved in their speciation; an assumption supported also by the lack of shared synapomorphies among the species.

It is more difficult to give a satisfactory hypothesis for the formation of the 7 remaining species between Branch 30 and Branch 36, each restricted either to the western or eastern Eurasia, or to the northern Oriental region. Though, some of the revealed distribution patterns can be accounted for by vicariance events following the formation of the Obik sea and Turgai Strait (65 to 45 million years ago) (Adams 1981), once separating the present eastern and western Eurasia.

The ancestor of the species above Branch 36 possibly reached North America across a Beringean route, as all, except one of its Nearctic descendants today are found in the western Nearctic. The eastern Nearctic *succinacea*, forms a most puzzling sister group to the Japanese *sapporoensis*; and provided the phylogenetic relationship is correct, at least one long dispersal event is needed in order to explain their present distribution. One species above Branch 36, *modesta*, has a Holarctic distribution, found west of the Rocky Mountains and at the Kamchatka peninsula. This distribution most likely is due to a rather recent Beringean dispersal.

In contrast to the results obtained by Gagné (1978, 1981) in his studies of *Trichonta* and *Phronia*, the present study shows that only 3 (12 per cent) of the species have an Holarctic distribution. This is more in accordance with the situation in *Mycomya* (Väisänen 1984). Consequently, the biogeography of *Coelosia* does not form a basis for predicting the European fauna to have a stronger affinity to the eastern than to the western fauna of North America.

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## Appendix

### Additional material studied

All studied types are included in the text. Spelling of geographical names follow, as far as possible, The Times Atlas of the World (The Times 1990). A map showing the biogeographical provinces in Fennoscandia and Denmark is given inside every issue of the series Fauna Entomologica Scandinavica (see also Økland (1981) and Heikinheimo & Raatikainen (1981)).

#### *Coelosia bicornis* Stackelberg

**FINLAND:** Ob: Rovaniemi, Pisavaara, ♂ ♀ 26.08.1964, R. Tuomikoski (ZMH). **RUSSIA:** Khabarovskij kray., Gur., ♂ 16.09.1975, T. Rysakova (MOSC); Kostroma, 0.4 km S. Ugory, ♂ 08.09.1981, A. Zaitzev (MOSC).

#### *Coelosia flava* (Staeger)

**AUSTRIA:** Raxalpe (1500 m.a.s.l.), ♂ 20.08.1960, W. R. M. Mason (CNC); Tirol, Obergurgl, 620.07.1953, J. R. Vockeroth (CNC). **ENGLAND:** Gloucester, Bigsweir, 2♂♂ 26.06.1972, P. Chandler (PJC); Middlesex, Perivale Wds., ♂ 02.06.1974, P. Chandler (PJC); Oxfordshire, Charlbury, 2♂♂ 3♀♀ 04.07.1936, F. W. Edwards (BM1936-459) (BMNH); Devon, Dowlands Cliff., ♂ ♀ 09.06.1937, F. W. Edwards (BM 1937) (BMNH); Devon, Torquay, 1♂2♀♀ 20.06.1960, J. R. Vockeroth (CNC). **FINLAND:** Lk: Kitilä, Pallas, 2♂♂ 29.07.1967, R. Tuomikoski (ZMH). **FRANCE:** Pyrénées, ♀ 1907, Pandelle, (MNHN); V. Pierre ciatierra, ♀ 21.07.1914, (MNHN), Magas Tatra, Tarpatak-v. ♂ 02.08.1963, Mihályi (destroyed, MNHN). **GERMANY:** Halle, Wörlitz, 1 ex 31.05., ♀ 01.06.1905(?), (Don. Dtsch. Ent. Inst.) (HUN); same ♂ 01.06.1905 (A. L. Melander coll.) (USNM); ?Kohlbach, ♂ 07.08.1901 (Ex Deutsch. Ent. Inst. 1951) (IOW), ♀ 07.08.1901, (Don. Dtsch. Ent. Inst.) (HUN). **HUNGARY:** Magas Tatra, Tarpatak-v., ♂ 02.08.1963, Mihályi (HUN). **IRELAND:** Co. Meath, Kells., ♀ 05.06.1953, coll. R. L. Coe (BM 1953-347) (BMNH); N. Yorks, Eosloy, ♂ 21.06.1972, A. Stubbs (BMNH). **ITALY:** Trentino Alto Adige, Trafoi, 3♂♂6♀♀ 07.1896 (A. L. Melander Coll.) (USNM), ♂ 07.1896 (Ex Deutsch. Ent. Inst. 1951) (IOW); ♀ 2ex 07.1896 (HUN). **NORWAY:** HOY: Samnanger, Ådland, ♂ 16.06.–02.07.1982, A. J. Nilsen (ZMBN); NSY: Bodø, Urskar, Skuti, ♂ ♀ 05.08.1982, A. J. Fjeldsø

(ZMBN); TRY: Tromsø, Skittenelv, 5♂♂4♀♀ 13.09.1987, G. Söli (ZMBN). **SWEDEN:** SK: Hälsingborg, ♂ 16.06., 2♀♀ 07.08.1922, O. Ringdahl (ZML); TO: Abisko, ♂ 08.08.1951, J. R. Vockeroth (CNC). **SWITZERLAND:** Vaud, St. Sulpice, 2♂♂ 06.1947, ♀ 22.05.1948, F. Schmid (IOW). **RUSSIA:** (Charpatian) Zakarpat'e, Khust, 2♂♂ 05.08.1963, B. Mamaev (MOSC); Zakarpat'e, Kvasy, 3♂♂ 24.06., 2♂♂ 29.06.1963, B. Mamaev (MOSC); Krasnodarskiy Kray, Krasnodar, 2♂♂ 09.06.1965, B. Mamaev (MOSC); Ural, 2♂♂2♀♀ 22.08.1925, Fridolin (ZIAS).

#### *Coelosia fusca* Bezzi

**DENMARK:** Jylland, Silkeborg, ♀ 25.03.1930 (ZMC), ♂ 12.04.1930 (ZMC); Velling Skov, ♂ 12.10.1930 (Gen. prep. 139, ZMC); Rudstrup Skov, ♂ 03.04.1932 (ZMC); ♂ 25.11.1934 (ZMC). **ENGLAND:** Wales, Anglesey, Newborough, ♀ 09.07.1987, P. Chandler (PJC); Dyfed, Pembrey Forest, ♂ 13.07.1986, P. Chandler (PJC); Oxford Mus., ♂ 09.02.1923, A. H. Hamm (BM 1925.27, BMNH); Logie, ♀ 09.1909, F. J. (BMNH); Felden, Herts, ♀ 09.03.1899, A. Piffard (BMNH). **FINLAND:** ? Kolmiranta, 2♂♂1♀ 31.07.1979, A. E. Stubbs (PJC); AI: Lemland, Flaka, ♀ 06.06.1962, R. Tuomikoski (ZMH); Ab: Vihti, Vihtijärvi, ♀ 12.05., ♂ 17.06., ♂ 21.06., ♂ 22.06., ♂ 13.07.1962, ♀ 01.06., ♀ 15.06., ♂ 22.06., ♀ 08.07., ♂ 05.08.1963, ♂ ♀ 27.09.1965, R. Tuomikoski (ZMH); Bromarv, Framnäs, 2♂♂ 12.06., ♀ 22.06.1966, K. Mikkola (ZMH); N: Helsing, Nordsjö, 2♀♀ 20.05., ♂ 08.10.1962, W. Hackman (ZMH); Helsing, Malminkartano, ♂ 16.09.1965, R. Tuomikoski (ZMH); Helsinki, Villinki, ♂ 07.06.1962, W. Hackman (ZMH); Helsingfors, 2♂♂ 28.05.1962, W. Hackman (ZMH); Kirkkonummi, Danskarby, 2♀♀ 06.1965, K. Mikkola (ZMH); Esbo, Westend, Småholmen, ♂ 09.06.1962, W. Hackman (ZMH); Esbo, Kolmperä, ♂ 08.06., 2♀♀ 09.06., 2♂♂1♀ 10.06., ♂ 11.06., ♀ 18.06., ♂ 29.09.1963, 14♂♂ 21.06, ♀ 03.10.1964, ♂ 10.06.1966, W. Hackman (ZMH); Tvärminne, ♂ ♀ 14.06.1966, K. Keynäs (ZMH); Sibbo, Hindsby, 2♀♀ 07.10.1987, P. Ahlroth (ZMH); Ta: Urjala, ♀ 02.10.1965, T. Brander (ZMH); Sa: Punkasalmi, ♂ 30.06.1963, W. Hackman (ZMH); Valkeala, Utti, ♀ 09.08., ♂ 16.09.1965, K. Mikkola (ZMH); Kb: Kontiolahti, Kolvana, 14♂♂13♀♀ 04.07.1965, R. Tuomikoski (ZMH); Pielisjärvi, 2♂♂ 15.06.1964, R. Tuomikoski (ZMH); Pielisjärvi, Koli, 6♂♂12♀♀ 05.07., 44♂♂57♀♀ 06.07.1965, R. Tuomikoski (ZMH); Ok: Kuhmo, 40♂♂13♀♀ 29.06., 38♂♂5♀♀ 01.07.1965, R. Tuomikoski

(ZMH); Sotkamo, ♀ 14.08.1962, ♂ 27.06.1963, A. V. V. Mikkola (ZMH); Sotkamo, Aarreniemi, ♀ 28.06.1963, ♀ 10.08., ♀ 11.08.1964, ♂ 09.07., 1♂ 3♀ 14.–15.07., 2♂♂ 3♀ 16.–21.07., ♂♀ 22.–28.07.1965, A. V. V. Mikkola, 2♀♀ 07.07.1965, R. Tuomikoski; ♂ 02.07.1966, K. Keynäs (ZMH); **Ob:** Rovaniemi, Pisavaara, ♂ 13.07.1965, R. Tuomikoski (ZMH); **Ks:** Kuusamo, Rukavaara, ♀ 24.06.1964, ♂ 09.07.1965, R. Tuomikoski (ZMH). **FRANCE:** Hyères Cr., ♂ dec. 1902 (MNHN); Isère, Col de Porte (1300 m.a.s.l.), 3♂♂ 2♀♀ 26.06.1970, L. Matile (MNHN); same data ♂ (CNC); Drôme, Ft. de Lente (1400 m.a.s.l.), ♂ 25.06.1970, L. Matile (MNHN). **ITALIA:** Lombardia, S. Iorio (?), ♂ 06.06.1903 (MIL); Aosta, Cogne, Piano di Sylvenoire (1550 m.a.s.l.), ♂ 27.06.1973, D. & L. Matile (MNHN); Vallée de Cogne P. (N.G.P.) (1650 m.a.s.l.), ♂ 24.06.1973, D. & L. Matile (MNHN). **NORWAY: TEY:** Porsgrunn, Skjelsvik, 1♂ 8♀♀ 16.10.1987, G. Sjøli (ZMBN); **VE:** Seim, Oseberg, 2♀♀ 26.10.1982, T. Andersen (ZMBN); Seim, Borrevann, 2♀♀ 15.06.1982, T. Andersen (ZMBN); **HOY:** Fjell, Vindenes, Austervågen, ♀ 10.09.1978, T. Andersen (ZMBN); Bergen, Askøy, Florvåg, 2♂♂ 20.11.1983, T. Andersen (ZMBN); Bergen, Fjellsiden, 4♂♂ 1♀ 11.09., 12.09.1982, G. Sjøli (ZMBN); Bergen, Fløyen, Skomakerdiket, ♀ 11.09.1982, G. Sjøli (ZMBN); Bergen, Fjellsiden, Tippetueveien, 2♂♂ 29.09.1982, G. Sjøli (ZMBN); Os, Lundatræ, 1♂ 2♀♀ 09/10.1975, T. Andersen (ZMBN); Osterøy, Fitjahjellen, ♂ 19.09.1982, G. Sjøli (ZMBN). **RUSSIA:** Zakarpat'e, Rakov, 3♂♂ 1♀ 18.06.1966, B. Mamaev (MOSC). **SPAIN:** Canary Islands, Tenerife, Aguamanza (1050 m.a.s.l.), ♂ 09.01.1974, J. R. Vockeroth (CNC). **SWITZERLAND:** (Grisons) Lenzerheide-Dieschen (1550–1600 m.a.s.l.) (Rèseineux), 2♀♀ 09.06.1976, L. Matile (MNHN); Canton of Vaud, Jorat, 7♂♂ 1♀ 24.05.1950, F. Schmid (IOW). **RUSSIA:** Leningrad province, Luga district., Tolmatshevo, ♀ 19.08.1937, A. A. Stackelberg (ZIAS).

*Coelosia gracilis* Johannsen

**CANADA: ALBERTA:** Banff, ♀ 10.08.1928, O. Bryant (CAL); Kananaskis, For. Exp. Sta. Seebe, ♀ 03.07, ♂ 2♀♀ 18.07.1968, H. J. Teskey (CNC); Laggan, ♀ 10.08.1928, O. Bryant (CAL); Waterton Ntl. Park, 4♂♂ 4♀♀ 24.07., ♀ 25.07.1946, G. F. Knowlton (IOW), ♀ 03.–07.07.1980, H. J. Teskey (CNC); **BRITISH COLUMBIA:** Ketchum L. (58°22'N, 131°45'W, 3600'), 4♂♂ 2♀♀ 23.08., 8♂♂ 2♀♀ 26.08.1960, R. Pilfrey, W. W. Moss (CNC); Manning Park, 3♂♂ 26.06.1984, R.

Danielsson (ZML); Mt. Revelstoke Nat. Pk., Eva Lake Trail (4000'), ♂ 14.07.1952, G. J. Spencer (CNC); Pete Lake (57°56'N, 131°56'W, 4000'), 4♂♂ 1♀ 20.08.1960, R. Pilfrey, ♂ 21.08.1960, W. W. Moss (CNC); Robson, ♂ 13.07.1947, ♂ 07.1947, H. R. Foxlee (CNC); Squamish, Diamond Head Trail (3300'), ♀ 05.08.1953, E. Mason, ♀ 16.08.1953, G. J. Spencer (CNC) Summit L., Mi. 392 Alaska Hwy. (4200'), 2♂♂ 19.–21.07.1959, E. E. MacDougall (CNC); **MANITOBA:** Fort Churchill, ♂ 01.08., ♂ 02.08., ♂ 05.08., 2♂♂ 11.08., ♂ 12.08., 3♀♀ 17.08., 4♂♂ 1♀ 21.08.1952, J. G. Chillcott (CNC); **NORTHWEST TERRITORIES:** Aklavik, MacKenzie River, ♂ 01.09.1929, O. Bryant (CAL); Baffin Island, Frobisher Bay, 35♂♂ 11.08.1948, F. G. DiLabio (CNC); Bathurst Inl., Baychimo Harb., 2♂♂ 30.06., ♂ 12.07.1966, G. E. Shewell (CNC); Exmouth L. (65°02'N, 115°04'W), 2♂♂ 22.07.1966, G. E. Shewell (CNC); Lac Maunoir, N shore., ♀ 24.07.1969, G. E. Shewell (CNC); Rocknest L. (65°39'N, 114°20'W), ♂ 26.08.1966, G. E. Shewell (CNC); **QUEBEC:** Gt. Whale R., ♀ 29.08., 2♂♂ 1♀ 31.08., ♂ 03.09., 5♂♂ 07.09.1949, J. R. Vockeroth (CNC); Indian House L., ♂ 15.08., 2♂♂ 1♀ 20.08.1954, R. Coyles (CNC); Payne Bay, ♂ 10.08.1958, W. R. M. Mason, 3♂♂ 19.08.1958, E. E. MacDougall (CNC); **SASKATCHEWAN:** Hudson Bay, ♀ 15.09.1959, J. R. Vockeroth (CNC); Otosquen (53°18'N, 102°W), ♂♀ 12.09.1959, J. R. Vockeroth (CNC). **U. S. A: ALASKA:** Anchorage, 30 mi NE, ♀ 04.08.1948, R. I. Sailer (USNM); Cold Bay (163°W, on tundra), ♂ 26.07.1952, W. R. Mason (CNC); Douglas Isld., ♀ 10.08.1958, (JEC); Isabel Pass, Mi. 206 Richardson Hwy. (2900'), ♂♀ 14.07., ♂ 16.07.1962, P. J. Skitsko (CNC); Kotzebue, ♂ 02.09. 1951, T. Overhulse (USNM); **COLORADO:** Cameron Pass, ♂ 19.08.1947, D. E. Hardy (IOW); Echo L., Mt. Evans (600'), ♂♀ 11.08., 2♂♂ 12.08.1961, C. H. Mann (CNC); Loveland Pass, W. slope (9850'), ♂ 08.08. 1960, C. H. Mann (CNC); **NEW HAMPSHIRE:** Mt. Washington, ♂ 29.07.1961, W. W. Wirth (USNM); **OREGON:** Umatilla Co., 27 mi E Ukiah, Highway 244 at Frazier Campground Road, ♀ 24.07.1974, P. H. Arnaud Jr. (CAL).

*Coelosia limpida* Plassø & Mann

**NORWAY: TRY:** Tromsø, Finnvikdalen, 3♂♂ 2♀♀ 25.08.1987, G. Sjøli (ZMBN); Tromsø, Prestevannet, ♂♀ 18.08., 19.08.1987 (ZMBN); Tromsø, Breidvikeidet, Granheim, 5♂♂ 01.09., 02.09.1987, G. Sjøli (ZMBN); Tromsø, Oldervik, 2♂♂ 13.09.1987, G. Sjøli (ZMBN).

*Coelosia modesta* Johannsen

**RUSSIA:** Kamchatka, Shiveluch, 1♀ 27.08.1909, Schmidt (as *C. quadricornis*, ZIAS). **CANADA: BRITISH COLUMBIA:** Cultus Lake, 2♂♂ 1♀ 21.10.1938, J. K. Jacob (CNC), 2♀♀ 24.06.1965, F. Schmid (CNC); Mt. Revelstoke (seepage, 5000'), ♂ 01.07.1968, W. W. Wirth (USNM); Robson, ♂ 10.05., ♂ 03.06.1947, H. R. Foxlee (CNC); Vancouver, Point Grey, ♂ 16.11., ♂♀ 22.11, 4♂♂ 28.11.1972, 2♀♀ 27.04.1973, J. R. Vockeroth (CNC); Victoria, ♀ 03.12.1961, D. Evans (CNC); ♀ 18.12.1961, F. I. S. (CNC). **U. S. A: ALASKA:** Unalakleet, ♀ 05.08.1961, R. Madge (CNC); **CALIFORNIA:** Alameda Co., Strawberry Canyon, ♂ 21.05., ♀ 28.12.1948, 9♂♂ 1♀ 02.1949, ♂ 21.03.1949, W. W. Wirth (USNM), Berkeley, Strawberry Can., 1♂ 14.04.1968, D. D. Munroe (CNC); Berkeley, 3♂♂ 15.05., ♀ 16.05., 1♂ 3♀ 23.05., ♂ 24.05.1915, M. C. VanDuzee (1 ex. misid. as *C. tenella*, CAL); Humboldt Co., Bair's Rch., Redwood Creek, 1♂ 2♀♀ 09.06., H. S. Barber (USNM); Marion Co., Silver Falls State Park, ♀ 23.06.1974, P. H. Arnaud Jr. (CAL); Marin Co., Mill Valley, ♂ 09.02., 4♂♂ 28.03., ♂ 07.04.1926 (M. C. VanDuzee Coll., CAL); Mt. St. Helena, ♂ 12.05.1926, M. C. VanDuzee (CAL); Marin Co., Copper Mine Gulch, 1♂ 4♀♀ 15.02., 2♂♂ 1♀ 17.02.1977, D. Dee Wilder (CAL); Marin Co., Inverness, ♀ 31.03.1949, W. W. Wirth (USNM), 2♂♂ 23.02.–06.03.1964, P. H. Arnaud (CAL), ♀ 10.05.1968, D. D. Munroe (CNC); Marin Co., Lily Pond, Alpine Lake (1500'), ♀ 10.04.1968, D. D. Munroe (CNC), ♀ 05.03.1969 (CNC); Marin Co., Mill Valley, 2♀♀ 03.09.1926 (CAL); ♀ 13.02.1966, P. H. Arnaud Jr. (CAL); Mill Valley, Blithedale Ridge, Lee Street (110 m), ♂ 02.–04.05., ♀ 06.–10.05., ♀ 28.05.–01.06.1965, P. H. Arnaud Jr. (CAL); Marin Co., Samuel P. Taylor St. Pk., along Lagunitas Creek, ♀ 20.05.1977, D. Dee Wilder (CAL); Mendocino Co., Ryan Creek, ♂♀ 09.04.1939, N. F. Hardman (B. Brookman Coll., CAL); San Mateo Co., Corte de Madera Creek, ♀ 14.03.1965, P. H. Arnaud Jr. (CAL); San Mateo Co., Corte de Madera Cr., vic. Portola, 1♂ 4♀♀ 11.06.1960, P. H. Arnaud (CAL); San Mateo Co., Redwood City, ♂ 02.01.1961, P. H. Arnaud (CAL); San Mateo Co., San Mateo County Memorial Park (60 m), ♂ 05.06.1977, P. H. Arnaud Jr. (CAL); Santa Cruz Co., Corralitos Creek Elev., 8 mi. NE Watsonville (200'), ♂♀ 04.04.1981, T. L. Tyler (CAL); Sonoma Co., Bodega Bay, ♀ 06.02.1966, J. D. Birchim (CAL); Eureka, ♀ 22.05., H. S. Barber (USNM); Jan Jose, Alum Rock Park, ♀ 05.04.1906 (misid. as *C. flavicauda*, USNM); Lafayette, ♀ 18.04.1968, D. D. Munroe (CNC); Pacific Grove, ♀ 09.05.1906

(as *C. flavicauda* det. O. A. Johannsen, CORN); San Francisco, ♀ 25.03.1964, P. H. Arnaud Jr. (CAL); **IDAHO:** Moscow Mt., ♀ 02.07.1911 (USNM), ♂ 26.06.1920, A. L. Melander (USNM); Priest Lake, ♀ 01.08.1916 A. L. Melander (USNM); **OREGON:** Baker Co., L. Goose Crk., 36 mi SE. Union (4000'), ♀ 13.–19.07., 8♂♂ 1♀ 22.–28.06.1975, E. J. Davis (JEC); Clackamas Co., Bruin Run Creek, Camp Creek Campground, ♂ 24.06.1974, P. H. Arnaud Jr. (CAL); Douglas Co., 8 mi E. Elkton, 2♂♂ 16.06.1971, Steyskal (USNM); H. R. Co., 18 mi S. Hood River, ♂ 10.06.1971, D. N. Ferro (JEC); Jackson Co., Squaw Lake, ♀ 22.05.1964, J. Schuh (JEC); Union Co., U. Lick Creek, 28 mi. SE Union (4280'), ♂ 22.–28.06.1975, E. J. Davis (JEC); Union Co., Whiskey Crk., 23 mi SSW La Grande (5120') ♀ 29.–31.07.1976, E. J. Davis (JEC); Salem, ♂♀ 04.07.1917, A. L. Melander (USNM); Viento, ♂ 01.07.1917, A. L. Melander (USNM); **WASHINGTON:** Asotin Co., Fields Spring National Park, ♂ 06.–07.06.1971, W. J. Turner (JEC); Clark Co., Vancouver, ♂♀ 19.05.1970 (JEC); Jeff Co., 5 mi S. W. Hoh R. S., Hoh River, 2♀♀ 04.08.1972, W. J. Turner & W. B. Garnett (JEC); Olympic National Park, Hoh River (Rain forest), ♂ 07.07.1968, W. W. Wirth (USNM); Olympic NP., ♂ 17.08.1954, R. Coleman (USNM); Kitt. Co., Swauk Mdw., 1 mi SE. Swauk Pass, 1♂ 4♀♀ 17.07.1972, W. B. Garnett (JEC); Pacific Co., Ft. Canby St. Prk., 5♂♂ 2♀♀ 11.–13.06.1971, W. J. Turner (JEC); Ft. Canby St. Prk., near Ilwaco, 2♂♂ 13.–15.06.1971, M. Jackson (JEC); 19 mi NE Ilwaco, ♀ 31.07.1972, W. J. Turner & W. B. Garnett (JEC); Pierce Co., Fort Lewis, ♂ 06.01., ♂ 02., ♂ 30.03., 2♀♀ 06.04., ♂ 15.04.1946, P. H. Arnaud (IOW); Skagit Co., Rockport St. Pk., 7 mi E. Concrete, 2♀♀ 16.–17.06.1971, J. A. Novak, W. J. Turner (JEC); Stevens Co., 5 mi NE Deer Lake (3200'), 2♀♀ 11.–13.07.1975, W. J. Turner (JEC); Adna, ♂ 10.07.1917, A. L. Melander (USNM); Ashford, ♀ 01.06.1921, H. G. Dyar (USNM); Chehalis, ♂ 15.03.1911 (USNM); Everett, ♂ 30.03.1946, C. Johansen (JEC); Glacier, ♂ 04.06.1917, H. G. Dyar (USNM); Ilwaco, ♀ 27.08.1917, ♀ 05.05.1918, A. L. Melander (USNM); Montesano, ♂ 19.07.1917, A. L. Melander (USNM); Olga, ♂ 17.05.1910, A. L. Melander (USNM); Piedmont, Lk. Crescent, ♀ 26.07.1917, A. L. Melander (USNM); Pullman, ♂ 25.05.1924, A. L. Melander (USNM), ♂ 18.06.1950, R. B. Spurrier (JEC); Pullman, Kamiak Butte, ♂ 06.05.1953, M. T. James (JEC); Sequim Bay, ♂ 03.09.1934, A. L. Melander (USNM); South Bend, ♀ 13.05.1917, A. L. Melander (USNM); Tacoma, ♂♀ 12.04.1913 (USNM); 23.2 mi S South Bend (Wash. 101), ♂ 09.10.1968, D. D. Munroe (CNC); 9 mi

NW Coconully, Salmon Mdw. (4500'), ♂ ♀ 23.–26.07.1975, W. J. Turner (JEC); Vashon, ♀ 28.05.1917, A. L. Melander (USNM); Washovaal, ♂ 25.05.1910, A. L. Melander (USNM).

*Coelosia pygophora* Coquillett

U. S. A: CALIFORNIA: San Mateo Co., Baker, ♂ (USNM); San Mateo Co., Woodside, ♂ ♀ 18.01.1947, P. H. Arnaud (IOW); San Mateo Co., Jasper Ridge, 4♂♂ 1♀ 18.01.1948, P. H. Arnaud Jr. (IOW); San Mateo Co., Junipero Serra Park, 23♂♂ 06.12.1964, P. H. Arnaud Jr. (CAL); San Mateo Co., Redwood City, ♂ 02.01.1961, P. H. Arnaud Jr. (CAL); Santa Clara Co., Anderson Resvr., 2♂♂ 27.11.1973, B. A. Tilden (CAL); Santa Clara Co., Stanford Univ., 3♂♂ 1♀ 02.01.1961, P. H. Arnaud Jr. (CAL).

*Coelosia tenella* (Zetterstedt)

DENMARK: Jylland, Silkeborg, 2♂♂ 16.12.1934 (Gen prep. 598, ZMC) ♂ 18.10.1942 (ZMC). EIRE: Sligo, Glen of Knocknarea, ♂ 13.05.1970, P. Chandler (JPC); Wicklow, Glendalough, ♂ 13.11.1984, P. Chandler (JPC). ENGLAND: Kent, Scadbury Park, ♂ 08.06.1983, P. Chandler (JPC); Surrey, Gracious Pond, ♀ 30.10.1978, P. Chandler (JPC); Sussex, Lavender Platt, ♀ 07.10.1976, P. Chandler (JPC); Logie, Elgin, 1ex. 2♂♂ 27.09.1910, F. Jenkinson (1913–9, BMNH); Newtonmore, ♀ 09.1905, F. J. (BMNH); Crowborough, Sussex, ♂ 09.01.1903, F. Jenkinson (1913–9, BMNH); Dingwall, Cromarty, ♀ 26.05.1911 (BMNH); Inverness, Aviemore, ♂ 05.1934, J. F. Edwards (BMNH); Hampshire, New Forest, Burley, ♂ 01.04.1973, A. M. Hutson (BMNH). FINLAND: Ab: Vihti, Vihtijärvi, 21♂♂ 10♀♀ 03.07., 08.07., 15.07., 16.07., 05.08., 07.08., 18.08.1962, 08.06., 16.06., 23.06.1963, 23.07., 29.06., 03.08., 08.08., 27.08., 20.10., 30.07., 10.08.1964, 3.10., 27.11.1965, R. Tuomikoski (ZMH); Lohja, Loanila, ♂ 25.06.1966, K. Keynäs (ZMH); Tenhola, Skogby bruk, 1♂ 26.08.1965, R. Tuomikoski, 2♂♂ 2♀♀ 24.09.1965, A. Mikkola 3♂♂ 10♀♀ 15.10.1965, K. Mikkola (ZMH); Paimio, Tarvasjoki, 1♀ 07.10.1979, P. Chandler (JPC); N: Esbo, Kolmperä, 24♂♂ 5♀♀ 06.06., 10.06., 22.06., 03.07., 29.09., 13.10.1963, 21.06., 22.07., 06.09., 12.09., 20.09.1964, 01.07., 19.09. 16.10.1965, W. Hackman (ZMH); Espoo, Bodom, ♂ ♀ 09.10.1962, R. Tuomikoski (ZMH); Espoo, W. Småholmen, ♂ ♀ 01.06., 20.08.1962, W. Hackman (ZMH); Helsingfors, ♂ 07.10.1962, W. Hackman (ZMH); Helsinki, Malminkartano, ♂ 16.09.1965, R. Tuomikoski (ZMH); Helsinki, Nordsjö, 5♂♂ 3♀♀ 23.10.1962, 26.06.,

22.09.1963, R. Tuomikoski (ZMH); Helsing, Nordsjö, 4♂♂ 1♀ 23.10. 1962, R. Tuomikoski (ZMH); Tvärminneby, ♂ 24.07. 1963, K. Mikkola (ZMH); Tvärminne, 1♂ 2♀♀ 24.08. 1963, 23.–24.08.1965, K. Mikkola (ZMH), ♂ 07.–08.07.1965, W. Hackman (ZMH); Nyland, Kirkkonummi, 9♂♂ 12♀♀ 10.–16.07., 13.–14.08., 20.08., 31.08.1963, K. Mikkola (ZMH); Kirkkonummi, Danskarby, ♂ 06.1965, K. Mikkola (ZMH); Tammisaari, Gullö, ♀ 16.–28.09. 1967, K. Mikkola (ZMH); Sibbo, Hindsby, 2♂♂ 3♀♀ 07.10.1987, P. Ahlroth (ZMH); Stensvik, 2♂♂ 06.10.1979, P. Chandler (JPC); Ta: Lammi, ♀ 07.10.1962, J. Kaisila, ♀ 19.07.–06.08.1963, K. Mikkola (ZMH); Lammi, Porrasoski, ♂ 28.10.1962, R. Tuomikoski (ZMH); Lammi, 7♂♂ 5♀♀ 09.1981, Ilka Hanski (Bred from *Leccinum scabrum*, ZMH); Urjala, 2♀♀ 02.10., 2♀♀ 16.10.1965, 5♂♂ 2♀♀ 22.10.1965, T. Brander (ZMH); Vanaja, Suurisuo, 2♂♂ 19.09.1965, R. Tuomikoski (ZMH); Sa: Valkeala, Utti, ♂ 16.09.1965, K. Mikkola (ZMH); Joutseno, 2♀♀ 28.09., 29.09.1965, E. Thuneberg (ZMH); Punksalmi, 2♂♂ 30.06.1963, W. Hackman (ZMH); Kb: Koli, ♂ 15.–16.08.1964, R. Tuomikoski (ZMH); Ok: Kuhmo, ♂ 29.06., ♂ 01.07.1965, R. Tuomikoski (ZMH); Sotkamo, ♀ 08.08.1962, A. Mikkola (ZMH); Sotkamo, Aarreniemi, 5♂♂ 6♀♀ 16.06., 20.07.1963, 14.08., 15.08., 18.08.1964, 09.07., 11.–14.07., 16.–21.07., 22.–28.07.1965, A. V. V. Mikkola (ZMH); Ob: Rovaniemi, Pisavaara, ♂ ♀ 13.07. 1965, R. Tuomikoski (ZMH); Ks: Kuusamo, Kiutaköngäs, 3♂♂ 27.07.1966, 19.–24.07.1967, R. Tuomikoski (ZMH); Kuusamo, Kitajoki, ♂ 20.07.1967, Mihályi (MNHN); Lk: Kitilä, Pallas, ♂ 29.07.1967, R. Tuomikoski (ZMH); Le: Utsjoki, ♂ ♀ 18.07.1965, R. Tuomikoski (ZMH); Pallastunturi (NL 680), ♂ 28.07.1967, Mihályi (HUN). FRANCE: Rambouillet, Seine a Dize, ♀, Ségué (MNHN). NORWAY: TEY: Porsgrunn, Skjelsvik, ♂ 16.10.1982, G. Sjøli (ZMBN); HOY: Fjell, Vindenes, 1♂ 9♀♀ 25.10.1977, 15.08., 05.09., 15.09., 8.10.1978, T. Andersen (ZMBN); Fjell, Vindenes, Austervågen, 1♂ 3♀♀ 15.08.1975, 10.08., 14.10.1978, T. Andersen (ZMBN); Fjell, Vindenes, Austre Loftsmysa, 1♂ 2♀♀ 05.08., 05.09. 1978, T. Andersen (ZMBN); Fjell, Vindenes, Geitneset, 2♀♀ 05.06., 05.09.1978, T. Andersen (ZMBN); Os, Lundatræ, 2♂♂ 2♀♀ 09/10.1975, 31.10.1976, T. Andersen (ZMBN); Bergen, Fana, Straume, 13♂♂ 9♀♀ 31.08.1979, T. Andersen (ZMBN); Bergen, Fana, Kalandsvann 31.10.1976, T. Andersen (ZMBN); Bergen, Askøy, Florvåg, ♂ ♀ 03.10., 20.11.1982, T. Andersen (ZMBN); Bergen, Fløien, Skomakerdiket, ♂ ♀ 11.09.1982, G. Sjøli (ZMBN); Bergen, Åsane, Eidsvåg, 5♂♂ 6♀♀ 31.10.1976,

T. Andersen (ZMBN); Osterøy, Fitjahjellen, 2♂♂ 19.09.1982, G. Søli (ZMBN); **HOI:** Kvam, Røyri, ♂ 10.10.1982, Andersen & Søli (ZMBN); Kvam, Stekka, ♂ 10.10.1982, Andersen & Søli (ZMBN); Odda, Teigen, ♂ 21.–30.10.1977, T. Andersen (ZMBN); Ullensvang, Hovland, ♀ 21.–30.10.1977, T. Andersen (ZMBN); **NSY:** Bodø, Urskar, Skuti, ♂ 05.08.1982, A. Fjeldsø (ZMBN); **FI:** Kautokeino, Kautokeino, ♂♀ 23.07.1987, G. Søli (ZMBN); **SVALBARD:** Spitsbergen, Gaffelbreen, St.Jonsfjorden ♂ 24.07.1960; Ankerbreen, St.Jonsfjorden 1♂2♀♀ 29.07.1960; Kapp Wijk, Dichsonfjorden ♂ 08.08.1960, ♂ 13.08.1960; Coraholmen, Ekmansfjorden (78°40'N, 14°45'E) 2♂♂ 1♀ 09.08.1960; Longyearbyen, 3♂♂ 2♀♀ 16.–24.08.1960, R. Mehl (ZMO). **SWEDEN:** **TO:** Abisko Lapland, ♂ 30.07.1951, J. R. Vockeroth (CNC). **RUSSIA:** NW Russia, Luga distr. Tolmachevo, ♂ 24.06.1935, 2♂♂ 01.07.1935, ♂ 13.08.1936, 1♂ 10.06.1937, 4♂♂ 2♀♀ 18.06.1938, 1♂ 20.06.1938, ♂ 03.08.1938, 2♂♂ 04.08.1938, Stackelberg (ZIAS); Kola peninsula, Kirovsk, Chibins Mts., ♂ 11.10.1933, Fridolin (ZIAS); N Russia, Salekhard, ♂ 27.08.1909, F. Zaitzev (ZIAS).

**CANADA:** **BRITISH COLUMBIA:** Lac la Hache, ♀ 02.07.1964, L. H. McMullen (CNC); Summit L. (Mi392 Alaska Hwy., 4500'), ♂ 08.07.1959, R. E. Leech (CNC); Ditto, ♀ 17.–19.07.1959, E. E. MacDougall (CNC); **MANITOBA:** Fort Churchill, ♂ 25.08.1950, J. G. Chillcott (CNC); **NORTH-WEST TERRITORIES:** Bathurst Inl., Baychimo Harb. (M.T.S. Gravity Survey Camp.), 8♂♂ 3♀♀ 30.07, 03.08., 06.08., 12.08., 16.08.1966, G. E. Shewell (CNC); Wharton L. (63°52'N, 99°45'W), ♂ 18.08.1965, J. G. Chillcott (CNC); Dubawnt L., (63°18'N, 101°37'W), 3♂♂ 2♀♀ 02.08.1966, J. G. Chillcott (CNC); Muskox L. (64°45'N, 108°10'W), ♂ 12.08.1953, J. G. Chillcott (wing slide no. ES191, CNC); Baffin Island, Frobisher Bay, ♂ 11.08., ♂ 12.08.1948, F. G. DiLabio (CNC); **ONTARIO:** Ottawa, ♂ 04.10.1951, J. F. McAlpine (CNC); Mer Bleu, 5 mi. E. Ottawa, 2♀♀ 15.06.1966, D. D. Munroe (Malaise trap) (CNC); **QUEBEC:** Beechgrove (45°39'N, 76°8'W), ♀ 2.10.1964, J. R. Vockeroth (CNC); Old Chelsea, Summit King Mt. (1150'), ♂ 24.06.1965, J. R. Vockeroth (CNC); Old Chelsea, ♀ 24.10.1965, J. R. Vockeroth (emerged from mixture of soil and rotten agaric) (CNC); Payne Bay, 2♂♂ 19.08.1958, E. E. MacDougall (CNC); **YUKON TERRITORY:** Herschel I., ♂ 22.07.1971, W. R. M. Mason (CNC). **U.S.A:** **ALASKA:** Gulkana, Paxson Lodge, ♀ 04.08.1951, W. R. M. Mason (CNC); Matanuska, ♂ 13.06.1944, J. C. Chamberlin (Rotary trap) (USNM); Mt. Fairplay,

Mt. 32 Taylor Hwy (3600'), ♀ 11.07.1962, R. E. Leech (CNC); Skagway, ♂ 03.06.1921, J. M. Aldrich (USNM); Steese Hwy. (MP 53.4) ♂ 03.09.1948, G. Jefferson (Alaska Ins. Project) (USNM); Umiat, ♂ 19.07., ♂ 05.08.1959, R. Madge (CNC); Unalakleet, ♂ 01.07., ♂ 14.07.1961, B. S. Heming (CNC); **COLORADO:** Echo Lake, Mt. Evans (10600'), ♂ 11.08.1961, C. H. Mann (CNC); Mt. Evans, Doolittle Ranch (9800'), ♂ 22.07.1961, J. G. Chillcott (CNC); ♀ 27.07.1961, C. H. Mann (CNC); Rocky Mt. National Park, Roaring River (40°25.6'N, 105°38.4'W, 9,400'), ♂♀ 11.07.1959, Jean Laffoon (IOW).

### *Coelosia truncata* Lundström

**AUSTRIA:** Tirol, Obergurgl, ♂ 20.07.1953, J. R. Vockeroth (CNC). **FINLAND:** **Ab:** Vihti, Vihtijärvi, ♂ 19.–21.06.1959, ♀ 18.07.1962, ♂ 02.06., ♂ 23.06., ♂ 29.06., 1♂ 15.09.1963, ♀ 27.09., 2♂♂ 2♀♀ 03.10.1965, R. Tuomikoski (ZMH); Bromarv, Framnäs, 2♂♂ 22.06.–05.07.1966, K. Mikkola (ZMH); N: Helsing, ♂ (2045), ♂ (2070), R. Frey (ZMH); Helsing, Nordsjö, ♂ 26.06.1963, R. Tuomikoski (ZMH); Esbo, Westend, ♂ 08.07.1962, W. Hackman (ZMH); Esbo, Kolmperä, ♂ 21.06.1964; ♀ 20.06.1965, W. Hackman (ZMH); Sibbo, Hindsby, 2♂♂ 07.10.1987, P. Ahlroth (ZMH); Kirkkonummi, Danskarby, ♂ 06.1965, K. Mikkola (ZMH); Ta: Urjala, 2♀♀ 02.10., ♂ 05.10., 2♀♀ 16.10.1965, T. Brander (ZMH); Vanaja, Suurisuo, 1♂2♀♀ 19.09.1965, R. Tuomikoski (ZMH); Sa: Valkeala, Utti, ♂ 16.09.1965, K. Mikkola (ZMH); Joutseno, ♀ 25.09., ♀ 28.09., 1♂2♀♀ 29.09., ♂ 30.09.1965, E. Thunberg (ZMH); **Kb:** Kitee, Otravaara ♂ 28.06.1963, W. Hackman (ZMH); Kitee, Papinniemi, ♂ 29.06.1963, W. Hackman (ZMH); Pielisjärvi, Koli, ♂ 05.07.1965, 1♂2♀♀ 24.07.1966, R. Tuomikoski (ZMH); **Ok:** Kuhmo, 4♂♂ 01.07.1965, R. Tuomikoski (ZMH); Sotkamo, ♂ 12.07., 2♂♂ 05.08., ♂ 12.08., ♂ 14.08.1962, A. V. V. Mikkola (ZMH); Sotkamo, Aarniemi, ♂ 23.06., 11♂♂ 11.–14.07., 3♂♂ 20.07., ♂ 21.07., ♂ 22.07., ♂ 24.07.1963, ♂ 11.08.1964, 33♂♂ 09.07., 13♂♂ 11.07., 47♂♂ 2♀♀ 14.–15.07., 33♂♂ 16.–21.07., 73♂♂ 1♀ 22.–28.07.1965, A. V. V. Mikkola, 4♂♂ 07.07.1965, 3♂♂ 1♀ 25.07.1965, R. Tuomikoski, 2♂♂ 02.07.1966, K. Keynäs (ZMH); **Ob:** Rovaniemi, Pisavaara, 2♀♀ 30.06., 1♂ 26.08.1964, 3♂♂ 1♀ 13.07.1965, R. Tuomikoski (ZMH); Turtola ♂, Bergroth (ZMH); **Ks:** Oulanka (Biol.st.), 2♂♂ 23.07.1967, 24.07.1967, Mihályi (MNHN); Oulanka Biol. St. (NL 66,3°), ♂ 23.07.1967, Mihályi (HUN); Kuusamo, Kiutaköngäs, ♂♀ 21.08.1964, Tuomikoski &

- Mikkola, 5♂♂ 3♀♀ 27.07.1966, 10♂♂ 7♀♀ 19.–24.07.1967, R. Tuomikoski (ZMH); Kuusamo, Juuma 5♂♂ 3♀♀ 21.08.1964, Mikkola & Tuomikoski (ZMH); Kuusamo, Juuma, Jäkälävuoma, 6♂♂ 2♀♀ 28.07.1966, R. Tuomikoski (ZMH); Lk: Kittilä, Pallas, 3♂♂ 1♀ 29.07.1967, R. Tuomikoski (ZMH); Muonio ♂ (G 329) R. Frey (ZMH); Le: Utsjoki, Ailigas, ♂ 14.07. 1965, K. Mikkola (ZMH); Utsjoki, 2♂♂ 1♀ 18.07. 1965, R. Tuomikoski (ZMH); Pallasjärvi, 2♂♂ 12.07.1966, K. Keynäs (ZMH); Pallast., 1♂ 12.07.1964, R. Tuomikoski (ZMH); Pallast., 1♂ (5051), R. Frey (ZMH); Ounastunturi, Marastojoki, ♂♀ 19.07.1962, G. R. (ZMH); Li: Inari, Laanila, ♂ 16.07.1965, R. Tuomikoski (ZMH); Kevo, ♀ 01.–07.08.1962, Heli Heikkilä (ZMH). **ITALIA:** Aosta, Valsavaranche, Ponte del Gran Clapey, ♂ 30.06.1973, L. Matile (MNHN). **NORWAY:** AK: Nesodden, Fagerstrand, ♀ 08/09.1989, S. Kobro (ZMBN); TEY: Porsgrunn, Skjelsvik, 2♂♂ 16.10.1982, G. Sjøli (ZMBN); HOY: Bergen, Fløyen, Skomakerdiket, ♀ 11.09.1982, G. Sjøli (ZMBN); Bergen, Fana, Kalandsvannet, ♀ 31.10.1976, T. Andersen (ZMBN); Samnanger, Ådland, 4♂♂ 16.06.–02.07.1982, A. J. Nilsen (ZMBN); Kvam, Røyrlø, ♂♀ 10.10.1982, Andersen & Sjøli (ZMBN); Kvam, Stekka, 2♂♂ 1♀ 10.10.1982, Andersen & Sjøli (ZMBN); Ullensvang, Hovland, ♂ 21.–30.10. 1977, T. Andersen (ZMBN); HOI: Ullensvang, Hovland, ♂ 21.–30.10.1977, T. Andersen (ZMBN); Kvam, Stekka, 2♂♂ 10.10.1982, Andersen & Sjøli (ZMBN); Røyrlø, ♂ 10.10.1982, Andersen & Sjøli (ZMBN); NSY: Bodø, Urskar, Skuti, 2♀♀ 05.08.1982, A. Fjeldså (ZMBN); TRY: Tromsø, Oldervik, ♀ 13.09.1987, G. Sjøli (ZMBN); Tromsø, Oldervik, Brattfjellet, 3♂♂ 2♀♀ 20.07., ♂ 05.08.1987, G. Sjøli (ZMBN); Tromsø, Oldervikdalen, 3♀♀ 13.09.1987, G. Sjøli (ZMBN); Tromsø, Breidvikeidet, Granheim, ♂♀ 01.09., 02.09.1987, G. Sjøli (ZMBN); Tromsø, Breidvikeidet, Littlemoen, ♂ 01.09.1987, G. Sjøli (ZMBN); Tromsø, Folkeparken, ♂ 27.08.1987, G. Sjøli (ZMBN); Tromsø, Tromsøya, Prestevannet, ♂♀ 18.08., ♀ 20.08.1987, G. Sjøli (1m ZMBN); Tromsø, Kvaløya, Finnvikdalen, ♂ 25.08.1987, G. Sjøli (ZMBN); TRI: Målselv, Dividalen, Svalheim, ♂ 09.09.1987, G. Sjøli (ZMBN); Dividalen, Høgskardhus, ♂ 09.09.1987, G. Sjøli (ZMBN); Storfjord, Signaldalen, Rognli, ♂ 07.–08.08.1987, G. Sjøli (ZMBN); FIØ: Kautokeino, Avzi, ♂ 25.–26.07.1987, G. Sjøli (ZMBN); Leirbotn, Lakselv, ♂ 23.07.1965, R. Tuomikoski (ZMH). **SWEDEN:** VG: Vamum, ♀ 09.10. 1979, P. Chandler (PJC); TO: Abisko Lpl., ♂ 19.07., ♀ 20.07.1951, J. R. Vockeroth (CNC); ? : Lpld., Riksgränsen, ♂ 29.07.1960, W. R. Mason (CNC). **RUSSIA:** Zhakarpate, Kvasy, ♂ 17.06., 1♂ 24.06.1963, Mamaev (MOSC); NW Russia, Luga distr., Tolmachevo, 2♂♂ 25.06.1935, ♂ 03.07.1938, Stackelberg (ZIAS); Kola peninsula, Kirovsk, Chibins Mts., ♂ 07.08.1933 (ZIAS), 2♂♂ 29.09.1935, 10.1933, Fridolin (ZIAS); Lapponiarossica, Nuortijärvi, Ylä-Tuloma, 3♂♂ 09.–14.07.1964, K. Mikkola (ZMH). **CANADA:** ALBERTA: Edmonton, ♂ 27.09.1924, O. Bryant (CNC); BRITISH COLUMBIA: Kleanza Cr., 14 mi E Terrace, ♂ 17.06.1960, C. H. Mann (CNC); Liard R. Hot Sprgs. (1725'), ♂ 24.08.1962, P. J. Skitsko (CNC); MANITOBA: Fort Churchill, ♂ 12.08.1952, J. G. Chillcott (CNC); NORTH-WEST TERRITORIES: Bathurst Inl., Baychimo Harb., 6♂♂ 1♀ 16.08.1966, G. E. Shewell (CNC); Muskox L., (64°45'N, 108°10'W), ♂ 12.08.1953, J. G. Chillcott (CNC); Nicholson L., Nend (62°45'N, 102°40'W), ♂ 26.–27.07.1966, J. G. Chillcott (CNC); QUEBEC: Payne Bay, ♂ 19.08.1958, E. E. MacDougall (CNC); SASKATCHEWAN: Otosquen (53°18'N, 102°W), ♂ 12.09.1959, J. R. Vockeroth (CNC). U.S.A: ALASKA: Naknek R., King Salmon, ♂ 31.07.1952, W. R. Mason (CNC); MAINE: Mt. Katahdin, Hunt Trail (1600–2400'), 4♂♂ 01.–06.07.1968, D. M. Wood (CNC); NEW YORK: Whiteface Mt. (4600–4872'), 3♂♂ 12.07.1962, J. R. Vockeroth (CNC); VERMONT: Jay Peak (3400–3800'), ♀ 20.07.1968, J. R. Vockeroth (CNC).