

# Family Carabodidae (Acari: Oribatida) V. The genus *Congocepheus* Balogh, 1958 (second part), with a redescription of *Congocepheus involutus* Mahunka, 1997, and descriptions of two new species

**Nestor FERNANDEZ**

National Council of Scientific and Technological Research,  
La Rioja University Campus. Research and Technology City,  
Av. Luis Mansueto de la Fuente S/N,  
La Rioja, 5300 (Argentina)  
[nestorfernand51@yahoo.fr](mailto:nestorfernand51@yahoo.fr)

**Pieter THERON**

Research Unit for Environmental Sciences and Management,  
North-West University,  
Potchefstroom Campus, 2520 (South Africa)  
[pieter.theron@nwu.ac.za](mailto:pieter.theron@nwu.ac.za)

**Christine ROLLARD**

Muséum national d'Histoire naturelle,  
Département Systématique et Évolution, UMR 7205, CNRS,  
case postale 53, 57 rue Cuvier, F-75231 Paris cedex 05 (France)  
[chroll@mnhn.fr](mailto:chroll@mnhn.fr)

**Louvrens TIEDT**

Laboratory for Electron Microscopy, CRB,  
North-West University,  
Potchefstroom Campus, 2520 (South Africa)  
[louvrens.tiedt@nwu.ac.za](mailto:louvrens.tiedt@nwu.ac.za)

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## KEY WORDS

Acari,  
Oribatida,  
Carabodidae,  
new species.

## ABSTRACT

The species *Congocepheus involutus* Mahunka, 1997 is redescribed, and two new species are described, *Congocepheus gabonensis* n. sp. and *Congocepheus ektactesi* n. sp., using optical and scanning electron microscopy.

## RÉSUMÉ

*La Famille Carabodidae (Acari: Oribatida) V. Le genre Congocepheus, Balogh, 1958 (deuxième partie) avec la redescription de Congocepheus involutus Mahunka, 1997 et les descriptions de deux nouvelles espèces.*

## MOT CLÉS

Acari,  
Oribatida,  
Carabodidea,  
espèces nouvelles.

L'espèce *Congocepheus involutus* Mahunka, 1997 est redécrite et deux espèces nouvelles sont décrites *Congocepheus gabonensis* n. sp. et *Congocepheus ektactesi* n. sp. sur la base d'observations en microscopie optique et électronique à balayage.

## INTRODUCTION

In the first part of our series on the genus *Congocepheus* Balogh, 1958 (Fernandez *et al.* 2013e) we studied and redescribed three species, *Congocepheus heterotrichus* Balogh, 1958, *C. orientalis* Mahunka, 1987 and *C. hauseri* Mahunka, 1989.

The specimen studied of *C. involutus*, was the holotype, deposited in MHNG. This material was so bleached that detailed study was almost impossible. However, a series of characteristics found in this material permitted easy recognition of this species amongst material from Madagascar housed at the MNHN. In the present paper, we redescribe *Congocepheus involutus* Mahunka, 1997 using additional material found MNHN collections, and include descriptions of two new species, adult stases *C. gabonensis* n. sp. and *C. ektactesi* n. sp., both from Gabon. All species were studied with the aid of optical and electronic scanning microscopy.

## MATERIAL AND METHODS

Specimens studied by means of light microscopy were macerated in lactic acid, and observed in the same medium using the open-mount technique (cavity slide and cover slip) as described by Grandjean (1949) and Krantz & Walter (2009). Drawings were made using an Olympus BHC compound microscope (Rungis, France) equipped with a drawing tube. Specimens were also studied by means of a scanning electron microscope (SEM).

Specimens preserved in ethanol were carefully rinsed by sucking them into a Pasteur pipette several times, then transferred to buffered glutaraldehyde (2.5%) in Sörensen phosphate buffer (pH 7.4; 0.1 M) for two hours. After postfixation for two hours in buffered 2% OsO<sub>4</sub> solution and rinsing in buffer solution, all specimens were dehydrated in a series of graded ethanols and dried in a critical point apparatus. Specimens were mounted on Al-stubs with double sided sticky tape and then gold coated in a sputter apparatus (Alberti & Fernandez 1988). Specimens from which the cerotegument was to be removed were macerated in a warm 70% lactic acid solution for 7-15 days, after which the cerotegument was carefully removed using fine needles.

For a study of the medial eye, specimens were dissected and monitored during the lactic acid maceration process (in warm 70% lactic acid), before being stained with chlorazol black E, a well-known stain (Coineau 1974).

Optical studies were necessary to eliminate cerotegument.

Measurements taken: total length (tip of rostrum to posterior edge of notogaster); width (widest part of notogaster) in micrometers (μm).

Leg chaetotaxy was studied by making use of standard, polarized and phase contrast microscopes, but are provisional, due to the fact that only adult specimens were available for study. Setal formulae of the legs include the number of solenidia (in parentheses); tarsal setal formulae include the famulus (ε). Intraspecific variation in setal formulae are indicated with brackets and asterisks.

## ABBREVIATIONS

### Morphology

Morphological terms and abbreviations used here are those developed by F. Grandjean (1952) (cf. Travé & Vachon 1975; Norton & Behan-Pelletier 2009; Fernandez *et al.* 2013a-e). Specific terms and abbreviations are used for setal types (Evans 1992: 73), ornamentation of cuticular surfaces (Murley 1951) and median eyes (Coineau 1970, 1974).

A number of specific morphological characters have not previously been described in detail, or cannot be described by adequate terminology and/or abbreviations. A new set of abbreviations are consequently included in the text and in the figures (see below).

### Institutions

MHNG Muséum d'Histoire naturelle, Geneva;  
MNHN Muséum national d'Histoire naturelle, Paris;  
NMP Natal Museum, Pietermaritzburg.

### Forest

FDHBA wet dense forest low altitude;  
FDHMA wet dense forest mean altitude.

### New abbreviations

a.tu.d anterior tutorial depression;  
b.ng. notogastral margin;  
l.c.r lateral cuticular elevated ribbon;  
m.c.r medial cuticular elevated ribbon;  
m.zo medial prodorsal zone;  
p.tu.d posterior tutorial depression;  
p.zo prodorsal paraxial zone.

## SYSTEMATICS

Family CARABODIDAE Koch, 1837

Genus *Congocephus* Balogh, 1958

TYPE SPECIES. — *Congocephus heterotrichus* Balogh, 1958.

*Congocephus involutus* Mahunka, 1997  
(Figs 1-5)

*Congocephus involutus* Mahunka, 1997: 133, 134.

MATERIAL EXAMINED. — Holotype: 1 ♀, adult, MAD 89/52 Saint Marie, leg. B.Hauser, MHNG.

OTHER MATERIAL STUDIED. — 3 ♀♀ “Mad.856.Madagascar Centre. Province de Tananarive. Forêt de Vanjamanitra (8km au SE d’Anjororobe) alt. 1380m, FDHMA avec bambou liane, mousses au sol, 12-V-1967 J-M Betsch Coll.” preserved in 70% ethanol (MNHN), 3 ♀♀ “Mad.906.Madagascar nord-est, Province de Tamative. Baie d’Antongil. Île de Nosy Mangabe, alt 300 m FDHBA, litière, 16-VII-1967 J-M.Betsch Coll.”, preserved in 70% ethanol (MHNG).

DIAGNOSIS (ADULT FEMALE). — Setation:  $c_1$ ,  $c_2$  epimeric, genital, adanal, simple;  $c_1$ ,  $c_2$ , largest, rounded tip; in, ro, da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$ ,  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$  lanceolate; in, ro with two medial longitudinal veins; notogastral only one medial longitudinal vein; le lanceolate-dentate; an spiniform. Prodorsum: polyhedral, rounded apically; laterally genal incision present; slightly elevated interlamellar process, complete. Notogastral anterior depression, crossing dorsosejugal furrow, reaching posterior zone of elevated interlamellar process. Low lamellar furrow clearly visible; lamellar apical tip rounded, extending up to le setal insertion. Bothridial opening lateral; bothridial ring smooth with margin not clearly delimited; bothridial tooth present. Sensillus clavate, barbate; appearing similar to toothbrush in lateral view. Superior cornea of naso clearly visible, situated slightly anterior of rostral setal insertion. Tutorium a curving rod-like cuticular thickening anterior and posterior tutorial depression present. Humeral apophysis polyhedral; excavated V-shaped depression present. Notogaster: oval, with prominent polyhedral humeral process; dorsosejugal furrow narrow, rectilinear; notogastral anterior depression ovoid, deep. Fourteen pairs of setae,  $c_1$ ,  $c_2$  setae inserted on flat slightly elevated region. Circumgastric furrow easily discernible. Lyrifissures: only im, ih, ip clearly visible. Ventral region: thin furrow separating epimera 1, 2, 3; 3 and 4 fused. Epimeral chaetotaxy 3-1-3-3. Discidium triangular, with rounded, expanded apex. Large anterior genital furrow. Four pairs of genital setae. Aggenital setae absent. Three pairs of adanal seta. Two pairs of anal setae; long sharply tipped anal plate. Lyrifissures iad clearly discernible, situated anterior to ad3 setae. Only one rounded depression behind acetabulum IV.

## ADULT DESCRIPTION

### Measurements

SEM 291 µm (300-305) × 167 µm (171-176) (measurements on three specimens). Light microscopy 290 µm (298-305) × 168 (172-176) (measurements on six specimens).

### Shape

Elongate oval (Figs 1A, 2A).

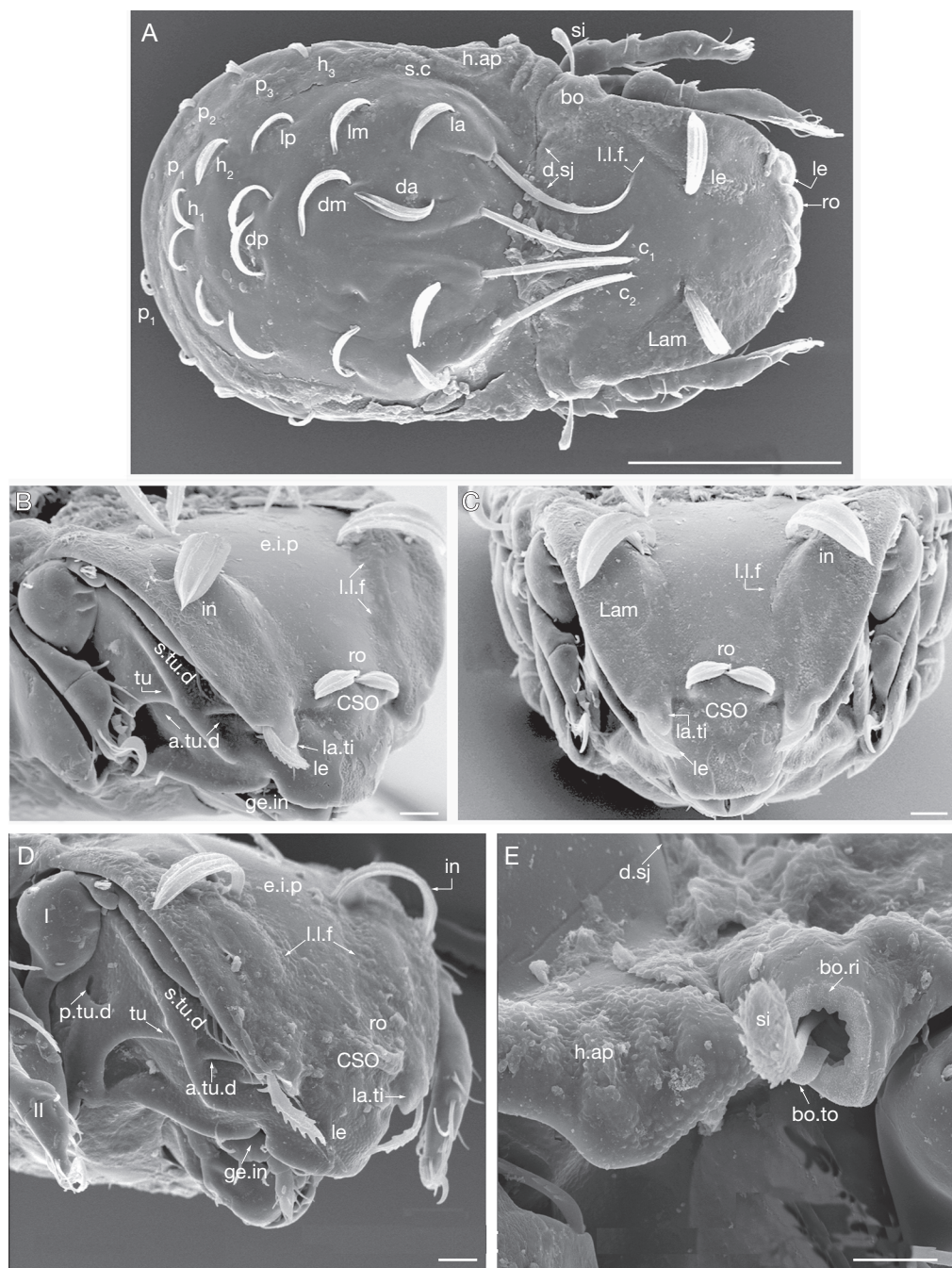


FIG.1. — *Congocepeus involutus* Mahunka, 1997, adult, SEM with cerotegument: **A**, dorsal view; **B**, lateral view; **C**, frontal view; **D**, lateral view inclined; **E**, humeral apophysis and bothridia, lateral view. Abbreviations: see Material and methods. Scale bars: A, 100  $\mu$ m; B-D, 10  $\mu$ m; E, 1  $\mu$ m.



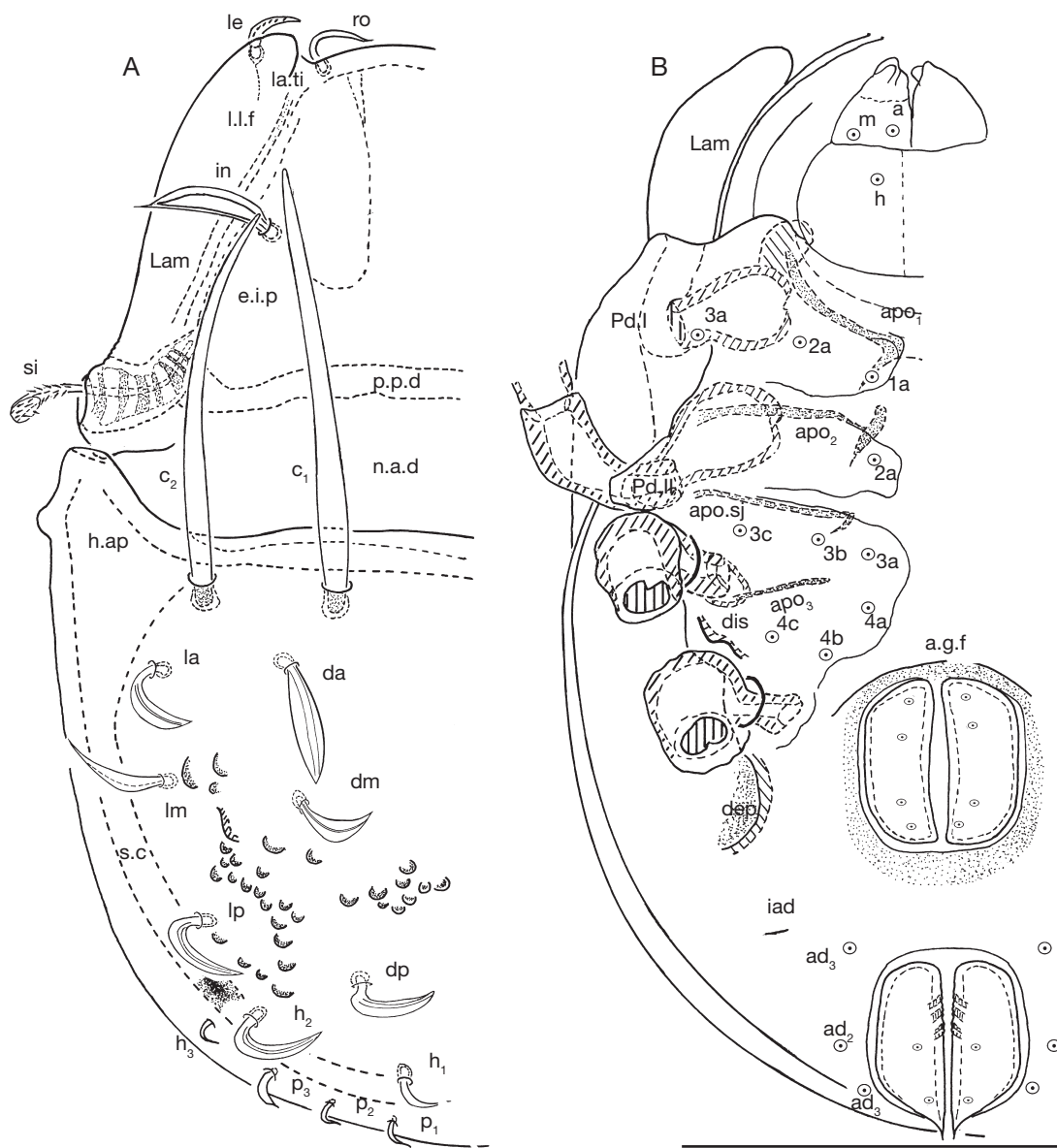


FIG. 2. — *Congocepheus involutus* Mahunka, 1997, adult: **A**, Dorsal view; **B**, ventral view. Abbreviations: see Material and methods. Scale bar: 100  $\mu$ m.

### Colour

Specimens without cerotegument; dark yellow to brown, clear, slightly shiny, observed in reflected light.

### Cerotegument

Specimens covered by thin layer (Figs 1A-E; 3A, B). SEM observations: faintly rugose to smooth.

*Integument*

Prodorsal microsculpture: faintly irregular tuberculate: bo, lamella, near insertion ro setae and around CSO; smooth; e.i.p, central zone between l.l.f up to ro setae, CSO surface.

Notogastral microsculpture; undulate.

Lateral microsculpture: slightly irregular tuberculate except for Pd I, Pd II and discidium smooth.

Ventral microsculpture; smooth.

*Setation*

Lanceolate; in, ro, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>; in and ro with two medial longitudinal veins (Figs 1B-D; 5B); notogastral (except c<sub>1</sub>, c<sub>2</sub> see below) with one medial longitudinal vein (Figs 1A, 5C); in largest; da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, largest; p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, h<sub>3</sub> smaller. Lanceolate-dentate; le setae (Figs 1B, D; 5D, F), shape and dentitions size, little variation between specimens (Fig. 1B, D). Simple; c<sub>1</sub>, c<sub>2</sub>, epimeric, genital, aggenital and adanal seta (Figs 1A; 2A, B; 3A); c<sub>1</sub> and c<sub>2</sub> largest, with rounded tip. Spiniform; anal setae (Fig. 5E).

*Prodorsum*

Polyhedral, rounded apically (Figs 1A-D; 2A). Convex in lateral view (Figs 3A; 4A, B); e.i.p slightly elevated, complete (Figs 3A; 4A); n.a.d reaching posterior zone of e.i.p.; posterior prodorsal zone depressed (Figs 1A; 2A). Three pairs of setae; size in>le>ro; ro setae, inserted slightly antiaxially to medial plane; directed medially and converging; touching each other apically (Fig. 1A, B, C); in setae inserted near l.l.f (Fig. 1A, B, C, D); le setae laterally (Figs 1B, D; 3A; 4A; 5F). Rostral anterior margin rounded; laterally, genal incision (d.ge), rounded, clearly visible (Figs 1B, D; 4B, D). Lamellae running dorsolaterally; dorsal furrow (l.l.f) (Figs 1A, B, C, D; 2A; 3A; 4A, B) demarcating inner paraxial margin; l.l.f terminating in the internal zone of conspicuous lamellar apex (la.ti) (Figs 1B, C; 3A); in frontal view (Fig. 4D) l.l.f appearing as a slightly darker cuticular thickening, visible on surface as shallow furrow. The la.ti robust, round tipped structure (Figs 1A, B, C; 2A; 3A). Bothridial opening laterally (Figs 3A, C; 4A). Sensillus more or less clavate (Fig. 3C), barbate; posterior zone smooth and anterior zone barbate causing toothbrush-like appearance (Fig. 3D).

Situated slightly in front of ro setae insertions, at the same level, superior cornea of naso (CSO) clearly visible (Figs 1B, C; 4D) as smooth rounded structure (dorsal view) and convex (in lateral view). Circumgastric furrow easily discernible, situated between la, lm, lp, h<sub>2</sub>, h<sub>1</sub> and h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub> setae (Figs 2A; 3A).

*Notogaster*

Shape; oval, with prominent polyhedral humeral process (Figs 1A; 2A); in lateral view, anterior clearly depressed and rest convex (Figs 3A; 4A); d.sj narrow, rectilinear, hardly discernible; notogastral anterior depression (n.a.d) ovoid, deep, slightly exceeding d.sj extending to e.i.p (Fig. 3A). Middle posterior zone of n.a.d, rectilinear; laterally curving, following the shape of h.ap (Fig. 2A).

Circumgastric furrow (s.c) present, hardly discernible (Figs 1A; 3A; 5A), almost always covered by cerotegument; without cerotegument, furrow well discernible, situated between la, lm, h<sub>2</sub>, h<sub>1</sub> and p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, h<sub>3</sub>, setal insertion (Fig. 2A).

Fourteen pairs of setae, (c<sub>1</sub>, c<sub>2</sub>, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>); c<sub>1</sub>, c<sub>2</sub> extending forward, exceeding d.sj by quite a bit (Figs 1A; 2A; 3A), inserted on flat little elevated protuberance. Lyrifissures, only im, ih, ip well visible (Figs 4A-C).

*Lateral region*

Prodorsum; e.i.p slightly elevated. Seta in clearly visible, outwards directed (Figs 3A; 4A); Lam easily discernible, terminating in conspicuous la.ti extending to le setae insertion (Figs 1B; 3A; 4D); tu rod-like curved cuticular thickening (Fig. 5D); s.tu.d deep (Figs 1B, D; 3A; 5D), pocket depression (a.tu.d) in anterior position, on both sides of tu (Figs 4B; 5D); rounded pocket depression posteriorly below tu, (p.tu.d) (Fig. 5D). Anterior; h.ap rounded tip, penetrating posterior bothridial zone (Figs 1E; 3A).

Excavated V-shaped depression on h.ap clearly visible (Fig. 3C, indicated by double arrow). Setae c<sub>1</sub>, c<sub>2</sub>, easily visible; tips extending slightly posterior to level of insertion of seta in (Figs 1A; 2A; 3A; 4A); small flat elevated protuberance situated posterior c setae; s.c easily discernible (Figs 1A; 3A) Lyrifissures hardly discernible; only im, ih clearly visible (Fig. 4A). One depression (dep) discernible posterior leg IV.

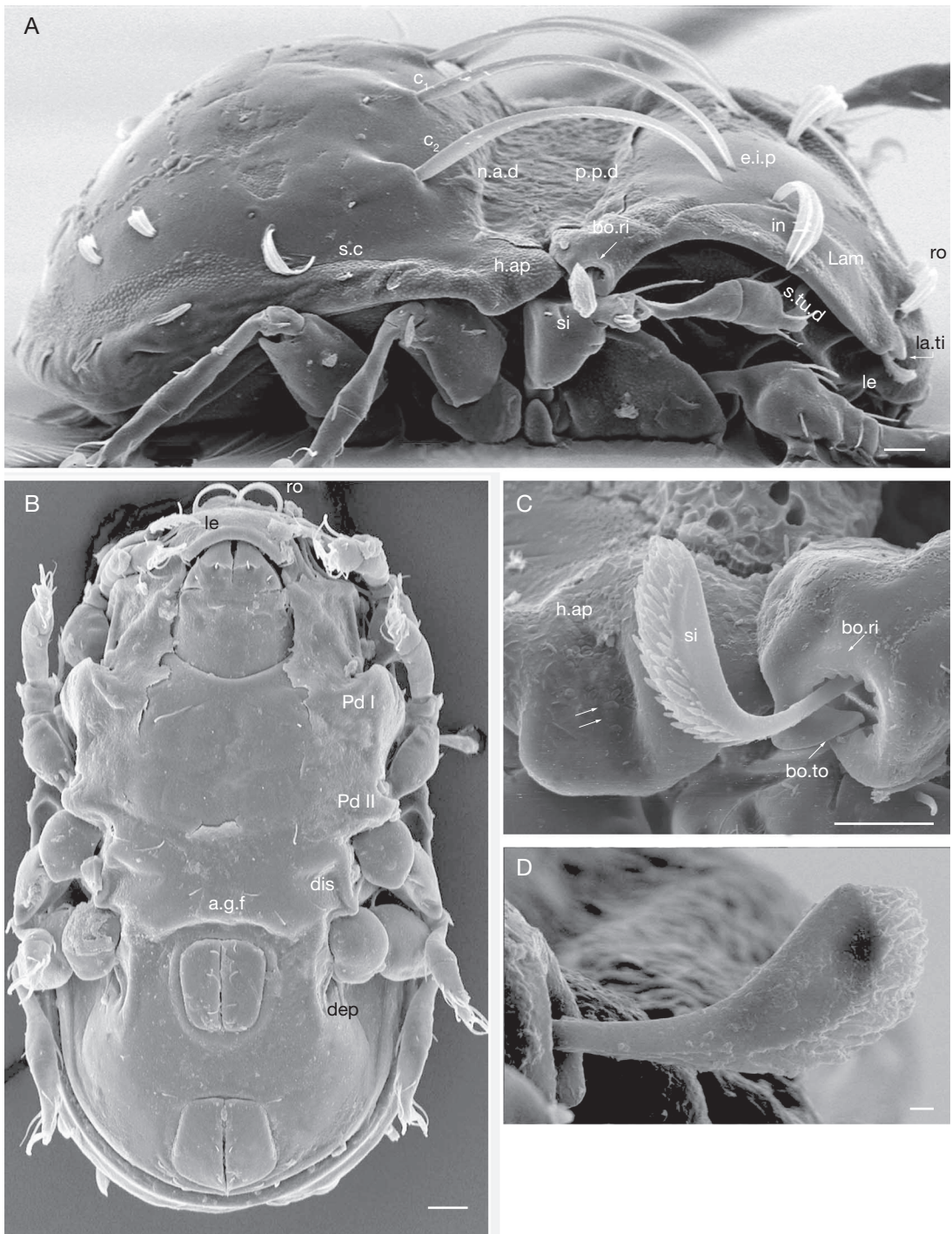


FIG. 3. — *Congocephus involutus* Mahunka, 1997, adult scanning electron micrographs: **A**, lateral view; **B**, ventral view; **C**, sensillus and humeral apophysis, antero-lateral view; **D**, sensillus, posterior view. Abbreviations: see Material and methods. Scale bars: A-C, 10  $\mu$ m; D, 1  $\mu$ m.

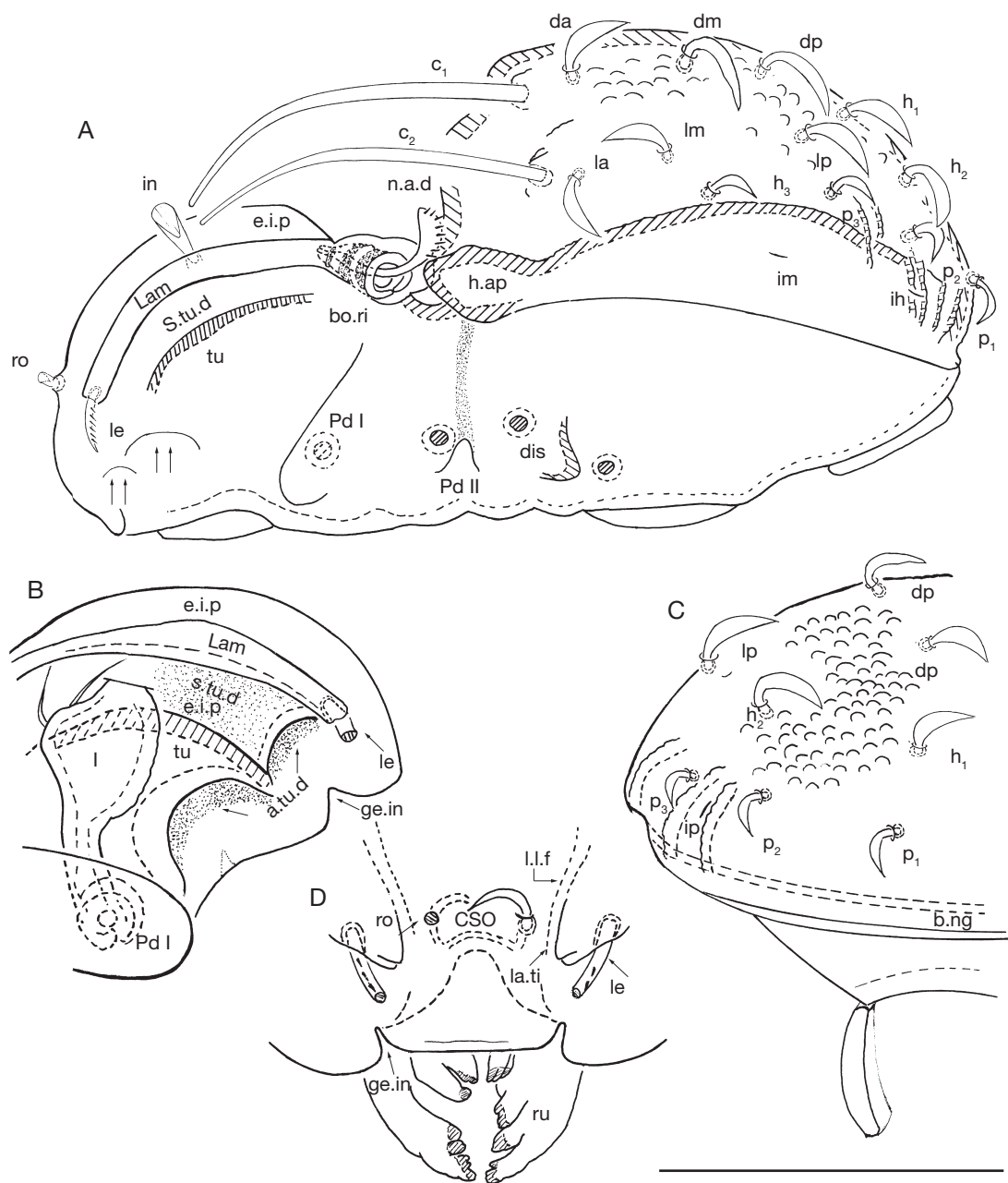


FIG. 4. — *Congocephus involutus* Mahunka, 1997 adult: **A**, lateral view; **B**, tutorial zone, lateral view; **C**, posterior view; **D**, frontal view. Abbreviations: see Material and methods. Scale bar: 100  $\mu$ m.

*Posterior view (Figs 4C, 5A)*

Setae: da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub> directing medially; p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, h<sub>3</sub>, directed posteriorly and ventrally.

Furrow of circumgastric depression (s.c) clearly visible. Lyrifissure ip easily discernible between p<sub>2</sub> and p<sub>3</sub>.



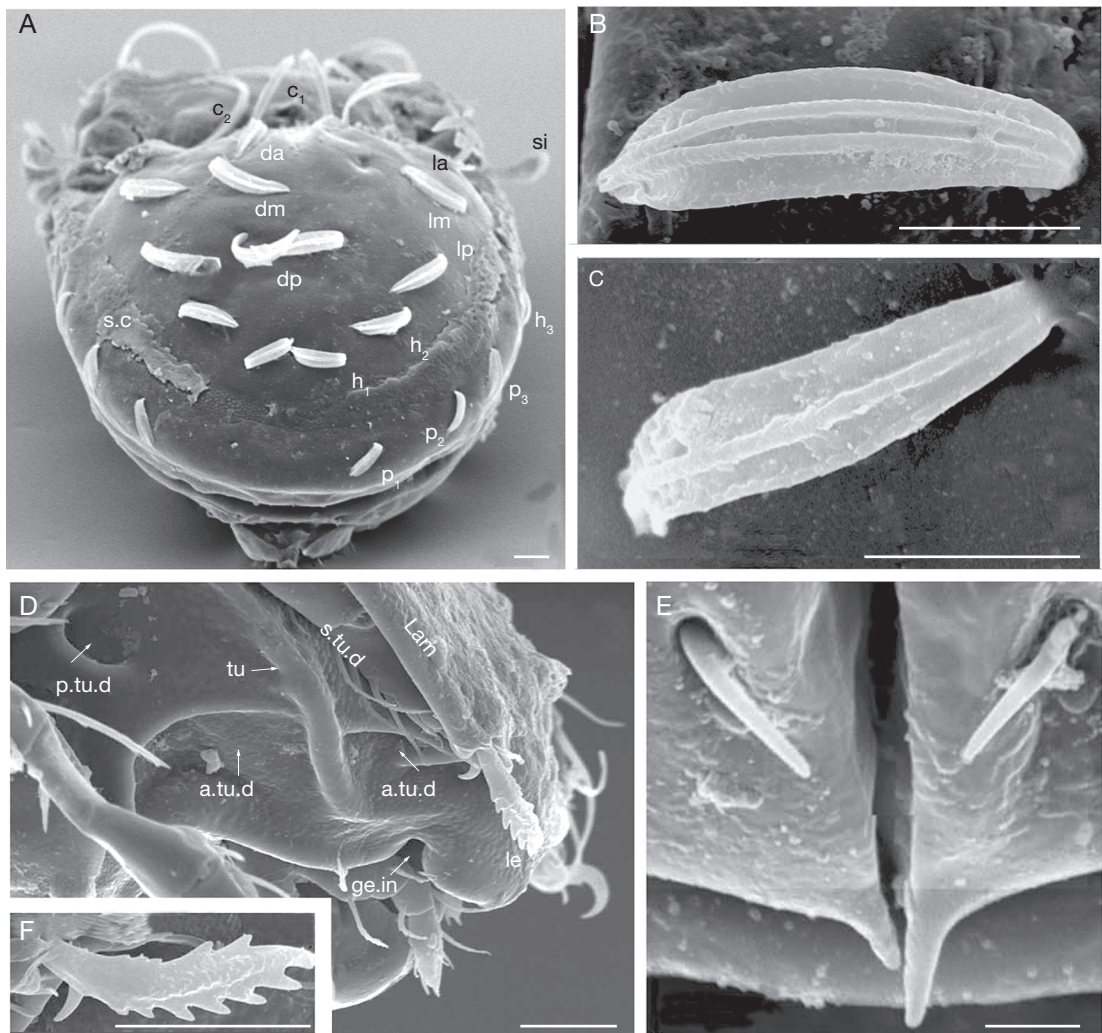


FIG. 5. — *Congocepheus involutus* Mahunka, 1997 adult, scanning electron micrographs: **A**, posterior view; **B**, interlamellar setae; **C**, notogastral setae; **D**, lateral view, zone tutorium; **E**, posterior zone, anal plate; **F**, lamellar seta, lateral view. Abbreviations: see Material and methods. Scale bars: A-C, F, 10  $\mu$ m; E, 1  $\mu$ m.

### Ventral region (Figs 2B, 3B)

SEM observation; epimera hardly visible due to presence of cerotegumental layer (Fig. 3B). Optical observation (Fig. 2B); thin furrow separating epimera 1, 2 and 3; 3 and 4 fused; apo<sub>1</sub>, apo<sub>2</sub>, apo<sub>3</sub> easily discernible. Epimeral chaetotaxy 3-1-3-3. Discidium (dis) triangular, rounded expanded apex. In front

of genital plate a.g.f conspicuous furrow, well delimited. Aggenital setae absent; four pairs of genital setae. Three pairs of adanal seta. Two pairs of anal setae; anal plate terminating in long sharp tip (Fig. 5E). Lyrifissures iad easily discernible, situated lateral and anterior ad<sub>3</sub> setae. Only one rounded depression clearly discernible posterior acetabulum IV.

TABLE 1. — *Congocepheus gabonensis* n. sp. setae and solenidia.

| Leg I          | Femur         | Genu   | Tibia                           | Tarsus                                               | Claw |
|----------------|---------------|--------|---------------------------------|------------------------------------------------------|------|
| setae          | d, (l), v     | (l), v | v, (l), d                       | ft", ε, (tc), (it), (p), (u), (a), s, (pv), pl", Ad" | 1    |
| solenidia      |               | σ      | φ <sub>1</sub> , φ <sub>2</sub> | ω <sub>1</sub> , ω <sub>2</sub>                      |      |
| <b>Leg II</b>  |               |        |                                 |                                                      |      |
| setae          | dp, da, l", v | (l), v | (v),d                           | (pv), s, (a), (u), (p), (it), (tc), (ft)             | 1    |
| solenidia      |               | σ      | φ                               | ω <sub>1</sub> , ω <sub>2</sub>                      |      |
| <b>Leg III</b> |               |        |                                 |                                                      |      |
| setae          | d, l', v      | l'     | (v)                             | Ad', (pv), s, (a), (u), (p), (it), (tc), ft'         | 1    |
| solenidia      |               | σ      | φ                               | -                                                    |      |
| <b>Leg IV</b>  |               |        |                                 |                                                      |      |
| setae          | d, v          | d, l'  | (v)                             | (pv), s, (a), (u), (p), (tc), (ft)                   | 1    |
| solenidia      |               | -      | φ                               | -                                                    |      |

REMARKS

In this species all elements of the “protection mechanism” are present, as in *Bovicarabodes* (Fernandez *et al.* 2013a), but the anterior part of h.ap penetrates deeply into the posterior part of bothridium.

*Congocepheus gabonensis* n. sp.  
(Figs 6-10; Table 1)

ETYMOLOGY. — The specific epithet is derived from Gabon, where the type species was collected.

MATERIAL EXAMINED. — **Holotype:** 1 ♀, Makokou, North-eastern Ogoové-Ivindo Province, 0°34'0"N, 12°52'0"E, 500 m. altitude, dense evergreen humid forest, Y. Coineau coll. I.1974 (MNHN).

**Paratypes:** same date as holotype and preserved in ethanol 70%; 3 ♀♀ (MNHN), 3 ♀♀ (MHNG), 3 ♀♀ (NMP), 6 ♀♀ not deposited, used for SEM.

TYPE LOCALITY. — Makokou, North-eastern Ogoové-Ivindo Province, 0°34'0"N, 12°52'0"E.

DIAGNOSIS (ADULT FEMALE). — Setae: rostral, interlamellar, notogastral and adanal, lanceolate rugous-dentate margin; ro, with two medial longitudinal veins; others with one medial longitudinal vein, ro directed inwards; in curving backwards; fourteen pairs of notogastral setae; c<sub>2</sub> directed forwards; others directed backwards; epimeric, aggenital, sub-capitular setae, simple; anal setae spiniform; genital setae spiniform, basally inflated.

Prodorsum; polyhedral, anterior margin rounded; prominent elevated interlamellar process. Notogastral anterior depression deep, exceeding d.sj, extending to posterior

part of prodorsum; shallow lamellar furrow deep, large, horse-shoe shaped with large elevated cuticular ribbon in central zone; ro insertion; anterior rounded end of horseshoe-shaped area; cornea superior naso present, surrounded by deep furrow; robust rounded lamellar tip. Bothridial opening laterally, directed slightly backwards; bothridial ring incomplete, bothridial tooth present. Sensillus uncinat. Humeral apophysis ovoid; anterior tip penetrating posterior bothridial zone.

Notogaster; posterior oval, anterior rectangular; clearly visible finger-like projection situated between c<sub>1</sub> setae; circumgastric furrow delimiting two zones; central and lateral; elevated central zone with polyhedral depression pattern and c<sub>1</sub>, la, lm, lp, h<sub>2</sub>, h<sub>1</sub> setae inserted; lateral zone curving, smooth, with h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub> setae inserted.

Tutorium; curving rod-like cuticular thickening; supratutorial depression deep; anterior and posterior tutorial depression pockets, present. Pedotecta I, II, discidium. Ventral region; epimera 1, 2, 3, slightly elevated, delimited by small deep furrow; 3 and 4 fused. Epimeral chaetotaxy 3-1-3-3. Genital zone, anal opening, polyhedral shape, delimited laterally by cuticular thickening; polyhedral depressions, slightly deeper than normal; one pair of aggenital setae situated posterior genital plate and close to ad<sub>3</sub> setal insertion level. Four pairs of genital setae. Three pairs of adanal seta. Two pairs of anal setae; anal plate with small sharp end. Lyrifissures iad not discernible.

ADULT DESCRIPTION

*Measurements*

SEM 370 μm (361-403) × 222 μm (117-231) (measurements from six specimens). Light microscopy 290 μm (298-305) × 168 (172-176) (measurements from six specimens).



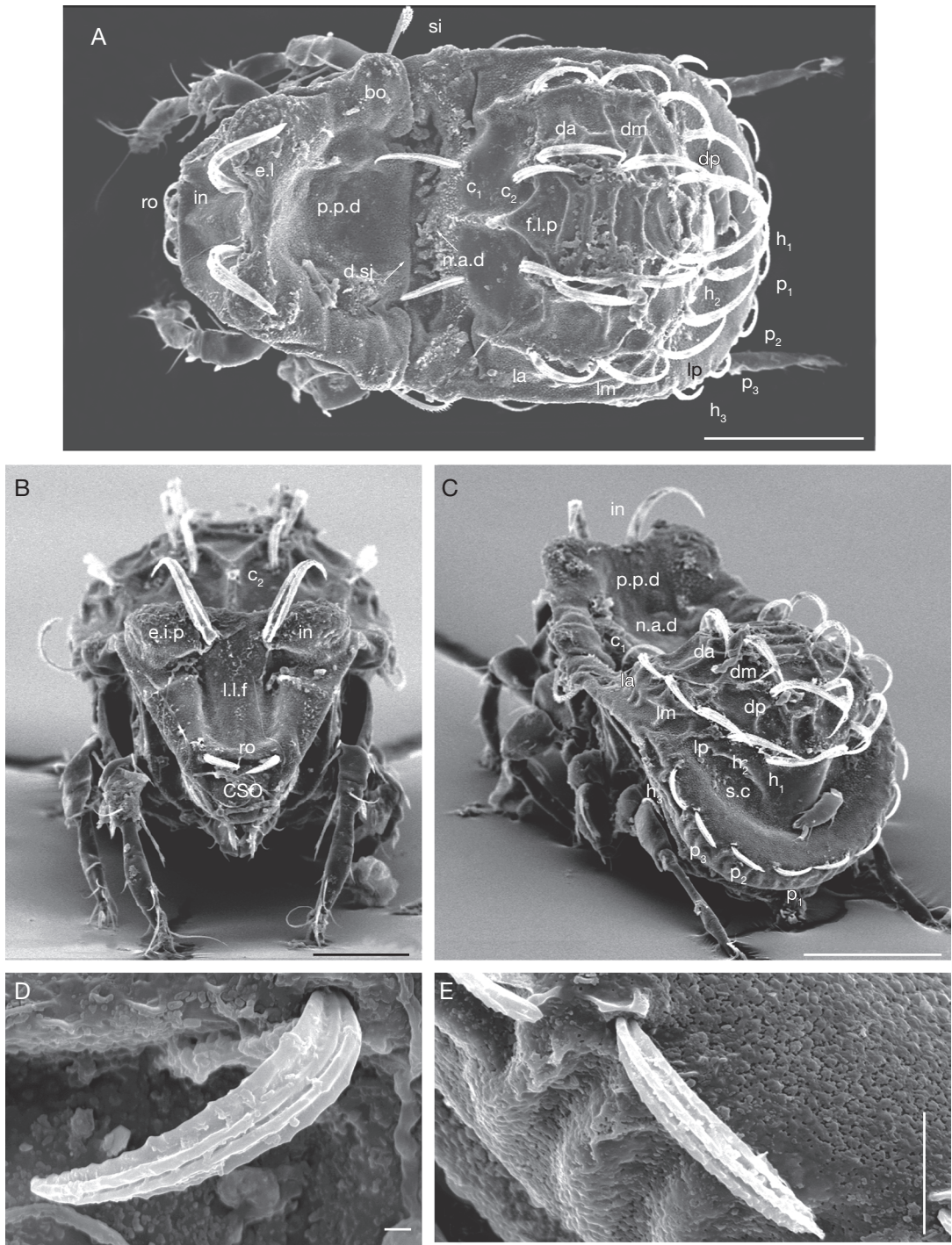


FIG. 6. — *Congocepheus gabonensis* n. sp. adult, scanning electron micrographs: **A**, dorsal view; **B**, frontal view; **C**, posterior view; **D**, ro, setae; **E**, lateral view,  $p_3$  setae. Abbreviations: see Material and methods. Scale bars: A-C, 100  $\mu$ m; D, 1  $\mu$ m; E, 10  $\mu$ m.

*Shape*

Prodorsum; polyhedral; notogaster; ovoid (Fig. 6A).

*Colour*

Specimens without cerotegument, dark brown to brown, clear; slightly shiny, when observed in reflected light.

*Cerotegument*

Specimens covered by thin cerotegumental layer. SEM observations; faintly rugous-porous, irregularly granulate or smooth.

Prodorsum; granulate, notogaster: faintly rugous-porous (Fig. 6A).

Ventral region; faintly rugous-porous around genital, anal opening, paraxial epimeric zone; smooth: epimeric zone with paraxial zone weakly rugous-porous (Fig. 9A, B).

*Integument*

Prodorsal microsculpture; slightly tuberculate: e.i.p; pustulate: zone between in and ro setae; undulate: bo, lamella; smooth: depressed posterior zone; l.l.f zone and CSO.

Notogastral microsculpture; reticulate: central zone; faintly irregularly tuberculate: h.ap, smooth: lateral zone and around n.a.d.

Lateral microsculpture; faintly irregularly tuberculate: sejugal and depressed zones; smooth: Pd I, Pd II and discidium.

Ventral microsculpture; faintly irregularly tuberculate: infracapitulum; smooth: epimeric zone, ventral shield, anal and genital plates.

*Setation*

Lanceolate: ro, in,  $c_1$ ,  $c_2$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$ ,  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$ , adanal; ro rugous-dentate margin, two medial longitudinal veins (Fig. 6D), directing inwards (Figs 6B; 7B, C); in,  $c_1$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$  V-shaped, margin rugous-dentate, one medial longitudinal vein (Fig. 6E); margins elevated producing V-shape, directing backwards (Figs 6A-C; 7A-D; 8A, B; 9D);  $c_2$  directing forwards; in wide, curving (Figs 6A, B; 7A, B, D; 8B);  $c_1$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$  more or less similar width;  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$  small (Figs 6A-C; 7A); adanal setae similar in length (Figs 8C; 9A, B); simple:

epimeric, aggenital, sub-capitular (Figs 8C; 9A); spiniform: anal (Fig. 9E); spiniform basally inflated: genital (Fig. 9F).

*Prodorsum*

Polyhedral, rounded apically (Figs 6B; 7C); e.i.p prominent elevated rounded end (Figs 6B; 7A, B). Posterior zone: e.i.p depressed (Fig. 6A, C). Three pairs of setae; size in>le=ro (Fig. 7B, C); ro setae curving, directed inwards, converging; each apical tip touching the other (Fig. 7B, C); inserted behind CSO, curving in setae, directed backwards (Figs 6A-C; 7A, B, D; 8A, B) positioned on cuticular transversal ribbon on e.i.p (Fig. 7B, C); le setae laterally (Fig. 7A-C). Rostral anterior margin rounded (Fig. 7C); lamellae run dorsolaterally; l.l.f deep, large, complex horse-shoe shaped furrow (Fig. 6B); both furrows separated by large elevated cuticular ribbon, ro inserted on anterior rounded end of horse-shoe (Fig. 7B, C); CSO ovoid, situated in front of l.l.f., surrounded by deep furrow; l.l.f end far to la.ti (Fig. 7B); robust la.ti structure with rounded tip. Bothridial opening lateral, backwards directed (Figs 7A; 8A; 9C); incomplete bo.ri, smooth; bo.to sharply tipped, clearly visible, si uncinata (Fig. 9C).

Slightly to front of, and at level of ro setae insertions, CSO clearly visible (Fig. 7B, C) as smooth ovoid structure (dorsal view) and convex (in lateral view). Furrow surrounding CSO posteriorly and laterally (Fig. 7B, C).

*Notogaster*

Shape; posterior oval (dorsal view) (Figs 6A; 8B); anterior medial zone rectangular; convex elevated (lateral view) (Figs 7A; 8A); d.sj narrow, rectilinear, well delimited (Figs 6A; 8B); n.a.d ovoid, deep, extending forwards and exceeding d.sj up to posterior zone of e.i.p (Figs 6C; 8A).

Fourteen pairs of setae ( $c_1$ ,  $c_2$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$ ,  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$ );  $c_2$  forwards directed;  $c_1$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$ ,  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$ , backwards directed (Figs 6A; 7A; 8A); f.l.p clearly visible between  $c_1$  setae (Figs 6A; 8B). Circumgastric furrow easily discernible delimiting two zones: central and lateral; central zone ovoid, elevated with polyhedral depression pattern (Figs 6A, B; 8B; 9D) where la, lm, lp,  $h_2$ ,  $h_1$  setae are inserted. Lateral zone, curved,



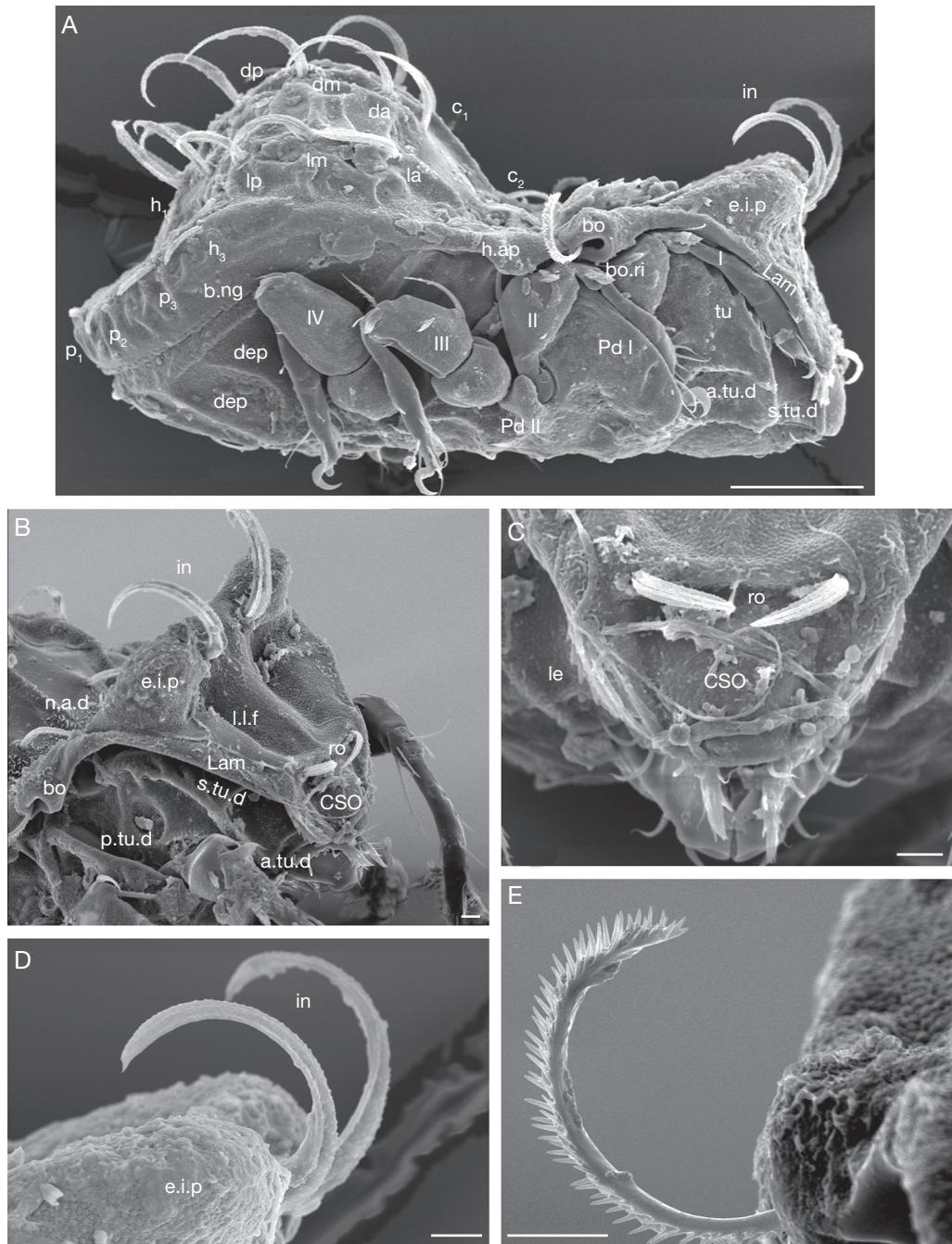


FIG. 7. — *Congocepheus gabonensis* n. sp. adult. scanning electron micrographs: **A**, lateral view; **B**, prodorsum, latero-dorsal view; **C**, prodorsum, frontal view; **D**, elevated interlamellar process and in setae, lateral view; **E**, sensillus, lateral view. Abbreviations: see Material and methods. Scale bars: A, 100  $\mu$ m; B-E, 10  $\mu$ m.

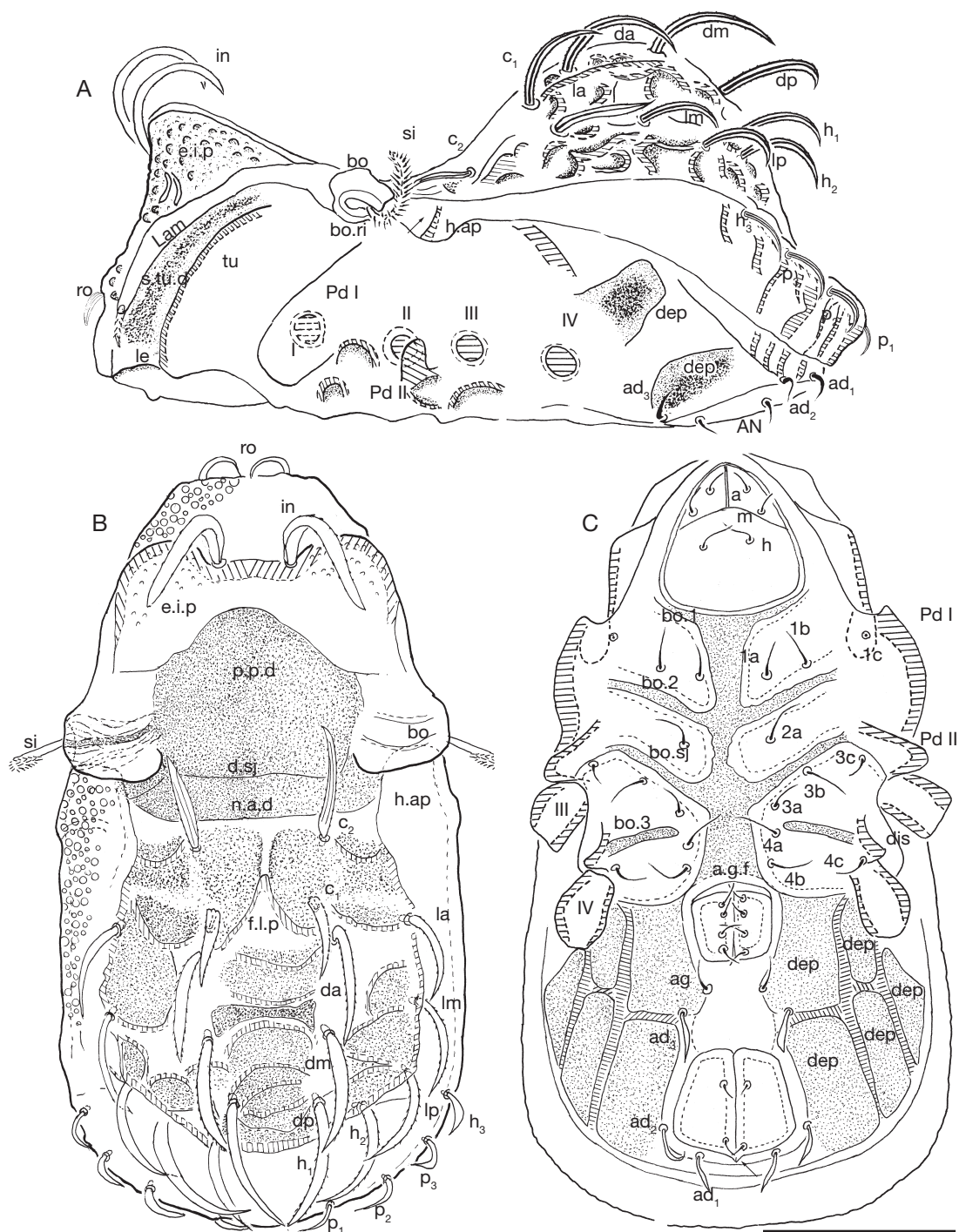


FIG. 8. — *Congocepeus gabonensis* n. sp. adult: **A**, lateral view; **B**, dorsal view; **C**, ventral view. Abbreviations: see Material and methods. Scale bar: 100 μm.



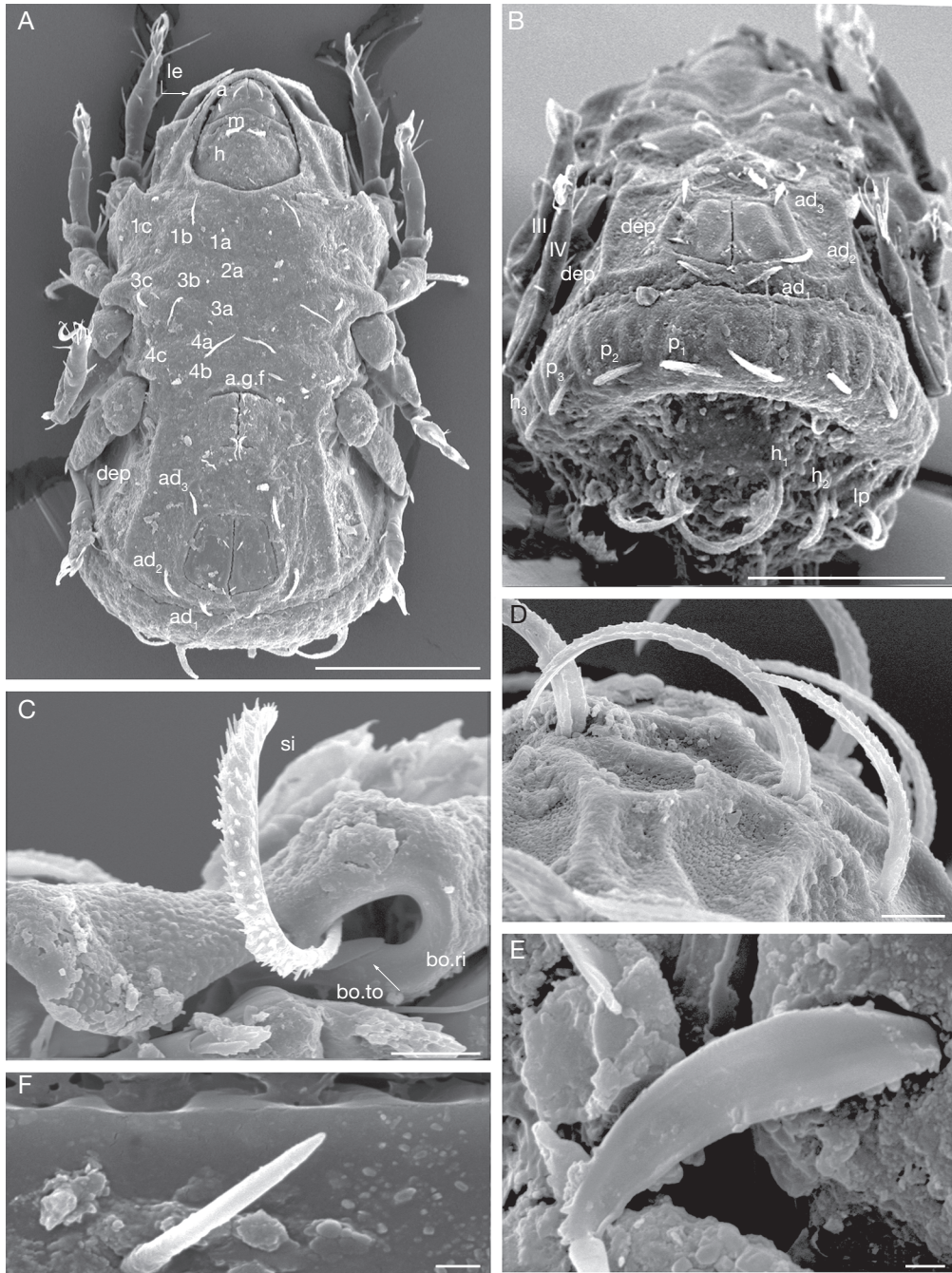


FIG. 9. — *Congocephus gabonensis* n. sp. adult, scanning electron micrographs: **A**, ventral view; **B**, ventral posterior view; **C**, lateral view, humeral apophysis and bothridial opening; **D**, notogastral setae; **E**, anal setae; **F**, genital setae. Abbreviations: see Material and methods. Scale bars: A, 100  $\mu$ m; B, C, 10  $\mu$ m; D, 10  $\mu$ m; E, F, 1  $\mu$ m.



more or less smooth, with  $h_3$ ,  $p_1$ ,  $p_2$ ,  $p_3$  setae; near b.ng, cuticular aligned ribbons (Figs 7A; 8A; 9B).

#### *Lateral region*

Prodorsum; e.i.p elevated. Setae in clearly visible, curving, backwards directed (Figs 7A, B, D; 8A). Lam easily discernible, ending in round la.ti extending to le setae insertion (Fig. 7B); tu curving rod-like cuticular thickening; s.tu.d deep; a.tu.d pocket depression present; posterior zone tu and close to Pd I, ovoid posterior depression (p.tu.d) (Fig. 7A).

Pedotectum I; prominent extending lamina covering the first acetabulum; situated almost parallel to tu, positioned backwards (Figs 7A; 8A). Pedotectum II; ovoid lamina, medium size (Figs 7A; 8A), situated slightly backwards from acetabulum II, with its posterior part in contact with trochanter III. Discidium situated slightly inwards and ventrally (Fig. 8C), for this reason hardly discernible in lateral view.

Bothridium ovoid to polyhedral (Figs 7A, B; 9C); bothridial opening laterally; bo.ri smooth, incomplete, clearly discernible; bo.to present (Fig. 9C). Humeral apophysis ovoid; upper tip penetrating posterior bothridial zone (Figs 7A; 8A). Excavated depression on h.ap clearly visible (indicated by arrow in Fig. 8A).

All setae (prodorsal and notogastral) clearly visible (Figs 7A; 8A); s.c hardly discernible. Lyrifissures not discernible (see Remarks). Several large depressions clearly discernible at level of leg III and behind leg IV (Figs 7A; 8A).

#### *Posterior view*

Elevated interlamellar process and posterior zone of prodorsum reached by n.a.d, clearly discernible (Fig. 6C). All notogastral setae easily discernible. Central and lateral notogastral zones delimited by s.c, well discernible (Fig. 6C). Notogastral ornamentations clearly discernible (Figs 6C; 9B).

#### *Ventral region*

SEM: observations flat ventrally (Fig. 9A) and slightly inclined postero ventrally (Fig. 9B). Epimera slightly elevated, delimited by slightly deep furrow (bo.1, bo.2, bo.sj) (Figs 8C; 9B). Epimera 4 fused, epimeral furrow (bo.3) small (Fig. 8C); apo<sub>1</sub>, apo<sub>2</sub>, apo.sj and apo<sub>3</sub> well discernible. Epimeral chaetotaxy 3-1-3-3

(see Remarks). Discidium (dis) triangular, rounded apex expansion; a.g.f hardly discernible, situated in front of genital plate.

Genital and anal opening zone; depressed polyhedral, delimited laterally by cuticular thickening; externally to cuticular thickening, the lateral wall descending obliquely. All these zones with large deeper than usual polyhedral depressions (dep). Aggenital setae situated backward to genital opening; inserted slightly paraxially and close to ad<sub>3</sub> setal insertion level (Fig. 8C). Four pairs of genital setae. Three pairs of adanal setae. Two pairs of anal setae; end of anal plate small, sharply tipped (Fig. 8C, indicated by arrow). Lyrifissures iad not discernible.

#### *Legs (Fig. 10A-D)*

All legs monodactyle. Setal formulae I (1-3-2-4-17) (1-2-2); II (1-4-3-3-15) (1-1-2); III (2-3-1-2-[14-15]) (1-1-0); IV (1-2-2-2-[12-13]) (0-1-0). In some instances, tarsus III with one additional unpaired seta (provisionally named Ad'), and tarsus IV with a more ventral seta (pv) for this reason the number of setae is between brackets and with an asterisk, indicating variable numbers present.

#### REMARKS

In some specimens in setae are large relative to notogastral setae ( $c_1$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$ ) but in other specimens in and notogastral setae are of equal size.

Very fine dirt found in these specimens is problematic in both SEM and optic microscopy. It hampers observation of detail of microsculptures, lyrifissures and in certain cases, changes the shape of setae (epimeric setae for example).

#### *Congocephus ektactesi* n. sp.

(Figs 11-18; Table 2)

ETYMOLOGY. — The specific epithet is derived from the exceptional characteristic found in this species; "*ektactesi*" derives from *ἐκτακτες* (Grec = extraordinary).

MATERIAL EXAMINED. — **Holotype:** 1 ♀, Makokou, Ogoové-Ivindo Province, 0°34'0"N, 12°52'0"E, 500 m. altitude; dense evergreen humid forest; Y. Coineau coll. I.1974 (MNHN).

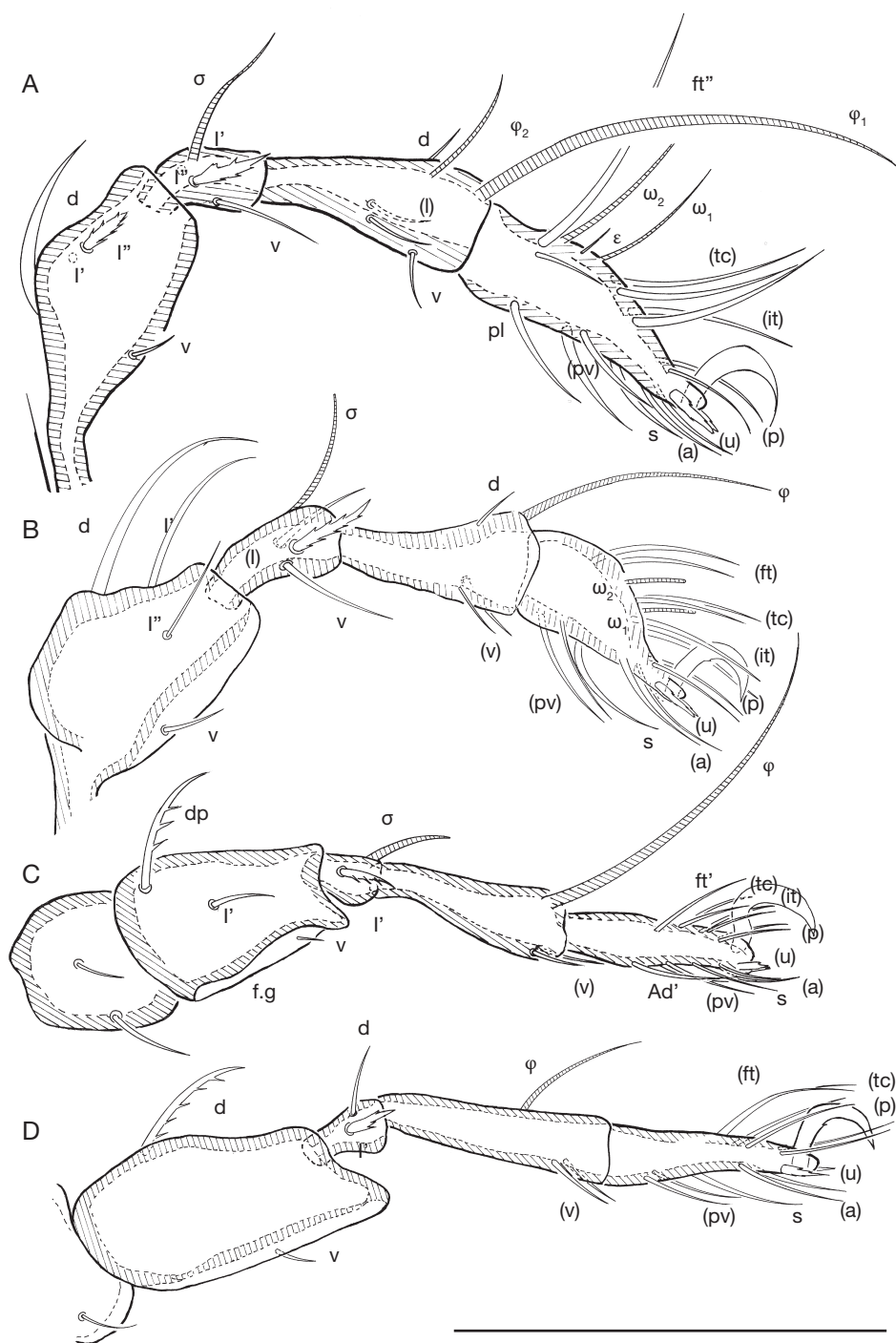


Fig. 10. — *Congocepeus gabonensis* n. sp. adult pattes. **A**, legs I, antiaxial; **B**, legs II, antiaxial; **C**, legs III, antiaxial; **D**, legs IV, antiaxial. Abbreviations: see Material and methods. Scale bar: 100  $\mu$ m.

**Paratypes:** same date as Holotype and preserved in ethanol 70%; 3 ♀♀ (MNHN), 4 ♀♀ (MHNG), 3 ♀♀ (NMP); 6 ♀♀ not deposited, used for SEM.

**TYPE LOCALITY.** — Makokou, Ogoové-Ivindo Province, north-eastern Gabon; situated at 0°34'0"N, 12°52'0"E.

**DIAGNOSIS (ADULT FEMALE).** — Setae; lanceolate-rugous; one medial vein: ro, in, c<sub>1</sub>, c<sub>2</sub>, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, ad; le; lanceolate-dentate; in directed outwards; c<sub>2</sub>, directed forwards; c<sub>1</sub>, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub> directed backwards; p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, h<sub>3</sub> directed backwards and down; epimeric: simple; aggenital, with three long pectines; genital and anal: simple, basally somewhat inflated.

Prodorsum; polyhedral; elevated interlamellar process, medially elevated, with three zones; two paraxial and one medial; large medial cuticular ribbon separating shallow lamellar furrow, deeper than usual; lamellar tip, short polyhedral apex; superior cornea of naso present; bothridial opening laterally; bothridial ring smooth, incomplete with bothridial tooth. Arching uncinat sensillus.

Notogaster; posterior oval; medial zone more or less rectangular; finger like projection clearly visible, smooth flat digitiform expansion. Polyhedral notogastral anterior depression, deep; two inclined lines delimiting posterior part, originating in the proximity of anterior zone of finger like projection; anterior part extending forwards reaching prodorsum; large central zone bordered by conspicuous depressed zones on both sides; clearly discernible polyhedral humeral apophysis; circumgastric furrow easily discernible.

Infracapitulum; transversal depression anterior to subcapitular seta h.

Elevated cuticular ribbons delimiting epimera; epimeral chaetotaxy 3-1-3-3; discidium triangular, rounded apex expansion; anterior genital furrow well discernible; four pairs of genital setae; two pairs of anal setae; anal plate with small sharp tip; aggenital, adanal and anal setae present; several medium-depth polyhedral depressions laterally to genital opening and anteriolaterally to anal opening; lyrifissure adanal, not discernible.

Legs: trochanter III, paraxially with a crown of small spines, three spines almost dorsally.

## DESCRIPTION

### Measurements

SEM: 475 µm (470-498) × 237 µm (221-243) (material used for SEM studies not deposited). Light microscopy: 480 µm (476-502) × 240 µm (233-242).

### Shape

Elongate oval (Figs 11A; 13D).

### Colour

Specimens without cerotegument, dark brown to brown; slightly shiny when observed in reflected light.

### Cerotegument

Specimens covered by thin layer, following cuticular irregularities, permitting observation of integumental characteristics. Behind c<sub>2</sub> setae, cerotegument granulate (Fig. 11C). Dirt present, generally on l.l.f (Fig. 15C) and a.g.f (Fig. 14A).

### Integument

Prodorsal microsculpture; foveate (Fig. 15E); lamellae, e.i.p, bothridial and rostral area (Fig. 15A-D); smooth: l.l.f (Figs 12E; 15A, D) zone between l.l.f; (Figs 12E; 15A, D); zone surrounding ro; CSO and in setal insertions (Figs 11A; 15A, C, D).

Notogastral microsculpture; large irregular fovea: dorsal zone (Figs 11A, B, D; 13D; 15A; 16B, C, D); foveate: h.ap, and zone between h<sub>1</sub> setal insertions (Figs 12E; 16B); smooth: n.a.d, zone in front of c<sub>1</sub>, la setal insertion (Figs 15A, 16C); f.l.p (Figs 11A, C, E; 15A; 16C); behind lp, h<sub>2</sub>, h<sub>1</sub> insertion to s.c (Fig. 16B).

Lateral microsculpture; foveate: lamellae; zone below tu; Pd I, superior part well defined and below less so, gradually becoming smooth; Pd II faintly defined but visible (Figs 12E; 13A; 16A, B); smooth: behind legs and zone of large polyhedral depressions (Fig. 13A).

Ventral microsculpture; foveate: infracapitulum, zone surrounding and slightly behind subcapitular seta h insertion (Fig. 14B); epimeric paraxial zone (Figs 13D; 14A) faintly defined; genital plate anterior zone, faintly defined (Fig. 13C); between adjacent polyhedral depressions, rarely present; smooth: infracapitulum, anterior part (Figs 13C; 14B); antiaxial epimeric zone; genital plate; posterior zone; anal plate and zone of large polyhedral depression (Figs 13C; 14A, C).

### Setation

Lanceolate; ro, in, c<sub>1</sub>, c<sub>2</sub>, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>, ad, all with more or less rugous-dentate margin (Figs 12A-E; 13A, D; 14G; 15A-D; 16B, C) and one clearly visible medial vein, but in slightly inclined observation, there are several



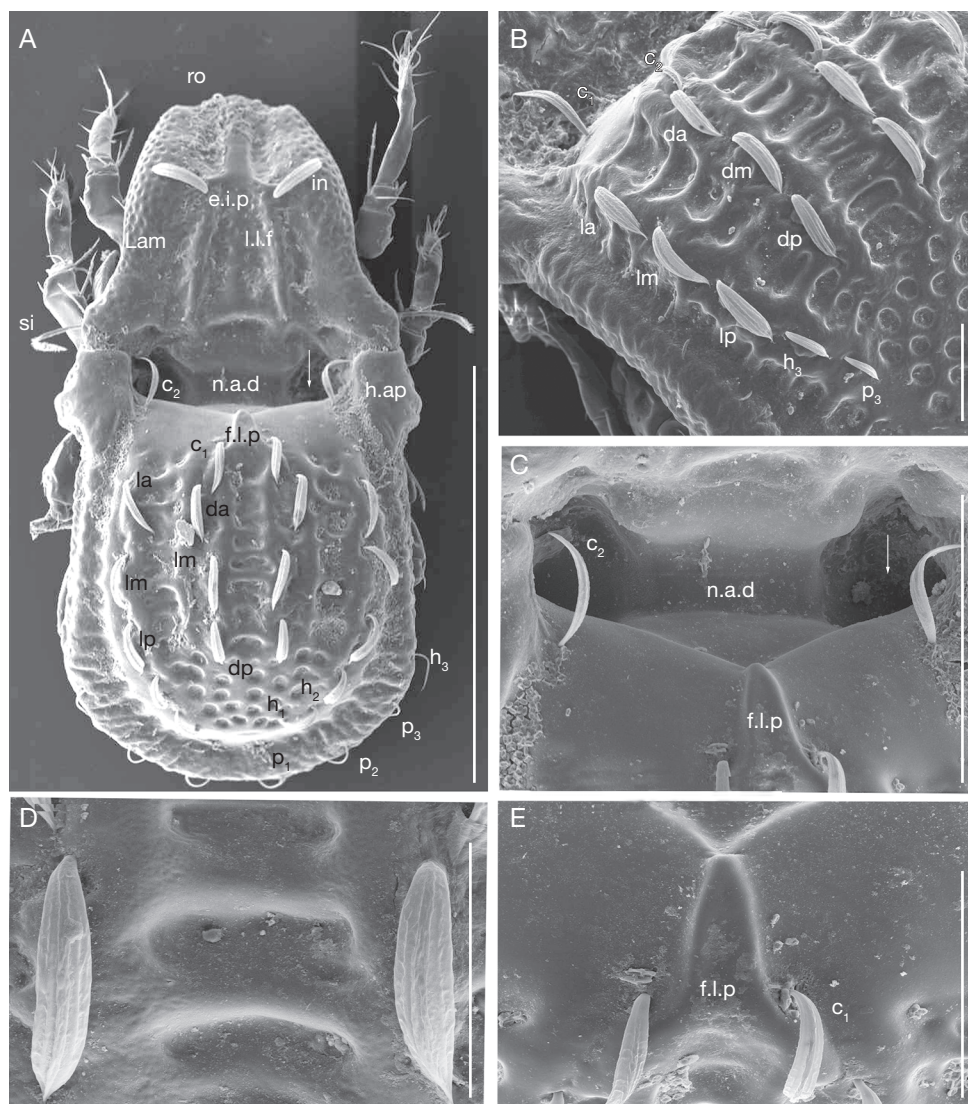


FIG. 11. — *Congocephus extactesi* n. sp. adult. scanning electron micrographs: **A**, dorsal view; **B**, anterior notogastral zone; **C**, notogastral anterior depression, dorsal view; **D**, microsculpture, between dp, notogastral setae; **E**, finger-like projection zone. Abbreviations: see Material and methods. Scale bars: A, 300  $\mu$ m; B, E, 50  $\mu$ m; C, 100  $\mu$ m; D, 40  $\mu$ m.

faint lines parallel to medial vein (Fig. 11D); ro setae forward directed (Figs 12E, 13A; 15A, C, D); in outwards directed (Figs 12E; 13D; 15A-D); le lanceolate-dentate (Figs 12E; 17C);  $c_2$  forward directed (Figs 13A, D; 15A; 16C);  $c_1$ , da, dm, dp, la, lm, lp,  $h_1$ ,  $h_2$  backwards directed (Figs 11A, B, D; 13A, D; 15A; 16A-C; 17A, B);  $p_1$ ,  $p_2$ ,  $p_3$ ,  $h_3$

backwards directed and down (Figs 13A; 16B). Notogastral setae  $c_1$ , da, dm, dp, la, lm, lp, more or less of even width and length;  $c_2$  thin, similar length to other notogastral setae as cited above;  $h_1$ ,  $h_2$  slightly narrower and shorter than other seta cited above (Fig. 16B), but size and lengths are variable (Figs 11B; 17A, B);  $h_3$ ,  $p_3$ ,  $p_2$ ,  $p_1$  thin

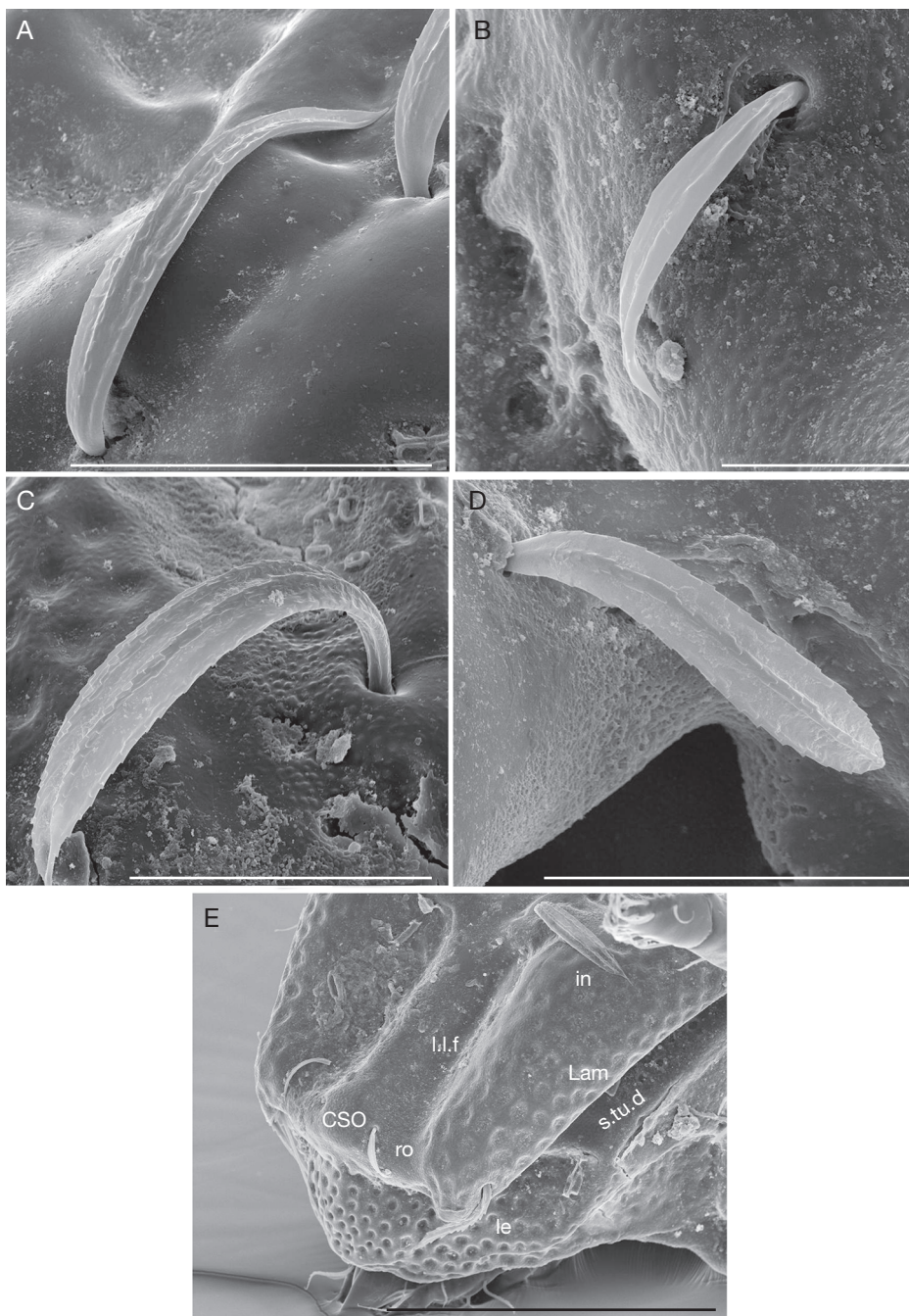


FIG. 12. — *Congocephus ektactesi* n. sp. adult., scanning electron micrographs: **A**, notogastral setae, da; **B**, c<sub>2</sub>, notogastral setae; **C**, in setae; **D**, ro setae, shape variation; **E**, Prodorsum, lateral view. Abbreviations: see Material and methods. Scale bars: A, C, D, 30  $\mu$ m; B, 10  $\mu$ m; E, 100  $\mu$ m.

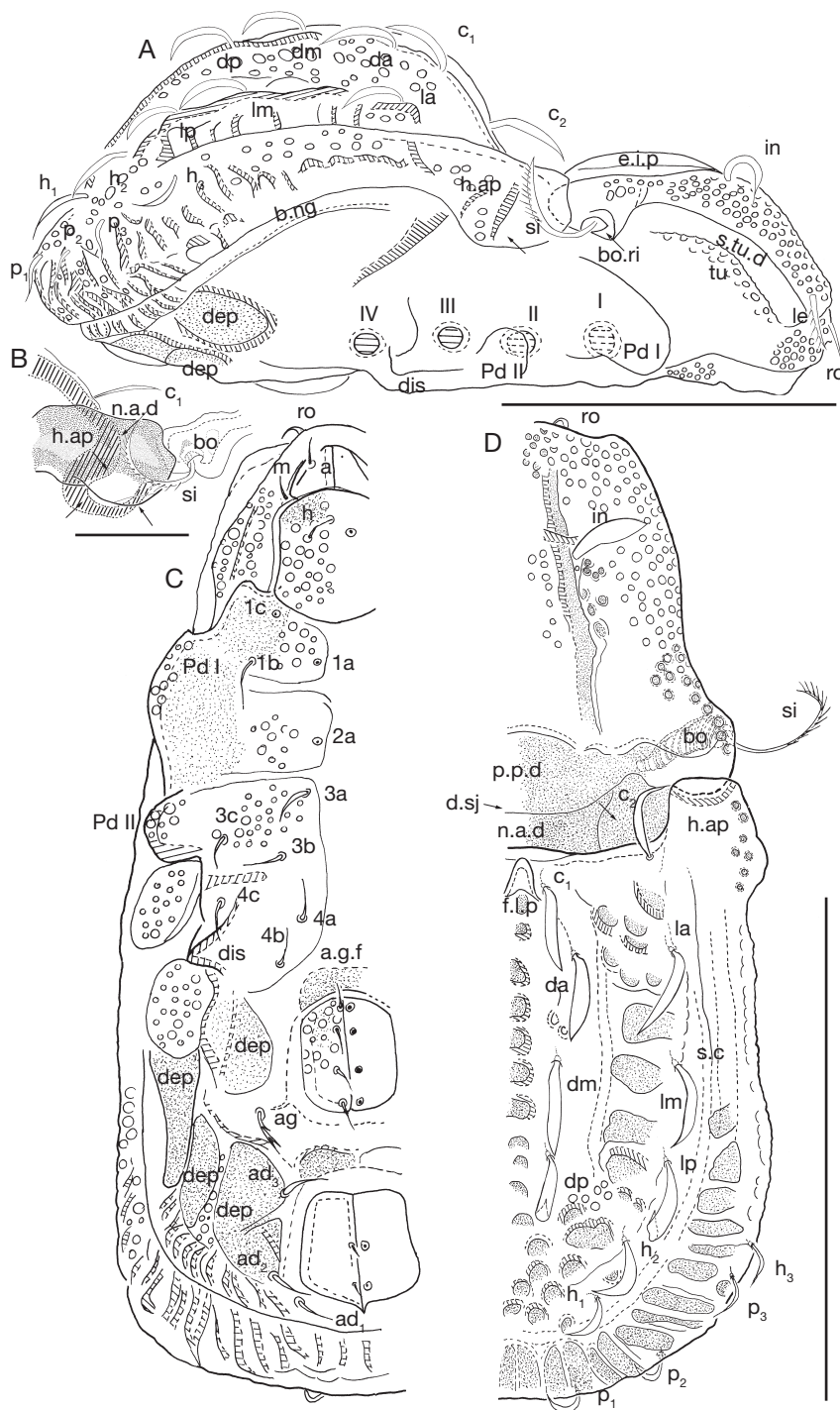


FIG. 13. — *Congocepheus extactesi* n. sp. adult: **A**, lateral view; **B**, zone notogastral anterior depression, detail; **C**, ventral view; **D**, dorsal view. Abbreviations: see Material and methods. Scale bars: A, 200  $\mu$ m; B, 30  $\mu$ m; C, D, 230  $\mu$ m.



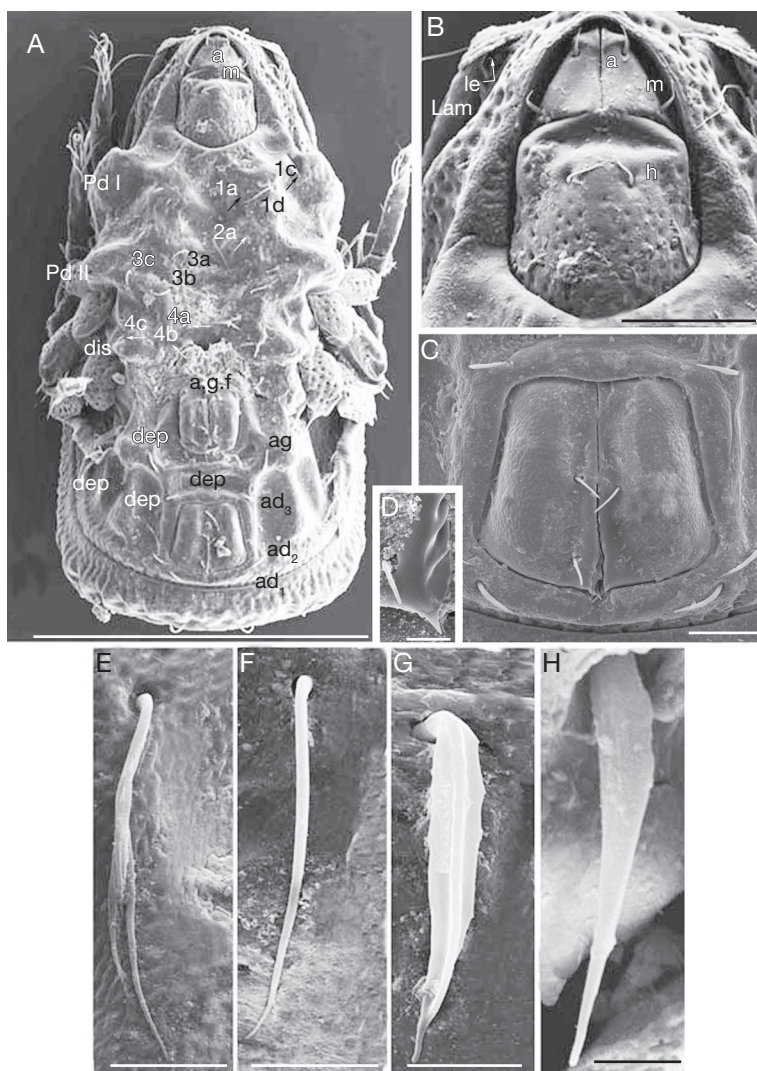


FIG. 14. — *Congocepheus ektatesi* n. sp. adult, scanning electron micrographs: **A**, ventral view; **B**, infracapitulum; **C**, anal zone; **D**, anal, sharp end; **E**, aggenital setae; **F**, epimeric setae; **G**, adanal setae; **H**, anal setae. Abbreviations: see Material and methods. Scale bars: A, 300  $\mu$ m; B, 50  $\mu$ m; C–E, 20  $\mu$ m; F, 30  $\mu$ m; G, 10  $\mu$ m; H, 5  $\mu$ m.

and smallest of all notogastral setae (Figs 11A; 13A; 16B). Adanal (Fig. 14A, G);  $ad_1$ ,  $ad_2$  largest. Simple; epimeric (Fig. 14F), more or less of equal length; but setae 1a, 1c, 2a and in several cases 3c and 4c hardly discernible, generally broken (Figs 13C; 14A). Aggenital; with long pectins, generally three (Figs 13C, 14E). Genital and anal simple, basally slightly inflated (Figs 13C; 14C, H).

#### *Prodorsum*

Polyhedral (Figs 11; 13D; 15A, D); e.i.p medially elevated (Figs 11A; 13; 15A; 16A–C); in setal insertion zone most prominent part of e.i.p (Figs 11A; 15A, B). Backwards to in setal level, prodorsal structure complex; two paraxial zones (p.zo) and one medial zone (m.zo) are clearly delimited (Figs 15A; 16C); m.zo triangular to

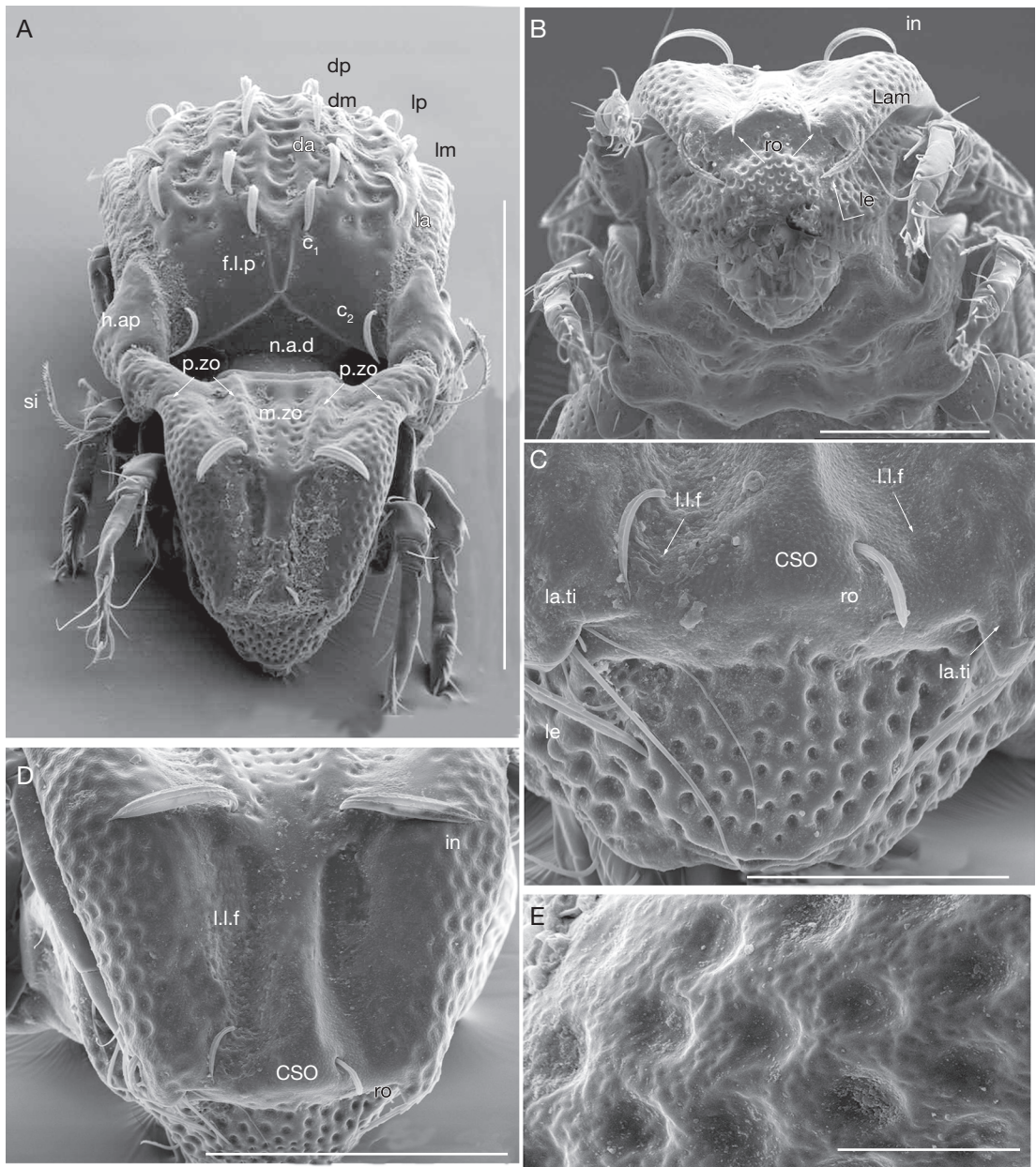


FIG. 15. — *Congocepheus extactesi* n. sp. adult., scanning electron micrographs: **A**, dorsal view; **B**, frontal view; **C**, CSO zone; **D**, frontal view, detail; **E**, prodorsal microsculpture. Abbreviations: see Material and methods. Scale bars: A, 300  $\mu$ m; B, D, 100  $\mu$ m; C, 50  $\mu$ m; E, 10  $\mu$ m.

polyhedral shape, delimited laterally by elevated cuticular ribbon (l.c.r); cuticular rectilinear ribbon (m.c.r) in medial zone, delimiting two concave

zones (Figs 16B, C); posterior of m.zo rectilinear. The p.zo situated laterally to m.zo; zones adjoining l.c.r large and concave (Figs 16B, C). Anterior part

TABLE 2. — *Congocephus ektactesi* n. sp. setae and solenidia.

| Leg I          | Femur         | Genu   | Tibia                         | Tarsus                                       | Claw |
|----------------|---------------|--------|-------------------------------|----------------------------------------------|------|
| setae          | d, (l), v     | (l), v | v, (l), d                     | ft", ε, (tc), (it), (p), (u), (a), s, (pv)   | 1    |
| solenidia      |               | σ      | φ <sub>1</sub> φ <sub>2</sub> | ω <sub>1</sub> , ω <sub>2</sub>              |      |
| <b>Leg II</b>  |               |        |                               |                                              |      |
| setae          | dp, da, l", v | (l), v | (v), d                        | Ad", (pv), s, (a), (u), (p), (it), (tc), ft" | 1    |
| solenidia      |               | σ      | φ                             | ω <sub>1</sub> , ω <sub>2</sub>              |      |
| <b>Leg III</b> |               |        |                               |                                              |      |
| setae          | d, l', v      | l'     | (v)                           | Ad', (pv), s, (a), (u), (p), (it), (tc), ft' | 1    |
| solenidia      |               | σ      | φ                             | -                                            |      |
| <b>Leg IV</b>  |               |        |                               |                                              |      |
| setae          | d, v          | d, l'  | (v)                           | (pv), s, (a), (u), (p), (tc), (ft)           | 1    |
| solenidia      |               | -      | φ                             | -                                            |      |

of e.i.p from in setal insertion, presenting deep l.l.f, separated by large medial cuticular ribbon (Figs 15A, D); l.l.f ending in front of in the la.ti (Fig. 15C); CSO situated in the anterior part of medial cuticular ribbon, between ro setae insertions, smooth ovoid structure (dorsal view) and convex (in lateral view) (Fig. 15C, D); la.ti polyhedral, short apex (Figs 15C; 17C). Rostral anterior margin round-lobed (Figs 12E; 15C). Lamellae running dorso-laterally. Bothridial opening lateral, (Figs 13A; 16A, B; 17D); bo.ri smooth, incomplete; bo.to sharp tip clearly visible (Fig. 17D); si uncinat, arching (Fig. 17D).

#### *Notogaster*

Shape (dorsal view): oval (posterior zone); rectangular (medial zone); concave (anterior zone); polyhedral (laterally, zone h.ap) (Figs 11A; 13D); lateral view: convex elevated; polyhedral (zone h.ap) (Figs 13A; 16A); d.sj hardly discernible, narrow, concave (Fig. 13D).

Notogastral anterior depression (n.a.d), deep, complex structure; pair of inclined lines delimiting posterior zone, originating in the proximity of anterior zone of f.l.p (Figs 11C; 15A; 16C); in frontal view (Fig. 15A), these two lines delimiting a triangular depression, extending laterally to h.ap. Anterior zone extending forwards and exceeding d.sj up to posterior zone of prodorsum, given a complex polyhedral shape (Figs 11C; 15A). At the bottom a large polyhedral middle zone,

bordered on both sides by a deep zone (Fig. 11C, indicated by arrow) (see Lateral Region). Humeral apophysis, polyhedral structure (Figs 11A; 13D; 16C). Fourteen pairs of setae (c<sub>1</sub>, c<sub>2</sub>, da, dm, dp, la, lm, lp, h<sub>1</sub>, h<sub>2</sub>, h<sub>3</sub>, p<sub>1</sub>, p<sub>2</sub>, p<sub>3</sub>), f.l.p, well visible (Figs 11A, C, E; 13D; 15A; 16C). Circumgastric furrow well discernible (Figs 11A; 13D; 16B; 17A, B).

#### *Lateral region* (Figs 13A; 16A, B)

Prodorsum; e.i.p slightly elevated. Lam well discernible, terminating in polyhedral la.ti extending slightly towards le setae insertion (Fig. 17C); tu a curving rod-like cuticular thickening, clearly delimited; s.tu.d deep, easily visible. Pedotectum I, prominent extended lamina, directed forward.

Pedotectum II, ovoid to polyhedral lamina, medium size, situated slightly behind acetabulum II, posterior part in contact with trochanter III. Discidium discernible between acetabula III and IV. Bothridia ovoid to polyhedral; bothridial opening lateral; bo.ri smooth, incomplete with prominent bo.to (Fig. 17D). Large rectangular to polyhedral humeral apophysis; anterior rectilinear, penetrated by posterior bothridial zone. This last zone very complex (Fig. 13B).

Excavated depression on h.ap clearly visible (Fig. 13A, indicated by arrow); s.c excavated, easily discernible (Fig. 16B). Lyrifissures not discernible (see Remarks). Several conspicuous polyhedral depressions behind acetabulum IV.



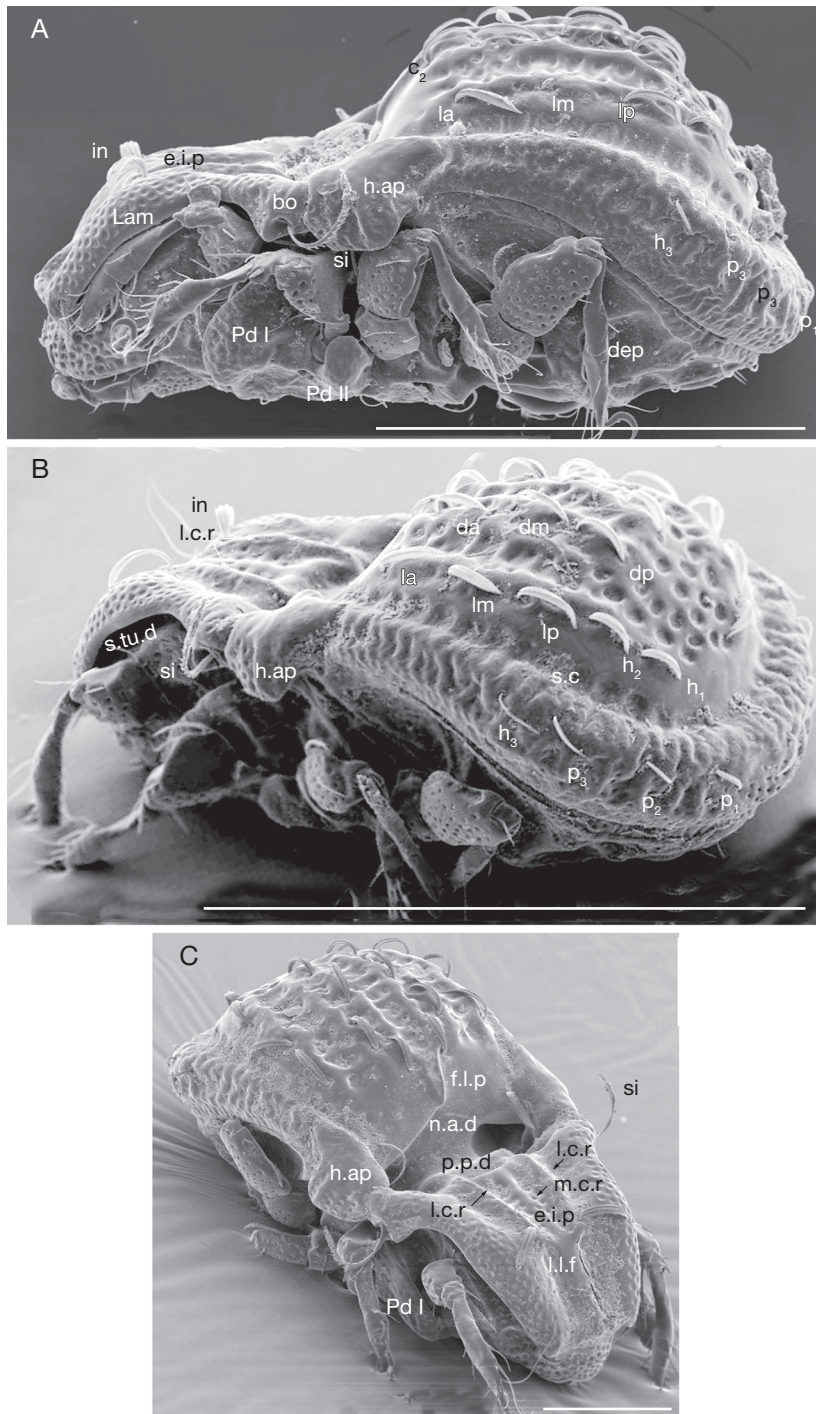


FIG. 16. — *Congocephus extactesi* n. sp. adult., scanning electron micrographs: **A**, lateral view; **B**, latero-posterior view; **C**, latero-dorsal view. Abbreviations: see Material and methods. Scale bars: A, B, 300  $\mu$ m; C, 100  $\mu$ m.

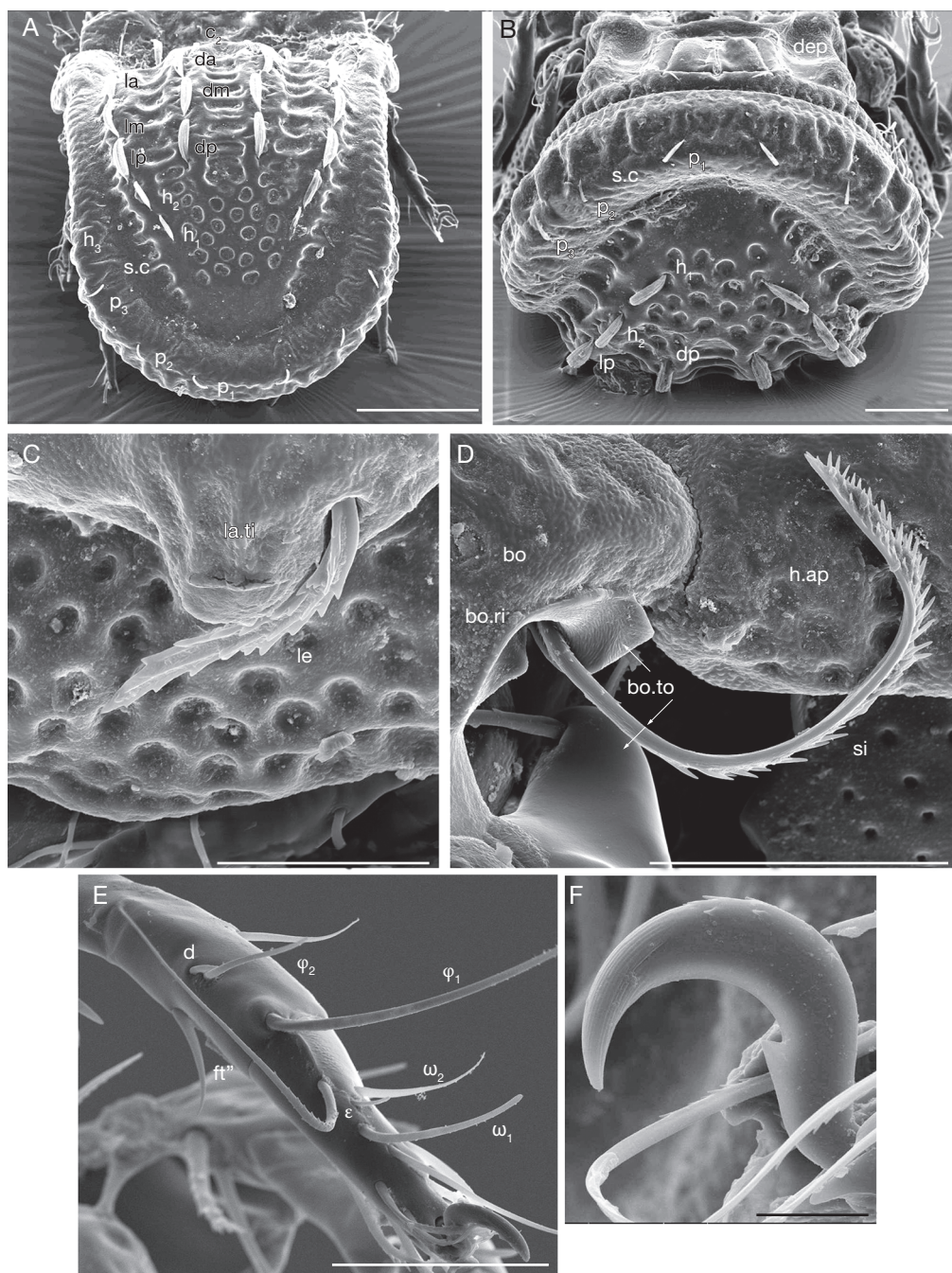


FIG. 17. — *Congocepheus ektactesi* n. sp. adult. scanning electron micrographs: **A**, notogastral posterior view; **B**, ventral posterior view; **C**, lamellar tip; **D**, bothridium; **E**, legs I, dorsal view; **F**, claw, lateral view. Abbreviations: see Material and methods. Scale bars: A, F, 100  $\mu$ m; B, 50  $\mu$ m; C, E, 30  $\mu$ m; D, 40  $\mu$ m.

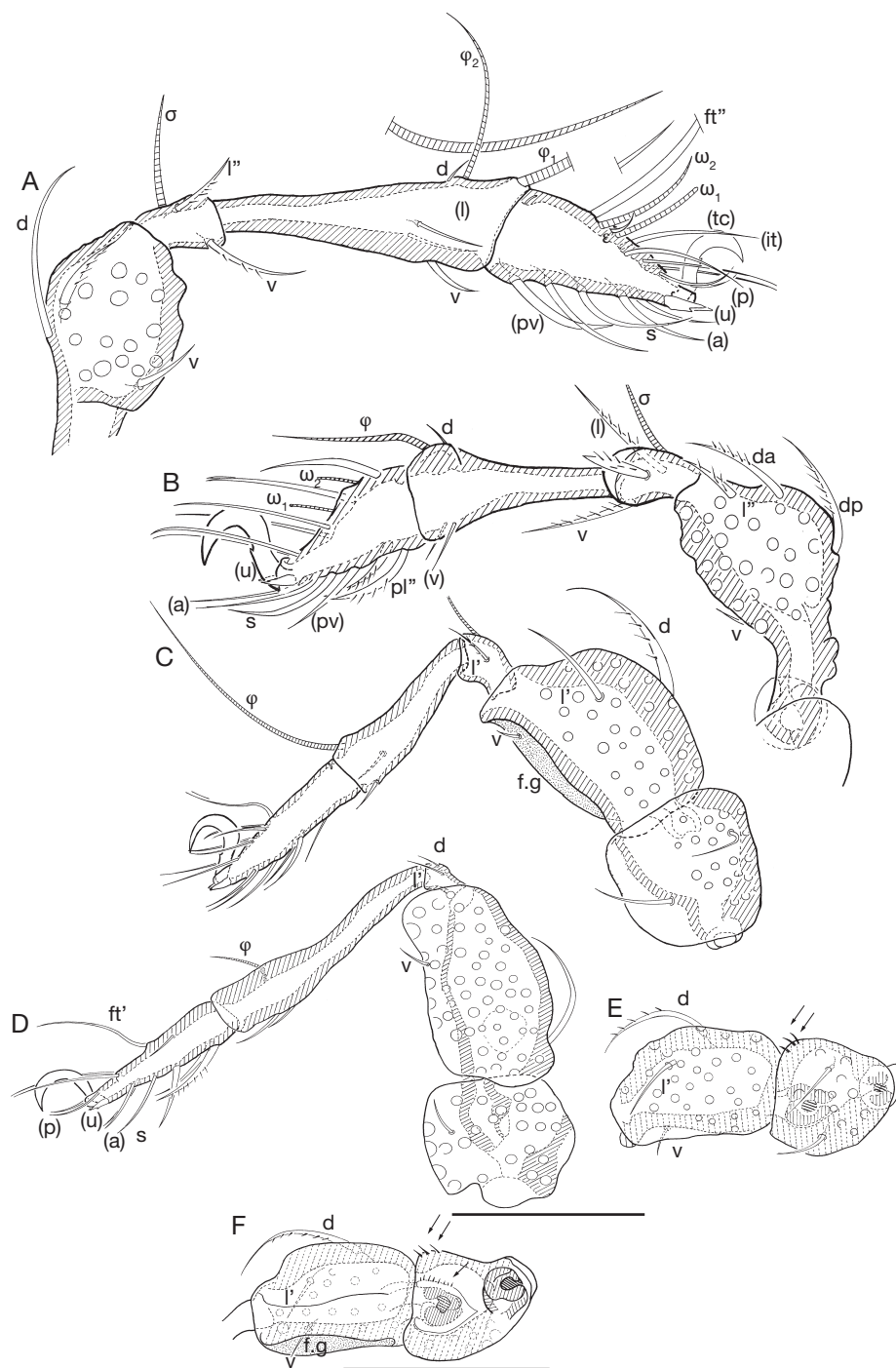


FIG. 18. — *Congocephus extactesi* n. sp. adult.: **A**, legs I, antiaxial; **B**, leg II, antiaxial; **C**, legs III, antiaxial; **D**, legs IV, antiaxial; **E**, trochanter-femur, leg III, antiaxial; **F**, trochanter-femur, leg III, paraxial. Abbreviations: see Material and methods. Scale bars: A-D, 50  $\mu$ m; E, F, 70  $\mu$ m.



*Posterior aspect (Figs 16B; 17A, B)*

Elevated interlamellar process, in setae, bothridium, posterior zone of prodorsum and posterior prodorsal ornamentation clearly visible (Fig. 16B). Notogastral setae, h.ap, s.c and notogastral microsculpture easily discernible.

*Ventral region*

Different observation angles and dispositions are necessary for properly understanding the ventral region. (Figs 13C; 14A; 17B); in flat observation (Figs 13C; 14A) elevated and depressed areas clearly discernible. Subcapitulum (Fig. 14B) with transverse depression immediately in front of seta h. Epimera clearly delimited but it is impossible to establish if delimitations elevated or depressed (Fig. 13C, optical observation). Epimera 3 and 4 fused. Epimera clearly discernible as slightly depressed more or less flat areas Epimeral chaetotaxy 3-1-3-3; dis triangular, rounded apical expansion; a.g.f medium depth, situated towards the front of genital plate. Four pairs of genital setae; two pairs of anal setae. Anal plate with small sharp tip (Figs 13C; 14C, D). Aggenital setae situated posterolaterally to genital plate. Three pairs of adanal setae situated on elevated zone between contiguous depressions (Figs 14A; 17B). Adanal and aggenital setae more or less of equal lengths, different shapes (see Setation). Several polyhedral depressions (medium depth) laterally to genital opening and anterolaterally to anal opening (Figs 14A; 17B). Lyrifissure iad not discernible (see Remarks).

*Legs (Fig. 18A-D)*

All legs monodactyle. Setal formulae I (1-3-2-4-15) (1-2-2); II (1-4-3-3-15) (1-1-2); III (2-3-1-2-(14-15) (1-1-0); 1-2-2-2-(12-13) (0-1-0). Tarsus III and IV with in some cases one additional seta (see Remarks).

Several aspects, hardly discernible in optical microscopy, had to be confirmed by SEM studies, such as: presence of d setae on tibia I near solenidium  $\varphi_2$  and the famulus ( $\epsilon$ ) situated between solenidia  $\omega_1$  and  $\omega_2$  (Fig. 17E), confirmed by SEM; claw with a tooth ventrally and slight dentition laterally and ventrally (Fig. 17F).

Trochanter III particular, with a crown of small spines (Fig. 18F, indicated by single arrow) on cu-

ticular paraxial thickenings (Fernandez *et al.* 2013a) and a series of three spines situated almost dorsally (Fig. 18F, indicated by double arrow), exceeding the trochanteral margin and clearly visible antiaxially (Fig. 18E) (see Discussion).

## REMARKS

Very fine dirt on these specimens complicated SEM and optic microscopy studies as it prevented observation of details of microsculpture and lyrifissures. In some cases, dirt was attached to setae surfaces and altered their shapes (epimeric setae for example).

We found size variations amongst setae; in is largest in most cases; but in some specimens interlamellar and notogastral setae were of equal size; setae  $h_1$  and  $h_2$  presented large variation from equal in size to very small in comparison to other notogastral setae.

We found variation in numbers of tarsal chaetotaxy of legs III and IV, similar to that found in *C. gabonensis* n. sp.

## DISCUSSION

*Congocephus gabonensis* n. sp., belongs to the same group as *C. taurus* Balogh, 1961. Comparison of the species is complicated by the short and incomplete original species description (only two figures, one dorsal and the other lateral). Some characteristics however permit differentiation of the species, such as: size of *C. taurus* (382-411  $\mu\text{m} \times 270$ -275  $\mu\text{m}$ ) is large relative to *C. gabonensis* n. sp. (290  $\mu\text{m}$  (298-305)  $\times$  168  $\mu\text{m}$  (172-176)); e.i.p divided in *C. taurus* versus entire in *C. gabonensis*; size and disposition of notogastral setae,  $c_2$  little in *C. taurus*, big in *C. gabonensis* n. sp.; other notogastral setae long and directed laterally in *C. taurus*, medium sized and posterior directed in *C. gabonensis* n. sp.

*Congocephus ektactesi* n. sp. is very different to all other congeners, with particularities such as: integumental microsculpture; setal disposition; prodorsum; bothridial ring; notogastral anterior depression and notogastral structure. Also, leg III presents very interesting structures. We indicated the presence of a particular protection mechanism involving several body structures, as well as an interesting leg folding process in several genera

(Fernandez *et al.* 2013a). In this new species we observed a series of spines situated paraxially on trochanter III. We infer that these structures play a role in the leg folding process, which is a new aspect to be studied related to the general process.

This newly described species exhibits many interesting characteristics, but probably serves to highlight our small and fragmentary knowledge of the genus *Congocephus*, and confirms, unfortunately, our opinion on the need to make detailed and complete studies. We regret being unable to find immature stases amongst our samples.

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