

Notes on Prostigmata of Argentina 1: A new species of the genus *Cryptognathus* Kramer (Acari: Cryptognathidae)

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Abstract: *Cryptognathus amalfitanii* sp. nov. is described and illustrated based on samples collected from epiphytes of the species *Tillandsia aëranthos* (Bromeliaceae) from different trees in Buenos Aires, Argentina.

Key words: Epiphytes, Mites, Prostigmata.

Resumen: **Notas sobre Prostigmata de Argentina 1: Una nueva especie del género *Cryptognathus* Kramer (Acari: Cryptognathidae).** Se describe e ilustra *Cryptognathus amalfitanii* sp. nov. en base a muestras colectadas en epífitas de la especie *Tillandsia aëranthos* (Bromeliaceae) en varias especies de árboles en Buenos Aires, Argentina.

Palabras clave: Epífitas, Ácaros, Prostigmata.

INTRODUCTION

The family Cryptognathidae Oudemans, 1902 comprises 60 species in three genera (Dögan, 2008): *Favognathus* Luxton, 1973 (36 species), *Cryptognathus* Kramer, 1873 (22 species) and *Cryptofavognathus* Dögan and Dönel, 2010 (2 species) (Fan & Zhang, 2005; Khanjani & Ueckermann, 2008; Dögan 2008; Dönel & Dögan, 2011; Uluçay & Koç, 2013). Members of this family are recognized by the presence of a protective hood anterior of the propodosoma, and extremely extendable gnathosomal base in adults (Dögan, 2008). Three species of this family, all belonging to the genus *Favognathus*, have been described from South America (Dögan, 2008): *F. agapictus* (Flechtmann, 1971) from Brazil, *F. ochraceus* (Summers and Chaudhri, 1965) and *F. pictus* (Summers and Chaudhri, 1965) both from Galapagos Islands, Ecuador. In this work we describe the first species of the family from Argentina which also constitutes the first record of the genus *Cryptognathus* in the Neotropical region.

MATERIALS AND METHODS

Specimens were hand collected from epiphytes of the species *Tillandsia aëranthos* (Bromeliaceae) on different trees in the campus of the sport club Vélez Sarsfield (Fig. 1), Ciudad

Autónoma de Buenos Aires, Argentina and fixed in 96% ETOH. Mites for optical microscopy were cleared in Nesbitt's fluid and mounted in Hoyer's medium following Walter & Krantz (2009). Specimens were studied and measured under an Olympus BH-2 or a Leica D2500 compound microscope. Drawings were made with a camera lucida mounted on the microscope. For scanning electron microscopy (SEM), specimens were dehydrated through a series of ethanol solutions of increasing concentration in absolute hexamethyldisilazane (Porta & Tricarico 2018) and then air-dried, mounted on individual stubs using adhesive copper tape, sputter-coated with gold-palladium and examined under a FEI XL 30 TMP scanning electron microscope varying the working distance and the voltage (15-22 eV). SEM photographs were taken in two sessions in August 2017.

The terminology of palp and leg chaetotaxy follows that of Grandjean (1944, 1946) except for the adoption of the interpretation of Robaux (1975) for the κ setae of the genu I as one σ solenidion. Idiosomal chaetotaxy terminology follows Kethley (1990) and Fan & Zhang (2005). All measurements are given in micrometers (μm) for the holotype and paratypes (in parentheses). The material examined is deposited at the Arachnological Collection of the Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires (MACN-Ar).



Fig. 1. Collecting locality with detail of the epiphyte *Tillandsia aëranthos* (Bromeliaceae) where the specimens *Cryptognathus amalfitanii* sp. nov. have been collected.

RESULTS

Family: Cryptognathidae Oudemans, 1902

Genus: *Cryptognathus* Kramer, 1879

Type species: *Cryptognathus lagena* Kramer, 1879

Cryptognathus amalfitanii sp. nov.
(Figs. 2-12)

Etymology. The specific name is a patronymic in memory of José Luis “Don Pepe” Amalfitani (1894-1969) for his invaluable contribution to the developing of Club Atlético Vélez Sarsfield as a great social and sportive institution.

Diagnosis

Palptibial claw present (Figs. 8A-B, 9B), front margin of the hood smooth (Fig. 4A), dorsal shield entirely reticulated (Fig. 3) with irregular polygons, each with more than 10 pores uniformly distributed (Fig. 4B); ventral shield (Fig. 6) without reticulations, with an U shaped sector of pores behind setae **3a** which extends laterally behind coxae IV and reaches **ag1** but not the anterior ring of genital valves and with lateral patches of pores between coxae III and IV, behind coxae I, II and hypostosomal ring; with a central ventral region between setae **4a** and **ag1** with longitudinal striae (Fig. 7C) that becomes transversally oriented (Fig. 7B) before the genital plates (Fig. 3); solenidia ω of tarsi III and IV absent in females and present in males; tarsi III and IV with only one proximoventral seta (Figs.



Fig. 2. *Cryptognathus amalfitanii* sp. nov. habitus alive.

10C-D, 12C-D), solenidion present on tibia III (Figs. 10C, 12C, E) and absent on tibia IV (Fig. 10D); (**tc**) setae on tarsus II dissimilar, **tc'** eu-pathidical and **tc''** not (Fig. 12B).

Comparisons

According to the key for the genus by Uluçay & Koç 2013, *C. amalfitanii* n. sp. resembles *C. striatus* Luxton, 1973 and *C. vulgaris* Luxton, 1973 by the reticulated dorsal shield, ventral shield without reticulations and front margin of hood smooth. It differs from *C. striatus* by the presence of both pores behind coxae IV and reticulation covering entire dorsal shield. From *C. vulgaris* by the absence of solenidia on female tarsus III and IV and by the presence of punctuation covering all dorsal shield.

Type material

Holotype, female (MACN-Ar 40686), hand collected from epiphytes of the species *Tillandsia aëranthos* (Bromeliaceae) on various trees, both exotic (*Pinus* sp., *Populus* sp.), and native (*Schinus molle*), in the campus of the sport club Vélez Sarsfield in Ciudad Autónoma de Buenos Aires (34° 38.023'S, 58° 30.963'O and altitude 10 m a.s.l), 16.VII.2017, A. O. Porta leg. Paratypes, same data, 6 females (MACN-Ar 40652, MACN-Ar 40670, MACN-Ar 40663, MACN-Ar 40644, MACN-Ar 40689, MACN-Ar 40666), 3 males (MACN-Ar 40649, MACN-Ar 40656, MACN-Ar 40691, MACN-Ar 40665), 2 immatures (MACN-Ar 40645, MACN-Ar 40669) all mounted in slides and 2 females (MACN-Ar 40666, MACN-Ar 40640) mounted for MEB.

Description

Colour chilli red in live (Fig. 2).



Fig. 3. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40666). Habitus dorsal. Scale bar: 100 μ m.

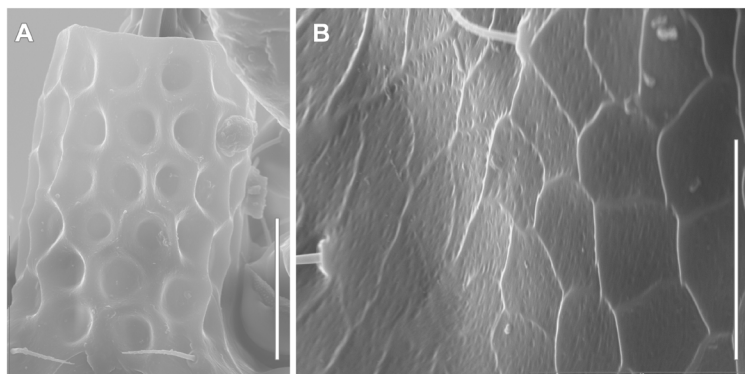


Fig. 4. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40666). **A** dorsal view of the hood; **B**. detail of the dorsal sculpture. Scale bars: **A** 20 μ m; **B** 10 μ m.

Female (n = 7)

Gnathosoma (Figs. 8 A-B, D, 9)

Chelicerae slender (Fig. 8D) 100 (98–108); mov-

able digits 28 (24–28). Peritremes (*pe.*) ramifying just back digits articulation. Palp segments trochanter glabrous; femur with 3 setae (Fig. 8A,

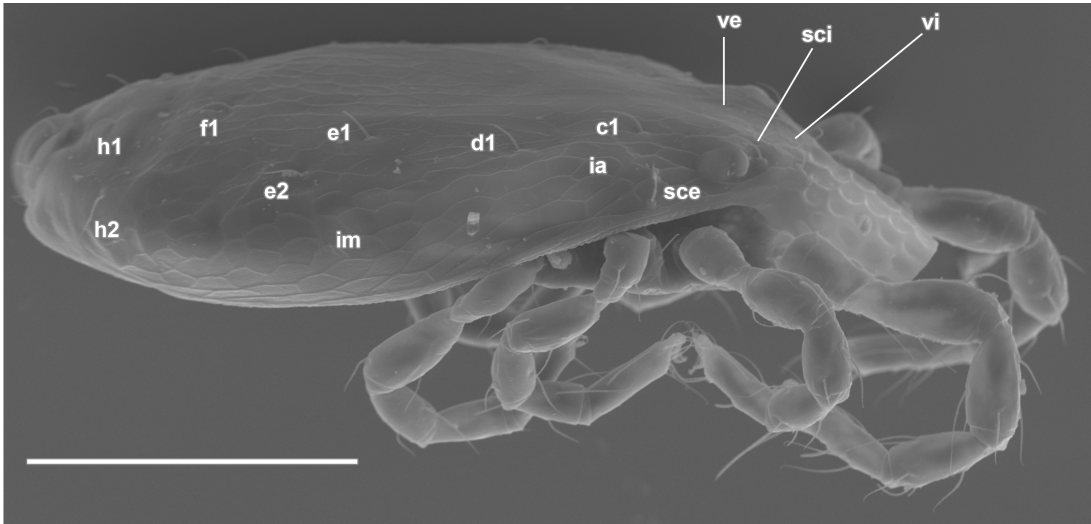


Fig. 5. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40640). Habitus in antiaxial view. Scale bar: 100 μ m.



Fig. 6. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40640). Ventral view. Scale bar: 100 μ m.

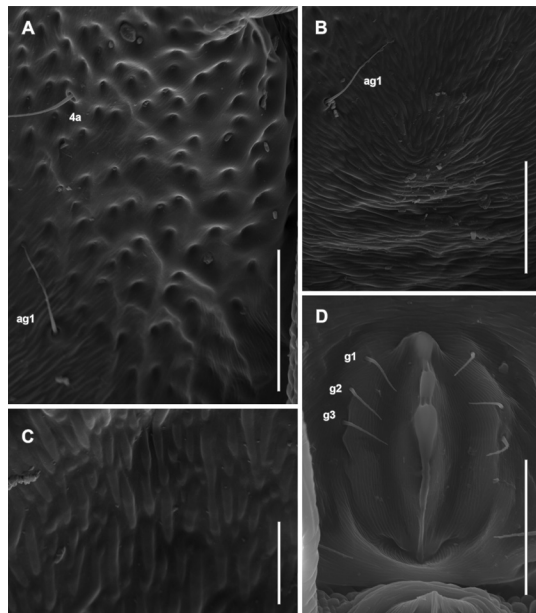


Fig. 7. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40640). Ventral view, **A**. Detail of the porous sector posterior to coxae IV; **B**. central striated sector anterior to genital valves; **C**. detail of the same; **D**. genital valves. Scale bars: A; B; D 20 μ m; C 5 μ m.

B), 36 (30-38) long; genu with 2 setae, 30 (26-30) long; tibia with 3 setae, 16 (14-18) long, palptibial claw present (Figs. 8A, B, 9B); tarsus 8 (8-10), with 7 setae and one solenidion, (*ul*), *acm* and *sul* eupathidical (Fig. 9C). Subcapitular setae *m* 26 (25-31), *m-m* 16; *or1* 10 *or2* 10.

Idiosoma (Figs. 2, 3) Oval in shape, 315 (245-315) long, 162 (153-186) wide at level of coxae IV. Anterior margin of the hood smooth (Fig. 4A) with 5-6 dimples in each longitudinal row. Dorsal shield (Fig. 3) completely ornamented with reticulations except region beside setae *h1*, reticular

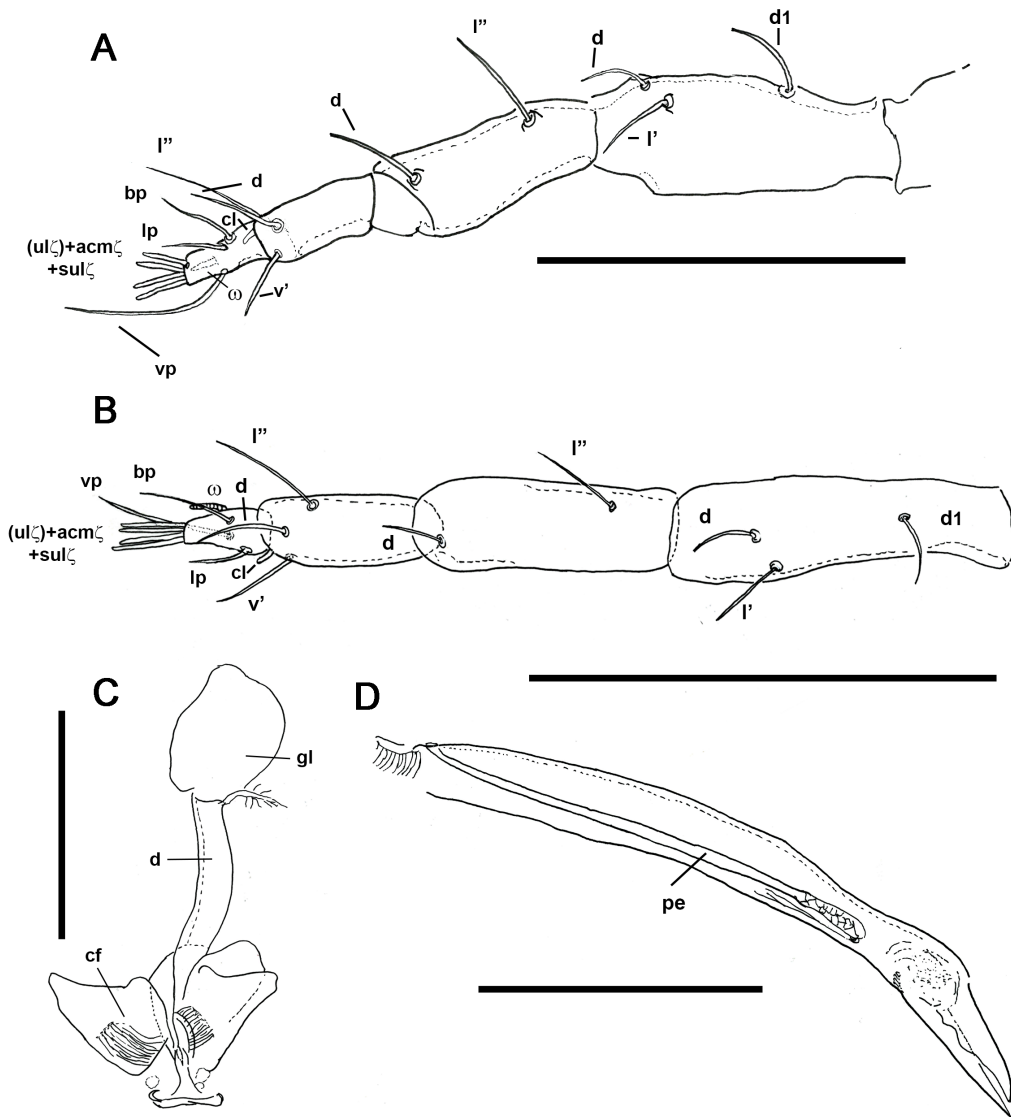


Fig. 8. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40689). **A** paraxial view of the palp; paratype (MACN-Ar 40663), **B** dorsal view of the palp; paratype (MACN-Ar 40665), **C** ventral view of the male genitalia; **D** chelicera, antiaxial view. Abbreviations: **cf**: cuticular frame, **cl**: tibial claw, **d**: duct, **gl**: genital gland, **pe**: peritreme. Scale bars: **A-D**: 50 μ m.

cells with more than 10 pores (Fig. 4B), pores distributed evenly in all reticulation cells; one pair of eyes and one pair of postocular bodies (**pob**) laterally between setae **sci** and **sce**. Eyes 6.4 (5-10) in diameter; **pob** 8.8 (8-11.2) in diameter. Dorsal shield with three pairs of slit-like cupules as follows: **ia** posterior to **c1** (Figs. 3, 5), **im** posterior to setae **e1** and anterior to **e2** (Figs. 3, 5) and **ip** posterior to **f1** and anterior to **h1** (Fig. 3); polygonal cells (Fig. 4B) mostly longer than wide. Dorsal idiosomal setae smooth. Length of dorsal

setae: **vi**: 12 (8-13); **ve**: 12 (7-13); **sci**: 12 (10-12); **c1**: 16 (11-17); **sce**: 15 (15-18); **d1**: 17 (13-17); **e1**: 16 (15-16); **e2**: 16 (13-18); **f1**: 12 (12-13); **h1**: 12 (10-13); **h2**: 15 (12-16). Distance between dorsal setae: **vi-vi**: 24 (24-30); **vi-ve**: 14 (10-19); **ve-ve**: 30 (26-30); **ve-sci**: 6 (4-10); **sci-sci**: 46 (28-46); **c1-c1**: 52 (45-53); **sce-sce**: 84 (80-102); **c1-sce**: 28 (30-32); **d1-d1**: 84 (64-84); **d1-e1**: 47 (45-48); **e1-e1**: 70 (68-76); **e1-e2**: 26 (21-27); **e2-e2**: 100 (102-106); **e1-f1**: 48 (45-52); **f1-f1**: 48 (39-44); **f1-h1**: 36 (34-42); **h1-h1**: 20 (20-26); **h1-h2**: 27 (22-32);

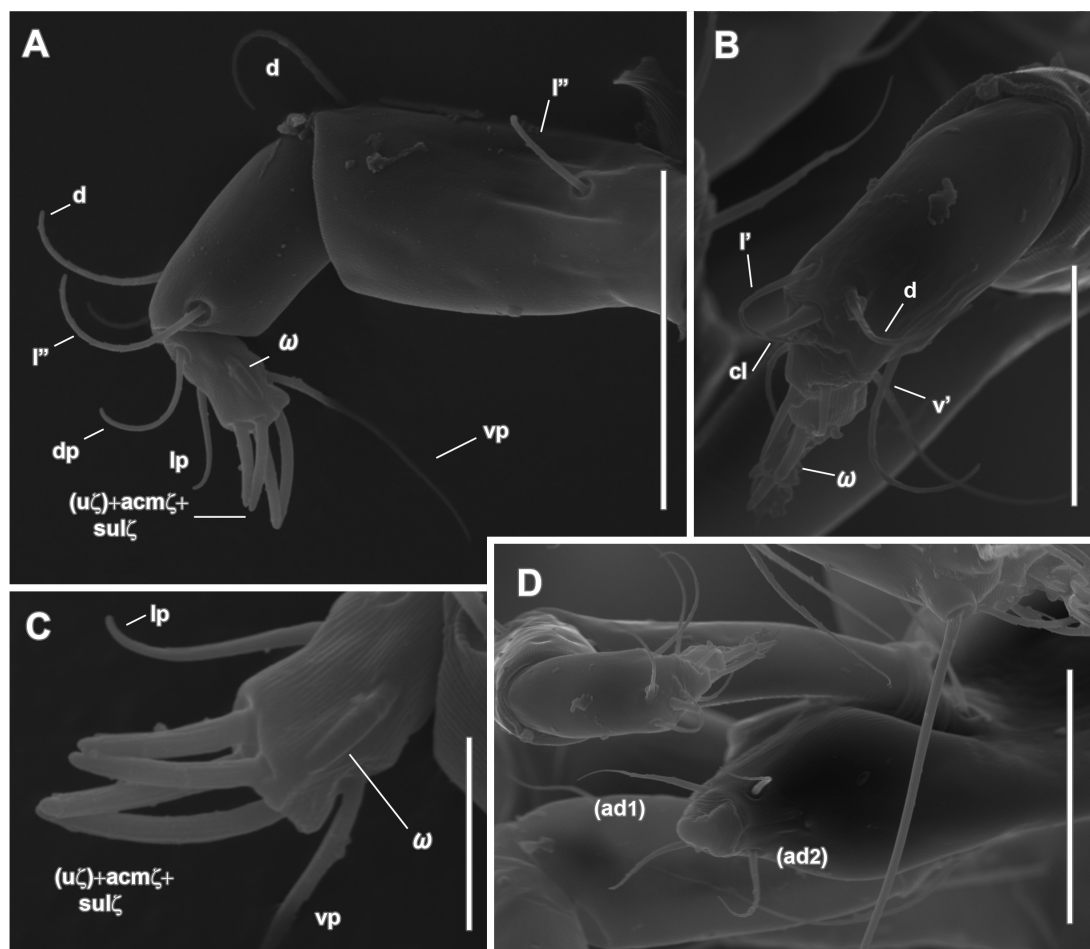


Fig. 9. *Cryptognathus amalfitanii* sp. nov. paratype (MACN-Ar 40666). **A.** antiaxial view of the left palp; paratype (MACN-Ar 40640), **B.** dorsal view of the left palp tibia; **C.** detail of the distal portion of the tarsus of the left palp; paratype (MACN-Ar 40666), **D.** hypostome. Scale bars: **A;** **D** 20 μ m; **B** 10 μ m; **C** 5 μ m.

h2-h2: 78 (72-82).

Ventral shield (Fig. 6), without reticulations, with an U shaped sector of pores behind setae **3a** which extends laterally behind coxae IV and reaches **ag1** but not the anterior ring of genital valves, and with lateral patches of pores between coxae III and IV, behind coxae I, II and hypostomal ring; with a central ventral region between setae **4a** and **ag1** with longitudinal striae (Fig. 7C) that become transversally oriented (Fig. 7B) before the genital plates (Fig. 3). Ventral setae subequal, **1a**:17 (20-24); **3a**:14 (11-18); **4a**: (14-17); **1a-1a**:18 (17-20); **3a-3a**: 37(33-39); **4a-4a**: **60** (56-68). Aggenital setae **ag1**: 12 (11-17); **ag2**: 12 (8-12); **ag3**: 9 (8-9); **ag1-ag1**: 48 (44-49); **ag2-ag2**: 53 (52-54); **ag3-ag3**: (36-40). Genital setae **g1**:12 (8-12); **g2**:10 (7-12); **g3**:10 (8-13). Pseudoanal setae **ps1**:10 (6-12), **ps2**:10 (9-10),

ps3:11 (8-10).

Legs (Figs. 10, 11, 12) For measurements see table 1. Segments of legs with striae. Solenidium ω absent on tarsi III and IV (Figs. 10C, D, 12D, C); ϕ on tibiae IV absent (10D); **I ϕ '** at same level as **I ϕ '** (Figs. 10A, 11D-E), more than 2x longer than ϕ '; **II ϕ** on basal half of tibia II (Figs. 10B, 12A); **III ϕ** on basal half of tibia III (Figs. 10C, 12C, E). Counts of setae and solenidia on legs I-IV: coxae (excluding 1a, 3a, and 4a) 2 + 1elcp, 1, 2, 1; trochanters 1, 1, 2, 1; femora 3, 3, 2, 2; genua 5 + 1 σ , 4 + 1 σ , 2, 3; tibiae 5 + 2 ϕ , 5 + 1 ϕ , 3 + 1 ϕ , 3; tarsi 15 + 1 ω , 12 + 1 ω , 9, 9. Lengths of solenidia: **I σ** : 3 (3-4), **II σ** : 4 (3-4), **I ϕ '**: 5 (4-6), **I ϕ '**:12 (11-12), **II ϕ** : 6 (6), **III ϕ** : 6 (6-7), **I ω** : 10 (10-12), **II ω** : 7 (6-8)

Male (n= 3)

Similar to female but with enlarged solenidia

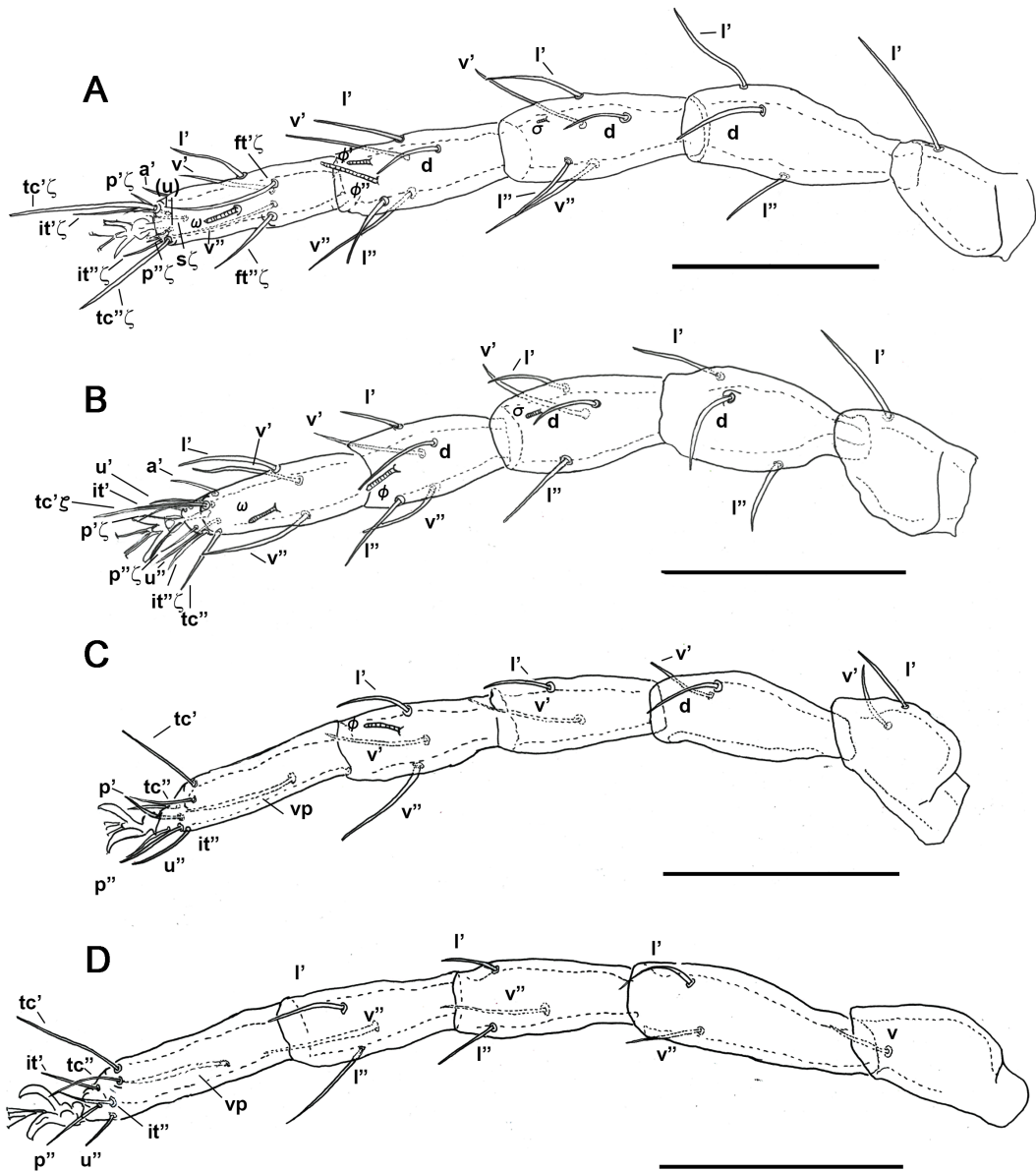


Fig. 10. *Cryptognathus amalfitanii* sp. nov. A-D, holotype (MACN-Ar 40686). Dorsal view of the left legs I-IV. Scale bars: A-D 50 μ m.

Table 1: length of the leg segments of the female. Abbreviations: Tr.: trochanter, Fe.: femur, Ge.: genu, Ti.: tibia, Ta.: tarsus.

Leg\segment	Tr.	Fe.	Ge.	Ti.	Ta.
I	30 (28-34)	52 (48-50)	40 (38-42)	36 (36-40)	42 (40-44)
II	30 (22-32)	38 (30-38)	30 (26-30)	28 (26-30)	36 (30-36)
III	32 (24-32)	32 (30-36)	32 (26-32)	30 (28-30)	40 (36-42)
IV	30 (30-40)	44 (40-46)	34 (32-38)	34 (30-36)	40 (36-42)

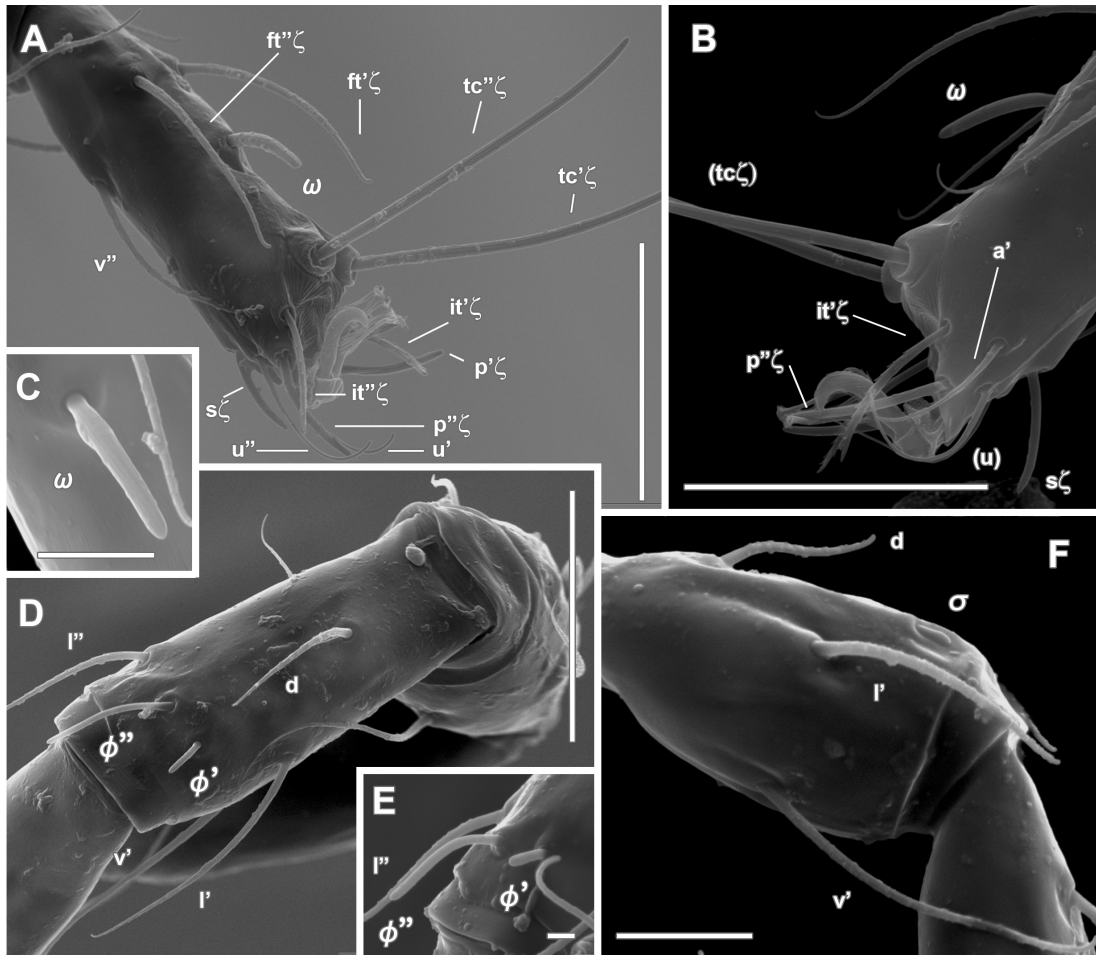


Fig. 11. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40666). Leg I: **A**, antiaxial view of the right tarsus; **B**, paraxial view of the right tarsus; **C**, detail of the tarsus solenidium; **D**, right tibia I, dorsal view; **E** same, detail of the solenidia; **F** paraxial view of the left genu. Scale bars: **A**; **B**; **D** 20 μ m; **C** 5 μ m; **E** 2 μ m; **F** 10 μ m.

ω present in all legs and with genital and anal openings fused.

Gnathosoma

Chelicerae 80; movable digits 24-24. Palpal setae as in female; femur 28-34 long; genu 22-24 long; tibia 12-14 long, palptibial claw present; tarsus 8. Subcapitular setae *m*: 22-36, *m-m*: 6-12, *or1*: 8, *or2*: 8.

Idiosoma

Oval, 224-240 long, 120-144 wide at level of coxae IV, hook 44-48 long with 4-5 dimples in each longitudinal row. Dorsal and ventral shields similar to female, but with setae *h2* more advanced and more proximal to *f1* than to *h1*; genital and anal openings fused and genital setae absent. Internal genitalia (Fig. 8C) with a cuticular frame (*cf*) connected by a long duct (*d*) with a

large impar gland (*gl*). Eyes 4.8-6.4 in diameter; *pob* 8.8-16 in diameter. Length of dorsal setae: *vi*: 8-10; *ve*: 8-12; *sci*: 8-10; *c1*: 12-13.6; *sce*: 12-14; *d1*: 16; *e1*: 10-16; *e2*: 12-14; *f1*: 9-10; *h1*: 10-11; *h2*: 10. Distance between dorsal setae: *vi-vi*: 21-24; *vi-ve*: 12-13; *ve-ve*: 24; *ve-sci*: 4-6; *sci-sci*: 36; *c1-c1*: 39-45; *sce-sce*: 80; *c1-sce*: 20-24; *d1-d1*: 64-66; *d1-e1*: 40-42; *e1-e1*: 46-48; *e1-e2*: 18-22; *e2-e2*: 76-80; *e1-f1*: 35-38; *f1-f1*: 24; *f1-h1*: 13-14; *h1-h1*: 14-17; *f1-h2*: 9; *h1-h2*: 12; *h2-h2*: 16. Ventral setae, *1a*: 12-16; *3a*: 15-18; *4a*: 12-14; *1a-1a*: 14-15; *3a-3a*: 30-32; *4a-4a*: 44-48. Aggenital setae *ag1*: 10-12; *ag2*: 12; *ag1-ag1*: 42-44; *ag2-ag2*: 20. Pseudoanal setae *ps1*: 9-10; *ps2*: 8; *ps3*: 7.

Legs For measurements see table 2. Counts of setae and solenidia on legs I-IV as in female,

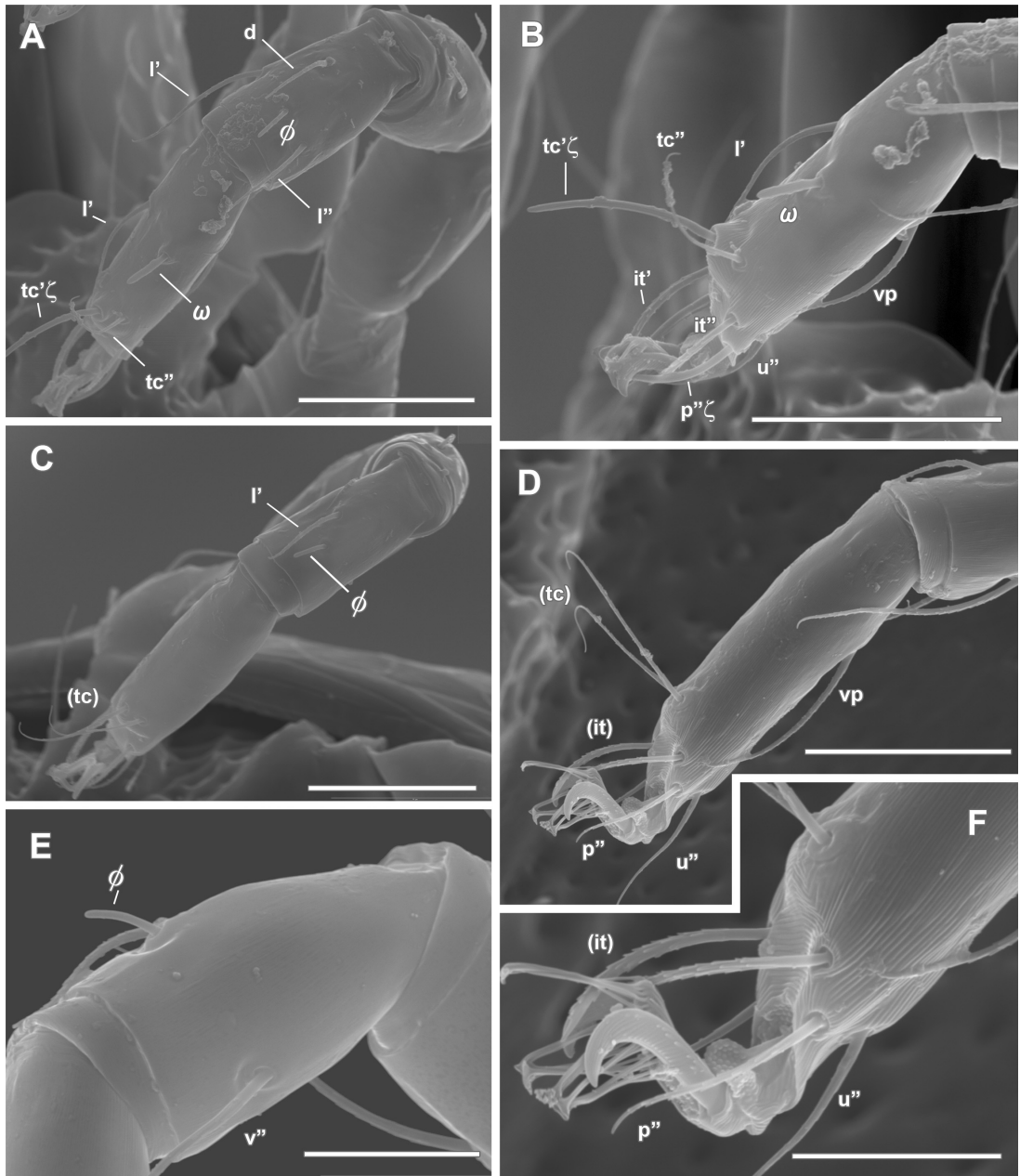


Fig. 12. *Cryptognathus amalfitanii* sp. nov., paratype (MACN-Ar 40666): **A**: dorsal view of the left tibia and tarsus II; **B**: antiaxial view of the left tarsus II; **C**: dorsal view of the left tibia and tarsus III; **D**, **F**: antiaxial view of the left tarsus IV; **E** left tibia III, antiaxial view. Scale bars: **A**; **B**; **C**; **D** 20 μ m; **E**; **F** 10 μ m.

Table 2: length of the leg segments of the male.

Leg\segment	Tr.	Fe.	Ge.	Ti.	Ta.
I	30-32	44-48	34-38	30-34	38-42
II	22-28	30-36	22-28	22-24	32-34
III	24-28	26-34	24-28	24-26	36
IV	26-32	36-46	29-38	26-34	38-42

Table 3: length of the segments of the legs of the deutonymph.

Leg\segment	Tr.	Fe.	Ge.	Ti.	Ta.
I	28-30	34-40	36-40	32-34	36-38
II	20-26	26-30	24-28	24-26	26-28
III	24-30	20-32	28-30	24-26	30-34
IV	26-30	30-36	30-38	30	30-38

except for the presence of enlarged solenidia on tarsus III and IV. Lengths of solenidia: **Iσ**: 4, **IIσ**: 3, **Iφ**: 5, **Iφ**": 11, **IIφ**: 6, **IIIφ**: 6, **Iω**: 14-15, **IIω**: 11-16, **IIIω**: 14-16, **IVω**: 14-16.

Deutonymph (n=2)

Gnathosoma

Chelicerae 72–79; movable digits 28. Palpal setae as in adults; femur 29-32; genu 24-27 long; tibia 17-22 long, palptibial claw present; tarsus 8 long. Subcapitular setae **m**: 20-24, **m-m**: 12-20; **or1**: 8, **or2**: 8.

Idiosoma

Idiosoma 259–289 long, 146-154 wide al level of coxae IV, prodorsal projection small, not hood-like; dorsal shield smooth, without the reticulations or pores presents in the adults; ventral shield finally striated; without genital valves or setae. Eyes 5-7 in diameter; **pob** 8-12 in diameter. Length of dorsal setae: **vi**: 7-13; **ve**: 13-16; **sci**: 16; **c1**: 16; **sce**: 13-20; **d1**: 16; **e1**: 13-18; **e2**: 14-19; **f1**: 12-17; **h1**: 14; **h2**: 16. Distance between dorsal setae: **vi-vi**: 18-19; **vi-ve**: 9; **ve-ve**: 30; **ve-sci**: 10; **sci-sci**: 30-46; **c1-c1**: 53-55; **sce-sce**: 102 ; **c1-sce**: 20-26; **d1-d1**: 64-76; **d1-e1**: 48-52; **e1-e1**: 40-46; **e1-e2**: 14-22; **e2-e2**: 70-76; **e1-f1**: 46-48; **f1-f1**: 50-55; **f1-h1**: 34-40; **h1-h1**: 13-16; **h1-h2**: 28-33; **h2-h2**: 70-75.

Legs For measurements see table 3. Counts of setae and solenidia on legs I-IV as in female. Lengths of solenidia: **Iσ**: 3-4, **IIσ**: 3-4, **Iφ**: 4, **Iφ**": 10, **IIφ**: 4-5, **IIIφ**: 4, **Iω**: 10-11, **IIω**: 7-8.

Remarks: The absence of solenidia on tarsus III and IV in immatures and females could indicate that it is the plesiomorphic condition for the genus.

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