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Author: Juvara-Bals, Ilinca

Source: Revue suisse de Zoologie, 124(2) : 225-239

Published By: Muséum d'histoire naturelle, Genève

URL: <https://doi.org/10.5281/zenodo.893509>

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New and rare species of *Holoparasitus* Oudemans, 1936 (Acari, Gamasida, Parasitidae) from the Athias-Henriot Collection

Ilinca Juvara-Bals

Muséum d'histoire naturelle, CP 6434, CH-1211, Genève 6, Switzerland. E-mail: ibals@bluewin.ch

Abstract: Five new species, *Holoparasitus madridensis*, *H. rondai*, *H. aquilinus*, *H. paralawrencei* and *H. floriformis* are described. Some characteristics of *H. lawrencei* Hyatt, 1987 are redescribed and a new species group, the *lawrencei*-group is established. New locality records for *H. maritimus* Hyatt, 1987 are given.

Keywords: Acari - Parasitidae - *Holoparasitus* - taxonomy - new records.

INTRODUCTION

The Parasitidae material deposited in the Muséum d'histoire naturelle (MHNG) of Geneva, which includes the large collection of the well known acarologist C. Athias-Henriot, is surprisingly diverse and rich, especially in the genera *Holoparasitus* Oudemans, 1936, *Leptogamasus* Trägårdh, 1936 and *Pergamasus* Berlese, 1904.

The genus *Holoparasitus* now includes a total of 55 species, mainly from the Palearctic region (Witalinski, 2017a). Only 41 species were attributed to 7 groups of species and their characteristics analyzed by different authors. One of the most important characteristics, which separate these groups into two categories, is the presence or absence of an excipulum (an oval pattern on sternal cuticle, between coxa II and III) in the male. The species groups with an excipulum are: the *calcaratus*-group (Hyatt, 1987; Witalinski & Skorupski, 2002) with 7 species, the *peraltus*-group (Witalinski & Skorupski, 2003) and the *hemisphaericus*-group (Witalinski, 2006) both with 2 species.

The others species groups are: the *annulus*-group (Juvara-Bals & Witalinski, 2006) with 2 species, the *caesus*-group (Juvara-Bals, 1975) with 4 species, the *crassisetosus*-group (Witalinski, 2017a) with 3 species and the *mallorcae*-group (Juvara-Bals, 1975; Juvara-Bals & Witalinski, 2000; Juvara-Bals, 2008) with 21 species. Concerning the other taxa, more revisions will be necessary to include them in species groups.

This paper continues with the description of new species from soil and leaf litter in west Mediterranean countries (Juvara-Bals & Witalinski, 2000; Juvara-Bals &

Witalinski, 2006; Juvara-Bals, 2008). The new species, *Holoparasitus madridensis* sp. nov., *H. rondai* sp. nov., *H. aquilinus* sp. nov., belong to the *mallorcae* group. The new species *H. paralawrencei* from northern Spain and *H. lawrencei* from Great Britain are here placed in a new species group. *Holoparasitus floriformis* sp. nov. has peculiar morphological characteristics and cannot be included in any of the established species groups. The geographical distribution of *H. maritimus* Hyatt, 1987, described and previously known from Great Britain, is here also reported from Spain.

A better knowledge of the species in this genus would allow us to better understand their phylogenetic relationship and to re-evaluate the species groups. The key to the species of the genus *Holoparasitus* was recently published by W. Witalinski (2017b).

MATERIAL AND METHODS

The material studied here is mostly part of the Athias-Henriot Collection, deposited in the Muséum d'histoire naturelle de Genève (MHNG) except for specimens of *H. lawrencei*, deposited in the Natural History Museum, London (NHML). In the majority of cases the specimens of *Holoparasitus*, examined in this paper from both collections, are in poor condition on permanent slides, so that some characteristics cannot be properly observed. The morphological terminology is based on Evans & Till (1979), the system of setal notation for the idiosoma follows that of Lindquist & Evans (1965) and Lindquist (1994). The following abbreviations are used: *hyp.*-hypostomatal setae, *pc.*-palpcoxal setae.

The measurements and indices characterizing females and males are those established by Juvara-Bals (2008). Morphometrics seem to be useful to separate closely related species. The length of the peritrematal groove, the length of tarsus I and IV give us information about the size of the mite, especially when mounted on permanent slides. Length and width of the mites are given only for two species kept in alcohol and earlier macerated in lactic acid, so that the size of the mite is indicative. The following measurements were also taken: epigynium height (h) represents the midline from the tip of the shield to the posterior margin and the basal width (b) is the length of its posterior margin; ratio h/b refers to the proportion between these two features of the epigynium; setae distance *st-st'* was measured between the two setae of pair *st* on the sternal shield. The setae on the idiosoma are simple, so that only their length (when possible) from the insertion to their tip, is given. Measurements in micrometers are specified after each presentation of a structure. I do not use standard characteristics, e.g. as female chelicera. The reasons for this are explained in the revisions of Micherdzinski (1969) and Hyatt (1987). Locality references, in the text, composed of initials followed by a number, refer to the Athias-Henriot collection. All the material, except the specimens of *H. lawrencei* was sampled by Prof. Herbert Franz.

TAXONOMY

Genus *Holoparasitus* Oudemans, 1936 *mallorcae* species group

Holoparasitus madridensis sp. nov.

Fig. 1

Holotype: Male; Spain, El Prado, surroundings of Madrid, sifting leaf litter under *Quercus ilex* L.; 5.02.1951 (Sp. 13).

Paratypes: 2 males and 5 females; with the same data as for the holotype.

Other material examined: 4 males, 4 females, 1DN; Spain, El Prado, surrounding of Madrid, sifting leaf litter under bushes of *Quercus ilex* L.; 05.02.1951 (Sp. 8). – 1 male, 14 females; Spain, El Prado, surrounding of Madrid, swampy soil near a spring, sifting litter of *Scirpus* sp.; 05.02. 1951 (Sp. 11). – 3 males, 3 females; Spain, surrounding of Torreldones, north of Madrid, forest soil under *Quercus ilex* L.; 06.07.1952 (Sp. 93).

Diagnosis: Male palptrochanter with sharp protuberance situated between slightly pilose seta *v1* and thicker pilose seta *v2*; this character associated with elongated corniculi carrying a small protuberance in their distal part. Female endogynium cup-shaped, with two short protrusions on posterior margin; epigynium with ovoidal, subapical structure and with sharp triangular apex.

Etymology: The species name, a Latinized adjective, refers to the city of Madrid in the surroundings of which the species was sampled.

Description of male: Idiosoma well sclerotized, yellow-brown-colored; its length 648-672, width 388-456. Dimensions of setae: on podonotum *j1* = 36, *r5* = 48, others about 24; opisthonotal setae short 12-18. Length of peritrematal shield 197-205.

Ventral idiosoma: Genital lamina in a shallow concavity; anterior margin of genital lamina with truncated central prong and two lateral triangular extensions, microsclerite trapezoidal (Fig. 1B). Sternogenital shield reticulated, gland pore *gv1* present, length of sternal setae 42 to 48; gland pore *gv2* simple; 8-9 pairs of opisthogastric setae, their length 36 to 42.

Gnathosoma: Gnathotectum trispinate, with large median prong and tiny lateral ones (Fig. 1E). Corniculi elongated, with small protuberance in their distal third (Fig. 1D). Hypognathal groove with 8-10 slightly denticulate rows; length of simple setae: *hyp.1* = 36, *hyp.2* = 43, *hyp.3* = 24, *pc.* = 42-48. Palptrochanter with setae *v1* slightly pilose, *v2* barbed and with a small, sharp protuberance located between these setae (Fig. 1C). Chelicera (Fig. 1F): fixed digit straight, with 2-3 small denticles above and under pilus dentilis; movable digit 78 long, with 4-5 denticles on inner margin; spermatodactyl slightly arched; arthroal brush small.

Legs: Coxa II with a group of six denticles and an isolated basal one (Fig. 1L). Spurs of legs II illustrated in Fig. 1A: short rounded apophysis and axillary process, ellipsoidal apophysis located on anterior margin of genual segment, tibial apophysis rectangular, its anterior margin indented. Measurements: tarsus I = 156-168; tarsus IV = 170-180.

Description of female: Idiosoma well sclerotized, yellow-brown-colored; its length 648-672 and its width 432-456. Dimensions of some podonotal setae: *j1* = 38, *r5* = 54; opisthonotal setae 12. Length of peritrematal shield 206-209.

Ventral idiosoma: Presternal plate ribbon-like, serrated, with median constriction; sternal shield reticulated, *gv1* situated near setae *st3*, sternal setae simple, their length ranging from 42 to 48. (Fig. 1G). Paragynial shield with rounded posterolateral protrusions, metagynial shield ellipsoidal (Fig. 1I). Epigynium with sharp triangular apex, its length 48-54; subapical structure discoidal (Fig. 1H).

Endogynium cup-like, with two conical protrusions on its posterior margin; their height 24-30 and their basal distance 4-5 (Fig. 1J-K). Gland pore *gv2* simple. Eight pairs of simple opisthogastric setae, their length 24 to 30. Adanal and postanal setae simple and short (12 long). Measurements: Sternal shield: *st1-st1'* = 50-60, *st2-st2'* = 80-96, *st3-st3'* = 108-117. Epigynium: height = 144-156, basal width = 168-180, h/b = 0.85-0.86.

Gnathosoma: Gnathotectum trispinate, its central prong sharply pointed (Fig. 1N). Corniculi conical, hypognathal

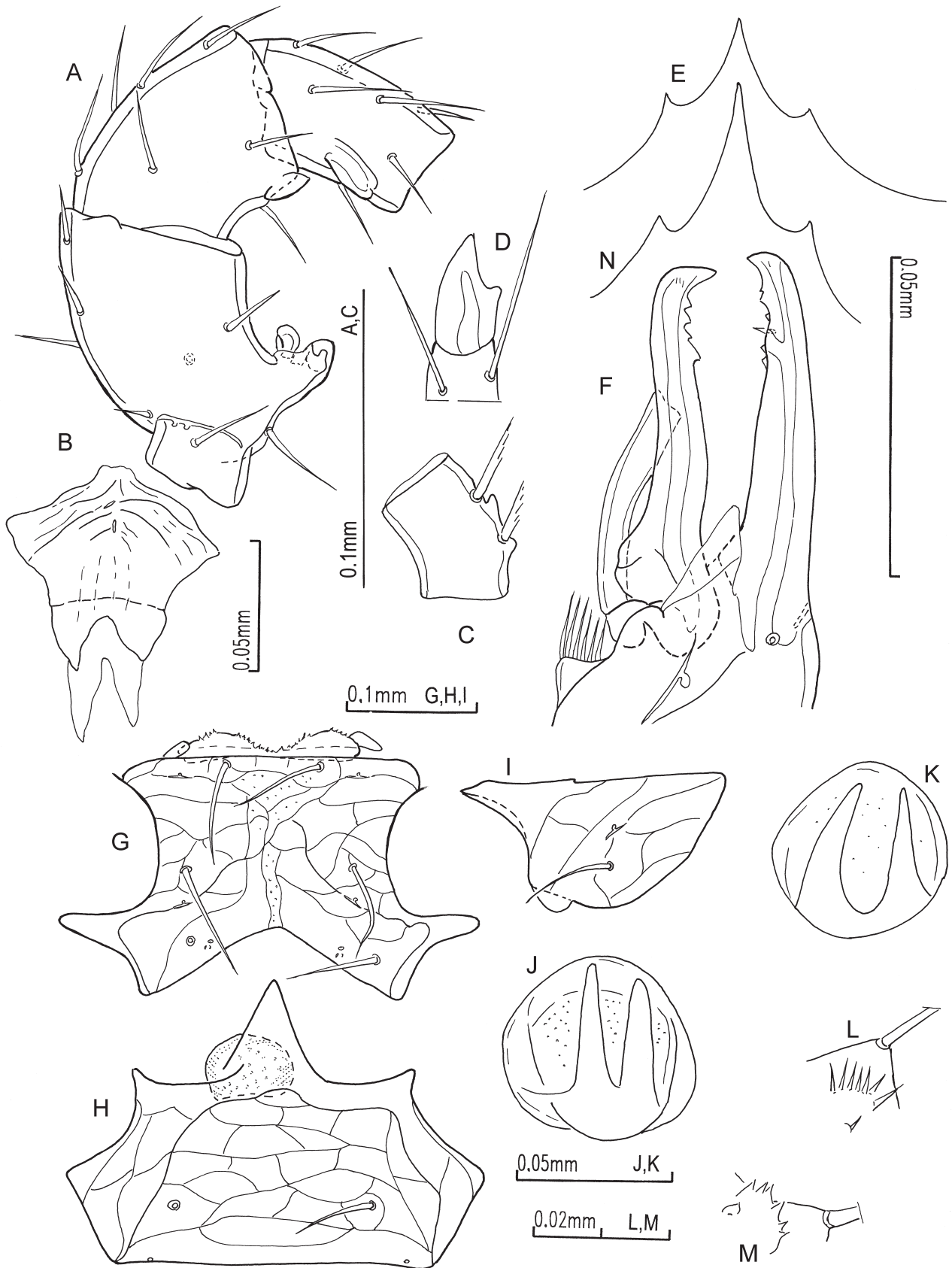


Fig 1. *Holoparasitus madridensis* sp. nov., male (A-F, M), female (G-L, N). (A) Femur, genu, tibia of leg II. (B) Genital lamina. (C) Palptrochanter. (D) Corniculus. (E-N) Gnathotectum. (F) Chelicera, antiaxial view. (G) Presternal plate and sternal shield. (H) Epigynum. (I) Paragynium. (J-K) Endogynium. (L-M) Group of denticles on coxa II.

groove with 8 rows of denticles, last 3 oligodenticulated. Hypostomatic setae simple, palpcoxal setae pilose; their length *hyp.1* = 36, *hyp.2* = 30, *hyp.3* = 24, *pc.* = 48. Length of movable digit of chelicera 84. Palptrochanter with small protuberances between pilose seta *v2* and simple seta *v1*.

Legs: Coxa II with a group of six short denticles (Fig. 1M). Tarsus I = 163-168; tarsus IV = 180-205.

Remarks: *Holoparasitus madridensis* sp. nov. is most closely related to the species in which males are characterized by a trispinate gnathotectum with a slender prong and two similar short lateral spines, and by a chelicera having denticles on the inner margin of both digits and a slightly curved spermatodactyl. These are: *H. mallorcae* Juvara-Bals, 1975 and *H. vaucheri* Juvara-Bals, 2008 from Algeria and *H. mahnerti* Juvara-Bals, 2008 from Morocco. The new species is distinguished by the shape of its corniculus, the sharp protuberance, between setae *v1* and *v2* on palptrochanter and the slightly arched spermatodactyl. Females differ from other species with two protrusions on the posterior margin of the endogynium (*H. mallorcae*, *H. vaucheri*, *H. gibber* Juvara-Bals & Witalinski, 2000) by the two protrusions being short and straight, the endogynial sac without denticles and the subapical epigynial structure formed like an ovoid disc.

Holoparasitus rondai sp. nov.

Fig. 2

Holotype: Male; Spain, Sierra de Ronda, Monte Arastepa, Prov. Andalusia, sifting of leaf litter and humus under bushes of *Quercus ilex* L. and *Crategus* sp., alt. 1100 m; 26.02.1951 (Sp. 34).

Paratypes: 10 males and 17 females, 1 DN; same data as for holotype.

Other material examined: 2 males, 3 females; same locality as types, sifting of turf soil, alt. 1400 m (Sp. 37).

Diagnosis: Male characterized by trispinate gnathotectum with a straight line between central prong and lateral spines and by tibia II with an ovoid and large apophysis. Female distinguished by epigynium with a subapical structure extending slightly beyond lateral margin of apex, its posterior side denticulate.

Etymology: The name is derived from the mountain Sierra de Ronda where the species was found.

Description of male: Length of idiosoma 624-650, width around 360. Cuticle well sclerotized, yellow-brown; length of some podonotal setae: *j1* = 36, *j2* = 48, *s1* = 24, *z2* = 36 others 25 to 30; opisthonotal setae from 14 to 16; length of peritrematal shield 210-228.

Ventral idiosoma: Sternogential shield reticulated,

without any pattern. Genital lamina with large triangular central process and rounded corners. Length of peritrematal shield = 210-228.

Gnathosoma: Gnathotectum trifid, with triangular, slender central prong and two little lateral spines (Fig. 2D). Hypognathal groove with 10 fine denticulated rows, hypostomatic setae simple, palpcoxal setae pilose, their length *hyp.1* = 42, *hyp.2* = 48, *hyp.3* = 24, *pc.* = 48. Corniculi conical, with protuberance in proximal half (Fig. 2E). Palptrochanter with seta *v1* barbed and *v2* slightly pilose; between them a flat protuberance (Fig. 2C).

Chelicera (Fig. 2A): Fixed digit slender its apex slightly curved, two little teeth above and below pilus dentilis. Movable digit with two denticles and a tooth at end of spermatotrema. Medium-sized brush-like process on arthrodial membrane (Fig. 2B).

Legs: Armature of leg II as in Fig. 2F: truncated femoral apophysis and rounded axillary process both ending on same level. Trapezoidal apophysis located near distal genual margin. Oval tibial apophysis large. On coxa II a ridge of 9 denticles. Measurements: tarsus I = 175-182; tarsus IV = 184-192.

Description of female: Length of idiosoma 720-745. Podonotal setae simple, *j1* = 48, others 24-42 long; opisthonotal setae short (18). Peritrematal shield 222-240 long.

Ventral idiosoma: Presternal plate denticulate, narrowed medially. Sternal shield with one dotted stripe medially; gland pore *gv1* located under *st3*, near posterior margin (Fig. 2G). Epigynium with pyramidal apex; subapical epigynial structure with lateral sides smooth and its center denticulated (Fig. 2H). Paragynial shield with ellipsoidal posterior protrusions, metagynial sclerite elongated (Fig. 2I). Endogynium cup-shaped, with two protrusions curved inwards; lateral walls of some specimens armed with 1 to 3 spines (Fig. 2J-K). Eight pairs of ventral setae, on opisthogaster, their length 42 to 60. Gland pore *gv2* simple. Measurements: sternal shield: *st1-st1'* = 54-57, *st2-st2'* = 85-93, *st3-st3'* = 110-120; length of sternal setae *st1* = 54-60, *st2* = 90-96, *st3* = 110-120; *h* = 96-97. Epigynium: height = 144-146, basal width = 180-192, *h/b* = 0.75-0.83.

Gnathosoma: Gnathotectum trispinate, with central prong long (Fig. 2L). Hypognathal groove with 10 rows of fine denticles; hypostomatic setae simple (*hyp.1*, *hyp.2* = 48, *hyp.3* = 24), palpcoxal pilose (48-54). Corniculi conical. Palptrochanter with seta *v1* barbed and seta *v2* slightly pilose.

Legs: Coxa II with an anterolateral ridge of 9 denticles. Tarsus I = 180-197; tarsus IV = 204-209.

Remarks: The most easily recognized features, which distinguished the male of *H. rondai* sp. nov. from the other species of the *mallorcae*-group, are the big oval apophysis (78 long) on tibia II, the characteristics of the chelicera and those of the trochanter of the pedipalp.

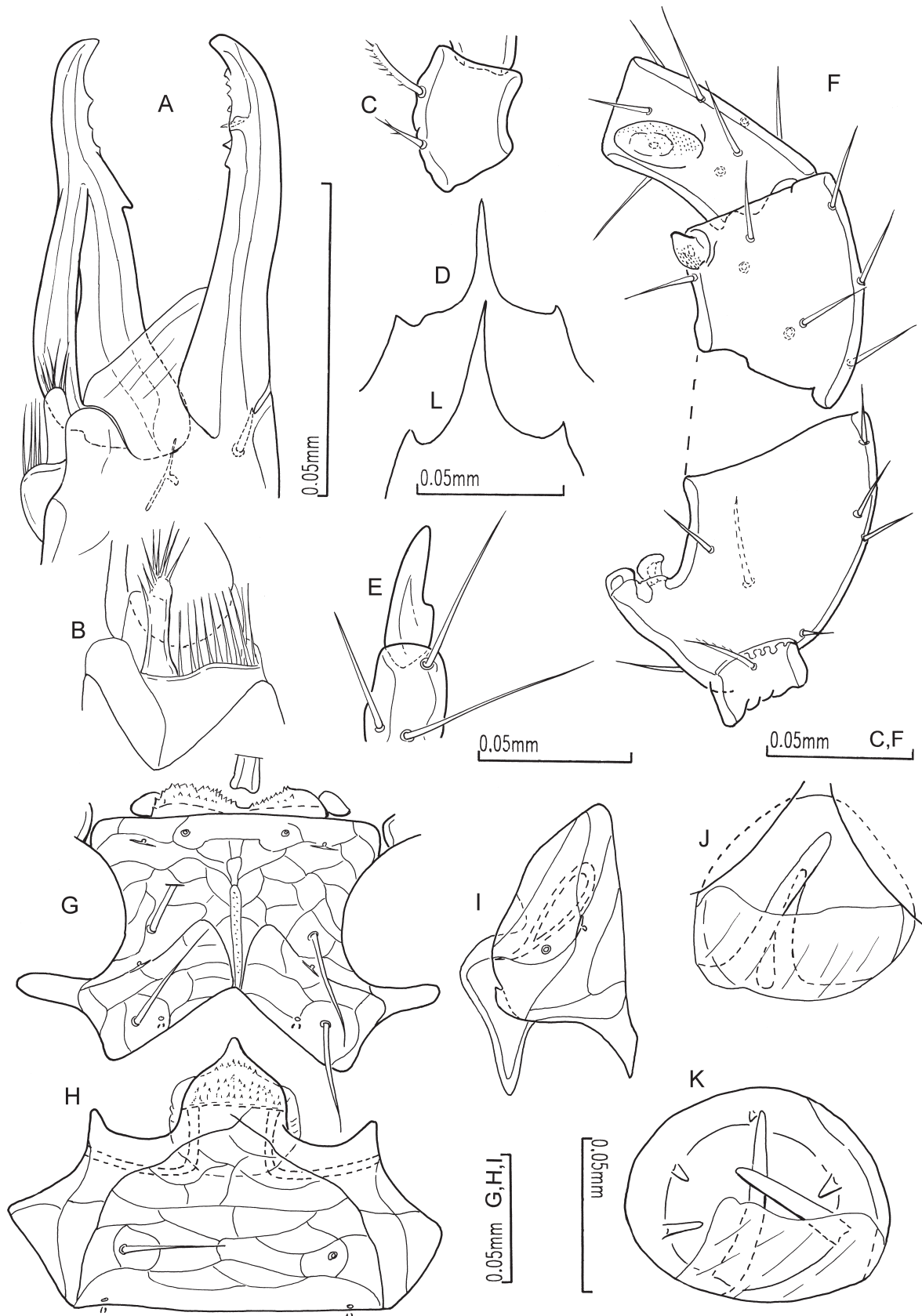


Fig 2. *Holoparasitus rondai* sp. nov., male (A-F), female (G-L). (A) Chelicera, paraxial view. (B) Arthroial membrane with brush-like process. (C) Palptrochanter. (D, L) Gnathotectum. (E) Corniculus. (F) Femur, genu tibia of leg II. (G) Presternal plate and sternal shield. (H) Epigynum. (I) Paragynium. (J-K) Endogynium.

The female is similar to the females of the *mallorcae*-group by having a cup-shaped endogynium with two protrusions on its posterior margin (sometimes with denticles on lateral walls) and a trispinate gnathotectum. This is particularly visible in *H. mallorcae*, *H. vaucheri*, *H. ellipticus* Juvara-Bals & Witalinski, 2000 and *H. gibber*.

The form of the endogynial protrusions (curved inwards) as well as characteristics of the epigynial apex make the female of *H. rondai* sp. nov. easily distinguishable.

Holoparasitus aquilinus sp. nov.

Fig. 3

Holotype: Male; Morocco, Monte Lachab (Lechhab) near Beni Bajale (Beni Bejalle)-Beni Bouchaib, west Rif, near a spring, alt. 1700 m, leaf litter from *Quercus ilex* L.; 2.04.1959 (Sp. 656).

Paratype: 1 female; same data as for holotype.

Diagnosis: Chelicera of male apex with movable digit hooked; fixed digit slightly curved, with 6-7 denticles, spermatodactyl arched. Epigynium with a long triangular apex and 2 spine-like lateral prongs; subapical epigynial structure a large slightly denticulate strip.

Etymology: The species name is a Latin cognomen derived from “*aquila*” = eagle, meaning “the eagle-like”, and refers to the shape of the apex of the movable digit of the male chelicera being hooked like the beak of an eagle.

Description of male: Length of squashed idiosoma 600-624. Dimensions of some podonatal setae: *jl* = 30 others 24; opisthonatal setae very short, 6-7 long. Length of peritrematal shield 192-204.

Ventral idiosoma: Sternogenital shield reticulated. Genital lamina with anterior margin rounded and with subgenital sclerite rectangular (Fig. 3C). Length of *st1* = 36. Distance between setae: *st1-st1'* = 72, *st2-st2'* = 84, *st3-st3'* = 96, *st4-st4'* = 66. Gland pore *gv1* and *gv2* simple.

Gnathosoma: Gnathotectum trispinate, with a large triangular central prong, with rounded apex and two tiny lateral spines (Fig. 3E). Corniculi conical, with small, sharp protuberance situated medially (Fig. 3B). Palptrochanter without protuberance, setae *v1* and *v2* pilose. Hypognathal groove with 4 large, non-denticulate rows. Chelicera (Fig. 3A): straight fixed digit with 1 denticle above pilus dentilis and 6 more below it; movable digit (96 long) with hooked apex, 4 denticles and a tooth on internal margin; arm of spermatodactyl arched; arthrodiol membrane with short brush-like process.

Legs: Coxa II with a fan-shaped ridge of 7-9 tiny denticles located anterolaterally (Fig. 3F). Leg II armed as follows (Fig. 3D): rounded femoral apophysis and

oval, inward bent axillary process, their apices at same level; between them a small protuberance. Triangular genual spur located near distal margin of the segment. Rectangular tibial apophysis 30 long, its apex slightly concave. Measurements: tarsus I = 156; tarsus IV = 144.

Description of female: Length of squashed dorsal idiosoma 672. Length of some setae: on podonotum *jl* = 25, *r1* = 12, others 36; opisthonotum with tiny setae, their length 6-12. Length of peritrematal shield 221.

Ventral idiosoma: Presternal plate serrated. Sternal shield reticulated, gland pore *gv1* under seta *st3* on posterior margin; length of sternal setae 48-50 (Fig. 3G). Paragynial shield with small rounded posterior protrusions and metagynial sclerite ellipsoidal (Fig. 3I). Epigynium: anterior margin with two lateral spines and long median apex (90 long); subapical structure a basal slightly denticulate strip (Fig. 3H). Gland pore *gv2* simple. Endogynium: a simple oval cup covered by a hyaline membrane and two rounded protrusions (Fig. 3J). Measurements: epigynium: height = 180, basal width = 192; h/b = 0.94;

Gnathosoma: Only the following character discernible: palptrochanter without protuberance between simple *v1* and pilose *v2*

Legs: Length of tarsus I and IV = 180 long.

Remarks: I examined only a female and a male, both not in very good condition, but the main features which distinguish the new species from others in the *mallorcae*-group could be properly observed. The female of *H. aquilinus* sp. nov. can be distinguished by the long triangular apex on the anterior margin of the epigynium and by the endogynium being a simple, oval cup. The male is easily recognizable by the shape of the chelicera. More material will be necessary in order to discern other characters especially those of the endogynium.

H. maritimus Hyatt, 1987

Material examined

Spain

1 female; Prov. Pontevedra, Cuesta del Ralo Salcedo, sifting leaves under bushes near old *Quercus* sp. tree; 1.07.1952 (Sp. 121). – 4 females, 3 males; Isla Estela, Enterra near Bayona, grassland; 2.08.1956 (Sp. 474). – 1 male; Monte Ferro, near Bayona, grassland; 3.08.1956, (Sp. 478). – 2 females, 1 male; Isla de Onc, humid turfs near a spring; 4.08.1956 (Sp. 484). – 2 females, 1 male, idem, from moss; (Sp. 122). – 1 female, 1DN; Prov. Ourense, Montes del Invernadero near Verin, Sierra de San Mamed near Campo de Buceros, soil near a rivulet; 24.07.1955 (Sp. 408). – 2 females, 1 male; Prov. Galicia, Sierra de Fontefria near Caniza, under *Quercus robur*; 31.07.1956 (Sp. 471). – 1 female; Brana de Bruins, near Santiago de Compostela, moss from a small peat bog;

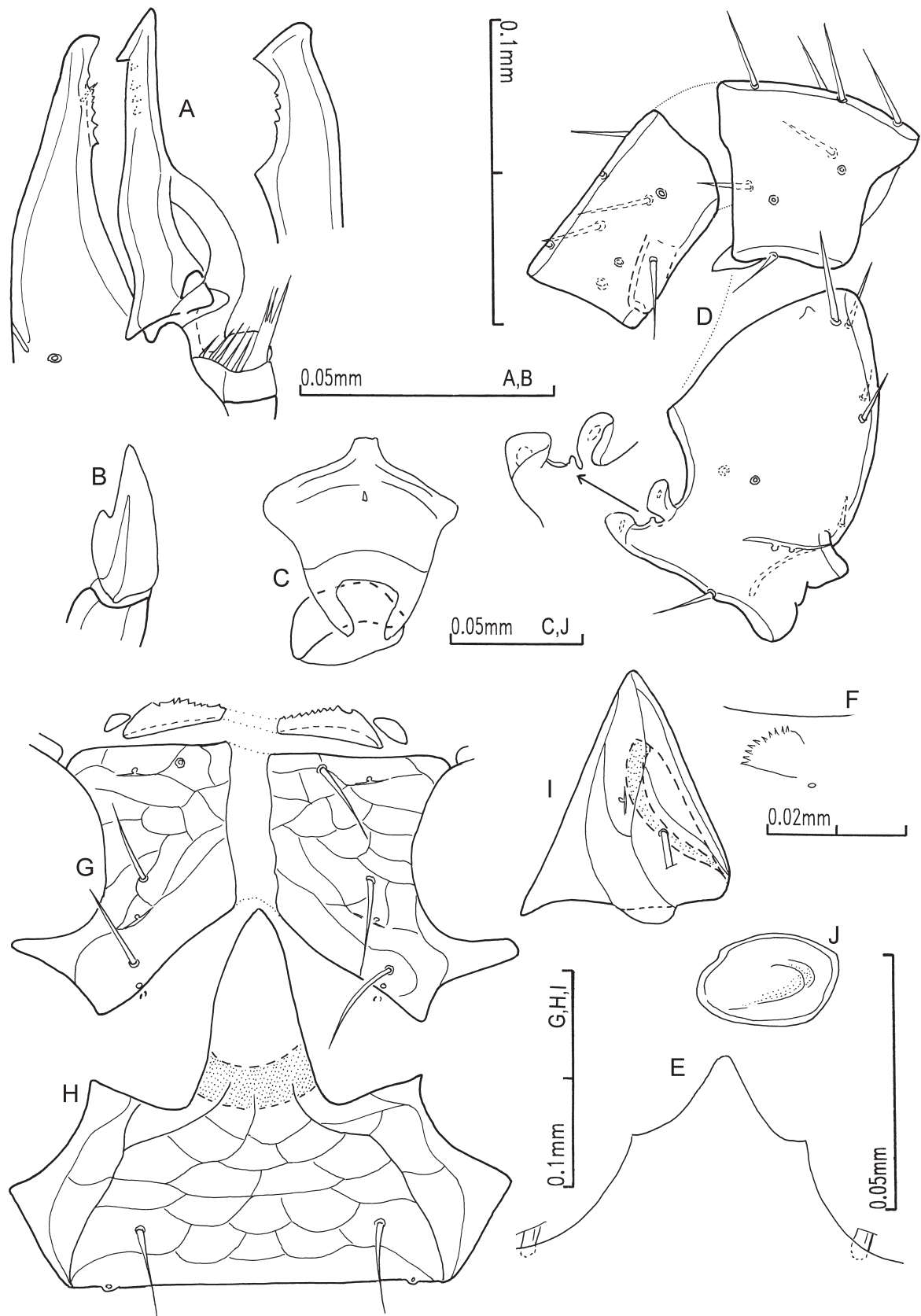


Fig 3. *Holoparasitus aquilinus* sp. nov., male (A-F), female (G-J). (A) Chelicera, antiaxial view. (B) Corniculus. (C) Genital lamina. (D) Femur, genu, tibia of leg II. (E) Gnathotectum. (F) Group of denticles on coxa II. (G) Presternal plate and sternal shield. (H) Epigynum. (I) Paragynium. (J) Endogynium.

4.08.1956 (Sp. 497). – 6 females, 3 males; Prov. Leon, Rio Duerna valley, near Molina Ferrada, leaf litter under bushes of *Quercus pyrenaica* and *Erica arborea*; 10.08.1957 (Sp. 567). – 1 female, 1 male; idem, leaf litter under *Quercus toza* near a rivulet; 10.08.1957 (Sp. 568). – 5 females, 3 males; Principado de Asturias, El Fito, west of Aviles, Oviedo, leaf litter under *Betula* sp., *Alnus* sp., *Quercus* sp.; 16.08.1957 (Sp. 587). – 1 female; Prov. Jaen, Sierra de Cazorlas, near Pantano el Tranco, leaf litter in maquis; 22.04.1963 (Sp. 945). – 1 male; Tenerife, Anaga, road to Pico del Ingles, leaf litter in laurel forest; 8.04.1965 (Sp. 1038).

Portugal

2 females; Madeira, south slope under Rabaçal, leaf litter under mimosa tree; 30.03.1967 (Sp. 1138). – 1 female; Ribeiro Grande and Ribeiro Bonito, leaf litter in laurel forest; 7.04.1967 (Sp. 1148-1151). – 1 female, 2 males; Queimadas near Santana, leaf litter of laurel tree; 1.04.1967 (Sp. 1141). – 1 female, 1 male; Acha das Areias, under la Boca de Encumeada; 5.04.1967 (Sp. 1146).

Remarks: *Holoparasitus maritimus* was described from Great Britain the type locality is Cornwall-Kelsey “from thrift *Armeria maritima*, on cliffs” (Hyatt, 1987). The species was also sampled in Scotland (Inner Hebrides) and in the Channel Islands (Jersey) from mossy turf, seaweed and beach grass. In the Athias-Henriot Collection I identified *H. maritimus* predominantly from different places and biotopes in the north-west and east of Spain (Prov. Pontevedra, Ourense, Galicia, Leon and the Principado de Asturias), as well as from the islands of Madeira and Tenerife. The distribution of these species seems to be linked to the sea shore and to the European Atlantic coast. Unexpectedly, I found *H. maritimus* also in one sample (Sp. 945) from the Sierra de Cazorla in the south of Spain. For a meaningful discussion of the distribution of this species more samples from other countries in Europe are necessary. *Holoparasitus maritimus* is easily recognizable by the following characteristics: the cuticle of the podonotum is medially strongly granular, the gnathotectum triangular, with a granular cuticle; the female has a simple cup-like endogynium with two lateral protrusions, a mucronate epigynial apex and a particular ornamentation of the sternal shield.

lawrencei species group

Remarks: *Holoparasitus lawrencei* and *H. paralarawrencei* sp. nov. cannot be included in any of the previously known species-groups which lack an excipulum. Therefore these two species are placed in a new species group which is close to *caesus*-group and has a similar pattern of reticulation on the ventral idiosoma in male and female. Other similarities between both groups are the characteristics of the fixed digit of

the male chelicera which has only 1 or 2 denticles in *H. tuberculatus* Juvara-Bals, 1975 and is indented in *H. fortunatus* Juvara-Bals, 1975. Both species groups differ in the armature of leg II, in features of palpfemur and palpgenual, and in characters of the epi- and endogynium in females. Only the particular characters of this group are mentioned.

Diagnosis: *Both sexes:* Gnathotectum trispinate, with central prong long and lateral prongs tiny; on ventral idiosoma gland pore *gv1* simple and *gv2* double on an unmodified cuticle.

Male: Gnathosoma without lateral incisions under setae *hyp.2*; corniculi conical; chelicera with fixed digit edentate and mobile digit without or with 1 or 2 denticles. Genital lamina without subgenital microsclerites. Ventral idiosoma reticulated, with one conspicuous line delimiting a slightly raised central part between *st1* and *st2* and a second less noticeable line between *st3* and *st4*. Armature of leg II: rounded femoral apophysis and trapezoidal process with their apices at the same level; ellipsoidal genual apophysis near anterior margin of the segment; large triangular or rounded (40 long) tibial apophysis.

Female: Presternal plate slightly denticulate, lateral platelets free; sternal shield reticulated, with a pair of lines starting between coxa II and III and running towards the middle of the shield where they join (*H. paralarawrencei* sp. nov.) or not (*H. lawrencei*). Apex of epigynium mucronate, subapical epigynial structure trapezoidal, with small membranous wings. Endogynium a big sack with ventrally two spherical protuberances continued dorsally by two elongated and denticulate structures. Endogynium covered with a fine membrane.

Distribution and remarks: *Holoparasitus lawrencei* was recorded from Great Britain and Ireland (Hyatt, 1987). *Holoparasitus paralarawrencei* sp. nov. was sampled by Prof. H. Franz in the north-west of Spain. In the Athias-Henriot Collection I identified other specimens from the north of Spain: Prov. Ourense (Sp. 408), Prov. Pontevedra (Sp. 483), and the Principado de Asturias (Sp. 498). The characteristics of the Spanish specimens are closed to those of *H. lawrencei* and *H. paralarawrencei* sp. nov. Unfortunately not enough material is available to identify them properly.

Species included: *Holoparasitus lawrencei* Hyatt, 1987 and *H. paralarawrencei* sp. nov.

Holoparasitus lawrencei Hyatt, 1987

Figs 4, 6E

Material examined: NHML 1984.12.4.-1; holotype; female; England, Cornwall-Hayle, from dry, light, leaf-litter; 24.5.1975; leg P. N. Lawrence. – NHML 1925.6.24.584; paratype; female; England, Lincolnshire,

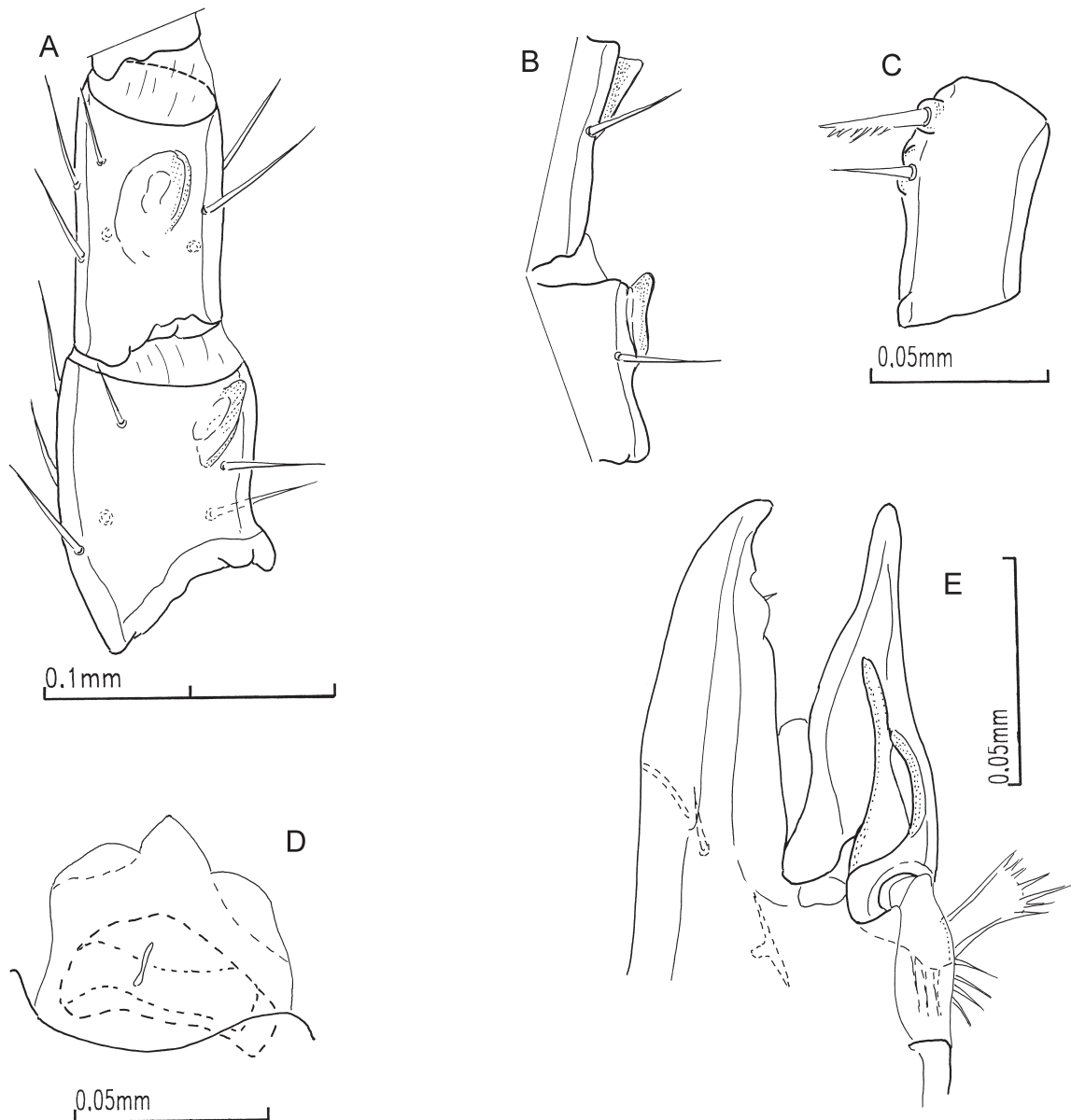


Fig 4. *Holoparasitus lawrencei* Hyatt, 1987, male. (A-B) Genual and tibial apophysis of leg II, ventral and lateral view. (C) Palptrochanter. (D) Genital lamina. (E) Chelicera, paraxial view.

no locality, no habitat data, 1900, leg. C. F. George. – NHML 1984.12.4.-3; paratype; male; United Kingdom, Isle of Wight, no habitat data; April 1948; leg T. A. Lloyd. – NHML 1984.12.4-2; paratype; male; Norfolk-Blackborough, with no habitat data; 25.2.1969; leg. A. Reeve.

Redescription of male: Length of idiosoma 780-840, width 550-610 (Hyatt, 1987). Genital lamina with a triangular apex instead of a bifid one (Fig. 4D). Length of simple hypognathal setae: *hyp.1*, *hyp.2* = 54-61, *hyp.3* = 38; *pc. pilose* = 66. Trochanter of pedipalp with a small protuberance between *v1* and *v2* (Fig. 4C).

Armature of leg II shown in Fig. 4A-B. Gland pore *gv2* double, situated behind coxa IV. Measurements (of 2 specimens): tarsus I = 192-206; tarsus IV = 240-250.

Redescription of female: Endogynium formed by a very big, oval and denticulate sack. Ventrally a central protrusion flanked by two rounded sacks and covered by a wrinkled membrane on posterior margin. Dorsally two very big structures filled with prominent denticles (Fig. 6E). Measurements: epigynium: height = 184-192, basal width = 228; *h/b* = 0.82-0.84. Sternal shield: *st1-st1'* = 62, *st2-st2'* = 108, *st3-st3'* = 139; *st1* = 54, *st2* = 60, *st3* = 66. Tarsus I = 187-192; tarsus IV = 240.

Remarks: The holotype and the paratypes examined correspond well with the original description of Hyatt. I here illustrate the endogynium, the armature of leg II and add some measurements. In the original description (Hyatt, 1987: fig. 11E) the movable digit of the female chelicera was drawn with 4-5 denticles, but in the holo- and paratypes studied I observed only 3 denticles. The other paratypes were not available in the NHML collection. *Holoparasitus lawrencei* was described by Hyatt (1987) from Great Britain; the type locality is Hayle in Cornwall. He identified specimens of this species from England (10 places), Scotland (2 localities), Wales and Ireland. All the specimens, except

the holotype, were considered as paratypes (20 males, 15 females). Unfortunately not all of the paratypes are deposited in the collection of the NHML so that the variability of the morphological characters of this species cannot be evaluated.

***Holoparasitus paralawrencei* sp. nov.**

Figs 5, 6 A-D, F

Holotype: slide M753 in MHNG arthropoda collection; male; Spain, Prov. Pontevedra, road from Gondomar to Tui, Sierra Grova, near Bayona, leaf litter under *Quercus* sp.; 5.08.1956 (Sp. 485).

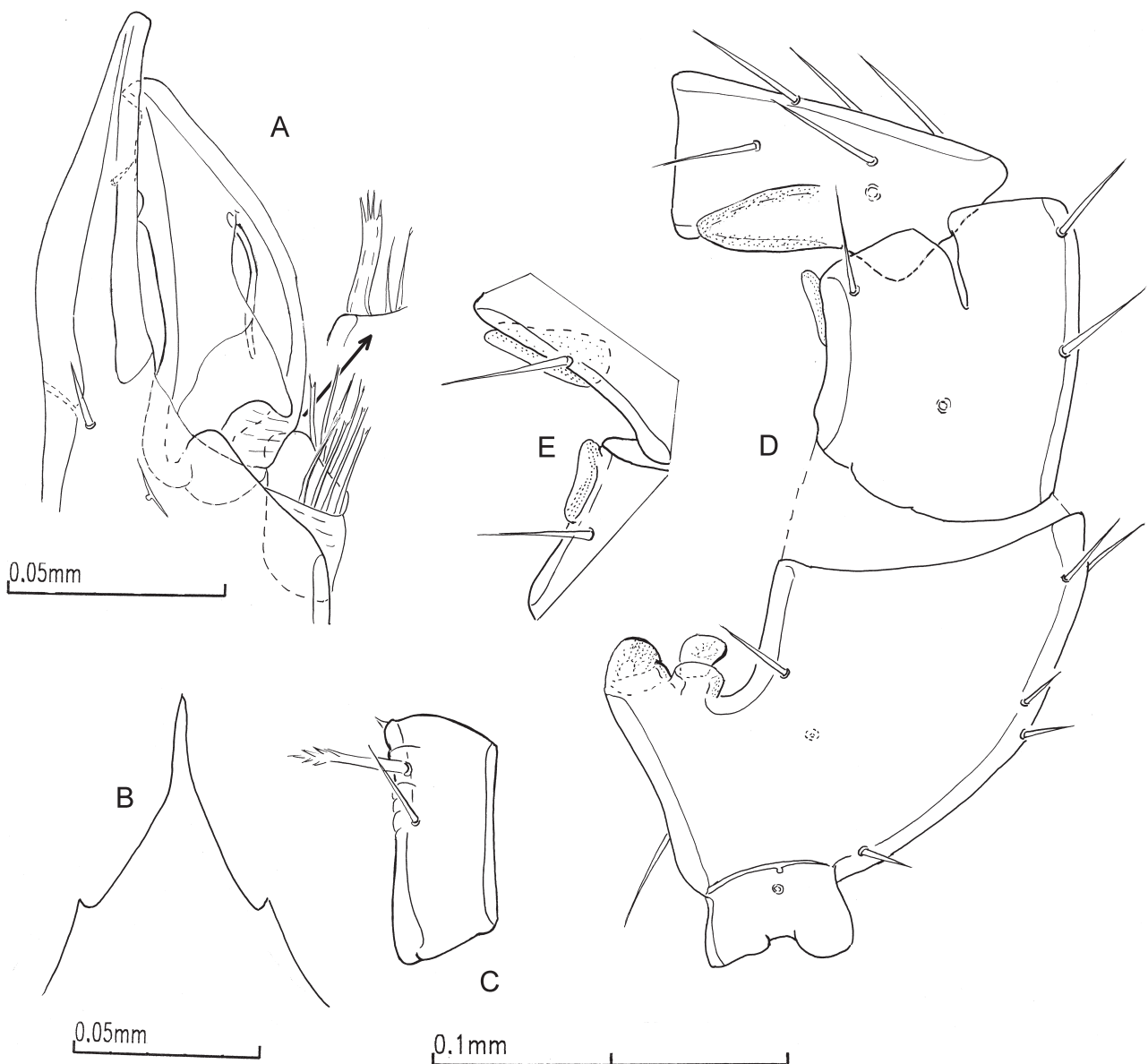


Fig 5. *Holoparasitus paralawrencei* sp. nov., male. (A) Chelicera, antiaxial view. (B) Gnathotectum. (C) Palptrochanter. (D) Femur, genu and tibia of leg II, anterolateral view. (E) Genual and tibial apophysis, posterolateral view.

Paratypes: 4 males, 3 females; same data as for holotype.

Diagnosis: Male chelicera with fixed digit straight and toothless, movable digit with 1-2 tiny denticles. Female endogynium a big sack with two rounded, slightly denticulate formations ventrally, each of them continued dorsally by a long peculiar structure with denticles apically and 1 or 2 teeth medially.

Etymology: The species name refers to similarities between the new species and *H. lawrencei*.

Description of male: Length of dorsal idiosoma 720-790, cuticle brownish red; podonotal setae: *jl* = 42, others 36-42 long, opisthonotal setae shorter 12-18 long. Length of peritrematal shield 252-257.

Ventral idiosoma: Genital lamina with a trapezoidal central prong and rounded lateral corners. Sternogenital region reticulated, slightly raised between setae *st1* and *st2*, with two conspicuous lines in its central part (Fig. 6F). Gland pore *gv1* present, gland pore *gv2* double. Length of sternal setae: *st1* = 48, *st2* = 50-54, *st3* = 48, *st4* = 55; length of opisthogastric setae 36.

Gnathosoma: Gnathotectum trispinate, its central prong long and sharply pointed (Fig. 5B). Palptrochanter with simple seta *v1* and pilose seta *v2* (Fig. 5C). Corniculi conical. Hypognathal groove with 10 denticulate rows. Palpcoxal setae pilose (60 long), hypostomatic setae simple, their length 54-66. Incisions absent in cuticle behind hypostomatic setae. Chelicera (Fig. 5A): Fixed digit straight, pilus dentilis situated medially on a toothless inner margin. Movable digit with 1-2 small teeth. Arthroal membrane with a small brush-like process.

Legs: Coxa II with a ridge of 7-10 denticles. Armature of legs II as in Fig. 5D-E: rounded femoral apophysis and trapezoidal axillary process; ellipsoidal genual apophysis located near anterior margin of segment; large triangular medially apophysis situated on tibia, its length 42. Measurements: tarsus I = 192-206; tarsus IV = 216-233.

Description of female: Idiosoma 840 long, cuticle brownish-red well sclerotized. Length of peritrematal shield 266.

Ventral idiosoma: Presternal plate slightly denticulate. Sternal shield, reticulated, with a pair of lines passing under pores *iv2* and joining in center of shield (Fig. 6A); *gv1* situated below setae *st3*. Sternal setae simple, their length around 65, only *st2* longer, 72-79. Paragynial shield with a small rounded postero-lateral protrusion; metagynial shield elongated. Epigynium reticulated, with mucronate apex and rectangular subapical structure with small rounded membranous wings (Fig. 6B-B'). Setae *st5* simple, 66 long. Endogynium (Fig. 6C-D) a big sack, covered at its base with a fine, pleated cuticle, formed by 2 rounded and slightly denticulate protuberances located ventrally and by 2 elongated structures with denticles on their tips situated dorsally. Opisthogaster with 9 pairs of

setae, their length around 50. Gland pore *gv2* with one opening and 2 glands. Measurements: Distance between sternal setae: *st1-st1'* = 66; *st2-st2'* = 96-108; *st3-st3'* = 122-132; epigynium: length = 168, basis = 233, h/b = 0.72.; tarsus I = 204; tarsus IV = 228-233.

Gnathosoma: Gnathotectum similar to that of male, trispinate with a longer central prong. Hypognathal groove with 9-10 fine denticulate rows. Length of hypognathal setae: *hyp.1*, *hyp.2* = 50; *hyp.3* = 24; *pc* = 54. Chelicera with movable digit (120 long) with 3 denticles and fixed digit with 2 denticles above pilus dentilis and 2 denticles below it.

Remarks: The new species found in the north of Spain is very similar to *H. lawrencei*. Females of *H. paralarrencei* sp. nov. differ from those of *H. lawrencei* in the following characteristics: the structure of the endogynium, the anterior margin of the epigynium which has a mucronate apex and the proportion of this shield (h/b = 0.72 versus 0.84). The two noticeable lines on the sternal shield are joined in the middle in *H. paralarrencei* sp. nov. but not in *H. lawrencei*. The male of the new species has 1 or 2 small teeth on the movable digit of the chelicera which is without teeth in *H. lawrencei*. The size of the Spanish specimens is smaller than those of the British specimens.

Species-group *incertae sedis* ***Holoparasitus floriformis* sp. nov.**

Figs 7- 8

Holotype: slide D768 in MHNG arthropoda collection; male; Spain, Roncesvalles, Prov. Navarra, road towards Burguete (the Pyrenees), litter of beech forest, alt. 949 m; 5.08.1955 (Sp. 429).

Paratypes: 4 females; same data as for holotype.

Diagnosis: Long corniculi of male reaching level of seta *v2*, movable digit of the chelicera stout and with an axe-shaped apex; femur of leg II with a long, curved femoral apophysis and with a big, oval axillary process. Presternal plate of female without denticles; epigynium very long h/b = 1; endogynium a sack with its opening surrounded with petal-like structures.

Etymology: The species names refers to the unique flower-shape (Latin: *flos* = flower) of the endogynium.

Description of male: Sclerocuticle of dorsal idiosoma with a simple reticulation, colour yellowish brown. Setae simple, their length on opisthonotum 12-15. Length of peritrematal shield 220.

Ventral idiosoma: Genital lamina with rounded angles; central prong absent (Fig. 7D). Sclerocuticle reticulated, without strongly procurved line or excipulum. All setae simple. Gland pore *gv1* and *gv2* simple. Eight pairs of setae on opisthogaster, their length about 24.

Gnathosoma: Gnathotectum trispinate (Fig. 8H). Corniculi straight and long (48 long), reaching setae *v2*, with

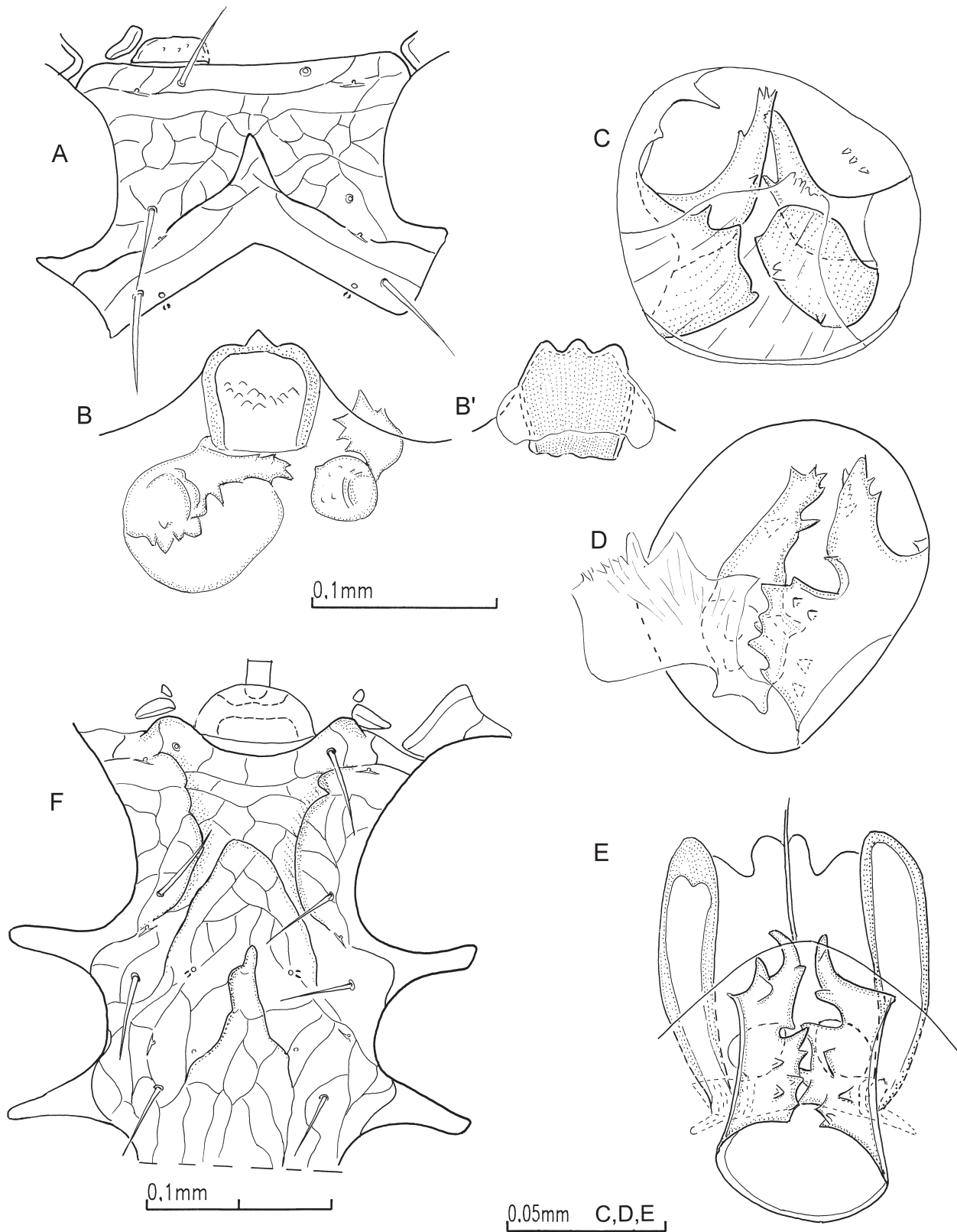


Fig 6. *Holoparasitus paralarrencei* sp. nov., female (A-D), male (F) and *Holoparasitus lawrencei* Hyatt, 1987, female (E). (A) Presternal plate and sternal shield. (B) Apex of epigynum and endogynium, ventral view. (B') Apex of epigynum, dorsal view. (C-D) Endogynium, ventral and (E) dorsal view. (F) Sternal shield and genital lamina.

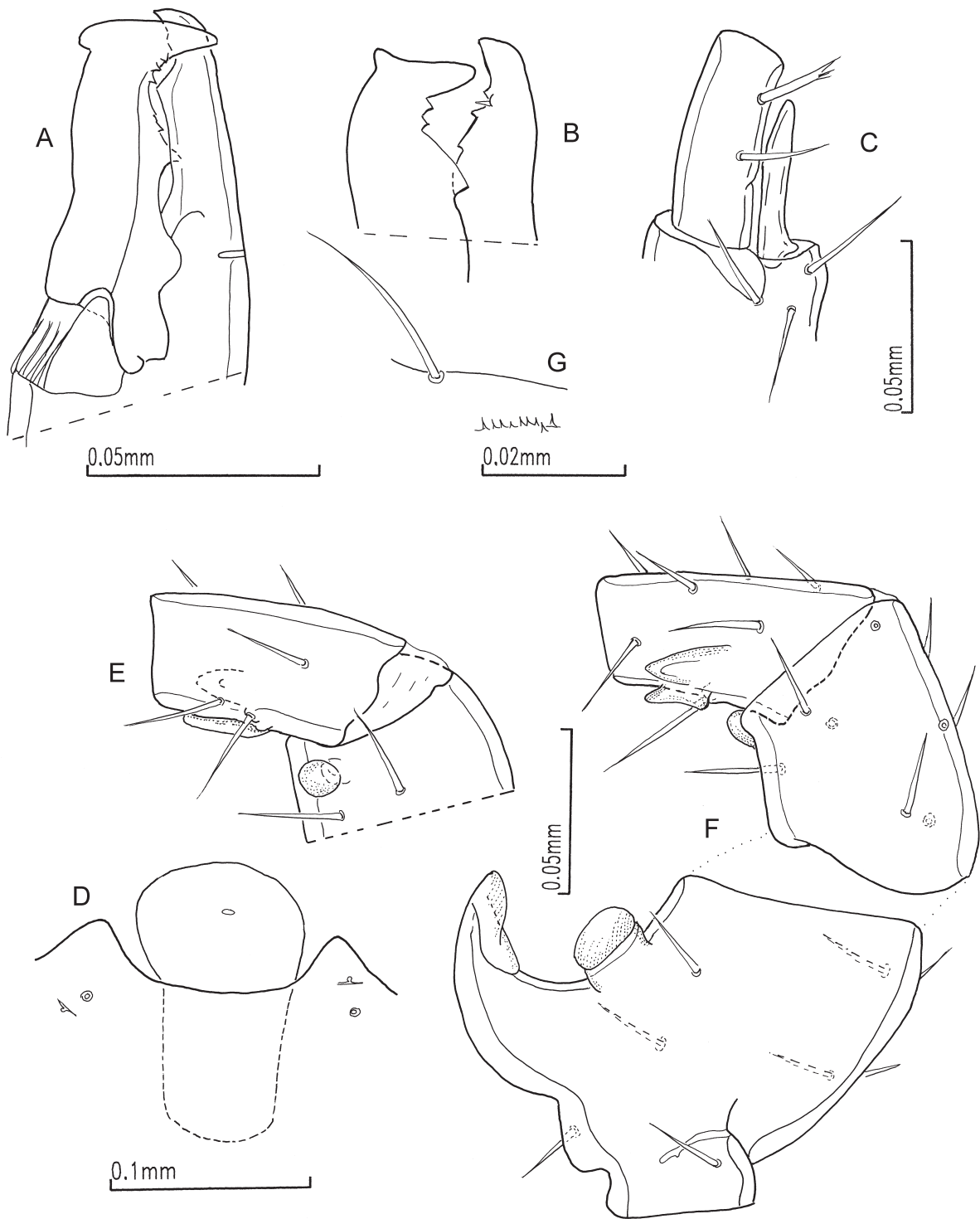


Fig 7. *Holoparasitus floriformis* sp. nov., male (A-F), female (G). (A-B) Chelicera. (C) Palptrochanter and corniculus. (D) Genital lamina. (E) Genual and tibial apophysis of leg II, anterolateral view. (F) Femur, genu, tibia, posterolateral view. (G) Denticulate ridge on coxa II.

a small protuberance at their base (Fig. 7C). Length of simple hypognathal setae: *hyp.1* = 36, *hyp.2* = 30, *hyp.3* = 24, *pc.* = 42. Palptrochanter with pilose *v2* and simple *v1*. Chelicera (Fig. 7A-B): movable digit large (84 long), its apex like a sharp axe and its inner margin denticulate; fixed digit with slightly curved apex and its inner margin with 1 denticle above pilus dentilis and 3 below it. *Legs*: Armature of leg II as shown in Fig. 7E-F: long,

curved femoral apophysis and large, oval axillary process; rounded apophysis situated on distal margin of genual segment; tibia with two apophyses, one triangular the other elliptical, both situated medially. Measurements: tarsus I = 163; tarsus IV = 156.

Description of female: Idiosoma well sclerotized, **colour** yellowish brown. All setae simple, length of podonotal setae: *jl* = 36, *sl* = 18, others 24; length of

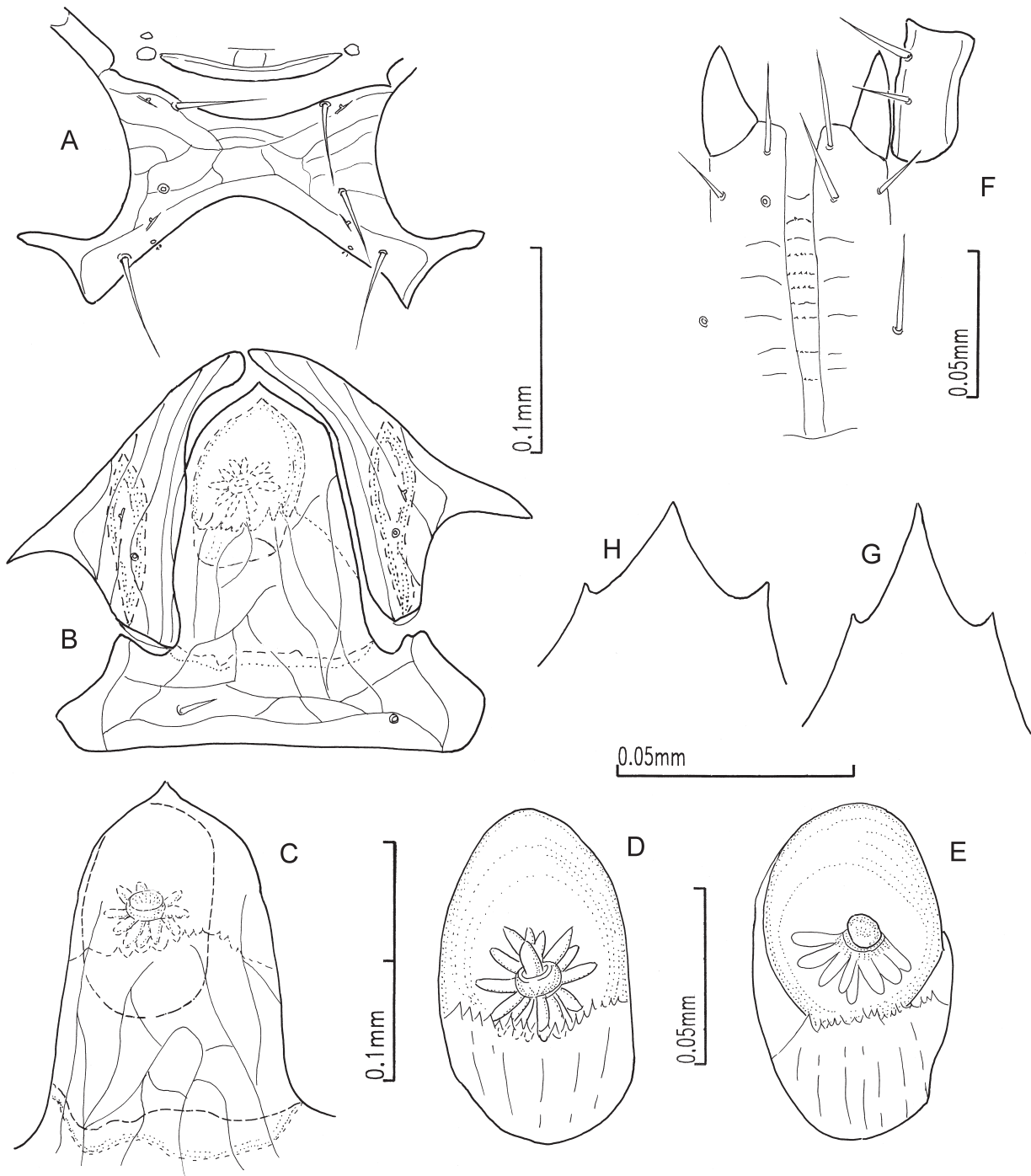


Fig. 8. *Holoparasitus floriformis* sp. nov., female (A-G), male (H). (A) Presternal plate and sternal shield. (B) Paragynia and epigynum. (C) Apex of epigynum. (D-E) Endogynium. (F) Gnathosoma and palptrochanter, ventral view. (G-H) Gnathotectum.

opisthonotal setae 12-18. Length of peritrematal shield about 230.

Ventral idiosoma: (Fig. 8A-B). Presternal plate ribbon-like, without denticles. Sternal shield reticulated; length of sternal setae: $st1 = 48$, $st2 = 42$, $st3 = 54$. Gland pore $gv1$ situated medially on posterior margin (Fig. 8A). Paragynial shield reticulated, stretched out around lateral margin of epigynium; posterior paragynial protrusion small and rounded; metagynial sclerite elliptical (Fig. 8B). Epigynium as long as its width at base. Apex elongated, anteriorly with a triangular apex and a slightly sclerotized subapical structure (Fig. 8C). Setae $st5$ short (20-24). Endogynium a big sack with its opening surrounded by structures shaped like petals, all covered by a thin membrane with a denticulate anterior margin (Fig. 8D- E). Gland pore $gv2$ simple. Opisthogaster with 8-9 pairs of setae, their length: $ZV4 = 30$, $JV5 = 18$, others 24-30. Measurements: distance between sternal setae: $st1-st1' = 72$, $st2-st2' = 96$, $st3-st3' = 110-132$; height of sternal shield = 36; epigynium: height = 187-192, basal width = 180-192, $h/b = 1-1.10$;

Gnathosoma: Gnathotectum trispinate (Fig. 8G). Corniculi conical. Hypognathal groove with 9-10 rows, most of them oligodent; hypostomatic setae simple, their length $hyp.1$, $hyp.2 = 30$; $hyp.3 = 24$; $pc. = 42$ (Fig. 8F). Movable and fixed digit of chelicera 84 long.

Legs: Coxa II with a ridge of 8 denticles (Fig. 7G). Length of tarsus I = 150-156 and tarsus IV = 156-161.

Remarks: The new species can be easily distinguished from all the known species of *Holoparasitus* by the particular characteristics of the endo- and epigynium of the female and by those of the chelicera of the male.

ACKNOWLEDGEMENTS

I am thankful to Peter Schwendinger (MHNG) for access to the Athias-Henriot Collection, to Jean Mariaux (MHNG) for providing laboratory facilities, to Peter Schuchert and Gilles Roth (both MHNG) for scanning the illustrations. Special thanks to Janet Beccaloni (NHML) who made it possible for me to compare the material from the Athias-Henriot Collection with types deposited in the NHML. I am grateful to Maria L. Moraza (University of Navarra, Spain), Peter Schuchert and Peter Schwendinger for their useful comments and corrections of the manuscript.

REFERENCES

- Berlese A. 1904. Manipulus I. *Redia* 1: 235-252.
- Evans G.O., Till W.M. 1979. Mesostigmata mites of Britain and Ireland (Chelicerata: Acari, Parasitiformes). An introduction to their morphology and classification. *Transaction of the Zoological Society of London* 35: 139-270.
- Hyatt K.H. 1987. Mites of the genus *Holoparasitus* Oudemans, 1936 (Mesostigmata: Parasitidae) in the British Isles. *Bulletin of the British Museum (Natural History), Zoology series* 52(4): 139-164.
- Juvara-Bals I. 1975. Sur le genre *Holoparasitus* Oudemans, 1936 et sur certains caractères morphologiques de la famille Parasitidae Oudemans (Parasitiformes). *Acarologia* 17: 384-409.
- Juvara-Bals I. 2008. New species of *Holoparasitus* Oudemans, 1936 (Acari, Parasitidae) from Spain, North Africa, the Canary and Madeira Islands. *Revue suisse de Zoologie* 115(1): 37-84.
- Juvara-Bals I., Witalinski W. 2000. Description of five new species of *Holoparasitus* Oudemans with redescription of *H. apenninorum* (Berlese, 1906) and *H. cultriger* (Berlese, 1906) from Italy and Spain (Acari, Gamasida, Parasitidae). *Revue suisse de Zoologie* 107(1): 3-30.
- Juvara-Bals I., Witalinski W. 2006. Two new species of the genus *Holoparasitus* Oudemans from the Bassin-Algeria and Sardinia (Acari: Gamasida: Parasitidae). *Genus* 17(3): 437-448.
- Lindquist E.E. 1994. Some observations on the chaetotaxy of the caudal body region of gamasinae mites (Acari: Mesostigmata), with a modified notation for some ventrolateral body setae. *Acarologia* 35: 323-326.
- Lindquist E.E., Evans G.O. 1965. Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina, Mesostigmata). *Memoir of the entomological Society of Canada* 47: 1-64.
- Micherdzinski W. 1969. Die Familie Parasitidae Oudemans, 1901 (Acarina, Mesostigmata). *Panstowe Wydawnictwo Naukowe, Krakow*, 690 pp.
- Oudemans A.C. 1936. Kritisch Historisch overzicht der Acarologie. *Volume A, part 3, 1805-1850*, E.J. Brill, Leyden, XX + 430 pp.
- Trägårdh I. 1936. *Leptogamasus*, a new genus of Acari from Sweden. *Entomologisk tidskrift* 57: 227-234.
- Witalinski W. 2006. New mites of the genus *Holoparasitus* Oudemans, 1936 from northern Austria and Karavanke (Acari: Parasitidae). *Zootaxa* 1320: 15-27.
- Witalinski W. 2017a. Two new species of *Holoparasitus* Oudemans, 1936 from Europe (Parasitiformes: Parasitidae). *Acarologia* 57(2): 211-221.
- Witalinski W. 2017b. Key to the world species of *Holoparasitus* Oudemans, 1936 (Acari: Parasitiformes: Parasitidae). *Zootaxa*, vol 4277 (3): 301-351.
- Witalinski W., Skorupski M. 2002. Genus *Holoparasitus* Oudemans, 1936 in Berlese Acaroteka (Acari: Gamasida Parasitidae). Part I. *Redia* 85: 37-60.
- Witalinski W., Skorupski M. 2003. Genus *Holoparasitus* Oudemans, 1936 in Berlese Acaroteka (Acari: Gamasida: Parasitidae). Part II. *Redia* 86: 17-22.