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Roncocreagris murphyorum n. sp. and *Occitanobisium nanum* (Beier) n. comb. (Neobisiidae) from Iberia, with notes on the sternal glands of pseudoscorpions (Chelonethi)

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Summary

Roncocreagris murphyorum n. sp. is described from northern Portugal. *Microcreagris galeonuda nana* Beier is raised to specific rank and transferred from the genus *Roncocreagris* Mahnert to *Occitanobisium* Heurtault, based on a redescription of the holotype. *Occitanobisium* is regarded as being closely related to *Roncocreagris*. *Neoccitanobisium* Callaini is reduced to subgeneric status under the genus *Neobisium* Chamberlin.

Sternal glands, which open through modified setae, are shown to be present in members of the Neobisiidae, Garypininae and Geogarypidae. They are homologous with the sternal glands previously described in the Syarinidae and Withiidae.

Introduction

Amongst a small collection of unidentified Portuguese pseudoscorpions, sent to me by Mr J. A. Murphy, was a single female of a new species of *Roncocreagris* Mahnert. Work on this species prompted a re-examination of the holotype of *Microcreagris galeonuda nana* Beier, which was found to have been misplaced in *Roncocreagris*.

Roncocreagris murphyorum n. sp. (Figs. 1–8)

Type

Holotype ♀, Portugal: Peneda-Gerês National Park, *c.* 800 m, litter, September 1982, J. A. Murphy leg. Deposited in spirit collection of British Museum (Natural History), reg. no. 1990.8.2.2.

Description

Colour pale, body straw-yellow, palps reddish-brown.

Carapace (Fig. 7) desclerotised behind posterior row of setae; a single pair of eyes with weak lenses; epistome barely developed, rounded; chaetotaxy 4: 4: 4: 2: 7 (21).

Tergal chaetotaxy 8: 10: 10: 11: 11: 10: 11: 11: 11: 10: 2, tergites II-XI with a median, unpaired seta (missing on VI).

Coxal setae: P 7–8 + 3–4 on manducatory process (total 10–12): I 5–7: II 6: III 5: IV 6; anterior process of coxa I long and acute; medial corner weakly granulate.

Anterior genital sternite with 8 setae; setae of posterior genital sternite (2)11(2); chaetotaxy of remaining sternites (2)13(2): 13: 2g (discal) + 12: 2g (discal) + 12: 12: 11: 11: T(?)8T(?): 2; sternites VI-X with an unpaired median seta; pleural membrane evenly papillate.

Chelicera (Fig. 5): Hand with 6 setae; flagellum (Fig. 6) with 8 blades, basal blade short and weakly dentate, other blades pinnate; serrula exterior with 16 blades, serrula interior with about 13; fixed finger bears 6 small, apical teeth and 7 larger, basal teeth; movable finger with 10 teeth, largest in middle; spinneret a low, rounded tubercle.

Palp (Figs. 1–3): Trochanter smooth; femur granulate along anterior margin; tibia smooth, with three lyrifissures on dorsum of pedicel; hand of chela granulate on meso-dorsal surface; 2 tuberculate pores at base of fixed finger; no microchaetae on hand; fixed finger with 38 teeth (anterior 8 retroconical, remainder rounded); movable finger with 38 teeth (anterior 6 cusped); diploid sensillum of movable finger raised (= false accessory tooth), just distad of *sb*, near dental margin; venom duct of fixed finger short (nodus ramosus opposite fifth tooth); *st* and *t* less than one areolar diameter apart; *t* directed upwards, acuminate.

Leg I: Chaetotaxy (basifemur-telotarsus) 10: 12: 15: 8: 25.

Leg IV (Fig. 4): Chaetotaxy 9: 10: 21: 11: 27; tibial TS 0.43; basitarsal TS 0.16; telotarsal TS 0.30; subterminal setae bifurcate, each branch with a small, subdistal barbule; posterior claws of all legs with a small tooth near base (absent on anterior claws).

Measurements (mm): Body 2.0; carapace 0.46 × 0.50 (0.92). Palp: femur 0.48 × 0.17 (2.85), tibia 0.40 × 0.18 (2.15), hand (including pedicel) 0.43 × 0.27 (1.6), movable finger 0.44 (mf/h 1.03), chela 0.82 (3.0). Leg I: basifemur 0.21 × 0.09 (2.5), telofemur 0.17 × 0.08 (2.1), tibia 0.20 × 0.06 (3.3), basitarsus 0.10 × 0.05 (2.1), telotarsus 0.16 × 0.05 (3.6). Leg IV: femur (total) 0.44 × 0.17 (2.7), tibia 0.35 × 0.09 (4.0), basitarsus 0.13 × 0.06 (2.0), telotarsus 0.21 × 0.06 (3.5).

Etymology

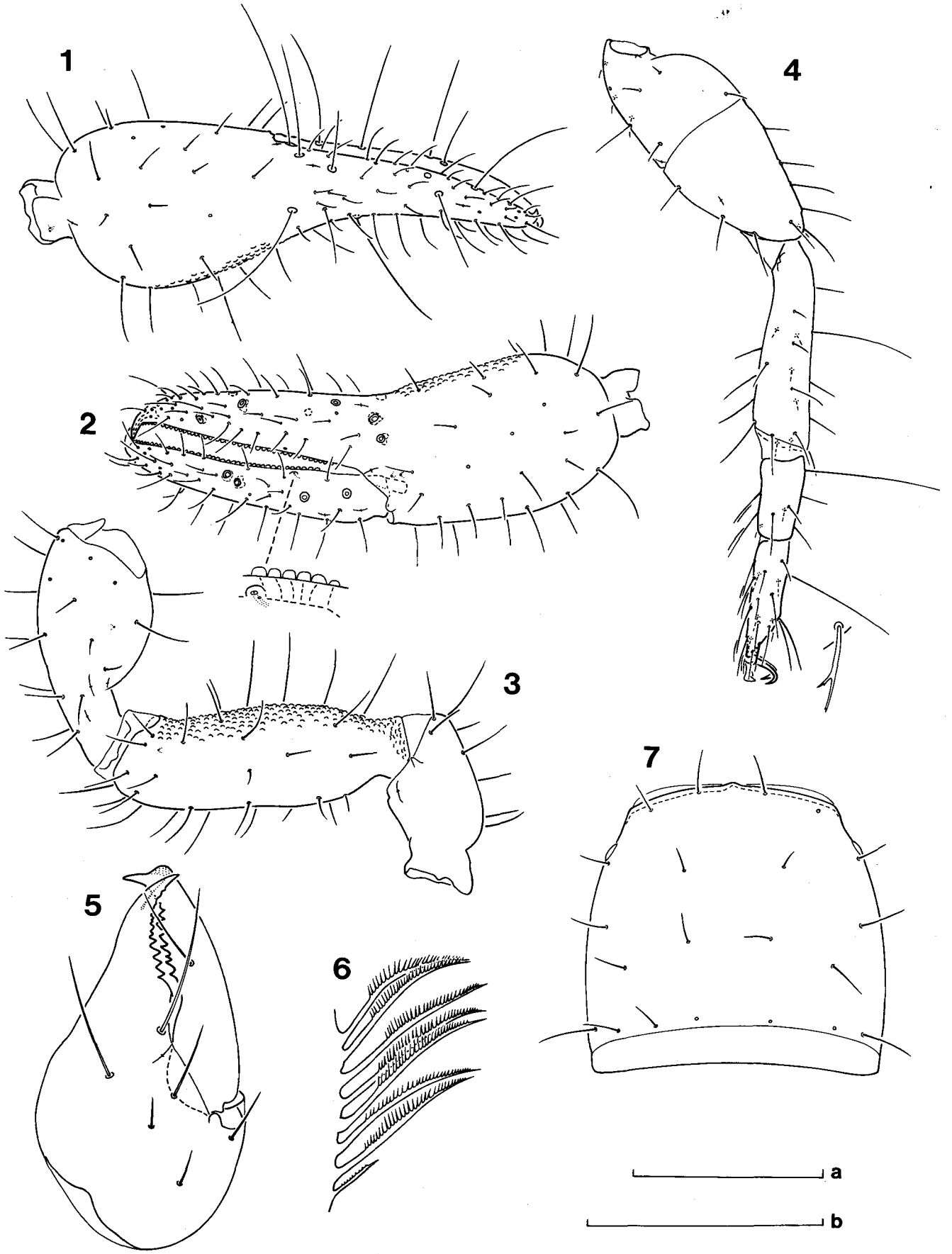
It is a pleasure to name this species after John and Frances Murphy.

Remarks

Roncocreagris murphyorum belongs to the *galeonuda* species group — an informal group characterised by the strong reduction of the spinneret. It can be separated from the other species of the group by the size and proportions of the palp. It will key out to *R. galeonuda robustior* (Beier) (probably a distinct species), using Mahnert's (1976) key. The latter species has a less robust chela (3.6 × longer than broad, finger distinctly longer than hand) and trichobothria *st/t* further apart.

It is interesting to note the strong general similarity of this new species to *Roncocreagris cambridgei* (L. Koch). This, the type species of the genus, differs from *murphyorum* only by the presence of a spinneret with rami and in having slightly stronger granulation on the palps.

The discal setae of sternites VI and VII are glandular and are given the notation *g* in the description. They are hollow, with a presumed terminal opening, but are not noticeably thickened. A thin, chitinous duct leads from a gland lying above the seta to the base of the hair (Fig. 8). This is the first record of such glands in the Neobisiidae (see discussion below).



Figs. 1–7: *Roncocreagris murphyorum* n. sp., holotype female. **1** Left chela, dorsal view; **2** Left chela, lateral view, with detail of diploid sensillum and adjacent teeth; **3** Trochanter, femur and tibia of left palp; **4** Left leg IV; **5** Right chelicera; **6** Flagellum; **7** Carapace. Scale lines: a = 0.3mm (Figs. 1–4); b = 0.1mm (Fig. 6), 0.2mm (Fig. 5), 0.4mm (Fig. 7).

***Occitanobisium nanum* (Beier) n. comb., n. stat.** (Figs. 9–12)

Microcreagris galeonuda nana Beier, 1959: 126–127, fig. 8.
Roncocreagris galeonuda nana: Mahnert, 1976: 212 (in key).

Material examined

Holotype ♂ of *M. galeonuda nana*, [Spain], Pantano; östl[iche] Orbaiceta, Nav[arres], 6 August 1955, [H.] Franz leg. (Naturhistorisches Museum Wien, in alcohol; specimen in poor condition, body and carapace broken).

Description

Carapace: Epistome obtuse; eyes no longer visible (Beier (1959: 126) describes them as being almost completely reduced, without lenses); four setae on anterior margin.

Tergal setae: I 6?: II 6: III–IX 8: X 3T1T3: XI T1T1T1T: XII 2.

Coxal setae: P 6+2 on manducatory process: I 7: II 6: III 4?: IV 4?; coxa I with a strong, blunt (broken?) anteriolateral process; each leg coxa overlapping the one behind it.

Anterior genital sternite with 11 setae; posterior genital sternite with 4 anterior and 4 posterior setae; chaetotaxy of remaining sternites mm6mm: 10: 5gg5: 5gg5: 12: 13: 12: 10?: TT: 2.

Genitalia very similar to those of *O. coiffaiti* (see Heurtault, 1978; fig. 16): atrium of ejaculatory canal large, reaching well into coxa IV; lateral apodeme frame annular; lateral genital sacs large, slightly expanded distally; 2+2 genital setae; posterior dorsal gland well developed, vesicles generally large (posterior) or small (anterior).

Chelicera: Hand with 6 setae; flagellum composed of 8 blades, anterior 6 blades pinnate (anterior blade, at least, is bipinnate), basal blade shorter than others; serrula exterior with 15 blades; serrula interior with 13 blades; both fingers with about 10 teeth (minute on movable finger); spinneret a low, rounded tubercle.

Palp (Figs. 9–10): All segments smooth except for some granulation on anteriodistal surface of femur and weak granulation on mesal surface of hand at base of fixed finger; chela with 2 tuberculate pores below *eb*; no microchaetae on hand; fixed finger with about 25 teeth, movable finger with 28; diploid sensillum of movable finger lies next to dental margin, just distad of *sb*; venom duct of fixed finger short; trichobothria *st* and *t* level, areoles proximate but not fused; *t* directed upwards, unmodified.

Leg IV (Figs. 11–12): Setae (basifemur-telotarsus) 5: 7: 16: 7: 25, subterminal seta simple.

Measurements (mm): Palp: femur 0.30 × 0.10 (2.9), tibia 0.26 × 0.12 (2.2), hand (+pedicel) 0.26 × 0.16 (1.6), movable finger 0.29 (1.1 × hand), chela length (+pedicel) 0.53 (3.3). Leg IV: basifemur 0.14 × 0.12 (1.1), telofemur 0.14 × 0.12 (1.1), total femur 0.27 (2.2), tibia 0.21 × 0.064 (3.25), basitarsus 0.081 × 0.046 (1.7), telotarsus 0.14 × 0.044 (3.05).

Remarks

In addition to the holotype of *Occitanobisium nanum* I have briefly examined the types of *O. coiffaiti* Heurtault, 1978. The original description of *coiffaiti* is good and there are only a couple of points that need to be added. Firstly, the ducts of the median secretory setae on sternites VI-VII are clearly visible (I have inferred from this that they are also present in *nanum*, though they were not observed in the holotype). Secondly, there are normally two foramina at the base of the lateral rods of the male genitalia. These are not visible in Heurtault's illustration (1978: fig. 16) because of the almost perpendicular orientation of the rods in the slide preparation of the holotype. It is likely that these foramina are also present in the holotype of *nanum*, but were overlooked by me for the same reason.

With the transfer of *nanum* to *Occitanobisium*, the question arises as to whether this species might be synonymous with *coiffaiti*. The differences between the two are slight: *nanum* has fewer setae on the tergites and manducatory process (2 versus 3), and is slightly larger than *coiffaiti*. As only a single, damaged specimen of *nanum* is available, it would be premature to synonymise the two species here.

The bipinnate nature of at least some of the flagellal blades of *Occitanobisium* is of interest. Until now, it has generally been assumed that bipinnate flagellal blades are found only in the Chthonioidea (Bishop, 1967; Muchmore, 1969). Heurtault (1978; fig. 5) clearly illustrated the second flagellal blade of *O. coiffaiti* as being bipinnate, but did not comment on this. The presence of two rows of pinnae on the flagellal blades is much harder to see in neobisiids than in chthonioids because the rows are more closely appressed and produce confusing interference patterns when observed with light microscopy. This might account for the "biramous denticles" seen by Leclerc (1989) on the flagellum of *Neobisium atlasense* Leclerc.

Systematic position of *Occitanobisium*

Heurtault (1978) compared *Occitanobisium* with other genera of the "Neobisiinae" because of its reduced spinneret. However, it has become increasingly obvious in recent years that this character is of limited value, even at the generic level. A good example is afforded by the *galeonuda* species group of *Roncocreagris*, where the reduction of the spinneret has resulted in forms very similar to *Roncus* species. Beier's assignment of these species to "*Microcreagris*" (= *Roncocreagris* in part) seems to have been based on intuition rather than any objective characters. Mahnert (1976) used the presence or absence of discal setae on sternites VI–VII as a generic character which can be used to separate *Roncus* and *Roncocreagris*. These discal setae are actually the glandular setae (pers. obs. of *Roncocreagris cambridgei* (L. Koch)). It appears that the discal position of sternal setae is a good indicator of their glandular nature in this family, but, conversely, the absence of discal setae does not imply the absence of sternal glands.

Occitanobisium shares several important characters (viz. form of flagellum; presence of glandular setae on sternites VI–VII; basic trichobothrial pattern; form of male genitalia) with *Roncocreagris* and is probably closely related to this genus. The characters which distinguish *Occitanobisium* from *Roncocreagris* (trichobothria *st* and *t* contiguous; subterminal setae of tarsi simple; glandular

setae of sternites not discal) are probably all autapomorphies of *Occitanobisium* (based on outgroup comparison with Syarinidae, and other genera of Neobisiidae). If this preliminary assessment is confirmed by a detailed cladistic analysis of neobisiid genera, it may prove necessary to synonymise *Occitanobisium* with *Roncocreagris*.

A parallel case is that of the monotypic genus *Neoccitanobisium* Callaini, 1981, which Callaini tentatively regarded as being intermediate between *Neobisium* and *Occitanobisium*. The only character uniting *Neoccitanobisium* and *Occitanobisium* is the distribution of the trichobothria, especially the contiguity of *st* and *t*. This is probably due to convergence between the two genera, as Callaini (1981; 535) suggests. The species of both genera are very small in size, and the proximity of the trichobothria is probably due to a low level of growth of the chelal fingers. Apart from the trichobothriotaxic differences, Callaini separated *Occitanobisium* from *Neobisium* on the basis of the presence of an "accessory tooth" on the movable finger of the chela in *Neoccitanobisium*. It is clear from Callaini's figures that this is actually a raised sensillum, similar to that found in species of *Roncobisium* Vachon. In view of the affinities of *Neoccitanobisium* to *Neobisium* it is hereby proposed to reduce it to subgeneric status under the latter. The type species therefore becomes *Neobisium* (*Neoccitanobisium*) *ligusticum* (Callaini) n. comb.

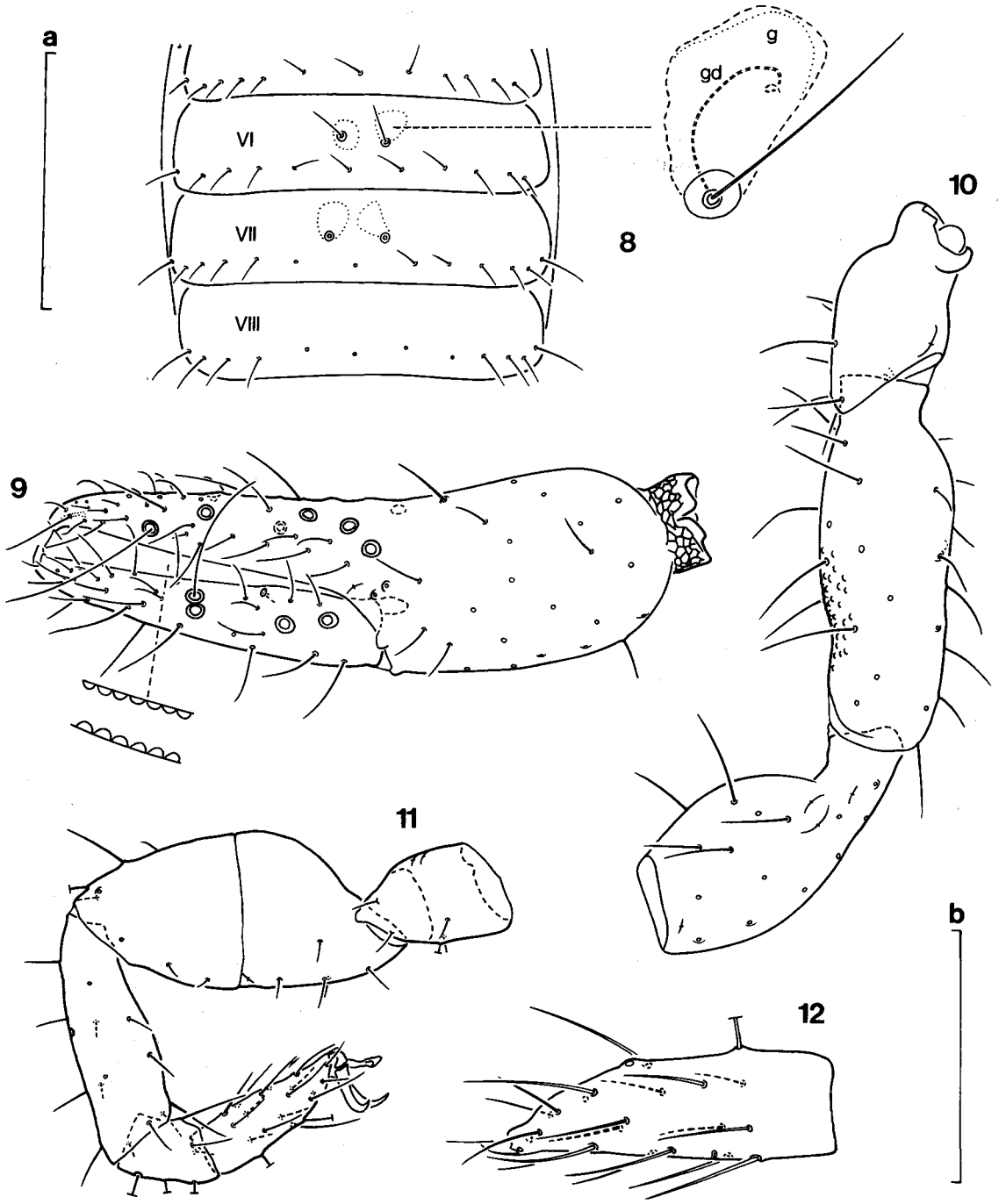


Fig. 8: *Roncocreagris murphyorum* n. sp., holotype female, median sternites with detail of glandular seta of sternite VI (g = sternal gland, gd = duct of sternal gland, VI–VIII = sternites six to eight). Scale line a = 0.4mm (0.078mm for detail).

Figs. 9–12: *Occitanobisium nanum* (Beier), holotype male. **9** Left chela, lateral view, with detail of dentition; **10** Trochanter, femur and tibia of left palp; **11** Right leg IV: **12** Telotarsus IV, enlarged. Scale line b = 0.2mm (Figs. 9–11), 0.1mm (Fig. 12).

The sternal glands of pseudoscorpions

As alluded to in the discussion of the status of *Occitanobisium*, sternal glands are known in the Syarinidae. Vachon (1952, 1954) first described the sternal glands in *Pseudoblothrus strinatii* Vachon, which has a complex, glandular structure opening on sternite VI. A similar, no doubt glandular, structure is found in most species of the closely related (synonymous?) genus *Chitrella* Beier (Vachon, 1969; Muchmore, 1973).

The only other family for which sternal glands have been described is the Withiidae. Vachon (1954) hinted that the bristle patches found in the males of *Withius* Kew might be secretory, an idea also suggested by Weygoldt (1969). Heurtault (1972) demonstrated the glandular nature of these patches, tentatively suggesting that the material secreted is a lipid.

Mahnert (1982) described plumose setae on sternites VI–VII of the male of *Afrogarypus stellatus* (Mahnert) (Geogarypidae) and suggested that these might have a secretory function. This is confirmed by the fact that all stages of geogarypids have setae with cuticular canals in the same position (pers. obs. of *Geogarypus* and *Afrogarypus* species). The secretory setae of *A. stellatus* are unusual for this family in being sexually dimorphic.

Secretory setae are also present in the subfamily Garypininae of the family Olpiidae. Again, these are normally paired, median setae with long ducts. Sexual dimorphism is common in this group, the males often having modified, or multiplied, secretory setae on sternites VI–VII (Beier, 1932: 208; Muchmore, 1979; Mahnert, 1988).

The taxonomic distribution of secretory setae within the Neobisiidae is interesting because they appear to have been lost sporadically in some genera which are not obviously related. I have been unable to find secretory setae in *Neobisium, Roncus* and *Bisetocreagris*, whilst they are present in *Roncocreagris, Occitanobisium* and *Acanthocreagris*.

Chamberlin's (1947) description of "median, paired microsetae" on sternites VI–VIII in species of *Vachonium* Chamberlin, suggests that it might be fruitful to look for sternal glands in the Vachoniidae/Bochicidae complex.

Of course, the absence of cuticular ducts does not necessarily mean that sternal glands are absent, the Withiidae being an obvious example. Although the glands can often be seen in cleared fresh material, histological examination of a wide variety of taxa will be necessary for a clearer understanding of their taxonomic distribution.

A plausible explanation of their function might be that they secrete some form of pheromone. This could serve to mark territories and, in the case of males, spermatophores. The vibrations of the third pair of legs observed by Weygoldt (1969) during the mating of *Withius piger* (Simon) (=*subruber* (Simon)) could be interpreted as a wafting of such a pheromone towards the female.

Lastly, it should be noted that presumably homologous glands — the "ventral abdominal glands" — are present in some solpugids (Millot, 1942), the sister group of the Chelonethi. These have a similar morphology to the sternal glands, opening through modified setae. These in turn may be homologous with the ventral glands found in palpigrades, as Millot states.

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