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## Description of the female of *Cornigamasus ocliferius* SKORUPSKI et WITALIŃSKI, 1997 with a key to *Cornigamasus* species (Parasitiformes: Mesostigmata: Gamasida: Parasitidae)

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ABSTRACT. This contribution provides a description of the female of a rare mite species, *Cornigamasus ocliferius* SKORUPSKI et WITALIŃSKI, from Poland. The description of the common *C. lunaris* by MICHERDZIŃSKI (1969) is revisited to indicate that the female he described actually belongs to *C. ocliferius*. Both females and males of *C. ocliferius* exhibit an unusual character: the loss of an ambulacrum and claws on tarsus I, despite their deutonymphs possessing complete tarsi I. In addition, a key to *Cornigamasus* species is provided.

Key words: acarology, taxonomy, Mesostigmata, Parasitidae, *Cornigamasus ocliferius*, female.

*Cornigamasus ocliferius* SKORUPSKI et WITALIŃSKI, 1997 is a rare species known from one male (SKORUPSKI & WITALIŃSKI 1997) specimen and ten deutonymphs (WITALIŃSKI et al. 2005) collected in southern Poland in and around the *locus typicus* in Pieniny Mountains. In recent years four additional deutonymphs of *C. ocliferius* as well as two males and two females were found in localities other than the *locus typicus*. The aim of this study is to provide complementary data on the unknown female of this species.

### ***Cornigamasus ocliferius* SKORUPSKI et WITALIŃSKI, 1997**

Figs 1-9, 12, 13

#### DIAGNOSIS

Female. Tarsus of 1st pair of legs ends with many setae including sensory ones, but an ambulacrum with claws and pulvilli is absent. Coxa III without posteroventral

protuberance. Endogynium elongated axially, its width much smaller than the distance between bases of paragnathal setae, with an arcuate thickening within the anterior part and circular, possibly porous area located posteriorly. Posterior endogynial margin narrow and not forming internally directed teeth or protrusions. Podonotal shield (fig. 1) with 5 and opisthonotal (fig. 2) with 2 pairs of stout, terminally pilose setae.

#### DIFFERENTIAL DESCRIPTION

Female. A detailed description of the *C. ocliferius* female has been provided by MICHARDZIŃSKI (1969: 437; his prep. no 71a-d, examined) who mistakenly described it as a female of *C. lunaris* (BERLESE), so only some characters are mentioned here to indicate differences from other *Cornigamasus* species. The *C. ocliferius* female is narrow and elongated, roughly rectangular in outline and rounded caudally (fig. 3). When alive it is olive-yellowish in colour, with a wide and dark brown gnathosoma due to internally located heavily sclerotized chelicerae. Dimensions of idiosoma: length 815–830 µm, width 420 µm (prep. nos 2410A, 2412), 967 x 567 µm (MICHARDZIŃSKI 1969). Lengths of tarsi I and tarsi IV in females, males and deutonymphs of *C. ocliferius* versus *C. lunaris* are presented in Table I.

Table I. Length of tarsi I and tarsi IV (ambulacrum not included) in *C. lunaris* (BERLESE) and *C. ocliferius* SKORUPSKI et WITALIŃSKI in micrometers. Number of measured specimens in parentheses.

species	stage	length of Ta I	length of Ta IV
<i>C. lunaris</i>	male (2)	194-212	191-202
<i>C. ocliferius</i>	male (2)	175-194	181-212
<i>C. lunaris</i>	female (2)	194-199	194-204
<i>C. ocliferius</i>	female (2)	183	181-191
<i>C. lunaris</i>	deutonymph (7)	157-183	157-180
<i>C. ocliferius</i>	deutonymph (4)	149-160	147-160

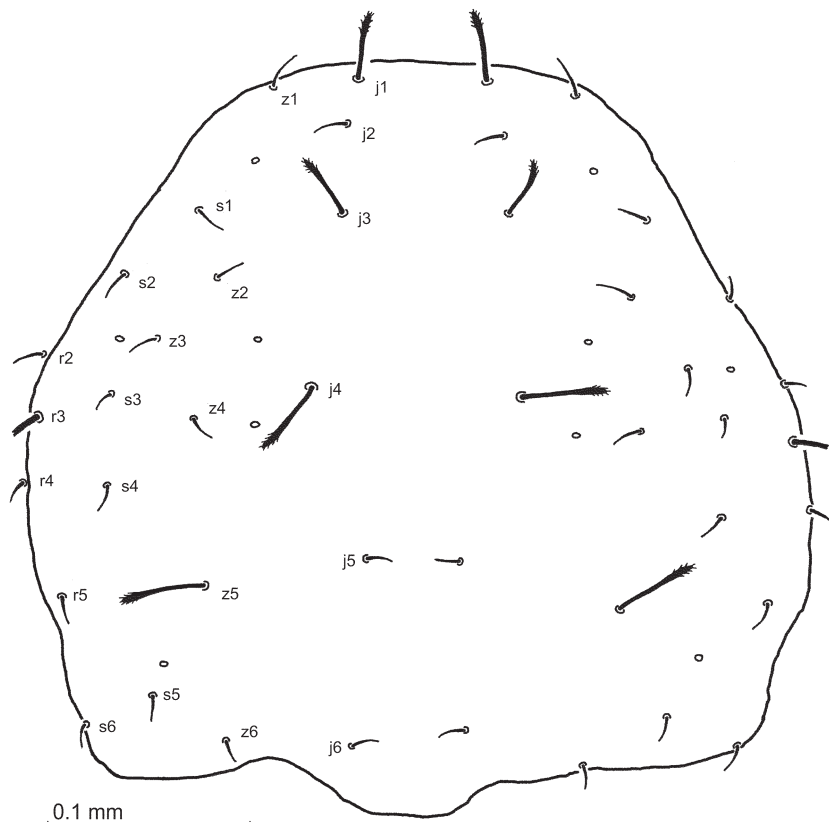
Dorsal side (figs 1, 2). Podonotal shield bears 22 pairs of setae including setae *r*2 and *r*4 which can be located on the shield or on flexible cuticle close to the shield margin. There are 5 stout (club-shaped) and terminally pilose setae (*j*1, *j*3, *j*4, *z*5 and *r*3). Setation and pore distribution are similar to those in *C. lunaris*, but seta *j*3 in *C. ocliferius* is stout and club-shaped whereas in *C. lunaris* it is simple. Female of *C. karachiensis* (ANVARULLACH et ALI KHAN, 1969) possesses 6 pairs of stout podonotal setae; it is necessary to note that structures described and documented by the authors as characteristic macrochaetae located randomly on legs are in fact fungal spores rather than setae. *C. oulaensis* MA, 1986 (= *C. lunaroides* MA, 1986\*) has 22 pairs of typical, thin podonotal setae.

\*MA (2005) considered *C. lunaroides* MA, 1986 as a junior homonym of *Cornigamasus lunarioides* ATHIAS-HENRIOT, 1980 and proposed a new species name *Cornigamasus oulaensis*.

The opisthonotal shield in *C. ocliferius* (fig. 2) is relatively small and bears 9 setae pairs with 2 pairs (Z1 and Z3) stout and terminally pilose. On flexible cuticle emerging from the opisthonotum there are 14 pairs of setae of which 10 pairs are stout and terminally pilose. In other species the opisthonotal shield is fitted with either twelve pairs of setae, three of which are stout in *C. lunaris* (HOLZMANN 1969; HYATT 1980), twelve pairs of simple setae (*C. oulaensis*), or eight pairs with two stout pairs in *C. karachiensis*.

Ventral side (fig. 3). Presternal plates are ellypsoidal and evidently larger than in *C. lunaris* in which they are small and wedge-shaped. The sternal shield is not reticulated, its anterior margin shows a shallow incision, whereas the posterior margin is irregularly truncate and axially concaved. In *C. lunaris* the marginal portions of the sternum are reticulated. In both species, sternal setae *st1* and *st3* are inconspicuous while setae *st2* are thicker and shorter.

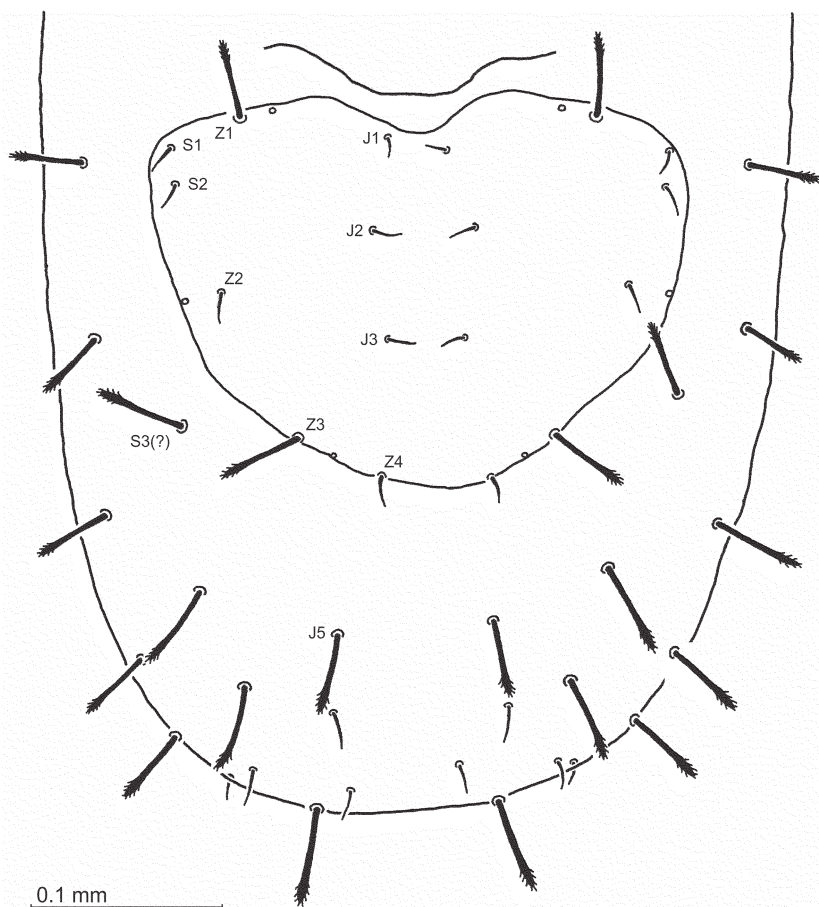
Genital region (figs 3, 4). Paragynia are inconspicuous. Epigynial plate terminates anteriorly with a narrow and long central prong, whereas posteriorly it is separated



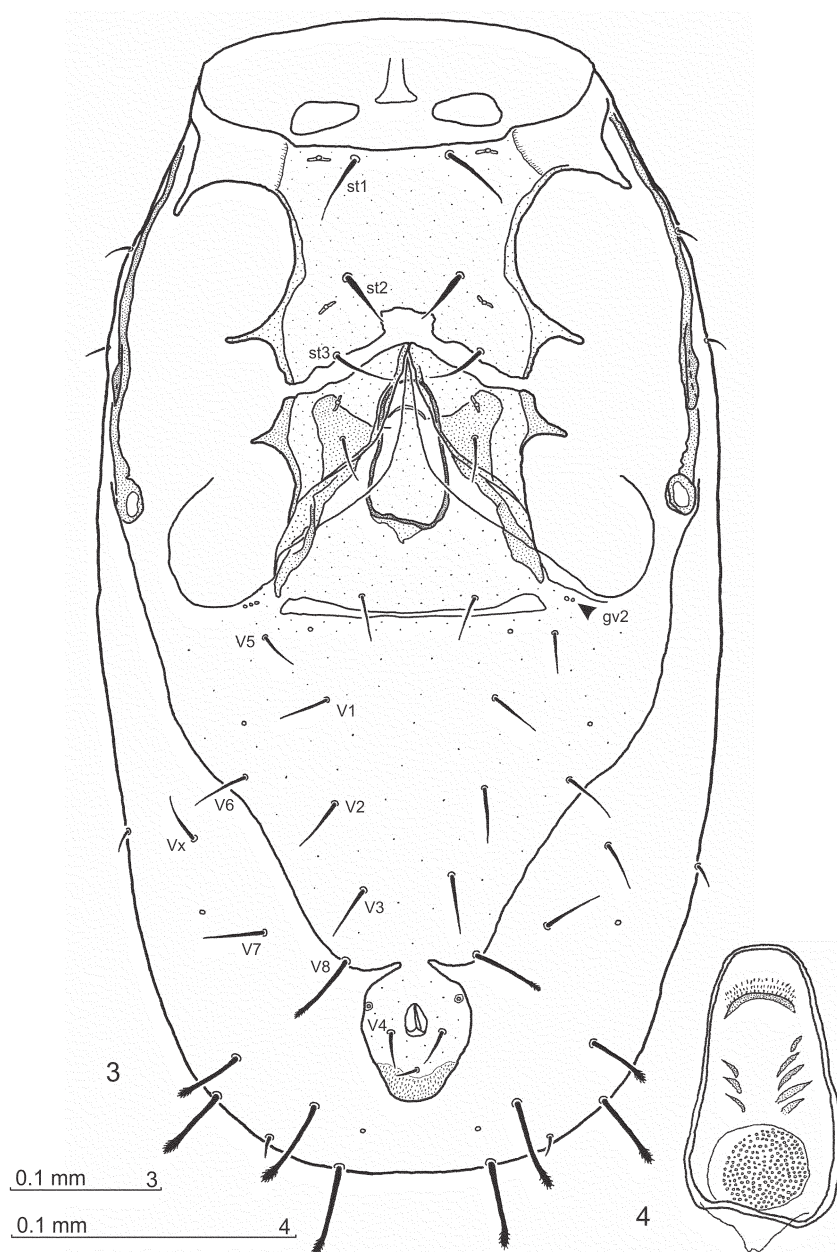
1. *Cornigamasus ocliferius* SKORUPSKI et WITALIŃSKI, female (slide no. 2412). Dorsal side of idiosoma – podonotal shield

from the opisthogastric shield only in the central part; laterally, the epigynial shield and opisthogastric are fused in the region of the *gv2* pores. The width of the elongated endogynium (fig. 4) is much smaller than distance between bases of paragynial setae. Its narrow margin is well pronounced. In the anterior part of the endogynium an arcuate thickening is visible, whereas there is a circular porous (?) area close to the endogynium's posterior pole. The posterior endogynial pole forms a fine triangular lamella protruding caudally. In *C. lunaris* the endogynium is approximately as long as it is wide and its posterior margin usually forms two internally directed dents of which the left one (in ventral view) is larger.

The opisthogastric shield is narrowed caudally and fused with a small perianal plate by a narrow band of cuticle. In *C. oculiferius* it bears 6 pairs of setae of which the posteriormost pair (*V8*) is stout, whereas in *C. lunaris* the opisthogastric shield bears 7 pairs of setae with one stout seta located posteriorly.

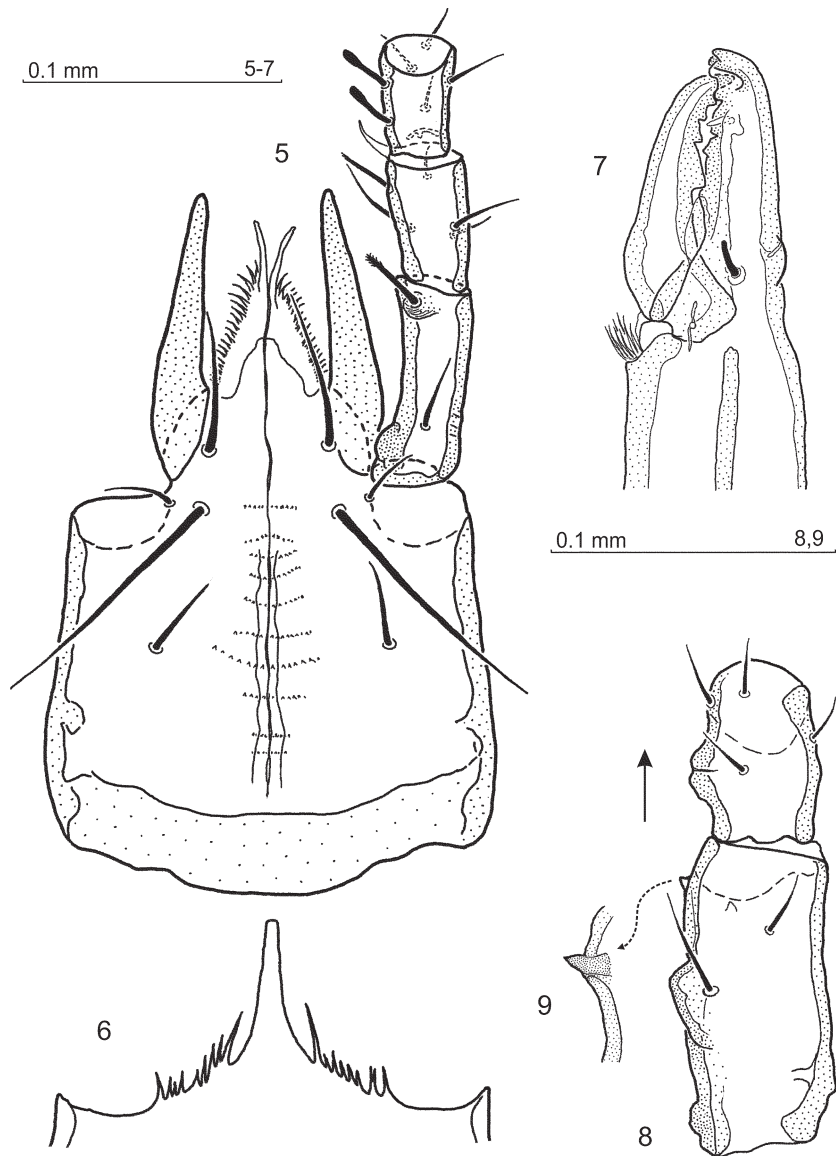


2. *Cornigamasus oculiferius* SKORUPSKI et WITALIŃSKI, female (slide no. 2412). Dorsal side of idiosoma – opisthonotal shield



3, 4. *Cornigamasus ocliferus* SKORUPSKI et WITALIŃSKI, female (slide no. 2412). 3 – ventral side of idiosoma, 4 – endogynium

Gnathosoma (fig. 5). Hypognathal groove with 9-10 poorly visible rows of denticles (up to 12 very weakly visible rows in *C. lunaris*). Hypostomatic and palpcoxal setae simple; of these the internal posterior hypostomatics are 3-4 times longer than



5-9. *Cornigamasus oculiferius* SKORUPSKI et WITALIŃSKI, female (slide no. 2410A). 5 – ventral side of gnathosoma, 6 – gnathotectum, 7 – chelicera abaxially, 8 – coxa and trochanter of leg I. Arrow is at anterolateral side, 9 – one of two teeth close to distal margin of coxa I from another perspective

the external ones. Gnathotectum (fig. 6) indistinguishable from that of *C. lunaris*, i.e. a long smooth central prong with truncated apex emerges from a denticulate base.

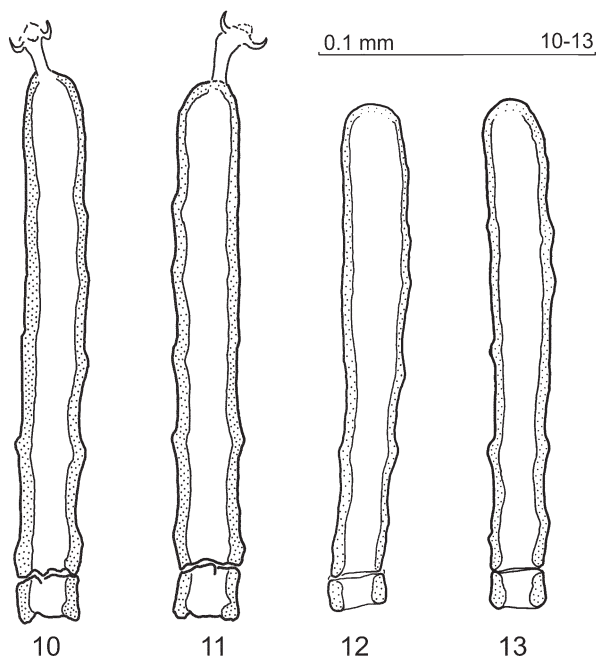
Chelicera (fig. 7). On the abaxial side, the fixed digit bears 3 teeth in front of the *pilus dentilis* – including an apical one followed by two others; behind the *pilus dentilis* are two poorly pronounced teeth. Close to the apex of the fixed digit, one tooth on the adaxial side forms a concavity which accommodates the tip of the movable digit. The movable digit has 4 well pronounced teeth followed by a pointed digit tip. Arthrodial membrane inconspicuous; abaxial seta short and rounded apically.

Pedipalps. Trochanter (fig. 5) with seta *v1* simple, seta *v2* pilose distally and positioned on a tubercle. Proximal end of trochanter with tubercles positioned adaxially. The anterolateral seta on the palp femur is nearly simple, only with apical pilosity. Distally, the palp femur possesses a large, arcuate lamellar protrusion directed adaxially. Anterolateral setae *all* and *al2* on palp genu are wider apically.

Legs II-IV and their chaetotaxy are inconspicuous; coxa III lack a posteroventral protuberance present in *C. lunaris*. Leg I is conspicuous due to its tarsus which is slightly club-shaped in outline (figs 10-13) and the ambulacrum with claws and pulvilli, located on tarsus I in all other parasitid species, is absent.

#### REMARKS ON BIOLOGY, DISTRIBUTION AND MORPHOLOGY/TAXONOMY

*Cornigamasus oculiferius* is an uncommon species since only several specimens have been found in southern and central Poland (MICHERDZIŃSKI 1969; SKORUPSKI &



10-13. Tarsi I in outline in *Cornigamasus lunaris* (BERLESE) (10, 11) and *Cornigamasus oculiferius* SKORUPSKI et WITALIŃSKI (12, 13) in dorsal perspective. 10 – male (slide 2417), 11 – female (slide 2417), 12 – male (slide 2399), 13 – female (slide 2412)

WITALIŃSKI 1997; WITALIŃSKI et al. 2005; this study). It should be emphasized, however, that KARG (1993: 460) documented two types of leg II in *C. lunaris*; one of them (p. 483, fig. 406b) as well as the genital region of the female from a German population (p. 474, fig. 390a), are indicative of *C. ocliferius* (SKORUPSKI & WITALIŃSKI 1997). If so, this species also occurs in Germany. Quite recently, the occurrence of *C. ocliferius* in Egypt has been reported by NEGM in a poster presentation during the 14th International Congress of Acarology (NEGM 2014).

Unfortunately, there is still no evidence for the explanation proposed by WITALIŃSKI and co-workers (2005) who suggested that the scarcity of this species is due to a strictly nidicolous existence in rodent nests from which it is only occasionally transported on fur to rodent-invaded haystacks or similar places.

The most taxonomically intriguing aspect of the morphology of *C. ocliferius* is a lack of an ambulacrum on the tarsi of legs I. This character has not been described in other *Cornigamasus* species or from other Parasitidae, but is typical for, e.g. Macrochelidae. However, a tendency for reduction of the ambulacrum of the first leg is apparent in *Cornigamasus*, since the ambulacra in *C. lunaris* adults are evidently smaller than in *Cornigamasus* deutonymphs (including *C. ocliferius*) as well as other Parasitidae species. This seems to support a trend in Parasitidae to use the first pair of legs primarily as sensory appendages (HYATT 1980). On the other hand it is surprising that such important and divergent characters as the presence or absence of ambulacrum can occur in closely related species.

#### KEY TO *CORNIGAMASUS* SPECIES

[*Cornigamasus* comprises 8 species: *C. imitans* ATHIAS-HENRIOT, 1980 (deutonymph only), *C. karachiesis* (ANVARULLAH et ALI KHAN, 1969) (female only), *C. lunariformis* ATHIAS-HENRIOT, 1980 (deutonymph only), *C. lunarioides* ATHIAS-HENRIOT, 1980 (deutonymph only), *C. lunaris* (BERLESE, 1882) (deutonymph, female, male), *C. ocliferius* SKORUPSKI et WITALIŃSKI, 1997 (deutonymph, female, male), *C. oulaensis* MA, 1986 (= *C. lunaroides* MA, 1986) (deutonymph, female, male), and *C. quasilinearis* ATHIAS-HENRIOT, 1980 (deutonymph only)]

#### FEMALES:

1. Tarsus I devoid of ambulacrum with claws and pulvilli. Podonotum with 5 and opisthonotum with 2 pairs of stout, club-shaped setae and additional 10 pairs of stout setae extending out of opisthonotum on a flexible cuticle. Endogynium elongated, its width much smaller than distance between bases of paragynial setae, internally directed dents on posterior endogynial margin absent ..... *C. ocliferius* SKORUPSKI et WITALIŃSKI, 1997
- Tarsus I ending with ambulacrum. Endogynium subspherical or elongated ..... 2.
2. All dorsal setae stout and brush-shaped. The anterior margin of sternum wavy, presternal platelets small. Epigynial central prong very narrow and long. Endogynium subspherical, its width is larger than distance between bases of paragynial setae; posterior endogynial margin with triangular elevation located centrally and directed antieriad ..... *C. oulaensis* MA, 1986 (= *C. lunaroides* MA, 1986)
- Podonotum with 4 or 6 pairs of stout setae, the other setae simple ..... 3.



3. Podonotum with 4 pairs and opisthonotum with 3 pairs of enlarged setae. Epigynum with elongated central prong. Endogynium subspherical with width equal or larger than distance between bases of paragynial setae; endogynial posterior margin forms two dents of quite different size ..... *C. lunaris* (BERLESE, 1882)
- Podonotum with 6 pairs and opisthonotum with 2 pairs of enlarged setae; additional 11 pairs of stout setae extending out of opisthonotum on a flexible cuticle; epigynum regularly triangular with sinuous lateral margins; endogynium roughly rectangular and narrow, its width smaller than distance between bases of paragynial setae ..... *C. karachiensis* (ANVARULLAH et ALI KHAN, 1969)

MALES:

1. Tarsus I devoid of ambulacrum with claws and pulvilli. Dorsum with 5 stout setae in front and 4 stout setae behind transversal dorsal suture (including pair at rear body margin). Genu I with a characteristic low protrusion on anterolateral side, femur II with one small conical main spur only .. *C. ocliferius* SKORUPSKI et WITALIŃSKI, 1997
- Tarsus I ending with ambulacrum ..... 2.
2. All dorsal setae stout and brush-shaped. Femur II with large curved main spur and small axillary spur; genu II and tibia II each bear one small spur ..... *C. oulaensis* MA, 1986 (= *C. lunaroides* MA, 1986)
- Dorsum with 5 pairs of stout setae in front and 5 pairs behind transversal dorsal suture (including pair at rear body margin). Femur II with large curved main spur and small axillary spur; genu II and tibia II each bear one small spur ..... *C. lunaris* (BERLESE, 1882)

DEUTONYMPHS:

1. Podonotum bears 18 pairs of setae ..... 2.
- Podonotum bears 19 or 20 pairs of setae, opisthonotum with 12 pairs of setae ..... 6.
2. Opisthonotum with 8 or 9 pairs of setae; mobile digit of chelicera with 5 teeth ..... 3.
- Opisthonotum with 12 pairs of setae; mobile digit of chelicera with 3 teeth ..... 4.
3. Opisthonotum with 8 pairs of setae ..... *C. lunariformis* ATHIAS-HENRIOT, 1980
- Opisthonotum with 9 pairs of setae ..... *C. ocliferius* SKORUPSKI et WITALIŃSKI, 1997
4. Tibia II simple, without convexity on anterolateral margin. Tarsus IV length 160-170 µm ..... *C. quasilunaris* ATHIAS-HENRIOT, 1980
- Tibia II with convexity on anterolateral side ..... 5.
5. Tarsus IV length up to 180 µm ..... *C. lunaris* (BERLESE, 1882)
- Tarsus IV length 215-225 µm ..... *C. lunaroides* ATHIAS-HENRIOT, 1980
6. Podonotum bears 19 pairs of setae ..... *C. imitans* ATHIAS-HENRIOT, 1980
- Podonotum bears 20 pairs of setae ..... *C. oulaensis* MA, 1986 (= *C. lunaroides* MA, 1986)

## MATERIAL EXAMINED

2 females of *C. ocliferius* (slides no. 2410A and 2412) and 2 deutonymphs (slides no. 2413 and 2426) collected on 1st Sept. 2012 in a decaying large haystack on grassland on the Jagiellonian University Campus, Kraków – Ruczaj, southern Poland. GPS coordinates N 50° 1.776'; E 19° 54.183'; alt. ca. 207 m a.s.l.

1 male of *C. ocliferius* (slide no. 2411) collected *ibid.*

1 male of *C. ocliferius* (slide no. 2399) collected on 7th August 2012 in decaying grass close to coniferous forest in Klikuszowa, southern Poland. GPS coordinates N 49° 32.192'; E 19° 58.477'; alt. ca. 780 m a.s.l.

1 female of *C. ocliferius* from the collection of Prof. WIKTOR MICHERDZIŃSKI (deposited in the Zoological Museum of the Jagiellonian University, Kraków, slide no. 71 a-d), collected by E. ROKICKI in October 1961 in Kampinoska Forest near Warsaw, Poland, and mistakenly determined as *Parasitus lunaris* (BERLESE) (MICHERDZIŃSKI 1969).

2 deutonymphs of *C. ocliferius* (slides no. 2395 and 2398) collected on 10th August 2012 in decaying litter and fodder from domestic rabbit culture in Jaszczurowa/Świnna Poręba, southern Poland. GPS coordinates N 49° 47.978'; E 19° 34.325'; alt. ca. 316 m a.s.l.

All material collected by the author in 2012 is in the author's collection.

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