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NOTES ON SPERMATOPHORES IN *CYPHOPHTHALMUS DURICORIUS* JOSEPH (ARACHNIDA: OPILIONES: SIRONIDAE)

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ABSTRACT

The spermatophores in the sironid species Cyphophthalmus duricorius duricorius *(JOSEPH, 1868) are presented. They were found in three females in Slovenia. The spermatophores consist of a bulb-like terminal portion, a tubular, and a basal portion, and are very similar to those in* C. serbicus *(HADŽI, 1973).*

Key words: arachnids, Cyphophthalmi, *Cyphophthalmus duricorius*, Opiliones, Sironidae, spermatophore

ANNOTAZIONI SU SPERMATOFORI DI *CYPHOPHTHALMUS DURICORIUS* JOSEPH (ARACHNIDA: OPILIONES: SIRONIDAE)

SINTESI

L'articolo presenta annotazioni sugli spermatofori di una specie di Sironidi, Cyphophthalmus duricorius duricorius *(JOSEPH, 1868). Gli spermatofori sono stati ritrovati in tre femmine in Slovenia e consistono in una porzione terminale a capsula, una porzione tubulare ed una basale. Sono molto simili a quelli della specie* C. serbicus *(HADŽI, 1973).*

Parole chiave: aracnidi, Cyphophthalmi, *Cyphophthalmus duricorius*, opilionidi, Sironidae, spermatofori

INTRODUCTION

Joseph (1868a) described the species *Cyphophthalmus duricorius* from the Jama pod Predjamskim gradom cave in the Predjama cave system near Postojna, Slovenia. Afterwards he made notice of further localities in the country (Joseph, 1868b, 1881, 1882), citing the species also under "(*Cyphophthalmus*) *Siro duricorius*". This way he showed that his newly described genus *Cyphophthalmus* should be taken under the synonymy of the genus *Siro* LATREILLE, 1796, and this statement was generally accepted, *e.g.* by Hansen & Sørensen (1904), Roewer (1923), Martens (1978). Later on, *Cyphophthalmus duricorius corfuanus* KRATOCHVÍL, 1937 (Kratoctvíl, 1937), *C. d. bythinicus* GRUBER, 1969, and *C. d. yalovensis* GRUBER, 1969 (Gruber, 1969) were described. Recently, the Balkan species were placed in the resurrected genus *Cyphophthalmus* JOSEPH, 1868 (Boyer *et al.*, 2005).

Sperm transfer is indirect in most arachnids, implemented by producing spermatophores or using specially modified palps in spiders (Ruppert & Barnes, 1994). Spermatophores are mostly stalky packages of sperm produced by males and gathered by females. Most harvestmen have a penis and ovipositor, while the role of the male genital organ in Cyphophthalmi has been supposed to take part in spermatophore deposition, therefore named spermatopositor (van der Hammen, 1985). Karaman (2005) noticed the evidence of spermatophores in *C. serbicus* (HADŽI, 1973) and in an undescribed *Cyphophthalmus* species, while Schwendinger & Giribet (2005) noticed the attachment of similar spermatophores to a female gonostome in the stylocellid genus *Stylocellus*, and they are known also in other stylocellids (Giribet, *in lit.*). The spermatophore consists of three parts: a bulb-like terminal portion having an appearance of a perforated compressed ball, a tubular, and a basal portion. The existence of spermatophores has been expected in other *Cyphophthalmus* species. Our scope was to prove the presence of spermatophores in *C. d. duricorius*, which is the type species of the genus, and to make a morphological comparison with those in *C. serbicus* and *Cyphophthalmus* sp.

MATERIAL AND METHODS

During the revision of *C. duricorius* in opilionid collections deposited in the Slovene Museum of Natural History (Ljubljana), about 300 specimens were checked for spermatophores. These were studied using Olympus CH30 microscope, and photographed with the Olympus C 4040 Zoom Digital Camera. The spermatophores were not detached from females and were studied as temporary mounts embedded in glycerol in Bürker-Türk's haemocytometer, illuminated from above. Measurements were taken from photographs considering the measure grid in the haemocytometer photographed at the same magnitude.

RESULTS

In the revised specimens of *C. d. duricorius* from Slovenia, three females with attached spermatophores were recorded (Figs. 1 a-d). In front of the Otoška jama cave near Postojna (UTM code VL37), a female with a spermatophore appeared on May 12th (the determination number TN 46/2004), while in Strmec (UM94), such female was collected on July 10th (TN 907/1998), and in Vitomarci (WM75) on July 3rd (TN 795/2002). The spermatophore is shaped like in *C. serbicus*, and an abundant amorphous mass (Figs. 1a, c), secreted mutually of ovipositor sticky glands (Karaman, 2005), is present. The frontal bulb portion is oval in shape measuring about 250–320 μm (257x314 μm, Fig. 1e); the tube is about 420–450 μm long. The basal part was not studied. In one case, the bulb portion has a short stalk-like protrusion (Fig. 1d), and globular contents are visible.

DISCUSSION

Karaman (2005) noticed that spermatophores are rarely to be found in *Cyphophthalmus*; in over 1000 specimens collected, he found only two females with spermatophores attached. The author of the present paper remembers a few cases of spermatophore removal from females while cleaning them for taxonomical studies. As the spermatophores resemble rather a waste plant material, introduced into the genital opening by accident, than an animal product, they have been very likely overlooked also by other opilionologists. As expected, the spermatophores in *C. d. duricorius* are of similar shape as in *C. serbicus*, but they are slightly bigger. At the moment, there is no reasonable explanation for this. Karaman (2005) exposed that there are more open than answered questions as for mating and sperm transfer in *Cyphophthalmus*. Most relevant data can be provided by direct observation.

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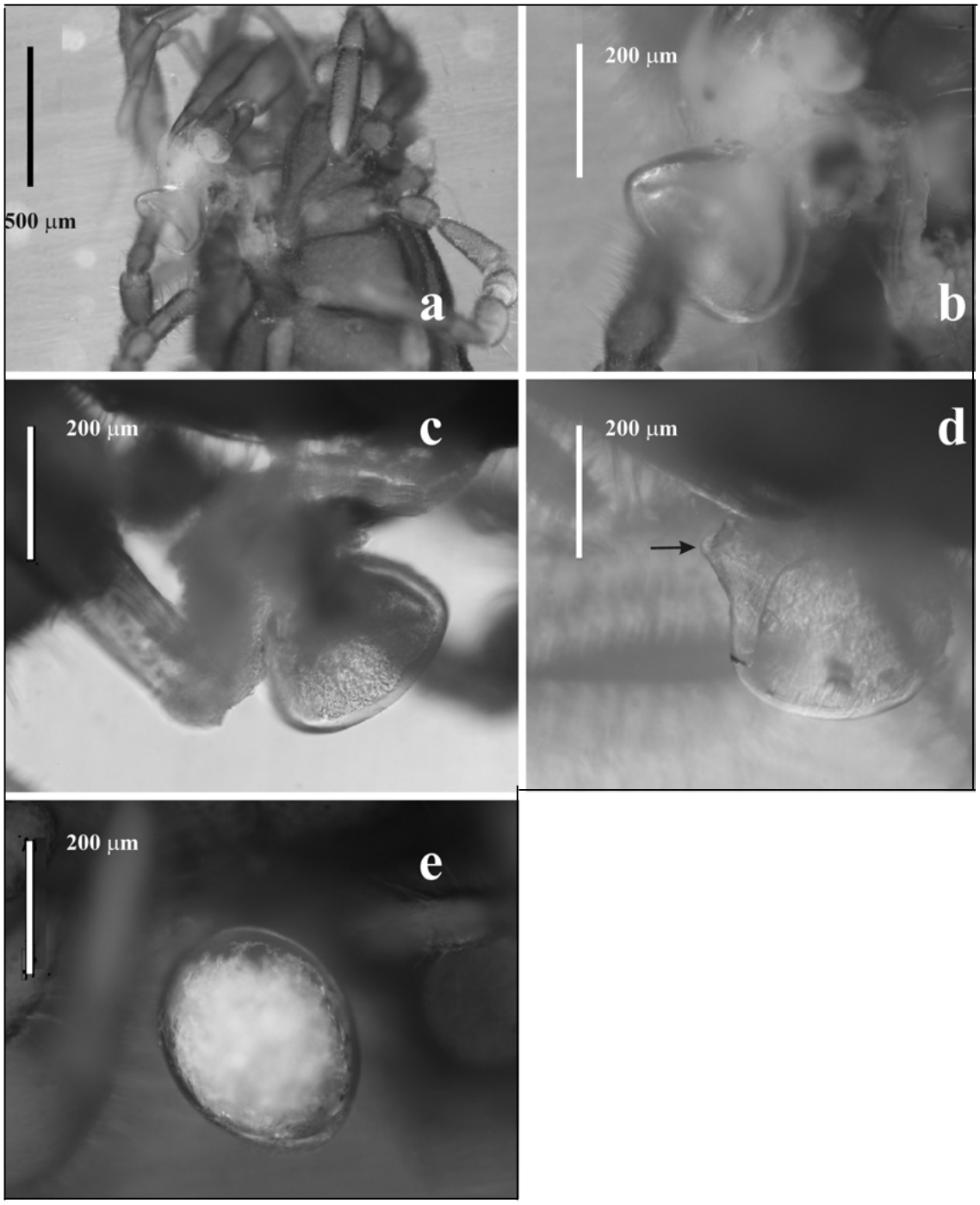

Fig. 1: *Cyphophthalmus duricorius duricorius* ***JOSEPH, 1868. (a) female with a white amorphous sticky mass on chelicerae, and an attached spermatophore; (b) the same female with the amorphous mass and spermatophore enlarged; (c) the side view of the amorphous mass attached to chelicerae, and the spermatophore; (d) cut-off or damaged (?) terminal bulb-like portion of the spermatophore (arrow); (e) terminal portion with the contents of globular appearance, probably encapsulated sperm.***

Sl. 1: *Cyphophthalmus duricorius duricorius* ***JOSEPH, 1968. (a) samica z belo amorfno lepljivo snovjo na helicerah in s pritrjenim spermatoforom; (b) ista samica z amorfno snovjo in spermatoforom pri večji povečavi; (c) pogled od strani na amorfno snov, pritrjeno na helicere, in spermatofor; (d) odrezan ali poškodovan (?) končni, zaobljeni del spermatofora (puščica); (e) končni, zaobljeni del spermatofora s kroglasto (globularno) vsebino, verjetno paketki sperme.***

SPERMATOFORI PRI *CYPHOPHTHALMUS DURICORIUS* JOSEPH (ARACHNIDA: OPILIONES: SIRONIDAE)

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POVZETEK

Avtor je med revizijo družine Sironidae v Sloveniji našel na treh samicah vrste Cyphophthalmus duricorius *JOSEPH, 1868, ki je tipska vrsta rodu, pritrjene spermatofore. Sestojijo iz treh delov: končnega zaobljenega dela, podobnega preluknjani stisnjeni žogi, cevastega ter osnovnega dela. Ovalni končni del meri okrog 250–320 µm v premeru, cevasti del je okrog 420–450 µm dolg, medtem ko osnovni del ni bil izmerjen, ker spermatofori niso bili odstranjeni s samic. Spermatofori* C. duricorius *duricorius so zelo podobni tistim pri* C. serbicus *HADŽI, 1973, ki so prvi opisani spermatofori med Cyphophthalmi.*

Ključne besede: Cyphophthalmi, *Cyphophthalmus duricorius*, Opiliones, pajkovci, Sironidae, spermatofor

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