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Source: Revue suisse de Zoologie, 129(1) : 221-227

Published By: Muséum d'histoire naturelle, Genève

URL: https://doi.org/10.35929/RSZ.0072

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Revue suisse de Zoologie (March 2022) 129(1): 221-227 ISSN 0035-418

The description of a new species of *Anarthrotarsus* Šilhavý from Greece and a discussion about the genus (Arachnida: Opiliones: Trogulidae)

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Abstract: *Anarthrotarsus trichasi* sp. nov., a second species of the genus *Anarthrotarsus* Šilhavý, 1967 is described based on fresh material from the northeastern part of the island of Crete, Greece. The male holotype of the type species of the genus *Anarthrotarsus* was discovered on the island of Corfu, Ionian Islands, Greece, but no other conspecific specimens were found there ever since. This also holds true for the population from Crete, from where a female paratype was collected. Genital morphology of male specimens from both populations markedly differs, and that of the holotype from Corfu is even unique among Trogulidae. Though the tarsal formula (1-1-1-1 in the four walking legs) is identical in both populations, penis morphology, the main generic character of *Anarthrotarsus*, clearly separates them. A close relationship of *A. trichasi* sp. nov. with species of the genus *Calathocratus* Simon, 1879 is supposed but awaits molecular genetic affirmation.

Keywords: Generic systematics - genital morphology - relationships - cryptic species - Crete - Corfu.

INTRODUCTION

The family Trogulidae has a paleo-Mediterranean distribution and occurs all over this region from northern Africa and the Iberian Peninsula eastwards to the Near East, i.e. to the Caucasus countries (Šilhavý, 1966; Staręga, 1966) and Turkey (Gruber, 1968; Schönhofer *et al*., 2013), and northwards to the Alps and central Europe (Martens, 1978). Eastwards the species' diversity fades out in the Iranian Alborz Mts (Snegovaya *et al*., 2021), Kyrgystan (Tchemeris, 2013) and Tajikistan (specimens in CJM) where only isolated species from widely separated localities are present. To date the family comprises five genera and 56 species (Schönhofer, 2013). Three genera include the majority of species, especially *Trogulus* Latreille, 1802 (32 species), *Anelasmocephalus* Simon, 1879 (13 spp.) and *Calathocratus* Simon, 1879 (9 spp.). For Greece ten trogulid species (Chatzaki, 2020) have been determined, but due to the puzzling homogeneity of external and partly genitalic characters, species delimitation is often difficult to establish, sometimes it is simply impossible. Modern molecular genetic analyses proved the diversity of species to be much larger than formerly believed. In recent years, ten species of *Trogulus* new to science were identified in various Mediterranean countries and were described; several more await disentanglement and formal description (Schönhofer & Martens, 2008, 2009; Schönhofer *et al*., 2013). On the other hand, the genera *Platybessobius* Roewer, 1940 and *Trogulocratus* Roewer, 1940 were synonymized with genus *Calathocratus*, again on the basis of a genetic analysis (Schönhofer & Martens, 2010). This taxonomic act was particularly striking as these three nominal genera were clearly separated by distinct tarsal formulas, i.e. the number of tarsal articles on the walking legs I-IV. Tarsal formulas are believed to clearly characterize and define the genus *Trogulus* and the closely related (and allopatric) species within various species groups in *Anelasmocephalus*. The newly circumscribed genus *Calathocratus* now comprises species with different tarsal formulas, and a close relationship among them is clearly shown by molecular data (Schönhofer & Martens, 2010). Also, in *Calathocratus,* the hidden diversity is enormous. Schönhofer & Martens (2010) identified nine more or less widely separated *Calathocratus* clades from Italy to Turkey and the Caucasus, of which

Manuscript accepted 18.01.2022
DOI: 10.35929/RSZ.0072

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at least the majority merits species rank. Most of them are still undescribed due to the difficulty to elucidate morphological distinctions, which are important for species identification beyond genetics.

Anarthrotarsus is an enigmatic trogulid genus from Greece. It was erected by Šilhavý (1967) based on a male specimen from Corfu, the holotype, and a female from eastern Crete. No further specimens were collected ever since, therefore a genital morphological comparison of specimens from these widely separated populations was not possible. The drawings of Šilhavý (1967) already indicated that the penis morphology of the type species, *A. martensi* Šilhavý, 1967, is quite peculiar and very distinct from any other trogulid species. Schönhofer & Martens (2010) were unable to incorporate *Anarthrotarsus* in an extensive phylogenetic study about trogulids based on molecular genetics due to the lack of fresh material. Recently, new material of both sexes of the Cretan population became available to us, and it is now evident that the holotype and paratype of *A. martensi* do not belong to the same species. Therefore, the population from Crete deserves a new status and name, which we give here.

MATERIAL AND METHODS

The examined material originated from the Opiliones collection of the Natural History Museum of Crete and was obtained during NHMC expeditions in eastern Crete in October to December of 1997 and January to March of 2008. The sampling method was pitfall trapping, as described in Salata *et al*. (2020).

Original line drawings were produced using a camera lucida attached to a Carl Zeiss research microscope. The photographs (Figs 1-2) were taken with a Canon 5D with a MP-E 65 mm f/2.8 1-5x Macrolens. Measurements were taken by means of a micrometer disc attached to a Leica M165C stereomicroscope. All measurements are given in mm.

The distribution map was created with the software QGIS 3.16.

Abbreviations of morphological terms

Cl	claw
Cx	coxa
FC	field code (sample number)
Fe	femur
L	leg
Mt	metatarsus
Pt	patella
Ta	tarsus
Ti	tibia
Tu oc	tuber oculorum, ocularium
Tr	trochanter

Museum acronyms

CJM	Private collection of J. Martens, Mainz, Germany, to be transferred to the SMF
MHNG	Muséum d'histoire naturelle de Genève, Switzerland
NHMC	Natural History Museum of Crete, University of Crete, Heraklion, Greece
SMF	Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt am Main, Germany

TAXONOMIC PART

Suborder Dyspnoi Hansen & Sørensen, 1904
Family Trogulidae Sundevall, 1833
Genus *Anarthrotarsus* Šilhavý, 1967

Type species: *Anarthrotarsus martensi* Šilhavý, 1967 by monotypy and original designation.

Species included: *Anarthrotarsus martensi* and *A. trichasi* sp. nov.

Anarthrotarsus trichasi sp. nov.

Figs 1-15

Anarthrotarsus martensi Šilhavý, 1967: 176 (in part, only female paratype).

Holotype: NHMC 81.5.619.1; male; GREECE, Crete, Lasithi, 2 km behind Moni Toplou, on the way to Vai, 35.2365°N 26.2273°E, 170 m alt.; 11.8.-14.12.1997; leg., I. Stathi (sample FC 619).

Paratypes: CJM 8994; 4 males, 1 female; collected together with the holotype. – CJM 8995; 2 males, 2 females; GREECE, Crete, Lasithi, Pacheia Ammos, 500 m east of village, 35.1094°N 25.8183°E, 20 m alt; 20.1.-16.3.2008; leg. D. Kaltsas (sample FC 9257). – NHMC 81.5.619.2; 1 male; same data as for the holotype. – MHNG; 1 male; same data as for the holotype. – SMF 19699; 1 female (paratype of *Anarthrotarsus martensi*); Siteia Bay [= Bucht von Sitia]; 11.3.1966; leg. H. Pieper.

Comparative material: SMF RII/7450; male holotype of *Anarthrotarsus martensi.* – CJM 5730; 1 specimen of *Calathocratus beieri* Gruber, 1968; TURKEY, Adana, Kozan-Feke; 25.4.2007; leg. Brachat & H. Meybohm. – CJM 7134; 1 specimen of *Calathocratus rhodiensis* (Gruber, 1963); GREECE, Rhodos, Profitis Ilias; 3.4.2012; leg. H. Meybohm. – CJM 1719; 3 specimens of *Calathocratus* sp.; MOROCCO, Tafoughalt; 30.9.2010; H. Wijnhoven. – CJM 5665; 1 specimen of *Calathocratus africanus* (Lucas, 1849); ITALY, Sicily, Piazza Armerina; 1.5.2009; H. Wijnhoven. – CJM 3039; 19 specimens of *Calathocratus kyrghyzicus* (Tchemeris, 2013); KYRGYSTAN, Sary-Celek Nature Reserve; 29./30.5.1993; leg. J. Martens. – CJM 3453;

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Figs 1-2. *Anarthrotarsus trichasi* sp. nov. (1) Body in dorsal view. (2) Legs III and IV in prolateral view. Scales: 1.0 mm. Photographs by A. Trichas.

1 specimen of *Calathocratus* sp.; IRAN, Masanderan; 31.5.1978; leg. J. Martens. – CJM 2464; 1 specimen of *Calathocratus* sp.; ISRAEL, Hazafon, Lower Galilee; 9.2.1987; leg. W. Schawaller & H. Schmalfuß. – CJM 6586; 3 specimens of *Calathocratus* sp.; TAJIKISTAN, Sary-Khosor State Reserve; 28.4.1990; leg. S. Dashdamirov.

Diagnosis: A small (4.1-4.4 body length) and slender (1.3-1.5 body width) species with thin and delicate legs (more so than in *A. martensi*); short and stout pedipalps; penis parallel-sided (ventral/dorsal views), with elongate glans sparsely covered with bifid setae.

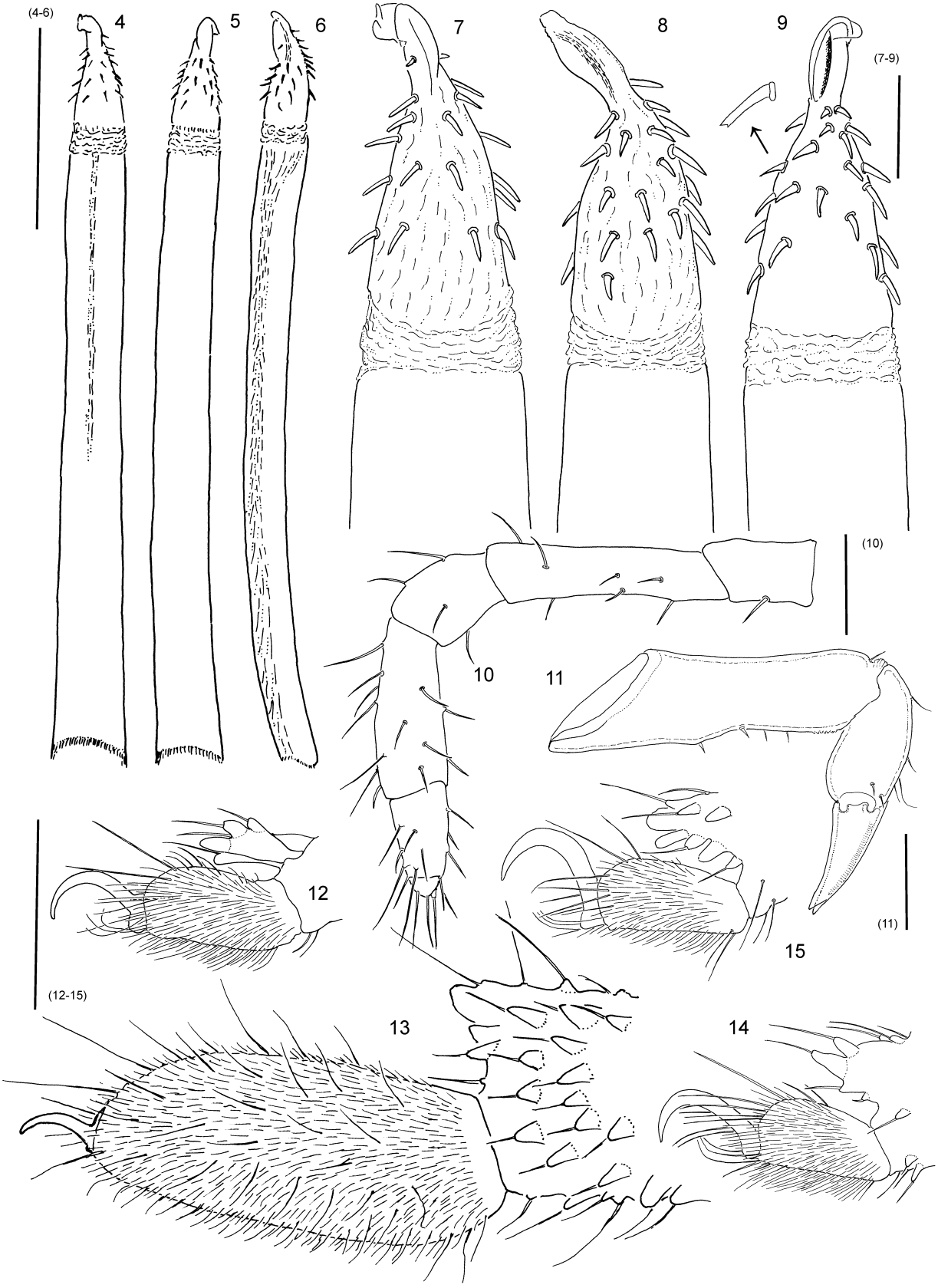
Name: The species epithet is a name (in the genitive case) in honour of Dr Apostolos Trichas, coleopterologist and curator of Arthropoda at the Natural History Museum of Crete, Greece.

Description: MALE (paratype CJM 8995). *Body, dorsal side* (Fig. 1)*:* Colour varying from yellowish brown to hazel-brown partly due to slight incrustations from the ochre-coloured soil at the collecting localities; body small and slender; increased density of circular, hemispherical papillae extending from eye mound to remainder of body; small and narrow head cup (approximately 0.5 in diameter) in comparison with total body length, with a downward slope and with poorly developed Tu oc (approximately 0.8 in diameter); eye interdistance short (0.29).
Body, ventral side: Increased papillation and the same proportion as on the dorsal side.



Fig. 3. *Anarthrotarsus trichasi* sp. nov.; localities on the island of Crete: 1 - Pacheia Ammos; 2 - Siteia Bay; 3 - Moni Toplou. White line indicates eastern border of the Dikti Mountain Range.

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Figs 4-15. *Anarthrotarsus trichasi* sp. nov., male paratype CJM 8995. (4-6) Penis in ventral, dorsal and lateral view, respectively. (7-9) Glans penis in ventral (7), lateral (8) and dorsal view (9; arrow pointing to enlarged illustration of bifid seta). (10) Right pedipalp in pro-lateral view. (11) Right chelicera in retro-lateral view. (12-15) Tarsi with claw in pro-lateral view: leg I (12), leg II (13), leg III (14), leg IV (15). Scales: 0.3 mm (4-6), 0.05 mm (7-9), 0.1 mm (10), 0.2 mm (11-15).

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Chelicera (Fig. 11): First article small (0.68 long) and slender, tapering from base to distal end, with a slight enlargement on ventral side; 2nd and 3rd article slender (0.25 and 0.31 long, respectively) as well, their setation sparse, longest setae on 2nd article on frontal side; size and proportion of chelicerae typical for small species of trogulids.
Pedipalp (Fig. 10): Short (0.88) and stout; Pt slightly enlarged in distal part; less obviously so in Ti; Ta cone-shaped, its distal part with a slight pseudo-articulation. Elongated setae more dense on Ti and Ta than on other articles.
Legs (Figs 2, 12-15): With increasing papillation and setation, especially on metatarsi and tarsi; apophyses on disto-dorsal surface of metatarsi most elongated in legs III and IV; tarsal articles of various sizes, longest in leg II; claws more or less distinctly hook-shaped, claw on leg I very robust and almost as large as tarsal article; smooth setae on all tarsi, including single long setae dorsally and distally. Several fine setae beneath the claw on tarsi I-III inflected upward in their distal part.
Genital morphology (Figs 4-9): Penis relatively short and slender; truncus nearly parallel-sided (in dorsal and ventral views), slightly tapering towards distal end in lateral view; glans slender, tapering towards stylus, sparsely covered with relatively short and stout setae, slightly forked at tip (see detail in Fig. 9); stylus slightly bent sidewards (in dorsal and ventral views).
FEMALE. General somatic morphology as in males, body dimensions slightly larger.

Measurements: Body length of males 4.1-4.4 (n=7) (average length 4.2), of female 4.68 (n=1). Penis length 0.98-1.11 (n=7) (average length 1.1). Measurements of legs and pedipalps see Table 1.

Variation: The specimens of *A. trichasi* sp. nov. examined do not appear to vary markedly in their somatic features. The male genitalia show very little variability in glans proportions as well as in the density of the setae cover.

Relationships: See Discussion.

Distribution and habitat preferences: The species is only known from three localities in the eastern part of the island of Crete (Lasithi Province), from near the coast to about 170 m altitude (Fig. 3). The female paratype of *A. martensi* from the Bay of Siteia, which we attribute to *A. trichasi* sp. nov. and designate it as a paratype of the latter, is within this altitudinal and geographic range. These three sites are characterized by dry vegetation such as groves of juniper (*Juniperus phoenicea* L.) and phrygana with hard-leaved and cushion plants like, e.g., the prickly burnet *Sarcopoterium spinosum* (L.) Spach.

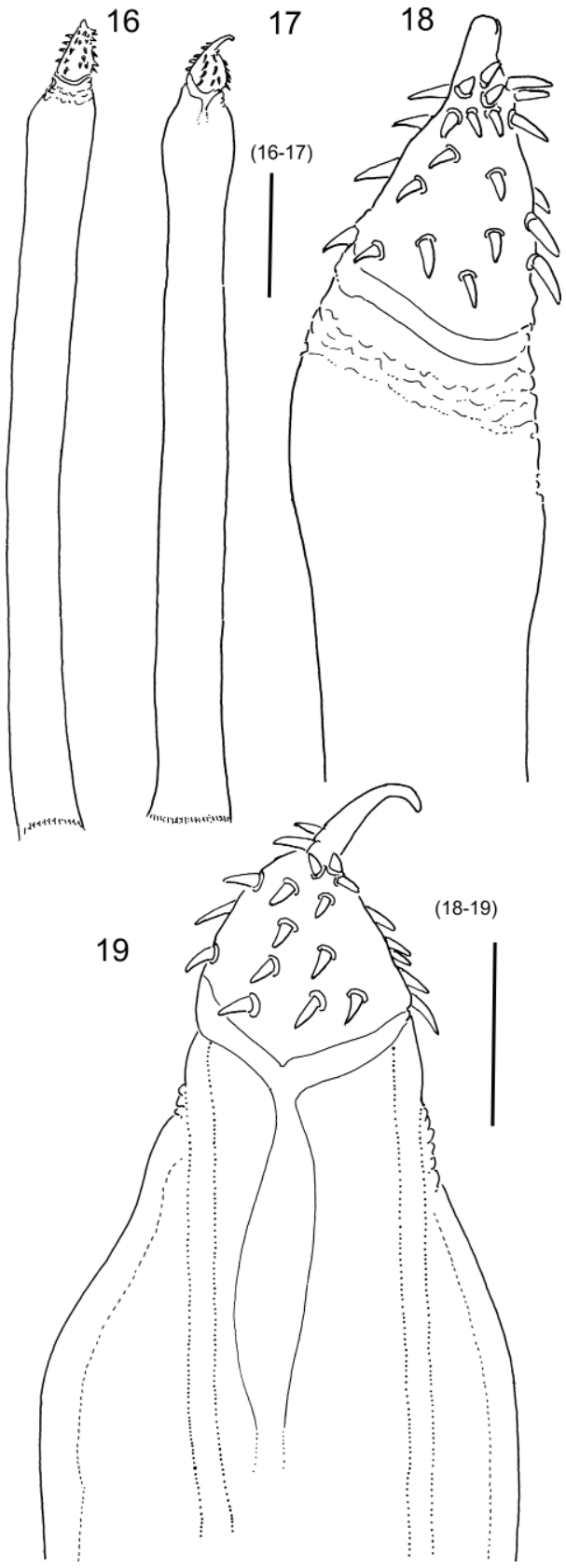
DISCUSSION

Single references to trogulids in Greece date back to Roewer (1940, 1950) but the species there have never been studied in any detail. Schönhofer (2013) mentions seven species, a relatively small number for a Mediterranean country, Chatzaki (2020) ten species. Species of *Trogulus* occur over large parts of the country including the Aegean Islands, all are presently attributed to one or two species names. A large amount of cryptic species is assumed to be present, but details are unavailable at present. The situation of the Cretan trogulid fauna is somewhat complicated though only few species are concerned. Roewer (1940) described *Calathocratus intermedius* (Roewer, 1940) and *C. singularis* (Roewer, 1940), all from the western part of the island. The collecting circumstances of these records are somewhat doubtful (see Helversen & Martens, 1972) and have never been clarified. A molecular genetic study identified two closely related but clearly separated populations of *C. singularis* within Crete and another one from the Peloponnese (Schönhofer & Martens, 2010); their taxonomic status is unclear. The latter authors also mention a *Trogulus* locality on Crete, Deliana, of unclear species affiliation ("*T.* aff. *gypseus*").

Table 1. Measurements of pedipalp and legs of male (paratype CJM 8995) and female (in parentheses, paratype CJM 8994) of *A. trichasi* sp. nov.

	Tr	Fe	Pt	Ti	Mt	Ta	Cl	Total
Pedipalp	0.11 (0.10)	0.28 (0.25)	0.12 (0.10)	0.21 (0.20)	-	0.16 (0.15)	-	0.88 (0.80)
L I	0.35 (0.32)	0.75 (0.71)	0.41 (0.40)	0.50 (0.46)	0.49 (0.50)	0.13 (0.10)	0.11 (0.11)	2.74 (2.60)
L II	0.41 (0.44)	1.40 (1.40)	0.55 (0.54)	0.96 (0.95)	1.10 (1.08)	0.43 (0.40)	0.06 (0.07)	4.91 (4.88)
L III	0.34 (0.33)	0.84 (0.85)	0.42 (0.44)	0.78 (0.70)	0.74 (0.70)	0.19 (0.15)	0.10 (0.10)	3.41 (3.37)
L IV	0.54 (0.52)	1.30 (1.25)	0.58 (0.55)	0.97 (0.92)	0.99 (0.95)	0.21 (0.20)	0.13 (0.14)	4.72 (4.43)

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Figs 16-19. *Anarthrotarsus martensi,* male holotype. (16-17) Penis in dorsal (16) and ventral view (17). (18-19) Glans in dorsal (18) and ventral view (19). Scales: 0.3 mm (16-17), 0.05 mm (18-19).

Among all these uncertainties, there is the single female specimen of *Anarthrotarsus martensi*, published already in 1967 (Šilhavý, 1967), the only record for this species until recently. Now males are available for study, and male genital morphology of specimens from both populations turn out to be remarkably different, and their status as separate species is evident. The male type specimen (allegedly) of *A. martensi* from Corfu is considerably smaller (3.95 body length) than males of *A. trichasi* (4.1-4.4 body length) and has a subdistally notably enlarged truncus (Figs 16-19), as well as a short glans covered by a loose array of short and stout setae. In contrast, the also distally parallel-sided penis of *A. trichasi* sp. nov. and its longish glans with only scattered bifid setae differ markedly. The distinct differences between the Corfu and Crete population raise the question whether both populations can at all be associated to the same genus. This is at least doubtful. The molecular genetic analysis of Schönhofer & Martens (2010) did not include either population, and the question remains open. A close relationship of *A. trichasi* sp. nov. with populations of *Calathocratus* is possible because of a strong similarity in their genital morphology. But the latter genus, with a distribution from northern Africa to Italy, the Balkans and Turkey and further east, is heterogeneous in itself and requires a detailed molecular and morphological study. For the time being we associate both species in question to *Anarthrotarsus* and expect clarification of the situation from a comprehensive molecular genetic study. As for the zoogeographical point of view, *A. trichasi* is recorded from three distant localities in Lasithi Province. All of these records are from the easternmost part of the island, without the Dikti Mts intervening and all east of this mountain range, which indicates an important role of these mountains as a biogeographical barrier between the east and the west of the island. Moreover, since the areas surrounding the *A. trichasi* localities are also covered with dry open shrublands, the distribution of this species may be more extensive than it is reported here. However, although information is still limited, we consider *A. trichasi* sp. nov. to be a small-scale endemic species of the eastern-most part of Crete.

ACKNOWLEDGEMENTS

This work was conducted within the framework of the Erasmus Mobility Programme. We would like to thank Dr Peter Jäger and Julia Altman for their kind hospitality towards P.K. during his Erasmus internship in the Arachnology section of the SMF. Sincere thanks also go to Lioumpitsa Kardaki, technical assistant, and to Dr Apostolos Trichas, curator of Arthropods in the NHMC, for providing the material examined and for their help with photographing the specimen. Dr Peter Schwendinger (MHNG) carefully edited the manuscript; many thanks go to him and to Dr Plamen Mitov (Sofia

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University, Bulgaria) for additional helpful remarks. Last but not least J.M. heartily thanks his friend Harald Pieper who, in the course of his extensive journeys to the Greek islands, collected the first female of what is now *A. trichasi* sp. nov. in 1966.

REFERENCES

Chatzaki M. 2020. The Harvestmen. *In*: Pafilis P. (ed). The Fauna of Greece. Biology and Management of Wild Fauna. *Broken Hill Publishers Ltd., Nicosia, Cyprus*, 1109 pp. [in Greek]

Gruber J. 1963. Ergebnisse der von Dr. O. Paget und Dr. E. Kritscher auf Rhodos durchgeführten zoologischen Exkursionen. VII. Scorpiones und Opiliones. *Annalen des Naturhistorischen Museums Wien* 66: 307-316.

Gruber J. 1968. Ergebnisse zoologischer Sammelreisen in der Türkei: *Calathocratus beieri*, ein neuer Trogulide aus Anatolien (Opiliones, Arachnida). *Annalen des Naturhistorischen Museums Wien* 72: 435-441.

Hansen H.J., Sørensen W. 1904. On two orders of Arachnida. Opiliones, especially the suborder Cyphophthalmi, and Ricinulei, namely the family Cryptostemmatoidae. *Cambridge University Press*, 178 pp.

Helversen O. von, Martens J. 1972. Unrichtige Fundort-Angaben in der Arachniden-Sammlung Roewer. *Senckenbergiana biologica* 53: 109-123.

Latreille P.A. 1802. Famille troisième. Phalangiens (pp. 314-329). *In*: Latreille P.A., Sonnini C.S. (eds). Histoire naturelle, générale et particulière des crustacés et des insectes. Volume 3. *F. Dufart, Paris*, 467 pp.

Lucas P.H. 1849. Crustacés, arachnides, myriopodes et hexapodes. *Exploration scientifique de l'Algérie, pendant les années 1840, 1841, 1842, publiée par ordre du gouvernement et avec le concours d'une commission académique; série IV: sciences physiques-Zoologie; sous-série II; histoire naturelle des animaux articulés* 1: 1-403.

Martens J. 1978. Spinnentiere, Arachnida; Weberknechte, Opiliones. *Die Tierwelt Deutschlands* 64: 1-464.

Roewer C.F. 1940. Neue Assamiidae and Trogulidae. Weitere Weberknechte X. *Veröffentlichungen aus dem Deutschen Kolonial- und Übersee-Museum in Bremen* 3: 1-32.

Roewer C.F. 1950. Neue Assamiidae and Trogulidae. Weitere Weberknechte XV. *Senckenbergiana* 31: 11-56.

Salata S., Kalarus K., Borowiec L., Trichas A., Kujawa K. 2020. How estimated ant diversity is biased by the sampling method? A case study of Crete: a Mediterranean biodiversity hotspot. *Biodiversity and Conservation* 29(9-10): 3031-3050.

Schönhofer A.L 2013. A taxonomic catalogue of the Dyspnoi Hansen and Sørensen, 1904 (Arachnida: Opiliones). *Zootaxa* 3679: 1-68.

Schönhofer A.L., Martens J. 2008. Revision of the genus *Trogulus* Latreille: the *Trogulus coriziformis* species-group (Opiliones: Trogulidae). *Invertebrate Systematics* 22: 523-554.

Schönhofer A.L., Martens J. 2009. Revision of the genus *Trogulus* Latreille. The *Trogulus hirtus* species-group (Opiliones: Trogulidae). *Contribution to Natural History (Bern)* 12: 1207-1251.

Schönhofer A.L., Martens J. 2010. Hidden Mediterranean diversity: Assessing species taxa by molecular phylogeny within the opilionid family Trogulidae (Arachnida, Opiliones). *Molecular Phylogenetics and Evolution* 54: 59-75.

Schönhofer A.L., Karaman I.M., Martens J. 2013. Revision of the genus *Trogulus* Latreille: the morphologically divergent *Trogulus torosus* species-group of the Balkan Peninsula (Opiliones: Dyspnoi: Trogulidae). *Zoological Journal of the Linnean Society* 167: 360-388.

Šilhavý V. 1966. Neue Troguliden aus dem Kuban-Gebiet und dem Kaukasus (Arach., Opiliones). *Senckenbergiana biologica* 47: 151-154.

Šilhavý V. 1967. *Anarthrotarsus martensi*, ein neuer Weberknecht aus Griechenland (Arach., Opiliones). *Senckenbergiana biologica* 48: 175-178.

Simon E. 1879. Les ordres des Chernetes, Scorpiones et Opiliones. *Les Arachnides de France* 7: 1-332.

Snegovaya N.Yu., Cokendolpher J.C., Zamani A. 2021. Further studies on harvestmen (Arachnida: Opiliones) from Iran, with the descriptions of two new species. *Zootaxa* 4984: 73-86.

Staręga W. 1966. Beitrag zur Kenntnis der Weberknecht-Fauna (Opiliones) der Kaukasusländer. *Annales Zoologici* 23: 387-411.

Sundevall C.J. 1833. Conspectus Arachnidum. *C.F. Berling, Londini Gothorum [= Lund]*, 39 pp.

Tchemeris A.N. 2013. Two new harvestman species (Arachnida: Opiliones) from the collection of the Siberian Zoological Museum. *Arthropoda Selecta* 22: 41-46.

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