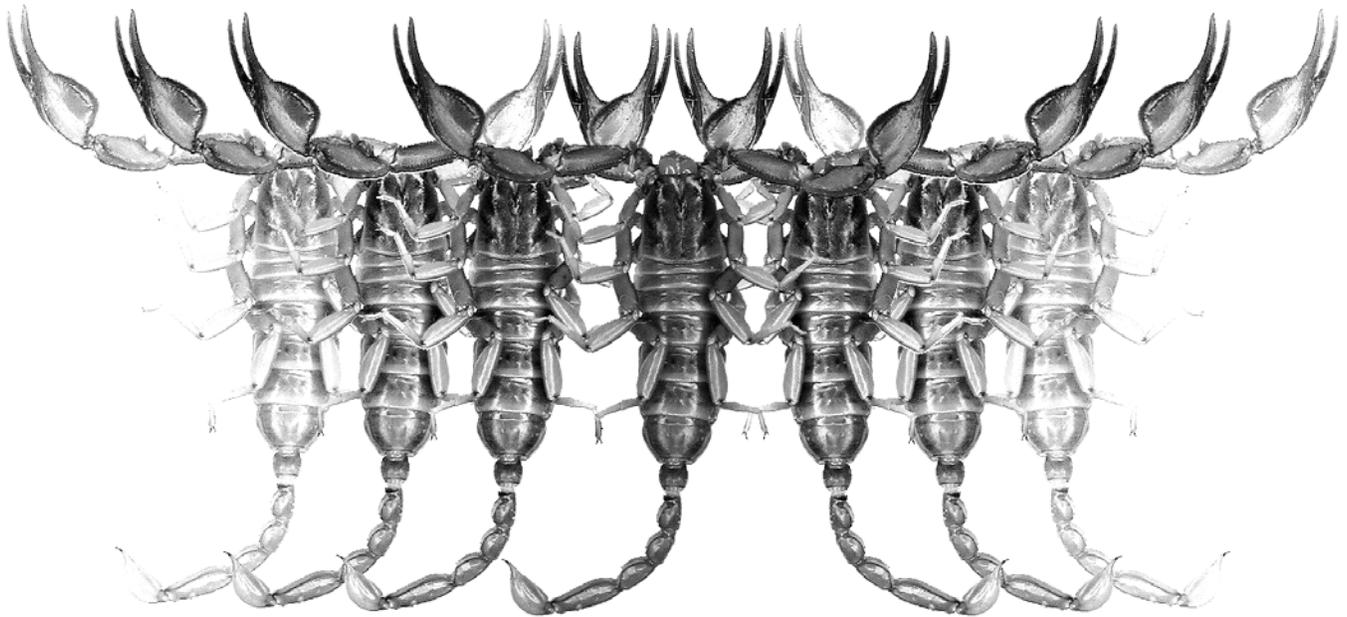


Euscorpium

Occasional Publications in Scorpiology



**A Seven-Legged Scorpion: the First Teratological
Leg Absence Found in *Scorpio maurus fuscus*
(Scorpiones: Scorpionidae)**

David David

December 2012 – No. 151

Euscorpius

Occasional Publications in Scorpiology

EDITOR: Victor Fet, Marshall University, ‘fet@marshall.edu’

ASSOCIATE EDITOR: Michael E. Soleglad, ‘soleglad@la.znet.com’

Euscorpius is the first research publication completely devoted to scorpions (Arachnida: Scorpiones). *Euscorpius* takes advantage of the rapidly evolving medium of quick online publication, at the same time maintaining high research standards for the burgeoning field of scorpion science (scorpiology). *Euscorpius* is an expedient and viable medium for the publication of serious papers in scorpiology, including (but not limited to): systematics, evolution, ecology, biogeography, and general biology of scorpions. Review papers, descriptions of new taxa, faunistic surveys, lists of museum collections, and book reviews are welcome.

Derivatio Nominis

The name *Euscorpius* Thorell, 1876 refers to the most common genus of scorpions in the Mediterranean region and southern Europe (family Euscorpiidae).

Euscorpius is located on Website ‘<http://www.science.marshall.edu/fet/euscorpius/>’ at Marshall University, Huntington, WV 25755-2510, USA.

The International Code of Zoological Nomenclature (ICZN, 4th Edition, 1999) does not accept online texts as published work (Article 9.8); however, it accepts CD-ROM publications (Article 8). *Euscorpius* is produced in two *identical* versions: online (ISSN 1536-9307) and CD-ROM (ISSN 1536-9293). Only copies distributed on a CD-ROM from *Euscorpius* are considered published work in compliance with the ICZN, i.e. for the purposes of new names and new nomenclatural acts. All *Euscorpius* publications are distributed on a CD-ROM medium to the following museums/libraries:

- **ZR**, Zoological Record, York, UK
- **LC**, Library of Congress, Washington, DC, USA
- **USNM**, United States National Museum of Natural History (Smithsonian Institution), Washington, DC, USA
- **AMNH**, American Museum of Natural History, New York, USA
- **CAS**, California Academy of Sciences, San Francisco, USA
- **FMNH**, Field Museum of Natural History, Chicago, USA
- **MCZ**, Museum of Comparative Zoology, Cambridge, Massachusetts, USA
- **MNHN**, Museum National d’Histoire Naturelle, Paris, France
- **NMW**, Naturhistorisches Museum Wien, Vienna, Austria
- **BMNH**, British Museum of Natural History, London, England, UK
- **MZUC**, Museo Zoologico “La Specola” dell’Universita de Firenze, Florence, Italy
- **ZISP**, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia
- **WAM**, Western Australian Museum, Perth, Australia
- **NTNU**, Norwegian University of Science and Technology, Trondheim, Norway
- **OUMNH**, Oxford University Museum of Natural History, Oxford, UK
- **NEV**, Library Netherlands Entomological Society, Amsterdam, Netherlands

Publication date: 22 December 2012

A seven-legged scorpion: the first teratological leg absence found in *Scorpio maurus fuscus* (Scorpiones: Scorpionidae)

David David

Ramat-Gan, Israel; email: davidavid6@walla.com

Summary

A teratological leg absence anomaly is reported and discussed in a *Scorpio maurus fuscus* (Scorpionidae) specimen from Israel. In this scorpion, the third right leg is completely missing, and the fourth right leg has a deformed coxa, which abuts the entire lateral edge of the sternum. The area anterior to the sternum is visibly curved to the right. This is the first leg absence anomaly reported in scorpions.

Introduction

Various teratological anomalies in scorpions have been reported, usually related to body parts duplication and malformation. Recently, Teruel (2003) summarized cases including numerous pedipalp anomalies as well those of tergites and chelicera. Mattoni (2005) listed duplication of metasoma, tergite division or fusion, leg malformation, pedipalp chela compression, and pedipalp fusion. In some cases there is doubt whether anomalies are authentic or are due to regeneration. Duplications of metasoma are known from families Buthidae and Euscorpidae (Vachon, 1952; Sissom & Shelley, 1995). Some anomalies from Israel were previously documented such as *Leiurus quinquestriatus* (Buthidae) with two stings (Shulov & Amitai, 1955).

Very few anomaly cases of scorpion legs have been reported, referring to segment malformation and fusion: for instance, Armas (1977) reported malformation cases of leg segments from species of family Buthidae. However, nothing has been published on complete teratological absence of legs in scorpions. To my knowledge, the case reported here is the first such finding.

Materials and Methods

Examined material: *Scorpio maurus fuscus* (Ehrenberg, 1829) (Scorpionidae), Elqana, HaSharon area, Israel, 32.11°N, 35.0343°E, 1 May 2006, leg. D. David, 1 female. The specimen was collected during day search by stone-turning and burrow-digging. Among other specimens found was a female with a leg anomaly. The specimen is preserved in 70% alcohol and deposited in the author's private collection.

This specimen was kept in captivity for about six months. During this period, the seven-legged scorpion

showed no difficulties or abnormalities while walking, digging, or preying. Its *fourth* left leg segments (missing below fourth left coxa, Figs. 1 and 3) were broken off and lost after the specimen was preserved.

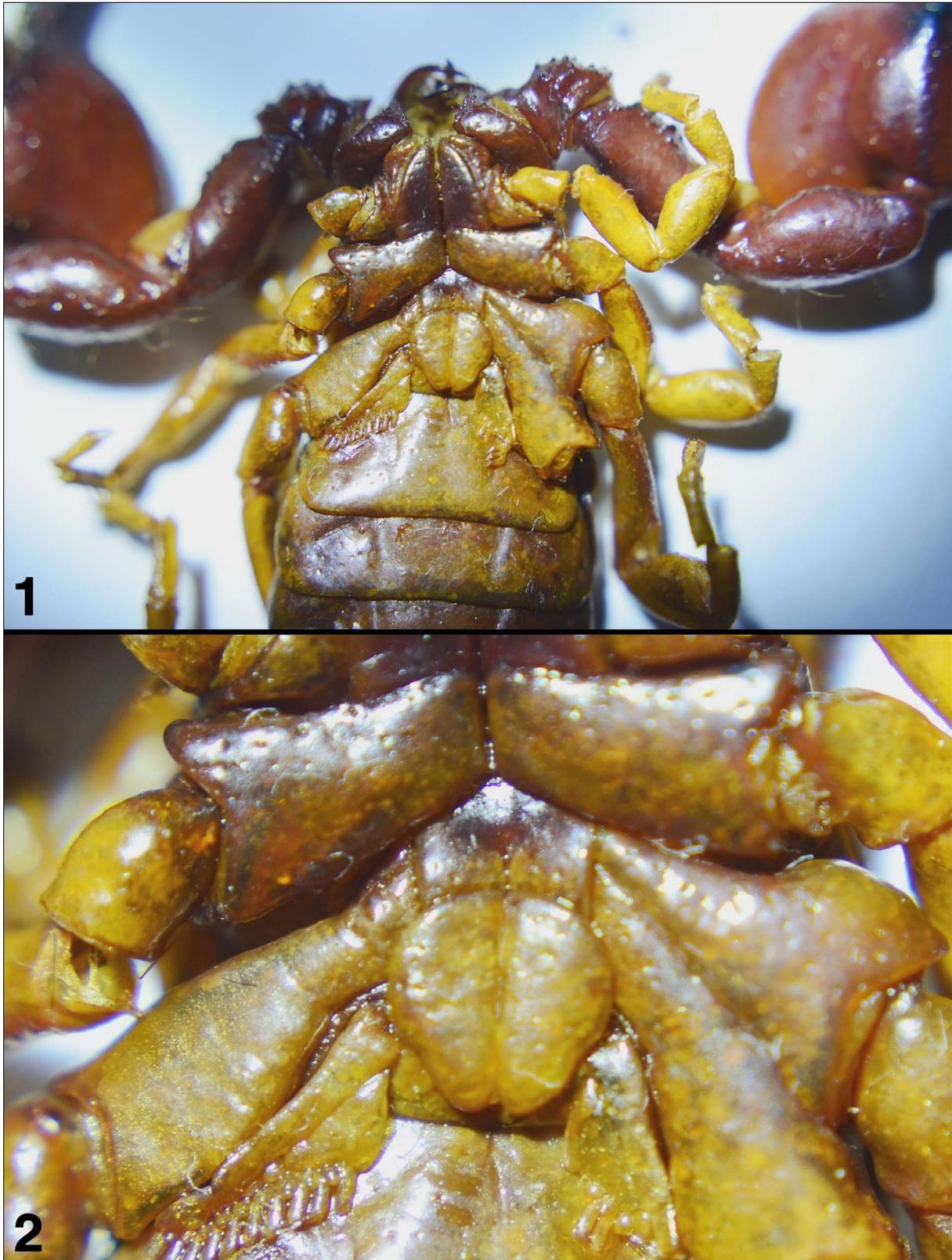
Results

During examination of the collected specimens, a female specimen with a leg anomaly had been detected. In this specimen, *one of the right legs is completely absent*, which appears to be the third leg. The fourth leg (judging from its coxa size and shape) is present but has a malformed coxa, which completely abuts the entire right lateral side of the sternum. The area anterior of the sternum (including its apex) it visibly curved to the right, reflecting absence of the third right leg (Figs.1-3). Morphometric measurements for the specimen are (in mm): total length, 60.40; carapace length/width 9.49/9.72; mesosoma length 16.43; metasoma segment I, length/width 3.44/4.48; metasoma segment V, length/width 8.44/3.22; telson length, 6.35. For other measurements, see Table 1.

Discussion

To my knowledge, this leg absence teratology observed in *Scorpio maurus fuscus* is the first case of leg absence reported in scorpions. It is an interesting case by itself, but also since it involves anatomical features that have been utilized in scorpion systematics as important characteristics, in particular position of leg coxae relatively to the sternum.

The coxosternal arrangements have been widely discussed in the context of fossil scorpion systematics and order's early evolution in the Paleozoic Era (Kjellesvig-Waering, 1986; Stockwell, 1989; Jeram,



Figures 1–2: 1. The anomalous specimen of *Scorpio maurus fuscus*, ventral view, anterior part. 2. Coxosternal area at higher magnification.



Figure 3: Total ventral view of *Scorpio maurus fuscus* specimen.

1998). In all modern scorpions, the last two pairs of coxae abut the sternum, while the first two meet in front of the sternum. In the extinct, so-called palaeophonid type from the Silurian period, however, *only the fourth pair* of coxae abuts the sternum while coxae of the first three leg pairs meet in front of the sternum (Stockwell, 1989: fig. 18). Jeram (1998) suggested that the most ancestral (plesiomorphic) coxosternal type was found in Silurian *Palaeoscorpis* where coxae of *all four* leg pairs meet in front of the sternum.

In the leg teratology observed here, only one (fourth) right coxae exists and completely abuts the

sternum on its right side, its basal portion being quite deformed. This malformation could involve developmental mechanisms related to those involved in some the most ancient evolutionary transitions in the order Scorpiones, i.e. between palaeophonid and scorpionid types of coxosternal arrangement.

Acknowledgments

I wish to thank Ersen Aydın Yağmur (Turkey), Oz Rittner (Israel), and Victor Fet (USA), for helping with

Segment	4th right leg	3rd left leg	4th left leg (broken off and missing below coxa)
Coxa	5.01/1.95	4.43/2.30	6.55/2.06
Trochanter	3.31/1.83	2.90/1.92	-
Femur	7.19/2.18	6.48/2.24	-
Patella	6.02/2.20	5.18/2.42	-
Tibia	2.93/1.18	2.92/1.18	-
Basitarsus	2.43/1.00	2.63/1.08	-
Tarsus	3.18/1.15	2.43/1.04	-

Table 1: Leg measurements in the anomalous specimen (length/width, mm)

the technical aspects, as well as for reviewing my manuscript.

References

- ARMAS, L. F. de. 1977. Anomalías en algunos Buthidae de Cuba y Brazil. *Poeyana*, 176: 1–6.
- JERAM, A. J. 1998. Phylogeny, classification and evolution of Silurian and Devonian scorpions. Pp. 17–31 in P. A. Selden (ed.). *Proceedings of the 17th European Colloquium of Arachnology, Edinburgh 1997*. Burnham Beeches, Bucks: British Arachnological Society.
- KJELLESVIG-WAERING, E. N. 1986. *A Restudy of the Fossil Scorpionida of the World*. Palaeontographica Americana, 55. Ithaca, New York: Paleontological Research Institution. 287 pp.
- MATTONI, C. I. 2005. Tergal and sexual anomalies in bothriurid scorpions (Scorpiones, Bothriuridae). *Journal of Arachnology*, 33: 622–628.
- SHULOV, A. & P. AMITAI. 1955. A scorpion *Leiurus quinquestriatus* H. and E. with two stings. *The Bulletin of the Research Council of Israel*, 5B:193.
- SISSOM, W. D. & R. M. SHELLEY. 1995. Report on a rare developmental anomaly in the scorpion, *Centruroides vittatus* (Buthidae). *Journal of Arachnology*, 23:199–201.
- STOCKWELL, S. A. 1989. *Revision of the Phylogeny and Higher Classification of Scorpions (Chelicerata)*. Ph.D. Dissertation, University of Berkeley, Berkeley, California. 319 pp. University Microfilms International, Ann Arbor, Michigan.
- TERUEL, R. 2003. Nuevos casos de anomalías morfológicas en escorpiones (Scorpiones: Bothriuridae, Euscorpiidae, Hemiscorpiidae, Ischnuridae, Iuridae, Buthidae, Chactidae, Chaerilidae, Diplocentridae, Scorpionidae). *Revista Ibérica de Aracnología*, 7: 235–238.
- VACHON, M. 1952. *Etudes sur les Scorpions*. Archives de l'Institut Pasteur d'Algérie, Alger. 482 pp.