

On publications about scorpions (Arachnida, Scorpiones) by Hemprich and Ehrenberg (1828–1831)

M. E. Braunwalder

Frauentalweg 97,
CH-8045 Zurich, Switzerland

and

V. Fet

Department of Biological Sciences,
Marshall University,
Huntington, West Virginia 25755, USA

Summary

For more than one and a half centuries, confusion has existed in the taxonomic literature over the correct quotation of publications on scorpions by Hemprich & Ehrenberg (1828b, 1829, 1831). We present the results of a study of the three original publications and provide notes on the scientific travels and biographies of Hemprich and Ehrenberg. These three publications constitute seminal taxonomic works on scorpions, which resulted in seven new genus-group names and 23 new species-group names. Of these names, many are still valid and widely used by taxonomists.

Introduction

Hardly any other paper on scorpions has been so frequently confused and misquoted as that published by Hemprich & Ehrenberg in the zoological series "*Symbolae Physicae*". One reason is that many authors, particularly in the 19th and first half of the 20th century, often suppressed the citation of publications or just quoted inadequate title abbreviations. Other authors had no copy of the paper available and thus simply referred to previous misquoted references in other publications. However, the major reason for the confusion, in our opinion, is that the works included in the "*Symbolae Physicae*" were not originally sold as bound volumes but as folio sheets with separate covers.

Most sources citing the papers discussed here refer to Hemprich and Ehrenberg as joint authors. However, some renowned arachnologists such as Thorell (1876b: 107), Kraepelin (1899: IX), Pocock (1902: 366) and Birula (1915: 131), correctly mentioned Ehrenberg as sole author.

Biographical notes on Hemprich and Ehrenberg

Friedrich Wilhelm Hemprich, born 24 June 1796, in Glatz (now Kłodzko, Poland), studied medicine in Breslau (now Wrocław) and Berlin, interrupted by two years of service in the army in France. In 1819, he defended his doctorate thesis on comparative physiology in Berlin, and was assigned as a medical teacher to the army. The famous naturalist Lichtenstein promoted Hemprich's deep interest in natural sciences and recommended him to the Imperial Academy of Sciences as scientific assistant for the expedition to Africa planned by Minutoli. Hemprich died from malaria during these travels on 30 June 1825 in Massaua (Eritrea) (Ratzel, 1880).



Fig. 1: C. G. Ehrenberg (1795–1876), painted by Eduard Radtke in 1857 (MfN d. HUB, BIX/1271).

Christian Gottfried Ehrenberg (Fig. 1), born 19 April 1795, in Delitzsch near Leipzig (Germany), studied first theology in Leipzig and then medicine in Berlin. However, his main interest was in the natural sciences, especially botany and zoology. After returning to Berlin in 1825 from travels with his friend Hemprich, Ehrenberg became a member of the Academy and Professor of the Faculty of Medicine. He dedicated his scientific work in the following two decades primarily to the analysis of the extensive geological and archaeological collections, countless ethno- and geographical records, and especially to the description of the zoological and botanical collections for the "*Symbolae Physicae*". Ehrenberg's friendship with the great Alexander von Humboldt (1769–1859), with whom he travelled to the Urals, Altai and Siberia in 1829, would have been very beneficial for his future scientific work. As an expert particularly in geology, systematics and comparative zoology (Porifera, Anthozoa, etc.), Ehrenberg established an excellent reputation as a scientist all over the continent. He became a member of many Academies of Sciences and, in 1860, he succeeded von Humboldt as a member of the Paris Academy. Until his death in Berlin on 27 June 1876, Ehrenberg published more than 70 scientific papers in many fields of natural history (Hanstein, 1877b).

Ehrenberg, 1828 (Buthidae); type species by monotypy *Buthus (Isometrus) filum* Ehrenberg, 1828 [currently *Isometrus maculatus* (DeGeer, 1778)].

Androctonus Ehrenberg, 1828, plate I, figs. 4–6, plate II, figs. 1–8 (in part, only plate II, figs. 1–2, 4–5, 8); currently *Androctonus* Ehrenberg, 1828 (Buthidae); type species by subsequent designation (Thorell, 1876a: 7) *Androctonus australis* (Linnaeus, 1758).

Leiurus Ehrenberg, 1828 (as a subgenus of *Androctonus*), plate I, figs. 4–6 (in part, only fig. 5); currently *Leiurus* Ehrenberg, 1828 (Buthidae); type species by subsequent designation (Vachon, 1949: 83) *Androctonus (Leiurus) quinquestriatus* Ehrenberg, 1828 [currently *Leiurus quinquestriatus* (Ehrenberg, 1828)].

Prionurus Ehrenberg, 1828 (as a subgenus of *Androctonus*), plate II, figs. 1–8 (in part, only figs. 1–2, 4–5, 8); unavailable name as a junior homonym (Francke, 1985); type species by subsequent designation (Lankester, 1885: 380) *Androctonus (Prionurus) funestus* Ehrenberg, 1828 [currently *Androctonus australis* (Linnaeus, 1758)].

Species-group names

Plate I, fig. 1: *Buthus (Heterometrus) palmatus* Ehrenberg, 1828; currently *Scorpio maurus palmatus* (Ehrenberg, 1828) (Scorpionidae).

Libyan desert (?Egypt), Egypt (Alexandria, Sinai), Lebanon (mountains), Arabia, Syria (type specimens unknown).

Plate I, fig. 2: *Buthus (Heterometrus) spinifer* Ehrenberg, 1828; currently *Heterometrus spinifer* (Ehrenberg, 1828) (Scorpionidae).

India (one specimen: holotype male ?ZMB 67).

Plate I, fig. 3: *Buthus (Isometrus) filum* Ehrenberg, 1828; currently *Isometrus maculatus* (DeGeer, 1778) (Buthidae).

"Gumfude" (1829)=now Al-Qunfudhah (Saudi Arabia); coast of Arabian desert on Red Sea, Jiddah (1831) (one specimen: holotype ZMB 86).

Plate I, fig. 4: *Androctonus (Leiurus) thebanus* Ehrenberg, 1828; uncertain species, probably *Buthacus* sp. (Buthidae) (Levy & Amitai, 1980: 77).

Egypt ("Thebae"=now Luxor), Sudan (Nubia) (2 specimens: syntypes ZMB 154).

Plate I, fig. 5: *Androctonus (Leiurus) quinquestriatus* Ehrenberg, 1828; currently *Leiurus quinquestriatus* (Ehrenberg, 1828) (Buthidae).

Upper Egypt, Sudan ("Dongola"=now Dunqulah, Nubia), Sinai, Arabian desert (17 specimens: 8 syntypes ZMB 140, Sinai).

Plate I, fig. 6: *Androctonus (Leiurus) macrocentrus* Ehrenberg, 1828; currently *Buthacus leptochelys* (Ehrenberg, 1829) (Buthidae).

Sinai (2 specimens: syntypes ZMB 153).

Plate II, fig. 1: *Androctonus (Prionurus) libycus* Ehrenberg, 1828; currently *Androctonus australis* (Linnaeus, 1758) (Buthidae).

Libya (coast, possibly Egypt), Alexandria, Siwah Oasis (7 specimens: 4 syntypes ZMB 127 between Alexandria and Siwah).

Plate II, fig. 2: *Androctonus (Prionurus) citrinus* Ehrenberg, 1828; currently *Androctonus amoreuxii* (Audouin, 1826) (Buthidae).

Upper Egypt, Sudan ("Dongola"=now Dunqulah, Nubia) (5 specimens: syntypes ZMB 124).

Plate II, fig. 3: *Androctonus (Prionurus) nigrocinctus* Ehrenberg, 1828; uncertain species, possibly a synonym of *Mesobuthus gibbosus* (Brullé, 1832) (Buthidae).

Lebanon (mountains near coast at Beirüt) (one specimen: holotype ZMB 139).

Plate II, fig. 4: *Androctonus (Prionurus) bicolor* Ehrenberg, 1828; currently *Androctonus bicolor* Ehrenberg, 1828.

Libya (coast, possibly Egypt), Sinai, Syria, Lebanon (13 specimens: 7 syntypes ZMB 137, Egypt; 2 syntypes ZMB 138, Syria).

Plate II, fig. 5: *Androctonus (Prionurus) funestus* Ehrenberg, 1828; currently *Androctonus australis* (Linnaeus, 1758) (Buthidae).

Egypt, Sudan ("Dongala"=now Dunqulah, Nubia) (2 specimens: one syntype ZMB 125, Dongala).

Plate II, fig. 6: *Androctonus (Prionurus) leiosoma* Ehrenberg, 1828; currently *Parabuthus leiosoma* (Ehrenberg, 1828) (Buthidae).

"Gumfude"=now Al-Qunfudhah (Saudi Arabia) (1829); Arabian desert by Red Sea, "Lohaie"=now Al-Luhayya (Yemen) (1831) (one specimen: holotype ZMB 129, "Arabia").

Plate II, fig. 7: *Androctonus (Prionurus) scaber* Ehrenberg, 1828; currently *Hottentotta scaber* (Ehrenberg, 1828).

"Arkiko in Habessinia"=probably Aqiq near Sudan/Eritrean border (2 specimens: syntypes ZMB 701).

Plate II, fig. 8: *Androctonus (Prionurus) melanophysa* Ehrenberg, 1828; currently *Androctonus australis* (Linnaeus, 1758) (Buthidae).

Libya (coast, possibly Egypt), Alexandria, Siwah Oasis, Sinai (25 specimens: 7 syntypes ZMB 128, between Alexandria and Siwa, Egypt).

Text descriptions of 1829

The descriptions of all genera and species depicted in the 1828 plates, were published, for the first time, in 1829 in the periodic series *Verhandlungen der Gesellschaft der Naturforschenden Freunde zu Berlin*, vol. 1, part 6, pp. 348–362 (pp. 1–15 on separate reprints). In this paper, Ehrenberg also introduced several new names which were not present in the 1828 plates; these names are listed below:

Genus-group names

P. 350: *Scorpius* Ehrenberg, 1829; currently an available senior synonym of *Euscorpius* Thorell, 1876 (Euscorpiidae); see below for discussion of name status. Type species designated by Ehrenberg as *Scorpius europaeus* (nec *Scorpio europaeus* Linnaeus, 1758, misidentification) from Trieste, Italy. Type fixed as *Euscorpius carpathicus* (Linnaeus, 1767) (Fet, in press).

P. 350: *Centrurus* Ehrenberg, 1829 (Buthidae); no type species was designated by Ehrenberg. See below for discussion of name status¹.

Species-group names

P. 351: *Buthus (Heterometrus) palmatus flavus* Ehrenberg, 1829; currently *Scorpio maurus palmatus* (Ehrenberg, 1828) (Scorpionidae).

Libyan desert (?Egypt), Alexandria (type specimens unknown).

P. 352: *Buthus (Heterometrus) palmatus rufus* Ehrenberg, 1829; currently *Scorpio maurus palmatus* (Ehrenberg, 1828) (Scorpionidae).

Sinai (type specimens unknown).

P. 352: *Buthus (Heterometrus) palmatus fuscus* Ehrenberg, 1829; currently *Scorpio maurus fuscus* (Ehrenberg, 1829) (Scorpionidae).

Lebanon, mountains near Beirut (type specimens unknown).

P. 353–354: *Androctonus (Leiurus) quinquestriatus brachycentrus* Ehrenberg, 1829; currently *Leiurus quinquestriatus* (Ehrenberg, 1828) (Buthidae).

“Lohaie”=now Al-Luhayyah (Yemen) (one specimen: holotype ZMB 141).

P. 354: *Androctonus (Leiurus) tunetanus intumescens* Ehrenberg, 1829; currently *Buthus occitanus tunetanus* (Herbst, 1800).

Egypt (one specimen: holotype ZMB 145).

¹The name *Centrurus* Ehrenberg, 1829 has been a subject of confusion. Its type was not designated in the original description, but it was fixed by subsequent monotypy as *Centrurus galbineus* C. L. Koch, 1838 (without a type locality). Later, Peters (1861: 511–512) stated that *Centrurus* sensu C. L. Koch, 1838 is a different genus from Ehrenberg's, and even introduced a new replacement name for it, *Dacurus* Peters, 1861, with “*Centrurus galbineus* Koch from Central America” as its type. Karsch (1879: 13) demonstrated that *Dacurus galbineus* sensu Peters, 1861 belonged to the genus *Opisthacanthus* (Ischnuridae), and introduced a new replacement name, *Caucon* Karsch, 1879, for *Centrurus* sensu C. L. Koch, 1838. Later, Kraepelin (1894: 34) demonstrated that *Centrurus galbineus* C. L. Koch, 1838 was a synonym of the Asian *Heterometrus longimanus* (Herbst, 1800). Meanwhile, Thorell (1876: 9) fixed the type species of *Centrurus* Ehrenberg, 1829 as *Androctonus biaculeatus* Lucas, 1835 [currently *Centruroides gracilis* (Latreille, 1804)] (Buthidae). As a result, many authors have since considered *Centrurus* the senior synonym of *Centruroides* Marx, 1889. In fact, it is a junior synonym of *Heterometrus* Ehrenberg, 1828 (although it obviously was not Ehrenberg's intention).

P. 355: *Androctonus (Leiurus) tunetanus intermedius* Ehrenberg, 1829; uncertain form, possibly *Buthus occitanus* (Amoreux, 1789).

“Lohiae”=now Al-Luhayyah (Yemen) (one specimen: holotype ZMB 145).

P. 355: *Androctonus (Leiurus) leptochelys* Ehrenberg, 1829; currently *Buthacus leptochelys* (Ehrenberg, 1829).

Sinai (three specimens: syntypes ZMB 152).

Text descriptions of 1831

It has long been known (Simon, 1879: 96) that the text (Latin version) of scorpion descriptions for “*Symbolae Physicae*” was published in 1831, later than the plates in 1828. These dates were confused by many subsequent authors with the 1829 date of the publication in German. As a result, important dates of taxonomic descriptions were, and still are, confused in the literature. In this Latin text (Hemprich & Ehrenberg, 1831) under the title “*Animalia articulata. Arachnoidea. Scorpiones africani et asiatici*”, Ehrenberg repeated, with slight changes, the descriptions that were published in the German article of 1829. He also described two additional new species in the following order:

Androctonus (Prionurus) capensis Ehrenberg, 1831: currently *Parabuthus capensis* (Ehrenberg, 1831).

South Africa (“Cape of Good Hope”) (holotype female, ZMB 133).

Androctonus (Prionurus) granulatus Ehrenberg, 1831: currently *Parabuthus granulatus* (Ehrenberg, 1831).

South Africa (“Cape of Good Hope”) (holotype male, ZMB 132).

We should note that both of these 1831 names were probably intended to represent varieties of *Androctonus leiosoma* Ehrenberg, 1828: they are listed under the same numbered paragraph (No. 10) but are characterised as “species” and given binomial names rather than trinomial (as was the case with subspecies of *Androctonus tunetanus* and *Buthus palmatus*).

List of currently valid taxa of scorpions described by Ehrenberg

The list includes four genera, eight species, and two subspecies of scorpions belonging to two families. Below, all names are listed alphabetically with their correct dates of description and current affiliation.

Family Buthidae

Genera: *Androctonus* Ehrenberg, 1828

Isometrus Ehrenberg, 1828

Leiurus Ehrenberg, 1828

Species: *Androctonus bicolor* Ehrenberg, 1828

Buthacus leptochelys (Ehrenberg, 1829)

Hottentotta scaber (Ehrenberg, 1828)

Leiurus quinquestriatus (Ehrenberg, 1828)

- Parabuthus capensis* (Ehrenberg, 1831)
Parabuthus granulatus (Ehrenberg, 1831)
Parabuthus leiosoma (Ehrenberg, 1828)

Family Scorpionidae

- Genera: *Heterometrus* Ehrenberg, 1828
 Species: *Heterometrus spinifer* (Ehrenberg, 1828)
 Subspecies: *Scorpio maurus palmatus* (Ehrenberg, 1828)
Scorpio maurus fuscus (Ehrenberg, 1829).

Taxonomic problems

Clarification of publication dates and detailed analysis of publications presented several problems with synonymy of Ehrenberg's scorpion species.

1. *Androctonus (Leiurus) macrocentrus* Ehrenberg, 1828 is a senior synonym of *Androctonus (Leiurus) leptochelys* Ehrenberg, 1829, which is currently well established as *Buthacus leptochelys* (Ehrenberg, 1829). We (Fet & Braunwalder, in press) have applied to the International Commission on Zoological Nomenclature for suppression of the long unused senior synonym, and for conservation of the name *Buthacus leptochelys* (Ehrenberg, 1829).

2. *Androctonus (Leiurus) thebanus* Ehrenberg, 1828 is an uncertain species which may also prove to be a synonym of *Buthacus leptochelys* (Ehrenberg, 1829). In this case, suppression of the senior name will also be necessary.

3. *Androctonus (Prionurus) nigrocinctus* Ehrenberg, 1828 is an uncertain species, and may possibly be a synonym of *Mesobuthus gibbosus* (Brullé, 1832) (Buthidae). In this case, suppression of the senior name will be necessary since Brullé's name is well established in the taxonomic and biological literature.

4. *Androctonus (Leiurus) tunetanus intermedius* Ehrenberg, 1829 is an uncertain subspecies described from Yemen. Its description fits that of *Buthus occitanus* (Amoreux, 1789); however, this species has never been found again on the Arabian Peninsula.

5. *Scorpius* Ehrenberg, 1829: 350, is an available senior synonym of *Euscorpius* Thorell, 1876 (Euscorpidae). The latter name is well established; Fet (in press) has applied to the International Commission for the suppression of *Scorpius* Ehrenberg, 1829.

6. *Centrurus* Ehrenberg, 1829: 350, is not a *nomen nudum* as stated by Francke (1985) but is an available junior synonym of *Heterometrus* Ehrenberg, 1828. Its type species was not originally designated; by subsequent monotypy it is *Centrurus galbineus* C. L. Koch, 1838, which is a junior synonym of the Asian *Heterometrus longimanus* (Herbst, 1800). *Centrurus* Ehrenberg, 1829 is not a synonym of *Centruroides* Marx, 1889 (Buthidae).

Spelling variations

A few orthographic variations of the genus and species names are different in the text (1829, 1831) from those on the plates (1828). This, most likely, caused later authors to use the spelling of the text names instead of

those on the plates. However, the 1828 date is available for the Latin names published in plate legends, and therefore the original spelling is that of the plate legends (1828). The subsequent changes, made by Ehrenberg himself (1829, 1831) are attempts at "better Latinization" (*Liurus* instead of *Leiurus*, and *liosoma* instead of *leiosoma*) and are not justified (Article 32c, II of the Code). Therefore, the spelling of at least one specific name constantly used by scorpion systematists, *Parabuthus liosoma* (Ehrenberg, 1828) is an unjustified emendation and must be corrected to the original spelling, *Parabuthus leiosoma* (Ehrenberg, 1828).

Significance for zoogeography and systematics

All taxa described by Ehrenberg (whether they proved to be synonyms of earlier described scorpion taxa or new ones) are among the commonest elements of the scorpion fauna of Africa and Asia. The collections of Hemprich and Ehrenberg provided a representative sample of the scorpiofauna from the arid regions of northern Africa and the Middle East, characterised by the presence of such typical genera as *Androctonus*, *Buthus*, *Buthacus*, *Leiurus*, and *Scorpio*. This was undoubtedly the first work devoted to scorpions where local habitats could be determined from the published locality information, and where geographical elements of the scorpion fauna were discussed (see 1829 and 1831 texts). Thus, the publications of Hemprich and Ehrenberg were the first not only to describe taxa, but also to give a concise account of the scorpiofauna of northern Africa and the Middle East. Such an early impact should not be overlooked in the history of zoogeography. Only by the end of the 19th century would comprehensive zoogeographic works be published related to the scorpiofauna.

Before the time of Ehrenberg, the history of scorpion taxonomy was rather short and occasional. Indeed, Linnaeus described only 6 species of scorpions in 1758 and 1767. The impact of Ehrenberg, who was one of the first serious scorpion taxonomists, cannot be underestimated. His work was to be continued several years later by the famous German arachnologist, C. L. Koch. It would be prudent to say that the publications by Hemprich and Ehrenberg in the 1820s provided a momentum for the development of scorpion taxonomy in Europe, and especially in Germany, where such prominent scorpologists as Carl Ludwig Koch, Ludwig Koch, Friedrich Karsch and Karl Kraepelin were to carry studies of this group further towards the 20th century.

Conclusions

1. Ehrenberg should be recognised as sole author of all the scorpion taxa, since he examined and described the species after Hemprich's death in 1825. However, we suggest (and it certainly would have been Ehrenberg's intention) that the authors of the publications should be

cited together as "Hemprich & Ehrenberg". This would be consistent with modern usage.

2. The correct dates and titles of the three existing publications are given below in the list of references (see Hemprich & Ehrenberg, 1828b, 1829, 1831).

3. Ehrenberg created seven new genus-group names and 23 new species-group names of scorpions. Of these, currently valid are four genera, eight species, and two subspecies, belonging to two families. Ehrenberg's taxa provided a good sample of the faunal diversity of North African and Middle Eastern scorpions. This contribution was important for the future development of scorpion taxonomy and systematics.

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References

- BIRULA, A. A. 1915: Arachnologische Beiträge. VI. Ueber die nordostafrikanischen Formen *Parabuthus liosoma* (Hemp. et Ehr.). *Russk. ent. Obozr.* **15**(2): 131–146.
- BONNET, P. 1945: *Bibliographia Araneorum* **1**: 1–832. Douladoure, Toulouse.
- FET, V. (in press): Case 3025. *Euscorpis* Thorell, 1876 (Arachnida, Scorpiones): proposed conservation of the generic name, and suppression of *Scorpius* Ehrenberg, 1829. *Bull. zool. Nom.*
- FET, V. & BRAUNWALDER, M. E. (in press): Case 3030. *Buthacus leptochelys* (Ehrenberg, 1829) (Arachnida, Scorpiones): proposed conservation of the specific name. *Bull. zool. Nom.*
- FRANCKE, O. F. 1985: Conspectus genericus scorpionorum 1758–1982 (Arachnida: Scorpiones). *Occ. Pap. Mus. Texas Tech. Univ.* **98**: 1–32.
- HANSTEIN, J. 1877a: *Christian Gottfried Ehrenberg*. Bonn.
- HANSTEIN, J. 1877b: Ehrenberg, Christian Gottfried. *Allgemeine Deutsche Biographie* **5**: 700–711.
- HEMPRICH, F. W. & EHRENBURG, C. G. 1828a: *Naturgeschichtliche Reisen durch Nord-Afrika und West-Asien in den Jahren 1820 bis 1825 von Dr. F. W. Hemprich und Dr. C. G. Ehrenberg. Herausgegeben von Dr. Ehrenberg. Erster Band, Erste Abteilung. Historischer Teil. Ernst Siegfried Mittler, Berlin, Posen und Bromberg.*
- HEMPRICH, F. W. & EHRENBURG, C. G. 1828b: Arachnoidea. Plates I+II. In: *Symbolae Physicae seu Icones et Descriptiones Animalium Evertebratorum sepositis Insectis quae ex itinere per Africam borealem et Asiam occidentalem. Friderici Guillemi Hemprich et Christiani Godofredi Ehrenberg, studio novae aut illustratae redierunt. Percensuit edidit Dr. C. G. Ehrenberg. Decas I. Berolini ex officina Academica, venditur a Mittlero: Index and plates.*
- HEMPRICH, F. W. & EHRENBURG, C. G. 1829: Vorläufige Uebersicht der in Nord-Afrika und West-Asien einheimischen Scorpione und deren geographischen Verbreitung, nach den eigenen Beobachtungen von Dr. Hemprich und Dr. Ehrenberg. *Verh. Ges. naturf. Freunde Berl.* **1**(6): 348–362 (reprints: 1–15).
- HEMPRICH, F. W. & EHRENBURG, C. G. 1831: Animalia articulata. Arachnoidea. Scorpiones africani et asiatici. In: *Symbolae Physicae. Animalia evertebrata exclusis insectis percensuit Dr. C. G. Ehrenberg. Series prima cum tabularum decade prima. Continet Animalia Africana et Asiatica 162.* Berolini ex officina Academica. Venditur a Mittlero, 12 pp. (unnumbered) (separate text delivery which was intended to be part of the 1828 issue of "Symbolae Physicae").
- HUMBOLDT, A. von 1826: *Bericht über die Naturhistorischen Reisen der Herren Ehrenberg und Hemprich durch Ägypten, Dongola, Syrien, Arabien und den östlichen Abfall des Habessinischen Hochlandes, in den Jahren 1820–1825.* Druckerei der Königlichen Akademie der Wissenschaften, Berlin.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE 1985: *International Code of Zoological Nomenclature* (3rd ed.). International Trust for Zoological Nomenclature, London.
- KARSCH, F. 1879: Scorpionologische Beiträge. Part I. *Mitt. münch. ent. Ver.* **3**: 6–22.
- KRAEPELIN, K. 1894: Revision der Scorpione. II. Scorpionidae und Bothriuridae. *Jb. hamb. wiss. Anst.* **11**: 1–248, 3 plates.
- KRAEPELIN, K. 1899: Scorpiones und Pedipalpi. *Tierreich* **8**: 1–265.
- LANKESTER, E. R. 1885: Notes on certain points of the anatomy and generic characters of scorpions. *Trans. zool. Soc. Lond.* **11**(10): 372–384.
- LEVY, G. & AMITAI, P. 1980: Arachnida. I. Scorpiones. *Fauna palaest.* 1–130.
- MORITZ, M. & FISCHER, S.-CH. 1980: Die Typen der Arachnidensammlung des Zoologischen Museums Berlin. III. Scorpiones. *Mitt. zool. Mus. Berl.* **2**(36): 309–326.
- PETERS, W. 1861: Ueber eine neue Eintheilung der Skorpione und ueber die von ihm in Mossambique gesammelten Arten von Skorpionen. *Mber. K. preuss. Akad. Wiss.*: 507–516.
- POCOCK, R. I. 1902: A Contribution to the Systematics of Scorpions. *Ann. Mag. nat. Hist.* (7) **10**: 364–380.
- RATZEL 1880: Hemprich, Wilhelm Friedrich. *Allgemeine Deutsche Biographie* **11**: 728–729.
- SIMON, E. 1879: *Les Arachnides de France* **7**: 1–332. Paris, Roret.
- SISSOM, W. D. 1994: Descriptions of new and poorly known scorpions of Yemen (Scorpiones: Buthidae, Diplocentridae, Scorpionidae). *Fauna Saudi Arabia* **14**: 3–39.
- THORELL, T. 1876a: On the classification of scorpions. *Ann. Mag. nat. Hist.* (4) **17**: 1–15.
- THORELL, T. 1876b: Etudes scorpionologiques. *Atti Soc. ital. Sci. nat.* **19**: 75–272.
- VACHON, M. 1949: Etudes sur les Scorpions. III. Description des scorpions du Nord de l'Afrique. *Archs Inst. Pasteur Algér.* **27**(1): 66–100.