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

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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).

The travels to Africa and the Middle East (1820-1825)

In 1820, the Imperial Academy of Sciences in Berlin assigned Hemprich and Ehrenberg to accompany the expedition of General Lieutenant Menu von Minutoli to Egypt as naturalists. In August 1820, they departed from Trieste (Italy) to Egypt. From Alexandria, the expedition first moved along the coastline to Darnah (Cyrenaica, Libya) where political harassment from bedouin chiefs enforced the splitting of the expedition team. Hemprich, Ehrenberg and their scientific staff then crossed the Libyan desert to the Oasis of Siwah and finally returned to Cairo and Alexandria in December 1820.

During a second trip from March to July 1821 to Lake Moeris and the region of Al-Fayyum, Ehrenberg contracted typhus and was bedridden for three months. Owing to new funding from the Academy, the scientific team led by Hemprich and Ehrenberg was able to continue their expedition in the Nile valley up to the Dongola region (Dunqulah) and in the Nubian desert near Kurti (Sudan) until February 1823. Political riots and the death of some staff members, however, enforced a new itinerary. Hemprich immediately returned to Cairo with most of the collected material while Ehrenberg joined his friend some weeks later.

During the period from May 1823 to March 1824, while awaiting the transfer of new grants from the Academy, Hemprich and Ehrenberg examined the Sinai Peninsula and the Gulf of Aqaba including the islands southwards to Al-Muwaylih in Saudi Arabia. After their return to Cairo, the scientists were informed that the promised funds had been embezzled by the Prussian consul in Trieste and that new funds would arrive in three to four months at the earliest. They therefore decided to extend their scientific studies to Syria and the Lebanon mountains until August 1824.

At the end of November 1824, Hemprich and Ehrenberg finally embarked at Suez for their longplanned expedition to Ethiopia. Their first route led from Jiddah to Mecca and then along the coast of the Asir region in Saudi Arabia to Al-Luhayyah ("Lohaie") in Yemen. From there they visited many of the islands in the Farasan and Dahlak archipelagos until they arrived at Massaua in Eritrea in April 1825. In two separate excursions, Hemprich and Ehrenberg examined the fauna and flora of the slopes and mountains of the Eritrean Plateau in the region of Asmara. After their return to Massaua, many of the members of the expedition became infected with malaria; among them was F. W. Hemprich, who succumbed to the illness on 30 June 1825. The loss of his friend influenced Ehrenberg's decision to return to Berlin, where he finally arrived in December 1825.

The zoological results of Hemprich and Ehrenberg's travels to Africa and the Middle East are very impressive: a total of more than 34,000 animals of nearly 4,000 species had been collected, among them 20,000 insects but relatively few arachnids—only 275 specimens representing 120 species (von Humboldt, 1826: 20). A detailed travel report without any information on

particular scientific subjects was published by Hemprich & Ehrenberg (1828a).

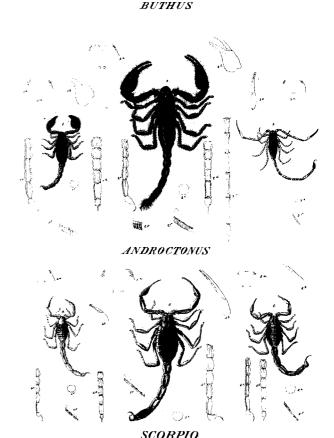
The zoological series "Symbolae Physicae"

Ehrenberg published his descriptions and the plates depicting the animals that he and Hemprich had collected in nine unbound volumes in the series "Symbolae Physicae" between 1828 and 1845. The first eight volumes were printed and sold by E. S. Mittler, Berlin; volume nine, by G. Reimer, Berlin:

1828	volume 1	birds (Decas I)
1828-1831	volume 2	non-insect invertebrates
		(Decas I)
1828-1832	volumes 3-4	mammals (Decas I-II)
1829-1832	volumes 5–7	insects (Decas I-III)
1834	volume 8	insects (Decas IV)
1845	volume 9	insects (Decas V)

A second edition of all zoological volumes of the "Symbolae Physicae" was printed by Reimer in 1899 in 3 volumes with a supplementary volume edited by Carlgren, Hilgendorf, von Martens, Matschie, Tornier and Weltner. In 1900, a second supplementary volume on botany edited by Schumann was added to the series.

Zuologice Il Arachnoidea.



BUTHUS (Hebremetrus) palmatus : ANDROCTONUS (Laurus) thebanus ; forufar) s quinquefush ; (Isometrus) Telurn s macrocentus

Fig. 2: Plate I of "Symbolae Physicae" 1828 (Zentralbibliothek Zurich, NNN 13).

Each volume was delivered with a cover with printed title, the unbound folio sheets, the plates and an index. The folio sheets, each containing four **unnumbered** pages, are, however, marked with a small title abbreviation at the bottom left on the first page and the letters a, b, c, etc. at the bottom right of each sheet. This method caused readers and librarians to bind their volumes according to their own interpretation and individual needs. Some authors (e.g. Bonnet, 1945: 334; Levy & Amitai, 1980: 124; Sissom, 1994: 38) cite the scorpion publication of 1831 with the pagination "pp. 115–126". They probably refer to the bound copy deposited in the Natural History Museum Library (London) that features the mentioned numbers on each page written by hand (G. Levy, pers. comm.).

Ehrenberg originally planned to publish his descriptions of scorpions together with the plates in volume 2 of the "Symbolae Physicae" in 1828. But since he failed to finish his manuscripts in time due to many professional problems and inconveniences (Hanstein, 1877a: 37), only the cover with the original volume title, all of the plates [six on Phytozoa, two on Mollusca and two on Arachnoidea (scorpions)] and the index were published in that year. The text descriptions were not included.

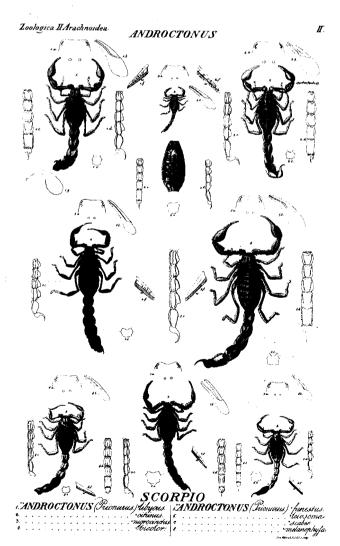


Fig. 3: Plate II of "Symbolae Physicae" 1828 (Zentralbibliothek Zurich, NNN 13).

Ehrenberg published the first manuscript on scorpions in the German language in the series Verhandlungen der Gesellschaft der Naturforschenden Freunde zu Berlin and subsequently in a reprint version in 1829. The slightly changed Latin translation of the manuscript for the "Symbolae Physicae" containing 12 unnumbered pages on three folio sheets (a, b and c) was then finally printed in 1831 and delivered with a provisional cover entitled "Animalia Evertebrata exclusis Insectis".

Review of the scorpion genera and species described by Ehrenberg

In total, Ehrenberg created seven genus-group names (of which four are currently valid) and 23 species-group names (eight are currently valid) of scorpions (Arachnida, Scorpiones: families Buthidae and Scorpionidae). Below, we give a detailed analysis of the nomenclature created in three existing separate publications.

Plates of 1828

The brilliantly hand-coloured illustrations (Figs. 2–3), created by Samuel Weber and supplemented with accurate detailed drawings of the eye areas on the prosoma, the pectines, the pedipalps, the dorsal and lateral side of the cauda, and a cross-section of the fourth caudal segment for each species, were published in 1828. The plates bear not only illustrations, but also Latin binomina for 14 species which, according to Article 12(7) of the International Code of Zoological Nomenclature (1985), constitutes an indication. Therefore, the date 1828 is the first available date of publication for the 14 new names. Of these, five names are currently valid, seven are junior synonyms, and two have uncertain status (see below).

Five new genus-group (generic and subgeneric) names were also introduced by Ehrenberg on the same plates in 1828; four of these are currently valid generic names, and one is a junior synonym.

Below, we list the five genus-group names and 14 specific names as they were given in 1828 and their current equivalents. The type localities and information on type material are given according to Ehrenberg's subsequent descriptions (Hemprich & Ehrenberg, 1829, 1831) and data with the type material (Moritz & Fischer, 1980). Most of Ehrenberg's scorpion types still exist and are deposited in the Zoological Museum of the Humboldt-Universität in Berlin (ZMB).

Genus-group names

Heterometrus Ehrenberg, 1828 (as a subgenus of Buthus Leach, 1815), plate I, figs. 1–2 (in part, only fig. 2); currently Heterometrus Ehrenberg, 1828 (Scorpionidae); type species by subsequent designation (Karsch, 1879: 20) Buthus (Heterometrus) spinifer Ehrenberg, 1828 [currently Heterometrus spinifer (Ehrenberg, 1828)].

Isometrus Ehrenberg, 1828 (as a subgenus of Buthus Leach, 1815), plate I, fig. 3; currently Isometrus

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 Beirut) (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 (Euscorpiidae). 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 scorpiologists 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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