



## Type specimens of “insectivoran” mammals at the Museum für Naturkunde, Berlin

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## Abstract

The collection of the Zoological Museum of the Humboldt-University Berlin holds approximately 2,000 mammal type specimens. No catalogue has yet been published. Here, we present a type catalogue of the non-monophyletic group "Insectivora" containing the Erinaceidae (hedgehogs), Soricidae (shrews), Talpidae (moles), Solenodontidae (solenodons), and Chrysochloridae (golden moles). We checked the present nomenclatural and taxonomic status of each (referred) type specimen. We registered 33 holotypes, 69 syntypes and 13 paratypes (of which 17 represent subspecies and 3 are missing). We reidentified two original specimens of Küster's *Sorex pachyurus*, now *Crocidura pachyura*, which is a senior name for *Crocidura ichnusae*. Lectotypes are designated for *Solenodon cubanus*, *Sorex pachyurus*, and *Myosorex preussi*.

**Key words:** mammal types, insectivorans, golden moles, *Crocidura pachyura*, *Solenodon cubanus*, Museum für Naturkunde Berlin, ZMB

## Introduction

The mammal collection of the Zoological Museum of the Humboldt-University Berlin (referred to as ZMB for "Zoologisches Museum Berlin") is one of the World's most important in terms of species diversity and number of types, which approaches 2,000 specimens. Unfortunately, a comprehensive type catalogue of these holdings has not yet been published. Our goal in this paper is to focus on a relatively small but historically important group of this collection: the "Insectivora". Of the approximately 450 currently-recognized species of mammals traditionally classified in this group, the largest repositories are in the Natural History Museum (London), the United States National Museum (Washington), and the Muséum National d'Histoire Naturelle (Paris). The next-largest collections of "insectivoran" types are in Berlin (Table 1) and the American Museum of Natural History (New York).

As described elsewhere (e.g. Gregory 1910, Butler 1988, Nowak 1999), "Insectivora" as used throughout most of the 20th century comprised six extant families of placental mammals: the Erinaceidae (hedgehogs), Soricidae (shrews), Talpidae (moles), Solenodontidae (solenodons), Chrysochloridae (golden moles), and Tenrecidae (tenrecs). Over the past decade, it has become clear that this assemblage conflates members of two very different placental radiations: erinaceids, soricids, talpids, and solenodontids within the larger clade of Laurasiatheria (Waddell *et al.* 1999, Roca *et al.* 2004), and tenrecids and chrysochlorids as part of the Afrotheria (Stanhope *et al.* 1998).

Because nearly all zoological collections keep afrotherian and laurasiatherian lineages of insectivoran-grade mammals in close proximity to one another, both physically in storage and for record-keeping purposes, we discuss both groups in this paper. However we do not question their phylogenetic disparity, and recognize the validity of Afrotheria including tenrecs and golden moles (Murphy *et al.* 2001; Roca *et al.* 2004).

Statements on the status and valid name of taxa treated in this report principally refer to the last edition of Wilson & Reeder (2005), particularly on the chapters that include hedgehogs and soricomorphs (Hutterer 2005) and golden moles (Bronner & Jenkins 2005). Cases where we deviate from these sources are clearly stated. For suprafamilial taxonomy we follow Archibald (2003) and Asher (2005).

**TABLE 1.** Summary of valid type specimens of insectivoran-grade mammals at the Zoologisches Museum Berlin (ZMB).

Chrysochloridae (Afrotheria)

Taxon	First published as	Type specimen(s)	Type locality	Author, publication
<i>Calcochloris obtusirostris</i>	<i>Chrysochloris obtusirostris</i>	ZMB 719(alc.), ZMB 720(skin), ZMB 12945(skull, skeleton, skin) ZMB 31020 (skull), ZMB 85341(skull)	Inhambane, Mozambique	Peters, W. 1851. Bericht Verhandl. K. Preuss. Akad. Wiss. Berlin, 16: 467
<i>Chrysochloris stuhlmanni</i>	<i>Chrysochloris stuhlmanni</i>	ZMB 29456 (skull, skeleton, skin), ZMB 85340 (skin)	Kinjawanga, Issango river, Ukondjo, DR Congo	Matschie, P. 1894. Sitzb. Ges. Naturf. Fr. Berlin, p. 123

Erinaceidae (Lipotyphla)

Taxon	First published as	Type specimen(s)	Type locality	Author, references
<i>Paraechinus aethiopicus</i>	<i>Erinaceus aethiopicus</i>	ZMB 731 (skull and skin)	Egypt	Ehrenberg, C.G. 1832. Symb. Phys. Mamm., 2, sig. k, footnote

Solenodontidae (Lipotyphla)

Taxon	First published as	Type specimen(s)	Type locality	Author, publication
<i>Solenodon cubanus</i>	<i>Solenodon cubanus</i>	ZMB 2761 (skin, skull, skeleton)	Aguilera, Sierra Maestra, Cuba	Peters, W. 1861. Monatsb. K. Preuss. Akad. Wiss. Berlin, 1861: 169

Soricidae (Lipotyphla)

Taxon	First published as	Type specimen(s)	Type locality	Author, publication
<i>Crocidura dolichura</i>	<i>Crocidura dolichura</i>	ZMB 5037 (female, body in alcohol, skull extracted)	Bonjongo, Cameroon	Peters, P. 1876. Monatsb. K. Preuss. Akad. Wiss. Berlin: 475
<i>Crocidura fischeri</i>	<i>Crocidura fischeri</i>	ZMB 98251 (male, mounted skin, skull lost)	Nguruman, Massai-Land Northwest of Lake Natron, close to Mt. Sambo, Kenya	Pagenstecher, A. 1885. Jb. Hamburger Wiss. Anst., 2: 34
<i>Crocidura foetida</i>	<i>Crocidura foetida</i>	ZMB 3826 (adult male, body in alcohol)	Bengkajang (= Benkayang), Borneo	Peters, W. 1870. Monatsb. K. Preuss. Akad. Wiss. Berlin, 586
<i>Crocidura gracilipes</i>	<i>Crocidura gracilipes</i>	ZMB 3905 (body in alcohol, skull, extracted)	Kilimandjaro, Tanzania	Peters, W. 1870. Monatsb. K. Preuss. Akad. Wiss. Berlin: 590
<i>Crocidura hirta</i>	<i>Crocidura hirta</i>	ZMB 668 (male, skull, skin) ZMB 669 (gravid female, skull, skin)	Tette, Mozambique	Peters, W. 1852. Reise nach Mossambique, Säugethiere, p. 78

<i>Crocidura monticola</i>	<i>Crocidura monticola</i>	ZMB 3820 (damaged skull, body in alcohol)	Surakarta, Java	Peters, W. 1870. Monatsb. K. Preuss. Akad. Wiss. Berlin: 588
<i>Crocidura nigrofuscata</i>	<i>Crocidura nigrofuscata</i>	ZMB 83308 = A 5572 (female, skull, skin)	Wukalala, Kinjawanga, DR-Congo	Matschie, P. 1895. Säugethiere Deutsch-Ost-Afrikas, p. 33
<i>Crocidura zimmermanni</i>	<i>Crocidura zimmermanni</i>	Paratypes (skins & skulls): ZMB 92659 (male), ZMB 92661 (fem.), ZMB 92662 (fem.), ZMB 92658 (male), ZMB 92660 (fem.). Holotype: NMW B 5510 (Vienna)	Nidha High Plateau, Ida, Crete	Wettstein, O. 1953. Z. Säugetierkunde 17: 12
<i>Diplomesodon pulchellum</i>	<i>Sorex pulchellus</i>	ZMB 680 (skull and skin)	Kyrgistan. Aral Sea	Lichtenstein, H. 1823. In Eversmann: Reise von Orenburg nach Bokhara, Berlin, p. 124
<i>Crocidura pachyura</i>	<i>Sorex pachyurus</i>	ZMB 15116 (alc., skull extracted), ZMB 83304 (alc.)	Sardinia Isl., Italy	Küster, C.K. 1835.
<i>Nectogale elegans</i>	<i>Nectogale elegans</i>	Paratype: ZMB 4797 (skull, skin) Holotype: MNHN 1870-6 (Paris)	Sichuan, Moupin (= Baoxing), western China	Milne-Edwards, H. 1870. C.R. Acad. Sci. Paris, 70: 341
<i>Paracrocidura graueri</i>	<i>Paracrocidura graueri</i>	ZMB 83255 (body in alcohol, skull, extracted)	Primary forest near mountain range adjacent to Tanganjika Lake, DR Congo	Hutterer, R. 1986. Bonn. zool. Beitr., 37: 81
<i>Suncus etruscus</i>	<i>Sorex etruscus</i>	ZMB 3540 (missed) ZMB 15111 (in alc., skull extracted), ZMB 15112 (in alc., skull extracted)	Pisa, Italy	Savi, P. 1822. Nuovo Giorn. de Letterati, Pisa, 1: 60
<i>Sylvisorex howelli usambarensis</i>	<i>Sylvisorex howelli usambarensis</i>	ZMB 83838 (male, adult, skull, body in alc.)	Ambangulu, Usambara, NO-Tansania	Hutterer, R. 1986. Bonn. zool. Beitr. 37: 23
<i>Sylvisorex johnstoni dieterleni</i>	<i>Sylvisorex johnstoni dieterleni</i>	ZMB 7563 (female, adult, skull, body in alc.)	Usambiro, NW-Tansania	Hutterer, R. 1986. Bonn. zool. Beitr. 37: 25

#### Talpidae (Lipotyphla)

Taxon	First published as	Type specimen(s)	Type locality	Author, publication
<i>Scapanus latimanus</i>	<i>Scalops latimanus</i>	ZMB 712 (skull and skin)	Santa Clara, California USA	Bachman, J. 1843. Boston J. Nat. Hist., 4: 34

## Collections and collectors in Berlin

Many scientists have contributed to the recognition of insectivoran species diversity. The most prolific of these researchers that used the collection in Berlin include Martin Heinrich Karl Lichtenstein (1780–1857), Johann Georg Wagler (1800–1832), Wilhelm Carl Hartwig Peters (1815–1883), and Paul Matschie (1861–1926). Although none of Wagler's named insectivoran species are currently recognized, he is credited for naming the genus *Crocidura* (Wagler, 1832), which remains the most speciose mammalian genus alive today.

Lichtenstein, Peters, and Matschie served many years as zoologists at the Naturkundemuseum in Berlin (see Angermann 1989). Martin H. K. Lichtenstein helped in the founding of Berlin Zoologischer Garten, which at the time was jointly administered with the Naturkundemuseum and Berlin (later Humboldt) University. From 1813 to 1857 Lichtenstein was director of the Berlin Naturkundemuseum. Although Lichtenstein effectively described many species (and not just mammals), his collecting and archival activities were oriented around the needs of public exhibitions. As was often the case in the early 19th century, "extra" specimens were regularly sold or traded in order to increase the flow of new material. Starting in 1843, some summary cataloging efforts of the collection were made; however the regular use of a consistent numbering system did not start until Lichtenstein's successor, W.C.H. Peters.

Wilhelm Carl Hartwig Peters was director of the Museum from 1857 until his death in 1883, and served also as curator of mammals during this time. Peters was an early adherent of Darwinian evolution, and is well known for his collection work in Mozambique and his contributions to the systematics of bats. Many of his named species are still considered valid today. Peters viewed the collection as the basis of scientific research and was the first mammal curator to effectively archive the collection. The present collection of ZMB contains numerous specimens, whose parts once had been stored for long time in separate collections with different catalogue systems (see Angermann 1989). Skins had been registered in the "A-Katalog" - the entry book of the Zoological Collection - whereas many skulls and skeletons had been insufficiently registered in the Catalogue of the Anatomical Collection of the Medical Faculty ("An - Katalog"). Most but not all specimens of both catalogues had been later registered in the *Catalogus generalis Musei Zoologici Berolinensis*. This general catalogue is today the main record of the mammal collection of the ZMB and was started by Peters in 1857.

Paul Matschie worked in a scientific capacity at the Berlin Museum starting around the time of Peters' death, and became curator of mammals in 1890, following A. Reichenow. Matschie's curatorial responsibilities also included herpetology until 1893, after which point he focused primarily on mammals until his death in 1926. Matschie was one of the most prolific German naturalists ever, to whom hundreds of specific designations are credited, although many of these are now considered synonyms.

Johann Georg Wagler worked with Johann Baptist von Spix, and after his death in 1829 became director of the zoological museum of Ludwig-Maximilians-Universität in Munich. His research activities focused on South American vertebrates, particularly reptiles, amphibians, and birds.

Other scientists and collectors that acquired important specimens for the ZMB include Johann Christoph Gundlach (1810–1896), Franz Ludwig Stuhlmann (1863–1928), Eduard Schnitzer (1840–1892, also known as Emin Pascha), Reinhold Buchholz (1837–1876), Gustav Adolf Fischer (1848–1887), Martin Eisentraut (1902–1994), Rudolf Grauer (1870–1927), Carl Eduard von Martens (1831–1904), Oscar Rudolph Neumann (1867–1946), Baron Carl Claus von der Decken (1833–1865), Friedrich Wilhelm Waldemar von Preussen (1817–1849), Fedor Jagor (1816–1900), Ferdinand von Krauss (1812–1890), Hermann Engelhard von Nathusius (1809–1879), Wilhelm Friedrich Hemprich (1796–1825), and Christian Gottfried Ehrenberg (1795–1876). Hemprich and Ehrenberg studied the natural history of Egypt and adjacent countries. In 1825 Hemprich died in Massaua [Massawa, Eritrea] and Ehrenberg, after he buried his friend, travelled back to Europe. Ehrenberg published the results of their discoveries in 1828–1832 under both their names in the "Symbolae Physicae" (Ehrenberg and Hemprich 1828).

## Terminology

The present type catalogue has been prepared in accordance with the rules and recommendations of the International Commission on Zoological Nomenclature (ICZN). Following the fourth edition of the ICZN (1999: 79–86), we use the following terms in the text below to refer to type specimens:

**Holotype:** single specimen identified by the author as representative of new species at time of publication.

**Paratype:** specimen(s) identified in the original publication as belonging to a type series, besides the holotype.

**Syntype:** series of specimens referred to in original and/or later publications as representative of the name-bearing type, but not necessarily identified by the original author as types. "Syntype" encompasses the preceding two type-categories.

**Lectotype:** specimen designated subsequent to original publication as superceding any previously existing syntypes. Designation of a lectotype results in nullification of previously existing holo/syn/paratypes (ICZN, 1999: articles 73, 74).

**Paralectotype:** Specimens previously regarded as types that have been superceded by designation of a Lectotype become known as paralectotypes (ICZN, 1999: article 74.1.3).

## Institutional Abbreviations

BMNH, The Natural History Museum London; MNHN, Musé National d'Histoire Naturelle Paris; NMW, Naturhistorisches Museum Wien, SMNS, Staatliches Museum für Naturkunde Stuttgart, ZFMK, Zoologisches Forschungsmuseum Alexander Koenig Bonn, ZMB, Museum für Naturkunde Berlin.

## Catalogue of type specimens

### **Afrotheria Stanhope *et al.*, 1998**

### **Tenrecoidea McDowell, 1958**

### **Chrysochloridae Gray, 1825**

### ***Amblysomus* Pomel, 1848**

### ***Chrysochloris holosericea* Lichtenstein, 1830**

Lichtenstein, H. (1830) Darstellung neuer oder wenig bekannter Säugethiere. Verlag C.G. Loderitz Berlin 1827–1834.

Valid name: *Amblysomus hottentotus* (A. Smith, 1829)

Syntypes: ZMB 721, ZMB 722, ZMB 723, ZMB 724, all are mounted skins still containing the skulls and elements of the distal limb-skeleton inside. All labeled specimens were collected by Krebs from the "Kap der guten Hoffnung" [Cape of good hope], and were entered into the ZMB collection on 22 February 1822.

Comments: As defined by Lichtenstein (1830), ZMB 76783 (skull, old number = A 2825) may also have been part of the type series.

### ***Calcochloris* Mivart, 1867**

### ***Chrysochloris obtusirostris* Peters, 1851**

Peters, W.C.H. (1851) Mittheilung über zwei neue Insectivoren aus Mossambique. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preußischen Akademie der Wissenschaften zu Berlin, 16: 467[467–468].

Valid name: *Calcochloris obtusirostris* (Peters, 1851)

Syntypes: ZMB 719, male, adult, body in alcohol; ZMB 720, female, juvenile, skin; ZMB 12945, female, adult, skin, skull, and skeleton; ZMB 31020 (old number = An 15187), fragmentary skull; ZMB 85341 (old number = An 17017), male, skull. Collected by Dr. W. Peters from Inhambane, Mozambique between 1843 and 1847.

### ***Chrysochloris* Lacepede, 1799**

### ***Chrysochloris stuhlmanni* Matschie, 1894**

Matschie, P. (1894) Drei neue Säugethiere (*Herpestes*, *Pediotragus*, *Chrysochloris*) von Ostafrika. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 1894: 123[121–125].

Valid name: *Chrysochloris stuhlmanni stuhlmanni* Matschie, 1894

Syntypes: ZMB 29456, female, skull, skeleton, skin of head (detached), collected from Kinjawanga, 950m (elevation), west of the Issango-Semliki river, "ungefähr 0°27' 30" nördl. / 29°50' östl., dicht an der Südgrenze des Urwaldgebietes", in what is today the Democratic Republic of Congo, near the Ugandan border, by F. Stuhlmann on 6 January 1892; ZMB 85340 male, skin, collected from "foot of Runssoro near Karevia in Ukondjo" in Uganda by Emin Pascha on 13 June 1891. A third type female skull, also collected from Kinjawanga by F. Stuhlmann on 4 January 1892, is currently missing.

Comments: Matschie (1894: 124–125) appears to indicate two female specimens collected by Stuhlmann from the Kinjawanga locality: "weib. Schädel, weib. Skelett, Kopf davon in Alcohol" (p. 125). Furthermore, he provides three dates following his telegraphic species description in Latin that presumably correspond with the collection dates for each of the three specimens: "4.1.92, 6.1.92, 13.VI.91," followed by "1 male, 2 female female" using gender symbols (p. 124). The former two dates correspond with F. Stuhlmann's collecting activities at or near Kinjawanga in 1892. Since Matschie's description, only one accession number (29456) for a golden mole in the Berlin collection has been attributed to this locality. Two additional skulls of *C. stuhlmanni* are present in the ZMB collection (77162, 77163), but lack accession or locality data. One of these may comprise Stuhlmann's second Kinjawanga specimen, but we cannot be sure.

### ***Lipotyphla* Haeckel, 1866**

### ***Erinaceomorpha* Gregory, 1910**

### ***Erinaceidae* Fischer, 1814**

### ***Atelerix* Pomel, 1848**

### ***Erinaceus krugi* Peters, 1877**

Peters, W.C.H. (1877) Über eine auf der Insel Puertorico gemachte Sammlung von Säugethieren und Amphibien sowie über die Entwicklung eines Batrachiers *Hylodes martinicensis* ohne Metamorphose. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1877 [for 1876]: 703–714.

Valid name: *Atelerix algirus* (Lereboullet, 1842)

Holotype: ZMB 5157, sex indet., skull and skin. This specimen was collected by Krug, apparently from Mayaguez, Puerto Rico where it had presumably been introduced.

Comments: Hutterer (1983) favored the possibility that the type specimen was introduced into Puerto Rico from Spain or North Africa, as is known to be the case with *Chlorocebus aethiops* in the Cape Verde Islands and *Atelerix algirus* in the Canary Islands.

### ***Erinaceus* Linnaeus, 1758**

#### ***Erinaceus hanensis* Matschie, 1907**

Matschie, P. (1907) Chinesische Säugetiere. In: Expedition Filchner nach China und Tibet. Zool.-Bot. Ergebnisse, p. 138 [134–242], Berlin

Valid name: *Erinaceus amurensis* Schrenk, 1859

Holotype: ZMB 50765, sex indet., skin. The type was collected by Kreyenberg from Han-kiang, China in 1904.

Comments: The BMNH London holds a referred type specimen (no. 1908.12.14.2) of *Erinaceus hanensis* Matschie, 1907. However, based on the type description, ZMB 50765 is the actual holotype.

#### ***Erinaceus kreyenbergi* Matschie, 1907**

Matschie, P. (1907) Chinesische Säugetiere. In: Expedition Filchner nach China und Tibet Zool.-Bot. Ergebnisse, p. 135 [134–242], Berlin

Valid name: *Erinaceus amurensis* Schrenk, 1859

Comments: The holotype could not be found in the collection. Matschie may have sent it back to the Magdeburg Museum after description as indicated in the following quote (Matschie, 1907: 137): "Hilzheimer [1906:184] erwähnt einen durch Herrn Dr. Kreyenberg gesammelten Igel: "1 Fell dem der Kopf abgeschnitten ist. Wahrscheinlich *E. dealbatus* Swinh. In Schanghai auf dem Markt gekauft. 1904". Herr Professor Dr. Martens hat mir aus dem Magdeburger Museum auch diesen Igel zur Verfügung gestellt. Das Fell ist vollständig, ihm fehlt keineswegs der Kopf. Es ist aber das von Herrn Dr. Hilzheimer erwähnte Stück: denn auf dem Begleitzettel steht: "Dem Igel fehlt der Kopf, wahrscheinlich *Erinaceus dealbatus* Swinhoe."

Translation: "Hilzheimer (1906: 184) mentions a hedgehog collected by Kreyenberg (Matschie, 1907: 137): '1 skin from which the head is removed. Probably *E. dealbatus* Swinh. Purchased at a market in Shanghai. 1904.' Martens made this specimen available to me via the Museum in Magdeburg. The skin is complete, including the head. It is nevertheless the specimen mentioned by Hilzheimer, as the specimen tag indicates 'the hedgehog is lacking the head, probably *Erinaceus dealbatus* Swinhoe.' "

The holotype also could not be found in the collection of the Magdeburg Museum of Natural History [pers. comm. by Dr. Hans Pellmann]. Since all documentation (old entry books and catalogues) in the Magdeburg Museum has been destroyed during the Second world war, the whereabouts of the holotype specimen are unclear. According to the online-list of mammal type specimens [www.nhm.ac.uk/research-curation/projects/mammal-types](http://www.nhm.ac.uk/research-curation/projects/mammal-types), and P. Jenkins (pers. comm.), the BMNH holds spines of the holotype (1908.12.14.3), which probably were exchanged from Magdeburg.



### ***Erinaceus danubicus* Matschie, 1901**

Matschie, P. (1901) Über rumänische Säugethiere. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 1901: 229 [220–238].

Valid name: *Erinaceus roumanicus* Barrett-Hamilton, 1900

Syntype: ZMB 12663, male, skull and skin. Collected from Prundu, Romania, by Dombrowski in April–May 1901.

Comments: Matschie did not designate a holotype. The description was based on 5 specimens of which one remained in the ZMB. The further 4 syntypes are presumably in the Grigore Antipa Museum Bucharest.

### ***Erinaceus tschifuensis* Matschie, 1907**

Matschie, P. (1907) Chinesische Säugetiere. In: Expedition Filchner nach China und Tibet Zool.-Bot. Ergebnisse, p. 137 [134–242], Berlin

Valid name: *Erinaceus amurensis* Schrenk, 1859

Holotype: ZMB 4625, adult, mounted skin, skull extracted; purchased from Gerrard from Tschifu [Yantai, Shandong], China

Comments: The BMNH London holds spines of a specimen (no. 1908.12.14.1) listed as the holotype of *Erinaceus tschifuensis* Matschie, 1907 in the online list of mammal type specimens mentioned above. However, in the original description (Matschie 1907), ZMB 4625 is clearly designated as the holotype, and is so recognized here.

### ***Erinaceus roumanicus dissimilis* Stein, 1929**

Stein, G. (1929) Zur Kenntnis von *Erinaceus roumanicus* B.-Hamilt. Zeitschrift für Säugetierkunde 4: 240 [240–250].

Valid name: *Erinaceus roumanicus* Barrett-Hamilton, 1900

Holotype: ZMB 41381 (adult male), skin, skull extracted. Collected by Kühnast from Klein-Stürlack, Ostpreussen [formerly East Prussia, today Poland] on 30 May 1929.

Comment: Seven additional paratypes from his private collection were mentioned by G. Stein in his description, none of which could be traced.

### ***Hemiechinus Fitzinger, 1866***

*Erinaceus (albulus) holdereri* Matschie, 1922

Matschie, P. (1922) Bemerkungen über einige tibetanische Säugetiere. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 1922: 73 [65–77].

Valid name: *Hemiechinus auritus* (Gmelin, 1770)

Holotype: ZMB 32180 (skin) & ZMB 32181 (skull) from the same individual, male. Collected by Holderer in the Gobi on 24 May 1898.

### ***Erinaceus albulus turfanicus* Matschie, 1911**

Matschie, P. (1911) Über einige von Herrn Dr. Holderer in der südlichen Gobi und in Tibet gesammelte Säugetiere. In: K. Futterer, Durch Asien. Bd. 3, 5, Zool.: 4 [1–29], Berlin.

Valid name: *Hemiechinus auritus* (Gmelin, 1770)

Holotype: ZMB 32178 (skin) and ZMB 32179 (skull) from the same individual, male. Collected by Holderer from Chami, Sinkiang [Xinjiang, China] on 4 May 1898.

### ***Erinaceus libycus* Ehrenberg, 1828**

[Hemprich, W.F. &] Ehrenberg, C.G. (1832) *Symbolae Physicae seu Icones et Descriptiones corporum naturalium novorum aut minus cognitorum quae ex itineribus per Libyam Aegyptum Nubiam Dongalam Syriam Arabiam et Habessiniam... Pars Zoologica I. [Mammalia]*. Berlin, ex Officina Academica, 1828 [1828–1832] [unpaginated].

Valid name: *Hemiechinus auritus* (Gmelin, 1770) ssp. *libycus* (Ehrenberg, 1828)

Syntypes: ZMB 732, male, mounted skin with skull inside; ZMB 733, female, juvenile, mounted skin with skull inside. Collected by Hemprich and Ehrenberg in Egypt 1820–1823.

### ***Paraechinus* Trouessart, 1879**

### ***Erinaceus aethiopicus* Ehrenberg, 1832**

[Hemprich, W.F. &] Ehrenberg, C.G. (1832) *Symbolae Physicae seu Icones et Descriptiones corporum naturalium novorum aut minus cognitorum quae ex itineribus per Libyam Aegyptum Nubiam Dongalam Syriam Arabiam et Habessiniam... Pars Zoologica I. [Mammalia]*. Berlin, ex Officina Academica, 1832[1828–1832]: 2, sig. k, footnote [unpaginated].

Valid name: *Paraechinus aethiopicus* (Ehrenberg, 1832)

Holo- or Syntype: ZMB 731, sex indet., skull and skin, collected by Hemprich and Ehrenberg from Egypt, 1820–1823.

Comment: In the original description Ehrenberg provided no details on the number of specimens examined.

### ***Soricomorpha* Gregory, 1910**

### ***Solenodontidae* Gill, 1872**

### ***Solenodon* Brandt, 1833**

### ***Solenodon cubanus* Peters, 1861**

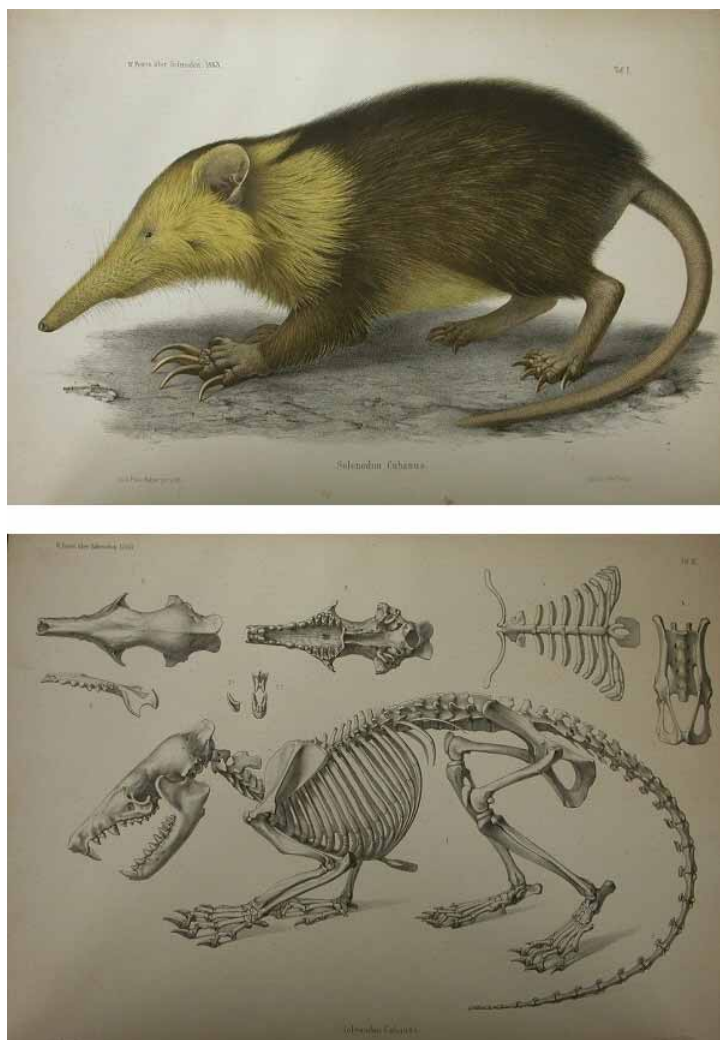
Peters, W.C.H. (1861) Bemerkungen über einen *Solenodon cubanus*. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1861: 169[169].

Description and figures in: Peters, W.C.H. (1863) Über die Säugethiergattung *Solenodon*. Abhandlungen der Königl. Akademie der Wissenschaften zu Berlin, 1863: 1–22, Tafeln I–III.

Valid name: *Solenodon cubanus* Peters, 1861

Lectotype (here designated): ZMB 2761 (adult female), skin, skull and skeleton, according to the catalogue entry by Peters collected from "Aguilera, am Abhange der Sierra Maestra, zwischen Cap Maisi und Cap Cruz" in Cuba by J. Gundlach, ded. by Sezekorn.

Comments: Ottenwalder (2001) in his revision of the genus *Solenodon* considered an animal from Bayamo as the holotype: "Holotype: Adult female from the mountains near Bayamo, Provincia Granma, Cuba; Berlin Academy of Sciences. Obtained by J. Gundlach." This author possibly considered the specimen ZMB 4014, a female in alcohol collected near Bayamo, Cuba, by Gundlach (original catalogue entry). Together with a juvenile male (ZMB 4015) from the same collector and locality, ZMB 4014 was catalogued between 1867 and 1869, and therefore most probably after the publication of Peters (1861). Peters' description of *S. cubanus* however was based primarily on the female ZMB 2761. He also mentioned a male specimen from the mountains near Bayamo, Cuba, that had been described by Poey and which Peters included in his new species. He listed measurements (taken by Poey) of that specimen. According to the Code (ICZN 1999, article 73.2.1) it should be regarded as a syntype, together with ZMB 2761. The male specimen of Poey could not be located, and it is unknown whether it still exists in a collection.



**FIGURE 1.** Original figures of *Solenodon cubanus* Peters, 1861, adapted from Peters (1863).

The specimens 2761 and 4014 had both been marked with a type symbol in the ZMB catalogue. However, this is for the latter specimen an error. We believe that specimens 4014 and 4015 have no type status. In addition, both are still completely preserved in alcohol and could not have served for Peters' description, which

includes a detailed analysis of the skeleton and the inner soft parts. Measurements and the plate published by Peters (Fig. 1) agree well with ZMB 2761, a now stuffed and mounted specimen with skull and skeleton preserved (Figs. 2 – 3). Therefore, we designate ZMB 2761 as lectotype for *Solenodon cubanus*.



**FIGURE 2.** Skin of the Lectotype specimen ZMB 2761 *Solenodon cubanus* Peters, 1861 in lateral, dorsal and ventral views.



**FIGURE 3.** Skull of the Lectotype specimen ZMB 2761 *Solenodon cubanus* Peters, 1861 in ventral, dorsal and lateral views.

## **Soricidae Fischer, 1814**

### **Crocidurinae Milne-Edwards, 1872**

#### ***Crocidura* Wagler, 1832**

#### ***Crocidura dolichura* Peters, 1876**

Peters, W.C.H. (1876) Über die von dem verstorbenen Dr. Reinhold Buchholz in Westafrika gesammelten Säugethiere. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin: 475 [469–485].

Valid name: *Crocidura dolichura* Peters, 1876

Holotype: ZMB 5037, female, body in alcohol, skull extracted. Collected by Buchholz from “Bonjongo” [near Victoria, Mt. Cameroon] in Cameroon, ca. 1874–1875.

Comments: The skull of the holotype was figured by Brosset *et al.* (1965, figs. 2, 4, 6, 8).

#### ***Crocidura fischeri* Pagenstecher, 1885**

Pagenstecher, A. (1885) Die von Dr. G.A. Fischer auf der Reise in das Massai-Land gesammelten Säugethiere. Jahrbuch der Hamburgischen Wissenschaftlichen Anstalten, 2: 34 [31–46].

Valid name: *Crocidura fischeri* Pagenstecher, 1885

Holotype: ZMB 98251, male, mounted skin (with a skull imitation inside), skull apparently lost. Collected by G.A. Fischer from “Nguruman, Massai-Land” [Kenya] in 1883.

Comments: The type, formerly in the Hamburg Museum, was believed to be lost (Heim de Balsac & Meester 1977) but was rediscovered in the Berlin collection in 1983 (Hutterer 1986). The currently-missing skull had been figured by Pagenstecher (1885); how the skin was transferred to Berlin remains unknown.

#### ***Crocidura vulcani* Heim de Balsac, 1956**

Heim de Balsac, H. (1956) Diagnoses de *Crocidura* inédites d’ Afrique occidentale. Mammalia, 20 (2), 134 [131–139].

Valid name: *Crocidura virgata* Sanderson, 1940

Holotype (designated by description): ZMB 91354 skull and skin, sex indet. Collected by Eisentraut from Bibundi-Krater, Mt. Cameroun (1600m), Cameroon on 4 May 1938.

#### ***Sorex cinnamomeus* Lichtenstein, 1829**

Lichtenstein, H. (1829) Verhandlungen der Gesellschaft Naturforschender Freunde zu Berlin 1829, 2: 385.

Valid name: *Crocidura flavescens* Geoffroy, 1827

Syntypes: ZMB 678, 679 and 681 (= An 17025, juv), mounted skins with skull inside. Collected by Mundt and Maire from “Cap” [Cape of Good Hope, western Cape Province, South Africa].

### ***Sorex rutilus* Sundevall, 1846**

Sundevall, C.J. (1846) Nya Mammalia fran Sydafrika. Öfersigt af kongl. Vetenskaps-Akademiens Förhandlingar, 3(2): 119 [118–121].

Valid name: *Crocidura flavescens* Geoffroy, 1827

Syntype: ZMB 685, skin with skull inside. Collected by J. Wahlberg from Port Natal [= Durban, South Africa], [1842–1843].

### ***Crocidura foetida* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 586 [584–596].

Valid name: *Crocidura foetida* Peters, 1870

Holotype: ZMB 3826, male, adult, body in alcohol. Collected by von Martens, Bengkajang [Benkayang], Borneo, [13 March–13 June 1863].

Comments: In his original description, Peters (1870: 586) does not identify the sex of the type. However, he does describe the presence of lateral glands, indicative of a sexually mature male.

### ***Crocidura doriae* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 587 [584–596].

Valid name: *Crocidura foetida* Peters, 1870 ssp. *doriae* Peters, 1870

Holotype: ZMB 3508, female, adult, body in alcohol; collected from Sarawak, Borneo by Marquis J. Doria, between 1865 and 1867.

### ***Crocidura bicolor sansibarica* Neumann, 1900**

Neumann, O. (1900) Die von mir in den Jahren 1892–95 in Ost- und Central-Africa, speciell in den Massai-Ländern und den Ländern am Victoria Nyansa gesammelten und beobachteten Säugethiere. Zoologische Jahrbücher, Abteilung für Systematik, Jena 13 (6): 544 [529–562].

Valid name: *Crocidura fuscomurina* (Heuglin, 1865)

Holotype: ZMB 83301 (= A 5486), female, adult, body in alcohol Collected by Neumann from “Mojoni, Sansibar” [Tanzania] between 8–12 January 1893.

### ***Crocidura gracilipes* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 590 [584–596].

Valid name: *Crocidura gracilipes* Peters, 1870

Syntype: ZMB 3905, sex indet., body in alcohol, skull extracted. Collected by von der Decken from “Kilima Ndjaro” [Kilimanjaro, Tanzania] [between July 1861 and 1865].

Comments: The status of this taxon is unresolved. The type locality was given by Peters as “Auf der Reise nach dem Kilimandscharo”, which leaves considerable ambiguity. The skull was figured by Heim de Balsac (1968a, fig. 14).

### ***Crocidura hirta* Peters, 1852**

Peters, W.C.H. (1852) Naturwissenschaftliche Reise nach Mossambique, auf Befehl seiner Majestät des Königs Friedrich Wilhelm IV. in den Jahren 1842 bis 1848 ausgeführt. Berlin, p. 78.

Valid name: *Crocidura hirta* Peters, 1852

Syntypes: ZMB 668, male, skin, skull; ZMB 669, gravid female, skin, skull. Both specimens were collected by W. Peters from Tette, Mozambique between 1843 and 1847.

Comments: Peters (1852, p. 81), noted three specimens (1 male and 2 females, one of which was gravid). The non-gravid female does not appear to be in the ZMB collection.

### ***Crocidura annellata* Peters, 1852**

Peters, W.C.H. (1852) Naturwissenschaftliche Reise nach Mossambique, auf Befehl seiner Majestät des Königs Friedrich Wilhelm IV. in den Jahren 1842 bis 1848 ausgeführt. Berlin, p. 85.

Valid name: *Crocidura hirta* Peters, 1852

Syntypes: ZMB 672, 673, 674 (skins) and for this A 5528 (3 skulls, which can not be associated individually to 672–674), 2 males and 1 female. Collected by W. Peters from Tette, Mozambique, between 1843 and 1847.

Comment: Peters (1852: 86) discussed three specimens.

### ***Crocidura canescens* Peters, 1852**

Peters, W.C.H. (1852) Naturwissenschaftliche Reise nach Mossambique, auf Befehl seiner Majestät des Königs Friedrich Wilhelm IV. in den Jahren 1842 bis 1848 ausgeführt. Berlin, p. 83.

Valid name: *Crocidura hirta* Peters, 1852

Holotype (as indicated in the original description): ZMB 671 (= A 5523 and An 17023), female, skin, skull. Collected by W. Peters from “Inhofa”, along Zambesi River, Tette, Mozambique, between 1843 and 1847.

### ***Crocidura sacralis* Peters, 1852**

Peters, W.C.H. (1852) Naturwissenschaftliche Reise nach Mossambique, auf Befehl seiner Majestät des Königs Friedrich Wilhelm IV. in den Jahren 1842 bis 1848 ausgeführt. Berlin, p. 82.



Valid name: *Crocidura hirta* Peters, 1852; fide Ellerman, Morrison-Scott & Hayman (1953).

Holotype (by original description): ZMB 670 (old number A 5526), female, juvenile, skin, skull, peninsula Cabaceira, Mozambique, leg. W. Peters between 1843 and 1847.

### ***Crocidura retusa* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 585 [584–596].

Valid name: *Crocidura horsfieldii* (Tomes, 1856)

Syntypes: ZMB 83306, male, extracted skull and body in alcohol; ZMB 3814, male, body in alcohol Collected by Cuming from Paradenia, Sri Lanka.

### ***Crocidura monticola* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 588 [584–596].

Valid name: *Crocidura monticola* Peters, 1870

Holotype: ZMB 3820, male, body in alcohol, skull damaged. Collected by F. Jagor from Mt. Lawu (3,500 feet), Surakarta, Java, between 1857 and 1861.

### ***Crocidura nigrofuscus* Matschie, 1895**

Matschie, P. (1895) Die Säugethiere Deutsch-Ost-Afrikas. Berlin: p. 33 [1–157].

Valid name: *Crocidura nigrofuscus* Matschie, 1895

Holotype: ZMB 83308 (= A 5572), female, skin, skull. Collected by F. Stuhlmann from Wukalala, Kinjawanga, D.R. Congo on 4 January 1892, on the same expedition during which he collected the types of central African golden moles (see above).

### ***Crocidura manni* Peters, 1878**

Peters, W.C.H. (1878) Mitteilung über eine neue Spitzmaus aus Westafrika. Sitzungsberichte der naturforschenden Freunde zu Berlin, 1878: 19 [19–20].

Valid name: *Crocidura olivieri* (Lesson, 1827) ssp. *manni* Peters, 1878

Paralectotypes: ZMB 5253, female, body in alcohol, skull extracted; ZMB 5254, juvenile in alcohol. Both specimens were collected by Mann from Lagos, Nigeria and given to the ZMB by F. Krauss (Stuttgart).

Comments: Other elements of the type series are located in the SMNS (Stuttgart). Peters (1878) described three females, one of which was gravid with three embryos, given to him by Krauss of the Stuttgart Museum.

Presumably one of the females and a neonate remained in Berlin. Hutterer and Happold (1983: 42) designated the specimen SMNS 1646a as lectotype.

### ***Crocidura martiensseni* Neumann, 1900**

Neumann, O. (1900) Die von mir in den Jahren 1892–95 in Ost- und Central-Africa, speciell in den Massai-Ländern und den Ländern am Victoria Nyansa gesammelten und beobachteten Säugethiere. Zoologische Jahrbücher, Abteilung für Systematik, Jena 13 (6): 544 [529–562].

Valid name: *Crocidura olivieri* (Lesson, 1827) ssp. *martiensseni* Neumann, 1900

Holotype: ZMB 8909, female, body in alcohol, skull extracted. Collected by Martienssen from Magrotto, Usambara [Tanzania] on 04 December 1896.

Paratypes: ZMB 9411, male, body in alcohol, and for this ZMB 9412 (skull extracted); ZMB 9413, female, body in alcohol, and for this ZMB 9414 (skull extracted); ZMB 9415, female, body in alcohol, and for this ZMB 9416 (skull extracted); all paratypes collected by Martienssen from the same locality as the holotype, but at a later date (29 May 1897). An additional specimen in alcohol containing a skull inside (A 5487), collected by O. Neumann from Kilimanjaro Marangu in April 1895, probably also belongs to the type series.

Comments: Neumann (1900: 544) identified a specimen from the Usambara Mountains collected by Martienssen as the holotype.

### ***Crocidura flavescens nyansae* Neumann, 1900**

Neumann, O. (1900) Die von mir in den Jahren 1892–95 in Ost- und Central-Africa, speciell in den Massai-Ländern und den Ländern am Victoria Nyansa gesammelten und beobachteten Säugethiere. Zoologische Jahrbücher, Abteilung für Systematik, Jena 13 (6): 544 [529–562].

Valid name: *Crocidura olivieri* (Lesson, 1827) ssp. *nyansae* Neumann, 1900

Syntypes: ZMB 83312 (= A 5484), female, juvenile, skin; ZMB 83311 (= A 5485), skin, skull; ZMB 83314 (= A 5491), female, body in alcohol; ZMB 25490 (= A 5490) skin, ZMB 83313 skull (but according to the label the collector is listed as Schillings); ZMB 83316 (= A 5492), skull; ZMB 83315 (= A 5493), skull. Syntypes collected by Neumann from Kwa Lubwa [= Djindja Ussoga], Uganda between May and October 1894.

Comments: Neumann (1900: 544) discussed five specimens: 2 adult females, 1 juvenile female, 1 adult male, 1 unsexed juvenile. Neumann did not fix a holotype; however, the ZMB collection data indicates that the specimens listed above are most likely those discussed by him.

### ***Crocidura schweitzeri* Peters, 1877**

Peters, W.C.H. (1877) Über eine neue Gattung von Flederthieren, *Amorphochilus*, aus Peru und über eine neue *Crocidura* aus Liberia. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1877: 187 [184–189].

Valid name: *Crocidura poensis* (Fraser, 1843)

Holotype: ZMB 5421, skin without skull, collected by Schweitzer from Liberia.

Comment: The taxonomy of the *C. poensis* species group is still not settled, and *C. schweitzeri* remains a potential name for the West African population.

### ***Sorex pachyurus* Küster, 1835**

Küster, H.C. (1835) Beiträge zur Naturgeschichte der Insel Sardinien. Isis von Oken 28: 77 [75–78].

Valid name: *Crocidura pachyura* (Küster, 1835)

Syntypes: ZMB 15116, male, body in alcohol, skull extracted [May 2006], ZMB 83304, sex, indet., body in alcohol; both specimens collected by Küster from Cagliari, Sardinia, Italy. ZMB 15116 is here designated as the lectotype.

Comments: Küster mentioned four specimens from Cagliari, for which he proposed a new name, in case the species turns out to represent a new species ("Sollte sich diese Art als neu bestätigen, so würde ich, wegen des kurzen, dicken Schwanzes, den Namen *pachyurus* vorschlagen"). Two of these survived in the Berlin collection. Following the old general catalogue, the specimens were collected in Sardinia and donated by Küster (see Bolling, 1968 for biographic details); they came into the museum collection through the Landwirtschaftliche Hochschule Berlin, which contained the collection of Hermann Engelhard von Nathusius (1809–1879), who possibly stayed in contact with Küster.

Species status for the *Crocidura* population of Sardinia and other Mediterranean and North African populations was recently proposed by Cosson *et al.* (2005) based on a phylogeographic analysis of the *C. russula* species group across Europe and North Africa. The newly identified taxon was formally named *C. ichnusae* by Hutterer (2005), being the earliest name that could be properly identified genetically and morphologically.

The taxon *pachyurus* was erroneously assigned to *Suncus etruscus* in many taxonomic checklists from Miller (1912) to Hutterer (2005). Recently, Contoli *et al.* (2002) analysed Küster's description and concluded, in the absence of a type specimen, that *pachyurus* most probably represents a *Crocidura* and not *Suncus etruscus*. In a forgotten publication Cavazza (1912) came to the same conclusion. The surprising rediscovery of the syntypes in Berlin and the study of the skull of ZMB 15116 support their view. The syntypes of *Sorex pachyurus* perfectly agree with the *Crocidura* population of Sardinia currently called *C. ichnusae* Festa, 1912 (voucher specimens used for the genetic study of Cosson *et al.* 2005 available at ZFMK Bonn). We therefore conclude that the name *Crocidura pachyura* (Küster, 1835) should be used for that species. As *Crocidura russula* (Hermann, 1780) and *C. pachyura* are cryptic sister taxa, a type specimen should be available; we therefore select ZMB 15116 as the lectotype of *C. pachyura*.

Measurements of ZMB 15116 (Figs. 4 – 6) are given here for first time: head and body length 65 mm; tail 36 mm; hindfoot (without claws) 13 mm; ear 9 mm; condylobasal length 18.0 mm; zygomatic width 5.8 mm; width of processus postglenoidalis 5.8 mm; upper toothrow 8.1 mm; height of processus coronoideus 4.5 mm. The external measurements, particularly the short tail, are typical for the Sardinian population (Kahmann & Einlechner 1959). The skull size is at the lower limit of the range known from the Sardinian population.

### ***Crocidura maior* Wagler, 1832**

Wagler, J.G. (1832) Neue Sippen und Gattungen der Säugethiere und Vögel. Isis von Oken 25: 1218.

Valid name: *Crocidura russula* (Hermann, 1780)

Syntypes: ZMB 22016, sex indet., body in alcohol, skull extracted (missing), collected from Eichstedt by Wagler; ZMB 22018, (juvenile male ?), body in alcohol. Collector unknown, from Bavaria, Germany.

Comments: Wagler used the name "maior" and not "major" as listed in Hutterer (2005).



**FIGURE 4.** Body (in alcohol) of the Lectotype specimen ZMB 15116 *Sorex pachyurus* Küster, 1835 [now *Crocidura pachyura*] in lateral view.

#### ***Crocidura poliogastra* Wagler, 1832**

Wagler, J.G. (1832) Neue Sippen und Gattungen der Säugethiere und Vögel. Isis von Oken 25: 1218.

Valid name: *Crocidura russula* (Hermann, 1780)

Syntype: ZMB 22017, very young specimen, sex indet., body in alcohol, collected near the Rhine (“ad Rhenum”); no further data available.

#### ***Crocidura rufa* Wagler, 1832**

Wagler, J.G. (1832) Neue Sippen und Gattungen der Säugethiere und Vögel. Isis von Oken 25: 1218.

Valid name: *Crocidura russula* (Hermann, 1780)

Possible Syntypes: ZMB 83303, female, body in alcohol; ZMB 22014, male, body in alcohol. Collector unknown, from Thüringen (Thuringia), Germany.

Comment: ZMB 83303 and 22014 are listed in the ZMB catalogue as “Originale”(originals), but Wagler noted “ad Rhenum” as the type locality, which does not fit with “Thuringia”.



**FIGURE 5.** Skull of the Lectotype specimen ZMB 15116 *Sorex pachyurus* Küster, 1835 in lateral view.

***Crocidura moschata* Wagler, 1832**

Wagler, J.G. (1832) Neue Sippen und Gattungen der Säugethiere und Vögel. Isis von Oken 25: 1218.

Valid name: *Crocidura suaveolens* (Pallas, 1811)

Syntype: ZMB 83309, in alcohol; collected in Bavaria (by implication); no further data available.

Comments: This taxon was listed as a synonym of *C. russula* by previous authors but voucher specimens were never studied. The skull of syntype ZMB 83309 was extracted in June 2006 and revealed the identity of *moschata* as *C. suaveolens*. Measurements of ZMB 83309 are as follows: head and body length c. 59 mm, tail length 34 mm, hindfoot length 10.5 mm; skull small, third upper unicuspid smaller than second and parastyle of P4; condylobasal length 16.9 mm, maxillary width 5.5 mm, coronoid height 4.1 mm.



**FIGURE 6.** Skull of the Lectotype specimen ZMB 15116 *Sorex pachyurus* Küster, 1835 in dorsal and ventral view.

***Sorex fimbriatus* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Crocidura suaveolens* (Pallas, 1811)

Syntypes: ZMB 22006, body in alcohol, skull extracted [in June 2006]; ZMB 83310, male, body in alcohol, skull extracted [June 2006]. Collected from Bavaria, Germany (by implication). No further data available.

Comments: This taxon was listed as a synonym of *Crocidura russula* until recently. The extraction of skulls from the two syntypes in 2006 revealed its identity with *C. suaveolens*. Measurements of ZMB 22006, an old adult, are as follows: head and body length c. 57 mm, tail length 35 mm, hindfoot without claws 11 mm; skull broken but small, maxillary width 5.7 mm, coronoid height 4.0 mm; upper unicuspid 2 and 3 in line with parasytle of P4. Measurements of ZMB 83310 are as follows: head and body length c. 54 mm, tail length 37 mm, hindfoot length 11 mm; skull broken, maxillary width 5.3 mm, coronoid height 4.1 mm; third upper unicuspid smaller than U2 and parastyle of P4.

### ***Crocidura russula zimmermanni* Wettstein, 1953**

Wettstein, O.von (1953) Die Insectivora von Kreta. In: Zimmermann *et al.*: I. Die Wildsäuger von Kreta. Zeitschrift für Säugetierkunde 1953, 17: 12 [4–13].

Valid name: *Crocidura zimmermanni* Wettstein, 1953

Paratypes: ZMB 92659, male, ZMB 92661, female, ZMB 92662, female; ZMB 92658, male; ZMB 92660, female; skins & skulls. Collected by Zimmermann from Nidha Highlands, Ida, Crete (Greece), between 8–12 July 1942.

### ***Diplomesodon* Brandt, 1852**

#### ***Sorex pulchellus* Lichtenstein, 1823**

Lichtenstein, H. (1823) In: Eversmann, Reise von Orenburg nach Bokhara, Berlin, p. 124.

Valid name: *Diplomesodon pulchellum* (Lichtenstein, 1823)

Holotype: ZMB 680, skin and skull. Collected by Eversmann from the Aral Sea, Kyrgistan on 01 May 1821.

### ***Paracrocidura* Heim de Balsac, 1956**

#### ***Paracrocidura graueri* Hutterer, 1986**

Hutterer, R. (1986) Synopsis der Gattung *Paracrocidura* (Mammalia: Soricidae), mit Beschreibung einer neuen Art. Bonner zoologische Beiträge 37: 81 [73–90]

Valid name: *Paracrocidura graueri* Hutterer, 1986

Holotype: ZMB 83255, male, adult, body in alcohol, skull extracted. Collected by R. Grauer from primary forest behind the mountains adjacent to the northwestern shore of Lake Tanganjika [mountain forest at 2,000 m altitude, near Sibatwa, Itombwe-Massiv, Democratic Republic of Congo; according to Hartert 1909, Prigogine 1971, 1978] on 17 December 1908.

### ***Suncus* Ehrenberg, 1832**

#### ***Sorex etruscus* Savi, 1822**

Savi, P. (1822) Osservazioni sopra alcuni Topi Ragni Toscani. *Nuovo Giornale dei Letterati di Pisa*, 1: 60.

Valid name: *Suncus etruscus* (Savi, 1822)

Syntypes: ZMB 3540, sex indet., body in alcohol; ZMB 15111, sex indet., and ZMB 15112, sex indet., both specimens bodies in alcohol, skulls extracted. All specimens were collected by Savi from the region of Pisa, Italy. ZMB 3540 was given to the ZMB by Doria in 1868 but is presently missing.

Comments: Savi mentioned in his description that several original specimens were sent to Lichstenstein in Berlin, as well as to many other museums in Europe.

### ***Crocidura albicauda* Peters, 1866**

Peters, W.C.H. (1866) Vorläufige Übersicht der aus dem Nachlasse des Baron Carl von der Decken stammenden und auf seiner ostafrikanischen Reise gesammelten Säugethiere und Amphibien. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin: 885 [884–892].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntypes: ZMB 83302, female, juv., body in alcohol; ZMB 3463, male, adult, in alcohol, skull extracted. Collected by von der Decken from Angasija [Ngasidja, Grande Comore] ca. 1862.

Comments: Hutterer & Tranier (1990) discussed the status of *C. albicauda*. ZMB 3463 has the dental formula of *Crocidura*, but resembles *Suncus* in other skull characteristics, body size, and in having a thick, hairy white tail. Hence, Hutterer & Tranier regarded the specimen to be a *Suncus murinus*, missing one pair of unicuspid teeth. Specimens collected later by Voeltzkow on the same island are definitely *Suncus murinus*. Symmetrical absence of last upper unicuspid is not unusual in *Suncus murinus* and was also found in several Japanese populations, in one case in 100% of all animals from Nagasaki (Koyasu *et al.* 2005).

### ***Crocidura ceylanica* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 591 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Holotype: ZMB 3824, male, adult, body in alcohol Collected by Cuming from Paradenia, Sri Lanka.

### ***Crocidura (Pachyura) fuscipes* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 594 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntypes: ZMB 690, male, skin, skull; ZMB 3822, female, adult, lactating, body in alcohol, skull extracted; ZMB 83305, sex indet., body in alcohol Collected by F. Jagor from Singapore between 1857 and 1861.

Comments: Peters (1870: 594) mentioned six specimens in the type series, of which only the above three are currently accounted for in the ZMB collection.



### ***Suncus sacer* Ehrenberg, 1832**

[Hemprich, W.F. & Ehrenberg, C.G. (1832) *Symbolae Physicae seu Icones et Descriptiones corporum naturalium novorum aut minus cognitorum quae ex itineribus per Libyam Aegyptum Nubiam Dongalam Syriam Arabiam et Habessiniam...* Pars Zoologica I. [Mammalia]. Berlin, ex Officina Academica, 1832[1828–1832] [unpaginated].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntypes: ZMB 663, 664, and 665, skins, skulls. Collected by Hemprich and Ehrenberg from Suez, Egypt in 1823.

### ***Crocidura (Pachyura) kükenthalii* [kuekenthalii] Matschie, 1900**

Matschie, P. (1900) Die Säugethiere der von W. Kükenthal auf Halmahera, Batjan und Nord-Celebes gemachten Ausbeute. —In: Kükenthal, W: *Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo*. Zweiter Teil: Wissenschaftliche Reiseergebnisse. Bd. 3. *Abhandlungen der senckenbergischen naturforschenden Gesellschaft*, 25 (2): 279 [247–296], Frankfurt a.M.

Valid name: *Suncus murinus* (Linnaeus, 1766)

Holotype (designated by Matschie): ZMB 83300, female, adult, body in alcohol, skull extracted;

Paratype (designated by Matschie): uncatalogued, female, juvenile, body in alcohol; both specimens collected from Tobelo, Halmahera by Kükenthal, May 1894.

### ***Crocidura luzoniensis* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1870: 595 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntypes: ZMB 3821, female, body in alcohol; collected by F. Jagor from Daraga (Philippines) between 1857 and 1861; ZMB 3823, female, body in alcohol; collected by von Martens from Manila between 1859 and 1862.

### ***Crocidura (Pachyura) media* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1870: 592 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Holotype: ZMB 3815, male, adult, body in alcohol. Collected by Cuming from Paradenia, Sri Lanka.

### ***Crocidura microtis* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. *Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin*, 1870: 589 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntypes: ZMB 83307, juvenile, skin, skull; ZMB 3870, juvenile, skin without skull. Collected by Faber from Hong Kong, China.

### ***Crocidura sumatrana* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 593 [584–596].

Valid name: *Suncus murinus* (Linnaeus, 1766)

Holotype: ZMB 3825, female, adult, body in alcohol, skull extracted, collected from Palembang, Sumatra by Dr. von Martens between 26 March and 30 June 1862.

### ***Crocidura Waldemarii* Peters, 1870**

Peters, W.C.H. (1870) Über neue Arten von Spitzmäusen des Königl. Zoologischen Museums aus Ceylon, Malacca, Borneo, China, Luzon und Ostafrika. Monatsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin, 1870: 590 [584–596].

Valid name: *Suncus murinus* Linnaeus, 1766

Holotype: ZMB 662, adult female, skin, skull. Collected by Prince Waldemar of Prussia from “Bengalen” (India) between 1844 and 1846.

Comments: This specimen had not previously been identified as a type in the collection; it is however the only registered soricid specimen collected by Prince Waldemar of Prussia during an expedition to India 1844–1846. Peters (1870) observed a single specimen.

### ***Sorex crassicaudus* Lichtenstein, 1829**

Lichtenstein, H. (1829) Verhandlungen der Gesellschaft Naturforschender Freunde zu Berlin, p. 386.

Valid name: *Suncus murinus* (Linnaeus, 1766)

Syntype: ZMB 663, skin and skull. Collected by Hemprich and Ehrenberg from Suez, Egypt 1823.

Comment: The taxon name and description are credited to Lichtenstein 1829, although he mentioned a publication planned by Ehrenberg. Previously the taxon was credited to Hemprich & Ehrenberg 1832 (or 1834).

### ***Sylvisorex* Thomas, 1904**

### ***Sylvisorex howelli usambarensis* Hutterer, 1986**

Hutterer, R. (1986) Diagnosen neuer Spitzmäuse aus Tansania (Mammalia: Soricidae). Bonner zoologische Beiträge 37: 23 [23–33]

Valid name: *Sylvisorex howelli* Jenkins, 1984

Holotype: ZMB 83838, male, adult, body in alcohol, skull extracted. Collected in 1898 by Martienssen from Ambangulu, West Usambara Mountains, Tanzania.

### ***Sylvisorex johnstoni dieterleni* Hutterer, 1986**

Hutterer, R. (1986) Diagnosen neuer Spitzmäuse aus Tansania (Mammalia: Soricidae). Bonner zoologische Beiträge 37: 25 [23–33]

Valid name: Provisionally *Sylvisorex johnstoni dieterleni* Hutterer, 1986; *Sylvisorex johnstoni* (Dobson, 1888) contains more than one genetic lineage (Querouil *et al.* 2003), and *S. dieterleni* would be a potential taxon name for an eastern clade.

Holotype: ZMB 7563, female, adult, body in alcohol, skull extracted. Collected by Graf Götzen from Usambiro, NW-Tanzania.

### ***Myosorex preussi* Matschie, 1893**

Matschie, P. (1893) Über einige afrikanische Säugethiere. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin: 177 [175–178].

Valid name: *Sylvisorex morio* (Gray, 1862)

Syntypes: ZMB 6990, female, skull (skin of *Sorex araneus*, original skin presumably lost, see below); ZMB 6991, female, skin and skull; ZMB 6992, skin (skull of *Crocidura attila*, see below); all collected by Preuss from Buea, Cameroon, elevation 950 m.

Comments: Matschie based his original description on “three females from Buea, Cameroon, 950 m elevation”. However, this small series actually consists of three different genera and species. Upon inspection of the type series, Heim de Balsac & Lamotte (1956) concluded that some mismatching must have occurred at the Berlin Museum during Matschie’s tenure. They identified the skin ZMB 6990 as the “Type” (marked with an asterisk in the catalogue) of “*Myosorex preussi*”, but the associated skull as belonging to *Sylvisorex morio*. The remaining specimens were listed as “Cotype A” (skin and skull of *Sylvisorex morio*) and “Cotype B” (skin of *S. morio*, skull of *Crocidura attila*). In a subsequent publication, Heim de Balsac (1968b) figured the skin of ZMB 6990 as the type and only representative of what he believed to be *Myosorex preussi*. It must be mentioned that this skin closely resembled skins of *Myosorex* proper from Cameroon described for the first time in that report. However, Hutterer (1993) identified the same skin as belonging to European *Sorex araneus*, while he found the other determinations to be correct. In fact, the colour of the skin reminded him of similar specimens from Brandenburg near Berlin. By declaring the skin of *Sylvisorex preussi* as the “Type” in 1956 (if equivalent to a lectotype designation), Heim de Balsac & Lamotte (1956) would have made the taxon a junior synonym of *Sorex araneus*, as followed by Hutterer (1993, 2005). It is impossible to know when the present mismatching of specimens occurred. Some details of Matschie’s description (page 177, “Einem Exemplar fehlt dieser Zahn”) suggest that the skull of *Crocidura attila* was already mismatched with the skin of *Sylvisorex morio* of ZMB 6992 when Matschie had the series on his desk. The *Sorex araneus* skin of ZMB 6990 deviates strongly from the other two skins in the series (see Fig. 7) and we assume that Matschie would have noticed the difference. It may have been associated with the wrong skull during the 50 years that passed between Matschie’s description and Heim de Balsac’s visit of the Berlin Museum in the 1950s. If so, then the selection of this skin by Heim de Balsac & Lamotte (1956) was invalid. Given that the other specimens of the type series represent species like *Sylvisorex morio* and *Crocidura attila* that do occur at Buea, Mt Cameroon

(Eisentraut 1963), and given that ZMB 6991 is the only remaining specimen with correctly associated skin and skull, we select ZMB 6991 as the lectotype of *Myosorex preussi* Matschie, 1893. The taxon therefore becomes a synonym of *Sylvisorex morio* (Gray, 1862).



**FIGURE 7.** Skins of the type series of *Myosorex preussi* Matschie, 1893. ZMB 6992 and 6991 belong to *Sylvisorex morio* as shown by Heim de Balsac & Lamotte (1956). Note that Hutterer (1993) identified the skin of ZMB 6990 as belonging to European *Sorex araneus*.

## Soricinae Fischer, 1814

### *Nectogale* Milne-Edwards, 1870

#### *Nectogale elegans* Milne-Edwards, 1870

Milne-Edwards, A. (1870) Note sur quelques Mammifères du Tibet oriental. Comptes rendus de l'Académie des sciences Paris, 70: 341 [341–342].

Valid name: *Nectogale elegans* Milne-Edwards, 1870

Paratype: ZMB 4797, male, adult, skin, skull. Collected by Armand David from “Moupin” [Baoping, Sichuan Province, western China], ex Museum Paris (MNHN).

Comments: The holotype of *N. elegans* is MNHN 1870-6 (Paris), collected from the same locality as the Berlin specimen. The ZMB specimen was presumably part of the type series housed in Paris.

### ***Neomys* Kaup, 1829**

#### ***Sorex psilurus* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Neomys fodiens* (Pennant, 1771)

Holotype: ZMB 62470, skull. Presumably from Bayern [Bavaria], Germany; part of the “Nehring Collection” at the ZMB.

#### ***Sorex* Linnaeus, 1758**

#### ***Sorex melanodon* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Sorex araneus* Linnaeus, 1758

Syntypes: ZMB 83298, male, juvenile, ZMB 83299, male, juvenile; bodies in alcohol; ZMB 21995, female, juvenile, body in alcohol Collected from Bavaria, Germany.

Comments: All specimens are from the “Nathusius Collection” which was stored in the Königliche Landwirtschaftliche Hochschule Berlin until 1915.

#### ***Sorex concinnus* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Sorex araneus* Linnaeus, 1758

Holo- or Syntype: ZMB 22002, female, adult, collected from Bayern, Germany; donated or exchanged by J. A. Wagner (Zoologische Staatssammlung München).

Comment: In the original description Wagler provided no details on the number of specimens examined.

#### ***Sorex rhinolophus* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Sorex araneus* Linnaeus, 1758

Syntype: ZMB 22001, male, adult, body in alcohol. From Bavaria, Germany.

#### ***Sorex isodon marchicus* Passarge, 1984**

Passarge, H. (1984) *Sorex isodon marchicus* ssp. nova in Mitteleuropa. Zeitschrift für Säugetierkunde 49: 278 [278–284].

Valid name: *Sorex araneus* Linnaeus, 1758

Holotype: ZMB 83485, male, adult, skull (damaged by fire), body in alcohol, collected from Eberswalde, Brandenburg, Germany, by Dr. H. Passarge, 13 June 1981.

Comments: As shown by morphometric and karyotypic investigation (Turni *et al.* 2001; Brünner *et al.* 2002), *Sorex isodon marchicus* Passarge, 1984 belongs to *Sorex araneus* Linnaeus, 1758.

### ***Sorex pumilio* Wagler, 1832**

Wagler, J.G. (1832) Abhandlungen aus der Zoologie und Zootomie. Isis von Oken 25: 54.

Valid name: *Sorex minutus* Linnaeus, 1766

Syntype: ZMB 22003, in alcohol. Collected from Bavaria, Germany. Presently not found in the collection.

### **Talpidae Fischer, 1814**

#### **Talpinae Fischer, 1814**

#### ***Mogera* Pomel, 1848**

#### ***Mogera robusta* Nehring, 1891**

Nehring, A. (1891) Über *Mogera robusta* n.sp. und über *Meles* sp. von Wladiwostock in Ost-Sibirien. Sitzungsberichte der Gesellschaft Naturforschender Freunde zu Berlin, 6: 95 [95–108].

Valid name: *Mogera wogura* (Temminck, 1842)

Holotype: ZMB 15084 (skin) and 15085 (skull, skeleton) from the same individual. Collected by Dattan from Vladivostok, Russia in 1889.

Comments: Even though an additional specimen in the ZMB collection (6867) is identified as a type, Nehring described this species based only on a single specimen from Dattan, Vladivostok. ZMB 6867 was collected by "Rex und Co." from "Jezzo" [presumably northeastern Asia].

### **Scalopinae Gill, 1875**

#### ***Scapanus* Pomel, 1848**

#### ***Scalops latimanus* Bachman, 1843**

Bachman, J. (1843) Observations on the genus *Scalops* (Shrew Moles) with descriptions of the species found in North America. Journal of the Boston Society of Natural History 4 (1): 34 [26–35].

Valid name: *Scapanus latimanus* (Bachman, 1843)

Syntype: ZMB 712, skull and skin. Collected by Deppe from Santa Clara, Monterey, California in October 1834.

Comments: Bachmann examined two specimens from the ZMB. Following Peters (1863: 656), and still evident on the original label of ZMB 712, this type specimen is identified with "Mexico" on its label. However, Peters pointed out that it was in fact collected from Monterey, California: "Das Original exemplar ... stammt nicht aus Mexico, sondern ist, wie dem Eingangsjournal der Deppe'schen Sammlung hervorgeht, aus

Monterey in Californien eingesandt und im October 1834 in Sta. Clara ... gesammelt worden" (Peters, 1863: 656). Peters goes on in his paper to disagree with Bachman's (1843) proposed inclusion of *latimanus* in the genus *Scalops*. Instead, he recommended synonymizing *latimanus* with *Scapanus townsendii*. Following Huchinson (1987), we retain Bachman's species but place it in the genus *Scapanus*.

## Conclusion

Evaluation of mammal types at the ZMB is particularly complicated. Many types are not accounted for due to faults ranging from insufficient labelling at the time of receipt and description, destruction during World War II, and staffing cuts both before and after German reunification. Consequently, many types remained unrecognized, labelled with synonymous or incorrect names until present. We believe that the inventory of insectivoran-grade types housed at the ZMB presented herein will contribute to the process of improving the basis upon which we recognize species and, as such, our ability to describe and understand biodiversity. The present effort comprises the beginning of a larger catalogue series for the approximately 2000 mammal types housed in the collection of ZMB, with Chiroptera soon to follow (Turni and Kock, in prep.) and Primates, Carnivora, Lagomorpha, and Perissodactyla in preparation.

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