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## Early German Herpetological Observations and Explorations in Southern Africa, With Special Reference to the Zoological Museum of Berlin

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**Abstract.** The earliest herpetological records made by Germans in southern Africa were casual observations of common species around Cape Town made by employees of the Dutch East India Company (VOC) during the mid- to late Seventeenth Century. Most of these records were merely brief descriptions or lists of common names, but detailed illustrations of many reptiles were executed by two German illustrators in the employ of the VOC, Heinrich CLAUDIUS and Johannes SCHUMACHER. CLAUDIUS, who accompanied Simon VAN DER STEL to Namaqualand in 1685, left an especially important body of herpetological illustrations which are here listed and identified to species. One of the last Germans to work for the Dutch in South Africa was Martin Hinrich Carl LICHTENSTEIN who served as a physician and tutor to the last Dutch governor of the Cape from 1802 to 1806. Although he did not collect any herpetological specimens himself, LICHTENSTEIN, who became the director of the Zoological Museum in Berlin in 1813, influenced many subsequent workers to undertake employment and/or expeditions in southern Africa. Among the early collectors were Karl BERGIUS and Ludwig KREBS. Both collected material that is still extant in the Berlin collection today, including a small number of reptile types. Because of LICHTENSTEIN'S emphasis on specimens as items for sale to other museums rather than as subjects for study, many species first collected by KREBS were only described much later on the basis of material obtained by other, mostly British, collectors. Another of LICHTENSTEIN'S protégés was Wilhelm PETERS, who spent five years in Mozambique (1843–1847). PETERS described more than 50 new species on the basis of specimens collected during his trip. As LICHTENSTEIN'S successor at the Zoological Museum he also fostered collecting efforts by German missionaries, doctors, and travelers in southern Africa. Among his most important sources of material was the Rhenish missionary Carl Hugo HAHN, who supplied PETERS with numerous specimens of new species from the Namibian interior. Paradoxically, the Berlin Museum's dominance in southern African herpetology began to wane after Germany colonized South West Africa (Namibia) in 1884, only one year after PETERS' death.

**Key words.** History, herpetology, Dutch East India Company, South Africa, Mozambique, Namibia.

### 1. INTRODUCTION

The history of German herpetological discovery in Africa, and elsewhere in the non-European world, differs significantly from that of other European nations, such as Britain and France. In part this reflects the fact that German national political unity was not achieved until 1871. As such, the great voyages of discovery sent out by other countries were not launched by Germany and only the larger German kingdoms and states, most notably Prussia and Bavaria, were able to support scientists and collectors abroad. Rather, the majority of natural history specimens from Africa that entered German museums until the late Nineteenth Century came from independent travelers, physicians, missionaries, and businessmen. Only in the 1880s when Germany joined other European powers in the African colonial land grab, in Tanganyika, Cameroon, Togoland, and South West Africa, did opportunities for museum enrichment through governmental or institutionally supported expeditions present themselves.

In this paper I selectively review some of the contributions to southern African herpetology made by Germans from the foundation of the Dutch fort at the Cape of Good Hope in 1652 to the beginning of the German co-

lonial period in Deutsch Südwest Afrika (now Namibia) in the 1880s. As it is not possible to review the contributions of all explorers and collectors during this 230 year period, I have focused my discussion of the latter period (post-1800) on those persons connected in some way with the Zoological Museum of the Friedrich-Wilhelms-Universität zu Berlin (now the Institut für Systematische Zoologie im Museum für Naturkunde der Humboldt-Universität zu Berlin), here abbreviated as ZMB.

### 2. GERMAN CONTRIBUTIONS TO HERPETOLOGY AT THE CAPE 1652–1800

#### 2.1. Herpetological observations by German visitors to the Cape

German contributions to southern African herpetology began during the period of the hegemony of the Dutch East India Company (Verenigde Oost-Indische Compagnie or VOC), which established a replenishment station at the Cape in 1652 to supply Company ships en route between Dutch ports and trading posts and settlements in India and the Far East. During the following 154 years numerous Germans served in the employ of the VOC or the Dutch colonial government, chiefly as

soldiers, but also as apothecaries, doctors, and in other skilled positions. Because the VOC did not establish extensive settlements beyond the tip of Africa, herpetological records for this period are largely limited to Cape Town and its environs. Nearly all of the early herpetological observations by German employees of the Company were casual mentions in the context of broader travel narratives, in which the Cape itself often figured as only a small part. Indeed, most of their discussions of animals focused on large mammals, such as elephants and lions, that then still occurred around Cape Town (ROCKMAAKER 1989).

The first herpetological observation recorded by a German at the Cape was actually made in 1646, several years before the establishment of the Dutch fort. Johann Sigmund WURFFBAIN touched at the Cape for just four days on his return from a 14 year period of service to the VOC in Asia, and recorded the existence of small tortoises (WURFFBAIN 1686). The first herpetological observations to be published, however, were those of Johann Jacob MERKLEIN (1672). MERKLEIN, a barber and surgeon from Winshein (now Winsen an der Luhe) in Lower Saxony, who visited the Cape from 2 March to 17 April 1653, while Jan VAN RIEBEECK was commander of the Cape Fort. His remarks on herpetology were likewise limited to comments on the presence of tortoises, probably *Chersina angulata* (Schweigger, 1812), which were regularly bartered from the indigenous population by early European visitors to the Cape (RAVEN-HART 1967). Johann Wilhelm VOGEL (1637–1723), director of VOC mines in Sumatra, noted the presence of snakes at the Cape observed during his brief transits in 1679 and 1688 (VOGEL 1716; Fig. 1). During his visit at the Cape in 1681, Elias HESSE (1630–?), a mining engineer from Ottendorf (Ottendorf, Baden-Württemberg), recruited by the VOC to work in Sumatra (by Benjamin OLITZ, VOGEL's predecessor as director of mines; HOWGEGO 2003) remarked that stuffed snakes (along with a variety of mammals) were kept on display at the Fort (HESSE 1687). Although it is not possible to determine which species Hesse saw, the Mole snake – *Pseudaspis cana* (Linnaeus, 1758), Cape cobra – *Naja nivea* (Linnaeus, 1758), and Puffadder – *Bitis arietans* (Merrem, 1820) certainly occurred locally and would have been large enough to make impressive displays. Other early observations on reptiles include those of Christoff (or Christoph) FRIK (or FRYKE) (1692), a surgeon from Ulm, who commented on tortoises (again probably *C. angulata*) he observed during stops at the Cape in 1681 and 1685, and Ernst Christof BARCHEWITZ (1730) who discussed chameleons, *Bradypodion pumilum* (Gmelin, 1789), he had seen at the Cape in 1709.



Fig. 1: Title page of Johann Wilhelm VOGEL's *Ost-Indianische Reise-Beschreibung* (1716), one of the earliest books in German to discuss the Cape herpetofauna. The title page is remarkable in being double width and folded in the book. Image courtesy of the Linda Hall Library of Science, Engineering & Technology.

Peter KOLB (1675–1726; Fig. 2) of Dörflas (Thüringen) was trained in mathematics and other fields at Halle and was sent to the Cape in 1705 by Baron Bernhard Friedrich VON KROSIGK, privy councilor to FRIEDRICH, the first king of Prussia (1657–1713) to make astronomical observations. He later entered the employ of the VOC in 1709, remaining at the Cape until 1713. In his subsequent book about the Cape (Fig. 3), written when he was rector at Neustadt an der Aisch, KOLB (1719) included a large, but mainly superficial, section on natural history which included mentions of chameleons, frogs, terrapins, tortoises, “salamanders” (probably agamids), legless lizards, and several kinds of snakes (“Aspis,” “Augenschlange,” “Baumschlange,” “Brandschlange,” “Cobra de capello,” and “Haarschlange”). Much of the text was derived from comments by earlier authors (e.g. GESNER and ALDROVANDI) and very little reflects personal observation of living animals at the Cape. Several of these animals: a turtle, legless lizard, horned adder, and cobra, were also figured in his book (Fig. 4). Another long term resident at the Cape, Otto Friedrich MENTZEL (1709–1801) was in the employ of the VOC from 1732 to 1741. In his book (1787) he mentioned both snakes and lizards, but did not provide much detail.

In addition to the casual observations above, some German naturalists who visited the Cape made more detailed and directed studies of the local fauna. The best known of these was Johann Reinhold FORSTER (1729–1798). FORSTER, whose family was of English decent, was born in Dirschau (now Tczew, Poland) and had



Fig. 2: Portrait of Peter KOLB from *Caput Bonae Spei Hodiernum* (1719). KOLB was one of the first German long term residents at the Cape and the first to record and illustrate a number of reptile species. Image courtesy of Bryn Mawr College.



Fig. 3: Title page of KOLB's *Caput Bonae Spei Hodiernum* (1719). KOLB spent eight years at the Cape and discussed and illustrated a number of reptiles. The book contains a second title page with a slightly different title (see References), accounting for some bibliographic confusion. Image courtesy of Bryn Mawr College.

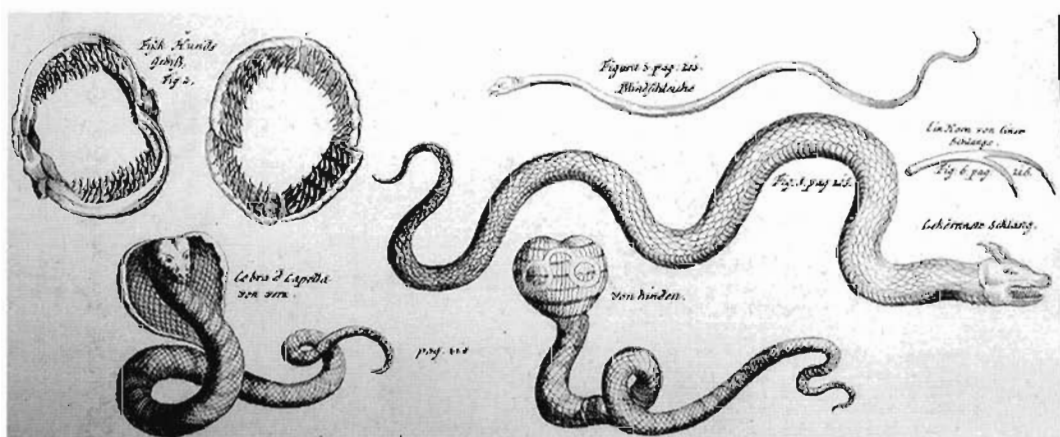


Fig. 4: Portion of plate IX from KOLB (1719) illustrating the "Cobra d Capella", "Gehörnnete Schlang", and "Blindschleiche", in addition to shark jaws. The horned snake is certainly *Bitis cornuta* and the cobra is meant to be the Cape cobra, *Naja nivea*, although the spectacled hood identifies it as the spectacled cobra of Asia (*Naja naja*). The other animal is impossible to identify, but KOLB'S text comparisons to *Anguis fragilis* Linnaeus, 1758 in Germany suggest that a reduced limbed lizard was intended. The only totally limbless lizard in the area that was known to KOLB is *Acontias meleagris* (Linnaeus, 1758).



Fig. 5: Map of southern Africa showing the location of places mentioned in the text of this chapter. Important localities visited by CLAUDIUS, LICHTENSTEIN, KREBS, WAHLBERG, and HAHN are indicated. Localities in Mozambique visited by PETERS are mapped in BAUER et al. (1995). Inset map at lower right shows details of the Eastern Cape region where Ludwig KREBS settled and made most of his herpetological collections.

been trained for the clergy in Halle before moving to England in 1766. After establishing his reputation as an expert in natural history and philology in Britain, he earned a position as naturalist on the ship *Resolution* on James COOK's second voyage (1772–1775) (HOARE 1976). He and his son Johann Georg (George) Adam FORSTER (1754–1794) visited the Cape briefly in 1772 and again in 1775. During their stay the elder FORSTER made numerous descriptions of zoological subjects which were illustrated by his son, who was a draughtsman on the expedition. FORSTER returned to Halle in 1780 and remained in Germany for the rest of his life. He subsequently translated the works of THUNBERG, PATERSON, and LEVAILLANT for the Berlin publisher C. F. VOSS. His most significant contribution to southern African herpetology was probably the translation into German of William PATERSON's *A Narrative of Four Journeys* (German edition 1790), which included brief but accurate observations on a number of reptiles. FORSTER's own *Descriptiones Animalium* (prepared

1775–1780) ended up in the royal library in Berlin in 1799 and was eventually published by Martin Hinrich Carl LICHTENSTEIN (FORSTER 1844).

## 2.2. German Illustrators at the Cape: CLAUDIUS and SCHUMACHER

The first major European expedition north from the Cape of Good Hope was that of Simon VAN DER STEL (1639–1712) who served first as commander of the Fort (1679–1690) and later as governor (1690–1699). VAN DER STEL led an expedition to the area of present-day Springbok in Namaqualand (Fig. 5) to look for copper deposits (WATERHOUSE 1932, 1979; WILSON et al. 2002). The expedition left the Cape in August 1685 and returned in January of the following year. This journey was of zoological significance because VAN DER STEL noted the more conspicuous animals seen en route and because drawings and watercolors of various natural history subjects were prepared on the trip. These illustrations were the work of Heinrich CLAUDIUS (1655–ca.

1697), an apothecary born in Breslau (now Wrocław, Poland) who had been in the service of the botanist Andreas CLEYER in Batavia. CLAUDIUS was sent to the Cape by CLEYER in 1682, but when CLEYER no longer required his services, he was taken on in the employ of the VOC (GUNN & CODD 1981; WILSON et al. 2002). CLAUDIUS had previously been employed to record information about animals and plants gleaned on the earlier but less grand expedition of Olof BERGH to Namaqualand in 1683. In all CLAUDIUS rendered 72 paintings that were sent with VAN DER STEL'S report of the journey to the VOC headquarters in Amsterdam and subsequently found their way into the collection of Trinity College, Dublin (WATERHOUSE 1932, 1979). Other important sets of CLAUDIUS drawings are in collections known as the *Icones Plantarum et Animalium* in the Africana Museum (Johannesburg), reported on by KENNEDY (1967) and the *Codex Witsenii* in the South African Museum (Cape Town), reviewed and reproduced by BARNARD (1947) and WILSON et al. (2002). A smaller collection of illustrations in the Africana Museum was noted and reproduced by both SMITH (1952) and KENNEDY (1967), and the contents of a small set of CLAUDIUS illustrations (14) in the National Library of South Africa (formerly South African Public Library, Cape Town) has been summarized, and reproduced in part by ROOKMAAKER (1989). Several other sets of CLAUDIUS drawings, or copies thereof are also present in European collections (GUNN & CODD 1981).

ROOKMAAKER (1989) provided a concordance among the CLAUDIUS illustrations that are present in several important collections. The versions of the illustrations differ, in some cases significantly, and some are the work of unknown copyists rather than CLAUDIUS himself (WILSON et al. 2002). In part because of differences in coloration and patterning of the subjects, the identifications of the species illustrated have also varied. CLAUDIUS appears to have provided far more accurate representations of plants than of animals (BARNARD 1947), and among animals, reptiles were fairly imprecisely rendered.

The expedition would have passed through the ranges of many reptiles but it is clear that only snakes and the more conspicuous lizards caught the attention of the party. It is not surprising that nocturnal or cryptic species, such as geckos or skinks, are not represented, whereas relatively large, diurnal, slow-moving species, including *Chamaeleo namaquensis* Smith, 1831 (Fig. 6) and *Cordylus cataphractus* Boie, 1828 (Fig. 7) were depicted by CLAUDIUS. In all, CLAUDIUS illustrated 16 different reptiles, representing 14 different species, all lizards and snakes (Figs. 8–11). The data accompanying the CLAUDIUS illustrations vary, but several sets of drawings provide dates when animals were observed and can be correlated with the known itinerary of VAN DER STEL'S expedition. A number of

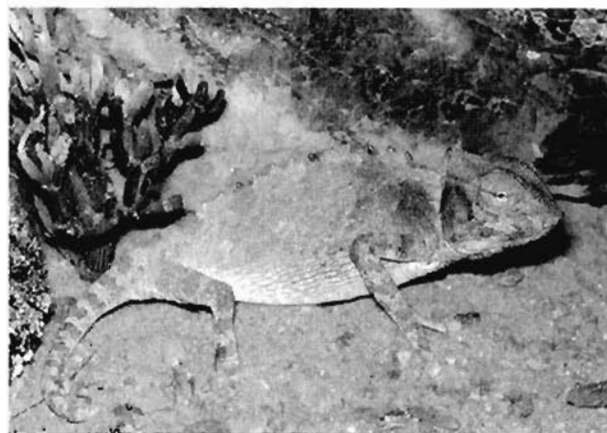


Fig. 6: *Chamaeleo namaquensis*, the most distinctive lizard illustrated by CLAUDIUS in Namaqualand. CLAUDIUS' drawing of this species was reproduced by many authors beginning with TACHARD in 1686. Compare with Fig. 12. Photo by Randall BABB.

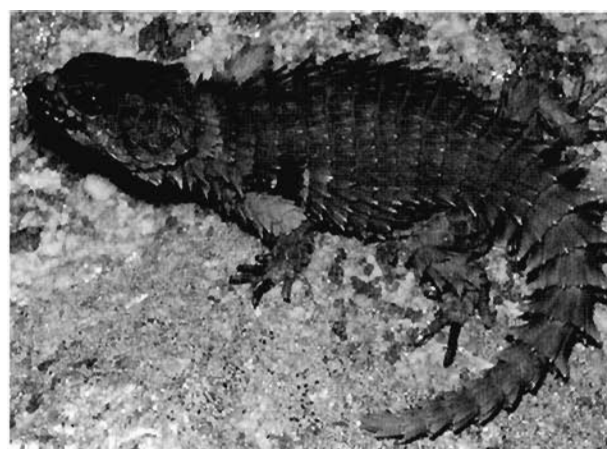


Fig. 7: *Cordylus cataphractus*, a large rock-dwelling cordylid observed and figured by CLAUDIUS on VAN DER STEL'S expedition to Namaqualand. Compare with Figs. 8 and 14. Photo by Randall BABB.



Fig. 8: *Cordylus cataphractus*. Drawing by Heinrich CLAUDIUS (Folio 144 from the *Codex Witsenii*). Compare with Figs. 7 and 14. Reproduced with permission from WILSON et al. (2002). courtesy of Iziko Museums of Cape Town.

different identifications of CLAUDIUS' subjects have been made, but I have reevaluated these in light of the illustrations themselves, as well as distributional criteria (Table 1).



**Tab. 1:** Reptiles illustrated by Heinrich CLAUDIUS on the VAN DER STEL expedition to Namaqualand (1685). ROOKMAAKER'S (1989) concordance of illustrations in major South African library collections is combined with information about date and locality of the animals figured and my own interpretation of species identity based on the various CLAUDIUS drawings photographically reproduced by WATERHOUSE (1932), BARNARD (1947), SMITH (1952), KENNEDY (1967), GUNN & CODD (1981), ROOKMAAKER (1989), and WILSON et al. (2002). Abbreviations: AM = Africana Museum, Johannesburg, IPA = *Icones Plantarum et Animalium* collection, SAM = South African Museum, Cape Town, SAPL = National Library of South Africa, Cape Town (formerly South African Public Library), TC = Trinity College, Dublin.

Species	Drawings	Date	Locality
<i>Chamaeleo namaquensis</i> <sup>1</sup>	AM 24a, 25F, IPA 364a, TC 741, SAPL-Z4	15.xii.1685	Spoeg River 30°30'S, 17°35'E
<i>Cordylus cataphractus</i> <sup>2</sup> ; Fig 8	IPA 365a, TC 743, SAM 144	26.ix.1685	Modderkuil 32°25'S, 18°35'E
<i>Agama aculeata</i> <sup>3</sup>	AM 22b, IPA 367b, TC 745 missing, SAPL-Z5, SAM 154	5.xi.1685	Koperberg 29°42'S, 17°57'E
<i>Naja nivea</i> <sup>4</sup>	TC 769a, SAM 150a	?	?
<i>Dasypeltis scabra</i> <sup>5</sup>	TC 769b, SAM 150b	9.ix.1685	Martin's Kloof 32°30'S, 18°44'E
<i>Bitis cornuta</i> <sup>6</sup> ; Fig 9	AM 23a, 25H, TC 771, IPA 363b, SAM 158	6.xi.1685	Sand River 29°59'S, 17°53'E
<i>Pseudaspis cana</i> <sup>7</sup>	TC 773, SAM 148	6.x.1685	Keert Weder 30°30'S, 18°00'E
<i>Aspidelaps lubricus</i> <sup>8</sup>	IPA 365b, TC 775a, SAM 146	6.ix.1685	Piketberg 32°40'S, 18°45'E
<i>Acontias lineatus</i> <sup>9</sup>	IPA 365c, TC 775b, SAM 146	2.x.1685	Groot Doornbusch River 30°40'S, 18°00'E
<i>Naja nivea</i> <sup>10</sup> ; Fig 10	AM 22a, IPA 367a, TC 777, SAM 156	8.xi.1685	ca. 30°05'S, 17°40'E
<i>Merolex knoxii</i> ? <sup>11</sup> ; Fig 11 (top)	AM 24b, 25Ga, IPA 364b, SAM 152a	20.xii.1685	Groot Doornbusch River 30°40'S, 18°00'E
<i>Pedioplanis laticeps</i> ? <sup>11</sup> ; Fig 11 (bottom)	AM 24c, 25Gb, IPA 364c, SAM 152b	20.xii.1685	Groot Doornbusch River 30°40'S, 18°00'E
<i>Agama hispida</i> <sup>12</sup>	IPA 415a,b	?	?
unidentifiable <sup>13</sup>	IPA 424	?	?
<i>Pseudaspis cana</i> <sup>14</sup>	IPA 416	?	?
<i>Tetradactylus tetradactylus</i> or <i>Cordylus subtesellatus</i> <sup>15</sup>	IPA 417	?	?

<sup>1</sup> The numerous versions of the chameleon illustration vary in their accuracy, but all are unambiguously *Chamaeleo namaquensis*, one of only two chameleons that occur in the area visited by VAN DER STEL.

<sup>2</sup> The enlarged dorsal scales unambiguously identify this species, although in some versions of this illustration the lizard is represented as a more generalized cordylid and could perhaps be mistaken for *C. polyzonus* Smith, 1838. BARNARD (1947) suggested that it might represent *C. giganteus* SMITH, 1844, but this species does not occur anywhere in the Northern or Western Cape Provinces along VAN DER STEL'S route.

<sup>3</sup> All previous authors have identified this lizard as a member of the genus *Agama* Daudin, 1802. It is difficult to determine which of the several species occurring in the region is intended. The animal is illustrated with a series of blue diamonds or blotches along the dorsal midline of the back and tail, and most closely resembles *A. aculeata*, although *A. anchietae* might have been intended. WILSON et al. (2002) identified the species as *Agama hispida*. Alternatively, the illustration might be the artist's composite of several agamid species.

<sup>4</sup> WATERHOUSE (1932) and ROOKMAAKER (1989) identified this snake as *Naja nivea*. BARNARD (1947), however, considered it to be "unmistakably" *Leptodira* (= *Crotaphopeltis hotamboeia*), a view subsequently followed by WILSON et al. (2002). This illustration does not particularly resemble either species, but on the basis that it was reported to be venomous I tentatively accept its identity as a cobra.

<sup>5</sup> BARNARD (1947) and WILSON et al. (2002) identified this species as *Dasypeltis scaber* (Linnaeus, 1758). Although the patterning is consistent with this species, it also would apply to *Causus rhombeatus*, an identification favored by WATERHOUSE (1932) and ROOKMAAKER (1989). However, because the latter species does not occur in the region traversed by VAN DER STEL'S expedition, the former interpretation is likely.

<sup>6</sup> The multiple horns present on the best executed versions of this drawing make the identification of this species unambiguous.

<sup>7</sup> All authors have identified this illustration as a Mole snake, *Pseudaspis cana*. Although the drawing itself is somewhat ambiguous, the accompanying text indicates that the snake was eight feet long, which combined with its heavy body and uniform black coloration, supports this view.

<sup>8</sup> The snake illustrated was described as being venomous and one-and-a-half feet long. KENNEDY (1967) and ROOKMAAKER (1989) did not suggest a specific identification. BARNARD (1947) and WILSON et al. (2002) identified it as possibly a young Mole snake. This interpretation is plausible, but accepting that the snake was venomous, I interpret it as the Coral snake, *Aspidelaps lubricus* (Laurenti, 1768), which occurs in the region and bears a dorsal pattern at least superficially similar to that depicted by CLAUDIUS. Michael BATES (pers. comm.) has suggested that the illustration most closely resembles *Causus rhombeatus*, although the species does not occur in the area visited by the expedition.

<sup>9</sup> The animal illustrated is drawn as a snake, with a protruding forked tongue and a tapering tail, and was noted as being particularly small. WATERHOUSE (1932) questionably identified the illustration as a skaapsteker, *Psammophylax rhombeatus*, but the color pattern seems entirely inappropriate to this species, which is also not especially tiny. It has been interpreted as *Acontias* sp. by BARNARD (1947), ROOKMAAKER (1989), and WILSON et al. (2002). Given the locality where the specimen was observed, I consider it most likely to represent *Acontias lineatus*, although it could be a small snake, such as *Prosymna* sp., poorly rendered.

<sup>10</sup> This illustration was identified as "mamba (?)" by WATERHOUSE (1932), but all subsequent authors have, correctly I believe, identified it as a Cape cobra, *Naja nivea*.

<sup>11</sup> Both figures can only be lacertids or perhaps cordylids, based on the plate-like ventral scales and the whorls of small tail spines. These lizards were identified by BARNARD (1947) and KENNEDY (1967) as *Eremias* (= *Pedioplanis*) sp. WILSON et al. (2002) identified the upper lizard in the figure as *Merolex knoxii* (Milne-Edwards, 1829) and the other as possibly *Pedioplanis namaquensis* (DUMÉRIE & BIBRON, 1839). The upper figure is difficult to identify with any species occurring in the vicinity of the Groot Doornbusch River (now the Groenrivier), where the text indicates that the lizards were seen on 20 December 1685, although *M. knoxii* is a reasonable choice. The lower figure is unlikely to be *P. namaquensis*, as this species does not occur as far south as the Groenrivier. This figure also bears some similarity to female or juvenile *Platysaurus capensis* Smith, 1844. This interpretation is supported by the text accompanying the illustrations which indicates that this species was encountered in the mountainous areas of Namaqualand visited by CLAUDIUS and VAN DER STEL, but again this species occurs only north of the Groenrivier area. If the date and implied locality are assumed to be correct the Cape sand lizard, *Pedioplanis laticeps* (Smith, 1849), is perhaps the most likely candidate for the lower figure.

<sup>12</sup> The lizards illustrated in IPA 415 have not previously been identified. These are, in fact, among the most realistic CLAUDIUS reptile drawings and obviously represent *Agama hispida*.

<sup>13</sup> IPA 424 was figured in TACHARD (1686; Fig. 15) as the "petit lézard." It is unidentifiable. No South African lizard has the three bold white crosses on a dark back as depicted. The body form is generalized and could be an agamid, although TACHARD'S (1686) version of the lizard shows enlarged ventral plates, suggesting a lacertid or cordylid. It is possible that the figure was selected for reproduction by TACHARD because of the religious symbolism of the crosses on the back.

<sup>14</sup> IPA 416 has not previously been identified. I tentatively suggest that it may represent a young Mole snake, *Pseudaspis cana*, or less likely *Dipsina multimaculata* (Smith, 1847), the range of which may just have been reached by VAN DER STEL'S expedition at its northernmost point.

<sup>15</sup> IPA 417 was previously identified as a snake (e.g., ROOKMAAKER 1989). However, it is clearly a reduced limb lizard with a very long tail. I consider it likely to be *Tetradactylus tetradactylus* (Daudin, 1802), perhaps encountered by the expedition just outside of Cape Town, or *Cordylus subtesellatus* (Smith, 1844), which is common in the Springbok area.



Fig. 9: *Bitis cornuta*, Many-horned adder. Drawing by Heinrich CLAUDIUS (Folio 158 from the *Codex Witsenii*). Along with several lizard drawings, this has been one of the most frequently reproduced of the reptile illustrations from VAN DER STEL'S expedition. Compare with the later published illustrations based on this drawing (Figs. 13 and 17). Reproduced with permission from WILSON et al. (2002), courtesy Iziko Museums of Cape Town.



Fig. 10: *Naja nivea*, Cape cobra. Drawing by Heinrich CLAUDIUS (Folio 156 from the *Codex Witsenii*). This rendition is accurate with respect to color, showing the yellow phase of this species that occurs in the Northern Cape Province. The illustration is remarkable for its dissected view of the venom apparatus. Text accompanying the drawing explains how the people of the region removed the venom gland and used it to poison their arrows and assegais. Reproduced with permission from WILSON et al. (2002), courtesy Iziko Museums of Cape Town.

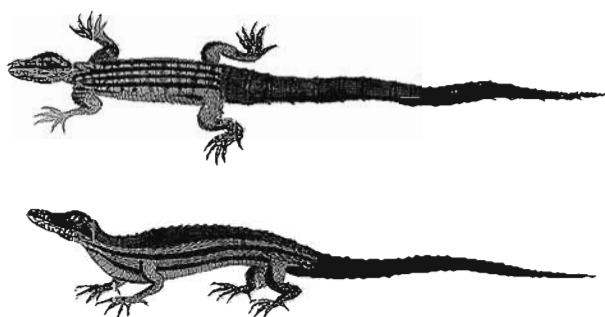


Fig. 11: Lacertid lizards (see Table 1 and associated notes for possible species identifications). Drawing by Heinrich CLAUDIUS (Folio 152 from the *Codex Witsenii*). Reproduced with permission from WILSON et al. (2002), courtesy Iziko Museums of Cape Town.

CLAUDIUS' illustrations themselves were not published until the Twentieth Century. However, versions of his work reached a broad audience through secondary sources. CLAUDIUS donated several illustrations, including some of reptiles, to Father Guy TACHARD (1648–1712), a French Jesuit priest and scientist who visited the Cape in 1685 and again the following year. These illustrations, including those of a “chaméleon” – *Chamaeleo namaquensis* (Fig. 12), “céraste” – *Bitis cornuta* (Daudin, 1803) (Fig. 13), “grand lézard” – *Cordylus cataphractus* (Fig. 14), and “petit lézard” (unidentified; Fig. 15) appeared in TACHARD'S *Voyage de Siam* (1686; Fig. 16). Several of these illustrations were subsequently used again in *Gazophylacii Naturae* (PETIVER 1702–1709), from which work they were reproduced by GUNN &

CODD (1981). CLAUDIUS' chameleon drawing was still being used by BONNATERRE (1789) more than a century after its initial rendering. CLAUDIUS' adder drawing also appeared, as did other older illustrations, such as those of KOLB (1719), in a number of derivative works about the Cape and its fauna (Fig. 17).

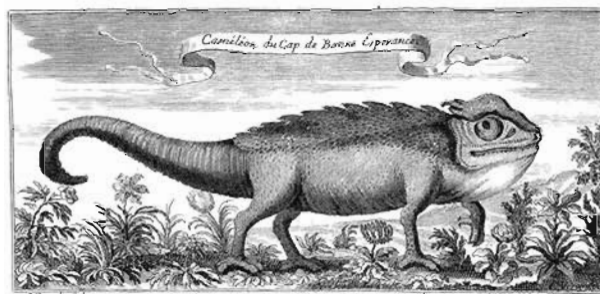


Fig. 12: Caméleon du Cap de Bonne Esperance, plate from TACHARD'S *Voyage de Siam* (1686). The species is clearly *Chamaeleo namaquensis* and the drawing is based on the original by CLAUDIUS. This image was used in natural history works for more than a century after its initial rendering. Compare with Fig. 6. Image courtesy of the Linda Hall Library of Science, Engineering & Technology.

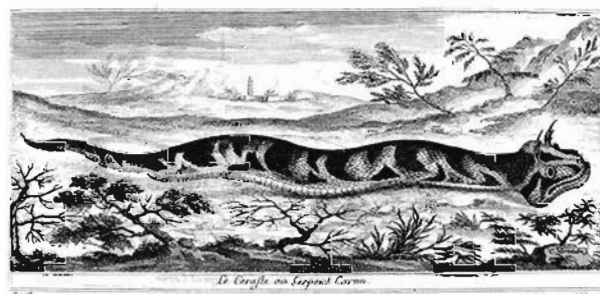


Fig. 13: Le ceraste ou serpent cornu, plate from TACHARD'S *Voyage de Siam* (1686). The illustration is based on the original by CLAUDIUS. The multiple horns clearly identify it as *Bitis cornuta*. Compare with CLAUDIUS' original drawing (Fig. 9) and a later reproduction (Fig. 17). Image courtesy of the Linda Hall Library of Science, Engineering & Technology.



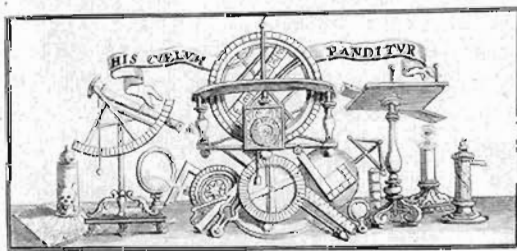
Fig. 14: Grand lézard du Cap, plate from TACHARD'S *Voyage de Siam* (1686). The illustration is based on the original by CLAUDIUS (Fig. 8) and represents *Cordylus cataphractus* (see Fig. 7). Image courtesy of the Linda Hall Library of Science, Engineering & Technology.



Fig. 15: Petit lizard du Cap de Bonne Esperance, plate from TACHARD'S *Voyage de Siam* (1686). The original illustration by CLAUDIUS is present in only one of the extant collections of images from VAN DER STEL'S expedition. The species is unidentifiable and is the least anatomically correct of the reptile plates by CLAUDIUS. The pattern, with crosses on the back, does not resemble any known South African lizard. Image courtesy of the Linda Hall Library of Science, Engineering & Technology.

# VOYAGE DE SIAM, DES PERES JESUITES, Envoyez par le ROY aux Indes & à la Chine.

AVEC LEURS OBSERVATIONS  
Astronomiques, Et leurs Remarques de Physique,  
de Géographie, d'Hydrographie, & d'Histoire.



A PARIS,  
Chez ARNOULD SENEUZE, rue de la Harpe, à la Sphere,  
ET  
DANIEL HORTHEMELS, rue de la Harpe, au Mécanas.

M. DC. LXXXVI.  
PAR ORDRE EXPRÉZ DE SA MAJESTÉ.

Fig. 16: Title page of Guy TACHARD'S *Voyage de Siam* (1686). TACHARD published several of the CLAUDIUS reptile drawings for the first time. Image courtesy of the Linda Hall Library of Science, Engineering & Technology.

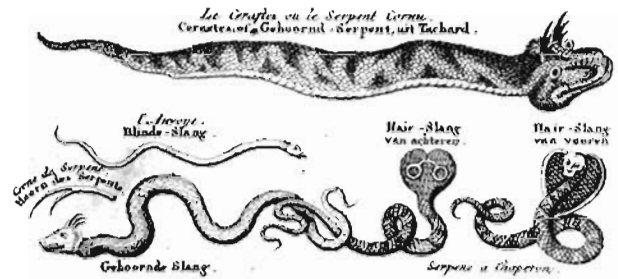


Fig. 17: Plate from an unknown French book of the Eighteenth Century. The illustrations of KOLB (1719; Fig. 4) have been redrawn and supplemented by "le Cerastes" from TACHARD (1686; Fig. 13), itself derived from the original drawing of CLAUDIUS (Fig. 9).

Another German illustrator of note was Johannes SCHUMACHER, originally from Rodenburg (fide ROOKMAAKER 1989; identity of this village is uncertain), who arrived in the Cape as a soldier in 1770. SCHUMACHER prepared watercolors for Hendrik SWELLENGREBEL, who visited the Cape during 1776–1777 and later illustrated the *GORDON Atlas* (HALLEMA 1951; FORBES 1965; SCHUTTE 1982). The *GORDON Atlas* depicts zoological and other subjects observed or collected by Robert Jacob GORDON (1743–1795) during his explorations in southern Africa between 1777 and 1786 (ROOKMAAKER 1981; HOWGEGO 2003). ROOKMAAKER (1980, 1989) reviewed the zoological drawings of SCHUMACHER and identified the species he illustrated. Although GORDON himself noted a wide variety of reptiles in his accompanying journals, only some of the more conspicuous tortoises, lizards, and viperids were drawn by SCHUMACHER: *Chersina angulata*, *Psammobates tentorius* (Bell, 1828) (Fig. 18), *Homopus areolatus* (Thunberg, 1787), *Geochelone pardalis* (Bell, 1828), *Pelomedusa subrufa* (Lacépède, 1788), *Chamaeleo namaquensis*, *Bradypodion pumilum*, *Agama atra* Daudin, 1802, *Agama hispida* (Kaup, 1827), *Varanus albigularis* (Daudin, 1802), *Bitis atropos* (Linnaeus, 1758), *Bitis cornuta*, and *Bitis caudalis* (Smith, 1849).

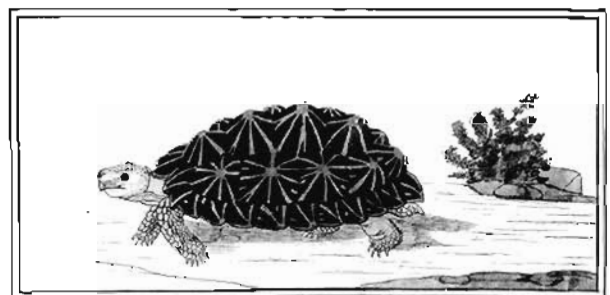


Fig. 18: Illustration of *Psammobates tentorius* by Johannes SCHUMACHER from the *Gordon Atlas*. Schumacher's drawings, executed approximately a century after those of CLAUDIUS, are much more realistic and his images of chelonians are especially well done. Image courtesy of Kees ROOKMAAKER, with permission of the Rijksmuseum, Amsterdam.



### 3. EARLY SOUTH AFRICAN COLLECTORS AND COLLECTIONS FOR THE BERLIN MUSEUM

#### 3.1. Martin Hinrich Carl LICHTENSTEIN

Martin Hinrich Carl LICHTENSTEIN (1780–1857; Fig. 19) was one of the last German citizens in the employ of the Dutch at the Cape, and the most important with regard to establishing a link between academic herpetology in Germany and southern Africa. LICHTENSTEIN was born in Hamburg and received his academic training in Jena and Helmstedt (STRESEMANN 1960; the latter university, founded in 1576, was closed by King Jerome

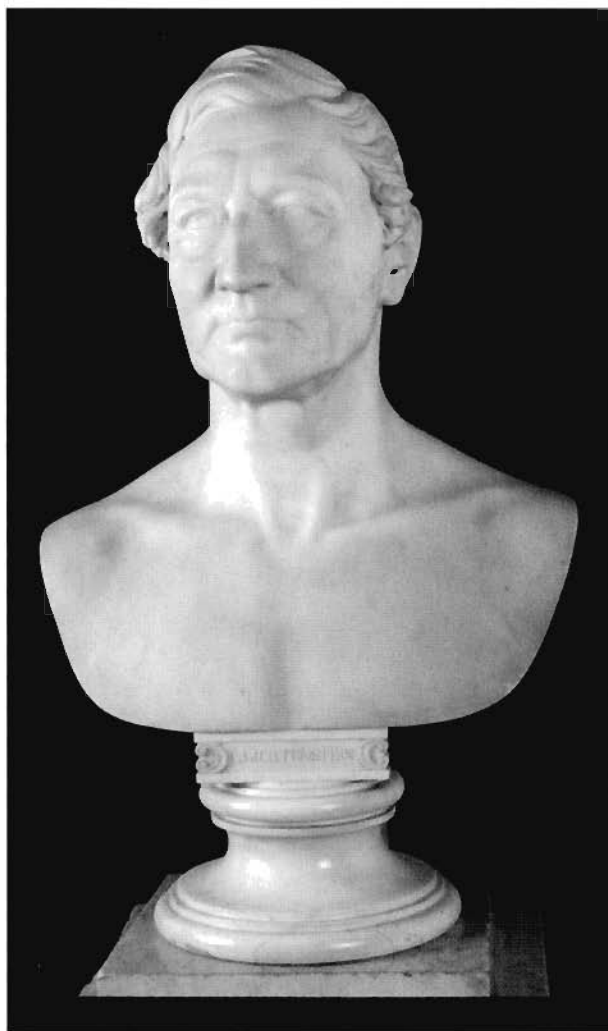


Fig. 19: Martin Hinrich Carl LICHTENSTEIN (1780–1857) at the age of 72. Bust by Albert WOLFF (1814–1892) in the Museum für Naturkunde der Humboldt-Universität zu Berlin. Another version of the bust is on display in the Berlin Zoological Gardens. Image courtesy of the Museum für Naturkunde der Humboldt-Universität zu Berlin, Historische Bild- und Schriftgutsammlungen (Bestand: ZM, Signatur: B XIII/3).

Bonaparte of Westphalia in 1810). Almost immediately after receiving his medical degree, LICHTENSTEIN was chosen by J. W. JANSSENS, who had been named as the new Dutch governor of the Cape Colony, as family doctor and tutor for his 13 year old son. The Cape was annexed by the British in 1795 and had just reverted to Dutch control under the terms of the Peace of Amiens. LICHTENSTEIN planned to use the opportunity to gather information about the natural history of the still poorly known subcontinent. He arrived in Table Bay on 23 December 1802. Between 1803 and 1805 he traveled extensively. In 1803 he journeyed north to Saldanha Bay, then east through the Cedarberg, to the area near the modern town of Calvinia. He then traveled south through the Roggeveld and the Kouebokkeveld to Tulbagh before heading to the eastern borders of the colony. LICHTENSTEIN passed through Swellendam and then on to Plettenberg Bay, collecting insects and plants. From there he preceded to Algoa Bay, then inland to Uitenhage, and thence to Graaff-Reinet before crossing the Karoo en route back to Cape Town (Fig. 5; see GUNN & CODD 1981 for a more complete itinerary). Around Cape Town he spent much time with Peter (Pieter) Heinrich POLEMAN (variously spelled POLEMANN or POHLMANN) (1780–1839), an apothecary originally from Holstein, who had also arrived at the Cape in 1802. POLEMAN had been hired by, and eventually became the partner of, Dietrich PALLAS (ca. 1768–1840), an Alsatian doctor who had founded Cape Town's first apothecary shop).

In 1805 LICHTENSTEIN traveled as part of an expedition to explore the northeastern districts of the colony. The party departed from Tulbagh, traveled through Sutherland, continued on to Prieska, crossing the Orange River, and finally reached Kuruman. His final expedition, also in 1805, was to the Roggeveld, where he was sent on a mission to inoculate residents against smallpox. However, in January 1806 the British Fleet arrived at the Cape of Good Hope to reclaim the Dutch territory. After the capitulation of the Dutch garrison, JANSSENS and his entourage, including LICHTENSTEIN, were returned to Europe.

LICHTENSTEIN collected no reptiles or amphibians in southern Africa and no mention of them are to be found in the two volumes of his book *Reisen in südlichen Africa* (1811–1812). Instead he focused on insects and plants and to some extent large mammals. His insect collection went to Carl ILLIGER, and the plants to Johann Centurius VON HOFFMANNSEGG and Carl Ludwig WILLDENOW in Berlin. ILLIGER and VON HOFFMANNSEGG were among the founders of the Zoological Museum of the University in Berlin (Fig. 20). Based on the collections he had made and the text of the first volume of *Reisen im südlichen Africa*, LICHTENSTEIN was awarded an honorary doctorate from the University, and was al-

most immediately appointed as professor of Natural History (Zoology). Upon the death of ILLIGER in 1813, LICHTENSTEIN assumed the post of director of Zoological Museum (MAUERSBERGER 1994). His subsequent publication record was not strong and his few herpetological contributions contained only two descriptions of southern African snakes (see below). Nonetheless, between 1815 and 1848 LICHTENSTEIN had a huge influence on the development of Berlin as a center of African herpetology, primarily through his encouragement of young collectors to go to Africa and to send material back to the Zoological Museum.

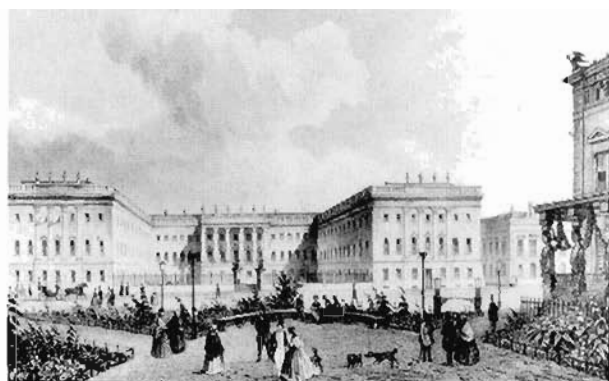


Fig 20: The main building of the Friedrich-Wilhelms-Universität zu Berlin (now Humboldt-Universität zu Berlin) on Unter den Linden in 1852 (F. HIRSCHENHEIM after C. WÖRBS). The Zoological Museum was housed on the second floor of the east wing of the building. Both LICHTENSTEIN and PETERS spent their directorships in these cramped quarters. Image courtesy of the Deutsche Staatsbibliothek, Berlin.

### 3.2. The BLOCH and VON BORCKE African Collections

When LICHTENSTEIN became director of the Zoological Museum, the only southern African herpetological specimens present were derived from the large and important private collection of Marcus (Markus) Elieser (Elisar) BLOCH (1723–1799; Fig. 21), a physician who received his training at the University of Frankfurt an der Oder. BLOCH's chief interest was in ichthyology, where he made valuable contributions through his scholarly publications (PAEPKE 1999). He also published in herpetology, but his greatest contribution to this field was his collection, which was one of the primary sources of the material described by Johann Gottlob SCHNEIDER (1750–1822) in his *Historia Amphibiorum*, published in two parts in 1799 and 1801. In 1802 BLOCH's collections and catalogues were sold to the Königlich Preußische Akademie der Wissenschaften zu Berlin, and in 1810 they were turned over to the newly founded Zoological Museum of the University of Berlin (KARRER et al. 1994; PAEPKE 1999).



Fig. 21: Marcus Elieser BLOCH (1723–1799). Engraving by Johann Georg KRÜGER, from KRÜNITZ (1784). Original size 10 x 15 cm. Image courtesy of the Museum für Naturkunde der Humboldt-Universität zu Berlin, Historische Bild- und Schriftgutsammlungen (Bestand: GNF, Signatur: PM II, 16a).

BLOCH's herpetological catalogue has not been located, but an early unpublished list of the Museum holdings, the *Katalog Inventarium der Amphibien ca. 1822/23*, reveals that at least 380 amphibian and reptile specimens from BLOCH were once in the collection (BAUER 1999). At least nine of BLOCH's specimens from the Cape, including specimens of *Cordylus cordylus* (Linnaeus, 1758), *Bradypodion pumilum*, *Psammobates geometricus* (Linnaeus, 1758), *Psammophylax rhombeatus* (Linnaeus, 1758), *Hemachthus haemachthus* (Bonnaterre, 1790), and *Tetradactylus seps* (Linnaeus, 1758) are still extant.

The Museum's African collections were also enriched by the purchase in 1817 of the collections of Graf VON BORCKE AUF HUETH. His collections, like those of BLOCH, were worldwide in scope. At least 12 South African specimens donated by VON BORCKE are extant in the Berlin collection, including the holotype (ZMB 750) of the common lizard *Agama aculeata* Merrem, 1820 (fide DENZER et al. 1997). Typical of the time, collec-

tion localities for all of the specimens were vague and sometimes not even accurate to continent. Nonetheless, all of the species represented are or were common in the immediate vicinity of Cape Town and were almost certainly obtained by BLOCH and VON BORCKE from dealers, traders, or acquaintances who had collected there.

### 3.3. Karl BERGIUS and Other Collectors of the 1810s

LICHTENSTEIN was anxious to expand the Museum's holdings in all areas of zoology and was able to influence many of his students and acquaintances to collect for him. For example, Christian Heinrich Friedrich HESSE (1772–1832), who had settled in the Cape in 1800 and hosted LICHTENSTEIN during his service to JANSSENS (GUNN & CODD 1981), sent natural history material to Berlin at LICHTENSTEIN's request. Because of his own experiences in South Africa, LICHTENSTEIN was particularly successful in encouraging young scholars to pursue expeditions or employment on the subcontinent. Karl Heinrich BERGIUS (1790–1818) from Küstrin was a medical student in Berlin, where he came under LICHTENSTEIN's tutelage. LICHTENSTEIN recommended him to his old friends, the apothecaries PALLAS and POLEMAN in Cape Town. Although he was to be employed as an apothecary, his real desire was to collect for the Museum in Berlin. Following his arrival at the Cape in 1815, BERGIUS collected in his spare time and made the acquaintance of several of LICHTENSTEIN's old friends, including HESSE, as well as a variety of European voyagers and collectors who came to the Cape during this active period of exploration (GUNN & CODD 1981). BERGIUS, however, was unsatisfied with his position at PALLAS and POLEMAN and left in mid 1817.

Shortly after BERGIUS had left for the Cape, LICHTENSTEIN employed Johannes Ludwig Leopold MUND (1791–1831) and Louis MAIRE (birth and death dates unknown) as botanical and zoological collectors. MUND had known BERGIUS in school and visited him in Cape Town. This may have further increased BERGIUS' dissatisfaction with his own position and soured him towards LICHTENSTEIN, who expected him to collect for the museum without formal support but had seen fit to send others as "official" museum collectors. MUND and MAIRE sent at least two shipments of specimens back to Berlin between their arrival in 1816 and 1818, but as little else followed, the Prussian government recalled them in 1821. Both ignored the recall and remained in South Africa, MUND as a surveyor and MAIRE as a doctor.

Unfortunately, BERGIUS, who continued to send specimens to Berlin, died of tuberculosis less than one year after his departure from PALLAS and POLEMAN. During his short period of activity at the Cape he had collected a number of herpetological specimens. His material, as might be expected, based on his short period of activity and restriction to the immediate environs of Cape Town,

consisted chiefly of common species of the southwestern Cape. The *Katalog Inventarium der Amphibien ca. 1822/23* indicates that there were once 33 BERGIUS specimens of reptiles and amphibians in the collection. At least 27 of these are still extant (BAUER 2000). Among them are specimens of *Bradypodion pumilum*, *Duberria lutrix* (Linnaeus, 1758), *Trachylepis capensis* (Gray, 1831; see BAUER 2003 for justification of the application of *Trachylepis* to African species previously assigned to *Mabuya*), *Naja nivea*, *Crotaphopeltis hotamboeia* (Laurenti, 1768), *Agama atra*, *Cordylus cordylus*, *Strongylopus grayi* (Smith, 1849), and *Breviceps gibbosus* (Linnaeus, 1758). Also collected by BERGIUS were the types of two species, *Pachydactylus bergii* Wiegmann, 1834 (= *Pachydactylus geitje* [Sparman, 1778]; lectotype ZMB 317A, paralectotypes ZMB 317B–C, BAUER & GÜNTHER 1991) and *Coluber rufulus* Lichtenstein, 1823 (= *Lycodonomorphus rufulus*; holotype ZMB 1759, BAUER 2000). FFOLLIOT & LIVERSIDGE (1971) attributed the type of the latter species to KREBS (see below), but it is clear from specimen and catalogue records that LICHTENSTEIN's (1823) description was based on an animal sent by BERGIUS (BAUER 2000).

Another acquaintance of LICHTENSTEIN to visit the Cape was Adelbert VON CHAMISSO (1781–1838; born Louis Charles Adélaïde DE CHAMISSO DE BONCOURT). He had also studied natural history at the University in Berlin and knew both BERGIUS and MUND. CHAMISSO was the naturalist on the *Rurik*, the Russian ship captained by Otto VON KOTZEBUE (1788–1846) that circumnavigated the world in 1815–1818. VON CHAMISSO arrived at the Cape in April 1818 and was disturbed to discover that his friend BERGIUS had died. During his brief stay CHAMISSO collected in and around Cape Town with MUND, MAIRE and Ludwig KREBS (see below) (GUNN & CODD 1981). CHAMISSO was primarily interested in botany and later became the curator of the botanical garden in Berlin, but he did collect some zoological material, including herpetological specimens, some of which were deposited in the collections in Berlin upon his return to Europe, later in 1818 (fide *ZMB Eingangs Journal 1811–1857*). In addition to his contributions to natural history, VON CHAMISSO was also a noted poet and writer.

### 3.4. Ludwig KREBS

The most important of LICHTENSTEIN's contacts in South Africa from a herpetological perspective was Georg Ludwig Engelhard KREBS (1792–1844; Fig. 22), who in 1817 replaced BERGIUS at PALLAS and POLEMAN. KREBS was born in Wittingen (now in Lower Saxony) and had worked as an apprentice apothecary, probably in Hamburg, prior to receiving his full qualifications and departing for Africa. Unlike BERGIUS,

KREBS was not recruited for the firm by LICHTENSTEIN. Like his predecessor, however, KREBS was a keen naturalist and even did some local collecting with BERGIUS before the latter's death (FFOLIOTT & LIVERSIDGE 1971). Krebs also spent time with the French naturalist, Pierre DELALANDE (1787–1823) during his stay at the Cape during the period 1818–1820, learning from him some of the techniques of specimen preparation. Once established in South Africa, KREBS asked his brother Georg, who was training to be a doctor in Berlin, to determine whether LICHTENSTEIN would be interested in purchasing zoological specimens for the Museum.



Fig. 22: Georg Ludwig Engelhard KREBS (1792–1844). Detail of a miniature painted on ivory by Frederick BOLTE. From FFOLIOTT & LIVERSIDGE (1971), *Ludwig KREBS, Cape Naturalist to the King of Prussia 1820–28*, by permission of A. A. Balkema.

LICHTENSTEIN responded favorably to KREBS in 1820 and provided him with instructions on the preservation and packing of specimens. This initiated a 20-year series of contacts between the two men. KREBS' first "trial" shipment went to Berlin in 1820 and another three followed in 1821. Apparently satisfied with the quality and quantity of material, LICHTENSTEIN obtained for KREBS the title of "Cape Naturalist to the King of Prussia" from the Prussian Department of Education and Medicine. This established an exclusive arrangement guaranteeing KREBS payment for his specimens. KREBS became especially valuable to LICHTENSTEIN in late 1821. After parting amicably from PALLAS and POLE-

MAN at the expiry of his four-year contract with the firm, KREBS moved to the Eastern Cape (Fig. 5), then an area poorly known biologically and not represented in the collections of European museums. From November 1821 until early 1825 he was based in the town of Uitenhage. In 1822 he sent four specimen lots to Berlin from Uitenhage, the Sundays River, Van Stadens (near Port Elizabeth), the Suurberg, and the Swartkops River. During 1823 he made excursions eastward as far as the Fish River, sending large shipments to Berlin in 1824 and 1825. In June 1824, however, LICHTENSTEIN advised KREBS that their arrangement would soon expire and that he would no longer be able to rely on funding from the Museum.

KREBS traveled to Cape Town in November of that same year in order to discuss with POLEMAN his future and his plans for opening his own pharmacy in Cape Town, and to determine if it might be possible for his brother Georg to come to the Cape after completing his medical training in Berlin. These plans did not materialize and KREBS divided much of the next several years between the farm Bushfontein on the Baviaans River, where he had built a small hut for himself, and Grahamstown, where he was establishing his own pharmacy in collaboration with Leopold SCHMIDT. In 1827 through his brother Georg he set up a company in which shares could be purchased for the collection of natural history specimens. LICHTENSTEIN and others in Berlin who had received specimens from KREBS agreed to assist in the auctioning of material received after the twelfth shipment, the last covered under the original agreement between LICHTENSTEIN and KREBS.

In 1828 KREBS contracted rheumatism, which severely curtailed his activities for the next two years. However, during this time he obtained burghership of the Cape Colony and was permitted to purchase the farm Doornkroon on the Baviaans River, which in 1832, after the purchase was completed, was renamed Lichtenstein. In 1830 the twelfth shipment was finally dispatched. It included a huge number of specimens from the Baviaans River, Tembuland, and the Tarka and Orange Rivers (Fig. 5). Among the contents were a complete Hottentot (Khoi-Khoi) in brine and a small elephant skeleton, in addition to more than 7000 insects and almost 900 birds (FFOLIOTT & LIVERSIDGE 1971).

By the time KREBS had recovered from his illness his nephew Carl KEMPER had arrived from Germany and in 1830–1831 they made an expedition to the Orange River, collecting material for the thirteenth shipment to Europe, which was sold at auction. In 1834 Ludwig's brother Georg emigrated from Germany and joined him briefly at the farm Lichtenstein before moving on to the larger town of Graaff-Reinet. Both KREBS' own poor health and the Sixth Kaffir War (Frontier War) of 1834–

35 prevented the collection of more material for some time. In 1836 the death of his partner SCHMIDT in Grahamstown prompted KREBS to divest himself entirely of his interests in Grahamstown and he remained based at his farm Lichtenstein thereafter. A fourteenth collection was dispatched during 1837 and ultimately auctioned in Berlin in October 1839. In 1838 KREBS undertook a long planned northern expedition, departing in March and returning in December. This journey took him across the Orange River at Aliwal North, through parts of present-day Lesotho, and across the Vaal River at Kommando Drift before turning south via a more westerly route through Colesberg and Graaff-Reinet. The collections made during this trip constituted the contents of the fifteenth and last of KREBS' shipments to Berlin. This shipment was received in Berlin in 1840 and auctioned by LICHTENSTEIN in 1842. KREBS himself died at the farm Lichtenstein in 1844.

According to shipment records, KREBS sent at least 250 herpetological specimens to Berlin (FFOLLIOTT & LIVERSIDGE 1971). From a herpetological perspective, the most important of KREBS' shipments were the third, sixth, and twelfth. The third shipment was dispatched on 10 October 1821 and received in Berlin 22 February 1822 by LICHTENSTEIN. It included 41 specimens, mostly of common species, chiefly from the vicinity of Cape Town. Among them were *Psammobates geometricus*, *Cordylus cordylus*, *Agama aculeata*, *Afrogecko porphyreus* (Daudin, 1802), *Bradypodion pumilum*, *Bitis atropos*, and *Psammophylax rhombeatus*. The sixth collection contained material collected from Uitenhage and the Sundays River (Fig. 5) and was shipped from Cape Town in July 1822 and received in Berlin on 11 April 1823. It included 85 herpetological specimens including *Bradypodion ventrale* (Gray, 1845), *Pachydactylus geitje*, *Acontias meleagris* (Linnaeus, 1758), *Bitis arietans*, *Causus rhombeatus* (Lichtenstein, 1823), and *Homoroselaps lacteus* (Linnaeus, 1758). KREBS' twelfth shipment included his largest collection (90 specimens) of reptiles and amphibians. It was dispatched from Cape Town on 27 November 1829 and arrived in Berlin on 21 June 1830. This shipment included specimens of *Varanus niloticus* (Linnaeus, 1758), *Agama atra*, *Gerrhosaurus flavigularis* Wiegmann, 1828, *Trachylepis capensis*, *Chamaesaura anguina* (Linnaeus, 1758), *Psammophis crucifer* (Daudin, 1803), *Lycodomomorphus rufulus*, and *Xenopus laevis* (Daudin, 1802). Other early shipments, including the second (1821), fourth and fifth (both 1822) also contained small numbers of herpetological specimens, and the eleventh, sent in the southern hemisphere winter of 1825 contained "3 bottles of snakes and lizards" and "some web-footed reptiles" (fide FFOLLIOTT & LIVERSIDGE 1971), but no inventory of these specimens seems to have survived. In his correspondence with LICHTENSTEIN, KREBS also mentioned

uncollected reptiles such as "a snake of about 120 feet length which is supposed to live in the Kraal of the Tamboukie chief, WASANNA" (FFOLLIOTT & LIVERSIDGE 1971).

At least 60 of KREBS' specimens are still extant in Berlin. They include widely distributed species such as *Pseudaspis cana*, *Lamprophis aurora* (Linnaeus, 1758), *Psammophylax rhombeatus*, *Hemachtus haemachtus*, *Homoroselaps lacteus*, *Bitis arietans*, and *Psammophis crucifer*. Also included are Western Cape endemics, such as *Bradypodion pumilum*, obviously collected early in KREBS' life in South Africa. Many, however, are absent from the southwestern Cape but present in the Eastern Cape, where KREBS ultimately settled: e.g., *Pachydactylus maculatus* Gray, 1845, *Bradypodion ventrale*, *Causus rhombeatus*, and *Bitis caudalis*.

Although many of the species collected by KREBS were new to science, few were described, largely owing to LICHTENSTEIN'S focus on museum administration rather than systematics. LICHTENSTEIN (1823) described only one species, *Sepedon rhombeata* (= *Causus rhombeatus*) on the basis of KREBS' collections (but see DE MASSARY & INEICH 1994 for a differing opinion), although other researchers based their descriptions of *Gerrhosaurus flavigularis* Wiegmann, 1828 (syntypes ZMB 1140–41 fide BAUER et al. 1994), *Scincus homalocephalus* Wiegmann, 1828 (= *Trachylepis homalocephala*; holotype ZMB 1239, fide BAUER 2000; BAUER et al. 2003), and *Cricochalcis aenea* Fitzinger, 1843 (= *Chamaesaura aenea*; holotype ZMB 1172, fide BAUER et al. 1994) on material in Berlin collected by KREBS (BAUER 2000).

As noted by STRESEMANN (1954), LICHTENSTEIN'S chief interest in KREBS' material seems to have been as a source of revenue for the museum, which was chronically short of finances at the time. Indeed, LICHTENSTEIN'S letters to KREBS stressed how valuable the material would be for sale or exchange with other institutions (FFOLLIOTT & LIVERSIDGE 1971). One unfortunate outcome of LICHTENSTEIN'S apparent indifference to the scientific (as opposed to monetary) value of collected specimens was his carelessness with the data provided by KREBS. Apparently KREBS provided detailed locality data with at least some of his specimens, but LICHTENSTEIN reduced the localities to almost meaninglessly general areas (STRESEMANN 1954). Thus, the majority of KREBS' specimens bear the localities "Cap der Gutton Hoffnung" (Cape of Good Hope) or "Kaffirland" (Eastern Cape) in the ZMB catalogues. LICHTENSTEIN'S inattention to this material has, to some extent, obscured the fact that KREBS was one of the most prolific African collectors of his time. STRESEMANN (in FFOLLIOTT & LIVERSIDGE 1971) estimated that KREBS' collections were more extensive than those



of Sir Andrew SMITH, who described a large percentage of the vertebrate fauna of the Cape on the basis of his own collections made contemporaneously with those of KREBS. Because KREBS was not an "academic" naturalist, however, he himself described nothing and, in fact, donated bird and mammal specimens to SMITH during 1825 and 1826 when SMITH was the director of the fledgling South African Museum in Cape Town (KIRBY 1965). The two men had apparently met both in Albany in the Eastern Cape in 1823 and again in Cape Town, during KREBS' visit in 1825.

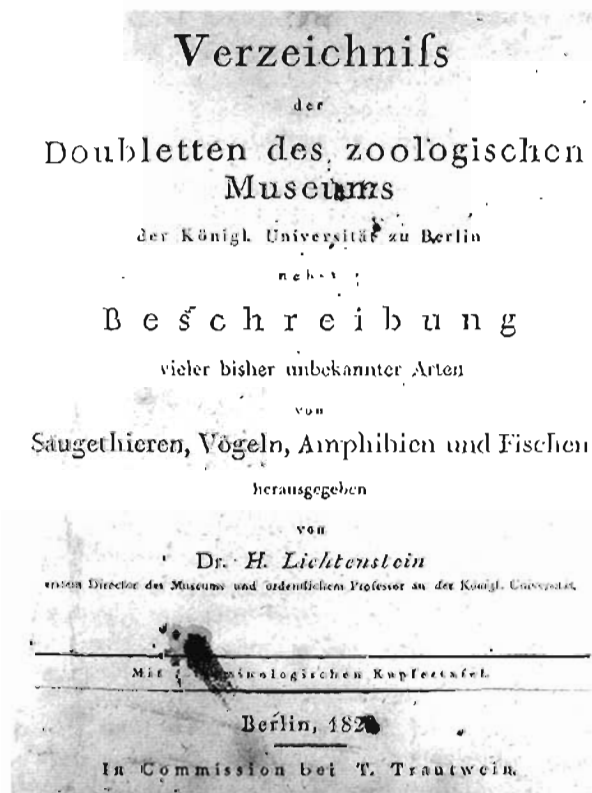


Fig. 23: Title page of LICHTENSTEIN's *Verzeichniss der Doubletten des zoologischen Museums* (1823), a sale catalogue, as well as systematic work, in which material collected by Ludwig KREBS in South Africa was listed. Collection of the author.

LICHTENSTEIN was apparently successful in earning money from KREBS' material. By 1823 KREBS had sent at least 125 amphibian and reptile specimens to Berlin, but only 36 can be identified in the *Katalog Inventarium der Amphibien ca. 1822/23*. It appears likely that LICHTENSTEIN (1823) included some of KREBS' herpetological specimens from the first seven shipments in the *Verzeichniss der Doubletten* (Fig. 23), one of several sales catalogues he presented during his directorship at the Museum. Although no collector is given for the specimens listed, the African herpetological material at this time was primarily from KREBS and BERGIUS. Among the specimens from "Africa meridionalis" in the cata-

logue were *Agama aculeata*, *Agama gemmata* nomen nudum [= *Agama hispida*], *Cordylus verus* Laurenti, 1768 [= *Cordylus cordylus*], *Gecko ocellatus* Cuvier, 1817 [= *Pachydactylus geitje*], *G. porphyreus* [= *Afrogecko porphyreus*], *Chamaeleo pumilus* [= *Bradypodion pumilum*], *Scincus trilineatus* Cuvier, 1829 [= *Trachylepis capensis*], *Typhlops lumbricalis* (Linnaeus, 1758) [probably *Rhinotyphlops lalandei* (Schlegel, 1839)], *Acontias meleagris*, *Coluber rhombeatus* [= *Psammophylax rhombeatus*], *Coluber arciventris* Daudin, 1803 [= *Duberria lutrix*], *Coluber melanocephalus* Linnaeus, 1758 [possibly *Aparallactus capensis* Smith, 1849], *C. rufulus* [= *Lycodonomorphus rufulus*, described on p. 105], *Elaps lacteus* [= *Homoroselaps lacteus*], *Sepeodon rhombeata* [= *Causus rhombeatus*, described on p. 106], and *Vipera atropos* [= *Bitis atropos*].

KREBS' great northern expedition in 1838 resulted in his fifteenth shipment of specimens, which, although unimportant herpetologically, included hundreds of bird and mammals specimens and resulted in an auction catalogue issued by LICHTENSTEIN in 1842 (FOLLIOTT & LIVERSIDGE 1971). Additional South African herpetological sale material was later offered in the *Nomenclator Reptilium et Amphibiorum Musei Zoologici Berolinensis* (LICHTENSTEIN & VON MARTENS 1856), but because so little locality information was provided in this catalogue it is difficult to determine if any of these specimens represent previously unsold material from KREBS.

#### 4. OTHER GERMAN MUSEUMS AND THEIR SOUTH AFRICAN COLLECTORS

LICHTENSTEIN's collectors were not alone in South Africa in the first half of the Nineteenth Century. Cape Town, and later other parts of the Cape Colony, was home to a large number of German immigrants, often engaged in skilled professions. Apothecaries in particular and, to a lesser extent, doctors in South Africa were drawn disproportionately from Germany. Some of these men collected natural history specimens, and those who did frequently donated or offered the right of first refusal of sale to institutions in their home states.

Carl Ferdinand Heinrich LUDWIG (1784–1847) was instrumental in providing specimens to the Senckenberg Museum and especially to the Naturhistorische Staatssammlung Württembergs (now the Staatliches Museum für Naturkunde Stuttgart, SMNS). LUDWIG came to the Cape in 1805 to take up a position in an apothecary shop in Cape Town and rose quickly in social prominence. He devoted much time to the collection of plants and animals. In 1826 his donation of a natural history collection to the Royal Cabinet of Natural History in Stuttgart earned him a knighthood and the right to call himself Baron VON LUDWIG. LUDWIG did not collect

widely himself, but did obtain specimens from others who did, including Andrew SMITH. Parts of LUDWIG'S large private collection was loaned for display to the South African Museum under SMITH'S directorship, although this (as well as SMITH'S private collection) was eventually removed from the Museum in 1837 (SUMMERS 1975).

On several trips to Germany, LUDWIG presented other large collections to a variety of museums and herbaria. In 1838 he invited Christian Ferdinand Friedrich VON KRAUSS (1812–1890) to accompany him back to the Cape. KRAUSS collected in the interior, eastward to Knysna, Port Elizabeth, and Natal (Fig. 1). He returned to Cape Town in 1840 and left for Europe to take up a position at the Museum in Stuttgart (GUNN & CODD 1981), where he eventually became director in 1856. Although there is no evidence of LUDWIG'S specimens having provided the basis for descriptions, the type of *Stenostoma conjunctum* Jan, 1861 [= *Leptotyphlops conjunctus*] (SMNS 2519A) was based on a specimen from the Cape of Good Hope (Eastern Cape fide BROADLEY & WATSON 1976), collected by KRAUSS (SCHLÜTER & HALLERMANN 1997). RÜPPELL (1845), in his catalogue of the herpetological collections of the Senckenberg Museum in Frankfurt am Main, also thanked Baron VON LUDWIG for donating a large number of the South African specimens held by that institution.

Eduard Friedrich POEPPIG (1798–1868) in Leipzig also promoted the work of a collector in South Africa, namely Wilhelm GUEINZIUS (1814–1874). GUEINZIUS was an apothecary trained in Leipzig, where he had apparently met POEPPIG. He arrived at the Cape in 1838 and moved to Natal in 1841 from where he forwarded natural history specimens to Leipzig. He was at first supported financially by POEPPIG (GUNN & CODD 1981), but he eventually settled permanently in Natal (now KwaZulu-Natal) and lost this backing. The herpetological collections of the Leipzig Museum were incorporated into the collection of the Staatliches Museum für Tierkunde in Dresden, but much of the material, including important specimens from GUEINZIUS had been lost or destroyed prior to this transfer, chiefly as a result of damage during World War II (OBST 1977). At least some of the material was described as new by POEPPIG in a manuscript that was never published. GUEINZIUS also collected material that reached Wilhelm Peters in Berlin (see below). Both *Heterolepis gueinzii* Peters, 1874 [= *Mehelya capensis* (Smith, 1847)] and *Atractaspis natalensis* Peters, 1877 [= *Macrelaps microlepidotus* (Günther, 1860)] were described on the basis of material provided by GUEINZIUS and other material, such as stuffed specimens of *Varanus albigularis* (ZMB 7642) and *V. niloticus* (ZMB 7641), are still extant in the Berlin collection.

## 5. WILHELM CARL HARTWIG PETERS

Certainly the most important southern African herpetological collections to reach Germany in the first half of the Nineteenth Century were those made by Wilhelm Carl Hartwig PETERS (1815–1883; Fig. 24). PETERS had been a student in Berlin and, encouraged by LICHTENSTEIN and others, he planned a voyage to Mozambique,

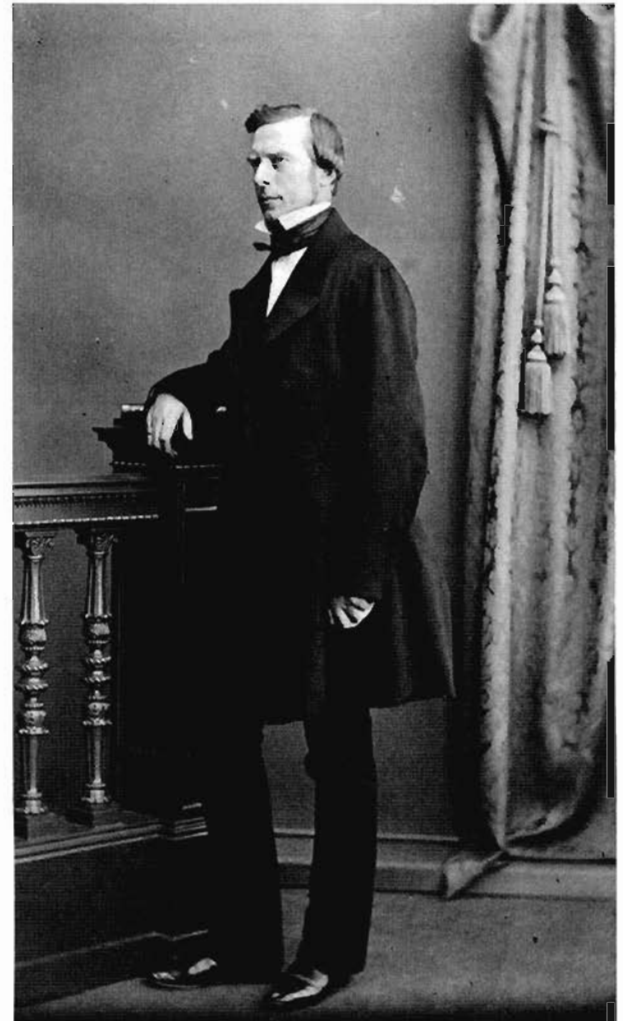


Fig. 24: Wilhelm Carl Hartwig PETERS (1815–1883) shortly after his return from his expedition to Mozambique. Image courtesy of the Museum für Naturkunde der Humboldt-Universität zu Berlin, Historische Bild- und Schriftgut-sammlungen (Bestand: ZM, Signatur B I/388).

at that time the major Portuguese colony on the east coast of Africa. PETERS, who was born in Coldenbüttel in Schleswig, began his university training in Copenhagen, but transferred to the Friedrich-Wilhelms Universität in Berlin in 1835. He earned his M.D. in 1838 and presented a dissertation on the skeletal anatomy of turtles. Following an 18-month stint working with Henri MILNE-EDWARDS in the Mediterranean, PETERS returned to Berlin as an assistant to Johannes MÜLLER in the Anatomical

Museum of the University. PETERS' experiences in the Mediterranean and the influence of Alexander VON HUMBOLDT, Christian Gottfried EHRENBURG, and especially Hinrich LICHTENSTEIN, all of whom had completed important voyages of biological exploration themselves, led PETERS to plan his own expedition. Perhaps influenced by LICHTENSTEIN'S experiences in southern Africa, PETERS departed for Mozambique in late 1842.

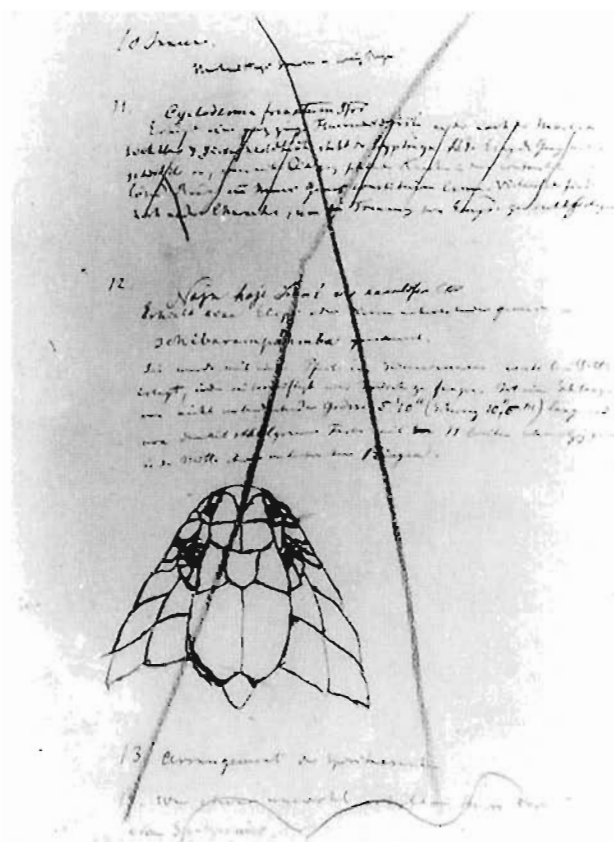


Fig. 25: Page from Wilhelm PETERS' Mozambique journal from January 1845. The entry includes notes from Tette (Tete) on *Cycloderma frenatum* Peters, 1854 and *Naja annulifera* Peters, 1854, two of the many species described by PETERS on the basis of his material from Mozambique and adjacent regions. The drawing shows the head scales for the new snake species. PETERS presumably crossed out pages after the material had been incorporated into manuscripts. Image courtesy of the Museum für Naturkunde der Humboldt-Universität zu Berlin, Historische Bild- und Schriftgutsammlungen (Bestand: Zool. Mus. Signatur: S I, Peters, W., Naturhist. Journal Africa 1843–1847, Bl. 148).

PETERS returned in 1848 having collected thousands of specimens, including perhaps 1000 amphibians and reptiles, chiefly in Mozambique, but also in Zanzibar, the Comores, Madagascar, South Africa and Angola. The details of PETERS' itinerary and collections have been summarized by BAUER et al. (1995). In total he sent 12 shipments from Africa to Berlin. The first of these (including 34 herpetological specimens) arrived in August

1844. Much larger herpetological collections arrived in May of 1845 and April of 1847, although most of PETERS' shipments contained at least some amphibian or reptile material. Most of the collection stayed in Berlin but some was auctioned by LICHTENSTEIN, who, as in the case of KREBS, frequently ignored detailed locality data. Other parts of the collection were eventually exchanged with other museums at a later time.

Unlike KREBS, however, PETERS, as a trained academic, planned on describing his own material (Fig. 25). The first report of his collections (PETERS 1844) appeared while he was still in the field. The bulk of the new species, more than 50, were described some years after his return (PETERS 1854), but the complete herpetological results of his expedition did not appear until a year before his death, in the *Reise nach Mozambique* (PETERS 1882). In all, by his own reckoning, PETERS collected representatives of 116 species (55 new) and seven new amphibian and reptile genera during his five years in Africa. This is only a fraction of the almost 650 new amphibian and reptile species he described during his career (BAUER et al. 1995) and only a subset of the southern African species he described. Indeed, upon LICHTENSTEIN'S death in 1857, PETERS became the director of the Zoological Museum and for 26 years presided over the growth of the Berlin collection. Although he did not send collectors to Africa as did LICHTENSTEIN, PETERS did cultivate connections with Europeans in southern Africa and described many additional species from the region, particularly South Africa and South West Africa.

## 6. LATE NINETEENTH CENTURY COLLECTORS

By the 1850s the Zoological Museum in Berlin had extensive southern African holdings, but nearly all originated from a narrow band along the western and eastern Cape coasts or from PETERS' localities in coastal Mozambique and the Zambezi Valley. Only limited material had been collected in the interior of South Africa, primarily by KREBS. In the late 1860s the Zoological Museum, Berlin was enriched by representative material collected by the Swedish traveler and zoologist Johann August WAHLBERG (1810–1856). On his second trip to Africa, WAHLBERG traveled extensively from Walvis Bay inland to Otjimbingwe and Windhoek and across the Kalahari to Rietfontein and Ghanzi, and then to Ngami Lake (in modern Botswana; Fig. 5). WAHLBERG was killed by an elephant in the Okavango Delta, but some of his collections survived. The majority of these went to Stockholm, but PETERS (1869a, 1870) described the new reptile material and the collection in Berlin received representatives. Included were several new species that represented the new gekkonid genera *Colopus* Peters, 1870 and *Rhoptropus* Peters, 1870. PETERS also

received material from Dr. Heinrich MEYER, who practiced medicine in Calvinia in the 1860s and sent the types of *Acontias lineatus* Peters, 1879 and *Chondrodactylus angulifer* Peters, 1870 from the surrounding Oorlogsrivier District (now Hantam District, Northern Cape Province).

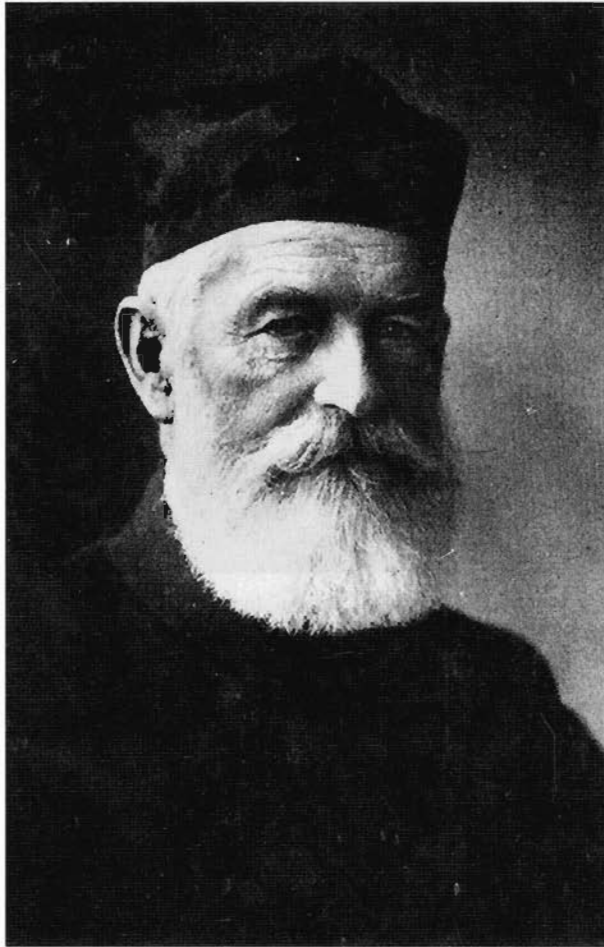


Fig. 26: Carl Hugo HAHN (1818–1896), Rhenish missionary who served in South West Africa and provided herpetological specimens to Wilhelm PETERS. Image from National Archives of Namibia.

The most important southern African material obtained during the latter half of the Nineteenth Century came from missionaries. In South Africa proper, Carl Heinrich Theodore GRÜTZNER (1834–1910) of the Berliner Mission provided PETERS with several new species from the northern Transvaal (now Mpumalanga and Limpopo Provinces), which had been collected at the Lutheran mission stations of Botsabelo (Botschabelo), Gerlachshoop, and Xa Matlale (PETERS 1869b, 1871, 1881, 1882). After PETERS' death MATSCHIE (1891) reported on a herpetological collection, which included new taxa, made by Agnes and Magdalene KNOTHE at the Mphome mission station near Haenertsburg (now

Haenertsburg, Limpopo Province). Most significant in this regard, however, were the Rhenish missionaries in the arid and herpetologically-unexplored region of South West Africa (modern Namibia). Rhenish Missions were first established in South West Africa in 1805 and were a fixture by the time that Carl Hugo HAHN (1818–1895; Fig. 26) who was originally from Riga (Latvia), arrived in 1842. HAHN worked as a missionary in Namaland and Damaraland from 1842 to 1873, with several return trips to Europe in between. During his first two decades in Africa HAHN was based at missions in Neu Barmen (now Gross Barmen) and Otjimbingwe (Fig. 5). The latter mission was established in 1849 and from that date until a return to Europe in 1860–1864, HAHN divided his time between the two missions. In 1855 he was given instructions to explore to the north and northwest of Hereroland and to promote the expansion of the mission into Ovamboland. From 1864 to 1873 HAHN ran a training school for Herero evangelists at Otjimbingwe. After a brief stay in Germany in 1873–1874 he returned to Cape Town as a Lutheran minister, retiring in 1884. He served briefly as a relief minister in Worcester in the Western Cape during 1891–1893 and died in Cape Town in 1895.

HAHN was a keen naturalist and his diaries reflect his concentration on detail (LAU 1984, 1985a, 1985b). Although HAHN knew little of reptiles himself, he did note their occurrence at the missions and provided PETERS in Berlin with considerable material from his missions in Neu Barmen and Otjimbingwe. HAHN's specimens were described by PETERS (1862, 1867, 1877) who named 13 new species on the basis of this material, including the common central Namibian species *Agama planiceps* Peters, 1862, *Trachylepis acutilabris* (Peters, 1862), and *Zygaspis quadrifrons* (Peters, 1862) and the restricted montane cordylid *Cordylus pustulatus* Peters, 1862. For the most part, the only species unambiguously identifiable from HAHN's own diaries are the well known venomous snakes, such as Puffadders, but occasionally it is possible to identify other species from his descriptions. Among the more interesting reptiles recorded by HAHN in his journals were "four-footed snakes" (possibly *Lygosoma sundevallii*). In 1856 he noted that the Swedish explorer WAHLBERG, who had visited him, had also seen these animals, but was unsure if they were lizards or snakes. HAHN recorded collecting and preserving three specimens on August 15, 1856; these are almost certainly ZMB 4223–25, the three syntypes of *Eumeces reticulatus* Peters, 1862 [a junior synonym of *Lygosoma sundevallii* (Smith, 1849)].

## 7. FIN DU SIÈCLE: HERPETOLOGY IN DEUTSCH-SÜDWEST-AFRIKA

By the 1870s small European settlements were forming in South West Africa, as German settlers followed the

Rhenish missionaries into newly "civilized" areas. This territory, north of the Orange River, was not part of the Cape Colony and had yet to be claimed as the prize of any European power. Disturbed by an ongoing conflict between the Herero people from the north and highlands of the country and the Namas of the south, the missionaries in 1868 appealed to the King of Prussia for "protection". The Herero and Nama leaders subsequently appealed to the Cape government for their intervention. The Prussian government did not act on the request of the missionaries, and only after a decade, in 1878, did the British respond by proclaiming their control of the deep harbor of Walvis Bay and the economically valuable guano islands (stretching along the Namibian coast from 24°40' S to 27°40' S).

In 1882 Franz LÜDERITZ, a German tobacco farmer and trader, purchased the area around Angra Pequena (now Lüderitz) on the coast of South West Africa. This enclave was expanded rapidly and in 1884 Otto VON BISMARCK, the German chancellor was asked for, and granted, German protection of the region. The following year the Deutsche Kolonialgesellschaft für Südwestafrika took over the region and by 1891 the colonial government was established at Windhoek. The German colonial experience in southern Africa was short-lived. The expansion of European settlements and the arrival of colonists (3700 by 1903) led to conflict between the Germans and the native population (Fig. 27), culminating in the Herero War (1904–1906). In the following decade World War I ended the German colonial era as Union of South Africa troops from the Cape took over South West Africa and the last of the German colonial troops surrendered in 1915.



Fig. 27: Namutoni Fort, northern Namibia. This fort was erected in 1903, during the brief period of German colonial rule (1884–1915) and now serves as a tourist camp in Etosha National Park. Photo by the author.

Although the work of Wilhelm PETERS dominated South West African herpetology until his death in 1883, the Berlin Museum's interests in South West Africa did not remain unchallenged in the brief colonial period. Pa-

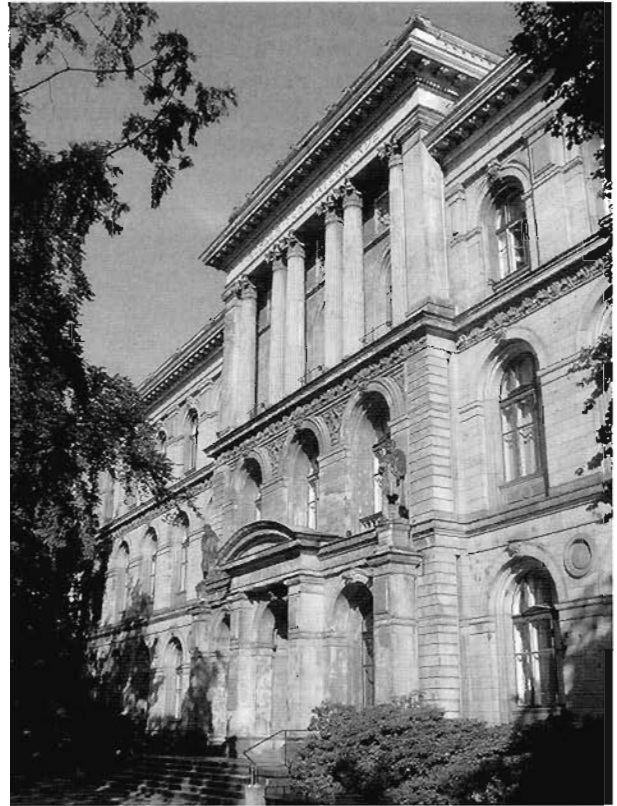


Fig. 28: Main entrance of the building currently housing the Museum für Naturkunde der Humboldt-Universität zu Berlin on Invalidenstraße (photo taken 7 August 2003). Although designed during PETERS' tenure as director, it opened only after his death. Image courtesy of Rainer GÜNTHER.

radoxically, the formal colonization of South West Africa in the year following PETERS' death facilitated the expeditions and explorations that lead to the loss of Berlin's herpetological hegemony of the region. Many large natural history collections, including some assembled as part of major, well-funded expeditions, poured back to Europe between 1884 and 1914. These specimens found their way into the collections in Hamburg, Wiesbaden, and Vienna, as well as the Senckenberg Museum in Frankfurt, and, of course, Berlin (Fig. 28). Richard STERNFELD (1910, 1911), then based at the Zoological Museum, Berlin, made substantial contributions to the herpetology of the region, although he also introduced many problems for subsequent workers (SPAWLS 1991). The contributions of BOETTGER, WERNER, ANDERSSON, and others based upon South West African collections in German museums were likewise significant and have been reviewed elsewhere (MERTENS 1955; SPAWLS 1991). Gustav TORNIER, PETERS' successor as herpetologist at the Zoological Museum expended his efforts, and those of the Museum in documenting the fauna of Germany's equatorial possessions of Cameroon, Togoland, and Tanganyika. Although the significance of Berlin's collections in these areas grew, the relative impor-



tance of the Museum's South West African collections declined steadily through the Twentieth Century, as workers from other institutions, most notably the Senckenberg Museum, used the support of the large and powerful German community in South West Africa to facilitate significant herpetological exploration and collections building (e.g., MERTENS 1955, 1971).

## 8. CONCLUSIONS

German contributions to the herpetology of southern Africa began as a byproduct of participation in the activities of the Dutch East India Company at the Cape of Good Hope in the mid-1600's. These pre-Linnean observations and illustrations have not, in the long run, contributed significantly to herpetology in the region because no new species were described, no specimens collected for study, and only the most cursory details of appearance and biology were recorded.

Hinrich LICHTENSTEIN came to South Africa at the very end of the period of Dutch control of the Cape and in many ways was a transitional figure in the shift from the casual observations of early Germans in the employ of the VOC to the formal scientific study of southern African herpetology as practiced by Wilhelm PETERS in the mid- to late Nineteenth Century. LICHTENSTEIN made no herpetological observations himself during four years in South Africa and, in his actions as museum director, seemed almost disinterested in the scientific value of specimens and their associated data. By the same token, he actively encouraged others to collect and established the Zoological Museum, Berlin as a dominant institution in the study of southern African reptiles and amphibians.

From the Museum's inception in 1810 until the death of Wilhelm PETERS in 1883, the Zoological Museum, Berlin was the center of southern African herpetological studies in Germany. For South West Africa and Portuguese East Africa (Mozambique) Berlin could claim the most extensive and important collections in the world. PETERS made the most of the important collections that he himself made in Mozambique and also promptly described any new material sent to him by HAHN, GRÜTZNER, MEYER, and others, ensuring the Zoological Museum's prominent position in the history of herpetology in southern Africa. However, the Museum could have played a much greater part than it did. LICHTENSTEIN'S activities in Berlin focused on the sale of material collected by BERGIUS and KREBS, rather than its description, and thus denied these early collectors the recognition they deserved. KREBS, in particular, collected many species of amphibians and reptiles new to science, but had the misfortune of being a contemporary of Andrew SMITH, who, unlike LICHTENSTEIN, acted on his discoveries, describing fully one-eighth of the south-

ern African species of amphibians and reptiles recognized today (BRANCH 1998).

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