

An annotated list of reptiles and amphibians from the 1905 Hamburg expedition to southwest Australia deposited in the Zoological Museum Hamburg

Jakob Hallermann¹

¹ Universität Hamburg, Centrum für Naturkunde (Cenak), Martin-Luther-King-Platz 3, 20146, Hamburg, Germany

<http://zoobank.org/343FCF76-526A-49C1-8C99-C7BBA9660FB2>

Corresponding author: Jakob Hallermann (hallermann@uni-hamburg.de)

Academic editor: Alexander Haas ♦ Received 20 March 2020 ♦ Accepted 26 May 2020 ♦ Published 15 July 2020

Abstract

The herpetological material of the 1905 Hamburg expedition to southwest Australia is redetermined and listed with precise locality data and habitat details. Of this material, 275 specimens of 57 species are still part of the herpetological collection of the Zoological Museum Hamburg (ZMH). A map showing 47 (out of 167) collecting points is provided. Some of the type specimens described in the original material by Prof. Franz Werner have been destroyed. A single paratype of *Crinia michaelsoni* (Werner, 1914) now *Geocrinia leai* (Flecher, 1898), formerly thought to be lost, was recovered in the ZMH collection. This historical collection is a valuable resource for understanding the composition of the herpetofauna of the previous century.

Key Words

Australia, historical expedition, Amphibia, Squamata, Chelonia, recovered type material

Introduction

Historical collections are valuable sources of information for investigating a country's past and present species inventory. Herpetological material from Australia is relatively rare in museum collections, and today it is difficult to obtain new material from Australia due to strict export and nature conservation regulations.

In 1883, the collections from a German expedition to South Georgia Island, near Antarctica were given to the Natural History Museum Hamburg (today's ZMH). The collection, mainly of invertebrates, was intended for further study and the Museum planned to make further expeditions to obtain collections from biogeographically adjacent areas. In 1892, Wilhelm Michaelsen, first curator of the Natural History Museum Hamburg, went on an expedition to Patagonia, Chile und Tierra del Fuego (Hamburger Magellanische Sammelreise 1892/93). Once that material had been analyzed, Michaelsen began planning

another expedition. His original plans to travel to Africa had to be altered because, at the same time, another scientist (Leonard Schultze from Jena) organized an expedition to southwest Africa. Michaelsen rerouted, and decided to travel to southwest Australia. Michaelsen, together with his colleague Robert Hartmeyer from the Natural History Museum Berlin (today's ZMB), organized and led the expedition to southwest Australia in 1905. As studies of this geographic area were, at the time, very rare, there was a distinct gap in the knowledge regarding its biogeographic distribution of animals: as such, Michaelsen's expedition aimed to close this gap and to provide much needed information and material (Michaelsen and Hartmeyer 1907).

The SW Australian expedition received financial support from both the Natural History Museums represented (Hamburg and Berlin), the Senate of Hamburg, the government of Western Australia and private sponsors (including Strelitz Bros., a company of merchants and shipping agents based in Fremantle in Western Australia,

established by two brothers from Hamburg). The expedition group travelled aboard the German mail steamer *Karlsruhe* and, on the morning of May 5, 1905, they arrived at the port of Fremantle, Western Australia. Along with the expedition participants and material, the ship transported 800 litres of pure ethanol. The zoological base station was in Fremantle. Strelitz Warehouse served as a depot for the ethanol and the hundreds of glass jars for zoological material. The expedition party was permitted to use all train lines free of charge, and many of the collection stations were situated along the railway lines. There were 167 collection points in total (stations 1–167) distributed throughout SW Australia, mainly around Fremantle, Perth, on Rottnest Island, and around Albany in the south (see map). All available animals were collected: terrestrial invertebrates, marine and freshwater invertebrates and terrestrial vertebrates. In this paper, I focus only on the reptile and amphibian collection of the expedition.

Franz Werner, Professor of the University of Vienna and an expert in amphibians and reptiles, was tasked with the determination of the expedition material. He published a detailed compilation of the herpetological material discovered during the SW Australian expedition. His lists comprise three parts: reptiles excluding Gekkonidae and Scincidae (Werner, 1909); reptiles (Gekkonidae and Scincidae) (Werner, 1910); and Amphibia (Werner, 1914).

All material deposited in the ZMH herpetological collection has been checked, redetermined and catalogued. The numerous changes in taxonomy of the Australian fauna since that era necessitate a taxonomic list of the present holdings. Furthermore, not all the specimens documented in Werner's lists (1909, 1910, 1914) are present. Some of the material was destroyed and lost during WWII, or has been deposited in other herpetological collections, including Hartmeyer's home institution, the Natural History Museum Berlin (pers. com. F. Tillack). Franz Werner was not affiliated with any one museum, but instead worked peripatetically through many European collections. He visited the Zoological Museum Hamburg on several occasions to examine material and sent the collections back to Austria to work on there. Most of the material would then have been returned to Michaelsen and Hartmeyer, who would have split it between their two home institutions. However, Werner presumably retained some of the material, which went to the Natural History Museum Vienna (NHMW) on his death (see Adler 1989).

The catalogues of the herpetological collection of the Zoological Museum Hamburg (ZMH) were all lost during WWII, therefore, the only available information is from the jar labels and literature.

Material and methods

All the jars containing material from the SW Australian expedition deposited in the Hamburg Zoological Museum's herpetological collection were checked and catalogued in a database (FileMaker pro advanced 17). Infor-

mation on locality and habitat were noted by Michaelsen (1907) in his appendix, and could easily be assigned to each specimen by the station number attached to the jar. Most of the specimens were specified or described by Werner (1909, 1910, 1914). Where possible, sex and age were recorded.

Results

List of reptile and amphibian species of the SW Australian expedition of 1905 deposited in the herpetological collection of ZMH.

The list is presented in systematic order, with current specific names, catalog numbers, specific localities and remarks, which address geographic and taxonomical importance. The map shows 47 out of 167 collection points where amphibians and reptiles of the expedition were found. Unless otherwise noted, the jar labels indicate all specimens were collected by Wilhelm Michaelsen.

There are 275 specimens of 57 species and one subspecies still present.

Lost type material

Part of the type material of the following species, described by Werner in 1909:

- Physignathus eraduensis*, holotype, from station 80, Eradu, destroyed. Current name: *Gowidon longirostris*.
- Aprasia brevirostris*, originally two syntypes, from station 99, Lion Mill (ZMB 24596) and station 145, Donnybrook, destroyed. Current name: *Aprasia pulchella*.
- Pseudechis denisonioides*, holotype, from station 80, Eradu, destroyed. Current name: *Pseudechis australis*.

Described by Werner in 1910, were lost during WWII:

- Diplodactylus alboguttatus*, originally three syntypes, from station 65, Denham, one paralectotype missing. Lectotype: SMF 8343 (designated by Wells and Wellington 1985), and one paralectotype in ZMB (21435; Kluge 1967). Current name: *Lucasium alboguttatum*.
- Ablepharus distinguendus*, holotype, station 119, Obelisk Hill, Fremantle (current name *Lerista distinguenda*; synonymy after Cogger et al. 1983).
- Egernia pulchra*, originally holotype (from Torbay, station 162) and four paratypes, one from South Albany and three from Lunenberg. The holotype is lost. Two paratypes still present from Lunenberg (ZMH R04404-05), and the South Albany paratype is in ZMB (ZMB 21458). The Lunenberg specimen with a complete tail is deposited in the Western Australian Museum (WAM R11345) (Mitchell 1950). Current name: *Liopholis pulchra*.

Lygosoma (Rhodona) bipes var. *concolor*. originally two syntypes from Denham, one of them is presumably ZMB 21464, the ZMH specimen is missing. This subspecies is a synonym of *Lerista miopus* (Günther, 1867).

Lygosoma (Hemiergis) initiale, originally nine syntypes, six from Lion Mill, three from Jarrahdale. One still present in ZMH (R01851); one in NHMW (16637; designated as lectotype by Wells and Wellington 1985), three in ZMB (21465, 21465A-B), all extant types from Lion Mill). Four paralectotypes (including all three from Jarrahdale) are probably destroyed. Current name: *Hemiergis initialis*.

Described by Werner in 1914:

Heleioporus albopunctatus var. *pelobatoides*, originally two syntypes from station 156 Beverley and station 158 from Broome Hill, not present in ZMH collection, having been destroyed during WWII. Current name *Neobatrachus pelobatoides*.

Extant material

Cheloniidae

Caretta caretta (Linnaeus, 1758)

ZMH R00803 (juvenile). Bernier Island, Museum Perth collection.

Remarks. The other four specimens listed by Werner (1909) not present in ZMH.

Chelonia mydas (Linnaeus, 1758)

ZMH R00813 (juvenile). Barrow Island, Museum Perth collection.

Remarks. Originally six specimens obtained.

Agamidae

Ctenophorus adelaidensis (Gray, 1841)

ZMH R11316. No specific locality.

Remarks. This is the only specimen obtained by the expedition, a donation from the Western Australian Museum; old determination *Amphibolurus adelaidensis* var. *pulcherrima* by Werner (1909), no subspecies valid.

Ctenophorus reticulatus (Gray, 1845)

ZMH R11167-68 (2 males). York, station 155, 174 m asl, bush and stony hills; ZMH R11189 (female): Edel Land, Baba Head, station 69, beach, bush; ZMH R11229-30: Murchinson district, male, female; ZMH R11235: Denham, station 65, bush, coastland 170 m asl; ZMH R11237-38: Northampton, station 71, hilly country with

dry bush, 170 m asl; ZMH R11307-08: Tamala, station 70, hilly land with sparse bush, coastland, sheep farm.

Remarks. R11229-30 received by the expedition from the collection of the Museum Perth; an additional ten specimens from Denham are present in ZMB (under ZMB 21431). The whereabouts of one specimen from Northampton is unclear. Original identification by Werner (1909) *Amphibolurus reticulatus*.

Moloch horridus (Gray, 1841)

ZMH R11169. Norseman, station 90, at south coast of Lake Cowan.

Remarks. An additional specimen is located in ZMB (under ZMB 21427) from Australia without specific locality, most likely represents the specimen reported by Werner (1909) from Eradu.

Pogona minor (Sternfeld, 1919)

ZMH R05017. North of Subiaco, station 109, forest.

Remarks. Formerly determined as *Amphibolurus barbatus* by Werner (1909).

Carphodactylidae

Nephrurus levis levis (De Vis, 1886)

ZMH R02829. Denham, station 65, bush, coastland.

Remarks. Old determination: *Nephrurus platyurus* by Werner (1910).

Diplodactylidae

Crenadactylus ocellatus (Gray, 1845)

ZMH R11312. Boorabbin, station 95, bush land with partially dry salt soil, 418 m asl.

Remarks. Identified by Werner (1910) as *Phyllodactylus ocellatus*.

Diplodactylus ornatus (Gray, 1845)

ZMH R11231-32. Geraldton, station 75, dunes, coastland.

Remarks. Four other specimens reported as *Diplodactylus vittatus* by Werner (1910) (two from Gooseberry Hill (one under ZMB 21453 as *D. granariensis*)), one each from York (ZMB 24589 as *D. granariensis* and one from Broome Hill) not found.

Diplodactylus pulcher (Steindachner, 1870)

ZMH R11266. Beverley, station 156, bush and stony hills, cultivated area, 194 m asl.

Remarks. Two other specimens reported by Werner (1910), from Boorabbin and Eradu, not found.

***Strophurus spinigerus* (Gray, 1842)**

ZMH R11233. Buckland Hill, station 114, bush and garden land, coastland.

Remarks. Identified by Werner (1910) as *Diplodactylus spinigerus*.

***Strophurus assimilis* (Storr, 1988)**

ZMH R11215. Day Dawn, station 76, heavily felled bush, many loose stones, at northern border of Lake Austin, 420 m asl.

Remarks. Identified by Werner as *Diplodactylus intermedius*.

Gekkonidae

***Christinus marmoratus marmoratus* (Gray, 1845)**

ZMH R11178. North of Subiaco, station 109, forest, coastland; ZMH R11180: Darling Ranges, Collie, station 137, tall forest, partially swampy; ZMH R11181-87: Boyanup, station 146, tall forest with cultivated land; ZMH R11265: South Albany, station 167, tall forest and bare stony hills, coast land; ZMH R11267-68, R12040-43: Harvey, station 136, tall forest with cultivated land, lowland W of Darling Ranges.

Remarks. Werner (1910) distinguished two species, *Phyllodactylus marmoratus* and *P. affinis*. Both are now considered to be *C. marmoratus*. Specimens listed by Werner as one species or the other but not located in ZMH are three from Lion Mill two under ZMB 24600, two from East Fremantle (one under ZMB 21454), and one each from Mundaring Weir (ZMB 24590), Cottesloe (ZMB 21455), Torbay (ZMB 24595), Cranbrook four from Bunbury, one more from north of Subiaco, Guildford and Yallingup.

***Gehyra variegata* (Duméril & Bibron, 1836)**

ZMH R11218-20. Moora, station 88, bush and forest, 182 m asl; ZMH R11239: Geraldton, station 75, dune bushes, coastland; ZMH R12023 (male): Yalgoo, station 77, hilly stony land with bushes, 310 m asl; ZMH R11240-57: Mount Robinson, station 91, bush, nine miles SE Kalgoorlie, 370 m asl; ZMH R12024-29 (6 specimens): Coolgardie, station 94, hilly, stony land with lumbered bush, 120 m asl; ZMH R11318-20: Northampton, station 71, hilly land with small creeks, farm and grassland, 170 m asl.

Remarks. Werner (1910) reported only 14 specimens from Mt Robinson, and none from Coolgardie. Additional localities reported for the species by Werner are Baba Head (ZMB 24591), Tamala (ZMB 24588), Dongara (ZMB 21446), Kalgoorlie (ZMB 21449), Gooseberry Hill (ZMB 27106), Northam (two under ZMB 21451), additional two specimens from Moora are in ZMB (under

ZMB 21452). The whereabouts of specimens from Day Dawn, Eradu, York, and Boorabbin could not be resolved.

***Heteronotia binoei* (Gray, 1845)**

ZMH R11321-28. Denham, station 65, bush, coastland.

Remarks. Two specimens under ZMB 21428 from Kalgoorlie and four specimens under ZMB 21434 from Denham are present in ZMB, the whereabouts of additional four specimens from Eradu could not be resolved.

***Underwoodisaurus milii* (Bory de Saint-Vincent, 1823)**

ZMH R12039 (subadult). North of Subiaco, station 109, forest, coastland.

Remarks. Reported by Werner (1910) as *Gymnodactylus Miliusii*.

Pygopodidae

***Aprasia repens* (Fry, 1914)**

ZMH R11315. York, station 155, bush and stony hills, cultivated area.

Remarks. Specimens reported by Werner (1909) from north of Subiaco are in ZMB (under ZMB 24606), the whereabouts of a specimen from Shark Bay could not be resolved.

***Delma fraseri* (Gray, 1831)**

ZMH R11258. Tamala, station 70, hilly country with sparse bush, sheep farm 70 miles S Denham; ZMH R11309: Eradu, station 80, bush on the slopes and in the dry bed of the Greenough River, 140 m asl.

Remarks. Additional specimens from Gooseberry Hill (as *Delma grayi*), York and Broome Hill are present in ZMB (ZMB 21303, 21305, 21304 respectively). The whereabouts of specimens from Northampton, north of Subiaco, Brunswick, and a second specimen from Eradu, could not be resolved.

***Lialis burtonis* (Gray, 1835)**

ZMH R04734 (juvenile). No specific locality in SW Australia; ZMH R11226: North of Subiaco, station 109, forest, coastland; ZMH R11313-14: Buckland Hill, station 114, bush and garden land, coastland.

Remarks. Additional specimens from Rottneest Island and Kelmscott are present in ZMB (ZMB 21302 and 21301 respectively), the whereabouts of a single specimen from York, listed by Werner, could not be resolved.

***Pygopus lepidopodus* (Lacépède, 1804)**

ZMH R11304 (male). Upper Blackwood District, Brancaster, J.M. Whistler leg.

Scincidae

***Ctenotus inornatus* (Gray, 1845)**

ZMH R04732. Eradu, station 80, bush on the slopes and in the dry bed of the Greenough River.

Remarks. This specimen conforms with the morphospecies *C. fallens* Storr, 1974, a junior synonym of *C. inornatus* (sensu Rabosky et al 2014). Werner listed this specimen as *Lygosoma (Hinulia) lesueurii*, an additional specimen from Rottneest Island is deposited in ZMB (ZMB 21456). The whereabouts of the second specimen from Rottneest Island and a single juvenile specimen from York could not be resolved.

***Ctenotus labillardieri* (Duméril & Bibron, 1839)**

ZMH R11165. Darling Ranges, Donnybrook, station 145, timber forest, 65 m asl; ZMH R11193- R11211, R11221 (20 specimens): South Albany, station 167, tall forest and bare stony hills, coastland; ZMH R11236: Jarrahdale, station 129, tall forest, highland, 220 m asl.

Remarks. Werner reported additional specimens from Lion Mill (two under ZMB 21444), Jarrahdale (two under ZMB 21438, one under ZMB 21440), Boyanup (ZMB 21437), Pickering Brook (ZMB 21441-42), Torbay (3 under ZMB 21439, one missing). The whereabouts of four specimens from NE of Albany (and one from Lunenberg) could not be resolved.

***Ctenotus pantherinus* (Peters, 1866)**

ZMH R11190. Beverley, station 156, bush and stony hills, cultivated area.

Remarks. A second specimen from Beverley is not present in ZMH.

***Cyclodomorphus melanops elongatus* (Werner, 1910)**

ZMH R03961(holotype). Boorabbin, station 95, bush land, dry salt sea soil, 418 m asl.

***Egernia depressa* (Günther, 1875)**

ZMH R11166. No specific locality, received from B. Woodward on 9 October, 1905.

***Egernia napoleonis* (Gray, 1838)**

ZMH R11212-13. Rottneest, station 121, dense bush and dunes, limestone rocks.

Remarks. Additional specimens from Rottneest Island are deposited in ZMB (under ZMB 21457). They were identified by Werner as *E. kingii* and listed from Torbay, NW Australia, Lunenberg and South Albany – these are not present in ZMH.

***Liopholis pulchra* (Werner, 1910)**

ZMH R04404-05 (2 paratypes). Lunenberg, station 138, tall forest, Darling Ranges.

Remarks. Formerly three paratypes from this locality. The specimen with a complete tail is missing. The holotype from Torbay, station 162, is lost. Werner (1910) described this species in the genus *Egernia*.

***Hemiergis initialis* (Werner, 1910)**

ZMH R01851 (paralectotype). Lion Mill, station 99, mountain with tall forest, western hillslope of Darling Ranges.

Remarks. Originally nine syntypes. NHMW 16637 was designated as lectotype by Wells & Wellington, 1985), three paralectotypes in ZMB (21465, 21465A-B), all extant types from Lion Mill. Four paralectotypes (including all three from Jarrahdale) are probably destroyed. Originally Werner described this species as *Lygosoma (Hemiergis) initiale*.

***Hemiergis peronii* (Gray, 1831)**

ZMH R01855-61 (7 specimens). South Albany, station 167, tall forest and bare stony hills; ZMH R11216-17 (juveniles): Donnybrook, station 145, tall forest, 65 m asl.

Remarks. Werner listed two additional specimens listed as *Lygosoma (Hemiergis) decresiensis* from Donnybrook. These are not present in ZMH, and one from Lunenberg is present (under ZMB 21467). Werner (1910) used these specimens (from South Albany) to erect a replacement name, *Lygosoma (Hemiergis) quadridigitatum*, for *Seps peronii* Fitzinger, 1826, due to the homonymy within *Lygosoma* of *Seps peronii* with *Heteropus peronii* (Duméril & Bibron, 1839). *Seps peronii* Fitzinger is a nomen nudum, and the name was republished, validated with a description, by Gray, 1831, with *Tetradactylus decresiensis* (Cuvier, 1829), a homonym within *Hemiergis* of *Tridactylus decresiensis* (Cuvier, 1829), in its synonymy. *Heteropus Peronii* is now *Carlia peronii*. Werner listed only three specimens from South Albany, but also listed nine specimens from Albany, two from NE of Albany, and additional specimens from Bridgetown (4), Yallingup (1) and Torbay (2). It is possible that some of the specimens from Albany and NE of Albany have become combined with those from South Albany.

***Lerista kendricki* Storr, 1991**

ZMH R06793. Tamala, station 70, hilly land with sparse bush, sheep farm 70 miles S Denham.

Remarks. The two specimens from Denham, which were the basis for Werner's *Lygosoma bipes* var. *concolor*, are not present in ZMH, but one of them is presumably ZMB 21464. *Lygosoma bipes* var. *concolor* is a synonym of *Lerista miopus*.

***Lerista elegans* (Gray, 1845)**

ZMH R11234. Rottnest, station 121, thick bush with dunes, limestone rocks.

Remarks. Werner listed this specimen as *Ablepharus elegans*.

***Lerista praepedita* (Boulenger, 1887)**

ZMH R04754-56. Buckland Hill, station 114, bush and garden land, coastland.

Remarks. Werner listed only one specimen from Buckland Hill, but did list four specimens (as *Lygosoma (Rhodona) praepeditum*) from north of Subiaco (one under ZMB 21462), and single specimens from Rottnest Island (under (ZMB 21463) and an unspecified locality in Western Australia.

***Menetia greyii* (Gray, 1845)**

ZMH R11222-23. Mundaring Weir, station 101, hilly bushland, western slope of Darling Ranges, 200 m asl; ZMH R11227-28 (juveniles): Fremantle, Obelisk Hill, station 119, limestone hills with loose stones, coastland; ZMH R11260, R11305 (juvenile): Guildford, station 103, bush forest, lowland W Darling Ranges, 8 m asl.

Remarks. Werner listed (as *Ablepharus greyii*) only one specimen from Station 119, but also listed three specimens from Wooroloo (three under ZMB 24599) and two from York (one under ZMB 27107). The whereabouts of one specimen each from Beverley and York could not be resolved.

***Morethia lineocellata* (Duméril und Bibron, 1839)**

ZMH R11171-77 (7 specimens). Rottnest, station 121, limestone rocks, dense bush and dunes; ZMH R11191: Mundaring Weir, station 101, hilly bushland, western slope of Darling Ranges, 200 m asl.

Remarks. Werner recorded two additional specimens of this species (as *Ablepharus lineo-ocellatus*), from South Albany (ZMB 24604 as cf. *M. obscura*) and north of Subiaco (ZMB 24605). The whereabouts of specimens from Rottnest Island and single specimens from Northampton and Boyanup could not be resolved.

***Morethia butleri* (Storr, 1963)**

ZMH R11224. Mount Robinson, station 91, bush, 370 m asl.

Remarks. Werner reported (as *Ablepharus taeniopleurus*) a second specimen of this species from Boorabbin, which is deposited in ZMB (under ZMB 21433).

***Tiliqua rugosa rugosa* (Gray, 1825)**

ZMH R11214. York, station 155 bush and stony hills, 174 m asl.

Remarks. Three additional specimens of this species reported by Werner as *Trachysaurus rugosus* from Tamala, Northam and York are not present in ZMH.

***Tiliqua rugosa rugosa konowi* (Mertens, 1958)**

ZMH R11225 (male). Rottnest, station 121, thick bush and dunes.

Varanidae

***Varanus caudolineatus* (Boulenger, 1898)**

ZMH R07220 (subadult). Day Dawn, station 76, heavily felled bush, many loose stones, 120 m asl.

Typhlopidae

***Anilius australis* (Gray, 1845)**

ZMH R11179. Rottnest, station 121, limestone rocks, dense bush and dunes; ZMH R11262: North of Subiaco, station 109, forest, coastland.

Remarks. Specimen ZMH R11179 identified by Werner (1909) as *Typhlops australis*, specimen ZMH R11262 as *Typhlops bituberculatus*, as jar label noted, but may be one of the two specimens referred to by Werner (1909), the second from north of Subiaco, is present in ZMB (ZMB 21306).

Elapidae

***Brachyuropsis semifasciatus* (Günther, 1863)**

ZMH R11310. North of Subiaco, Station 109, forest, coastland.

Remarks. Listed by Werner (1909) as *Rhynchelaps semifasciatus*.

***Demansia reticulata* (Gray, 1842)**

ZMH R11192 (juvenile). Northam, station 97, 147 m asl.

Remarks. Identified by Werner (1909) as *Demansia psammophis*.

***Elapognathus coronata* (Schlegel, 1837)**

ZMH R11259. North of Subiaco, Station 109, forest, coastland, ZMH R11263: South Alley, station 167, tall forest and bare stony hills, coastland.

Remarks. Identified by Werner (1909) as *Denisonia coronata*. Additional specimens from, Lunenburg and Boyanup, are present in ZMB (ZMB 21300 and 21299 respectively). The whereabouts of the specimen from Jarrahdale could not be resolved.

***Neelaps calonotus* (Duméril, Bibron & Duméril, 1854)**

ZMH R11317 (juvenile). North of Subiaco, station 109, forest, coastland.

Remarks. Identified by Werner (1909) as *Furina calonota*.

***Notechis scutatus* (Peters, 1861)**

ZMH R11170 (female). Mundijong, station 127, dry bush 127 m asl, lowland W of Darling Ranges.

***Parasuta gouldii* (Gray, 1841)**

ZMH R11311 (juvenile). no specific locality.

Remarks. Listed by Werner (1909) as *Denisonia gouldi*, and noted that the specimen was donated by Bernard Woodward, director of the Western Australian Museum.

***Pseudonaja affinis exilis* (Storr, 1989)**

ZMH R08833 (female). Rottneest, station 121, dense bush and dunes, limestone rocks.

Remarks. Old determination *Diemenia nuchalis* by Werner (1909). Two other specimens listed by Werner from this locality are not present in ZMH.

***Pseudonaja mengdeni* (Wells & Wellington, 1985)**

ZMH R08831 (female). Edel Land district, Baba head, station 69, bushes at beach.

Remarks. Identified by Werner (1909) as *Diemenia nuchalis*. Another specimen from this locality is deposited in ZMB (under ZMB 54545).

***Simoselaps bimaculatus* (Duméril, Bibron & Duméril, 1854)**

ZMH R11622 (juvenile). Buckland Hill, station 114, bush and garden land, coastland.

Remarks. Identified by Werner (1909) as *Furina bimaculata*.

Amphibia

Hylidae

***Litoria adelaidensis* (Gray, 1841)**

ZMH A15024 (female). Herdsmans Lake near Perth, station 111, freshwater, sometimes ephemeral, coastland; ZMH A15025 (female), A15027 (male): Boyanup, station 146, tall forest with cultivated land, ZMH A15031 (female): Mongers Lake, north of Subiaco, station 110, freshwater, permanent, coastland.

Remarks. Listed by Werner (1914) as *Hyla adelaidensis*. Additional specimens are present in ZMB from Albany (ZMB 24625), and station 147 at Boyanup (ZMB

24619). The whereabouts of two specimens from York could not be resolved.

***Ranoidea moorei* (Copland, 1957)**

ZMH A15026 (female). Beverley, station 157, freshwater, hilly, much cultivated land; ZMH A15030 (female): Albany, station 165, hills with stones and bush, coastland; ZMH A15034 (male): Bridgetown, station 144, tall forest in the Darling Ranges; ZMH A15035 (male): Pinjarra, station 133, predominantly under stones and logs, lowland W of Darling Ranges, cultivated land; ZMH A15036–42: North of Subiaco, station 109, forest; ZMH A15043–44: Lion Mill, station 99, mountain with tall forest, western hillslope of Darling Ranges; ZMH A15045–48: Mundaring Weir, station 101, hilly bushland, western hillslope of Darling Ranges; ZMH A15049–52: Boyanup, station 147, freshwater ponds, lowland W of Darling Ranges; ZMH A15053–54, A15056–63 (10 specimens): York, station 155, bush and stony hills, 174 m asl.

Remarks. All these above specimens were formerly determined as *Hyla aurea* by Werner (1914), apart from A15026, which was identified as *Crinia signifera*. Werner only recorded three individuals from Mundaring Weir, and four from north of Subiaco (ZMB 24616, ZMB 24618). Additional specimens from Bunbury (n = 5, one as ZMB 24609), Mongers Lake (ZMB 24624), Karrakatta (ZMB 24610), Jarrahdale (ZMB 24627), Donnybrook (ZMB 24621) and Busselton, and a fifth specimen from Boyanup reported by Werner, not present in ZMH. A second specimen from Albany is present in ZMB (ZMB 24626).

Limnodynastidae

***Heleioporus albopunctatus* (Gray, 1841)**

ZMH A15022. Lion Mill, station 99, mountain with tall forest, western hillslope of Darling Ranges.

Remarks. Additional, not redetermined specimens reported by Werner (1914) from Bunbury (ZMB 24615) and Busselton (ZMB 24644), plus a fourth specimen from Harvey, not present in ZMH.

***Heleioporus barycragus* (Lee, 1967)**

ZMH A14994–96. Harvey, station 136, tall forest with cultivated land, lowland W of Darling Ranges.

Remarks. Specimens reported by Werner (1914) as *Heleioporus albopunctatus*.

***Heleioporus eyrei* (Gray, 1845)**

ZMH A14988. Rottneest, station 121, dense bush and dunes, limestone rocks.

Remarks. Two additional specimens reported by Werner (1914) as *Heleioporus albopunctatus*, one is present in ZMB (ZMB 24612).

***Heleioporus psammophilus* (Lee & Main, 1954)**

ZMH A14985. Upper Blackwood District, Brancaster, collected by J. M. Whistler in 1905 without detailed locality data and date.

Remarks. Identified by Werner (1914) as *Heleioporus albopunctatus*.

***Limnodynastes dorsalis* (Gray, 1841)**

ZMH A15253-59. North of Subiaco, station 109, forest, coastland; ZMH A15260-62: Eradu, station 81, freshwater pond in the dry bed of the Greenough River, 140 m asl; ZMH A15263: North Fremantle, station 115, dunes with bushes, coastland; ZMH A15264: Gooseberry Hill, station 152, hilly bushland with creeks in the Darling Ranges; ZMH A15266-68: Harvey, station 136, tall forest with cultivated land, lowland W of Darling Ranges.

Remarks. Werner (1914) reported only six specimens from north of Subiaco. Additional specimens listed from Bunbury (n = 2, one under ZMB 24620), Buckland Hill (ZMB 24623), East Fremantle (ZMB 24617), Boyanup (ZMB 24614) and Albany (ZMB 24639), plus additional juveniles from Gooseberry Hill, not present in ZMH.

Myobatrachidae

***Crinia georgiana* (Tschudi, 1838)**

ZMH A14986. Stirling ranges, 9 miles NE Albany, station 164, at Kings River; ZMH A14987: Darling Ranges, Brunswick, station 140, freshwater (brook); ZMH A14989-90: Albany, station 165.

Remarks. An additional 17 specimens listed by Werner (1914) from Albany (7) one under ZMB 24642, Lion Mill (ZMB 24637), Mundaring Weir (ZMB 24634), Collicie (3), Jarrahdale (2), Donnybrook (2) and Guildford, not present in ZMH.

***Geocrinia leai* (Flecher, 1898)**

ZMH A15021 (1 paratype of *Crinia michaelsoni* Werner, 1914). Albany, station 166, freshwater ponds and marsh on granite hills, coastland.

Remarks. The above-listed paratype was only recently detected in the collection of ZMH and was therefore not published in previous type catalogues (Hallermann 1998, 2006). The holotype was collected at Donnybrook on 28 or 29 July 1905, and was apparently deposited in the collection of the Zoological Museum, University of Hamburg (ZMH) but is no longer present there. There is no existing correspondence that documents where the holotype was originally deposited or whether it was exchanged with the American Museum of Natural History.

Paratypes included two specimens from Jarrahdale (one of which is now catalogued as NMW 16383 (Häupl et al. 1994)), one specimen from Lunenburg, five additional specimens from Donnybrook (one of which is now

catalogued as AMNH 23451, and was identified as the holotype by Cogger et al. 1983), three specimens from Bunbury (including ZMB 24636), and five specimens from Boyanup (including ZMB 24638) (Bauer et al. 1996). The whereabouts of the remaining specimens listed above without catalog number are unknown, but most were probably in the Hamburg collection and may have been destroyed during WWII.

***Pseudophryne guentheri* (Boulenger, 1882)**

ZMH A15116-23 (8 specimens). Boyanup, station 146, tall forest, cultivated land, 37 m asl; ZMH A15124-43 (15 specimens): York, station 155, bush and stony hills, 174 m asl; ZMH A15144 (female): South Albany, station



Figure 1. Paratype of *Crinia michaelsoni* (= *Geocrinia leai*), in lateral, ventral and dorsal view. Measuring scale corresponds to millimeters.



Figure 2. Map of southwestern Australia showing the historical collection points (station numbers).

167, tall forest and bare stony hills, coast land, 75 m asl; ZMH A15145 (female): Moonyoonooka, station 82, tall forest with bare and stony hills, coastland, 322 m asl; ZMH A15146 (female): Broomehill, station 158, tall forest, West-Australian plate, 37 m asl; ZMH A15147-49: Harvey, station 136, tall forest with cultivated land, W of Darling Ranges, 37 m asl; ZMH A15150-52 (1 female, 2 juveniles): Upper Blackwood, district Brancaster, collection J.M. Whistler.

Remarks. Werner (1914) also recorded specimens of this species from Eradu ($n = 6$, one under ZMB 24611), Moora ($n = 10$, two under ZMB 24613, ZMB 24641)), Beverley ($n = 3$, one under ZMB 24622), Cannington ($n = 2$), Harvey ($n = 3$), Brunswick ($n = 1$) and Northampton ($n = 3$), and an additional five specimens from York. None of these are still extant in ZMH. An additional specimen from Cannington, not listed by Werner, is present under ZMB 24635.

Discussion

The state of Western Australia is a large area; it covers 2,529,875 square kilometers – about one third of the whole country of Australia. The Hamburg southwest-Australian expedition of 1905 collected specimens from coastal regions of the southwestern part of WA (map).

As of December, 2018, 560 species of reptiles and 80 species of amphibians are known to occur in Western Australia, with 349 reptile species described after 1905 (Uetz et al. 2018; Frost et al. 2019). At the time of the expedition in 1905, there were 211 reptile species known to occur in Western Australia; 30.8% of this number (65) were found during the expedition and 47 species are now part of the collection in ZMH. There are several reasons for this relatively low number of recorded species: the 1905 expedition only covered a small area of WA, it did not have a herpetological focus and the lack of good transportation at that time made it difficult to collect any specimens a long way from the railway stations. Over land, donkey cart was the only mode of transportation beside the railway. Coastal locality points were probably reached by boat. During the expedition, the time period for collection fell partly in winter (June to August) when reptile activity is low. The Australian landscape is characterized by a dry, hot climate in the interior and a more Mediterranean climate in the southwestern area, with maximum temperatures there of 30 °C in the summer months of January and February. Species occurring in these hostile conditions of the interior landscape must be highly adapted to the hot, dry climate. There are currently 80 amphibian species known from Western Australia, of which 35 occur in the southwestern part of the state (Anstis 2013). At the time of the expedition in 1905, there were 20 amphibian species known to occur in WA, and 13 in the SW part of the state (Werner 1914). Werner (1914) listed ten species and subspecies, of which one specimen of *Ranoidea moorei* (Copland, 1957) was wrongly determined as *Crinia signifera*, a species known to occur only in eastern Australia. Ten of the listed species are still present in the ZMH herpetology collection (see above), although identifications of these have changed in some cases. Under the former *Heleioporus albopunctatus*, four different species have since been newly-discovered and described.

Acknowledgements

I thank Wolfgang Böhme (ZFMK, Bonn) and Nadine Dupérré (Cenak, Hamburg) for their revision of an earlier version of the manuscript. Glenn Shea (University of Sydney) improved the manuscript with his helpful comments, and identifications of specimens. I thank Malena Morell and Sven Kruschinski for cataloging the expedition material of 1905 and Martina Mistera (Cenak) for preparing the map.

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