A review of synonyms and subspecies in the genus *Opistophthalmus* C.L. Koch (Scorpiones: Scorpionidae)

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The synonyms and subspecies attributed to species of *Opistophthalmus* C.L. Koch, 1837 (Scorpiones: Scorpionidae) are reviewed, based mostly upon examination of type material. Four species and seven subspecies are synonymized, five species are reinstated, and six subspecies (three of which were originally described as species) are elevated to the rank of species, bringing the total number of species recognized in the genus to 59. A list of the 34 synonyms accepted for the species of *Opistophthalmus* is appended. New synonyms: *O. austerus monticola* Hewitt, 1927 = *O. austerus* Karsch, 1879; *O. ecristatus* Pocock, 1899 = *O. boehmi* (Kraepelin, 1896); *O. karrooensis rugosus* Lawrence, 1946 = *O. karrooensis* Purcell, 1898; *O. laticauda crinita* Lawrence, 1955 = *O. pallipes* C.L. Koch, 1842; *O. latimanus austeroides* Hewitt, 1914 = *O. latimanus* C.L. Koch, 1841; *O. latimanus kalaharicus* Hewitt, 1935 = *O. pugnax* Thorell, 1876; *O. lundensis* Monard, 1937 = *O. wahlbergii* (Thorell, 1876); *O. pilosus* Werner, 1936 = *O. flavescens* Purcell, 1898; *O. pugnax natalensis* Hewitt, 1915 = *O. praedo* Thorell, 1876; *O. wahlbergi robustus* Newlands, 1969 = *O. wahlbergii* (Thorell, 1876); *O. werneri* Lamoral & Reynders, 1975 = *O. flavescens* Purcell, 1898. Removed from synonymy: *O. chaperi* Simon, 1880; *O. latro* Thorell, 1876; *O. luciranus* Lawrence, 1959; *O. praedo* Thorell, 1876; *O. scabrifrons* Hewitt, 1918. Subspecies elevated to species: *O. fuscipes* Purcell, 1898; *O. keilandsi* Hewitt, 1914; *O. lawrencei* Newlands, 1969; *O. leipoldti* Purcell, 1898; *O. pluridens* Hewitt, 1918; *O. pugnax* Thorell, 1876.

Key words: Arachnida, Scorpiones, Scorpionidae, *Opistophthalmus,* synonymy, subspecies.

INTRODUCTION

Between the late nineteenth and early twentieth centuries, many new species and subspecies were described from the rich southern African scorpion fauna. Descriptions based upon a single type specimen were common and type specimens of previously described taxa were seldom examined. This practice resulted in a plethora of synonyms, most often where the dimorphic sexes of one species were described as two different species. It also resulted in the synonymy of valid species by taxonomists who based their decisions on published descriptions (where figures were seldom provided) without examination of the type material. Further confusion was added through injudicious application of the subspecies category by taxonomists uncertain of the reliability of characters or the status of taxa and for whom subspecies appear to have provided a 'soft' alternative to synonymy.

Many of the southern African scorpion taxa have never been revised. Many published synonyms and accounts where synonymy was merely 'suspected' were subsequently absorbed into the literature without question. The validity of taxa, the type specimens of which were deposited in European museums, has remained particularly ambiguous.

As part of a larger investigation (L. Prendini, in prep.) into the systematics of *Opistophthalmus* C.L. Koch, 1837[1], the most speciose genus of African scorpions, all available type material from European and southern African museums (Table 1) was examined to confirm the nomenclatural validity of taxa, including putative synonyms and subspecies. In this paper, the synonyms (including all instances of 'suspected' synonymy) and subspecies attributed to species of *Opistophthalmus* are reviewed. Nomenclatural emendations are mostly based upon examination of the type material. However, the taxonomic decisions presented here are not derived solely from examination of the types. Additional large series of specimens (in many cases, all available material) have been examined for each putative taxon to assess the

Table 1. Abbreviations for museum collections containing specimens of *Opistophthalmus* examined during the course of this investigation.

AMGS	Albany Museum, Grahamstown, South Africa
BMNH	The Natural History Museum, London, U.K.
MHNC	Musée d'Histoire Naturelle, La-Chaux-de-Fond, Switzerland
MNHN	Museum National d'Histoire Naturelle, Paris, France
MZLU	Zoologiska Institutionen, Lunds Universitet, Sweden
NHMB	Naturhistorisches Museum Basel, Switzerland
NHMG	Göteborgs Naturhistoriska Museet, Sweden
NHMW	Naturhistorisches Museum Wien, Austria
NHRM	Naturhistoriska Riksmuseet, Stockholm, Sweden
NMNW	National Museum of Namibia, Windhoek, Namibia
NMSA	Natal Museum, Pietermaritzburg, South Africa
SAMC	South African Museum, Cape Town, South Africa
SMFD	Natur-Museum Senckenberg, Frankfurt, Germany
TMSA	Transvaal Museum, Pretoria, South Africa
ZMHB	Zoologisches Museum, Universität Humboldt, Berlin, Germany
ZMUC	Zoologisk Museum, Københavns Universitet, Copenhagen, Denmark
ZMUH	Zoologisches Institut und Zoologisches Museum, Universität Hamburg, Germany

extent of geographical variation and identify characters that are consistent across the range.

Species are delimited in accordance with the phylogenetic species concept, where a species is defined as a minimum diagnosable unit (Nelson & Platnick 1981; Cracraft 1983, 1989; Wheeler & Nixon 1990; Nixon & Wheeler 1990; Davis & Nixon 1992; De Pinna 1999). Subspecies are therefore regarded as junior synonyms of species unless they can be unequivocally differentiated on the basis of consistent morphological characters, in which case they represent valid species in the diagnostic sense, and are elevated accordingly. Reproductive species concepts, which emphasize 'reproductive isolation' (Dobzhansky 1937), *e.g.* the biological species concept (Mayr 1963) and the recognition species concept (Paterson 1985) are invoked only when evidence is available for the maintenance of 'genetic integrity' in sympatric populations. Ecological species concepts, emphasizing 'niche divergence' in sympatry (*e.g.* Van Valen 1976), are also mentioned where applicable, but ecological species are clearly synonymous with phylogenetic species if ecological attributes are regarded as phylogenetic characters (*e.g.* Wenzel 1993).

As a result of this investigation, four species and seven subspecies of *Opistophthalmus* are synonymized, five species are removed from synonymy, and six subspecies (three of which were originally described as species) are elevated to the rank of species, bringing the total number of species recognized in the genus to 59. A list of 34 synonyms accepted for the species of *Opistophthalmus* is provided in Appendix 1. Endnotes cited in the following sections are listed after the references at the end of this paper.

TAXONOMY

Opistophthalmus adustus Kraepelin

Opisthophthalmus adustus Kraepelin, 1908: 260; Hewitt 1918: 130; Lawrence 1955: 236; Rack 1971: 112; Newlands 1972b: 244, 251; Lamoral & Reynders 1975: 550; Lamoral 1978: 180; 1979: 671; Kovařík 1998: 138.

Opisthophthalmus betschuanicus: Hewitt 1918: 130.

Opisthophthalmus longiceps Lawrence, 1946: 401; Lamoral 1979: 671 (synonymized).

Opisthophthalmus adustus longiceps: Lawrence 1955: 236; Lamoral & Reynders 1975: 550; Kovařík 1998: 138.

Opistophthalmus adustus longiceps: Lamoral 1972: 120.

Opistophthalmus adustus: Fet 2000: 449.

Hewitt (1918), apparently unaware that Kraepelin (1908) had synonymized *O. betschuanicus* Penther, 1900 with *O. glabrifrons* Peters, 1861, suggested that *O. adustus* was a junior synonym of the former. Hewitt (1935) later concluded that *O. betschuanicus* was a subspecies of *O. glabrifrons.*

Lawrence (1946) described a new species, *O. longiceps,* that he considered to be closely related to *O. adustus,* and subsequently (1955) relegated it to a subspecies of the latter. Lawrence (1955) further

suggested that *O. adustus longiceps* could be a junior synonym of *O. adustus* or *O. betschuanicus,* both of which he regarded as valid species closely related to *O. wahlbergii* (Thorell, 1876)[2], but later (1967a) suggested that *O. betschuanicus* was a subspecies of *O. wahlbergii.*

The confusion remained unresolved until Newlands (1970) re-examined the holotype of *O. betschuanicus,* which he again synonymized with *O. glabrifrons,* while Lamoral (1979) synonymized *O. longiceps* with *O. adustus,* also based on a comparison of the type specimens. These synonyms were adopted by Fet (2000) and confirmed in this investigation, when the holotype of *O. longiceps* was re-examined and found to be conspecific with the lectotype and paralectotype of *O. adustus* but not with the holotype of *O. betschuanicus.*

Type material examined. NAMIBIA: Lectotype [designated Lamoral 1979]: ♀, 'Deutsch-Südwestafrika, 2.iv.1908, Prof. Fülleborn' (ZMUH 1242). Paralectotype [designated Lamoral 1979]: ♂, id. (ZMUH 1242). Holotype (*O. longiceps*): ♀, 'Oranjemund [*Karas Region, Lüderitz Distr.,* 28.55S 16.43E], vii.1942, D.C.H. Plowes' (TMSA 8628).[3]

Opistophthalmus austerus Karsch

Opisthophthalmus austerus Karsch, 1879b: 128; Kraepelin 1894: 94; Pocock 1896a: 237; Kraepelin 1899: 138; Purcell 1899: 155; Kraepelin 1901: 270; Purcell 1901: 196; Hewitt 1912: 304; 1918: 136; Werner 1936: 186; Roewer 1943: 230; Lawrence 1955: 237; Alexander & Ewer 1957: 421; Newlands 1972b: 244, 252; Lamoral & Reynders 1975: 550; Eastwood 1977: 219, 225; Moritz & Fischer 1980: 310; Kovařík 1998: 138.

Opistophthalmus colesbergensis Simon, 1880: 388; Kraeplin 1894: 94 (synonymized).

Opistophthalmus austerus: Simon 1880: 391; Fet 2000: 450.

Opisthophthalmus colesbergensis: Simon 1888: 382; Purcell 1899: 174.

Opisthophthalmus austerus monticola Hewitt, 1927: 419; Lawrence 1955: 237; Lamoral & Reynders 1975: 550; Kovařík 1998: 138. **Syn. n.**

Opistophthalmus austerus monticola: Fet 2000: 450.

Kraepelin (1894) first listed *O. colesbergensis* as a possible synonym of *O. austerus*[4], but indicated that the type specimens had not been examined. Purcell (1901) concurred with Kraepelin's (1894) tentative synonymy after examining new material collected from the type locality at Colesberg. A direct comparison of the type specimens of these taxa had not been conducted until this investigation, when the synonymy of *O. colesbergensis* with *O. austerus* was confirmed.

Hewitt (1927) described *O. austerus monticola* from a single, allegedly adult female specimen, and considered its small size to be diagnostic. Examination of the holotype for this investigation demonstrated that it is conspecific with *O. austerus.* The putative size difference can be dismissed because the holotype of *O. austerus monticola* is not adult. Additional characters provided by Hewitt (1927), *e.g.* the dorsoexternal surface of the patella rounded and not noticeably compressed, are similarly attributed to the juvenile status of the holotype. Such ontogenetic variation occurs in most species of *Opistophthalmus,* including *O. austerus.* Hewitt's (1927) other diagnostic characters for *O. austerus monticola* are diagnostic for *O. austerus*: carapace dorsoventrally compressed, only very finely granular laterally; dorsosubmedian carinae of metasomal segments III–IV each with an enlarged, spiniform granule distally; pedipalp chela manus weakly compressed dorsoventrally, with costate digital carina, and without dorsal secondary and subdigital carinae. *Opistophthalmus austerus monticola* is therefore synonymized with *O. austerus.*

Type material examined. SOUTH AFRICA: Holotype: ♀, 'Prom. bonae spei' (ZMHB 54). Holotype (*O. austerus monticola*): juv. ♀, 'Mont-aux-Sources [*Free State Prov., Witsieshoek Distr.,* 28.75S 28.87E], summit, 11500 ft., i.1926, R. Essex' (AMGS 5227). Syntypes (*O. colesbergensis*): 1♂, 'Colesberg [*Northern Cape Prov., Colesberg Distr.,* 30.73S 25.10E], Ortlepp' (MNHN RS 0223); 1♀, id. (MNHN RS 0225).[5]

Opistophthalmus boehmi (Kraepelin)

Heterometrus boehmei Kraepelin, 1896: 13; Moritz & Fischer 1980: 311.

Scorpio boehmei: Kraepelin 1899: 125.

Opisthophthalmus ecristatus Pocock, 1899: 411; Hewitt 1918: 130; Lawrence 1955: 238; 1964: 36; 1967b: 85; Newlands 1972a: 44; 1972b: 249, 251; Lamoral & Reynders 1975: 554; Kovařík 1998: 138. **Syn. n.**

Heterometrus boehmi: Pocock 1900: 364.

Opisthophthalmus boehmi: Kraepelin 1913: 184, 186; Probst 1973: 326; Lamoral & Reynders 1975: 550; Kovařík 1998: 138.

Scorpio boehmi: Lawrence 1964: 37.
Opistophthalmus ecristatus: Sissom 1990: 133; Fet 2000: 454.
Opistophthalmus boehmi: Fet 2000: 450.

Kraepelin (1896) described *Heterometrus boehmei,* but subsequently (1899) transferred it to *Scorpio* Linnaeus, 1758. Pocock (1900) listed the species in combination with *Heterometrus* Ehrenberg, 1828, but changed the spelling to *boehmi.* Kraepelin (1913) later listed the species in combination with *Opistophthalmus,* and proposed a formal change to *boehmi,* as the original name was a patronym honouring R. Böhm (not Böhme). Fet (2000) accepted the change to *boehmi* on the grounds that *boehmei* is an unjustified original spelling.

Pocock (1899) described a new species, *O. ecristatus,* considered to be related to *O. opinatus* (Simon, 1888), but neglected to mention *O. boehmi* and thus provided no diagnostic characters to separate *O. ecristatus* from the latter species. Kraepelin (1913) suspected that *O. ecristatus* was a junior synonym of *O. boehmi* and suggested that sexual characters (*e.g.* the higher pectinal tooth count of *O. ecristatus*) had been mistaken for diagnostic ones. However, Kraepelin (1913) refrained from proposing a formal synonymy as the holotype of *O. ecristatus* had not been examined. Hewitt (1918) noted that *O. ecristatus* appeared to approach the genus *Scorpio* and followed Kraepelin (1913) in suggesting that *O. ecristatus* was a junior synonym of *O. boehmi,* but again neglected to propose a formal synonymy. Hewitt's (1918) observation was later repeated by Lamoral & Reynders (1975) and Fet (2000).

The opposite opinion was provided by Lawrence (1964), who justified the placement of *S. boehmi* and *O. ecristatus* in different genera on the grounds that the differences between them (*i.e.* the higher pectinal tooth count and the presence of well-developed carinae on the pedipalp femur in *O. ecristatus*) were more significant than the similarities (*i.e.* the costate ventrolateral and ventrosubmedian carinae of the last sternite and first two metasomal segments). Lawrence (1964) further noted that if *O. ecristatus* were synonymous with *S. boehmi,* then it would represent an unusual case of discontinuous distribution, as the species does not appear to occur in the large area between Tanzania and the former Transvaal, where at least two other *Opistophthalmus* species are common.

The opinions of Kraepelin (1913) and Hewitt (1918), rather than Lawrence (1964), were confirmed in this investigation, when the holotypes of *O. ecristatus* and *O. boehmi* were compared and found to be conspecific. The following combination of characters, originally listed for *O. ecristatus* by Pocock (1899), is diagnostic for *O. boehmi*: median ocular tubercle situated medially on the carapace; pedipalp chela manus broad, dorsal surface uniformly finely granular, without dorsal secondary and subdigital carinae; last sternite and ventral surface of first metasomal segment with four strong costate carinae; telson vesicle granular ventrally; telotarsi III–IV each with a single retrolateral row of three spiniform setae in addition to those on the lobes. The morphological differences raised by Lawrence (1964) can be dismissed on the grounds that these represent intraspecific sexual dimorphism. *Opistophthalmus ecristatus* is therefore synonymized with *O. boehmi.* Current studies on the geographical distribution of *Opistophthalmus* species (L. Prendini, in prep.) suggest that, unless *O. boehmi* remains undiscovered in central Mozambique (which is presently very poorly sampled), this species may actually present a discontinuous distribution in central Tanzania and the Limpopo valley, as hypothesized by Lawrence (1964).

Type material examined. Holotype: ♀, 'Tanganjika See [TANZANIA: Lake Tanganyika], Dr R. Böhm' (ZMHB 7661). Holotype (*O. ecristatus*): subad. ♂, 'Transvaal [SOUTH AFRICA: *Northern Prov.*], Sarg. Capt. Clements, procured from Mr O.E. Janson' (BMNH 1896.12.20.28).

Opistophthalmus brevicauda Lawrence

Opisthophthalmus brevicauda Lawrence, 1928: 275; 1955: 213, 237; 1961: 147; Lamoral & Reynders 1975: 551; Lamoral 1979: 676; Kovařík 1998: 138.
Opisthophthalmus gaerdesi Lawrence, 1961: 149; Lamoral & Reynders 1975: 554; Lamoral 1979: 676 (synonymized).
Opisthophthalmus carinatus scabriceps Lawrence, 1966: 5; Lamoral & Reynders 1975: 553; Lamoral 1979: 676 (synonymized).
Opistophthalmus brevicauda: Fet 2000: 451.

Lamoral (1979) synonymized *O. gaerdesi* and *O. carinatus scabriceps* with *O. brevicauda* after comparison of the holotypes. Their synonymy was confirmed by re-examination of the holotypes during this investigation.

Type material examined. NAMIBIA: *Kunene Region*:

Holotype: ♂, 'Sesfontein [*Opuwo Distr.,* 19.13S 13.62E], i–iv.1926, South African Museum expedition' (SAMC B6090). Holotype (*O. carinatus scabriceps*): ♀, 'Welwitschia [*Khorixas Distr.,* Khorixas, 20.37S 19.97E], i.1963, F. Gaerdes' (NMSA 9051). Holotype (*O. gaerdesi*): ♂, 'mountains near Marienfluss Valley, Kaokoveld [*Opuwo Distr.,* 17.34S 12.44E], v.1961, F. Gaerdes' (NMSA 8292).

Opistophthalmus capensis (Herbst)

Scorpio capensis Herbst, 1800: 62 (male only, female conspecific with *O. latimanus* C.L. Koch, 1841, *teste* Peters 1861: 512; Thorell 1876b: 227; Simon 1880: 391).

Buthus (*Heterometrus*) *capensis*: Sundevall 1833: 32.

Opistophthalmus pilosus C.L. Koch, 1837: 91; 1850: 88; Peters 1861: 512 (synonymized).

Opistophthalmus maxillosus C.L. Koch, 1837: 93; 1850: 88; Kraepelin 1894: 97 (synonymized).

Scorpio (*Buthus*) *capensis*: Gervais 1844: 62.

Opisthophthalmus pilosus: Gervais 1844: 62; Kraepelin 1894: 100 (part).

Opisthophthalmus maxillosus: Gervais 1844: 62.

Opisthophthalmus capensis: Peters 1861: 512; Thorell 1876a: 13; 1876b: 227; Karsch 1879a: 20; Kraepelin 1894: 97; Pocock 1896a: 234; 1896b: 22; Laurie 1896: 192; Kraepelin 1899: 135 (part); Purcell 1899: 147 (part); Penther 1900: 158; Kraepelin 1901: 271; Werner 1902: 603; Borelli 1915: 463; Hewitt 1918: 133; Werner 1934: 278; 1936: 186; Lawrence 1955: 213, 237; Alexander 1958: 339; Bücherl 1964: 59; Lamoral & Reynders 1975: 551 (part); Eastwood 1977: 212 (part); 1978a: 229; 1978b: 249; Lamoral 1980: 204; Moritz & Fischer 1980: 312; Kovařík 1992: 185; 1998: 138.

Opistophthalmus capensis: Simon 1880: 388, 391; Fet 2000: 451 (part).

Koch (1837) transferred *Scorpio capensis* to a new genus, *Opistophthalmus,* redescribed the species from a female specimen, and described two new species, *O. pilosus,* from a male specimen, and *O. maxillosus,* from a juvenile. However, the specimen redescribed as *O. capensis* by Koch (1837) was not conspecific with *O. capensis,* but was instead an undescribed species, later described as *O. fallax* Thorell, 1876 (itself a junior synonym of *O. macer* Thorell, 1876, as discussed below).

Both Koch's (1837) remaining species were subsequently synonymized. Peters (1861) synonymized *O. pilosus* with *O. capensis,* an opinion adopted by Thorell (1876b) and Simon (1880). Kraepelin (1894) synonymized *O. maxillosus* with *O. capensis,* after comparing the juvenile holotype with Thorell's (1876b) redescription of *O. capensis,* but continued to recognize *O. pilosus* as a valid species, probably confusing the sexual characters according to Pocock (1896a). This opinion is supported by the fact that Kraepelin (1894), who had not examined the syntypes of *O. capensis,* considered Herbst's (1800) fig. 2 to be a male, despite the affirmation by Thorell (1876b), Simon (1880) and Pocock (1896a) that it was a female.[6] Subsequent authors, including Kraepelin (1899), listed *O. pilosus* in synonymy with *O. capensis,* but a re-examination of the type specimens was never conducted.

When Eastwood (1977) revised *O. capensis,* it was established that the syntypes of *O. capensis* were lost and a neotype was designated. No information was provided about the status of the type specimens of *O. maxillosus* and *O. pilosus.* During this investigation, the loss of the holotype of *O. maxillosus* was confirmed[7] and the holotype of *O. pilosus* was rediscovered in the BMNH.[8] Comparison of the holotype of *O. pilosus* with the neotype of *O. capensis* confirmed their synonymy. Further discussion of the synonyms and subspecies attributed to *O. capensis* is provided under *O. chaperi* Simon, 1880, *O. fuscipes* Purcell, 1898, *O. latro* Thorell, 1876 and *O. leipoldti* Purcell, 1898.

Type material examined. Neotype [designated Eastwood 1977]: ♂, 'Table View, Cape Town [SOUTH AFRICA: *Western Cape Prov., Cape Distr.*, 33.82S 18.48E], vi.1975, E.B. Eastwood' (SAMC C2a [old C2/1]). Holotype (*O. pilosus*): ♂, 'Java, Koch coll.' (BMNH 1913.9.1.68).

Opistophthalmus carinatus (Peters)

Heterometrus carinatus Peters, 1861: 515; 1862: 27; Moritz & Fischer 1980: 312.

Opisthophthalmus anderssonii Thorell, 1876b: 239; Karsch 1879b: 110; Kraepelin 1894: 85 (synonymized).

Opisthophthalmus histrio Thorell, 1876b: 242; Karsch 1879b: 110; Kraepelin 1894: 85 (synonymized); Lamoral 1979: 679 (synonymized).

Petrooicus carinatus: Karsch 1879b: 109.

Opistophthalmus anderssoni: Simon 1880: 391.

Opistophthalmus histrio: Simon 1880: 391.

Petrovicus furcatus Simon, 1888: 380; Kraepelin 1894: 85 (synonymized).

Oecopetrus carinatus: Pocock 1893: 307.

Opisthophthalmus carinatus: Kraepelin 1894: 85; Pocock 1896a: 235; 1896b: 22; Kraepelin 1899: 132; Purcell 1899: 141; Penther 1900: 158; Purcell 1901: 197; Werner 1902: 602; Kraepelin 1908: 264; Hirst 1911: 7; Hewitt 1912: 305; 1913: 150; Kraepelin 1914: 115; Werner 1916: 91; Hewitt 1918: 131; Pavlovsky 1924: 78; 1925: 201; Hewitt 1927: 418; Lawrence 1927: 73; 1928: 273; Werner 1934: 278; Hewitt 1935: 469; Werner 1936: 187; Kästner 1941: 234; Lawrence 1942: 235; Roewer 1943: 230; Lawrence 1955: 214, 237; Alexander 1958: 339; Lawrence 1961: 153; Bücherl 1964: 59; Newlands 1969: 6; 1972b: 249, 251; Lamoral & Reynders 1975: 552; Aguiar 1978: 111; Lamoral 1978: 172; Newlands 1978b: 687; Lamoral 1979: 679; Kovařík 1998: 138.

Opistophthalmus carinatus: Lampe 1917: 200; Sissom 1990: 132; Fet 2000: 452.

Opisthophthalmus carinatus histrio: Hewitt 1927: 419; Lawrence 1955: 238; 1959: 384; 1962: 220; Newlands 1969: 5; Lamoral 1971a: 17; 1971b: 13; Lamoral & Reynders 1975: 552.

The name *Oecopetrus* Pocock, 1893, was introduced as a substitute name for *Petrooicus* Karsch, 1879, believed to be a junior homonym of *Petroica* Swainson, 1829 (Aves, Passeriformes, Petroicidae). However, these names are not homonyms (Francke 1985; Fet 2000).

Kraepelin (1894) synonymized *O. anderssonii, O. histrio* and *Petrovicus furcatus* with *O. carinatus*. The synonymy of *O. anderssonii* and *O. histrio* was based on a comparison of the type specimens, whereas the synonymy of *P. furcatus* with *O. carinatus* was based only on an assessment of the original description. Kraepelin (1894, 1899, 1908) doubted the synonymy of *O. histrio* because of uncertainty about the identity of this species, which was described from a single juvenile specimen. Presumably as a result, some later authors (*e.g.* Purcell 1899) adopted Kraepelin's (1894) synonymy of *O. histrio,* whereas others (*e.g.* Hewitt 1927; Lawrence 1955, 1959, 1962; Newlands 1969; Lamoral 1971a,b; Lamoral & Reynders 1975) continued to recognize *O. histrio,* which they regarded as a subspecies of *O. carinatus*. Lamoral & Reynders (1975) omitted the synonymy of *O. anderssonii* with *O. carinatus* from their catalogue.

When Lamoral (1979) revised *O. carinatus,* the holotypes of *O. histrio* and *P. furcatus* were examined, but not the syntypes of *O. carinatus,* which could not be located. Lamoral (1979) concurred with Kraepelin's (1894) synonymy of *P. furcatus,* on the basis of a comparison with non-type specimens of *O. carinatus,* but erroneously listed *O. histrio* as a new synonym and omitted to mention *O. anderssonii.*

The syntypes of *O. anderssonii* were re-examined during this investigation and found to be conspecific with the lectotype and paralectotypes of *O. carinatus,* deposited in the ZMHB. Further comparison of these specimens with the holotype of *O. histrio* and a syntype[9] of *P. furcatus,* confirmed their synonymy. Despite the poor condition of the juvenile holotype of *O. histrio,* the specimen is evidently conspecific with *O. carinatus* as concluded by Lamoral (1979). Further discussion of the subspecies attributed to *O. carinatus* is provided under *O. brevicauda* and *O. lawrencei* Newlands, 1969.

Type material examined. Lectotype [here designated]: ♀, 'Tette [MOZAMBIQUE: *Tete Prov.,* Tete, 16.17S 33.58E], W. Peters' (ZMHB 69). Paralectotypes [here designated]: 3♂, 8♀, 1 subad. ♀, id. (ZMHB 2286–2289). Syntypes (*O. anderssonii*): 1♀, 1 juv. ♀, 'Africa meridionalis, 28.xi.1864, C.J. Andersson' (NHMG 0098:1). Holotype (*O. histrio*): juv. ♂, 'Caffraria, J.A. Wahlberg' (NHRM 52/42). Syntype (*P. furcatus*): ♀, 'Afrique Australe' (MNHN RS 0230).

Opistophthalmus cavimanus Lawrence

Opisthophthalmus cavimanus Lawrence, 1928: 274; Lawrence 1955: 238; Lamoral & Reynders 1975: 553; Lamoral 1979: 688; Kovařík 1998: 138.

Opisthophthalmus undulatus cavimanus: Hewitt 1934: 408.

Opistophthalmus cavimanus: Fet 2000: 453 (part).

Hewitt (1934) regarded *O. cavimanus* as a subspecies of *O. undulatus,* but Lawrence (1955) rejected this opinion and reinstated *O. cavimanus,* while Lamoral (1979) synonymized *O. undulatus* Kraepelin, 1908, with *O. schultzei* Kraepelin, 1908 (discussed below). Further discussion of the subspecies attributed to *O. cavimanus* is provided under *O. lamorali* Prendini, 2000.

Type material examined. NAMIBIA: *Kunene Region, Opuwo Distr.*: Lectotype [designated Lamoral 1979]: ♂, 'Sesfontein [19.13S 13.62E], i–iv.1926, South African Museum expedition' (SAMC B6094). Paralectotypes [designated Lamoral 1979]: 1♂, id. (AMGS 6853 [ex SAMC B6094]); 1♂,

'Caimaeis[10] [19.33S 14.00E], i–iv.1926, South African Museum expedition' (SAMC B6095).

Opistophthalmus chaperi Simon

Opistophthalmus chaperi Simon, 1880: 387; Fet 2000: 453.

Opisthophthalmus pilosus: Kraepelin 1894: 100 (part).

Opisthophthalmus chaperi: Purcell 1899: 156; Kraepelin 1899: 140; Purcell 1901: 202; Hewitt 1918: 136; Lawrence 1946: 400; 1955: 238; Eastwood 1977: 219, 225; Kovařík 1998: 138.

Opisthophthalmus capensis: Eastwood 1977: 212 (part).

Kraepelin (1894) synonymized *O. chaperi* with *O. pilosus* – a species that he continued to recognize, despite Peters' (1861) synonymy with *O. capensis* – but this synonymy was apparently not based on examination of the holotype of *O. chaperi.* Purcell (1899) continued to recognize *O. chaperi* as a valid species and provided several diagnostic characters to differentiate it from other *Opistophthalmus* species, including *O. capensis,* which he regarded as a senior synonym of *O. pilosus,* following Peters (1861), Thorell (1876b), Simon (1880) and Pocock (1896a). Kraepelin (1899) subsequently listed *O. chaperi* as a valid species, evidently following Purcell (1899). This view remained unchallenged by subsequent authors (*e.g.* Purcell 1901; Hewitt 1918; Lawrence 1946, 1955) until Eastwood (1977) again listed *O. chaperi* as a synonym of *O. capensis* (though referring to it as a valid species later in the same paper), while Lamoral & Reynders (1975) omitted it from their catalogue.

Eastwood's (1977) listing of *O. chaperi* in synonymy with *O. capensis* appears to be a *lapsus calami.* A letter from E.B. Eastwood to B.H. Lamoral (dated 15.vii.1976), notifying him of the omission of *O. chaperi* by Lamoral & Reynders (1975), suggests that Eastwood considered *O. chaperi* to be a valid species: 'I find that *Opisthophthalmus chaperi* is in fact synonymized with *O. pilosus* by Kraepelin (1891) [*sic*], but is listed in later work as a species by Purcell (1899), Hewitt (1918) and Lawrence (1955); also it is structurally and geographically distinct from the *capensis* species complex of which *pilosus* is a synonym.'

Comparison of the holotype of *O. chaperi* with the neotype of *O. capensis* for this investigation, confirmed that the two species are not conspecific. *Opistophthalmus chaperi* can be separated from *O. capensis* by the absence of an anterior furcated suture, the presence of 15 (rather than 14) trichobothria on the external surface of the pedipalp patella and more than three trichobothria on the ventral surface, and the presence of a prolateral row of spiniform setae on telotarsus IV. The status of *O. chaperi,* as distinct from *O. capensis,* is therefore upheld.

Type material examined. Holotype: ♂, 'Robertson [SOUTH AFRICA: *Western Cape Prov., Robertson Distr.,* 33.80S 19.88E], vi.1879, M. Chaper, région maritime, au pied de la grande chaîne, dans des éboulis rocheux peu garnis de végétation' (MNHN RS 0229).[11]

Opistophthalmus fitzsimonsi Hewitt

Opisthophthalmus intercedens fitzsimonsi Hewitt, 1935: 471; Lawrence 1955: 239; Lamoral & Reynders 1975: 556.

Opisthophthalmus fitzsimonsi: Lamoral 1979: 702; Kovařík 1998: 138.

Opistophthalmus fitzsimonsi: Fet 2000: 454.

Lamoral (1979) elevated *O. intercedens fitzsimonsi* to the rank of species. During this investigation, comparison of the holotype and paratypes of *O. fitzsimonsi* with the lectotype and paralectotype of *O. intercedens* Kraepelin, 1908, confirmed that they are not conspecific and supported Lamoral's (1979) decision. *Opistophthalmus fitzsimonsi* can be separated from *O. intercedens* by the characters provided by Lamoral (1979). Phylogenetic analysis of morphological and molecular data (L. Prendini, in prep.) suggests that *O. fitzsimonsi* shares a more recent common ancestor with *O. pluridens* Hewitt, 1918 (discussed below), than with *O. intercedens.*

Type material examined. Holotype: ♂, 'Gemsbok Pan, W Kalahari [BOTSWANA: *Ghanzi Distr.,* 21.72S 21.63E], 3.v.1930, Vernay-Lang Kalahari Expedition' (TMSA 5478). Paratypes: 1♂, id. (TMSA 5558); 1 subad. ♀, id. (TMSA 5482).

Opistophthalmus flavescens Purcell

Opisthophthalmus flavescens Purcell, 1898: 7; Kraepelin 1899: 139; 1908: 267; 1914: 116; Hewitt 1918: 135; Lawrence 1955: 238; Bücherl 1964: 59; Lawrence 1967a: 16; Newlands 1972b: 244, 252; Lamoral & Reynders 1975: 554; Newlands 1978b: 688; Lamoral 1979: 704; Kovařík 1998: 138.

Opisthophthalmus pilosus Werner, 1936: 187 (*nec O. pilosus* C.L. Koch, 1837); Lawrence 1955:

243; Weidner 1959: 103; Lamoral & Reynders 1975: 561. **Syn. n.**

Opisthophthalmus werneri Lamoral & Reynders, 1975: 563; Lamoral 1979: 762; Kovařík 1998: 140. **Syn. n.**

Opistophthalmus flavescens: Fet 2000: 455.

Opistophthalmus werneri: Fet 2000: 465.

Werner (1936) described *O. pilosus* on the basis of either two female syntypes or a male and female syntypes. Uncertainty regarding the sexes of the types arises from the ambiguity of the original description, wherein a male and female were described, but two females listed for material examined (Lamoral 1979). The pectinal tooth counts of the two specimens (23–21 for the 'male' *vs* 21–21 for the 'female') suggest that the specimens belonged to the same sex and were probably both female.

Lawrence (1955) regarded *O. pilosus* as a dubious species on the grounds that it was inadequately described and figured. Lamoral & Reynders (1975) subsequently introduced *O. werneri* as a replacement name for *O. pilosus* Werner, 1936, which is a junior homonym of *O. pilosus* C.L. Koch, 1837 (itself a junior synonym of *O. capensis*).

Lamoral (1979) requested the syntypes of *O. werneri* (formerly deposited in the ZMUH) for examination but the material was destroyed in an air disaster *en route.* Owing to the ambiguity of the original description, Lamoral (1979) followed Lawrence (1955) in citing *O. werneri* as a dubious species. Werner (1936) alleged that this species does not have an anterior furcated suture of the carapace but that it is most closely related to *O. peringueyi* Purcell, 1898, which does. Lamoral (1979) therefore suggested that *O. werneri* might be a valid species – related to either *O. adustus* or *O. flavescens,* depending on the presence or absence of a median longitudinal suture on the carapace – and maintained its status on the assumption that additional conspecific specimens might be collected in the future.

Since the early 1980s, extensive collecting has been undertaken in the formerly prohibited Diamond Areas of southern Namibia, where the syntypes of *O. werneri* were originally collected. No specimens matching Werner's (1936) description have subsequently been discovered, suggesting that *O. werneri* is synonymous with either *O. adustus* or *O. flavescens,* both of which occur in the area.

Despite the ambiguity of the description and poor quality of the figures, sufficient characters were provided by Werner (1936) to confirm that *O. werneri* is synonymous with *O. flavescens,* a psammophilous species from the central Namib sand system. The psammophilous habit of *O. werneri* is attested to by the collection data 'Lüderitz Bay, 30–40 km in surrounding dunes' and by the character 'basitarsi without spines but with long bristles' (Lamoral 1979: 762 [translation]). Although the psammophilous *O. adustus* also occurs in the Lüderitz District, the following characters provided by Werner (1936) are diagnostic for *O. flavescens,* rather than the former species: carapace deeply incised anteriorly, with interocular surface clearly falling off obliquely downwards; all sternites completely smooth; telotarsi IV each with a prolateral and a retrolateral row of spiniform setae. The presence, alone, of smooth sternites and a prolateral row of spiniform setae on telotarsus IV separates *O. flavescens* from *O. adustus.* The latter character also serves to separate *O. flavescens* from another widespread psammophile, *O. wahlbergii. Opistophthalmus werneri* and its synonym, *O. pilosus,* are therefore synonymized with *O. flavescens.*

Type material examined. Neotype [designated Lamoral 1979]:[12] ♀, 'Koichab River banks, 40 km NW Aus [NAMIBIA: *Karas Region, Lüderitz Distr.*], 26°13'S 16°05'E, 10.ii.1973, B.H. Lamoral' (NMSA 11111).

Opistophthalmus fuscipes Purcell, **stat. n.**

Scorpio afer: Wulfen, 1786: 39 (*nec S. afer* Linnaeus, 1758 *teste* Purcell 1899: 149).

Opisthophthalmus fuscipes Purcell, 1898: 20; Kraepelin 1899: 136.

Opisthophthalmus capensis fuscipes: Purcell 1899: 149; Hewitt 1918: 133; Lawrence 1955: 237; Weidner 1959: 103; Lamoral & Reynders 1975: 551; Eastwood 1977: 218; Kovařík 1998: 138.

Opistophthalmus capensis fuscipes: Fet 2000: 452.

Purcell (1899) paraphrased an old description of a Cape *Opistophthalmus* by Wulfen (1786), evidently misidentified as *Scorpio afer* Linnaeus, 1758, but referable instead to *O. fuscipes.* This appears to be the first description of a species of *Opistophthalmus,* and has been overlooked by all subsequent authors.

Purcell (1899) relegated *O. fuscipes* to a subspecies of *O. capensis* on the grounds that the diagnostic characters originally proposed for *O. fuscipes* – *i.e.* the shape of the spiracles, the number of

spiniform setae on the external laterodistal lobe of telotarsus IV, and the colouration (Purcell 1898) – were too intraspecifically variable to warrant species status. Purcell's (1899) points regarding the spiracles and spiniform setae remain correct because the differences between *O. fuscipes* and *O. capensis* are inconsistent across the range of both taxa. By contrast, the colour differences are consistent. However, colour differences alone are considered to be unsuitable for providing species status in *Opistophthalmus,* given the extent of colour variation exhibited by many species of the genus (*vide* Purcell 1901; Lamoral 1979), and must therefore be supported by additional morphological differences.

Re-investigation of the morphological variation in *O. fuscipes* and *O. capensis* suggests that although very similar, these species can be separated consistently by the following characters: carapace interocular surface uniformly coarsely granular in *O. fuscipes* (weakly granular anteriorly to entirely smooth – Cape Peninsula only – in *O. capensis*); carapace (female) posteromedian surface smooth in *O. fuscipes* (granular in *O. capensis*); pedipalp patella dorsointercarinal surfaces granular in *O. fuscipes* (smooth in *O. capensis*); sternites III–IV (male) smooth in *O. fuscipes* (tuberculate in *O. capensis*); dark reddish-brown in *O. fuscipes* (pale yellow in *O. capensis*).

These consistent diagnostic differences suggest that *O. fuscipes* and *O. capensis* are sound phylogenetic species. Their sympatric occurrence at Malmesbury in historical time (*e.g.* AMGS 5005) further suggests that they are sound biological species, which were reproductively isolated in the recent past, and is supported by evidence of genetic divergence (L. Prendini, in prep.). In so far as *O. fuscipes* and *O. capensis* differ markedly in their ecological requirements, they may also be regarded as ecological species (Van Valen 1976). *Opistophthalmus fuscipes* burrows exclusively in hard clayey-loam soils derived from shales of the Malmesbury group, whereas *O. capensis* burrows exclusively in Quaternary littoral sands and sandy-loam derived from Table Mountain sandstones and granites. *O. fuscipes* is therefore reinstated as a species.

Type material examined. Lectotype [here designated]: ♂, 'Tulbagh Road Station [SOUTH AFRICA: *Western Cape Prov., Tulbagh Distr.*, 33.32S 19.10E], 1896, W.F. Purcell' (SAMC 481a). Paralectotypes [here designated]: 6♀, 2 subad. ♂, 1 subad. ♀, id. (SAMC 481b); 1♂, 1♀, id. (AMGS [ex SAMC 481]).[13]

Opistophthalmus gigas Purcell

Opisthophthalmus gigas Purcell, 1898: 5; Kraepelin 1899: 139; Purcell 1899: 154; Hewitt 1913: 150; Kraepelin 1914: 116; Hewitt 1918: 136, 184; Roewer 1943: 230; Lawrence 1955: 239; 1961: 154; 1962: 221; Bücherl 1964: 59; Lamoral & Reynders 1975: 554; Eastwood 1977: 219, 225; 1978b: 252; Lamoral 1979: 711 (part); Kovařík 1998: 138.

Opistophthalmus gigas: Lampe 1917: 200; Fet 2000: 455.

Discussion of the subspecies attributed to *O. gigas* is provided under *O. haackei* Lawrence, 1966.

Type material examined. Holotype: ♀, 'Naroep [SOUTH AFRICA: *Northern Cape Prov., Namaqualand Distr.,* 29.07S 18.55E], 28.ii.1898, M. Schlechter' (SAMC 2231).[14]

Opistophthalmus glabrifrons Peters

Opisthophthalmus glabrifrons Peters, 1861: 514; Karsch 1879b: 110; Kraepelin 1894: 104; Pocock 1896a: 238; 1896b: 22; 1898a: 308; 1898c: 430; Kraepelin 1899: 140; Purcell 1899: 161 (part); Penther 1900: 159; Purcell 1901: 203; 1903: 303; Kraepelin 1908: 266 (part); 1913: 185 (part); 1914: 116; Hewitt 1918: 138; 1935: 472; Lawrence 1938: 292; Roewer 1943: 230; Lawrence 1955: 239 (part); Alexander & Ewer 1957: 421; Alexander 1958: 339; Lawrence 1961: 154; Dumortier 1964: 320; Lawrence 1964: 36; 1967b: 85; Newlands 1970: 199; 1972a: 44; 1972b: 249, 252; Probst 1973: 326; Lamoral & Reynders 1975: 555 (part); Newlands 1978a: 614; 1978b: 689; Moritz & Fischer 1980: 315; Kovařík 1992: 185; 1998: 138.

Opisthophthalmus laeviceps Thorell, 1876b: 228; Kraepelin 1894: 104 (synonymized).

Opistophthalmus laeviceps: Simon 1880: 391.

Opisthophthalmus latimanus: Pocock 1896a: 238 (misidentification: BMNH 1891.2.15.1–2).

Opisthophthalmus betschuanicus Penther, 1900: 160; Lawrence 1955: 237; Kraepelin 1908: 266 (synonymized); Newlands 1970: 199 (synonymized).

Opistophthalmus glabrifrons: Fet 2000: 455 (part).

Kraepelin (1894) synonymized *O. laeviceps* with *O. glabrifrons* and subsequently (1908) synonymized

O. betschuanicus, in both cases based on a comparison of the type specimens. Although the status of *O. laeviceps* as a junior synonym of *O. glabrifrons* has remained uncontested, the literature is replete with confusion regarding the status of *O. betschuanicus.*

Hewitt (1918), apparently unaware of Kraepelin's (1908) synonymy, suggested that *O. adustus* was a synonym of *O. betschuanicus,* but subsequently (1935) suggested that *O. betschuanicus* was a subspecies of *O. glabrifrons.* Lawrence (1967a) disagreed with Hewitt's (1935) surmise, first (1955) regarding *O. betschuanicus* as a valid species, distinct from *O. glabrifrons* but closely related to *O. adustus* and *O. wahlbergii,* only to suggest later (1967a) that it be regarded as a subspecies of *O. wahlbergii.*

Newlands (1970), also clearly unaware of Kraepelin's (1908) synonymy, compared the holotype of *O. betschuanicus* with non-type specimens of *O. glabrifrons* in the TMSA, and concluded that *O. betschuanicus* was synonymous with *O. glabrifrons,* later being credited for the synonymy by Lamoral & Reynders (1975) and Fet (2000).

During this investigation, a re-examination of the types of *O. laeviceps, O. betschuanicus,* and *O. glabrifrons* confirmed their synonymy. As discussed by Newlands (1970), the characters proposed for *O. betschuanicus* by Penther (1900) are diagnostic for *O. glabrifrons*: carapace with anterior furcated suture absent and median ocelli situated posteriorly; sternites III–VII smooth, VII granular in the posterior half; metasomal segments I–IV with distinct ventrosubmedian and ventrolateral carinae, ventrosubmedian carinae of segment I defined only at the lateral margins. Further discussion of the synonyms attributed to *O. glabrifrons* is provided under *O. praedo* Thorell, 1876.

Type material examined. Lectotype [here designated]: ♀, 'Tette [MOZAMBIQUE: *Tete Prov.,* Tete, 16.17S 33.58E], W. Peters' (ZMHB 56). Paralectotypes [here designated]: 1♂, 1♀, 1 subad. ♀, 1 juv. ♂, 1 juv. ♀, id. (ZMHB 2306); 1 juv. ♀, id. (ZMHB 7226). Holotype (*O. betschuanicus*): subad. ♀, 'Britisch-Betschuanaland [BOTSWANA], vii.1893, A. Penther' (NHMW 1900.I.16, 1.755). Holotype (*O. laeviceps*): ♂, 'Caffraria, 1840–1845, J.A. Wahlberg' (NHRM 55/43).

Opistophthalmus haackei Lawrence

Opisthophthalmus gigas haackei Lawrence, 1966: 4; Lamoral & Reynders 1975: 555.

Opisthophthalmus haackei: Lamoral 1979: 714; Kovařík 1998: 139.

Opistophthalmus haackei: Fet 2000: 456.

Lamoral (1979) elevated *O. gigas haackei* to the rank of species. Comparison of the holotype of *O. haackei* with the presumed holotype of *O. gigas* for this investigation confirmed that they are not conspecific and supported Lamoral's (1979) decision. *Opistophthalmus haackei* can be separated from *O. gigas* by the characters provided by Lamoral (1979). Phylogenetic analysis of morphological and molecular data (L. Prendini, in prep.) suggests that *O. haackei* shares a more recent common ancestor with *O. brevicauda, O. luciranus* Lawrence, 1959 (discussed below), and *O. ugabensis* Hewitt, 1934, than with *O. gigas.*

Type material examined. Holotype: ♀, 'Fish River Canyon [NAMIBIA: *Karas Region, Karasburg Distr.,* 27.62S 17.62E], x.1965, W.D. Haacke' (NMSA 9105).

Opistophthalmus intercedens Kraepelin

Opisthophthalmus intercedens Kraepelin, 1908: 265; 1914: 116; Hewitt 1918: 130; Lawrence 1955: 239; Lamoral & Reynders 1975: 556; Weidner 1959: 103; Lamoral 1979: 719; Moritz & Fischer 1980: 316; Kovařík 1998: 139.

Opisthophthalmus undulatus: Kraepelin 1908: 263 (misidentification: ZMHB 14994, 2 males).

Opisthophthalmus setiventer Lawrence, 1969: 115; Lamoral & Reynders 1975: 562; Lamoral 1979: 719 (synonymized).

Opistophthalmus intercedens: Fet 2000: 457.

Lamoral (1979) synonymized *O. setiventer* with *O. intercedens* after examination of the types. Comparison of the holotype of *O. setiventer* with the lectotype and paralectotype of *O. intercedens* confirmed their synonymy in this investigation. Two syntypes of *O. undulatus,* a junior synonym of *O. schultzei,* were also found to be conspecific with *O. intercedens.* Further discussion of the subspecies attributed to *O. intercedens* is provided under *O. fitzsimonsi* and *O. pluridens.*

Type material examined. NAMIBIA: *Karas Region, Lüderitz Distr.*: Lectotype [designated Lamoral 1979]: ♀, 'Kubub [Farm Kubub 15, 26.73S 16.28E], L. Schultze' (ZMHB 14973). Paralectotype [designated Lamoral 1979][15]: juv. ♀, id. (ZMHB 14973). Holotype (*O. setiventer*): subad. ♀, '8 mi W of Aus [26.64S 16.15E], 31.vii.1937, V. Fitzsimons' (AMGS). Syntypes (*O. undulatus*): 2♂, 'Kubub, iii–iv.1904, L. Schultze' (ZMHB 14994).

Opistophthalmus karrooensis Purcell

Opisthophthalmus karrooensis Purcell, 1898: 1; Kraepelin 1899: 139; Purcell 1899: 153; Penther 1900: 159; Purcell 1901: 196; Hewitt 1918: 135; Roewer 1943: 230; Lawrence 1955: 214, 240; Weidner 1959: 103; Lamoral & Reynders 1975: 557; Eastwood 1977: 219, 225; 1978b: 249; Kovařík 1998: 139.

Opisthophthalmus karrooensis rugosus Lawrence, 1946: 400; 1955: 240; Lamoral & Reynders 1975: 557; Kovařík 1998: 139. **Syn. n.**

Opisthophthalmus karooensis: Alexander & Ewer 1957: 421.

Opistophthalmus karrooensis: Fet 2000: 457.

Opistophthalmus karrooensis rugosus: Fet 2000: 458.

Lawrence (1946) described a new subspecies, *O. karrooensis rugosus,* but provided no diagnostic characters to separate it from *O. karrooensis.* The following combination of characters listed by Lawrence (1946) for *O. karrooensis rugosus* is diagnostic for *O. karrooensis*: carapace coarsely granular laterally with interocular area smooth; sternites and ventral surfaces of first three metasomal segments covered with numerous small rounded tubercles; ventrosubmedian carinae of metasomal segments I–III absent; ventrolateral carinae obsolete in segment II but distinct in segment III.

Additional diagnostic characters were provided to separate *O. karrooensis rugosus* from *O. karrooensis* in a subsequent key by Lawrence (1955): last sternite of female smooth (weakly granular posteriorly in *O. karrooensis*); width of pedipalp chela manus greater than length (equal in *O. karrooensis*); first proximal median lamella of pecten rounded, free of teeth for some distance at base, with 17/17 teeth (rectangular, pecten toothed along entire length, with 20/21 teeth, in *O. karrooensis*). The first character is misrepresented (the last sternite is smooth in female *O. karrooensis*) and the second too arbitrarily delimited to be of use for diagnostic purposes. Regarding the third character, Purcell (1899) noted that the number of pectinal teeth (of which the shape of the first proximal median lamella of the pecten is a function) cannot be regarded as of specific importance, because it is one of the first characters to change in local varieties. For example, in *O. karrooensis,* the pectinal tooth count is known to vary from 15–22 in females and 21–31 in males (Purcell 1899), falling within the range provided by Lawrence (1955) for both *O. karrooensis* and *O. karrooensis rugosus.* Re-examination of the syntypes of *O. karrooensis rugosus* during this investigation confirmed that they are conspecific with the lectotype and paralectotypes of *O. karrooensis,* with which the subspecies is therefore synonymized.

Type material examined. SOUTH AFRICA: *Western Cape Prov.*: Lectotype [here designated]: ♂, 'Prince Albert [*Prince Albert Distr.,* 33.22S 22.03E], 1896, W.F. Purcell' (SAMC 487a). Paralectotypes [here designated][16]: 1♂, 4♀, 3 subad. ♂, 2 subad. ♀, 4 juv. ♂, 5 juv. ♀, id. (SAMC 487b); 1 subad. ♂, 1 subad. ♀, id. (SAMC 488); 1♀, 'Beaufort West [*Beaufort West Distr.,* 32.35S 22.58E], 1885, Rev. G.H.R. Fisk' (SAMC 398); 3♂, 1♀, 10 subad. ♂, 7 subad. ♀, 37 juv. ♂, 32 juv. ♀, id. except '1896, W.F. Purcell' (SAMC 486); 1♀, 2 subad. ♂, 1 subad. ♀, 8 juv. ♂, 4 juv. ♀, 'Laingsburg, Buffels River [*Laingsburg Distr.,* 33.20S 20.85E], 1896, W.F. Purcell' (SAMC 489). Syntypes (*O. karrooensis rugosus*): 2♂, 'Seven Weeks Poort, Ladismith [*Laingsburg Distr.,* 33.40S 21.42E], 17–18.xi.1940, V. Fitzsimons' (TMSA 8468, 8470); 3♀, id. (TMSA 8469, 8471–8472); 4 subad. ♂, id. (TMSA 8467, 8474–8476); 1 juv. ♂, id. (TMSA 8478); 4 juv. ♀, id. (TMSA 8477, 8479–8481).

Opistophthalmus keilandsi Hewitt, **stat. n.**

Opisthophthalmus latimanus keilandsi Hewitt, 1914: 7; 1915: 326; 1918: 143; Lawrence 1955: 240; Weidner 1959: 103; Lamoral & Reynders 1975: 558; Kovařík 1998: 139.

Opistophthalmus latimanus keilandsi: Fet 2000: 459.

Hewitt (1914) described the subspecies, *O. latimanus keilandsi,* but later (1918) suggested that it could be a junior synonym of *O. praedo* (discussed below). The syntypes of *O. latimanus keilandsi* had not been compared with the holotype of *O. praedo* until this investigation, when they were not found to be conspecific.

The characters used by Hewitt (1915, 1918) to separate *O. pugnax natalensis* Hewitt, 1915 (a junior synonym of *O. praedo*), from *O. latimanus keilandsi* are diagnostic for these taxa (as discussed under *O. praedo*). The diagnostic differences between *O. latimanus keilandsi* and *O. latimanus* provide the rationale for its elevation to the rank of species. *Opistophthalmus keilandsi* can be separated consistently from *O. latimanus* by the following characters: absence of chemoreceptive setae (trichocopae *sensu* Vachon *et al.* 1958, 1960; Dumortier 1964) on the internomedian surfaces of the chelicerae; dorsal surface of pedipalp chela manus less granular in adult males and females; yellowish-brown colouration (Hewitt 1914, 1918; Lawrence 1955).

Type material examined. Lectotype [here designated]: ♀, 'Keilands near Tsomo [SOUTH AFRICA: *Eastern Cape Prov., Stutterheim Distr.,* 32.21S 27.53E], Rev. Fr. A. Schweiger' (AMGS). Paralectotypes [here designated]: 3♂, id. (AMGS).[17]

Opistophthalmus lamorali Prendini

Opisthophthalmus undulatus ugabensis Hewitt, 1934: 408 (AMGS 6574: male only).

Opisthophthalmus cavimanus ugabensis: Lawrence 1955: 238 (part); Lawrence 1969: 115; Lamoral & Reynders 1975: 553.

Opisthophthalmus cavimanus: Lamoral 1979: 691, 754 (misidentifications: AMGS 6574, male only; NMNW 133).

Opisthophthalmus litoralis: Lamoral 1979: 729 (misidentification: NMSA 10711).

Opistophthalmus cavimanus: Fet 2000: 453 (part).

Opistophthalmus lamorali Prendini, 2000: 109.

Hewitt (1934) described the subspecies, *O. undulatus ugabensis,* from a pair of syntypes. Lawrence (1955, 1969) transferred the subspecies to *O. cavimanus.* Lamoral (1979) synonymized *O. undulatus* with *O. schultzei* (discussed below) and discovered that the syntypes of *O. undulatus ugabensis* were not conspecific. Lamoral (1979) realized that the female syntype was a distinct species and designated it as the lectotype of *O. ugabensis,* but considered the male syntype to be conspecific with *O. cavimanus,* an opinion recently repeated by Fet (2000).

Prendini (2000) compared the female lectotype of *O. ugabensis* with the male syntype of *O. undulatus ugabensis* and concurred with Lamoral's (1979) opinion that they are not conspecific. However, Prendini (2000) demonstrated that the male syntype was an undescribed species, not conspecific with *O. cavimanus,* and described it as the holotype of *O. lamorali.*

Type material examined. Holotype: ♂, 'Ugab River [NAMIBIA: *Erongo Region, Omaruru Distr.,* 20.95S 14.13E], R.D. Bradfield' (AMGS 6574). Paratypes: refer to Prendini (2000).

Opistophthalmus laticauda Purcell

Opisthophthalmus laticauda Purcell, 1898: 26; Kraepelin 1899: 133; Hewitt 1918: 134; Lawrence 1955: 240; Bücherl 1964: 59; Lamoral & Reynders 1975: 557; Eastwood 1977: 219, 225; Kovařík 1998: 139.

Opistophthalmus laticauda: Fet 2000: 458.

Loss of the dry holotype of *O. laticauda* has been confirmed (M. Cochrane, pers. comm.) and a neotype selected.[18] Discussion of the subspecies attributed to *O. laticauda* is provided under *O. pallipes* C.L. Koch, 1842.

Type material examined. Neotype [here designated]: ♂, 'Nieuwoudtville, Bokkeveld Mts., Calvinia [SOUTH AFRICA: *Northern Cape Prov., Calvinia Distr.,* 31.38S 19.10E], xii.1902, W. Watermeyer' (SAMC 12037a).

Opistophthalmus latimanus C.L. Koch

Scorpio capensis Herbst, 1800: 62 (female only, *teste* Peters 1861: 512; Thorell 1876b: 227; Simon 1880: 391).

Opistophthalmus latimanus C.L. Koch, 1841: 65; 1850: 88; Simon 1880: 391; Fet 2000: 458.

Opisthophthalmus latimanus: Peters 1861: 512; Thorell 1876b: 227, 233; Kraepelin 1894: 91; Pocock 1896b: 22; Kraepelin 1899: 138; Purcell 1899: 159; Penther 1900: 159; Purcell 1901: 203; Hewitt 1912: 304; 1914: 4; 1915: 327; 1918: 140; Roewer 1943: 230; Lawrence 1955: 240; Alexander 1956: 867; 1957: 529; Alexander & Ewer 1957: 421; 1958: 349; Alexander 1958: 339; Vachon, Dumortier & Busnel 1958: 253; Alexander 1959: 392; Weidner 1959: 102; Vachon, Busnel & Dumortier 1960: 79; Dumortier 1964: 320; Alexander 1967: 165; 1972: 253; Newlands 1972b: 246, 252; Lamoral & Reynders 1975: 557; Eastwood 1977: 219, 225; 1978b: 252; Newlands 1978b: 689; Kovařík 1998: 139.

Opistophthalmus calvus L. Koch, 1867: 233; Simon 1880: 391; Purcell 1899: 159 (synonymized).

Opisthophthalmus calvus: Thorell 1876b: 233, 236; Kraepelin 1894: 93; Pocock 1896a: 238; Kraepelin 1899: 138.

Opisthophthalmus pugnax: Pocock 1896a: 239 (misidentification: BMNH 1876.70); Roewer 1943: 230 (misidentification *teste* Lawrence 1955: 241).

Opisthophthalmus latimanus austeroides Hewitt, 1914: 5; 1915: 327; 1918: 143; Lawrence 1955: 240; Lamoral & Reynders 1975: 558; Kovařík 1998: 139. **Syn. n.**

Opistophthalmus latimanus austeroides: Fet 2000: 459.

Peters (1861) first noted that one of the female syntypes of *Scorpio capensis* was conspecific with *O. latimanus.* Thorell (1876b) and Simon (1880) confirmed this opinion.

Kraepelin (1894) compared the holotypes of *O. calvus* and *O. latimanus,* and concluded that *O. calvus* differed only in the possession of well-developed dorsal secondary and subdigital carinae on the pedipalp chela manus, and fine granulation in the anterior region of the interocular surface. However, Kraepelin (1894) refrained from synonymizing *O. calvus* with *O. latimanus* and subsequently (1899) recognized *O. calvus* as a valid species. Pocock (1896a) also listed *O. calvus* and *O. latimanus* as distinct species. Purcell (1898) formally synonymized *O. calvus* with *O. latimanus,* on the grounds that the carinal and granulation characters, noted by Kraepelin (1894), were intraspecifically variable in the females of *O. latimanus. Opistophthalmus calvus* was regarded as a junior synonym of *O. latimanus* by subsequent authors, *e.g.* Lamoral & Reynders (1975) and Fet (2000).

During this investigation, the holotype of *O. latimanus* could not be located and is thought to have been destroyed during the Second World War (W. Schawaller, pers. comm.).[19] However, the holotype of *O. calvus* was re-examined and found to be conspecific with non-type material of *O. latimanus,* thereby confirming the synonymy.

Hewitt (1914) described *O. latimanus austeroides* as an intermediate between *O. latimanus* and *O. austerus,* differing from *O. latimanus* principally in the elongated pedipalp femur and chela of the adult male (Hewitt 1914, 1918). Lawrence (1955) further emphasized differences in the surface ornamentation of the last sternite and the ventrosubmedian carinae of metasomal segment I as a means of separating *O. latimanus austeroides* from *O. latimanus.* According to Lawrence (1955), sternite VII is smooth (female) to smooth, pitted or faintly furrowed transversely (male) in *O. latimanus austeroides,* but granular, rugose or transversely wrinkled in *O. latimanus,* and the ventrosubmedian carinae on metasomal segment I are costate in *O. latimanus austeroides,* but granular in *O. latimanus.*

The diagnostic characters provided for *O. latimanus austeroides* by Hewitt (1914, 1918) and Lawrence (1955) superficially appear reasonable, but are actually extremely variable across the distributional range of *O. latimanus.* Furthermore, this variation appears to be correlated with a rainfall gradient from the arid Great Karoo, inhabited by *O. latimanus austeroides* (and also by *O. austerus,* which has evidently converged on a similar morphology), to the relatively mesic Valley Bushveld, inhabited by *O. latimanus.* As noted by Hewitt (1914, 1918), specimens from the intervening area (*e.g.* AMGS 1780, 5353; BMNH 1899.7.28.1, 1901.3.8.9.10; SAMC C186; TMSA 9828) cannot be unequivocally assigned to either form using the length of the pedipalp femur and chela or the surface ornamentation of the last sternite and first metasomal segment. *Opistophthalmus latimanus austeroides* is therefore synonymized with *O. latimanus.* Further discussion of the synonyms and subspecies attributed to *O. latimanus* is provided under *O. keilandsi, O. praedo* and *O. pugnax* Thorell, 1876.

Type material examined. SOUTH AFRICA: Holotype (*O. calvus*): ♀, 'Südliches Afrika' (ZMUH S 93–94). Syntypes (*O. latimanus austeroides*): 3♂, 2♀, 'Klerksdale, near Middelburg [*Eastern Cape Prov., Middelburg Distr.,* 31.47S 25.05E], B. Marais' (AMGS 1720).

Opistophthalmus latro Thorell

Opisthophthalmus latro Thorell, 1876b: 225; Simon 1880: 388, 391.

Opisthophthalmus pilosus: Kraepelin 1894: 100 (part).

Opisthophthalmus capensis: Kraepelin 1899: 135 (part); Purcell 1899: 147 (part); Lamoral & Reynders 1975: 551 (part); Eastwood 1977: 212, 220, 224 (part).

Opistophthalmus capensis: Fet 2000: 451 (part).

Thorell (1876b) differentiated *O. latro* from *O. capensis* principally by its larger size and darker colouration. Simon (1880) provided further diagnostic characters for *O. latro*: coarser granulation on the lateral surfaces of the carapace; dorsal surface of the pedipalp chela manus granular, with granular dorsal secondary and subdigital carinae; longer metasoma; higher pectinal count (14–15).

Based on a comparison of the holotypes, Kraepelin (1894) synonymized *O. latro* with *O. pilosus,* which he continued to recognize, despite Simon's (1880) synonymy with *O. capensis.* Kraepelin (1899) and Purcell (1899) subsequently listed *O. latro* in synonymy with *O. capensis.* Purcell (1899) did not examine the holotype of *O. latro,* but concluded from the original description that it was merely an unusually large, dark male specimen of *O. capensis,* and cited the synonymy of *O. latro* with *O. pilosus* by Kraepelin (1894), who had examined the holotypes, as supporting evidence.

The distinction between *O. capensis* and *O. latro,*

dismissed by Purcell (1899), was again noted by Eastwood (1977), although also regarded as intraspecific variation within *O. capensis.* Eastwood (1977) mentioned various consistent differences between specimens, mainly from Paternoster (SAMC C58, C73) and 'typical' specimens from the Cape Peninsula (*i.e. O. capensis*). According to Eastwood (1977), these specimens differ from 'typical' *O. capensis* in the following characters: darker colour; carapace with interocular surface smooth, but with lateral surfaces very coarsely granular; dorsal surface of pedipalp chela manus finely granular with dorsal secondary and subdigital carinae more distinct (represented by a row of granules); external surface of pedipalp patella almost smooth; dorsal, ventral and internal surfaces of pedipalp femur more coarsely granular; sternite VII (female) less tuberculate.

The status of *O. latro* as a junior synonym of *O. capensis* remained unchallenged until specimens matching the original description of *O. latro* (SAMC C4591, C4947, C4949) were recently collected in sympatry with 'typical' *O. capensis* (SAMC C4806, C4809) at the Postberg, West Coast National Park. Comparison of these specimens and the abovementioned specimens (SAMC C58, C73) previously examined by Eastwood (1977), with the holotype of *O. latro,* revealed that they are conspecific, whereas the sympatric specimens of *O. capensis* are conspecific with the neotype of *O. capensis.* Examination of additional material for this investigation confirmed the distinctiveness of *O. latro,* which was evidently also sympatric with *O. capensis* at Saldanha in historical time (*e.g.* AMGS 6925). The sympatric occurrence of *O. latro* and *O. capensis* suggests that they are sound biological species because they are reproductively isolated. This is further supported by evidence of considerable genetic divergence between specimens of *O. capensis* and *O. latro* collected in sympatry at the Postberg (L. Prendini, in prep.). Although *O. latro* and *O. capensis* are sympatric in certain areas, they are ecologically separated (allotopic), *O. latro* burrowing exclusively in chalky-loam soils derived from coastal limestone deposits, whereas *O. capensis* burrows exclusively in sandy-loam derived from Table Mountain sandstones and granites. In so far as *O. latro* and *O. capensis* differ markedly in their ecological requirements, they may be regarded as ecological species (Van Valen 1976).

Opistophthalmus latro and *O. capensis* are sound phylogenetic species which, although very closely related, can be differentiated, even where they occur in sympatry, by the following characters: carapace interocular surface smooth, but bordered by very coarse granulation on lateral surfaces in *O. latro* (granular – though granulation weak to absent in specimens from the Cape Peninsula – and bordered by moderately coarse granulation on lateral surfaces in *O. capensis*); carapace (female) posteromedian surface smooth in *O. latro* (granular in *O. capensis*); pedipalp chela manus with dorsal secondary and subdigital carinae distinct in *O. latro* (obsolete in *O. capensis*); dark reddish-black colour in *O. latro* (pale yellow colour in *O. capensis*). *Opistophthalmus latro* is therefore removed from synonymy with *O. capensis.*

Type material examined. Holotype: ♂, 'Patria ignota, verisimiliter Africa meridionalis' (NHRM 52/41d).

Opistophthalmus lawrencei Newlands, **stat. n.**

Opisthophthalmus carinatus lawrencei Newlands, 1969: 5; Lamoral & Reynders 1975: 553; Kovařík 1998: 138.

Opistophthalmus carinatus lawrencei: Fet 2000: 453.

Newlands (1969) described a new subspecies, *O. carinatus lawrencei,* but provided neither the evidence to support its recognition as a subspecies nor a direct comparison with *O. carinatus.* Aside from colouration differences and a lower pectinal tooth count, the only diagnostic characters indicated by Newlands (1969) are as follows: carapace lateral margins convex and anterior margin rounded; anterior furcated suture very poorly developed; median ocelli situated almost in centre of carapace; dorsosubmedian carinae of metasomal segments II–IV with distal spiniform granules obsolete; telson vesicle distinctly bulbous and swollen.

Despite the seemingly minor differences between this subspecies and *O. carinatus,* comparison of the type specimens of both taxa for this investigation revealed numerous additional differences not discussed by Newlands (1969), but justifying the provision of species status for *O. lawrencei.* Newlands' (1969) recognition of this unique species as a subspecies of *O. carinatus* was mistaken for two reasons. Firstly, the morphological character combination of *O. lawrencei* cannot be confused with any other species of *Opistoph-*

thalmus. Secondly, *O. lawrencei* is only distantly related to *O. carinatus* and, together with the related *O. boehmi,* appears to be one of the most plesiomorphic species of the genus on the basis of morphological and molecular data (L. Prendini, in prep.).

The following characters, in addition to those mentioned above, differentiate *O. lawrencei* from *O. carinatus*: carapace anteromedian depression absent in *O. lawrencei* (present and distinct in *O. carinatus*); frontal notch entire in *O. lawrencei* (lobed in *O. carinatus*); antero-ocular depression weakly developed, narrow in *O. lawrencei* (well-developed, broad in *O. carinatus*); circumocular depressions converging anteriorly in *O. lawrencei* (diverging in *O. carinatus*); median longitudinal suture not reaching anterior carapace margin in *O. lawrencei* (extending to margin in *O. carinatus*); median ocelli situated medially on carapace in *O. lawrencei* (posteromedially in *O. carinatus*); pedipalp patella dorsoexternal carina distinct, costate-granular in *O. lawrencei* (obsolete to absent in *O. carinatus*); surfaces of sternites smooth and ventral surfaces of metasomal segments granular in *O. lawrencei* (surfaces of sternites and metasomal segments I–II smooth (female) or smooth to rugose (male), and of segments III–IV granular, in *O. carinatus*); sternite VII with paired granular ventrolateral carinae in *O. lawrencei* (acarinate in *O. carinatus*); metasomal segment V dorsal surface granular in *O. lawrencei* (smooth in *O. carinatus*); telotarsus VI prolateral row of spiniform setae absent in *O. lawrencei* (present in *O. carinatus*).

Type material examined. Holotype: ♂, 'J.F. Uys Private Nature Reserve, Farm Rochdale 700, E Waterpoort [SOUTH AFRICA: *Northern Prov., Soutpansberg Distr.,* 22.90S 29.70E], 18.vii.1967, G. Newlands' (AMGS). Paratypes: 1♀, id. (AMGS); 1♂, 2♀, id. except 'vii.1967' (AMGS); 1♂, id. except 'vi.1967, at base of Zoutpansberg' (TMSA 9575); 2♂, id. except 'xii.1967' (TMSA 17097, 17106).

Opistophthalmus leipoldti Purcell, **stat. n.**

Opisthophthalmus leipoldti Purcell, 1898: 18; Kraepelin 1899: 136; Purcell 1899: 146.

Opisthophthalmus capensis leipoldti: Hewitt 1918: 133; Lawrence 1955: 214, 237; Weidner 1959: 103; Lamoral & Reynders 1975: 551; Eastwood 1977: 218; Kovařík 1998: 138.

Opistophthalmus capensis leipoldti: Fet 2000: 452.

Purcell (1899, 1901) differentiated *O. leipoldti* from *O. capensis* principally by the granulation and carination of the external surface of the patella. Hewitt (1918) relegated *O. leipoldti* to a subspecies of *O. capensis* on the grounds that the diagnostic characters of the patella were too intraspecifically variable to warrant species status. Hewitt's (1918) decision, prompted in part by Purcell's (1899) decision to relegate *O. fuscipes* to a subspecies of *O. capensis,* is erroneous for the following reasons. Firstly, Purcell's (1899, 1901) diagnostic differences of the patella are consistent in adult females of *O. leipoldti* and *O. capensis*: distinct granular externomedian and ventroexternal carinae are evident in *O. leipoldti,* whereas these carinae are absent in *O. capensis*; the dorsoexternal surface of the patella is noticeably granular in *O. leipoldti,* but smooth in *O. capensis.* Secondly, the following additional diagnostic characters separate the two species: pedipalp chela internomedian carina present in *O. leipoldti* (absent in *O. capensis*); tergites (female) moderately granular on lateral surfaces only in *O. leipoldti* (uniformly coarsely granular on medial and lateral surfaces in *O. capensis*); sternite III (male) smooth in *O. leipoldti* (tuberculate in *O. capensis*); metasomal segment V ventral surface with lateral aspect linear in *O. leipoldti* (convex in *O. capensis*); first proximal median lamella of male pecten rounded, of female linear in *O. leipoldti* (angular in male and female *O. capensis*); telotarsus III prolateral row of spiniform setae absent in *O. leipoldti* (present in *O. capensis*). *O. leipoldti* is therefore reinstated as a species.

Type material examined. Lectotype [here designated]: ♂, 'Clanwilliam [SOUTH AFRICA: *Western Cape Prov., Clanwilliam Distr.,* 32.18S 18.90E], 1897, C.L. Leipoldt' (SAMC 1724a). Paralectotypes [here designated]: 3♂, 4♀, 1 subad. ♂, 4 subad. ♀, 2 juv. ♂, 6 juv. ♀, id. (SAMC 1724b).[20]

Opistophthalmus litoralis Lawrence

Opisthophthalmus wahlbergi litoralis Lawrence, 1955: 216, 242.

Opisthophthalmus litoralis: Lawrence 1969: 115; Newlands 1972b: 244, 252; Lamoral & Reynders 1975: 559; Newlands 1978b: 688; Lamoral 1979: 726; Kovařík 1998: 139.

Opistophthalmus litoralis: Fet 2000: 460.

Lawrence (1969) elevated *O. litoralis* to the rank of species and Lamoral (1979) maintained this status. During this investigation, comparison of Lamoral's (1979) 'homotype'[21] of *O. litoralis* (NMSA 10824) and additional material examined

by R.F. Lawrence and B.H. Lamoral in AMGS, NMSA and NMNW, with the syntypes of *O. wahlbergii,* confirmed that they are not conspecific and supported Lawrence's (1969) decision. *Opistophthalmus litoralis* can be separated from *O. wahlbergii* by the characters provided by Lamoral (1979). Phylogenetic analysis of morphological and molecular data (L. Prendini, in prep.) suggests that *O. litoralis* is not the sister species of *O. wahlbergii* and may share a more recent common ancestor with *O. cavimanus* and *O. lamorali.*

Opistophthalmus luciranus Lawrence

Opisthophthalmus luciranus Lawrence, 1959: 384; 1961: 153; Lamoral & Reynders 1975: 559.

Opisthophthalmus ugabensis: Lamoral 1979: 753 (part).

Opistophthalmus ugabensis: Fet 2000: 464 (part).

Lamoral (1979) synonymized *O. luciranus* with *O. ugabensis,* but provided no justification for the synonymy. When the types of *O. luciranus* were re-examined and compared with the lectotype of *O. ugabensis* for this investigation, it was evident that they are not conspecific. An examination of additional material, including all specimens studied by Lamoral (1979) and a series of new specimens of *O. ugabensis*, personally collected in Namibia, led to the conclusion that *O. luciranus* and *O. ugabensis* are allopatric sister species, which can be separated consistently from each other, and from the closely related *O. brevicauda,* by the trichobothrial (τ) characters of the pedipalp patella discussed and illustrated by Lamoral (1979).

Opistophthalmus brevicauda can be separated from *O. luciranus* and *O. ugabensis* by the presence, in the *v* series of the patella, of an outer accessory τ forming a basal pair with v_1, which is absent in both the latter species. The three species can be further separated by the number of τ in the *e* series: *O. luciranus* displays 14 *e* τ, the plesiomorphic number for *Opistophthalmus* (L. Prendini, in prep.), whereas *O. brevicauda* and *O. ugabensis* display 15 and 16^{22}, respectively. *Opistophthalmus luciranus* can be further separated from *O. ugabensis* by the presence of distinct ventrosubmedian carinae on metasomal segment I (obsolete in *O. ugabensis*), by the largely smooth interocular surface of the female carapace (granular in *O. ugabensis*), and by the position of the median ocelli, which are more posteriorly situated than in *O. ugabensis. Opistophthalmus luciranus* is therefore removed from synonymy with *O. ugabensis.*

Type material examined. Holotype: ♀, 'Lucira [ANGOLA: *Namibé Prov.,* 13.87S 12.53E], ix.1956, G. Rudebeck' (TMSA 8939). Paratypes: 1 subad. ♂, id. (TMSA 8940); 1 juv. ♂, id. (TMSA 8942).

Opistophthalmus macer Thorell

Opistophthalmus capensis: C.L. Koch, 1837: 89; 1850: 88 (misidentification *teste* Thorell 1876b: 238; Simon 1880: 391; Purcell 1899: 158).

Opisthophthalmus macer Thorell, 1876b: 236; Kraepelin 1894: 95; Pocock 1896a: 238; Kraepelin 1899: 137; Purcell 1899: 158; Penther 1900: 159; Purcell 1901: 202; Kraepelin 1914: 116; Hewitt 1918: 140; Lawrence 1946: 400; 1955: 241; Lamoral & Reynders 1975: 559; Eastwood 1977: 219, 225; 1978b: 249; Kovařík 1998: 139.

Opisthophthalmus fallax Thorell, 1876b: 238; Kraepelin 1894: 95 (synonymized).

Opistophthalmus fallax: Simon 1880: 391.

Opistophthalmus macer: Simon 1880: 391; Fet 2000: 461.

Opisthophthalmus fossor: Penther 1900: 158 (misidentification: NHMW 1772–1773).

As discussed above, Thorell (1876b) first noted that the specimen, redescribed as *O. capensis* by Koch (1837), was not conspecific with the latter and tentatively suggested that it was conspecific with *O. fallax.* Simon (1880) concurred with Thorell (1876b) and was followed in this opinion by Kraepelin (1894) and Purcell (1899), both of whom regarded *O. fallax* as a junior synonym of *O. macer.* The specimen of *O. capensis* described by Koch (1837) could not be located during this investigation and is presumed lost (L. Tiefenbacher, pers. comm.).[23] However, it is clear from Koch's (1837) description and fig. 308 that this specimen was a female, conspecific with the holotypes of *O. fallax* (female) and *O. macer* (male).

Purcell (1899) accepted Kraepelin's (1894) synonymy of *O. fallax* with *O. macer.* However, Kraepelin (1899) remained uncertain of the synonymy because no additional material had been examined to test the hypothesis, based on the lower pectinal tooth count and broader pedipalp chela manus of *O. fallax,* that the holotypes of *O. fallax* and *O. macer* were opposite sexes of the same species. *Opistophthalmus fallax* appears to have been forgotten subsequently by most authors, for

it was omitted from the revisions of Hewitt (1918) and Lawrence (1955), and from the catalogue of Lamoral & Reynders (1975), although listed as a synonym of *O. macer* by Fet (2000). Comparison of the holotypes of *O. fallax* and *O. macer* for this investigation confirmed their synonymy. Thorell (1876b) evidently mistook sexual characters for diagnostic ones.

Type material examined. SOUTH AFRICA: Holotype: ♂, 'Africa meridionalis, Caput Bonae Spei, J. Victorin' (NHRM 57/45). Holotype (*O. fallax*): ♀, 'Africa meridionalis' (NHRM 52/41b).

Opistophthalmus nitidiceps Pocock

Opisthophthalmus nitidiceps Pocock, 1896a: 243; 1896b: 22; Kraepelin 1899: 131; Purcell 1899: 174; 1901: 201; Hewitt 1912: 304; 1918: 138, 183; Lawrence 1955: 216, 241; Alexander & Ewer 1957: 421; 1958: 349; Alexander 1958: 339; 1959: 399; Lamoral & Reynders 1975: 560; Kovařík 1998: 139.

Opisthophthalmus breviceps Pocock, 1896a: 244; 1896b: 22; Kraepelin 1899: 141; Purcell 1899: 174; Hewitt 1912: 303; 1918: 138 (synonymized); Roewer 1943: 230; Alexander 1958: 339.

Opistophthalmus nitidiceps: Fet 2000: 461.

Hewitt (1912) discussed the similarity between newly acquired female specimens of *O. breviceps* (originally described from two males) and the description of *O. nitidiceps* (described from a female). Subsequently, Hewitt (1918) concluded that the original description of *O. breviceps* agreed exactly with male specimens of *O. nitidiceps* in the AMGS. Hewitt (1918) reasoned that Pocock (1896a) had mistaken sexual characters for diagnostic ones and that *O. breviceps* was therefore synonymous with *O. nitidiceps.* Lawrence (1955) later listed *O. breviceps* in formal synonymy with *O. nitidiceps.* However, the syntypes of *O. breviceps* had not been compared with the holotype of *O. nitidiceps* until this investigation, when it was established that they are conspecific and the synonymy thereby confirmed.

Type material examined. SOUTH AFRICA: Holotype: ♀, 'Port Elizabeth, Algoa Bay [*Eastern Cape Prov., Port Elizabeth Distr.,* 33.77S 25.62E], J.M. Leslie' (BMNH 1890.6.20.1). Syntypes (*O. breviceps*): 2♂, 'S. Africa, Dr Quain' (BMNH 1870.26).

Opistophthalmus opinatus (Simon)

Mossamedes opinatus Simon, 1888: 382.

Opisthophthalmus opinatus: Kraepelin 1894: 81; 1899: 130; Kraepelin 1914: 115; Werner 1916: 91; Hewitt 1918: 129, 181; 1931: 96; Werner 1934: 278; 1936: 189; Roewer 1943: 230; Bacelar 1950: 4; Lawrence 1955: 241; 1961: 153; Lamoral & Reynders 1975: 560; Lamoral 1979: 733, 782 (part); Kovařík 1998: 139.

Opistophthalmus opinatus: Lampe 1917: 199; Fet 2000: 461.

Opisthophthalmus opinatus bradfieldi Hewitt, 1931: 97; 1934: 410; Lawrence 1955: 241; 1961: 152; Lamoral & Reynders 1975: 560; Lamoral 1979: 733 (synonymized).

Lamoral (1979) synonymized *O. opinatus bradfieldi* with *O. opinatus,* based on a comparison of the type material. Re-examination of the types of *O. opinatus bradfieldi* and *O. opinatus* for this investigation confirmed their synonymy. Further discussion of the synonyms attributed to *O. opinatus* is provided under *O. scabrifrons* Hewitt, 1918.

Type material examined. Lectotype [here designated][24]: ♀, 'Moçamedes/Kalahari[25], sud-ouest Afrique, 1884–1886, Dr H. Schinz' (MNHN RS 0235). Syntypes (*O. opinatus bradfieldi*): 1♀, 'Krantzberg, near Usakos [NAMIBIA: *Erongo Region, Karibib Distr.,* 21.92S 15.68E], R.D. Bradfield' (AMGS 6359)[26]; 1 subad. ♂, id. (AMGS 6311).

Opistophthalmus pallipes C.L. Koch

Opistophthalmus pallipes C.L. Koch, 1842: 3; 1850: 88; Simon 1880: 391; Fet 2000: 462.

Opisthophthalmus pallidipes: Thorell 1876b: 228; Kraepelin 1894: 87; Pocock 1896a: 235; Purcell 1899: 151; Kraepelin 1914: 116; Hewitt 1918: 134; Lawrence 1946: 400; 1955: 216, 241; Alexander 1958: 339; Bücherl 1964: 59; Vachon 1974: 119, 120; Lamoral & Reynders 1975: 560; Eastwood 1977: 219, 225; 1978b: 249; Moritz & Fischer 1980: 321; Kovařík 1992: 185; 1998: 139.

Opisthophthalmus pallidimanus: Pocock 1896b: 23; Alexander 1958: 340.

Opisthophthalmus pallipes: Kraepelin 1899: 133; Werner 1902: 602; Kraepelin 1908: 266.

Opisthophthalmus laticauda crinita Lawrence, 1955: 214, 240; Lamoral & Reynders 1975: 557; Kovařík 1998: 139. **Syn. n.**

Opisthophthalmus gigas: Lamoral 1979: 712 (misidentification: NMSA 10653).

Opistophthalmus laticauda crinitus: Fet 2000: 458.

C.L. Koch (1842) described *O. pallipes,* but Thorell (1876b) considered the name to be an improper latinization and changed it to *O. pallidipes.* Most

subsequent authors, except Simon (1880), Kraepelin (1899, 1908) and Werner (1902), adopted the modified spelling. Pocock (1896a) cited the name as *palli[di]pes* and later (1896b) as *pallidimanus.* The original spelling is adopted here, following Fet (2000), who regarded Thorell's (1876b) change to *pallidipes* as an unjustified emendation.

Lawrence (1955) described the subspecies *O. laticauda crinita*[27] from a single, allegedly gravid female specimen. Lawrence (1955) was unable to make a proper comparison of *O. laticauda crinita* with *O. laticauda,* originally described from an adult male, but noted that the subspecies resembled both *O. laticauda* and *O. pallipes* and was perhaps a connecting link between them.

Re-examination of the holotype of *O. laticauda crinita* for this investigation revealed that it is neither gravid, nor adult. The loss of the male holotype of *O. laticauda* prevented a direct comparison with the holotype of *O. laticauda crinita,* but comparison of the latter with non-type material of *O. laticauda,* including specimens collected at Botterkloof (the type locality of *O. laticauda crinita*), confirmed that these taxa are not conspecific. *Opistophthalmus laticauda* is differentiated by the presence of cheliceral trichocopae, the presence of dorsal secondary and subdigital carinae on the pedipalp chela manus, and the granular condition of the ventroexternal carina. The holotype of *O. laticauda crinita* lacks trichocopae and lacks dorsal secondary and subdigital carinae, whereas the ventroexternal carina of the pedipalp chela manus is costate, characters that are diagnostic for *O. pallipes.*

Comparison of the holotypes of *O. laticauda crinita* and *O. pallipes* demonstrated that they are conspecific. Lawrence (1955) differentiated *O. laticauda crinita* from *O. pallipes* by the following characters: colouration; anterior granulation of the carapace; lateral surfaces of the carapace less steeply inclined to the dorsal surface; absence of ventrosubmedian carinae on metasomal segment I; granulation of the pedipalp femur and chela manus; narrower, more compressed chela manus with obsolete dorsal secondary and subdigital carinae; setation of the metasoma, pedipalps and legs. All of these characters, with the exception of the fourth, merely represent intraspecific variation within *O. pallipes* and cannot be used to separate *O. laticauda crinita* from the former. The fourth character is misrepresented. Close examination of the holotype of *O. laticauda crinita* revealed the presence of weakly developed ventrosubmedian carinae on metasomal segment I. *Opistophthalmus laticauda crinita* is therefore synonymized with *O. pallipes.*

Type material examined. Holotype: ♂, 'Afrika, Caffraria' (ZMHB 53). Holotype (*O. laticauda crinita*): subad. ♀, 'Botterkloof Pass, 30 mi NE Clanwilliam [SOUTH AFRICA: *Western Cape Prov., Calvinia Distr.,* 31.87S 19.27E], 30.xi.1950, P. & G. Brinck, G. & I. Rudebeck, narrow ravine, steep, stony slopes with *Euphorbia* and many other plants and bushes' (MZLU 950/3718).

Opistophthalmus pictus Kraepelin

Opisthophthalmus pictus Kraepelin, 1894: 102; 1899: 137; Purcell 1899: 151; 1901: 199; Hewitt 1912: 305; 1918: 133, 183; Lawrence 1955: 242; Weidner 1959: 103; Bücherl 1964: 59; Newlands 1972b: 249, 252; Lamoral & Reynders 1975: 561; Eastwood 1977: 219, 225; Lamoral 1979: 753; Moritz & Fischer 1980: 322; Kovařík 1992: 185; 1998: 139.

Opistophthalmus pictus: Fet 2000: 462.

Discussion of the synonyms and subspecies attributed to *O. pictus* is provided under *O. setifrons* Lawrence, 1961.

Type material examined. SOUTH AFRICA: Lectotype [here designated]: ♀, 'Reddersburg [*Free State Prov., Reddersburg Distr.,* 29.65S 26.17E], 30.iv.1887, H. Meyer' (ZMHB 7186). Paralectotypes [here designated]: 3♀, id. (ZMUH S 102–104); 1♀, id. (ZMUH S 137); 1♀, id. (BMNH 1897.6.20.2); 1♀, 'Cap bon. sp., 7.vi.1894, Naested' (ZMUC).

Opistophthalmus pluridens Hewitt, **stat. n.**

Opisthophthalmus intercedens pluridens Hewitt, 1918: 181; 1935: 471; Lawrence 1955: 239; Lamoral & Reynders 1975: 556; Kovařík 1998: 139.

Opistophthalmus intercedens pluridens: Fet 2000: 457.

Hewitt (1918) differentiated this subspecies from *O. intercedens* by the greater pectinal tooth count (14–15 in male and female), differences in the shape of the pectinal first proximal median lamella (free of teeth in the basal third, as opposed to the basal half) and the setation of the telotarsi. Hewitt (1918) noted that the pectinal tooth count differences were of doubtful importance and that, when the characters of *O. intercedens* are better known, the distinctive features of *O. intercedens pluridens* may seem minor. Lawrence (1955) nonetheless

used the same characters to separate the subspecies from *O. intercedens.*

Despite the apparently minimal differences provided by Hewitt (1918) and Lawrence (1955), comparison of the type specimens of both taxa for this investigation revealed numerous additional differences overlooked by these authors, but justifying the provision of species status for *O. pluridens.* These omissions can be partly attributed to the failure of the previous authors to compare adult males of the two taxa. *Opistophthalmus intercedens* occurs in a clade with *O. schultzei* and two presently undescribed species, all of which are characterized by marked sexual dimorphism (L. Prendini, in prep.). By contrast, *O. pluridens* is closely related to *O. fitzsimonsi,* both of which exhibit minimal sexual dimorphism.

Besides the differences in pectinal morphology, the following characters separate *O. pluridens* from *O. intercedens*: carapace anterior median depression shallow in *O. pluridens* (absent in *O. intercedens*); carapace antero-ocular depression strongly developed in *O. pluridens* (weakly developed in *O. intercedens*); superciliary carinae higher than ocelli in *O. pluridens* (lower in *O. intercedens*); pedipalp chela manus dorsal surface smooth, digital and ventroexternal carinae costate in *O. pluridens* (dorsal surface, digital and ventroexternal carinae granular in *O. intercedens*); tergites (female) moderately granular on lateral surfaces in *O. pluridens* (entirely smooth in *O. intercedens*); sternites and metasomal segments I–III (male) entirely smooth in *O. pluridens* (with coarse transverse undulations (corrugations) on sternites and metasomal segments I–II and granular tubercles on segment III in *O. intercedens*); metasoma with ventrolateral carinae present on segments I–III in *O. pluridens* (absent in *O. intercedens*); metasomal segment V ventral surface convex in lateral aspect, with ventrolateral carinae diverging distally in *O. pluridens* (linear in lateral aspect, with ventrolateral carinae subparallel in *O. intercedens*); telson vesicle surface entirely smooth in *O. pluridens* (granular ventrally in *O. intercedens*); basitarsi and tibia I–II with a few short spiniform setae retrolaterally in *O. pluridens* (with numerous stiff setae and elongated spiniform setae retrolaterally in *O. intercedens*).

Although closely related and sympatric in certain areas (*e.g.* Lohatlha), *O. pluridens* and *O. fitzsimonsi* can be separated by the following characters: carapace interocular surface entirely smooth except for granulation along the median longitudinal and anterior furcated sutures in *O. pluridens* (slightly granular anteriorly, with smooth areas medially, to entirely smooth except for granulation along sutures, in *O. fitzsimonsi*); pedipalp chela manus dorsal surface smooth, digital carina costate in *O. pluridens* (dorsal surface weakly granular, digital carina costate-granular in *O. fitzsimonsi*); tergites (female) moderately granular on lateral surfaces in *O. pluridens* (entirely smooth in *O. fitzsimonsi*); metasoma with ventrosubmedian carinae absent on segments I–III in *O. pluridens* (absent on segment I only in *O. fitzsimonsi*); telson vesicle surface entirely smooth in *O. pluridens* (granular ventrally in *O. fitzsimonsi*); telotarsi I–II ungues subequal in *O. pluridens* (distinctly unequal in *O. fitzsimonsi*); telotarsi III each with a single spiniform seta prolaterally in *O. pluridens* (lacking spiniform setae prolaterally in *O. fitzsimonsi*). The two species also differ ecologically, *O. pluridens* constructing burrows exclusively under stones, usually in loamy soils, whereas *O. fitzsimonsi* burrows exclusively in open ground, usually in sandy-loam to consolidated sand.

Type material examined. SOUTH AFRICA: *Northern Cape Prov.*: Lectotype [here designated]: ♀, 'Campbell [*Herbert Distr.,* 28.80S 23.70E], Dr R. Broom' (AMGS 2967). Paralectotypes [here designated]: 1 subad. ♂, 1 juv. ♂, 2 juv. ♀, id. (AMGS 2967); 1♂, 1 juv. ♂, 5 juv. ♀, 'between Campbell and Griquatown [*Hay Distr.,* 28.82S 23.50E], Dr R. Broom' (AMGS 3046).[28]

Opistophthalmus praedo Thorell

Opisthophthalmus praedo Thorell, 1876b: 230; Kraepelin 1894: 107; 1899: 140; Penther 1900: 159; Hewitt 1918: 143.

Opisthophthalmus curtus Thorell, 1876b: 234 (part).

Opistophthalmus praedo: Simon 1880: 391.

Opisthophthalmus pugnax: Pocock 1896a: 239; 1898b: 198 (misidentifications: BMNH 1891.5.30.1, 1897.2.30.1–2).

Opisthophthalmus glabrifrons: Purcell 1899: 161 (part); Kraepelin 1908: 266 (part); 1913: 185 (part); Lawrence 1942: 226; 1955: 239 (part); Lamoral & Reynders 1975: 555 (part).

Opisthophthalmus pugnax natalensis Hewitt, 1915: 325. **Syn. n.**

Opisthophthalmus latimanus natalensis: Hewitt 1918: 143, 183; Lawrence 1942: 227; 1955:

240; Lamoral & Reynders 1975: 558; Kovařík 1998: 139.

Opistophthalmus glabrifrons: Fet 2000: 456 (part).

Opistophthalmus latimanus natalensis: Fet 2000: 459.

Purcell (1899) synonymized *O. praedo* with *O. glabrifrons,* but Kraepelin (1899) and Penther (1900) regarded *O. praedo* and *O. glabrifrons* as distinct species. Kraepelin (1908) adopted Purcell's (1899) synonymy. Hewitt (1918) discarded *O. praedo,* owing to the uncertainty of its position, but did not list it as a synonym of *O. glabrifrons,* suggesting that he did not consider these species to be conspecific. *Opistophthalmus praedo* was omitted from Lawrence's (1955) checklist, but appeared again in the catalogues of Lamoral & Reynders (1975) and Fet (2000) as a synonym of *O. glabrifrons.*

Purcell's (1899) synonymy of *O. praedo* was not based on examination of the type specimens, but on an assessment of Thorell's (1876b) original description, and Kraepelin's (1894) subsequent description. Comparison of the holotype of *O. praedo* with the syntypes of *O. glabrifrons* revealed that, although *O. praedo* and *O. glabrifrons* are very closely related morphologically, they can be separated consistently and should therefore be regarded as phylogenetic species.

Although Kraepelin (1894) considered *O. praedo* to be more closely related to *O. pugnax,* Purcell (1899) could find no reason for separating *O. praedo* from *O. glabrifrons.* The characters used by Thorell (1876b) and Kraepelin (1894) to separate *O. praedo* from *O. glabrifrons* included the finely granular interocular surface of the carapace, more posterior position of the median ocelli, the narrower pedipalp chela manus with stronger dorsal secondary and subdigital carinae, and the lower pectinal tooth count (14–15). Purcell (1899) maintained that it is impossible to use these characters alone for separating *O. praedo* from *O. glabrifrons,* and that *O. praedo* should be regarded merely as a variety of *O. glabrifrons* unless other more reliable differential characters could be enumerated.

Purcell (1899) evidently overlooked at least one consistent diagnostic difference between the types of *O. praedo* and *O. glabrifrons,* mentioned in Kraepelin's (1894) description – the presence of 1–2 spiniform setae in the prolateral rows (excluding setae on the laterodistal lobes) of telotarsi III–IV. Examination of additional specimens from several collections for this investigation confirmed that *O. praedo* can be separated consistently from *O. glabrifrons* by this character, because *O. glabrifrons* is characterized by the absence of spiniform setae in the prolateral rows of telotarsi III–IV. In addition, the two species can be differentiated by the digital carinae of the pedipalp chela manus, and the externomedian and ventroexternal carinae of the pedipalp patella, which are costate in *O. praedo,* but granular in *O. glabrifrons,* and by the interocular surface of the carapace (female), which is finely granular anteriorly in *O. praedo* but smooth in *O. glabrifrons.* The chela manus of the adult male is narrower in *O. praedo* and, contrary to Purcell's (1899) statement, the dorsal secondary and subdigital carinae are obsolete (granular in *O. glabrifrons*). *Opistophthalmus praedo* is also smaller than *O. glabrifrons,* with considerably more granulation on the carapace and tergites, but less granulation on the dorsal surface of the chela manus. *Opistophthalmus praedo* is therefore removed from synonymy with *O. glabrifrons.*

Hewitt (1915) described the subspecies *O. pugnax natalensis,* which he later (1918) transferred to *O. latimanus natalensis.* Hewitt (1915) discussed the diagnostic characters between *O. pugnax natalensis* and *O. latimanus keilandsi,* noting that with respect to the shape of the pedipalp chela manus and the granulation of the last sternite and ventrosubmedian carinae of the first metasomal segment of the male, *O. pugnax natalensis* could be regarded as intermediate between *O. pugnax* and *O. latimanus keilandsi.* According to Hewitt (1915), *O. pugnax natalensis* resembles *O. latimanus keilandsi* also in the posterior position of the median ocelli, but differs in the stouter metasoma of the male. Hewitt (1915) commented further on the utility of cheliceral trichocopae as a diagnostic character in *Opistophthalmus,* noting the absence of these structures in *O. latimanus keilandsi* and *O. pugnax natalensis* compared with *O. pugnax* and *O. glabrifrons.* However, Purcell (1899) demonstrated that this character was intraspecifically variable in *O. glabrifrons.* Hewitt (1918) later suggested that *O. latimanus keilandsi* could be a junior synonym of *O. praedo,* as noted above.

The type specimens of *O. latimanus keilandsi, O. pugnax natalensis* and *O. praedo* had not been compared until this investigation, when Hewitt's (1918) suggestion that *O. latimanus keilandsi* and *O. praedo* are synonymous was refuted and it was instead revealed that *O. pugnax natalensis* and *O. praedo* are synonymous. The diagnostic characters used by Hewitt (1915) to separate *O. pugnax*

natalensis from *O. latimanus keilandsi,* and the following characters used to separate it from *O. pugnax,* are diagnostic for *O. praedo*: cheliceral trichocopae absent; median ocelli situated more posteriorly; pedipalp chela manus (male) width slightly narrower in proportion to length, with longer fingers, than in *O. pugnax*; chela manus less coarsely granulated, dorsal surface covered with numerous small isolated granules (male) or without coarse granulation except near the finger, but covered with coalescent ridges and granules (female); digital carina entirely costate (male) to costate in distal half only (female); dorsal secondary and subdigital carinae obsolete (male) to absent (female); granules on mesial portion of sternite VII (male) smaller and more numerous than in *O. pugnax*; ventrosubmedian carinae of metasomal segment I (male) composed of *c.* 8–10 coarse granules, the space between them including about 10 coarse granules, but not obliterated nor the carinae rendered indistinct. This last character also provides another diagnostic difference between *O. praedo* and *O. glabrifrons. Opistophthalmus pugnax natalensis* is therefore synonymized with *O. praedo.*

Hewitt's (1918) discussion of the differences between *O. latimanus natalensis, O. latimanus keilandsi* and *O. glabrifrons* provides further support for the synonymy of *O. pugnax natalensis* with *O. praedo.* According to Hewitt (1918), the chela manus of *O. latimanus natalensis* is similar to that of *O. latimanus keilandsi,* but granulation on the last sternite of male specimens from Mfongosi is considerably coarser than in the male of *O. latimanus keilandsi.* Hewitt (1918) noted further that although *O. latimanus natalensis* is similar to *O. glabrifrons* in several characters, the granular digital carina and dense granulation of the ventral surface of the first metasomal segment in both sexes, and of the last sternite in the male, differentiate the latter species. This distinction was evidently missed by Lawrence (1942), who referred the Mfongosi specimens (NMSA 8337, 8339, 17157 [old 722]) to *O. glabrifrons,* rather than to *O. latimanus natalensis.* However, the characters discussed by Hewitt (1918) are diagnostic for *O. praedo,* with which these specimens are also considered to be conspecific.

Type material examined. Holotype: ♂, 'Caffraria, 1840–1845, J.A. Wahlberg' (NHRM 57/46). Syntype (*O. curtus*): ♀, id. (NHRM 57/47b). Syntypes (*O. pugnax natalensis*): 1♂, 'Estcourt [SOUTH AFRICA: *KwaZulu-Natal Prov., Estcourt Distr.,* 29.00S 29.88E], Mrs E.J. Turner' (BMNH 1897.2.30.1–2); 1♀, id. except 'Mr. G.A.K. Marshall' (BMNH 1897.2.30.1–2).[29]

Opistophthalmus pugnax Thorell, **stat. n.**

Opisthophthalmus pugnax Thorell, 1876b: 232; Kraepelin 1894: 105; Pocock 1896a: 239 (part); 1896b: 22; 1898a: 308; Kraepelin 1899: 141; Purcell 1899: 161; Kraepelin 1901: 270; Werner 1902: 603; Hewitt 1915: 326; Werner 1934: 278; Kovařík 1992: 185.

Opisthophthalmus curtus Thorell, 1876b: 234 (part); Lenz 1894: 97; Kraepelin 1894: 105 (synonymized).

Opistophthalmus curtus: Simon 1880: 391.

Opistophthalmus pugnax: Simon 1880: 391.

Opisthophthalmus latimanus pugnax: Hewitt 1918: 142, 183; 1935: 474; Werner 1936: 189; Lawrence 1946: 400; 1955: 216, 241; Lamoral & Reynders 1975: 558; Kovařík 1998: 139.

Opisthophthalmus latimanus kalaharicus Hewitt, 1935: 472; Lawrence 1955: 240; Lamoral & Reynders 1975: 558; Kovařík 1998: 139. **Syn. n.**

Opisthophthalmus latimus pugnax: Lawrence 1942: 235.

Opistophthalmus latimanus kalaharicus: Fet 2000: 459.

Opistophthalmus latimanus pugnax: Fet 2000: 460.

Kraepelin (1894) synonymized *O. curtus* with *O. pugnax,* later relegated to a subspecies of *O. latimanus* by Hewitt (1918). When the syntypes of *O. curtus* were re-examined during this investigation, one was found to be conspecific with the holotype of *O. pugnax,* confirming their synonymy, but the other syntype was conspecific with the holotype of *O. praedo.*

Hewitt (1918) supported the recognition of *O. pugnax* as a subspecies of *O. latimanus* solely on the basis of an argument of intraspecific variation within *O. latimanus,* yet indicated that *O. pugnax* can be separated consistently from the latter by the nature of the granulation of the last sternite and ventrosubmedian carinae of the first metasomal segment in the adult male. In addition to the distinctive surface features (isolated coarse granular tubercles) on sternite VII and metasomal segment I, which are more accentuated in the adult male, *O. pugnax* can be separated from *O. latimanus* and related species (*O. glabrifrons, O. keilandsi* and *O. praedo*) by the presence of a transverse carina along the posterior margin of

sternite VII. The median ocelli of *O. pugnax* are also more anteriorly situated, and the pectinal tooth count lower, than in *O. latimanus*. *Opistophthalmus pugnax* can be further separated from *O. keilandsi* and *O. praedo* by the presence of cheliceral trichocopae, and from *O. glabrifrons* by the costate digital carina of the pedipalp chela manus, and the presence of 2–3 spiniform setae in the prolateral rows (excluding setae on the laterodistal lobes) of telotarsi III–IV. *O. pugnax* is therefore reinstated as a species.

Hewitt (1935) differentiated *O. latimanus kalaharicus* from *O. pugnax* by paler colouration, finer granulation of the last sternite, first metasomal segment and pedipalp chela manus, including weaker carinae, and by the presence of a single spiniform seta, rather than two, in the prolateral row of telotarsus IV. However, Hewitt (1935) noted that the coarser granulation of the chela manus, metasoma and last sternite is subject to variation in *O. pugnax*. In light of Hewitt's (1935) observation, supported by other authors (*e.g.* Purcell 1899), the status of *O. latimanus kalaharicus* rests entirely on minor differences in colour and the setation of telotarsus IV, both of which have been shown to vary intraspecifically in *Opistophthalmus* (*vide* Purcell 1899, 1901; Lamoral 1979). Examination of the syntypes of *O. latimanus kalaharicus* for this investigation failed to reveal further diagnostic differences between this subspecies and *O. pugnax,* with which it is therefore synonymized.

Type material examined. Holotype: ♂, 'Caffraria, 1840–1845, J.A. Wahlberg' (NHRM 57/47a). Syntype (*O. curtus*): ♀, id. (NHRM 57/47b). Syntypes (*O. latimanus kalaharicus*): 1♀, 'Metsimaklaba River, 12 mi W Gaberones [BOTSWANA: *Kgatleng Distr.,* Metsemothlaba, 24.47S 26.10E], 10.iii.1930, Vernay-Lang Kalahari Expedition' (TMSA 5570); 1 subad. ♂, id. (TMSA 5567).[30]

Opistophthalmus scabrifrons Hewitt

Opisthophthalmus opinatus: Hewitt, 1913: 150; Lamoral 1979: 733, 782 (part).

Opisthophthalmus scabrifrons Hewitt, 1918: 129; Lawrence 1955: 242; Lamoral & Reynders 1975: 561.

Opistophthalmus opinatus: Fet 2000: 461 (part).

Hewitt (1913) tentatively assigned three specimens to *O. opinatus,* but later (1918) described these as a new species, *O. scabrifrons*. Hewitt (1918) noted that *O. scabrifrons* agrees closely with *O. opinatus* in the following characters: position of the median ocelli; setation of the telotarsi; median longitudinal suture of carapace not distinctly furcated; ventrosubmedian carinae of the fourth[31] metasomal segment weakly developed; telson vesicle granular ventrally. According to Hewitt (1918), *O. scabrifrons* differs from *O. opinatus* in the following characters: pectinal first proximal median lamella toothed throughout length, tooth count of 21–23 in male; carapace entirely granular, coarsely so in the anterior half. Hewitt (1918) and Lawrence (1955) both used the lower pectinal tooth count and angular first proximal median lamella of *O. scabrifrons,* together with the increased granulation of the carapace, for separating the latter from *O. opinatus* in their keys.

Lamoral (1979) synonymized *O. scabrifrons* with *O. opinatus* after examination of the types, and additional material led to the conclusion that the diagnostic characters selected by Hewitt (1918) were sufficiently variable to bridge the character sets proposed to separate these species. In Lamoral's (1979) opinion, this variability was the result of unsuspected clinal differences in what were previously thought to be diagnostic ones. Lamoral (1979) listed characters putatively subject to clinal variation in *O. opinatus,* including one of Hewitt's (1918) diagnostic characters for *O. scabrifrons*: first proximal median lamella of each pecten mesially rounded (*O. opinatus*) to angular (*O. scabrifrons*) in male.

Although Lamoral (1979) synonymized *O. scabrifrons* with *O. opinatus,* he described a new species, *O. coetzeei,* which, by his own admission, could be separated from *O. opinatus* by only a few morphological criteria. According to Lamoral (1979), the occurrence of these differences in sympatric populations of *O. coetzeei* and *O. opinatus* confirmed their distinctiveness. Apparently, the recognition of *O. coetzeei* and *O. opinatus* as biological species was Lamoral's (1979) primary justification for describing *O. coetzeei.* Of the diagnostic characters provided, only the presence of spicules on the ventral and ventrolateral surfaces of the telson vesicle and the considerably smaller size of the adults consistently separate the latter from *O. opinatus.* However, *O coetzeei* can be further differentiated by the absence of ventrosubmedian carinae on metasomal segments I–IV and ventrolateral carinae on segments I–III.

When the types of *O. scabrifrons* and *O. opinatus* were again compared for this investigation, they were not found to be conspecific. Examination of additional museum material, including all

specimens examined by Lamoral (1979) and a series of new specimens personally collected in Namibia, confirmed the distinctiveness of *O. scabrifrons* and provided no evidence for Lamoral's (1979) putative clinal variation. The recent personal discovery of specimens, conspecific with *O. scabrifrons* (NMNW 2001) in sympatry with a 'typical' specimen of *O. opinatus* (NMNW 1985) in the vicinity of the Naukluft mountains (Namibia) casts further doubt on the clinal variation hypothesis.

Opistophthalmus scabrifrons and *O. opinatus* are evidently sound biological species because they are reproductively isolated in sympatry, as are *O. coetzeei* and *O. opinatus.* They are also sound phylogenetic species because *O. scabrifrons* can be separated consistently from *O. opinatus* by the following characters: carapace interocular surface uniformly granular throughout (smooth regions in *O. opinatus*); posterior sutures with an X configuration, converging on ocular tubercle from posterior carapace margin, then diverging just posterior to ocular tubercle, where they are usually connected to each other by a small cross-suture, and extending anteriorly for a short distance beyond ocular tubercle (posterior sutures of *O. opinatus* with V configuration, converging on ocular tubercle from posterior carapace margin, then connecting distally with ocular suture); first proximal median lamella of each pecten (male) with mesial margin angular, pectinal teeth present along entire posterior margin (first proximal median lamella of male with mesial margin shallowly curved, proximal third of posterior margin devoid of teeth in *O. opinatus*); ventrosubmedian carinae of metasomal segments I–II obsolete on I, but distinct on II (obsolete on I–II in *O. opinatus*). In addition, adult *O. scabrifrons* are considerably smaller and present a lower pectinal tooth count than adult *O. opinatus. Opistophthalmus scabrifrons* is therefore removed from synonymy with *O. opinatus*. *Opistophthalmus coetzeei* and *O. scabrifrons* are separated by the presence, in the former, of spicules on the telson vesicle and the absence of ventrosubmedian carinae on metasomal segments I–IV and ventrolateral carinae on segments I–III.

Type material examined. NAMIBIA: *Karas Region*: Lectotype [here designated]: ♂, 'Narudas Süd, Great Karas Mountains [*Karasburg Distr.,* Farm Narudas Süd 268, 27.38S 18.85E], 2.ii.1913, P.A. Methuen' (TMSA 411). Paralectotype [here designated]: ♂, 'Quibis, Great Karas Mountains [*Lüderitz Distr.,* Kuibis, 26.68S 16.83E][32], 30.xi.1912, P.A. Methuen, 1374 m' (TMSA 412).

Opistophthalmus schultzei Kraepelin

Opisthophthalmus schultzei Kraepelin, 1908: 262; Hewitt 1913: 150; Kraepelin 1914: 116; Hewitt 1918: 130; Lawrence 1955: 242; Weidner 1959: 103; Lamoral & Reynders 1975: 562; Lamoral 1979: 745; Moritz & Fischer 1980: 323; Kovařík 1992: 185; 1998: 139.

Opisthophthalmus undulatus Kraepelin, 1908: 263 (part); 1914: 116; Hewitt 1918: 130; Lawrence 1955: 242; Weidner 1959: 103; Lamoral & Reynders 1975: 562; Moritz & Fischer 1980: 325; Lamoral 1979: 745 (synonymized).

Opisthophthalmus laevicauda Roewer, 1943: 230; Lawrence 1955: 243; Lamoral & Reynders 1975: 557; Lamoral 1979: 745 (synonymized).

Opistophthalmus schultzei: Fet 2000: 463.

Opistophthalmus schultzei and *O. undulatus* were described by Kraepelin (1908) from type specimens collected at the same locality (Kubub, Namibia). Kraepelin (1908) puzzled over the apparent scarcity of female specimens available for *O. undulatus* and proposed three possible explanations. Perhaps the female of *O. undulatus* was naturally rarer than the male, perhaps the females of *O. undulatus* and *O. schultzei* were so similar that it was impossible to separate them, or perhaps the males of *O. schultzei* were dimorphic (implying that *O. undulatus* and *O. schultzei* could be synonymous). A fourth possibility not suggested by Kraepelin (1908), that *O. undulatus* was the adult male of *O. schultzei* (the male syntypes of *O. schultzei* were juveniles), was later verified when Lamoral (1979) examined some of the type specimens, and synonymized *O. undulatus* with *O. schultzei.* Lamoral (1979) also synonymized *O. laevicauda,* after examination of the holotype revealed that it was a juvenile, conspecific with *O. schultzei.*

During this investigation, the holotype of *O. laevicauda* and syntypes of *O. undulatus* were re-examined and found to be conspecific with the lectotype and paralectotypes of *O. schultzei,* confirming their synonymy. Two of the syntypes of *O. undulatus* (ZMHB 14994) were conspecific with *O. intercedens.*

Type material examined. NAMIBIA: *Karas Region,*

Lüderitz Distr.: Lectotype [designated Lamoral 1979]: ♀, 'Kubub [Farm Kubub 15, 26.73S 16.28E], iii–iv.1904, L. Schultze' (ZMHB 14988). Paralectotypes [designated Lamoral 1979][33]: 2♀, id. (ZMHB 14991); 1♀, id. (ZMHB 14996); 1 subad. ♂, id. (ZMHB 14988); 1 subad. ♂, id. (ZMHB 14992); 4♀, 1 subad. ♂, 1 subad. ♀, 2 juv. ♀, 8 first instars, id. except 'iii.1904' (ZMHB 14990); 3 subad. ♂, id. (ZMHB 14989); 1♀, id. (AMGS [ZMHB 10878]); 1 subad. ♂, id. (AMGS [ZMHB 10879]). Holotype (*O. laevicauda*): juv. ♀, 'Lüderitzbucht[34] [26.67S 15.17E], Eberlanz' (SMFD RII/6741). Syntypes (*O. undulatus*)[35]: 14♂, 'Kubub, iii–iv.1904, L. Schultze' (ZMHB 14993); 2♂, id. (ZMHB 14995); 1♂, id. (ZMHB 14997); 1♂, id. (AMGS [ZMHB 10880]).

Opistophthalmus setifrons Lawrence

Opisthophthalmus setifrons Lawrence, 1961: 151; Lamoral & Reynders 1975: 562; Lamoral 1979: 750.

Opisthophthalmus vivianus Lawrence, 1969: 112; Lamoral & Reynders 1975: 562; Lamoral 1979: 750 (synonymized).

Opisthophthalmus pictus nigrocarinatus Lawrence, 1969: 113; Lamoral & Reynders 1975: 561; Lamoral 1979: 750 (synonymized).

Opistophthalmus setifrons: Fet 2000: 463.

Lamoral (1979) synonymized *O. vivianus* and *O. pictus nigrocarinatus* with *O. setifrons* after comparison of the holotypes. Their synonymy was confirmed by re-examination of the holotypes during this investigation. Lamoral (1979) further suggested that *O. setifrons* could be a junior synonym of *O. pictus,* a view repeated recently by Fet (2000). Lamoral's (1979) assertion was not verified by examining the types of *O. pictus,* but was instead based on the opinion that all material identified as *O. setifrons* for his revision was conspecific with non-type specimens of *O. pictus* that he had examined. Furthermore, Lamoral's (1979) understanding of the diagnostic characters within this group of species was apparently unclear, for he misidentified several specimens (NMSA 11440) of *O. crassimanus* Purcell, 1898, as *O. pictus.*

Lawrence (1961) considered *O. setifrons* to be closely allied to *O. pictus* but differentiated it by the proportionally longer metasoma, greater width of the pedipalp chela manus, and lower pectinal tooth count. These characters suffer from the limitations of arbitrarily defined continuous variables, thus raising suspicion about the limits of the species involved. During this investigation, a comparison of the types of *O. pictus, O. setifrons, O. pictus nigrocarinatus* and *O. vivianus,* as well as a series of additional specimens, revealed that the two species are very similar morphologically, and female specimens can be particularly difficult to differentiate. Nonetheless, *O. setifrons* can be separated from *O. pictus* by the following characters: pedipalp chela manus with digital carina granular (costate, at least in distal portion, in *O. pictus*) and ventroexternal carina granular (costate to costate-granular in *O. pictus*); tergites (male) uniformly finely granular throughout (unevenly coarsely granular in *O. pictus*); telson vesicle elongated (more globose in *O. pictus*); pectines (male) with 11–12 teeth, mesial margin of first proximal median lamella straight, and proximal third of posterior margin devoid of teeth (with 16–17 pectinal teeth present along entire posterior margin, and mesial margin of first proximal median lamella angular in *O. pictus*). In addition, the pedipalp chela manus of *O. setifrons* is wider, and the shallow depression at the base of the fixed finger more conspicuous, as noted by Lawrence (1961).

Opistophthalmus setifrons and *O. pictus* appear to be completely allopatric, no populations of either species having thus far been discovered in the intervening area, part of which is occupied by the related, but morphologically distinct *O. crassimanus,* the distributional range of which does not extend north of the Orange River (Prendini 1995). *Opistophthalmus setifrons* appears to be entirely restricted to Namibia, occurring in the area roughly delimited by Rehoboth to the south, the Kunene River to the north, the escarpment to the west and the Kalahari sand system to the east. *Opistophthalmus pictus* is restricted to South Africa, within an area bounded by the southern Cape fold mountains and Drakensberg escarpment to the south and east, respectively, and the Kalahari sand system to the north. The western boundary of *O. pictus* distribution is undefined, but few records occur west of the 24°E meridian.

In view of the consistent, albeit subtle morphological differences between *O. setifrons* and *O. pictus,* together with their disjunct distributional ranges, the status of *O. setifrons* is upheld until further counterevidence, *e.g.* molecular data (L. Prendini, in prep.), has accumulated.

Type material examined. NAMIBIA: Holotype: ♂, 'Kam River [*Hardap Region, Rehoboth Distr.,* 24.12S

16.83E], xii.1932[36], H.W. Bell-Marley' (NMSA 8330). Holotype (*O. pictus nigrocarinatus*): ♂, '30 mi S Ohopoho [Opuwo], Kaokoveld [*Kunene Region, Opuwo Distr.,* 18.48S 13.90E], xii.1967, A. van der Merwe' (AMGS). Holotype (*O. vivianus*): ♂, 'Gebiet of Rehoboth [*Hardap Region, Rehoboth Distr.,* 23.42S 17.26E], xii.1932, H.W. Bell-Marley' (AMGS [TMSA 8225]).

Opistophthalmus ugabensis Hewitt

Opisthophthalmus undulatus ugabensis Hewitt, 1934: 408 (AMGS 6574: female lectotype only).

Opisthophthalmus cavimanus ugabensis: Lawrence 1955: 238 (part).

Opisthophthalmus ugabensis: Lamoral 1979: 753 (part); Kovařík 1998: 140.

Opistophthalmus ugabensis: Fet 2000: 464 (part).

Discussion of the synonyms attributed to *O. ugabensis* is provided under *O. luciranus.*

Type material examined. Lectotype [designated Lamoral 1979]: ♀, 'Ugab River [NAMIBIA: *Erongo Region, Omaruru Distr.,* 20.95S 14.13E], R.D. Bradfield' (AMGS 6574).[37]

Opistophthalmus wahlbergii (Thorell)

Miaephonus wahlbergii Thorell, 1876a: 13; 1876b: 222; Karsch 1879a: 20.

Opisthophthalmus wahlbergi: Kraepelin 1894: 83; Pocock 1896a: 237; 1896b: 23; Kraepelin 1899: 131; Purcell 1899: 139; Penther 1900: 158; Purcell 1901: 194; Kraepelin 1908: 262; Hewitt 1912: 305; 1913: 149; Kraepelin 1914: 115; Hewitt 1918: 130, 181; Pavlovsky 1925: 204; Lawrence 1928: 274; Werner 1934: 278; Hewitt 1935: 470; Roewer 1943: 230; Lawrence 1955: 216, 242; Alexander 1958: 339; Lawrence 1959: 384; Dumortier 1964: 320; Lawrence 1967a: 16; 1969: 108; Newlands 1969: 6; Lamoral 1972: 120; Newlands 1972b: 244, 251; Vachon 1974: 882; Lamoral & Reynders 1975: 562; Eastwood 1978b: 252; Lamoral 1978: 172; 1979: 756; Newlands 1978b: 687; Kovařík 1998: 140.

Opisthophthalmus wahlbergi gariepensis Purcell, 1901: 194; Lamoral & Reynders 1975: 563; Lamoral 1979: 756 (synonymized).

Opisthophthalmus wahlbergi nigrovesicalis Purcell, 1901: 195; Lawrence 1955: 243; Lamoral & Reynders 1975: 563; Lamoral 1979: 756 (synonymized).

Opistophthalmus wahlbergi: Lampe 1917: 199.

Opisthophthalmus lundensis Monard, 1937: 267; Lawrence 1959: 385; Forcart 1961: 49; Lawrence 1967a: 16; Lamoral & Reynders 1975: 559; Kovařík 1998: 139. **Syn. n.**

Opisthophthalmus wahlbergi robustus Newlands, 1969: 6; Lamoral & Reynders 1975: 563; Kovařík 1998: 140. **Syn. n.**

Opistophthalmus lundensis: Fet 2000: 460.

Opistophthalmus wahlbergii: Fet 2000: 464.

Opistophthalmus wahlbergii robustus: Fet 2000: 465.

Thorell (1876a) described a new species, *Miaephonus wahlbergii,* later transferred to *Opistophthalmus* by Kraepelin (1894), who modified the name to *wahlbergi.* All subsequent authors, except Karsch (1879), used this emendation until Fet (2000) demonstrated that it was an incorrect subsequent spelling, and reinstated the original name.

Monard (1937) described a new species, *O. lundensis,* from Angola. Presumably because this species was extralimital, Lawrence (1955) omitted it from his key to the South African *Opistophthalmus* and Lamoral (1979) omitted it from his revision of the Namibian scorpions. Aside from brief mention by Lawrence (1959, 1967a) and inclusion in the catalogues of Lamoral & Reynders (1975) and Fet (2000), *O. lundensis* has been ignored by contemporary workers. The status of this species remained unquestioned, and the type specimens unexamined, until this investigation.

Monard (1937) considered *O. lundensis* to be closely related to *O. wahlbergii,* and provided few characters by which it could be separated from the latter. According to the description, *O. lundensis* shares the following diagnostic characters with *O. wahlbergii*: carapace with median ocelli located posteromedially; telson vesicle ventral surface granular; metasomal segments I–III with ventrosubmedian carinae obsolete; basitarsi I–II each with comb-like row of long setae retrolaterally; telotarsi III–IV each without a prolateral row of spiniform setae. *Opistophthalmus lundensis* can only be separated from *O. wahlbergii* by the lower pectinal tooth count and the degree of excavation of the frontal notch, characters which are both known to vary considerably among populations of *Opistophthalmus* species (*vide* Purcell 1899) and thus cannot be used as diagnostic criteria for species delimitation. During this investigation, four[38] of the syntypes of *O. lundensis* were examined and found to be conspecific with

the lectotype and paralectotype of *O. wahlbergii*. *Opistophthalmus lundensis* is therefore synonymized with *O. wahlbergii*.

Newlands (1969) described the subspecies *O. wahlbergi robustus,* differing from *O. wahlbergii* principally in its darker colouration and more rounded pedipalp chela manus. As with Monard's (1937) diagnostic characters for *O. lundensis,* these characters are inadequate given the extent of colour and morphometric variation exhibited by *O. wahlbergii* (*vide* Purcell 1901; Lamoral 1979). Examination of the holotype and paratype of *O. wahlbergi robustus* for this investigation confirmed that these are also conspecific with the lectotype and paralectotype of *O. wahlbergii. Opistophthalmus wahlbergi robustus* is therefore synonymized with *O. wahlbergii.*

Lamoral (1979) synonymized Purcell's (1901) subspecies, *O. wahlbergi gariepensis* and *O. wahlbergi nigrovesicalis,* with *O. wahlbergii,* based on a comparison of the type material. Re-examination of the syntypes of *O. wahlbergi gariepensis* and *O. wahlbergi nigrovesicalis* confirmed their synonymy. Purcell's (1901) justification for these subspecies, on the grounds that both occur at Naroep without any transitional forms of colouration, is erroneous – specimens with intermediate colouration have been recorded from Naroep and Riemvasmaak (*e.g.* NMSA 10607; SAMC C5154). Further discussion of the subspecies attributed to *O. wahlbergii* is provided under *O. litoralis.*

Type material examined. Lectotype [here designated][39]: ♀, 'Africa, Caffraria, 1840–1845, J.A. Wahlberg' (NHRM 58/48). Paralectotype [here designated]: ♀, 'Africa meridionalis, 16.iv.1875, G.N. Westring' (NHMG 0093:1). Syntypes (*O. lundensis*): 2♀, 1 juv. ♂, 1 juv. ♀, 'Tyihumbwé [ANGOLA: *Lunda Prov.*], ix.1932, Dr A. Monard' (MHNC). Syntypes (*O. wahlbergi gariepensis*)[40]: 6♂, 24♀, 15 subad. ♂, 10 subad. ♀, 11 juv. ♂, 12 juv. ♀, 'Naroep, Great Bushmanland [SOUTH AFRICA: *Northern Cape Prov., Namaqualand Distr.,* 29.00S 18.57E], 1.xii.1897, M. Schlechter' (SAMC 2178); 6♀, 11 subad. ♂, 1 subad. ♀, 1 juv. ♂, 3 juv. ♀, id. except '26.ii.1898' (SAMC 2233). Syntypes (*O. wahlbergi nigrovesicalis*): 3♂, 39♀, 17 subad. ♂, 12 subad. ♀, 5 juv. ♂, 6 juv. ♀, id. except '10.xii.1897, 26.ii.1898, 28.ii.1898, 30.iii.1898' (SAMC 2202, 2232, 2235, 2971)[41]. Holotype (*O. wahlbergi robustus*): ♂, 'Crystal Salt works, Zoutpan, 20 mi W Waterpoort [SOUTH AFRICA: *Northern Prov., Soutpansberg Distr.,* 22.87S 29.33E], 26.vi.1968, R.W. Cameron' (AMGS). Paratype (*O. wahlbergi robustus*): ♀, id. except '24.vii.1968' (AMGS).

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ENDNOTES

[1]The original spelling of *Opistophthalmus* C.L. Koch, 1837 was changed to *Opisthophthalmus* by subsequent authors (except L. Koch and E. Simon) because C.L. Koch's (1837) name is an improper latinization. Francke (1985) rejected this spelling as an unjustified emendation. In the present paper, I have followed Fet (2000), in listing *Opistophthalmus* species without specifying the unjustified spelling by the following authors: Hewitt, Karsch, Kraepelin, Lamoral, Lamoral & Reynders, Lawrence, Monard, Newlands, Penther, Peters, Pocock, Purcell, Roewer, Thorell, Werner.

[2]According to Lamoral & Reynders (1975), Lawrence (1955) suspected that *O. adustus* was synonymous with *O. betschuanicus*.

[3]Lawrence (1946) neglected to mention another specimen with the same collection data: 1 juv. ♂ (TMSA 8626).

[4]Lamoral & Reynders (1975) credited the synonymy of *O. colesbergensis* with *O. austerus* to Purcell (1901).

[5]Four additional specimens (1 juv. ♂, 3 juv. ♀), not mentioned in the original description, were accessioned as MNHN RS 0225.

[6]Herbst's (1800) figures of the syntypes of *Scorpio capensis*, fig. 2 (♂) and fig. 3 (♀), respectively depict ♀ *O. capensis* and *O. latimanus.*

[7]According to Kraepelin (1894), the type specimens of *O. maxillosus* and *O. pilosus* were deposited in the München Sammlung. A search for these specimens failed to locate them in München (L. Tiefenbacher, pers. comm.) or any other major German collections (pers. comm.: H. Dastych, M. Geisthardt, M. Grasshoff, M. Moritz, W. Schawaller).

[8]The dubious locality data of BMNH 1913.9.1.68 are consistent with the data provided by Koch (1837) and later discussed by Kraepelin (1894).

[9]In addition to describing a ♀, Simon (1888) provided meristic data for a ♂. Simon (1888) did not specify the types; hence both specimens must be regarded as syntypes. Presumably the ♂ syntype is lost, but this could not be confirmed.

[10]Lawrence (1928) mistakenly cited Sesfontein as type locality for all three syntypes. The third syntype, not examined by Lamoral (1979), was discovered in the AMGS.

[11]An additional specimen (1 juv. ♂), not mentioned in the original description, was accessioned as MNHN RS 0229.

[12]Lamoral (1979) designated a neotype after E.B. Eastwood confirmed the loss of the holotype ♀ (dry). The collection data for the lost holotype are as follows (Purcell 1898: 9): 'Walfisch Bay, Damaraland

[NAMIBIA: *Erongo Region, Walvis Bay Distr.,* Walvis Bay, 22.99S 14.47E], C. Wilmer'.

[13]Two additional syntypes (1♂, 1♀; not examined), deposited in ZMUH, were exchanged from SAMC by W.F. Purcell (Weidner 1959; H. Dastych, pers. comm.). These specimens are hereby also designated as paralectotypes. Another two specimens may also be part of the original syntype series, but have not been designated as paralectotypes because the collection data differ slightly: 1♂, 1♀, 'Tulbagh Road Station, x.1896, W.F. Purcell & R.M. Lightfoot' (BMNH 1899.12.3.4–5 [ex SAMC]).

[14]SAMC 2231 is probably not the original holotype, although cited as such by Lamoral (1979). According to Purcell (1898: 7), the specimen 'bears no label' and Lamoral (1979) also states that the type locality and collector are unknown. Furthermore, the year of collection is the same as the year of publication of the description. The loss of the 2 ♂ (dry) described by Purcell (1898) has been confirmed (M. Cochrane, pers. comm.).

[15]Kraepelin (1908) cited the syntypes as 1 subad. ♀, 2 juv. Moritz & Fischer (1980) mentioned only the lectotype ♀ from ZMHB. In addition to the juv. paralectotype in ZMHB, a second juv. paralectotype (not examined) is deposited in ZMUH (Weidner 1959).

[16]The loss of at least one specimen from the series has been confirmed (M. Cochrane, pers. comm.): 1♂, 'Victoria West, 1885, R.M. Lightfoot' (SAMC 414). Two additional syntypes (1♂, 1♀; not examined), deposited in ZMUH, were exchanged from SAMC by W.F. Purcell (Weidner 1959; H. Dastych, pers. comm.). These specimens are hereby also designated as paralectotypes.

[17]Hewitt (1914) erroneously cited the syntypes as 1♂, 3♀. The four syntypes were identified from among additional specimens of *O. latimanus keilandsi* in AMGS, by their accompanying collection data, which matches that in Hewitt's (1914: 7) description: 'Keilands, collected by Rev. Fr. Albert Schweiger'. Weidner (1959) listed a 'paratype' ♀ of *O. latimanus keilandsi* in ZMUH that, together with an alleged 'paratype' ♂ in ZMUH (not listed), were exchanged from AMGS 1728 by J. Hewitt (H. Dastych, pers. comm.). The labels accompanying the two ZMUH specimens state: 'Keilands, Eastern Cape Colony'. Three additional specimens with the same accession number, but slightly different collection data, still remain in AMGS: 1♂, 2♀, 'Keilands, C.C., i.1913' (AMGS 1728). Due to the discrepancy between the number of specimens accessioned as AMGS 1728 and the number of specimens listed as syntypes by Hewitt (1914), it is doubtful that the two ZMUH 'paratypes' ex AMGS 1728 were part of the original syntype series.

[18]The collection data for the lost holotype are as follows (Purcell 1898: 27): 'Calvinia [SOUTH AFRICA: *Northern Cape Prov., Calvinia Distr.,* 31.47S 19.78E], P. Percival'.

[19]Although suspected, loss of the holotype has not been confirmed beyond reasonable doubt. Designation of a neotype is therefore postponed until such evidence is available. The collection data for the missing holotype are as follows (Koch 1841: 67): 'Das Vorgebirg der guten Hoffnung [Cape of Good Hope]'.

[20]Purcell (1898) cited the syntypes as 4♂, 6♀, 11 juv. Five additional 'paratypes' (not examined), deposited in ZMUH, were exchanged from SAMC by W.F. Purcell (Weidner 1959; H. Dastych, pers. comm.). Since SAMC 1724 still contains 21 specimens, it is doubtful that the five ZMUH 'paratypes' were part of the original syntype series.

[21]Lamoral (1979) examined the holotype of *O. litoralis,* originally deposited in MZLU, and identified it as a subad. ♂. However, the specimen could not be traced during this investigation (L. Cederholm, pers. comm.). Designation of a neotype is postponed until loss of the holotype has been confirmed beyond reasonable doubt. The collection data for the missing holotype are as follows (Lawrence 1955: 216): 'Namib Desert, Rocky Point [NAMIBIA: *Kunene Region, Opuwo Distr.,* 18.99S 12.50E], 10.vi.1951, Lund University Expedition, under drift-wood on sandy beach'.

[22]Most specimens of *O. ugabensis,* including all specimens from the Brandberg, display 16 *e* τ. However, 2♂ from the Khumib River (NMNW 700 [old 216–217]), each display 20 *e* τ. These specimens may represent an undescribed species.

[23]According to Kraepelin (1894), this specimen was deposited in the München Sammlung.

[24]Lamoral (1979) examined this specimen and referred to it as the holotype ♀, but since Simon (1888) also provided pectinal tooth counts for a ♂, the description was clearly based on two (or more) syntypes. Presumably the additional specimen(s) is lost, but this could not be confirmed.

[25]No locality data accompanied MNHN RS 0235. Simon (1888) apparently named the genus *Mossamedes* after Moçamedes (presently Namibé) in Angola (Kraepelin 1914; Hewitt 1931; Lawrence 1961). However, Lamoral (1979) listed the type locality as 'Kalahari', perhaps based on the title of Simon's (1888) paper. Since *O. opinatus* has not been recorded north of 21°S or west of 19°E (Prendini 1995), both putative localities are erroneous. H. Schinz's specimen must have originated in central Namibia.

[26]Two additional specimens (1♂, 1 juv. ♂) were accessioned as AMGS 6359. However, Hewitt (1931) clearly indicated which specimens were the types.

[27]The original name is an incorrect latinization, changed to *crinitus* by Fet (2000).

[28]Hewitt's (1918) description was based on three specimens (1♂, 1♀, 1 juv. ♂) collected by Dr R. Broom at Campbell, and at a locality between Campbell and Griquatown. Additional specimens with the same collection data were not mentioned in the description, although indicated as type specimens in AMGS.

[29]A subad. ♀ with the same collection data accompanied the ♂ and ♀ accessioned as BMNH 1897.2.30.1–2.

[30]Hewitt (1935) misidentified the syntypes as 2♂.

[31]Hewitt (1918) was evidently referring to the first, not fourth, metasomal segment.

[32] According to Lamoral (1979), Quibis is presently Kuibis on the Huib-Hoch Plateau, *c.* 200 km WNW of the Great Karasberg. It has not been possible to determine whether another Quibis occurs in the Great Karasberg. However, this possibility should not be discounted because the collection localities of P.A. Methuen's other specimens (TMSA 411, 433) occur there.

[33]Moritz & Fischer (1980) listed the following syntypes of *O. schultzei*: ZMHB 10878 (1♀); ZMHB 10879 (1♂); ZMHB 14988 (2♂, 2♀); ZMHB 14989 (3♂); ZMHB 14990 (8♀, juvs.); ZMHB 14991 (2 expl.); ZMHB 14992 (1♂). Four additional syntypes (2♂, 2♀; not examined) are deposited in ZMUH (Weidner 1959).

[34]The type locality of *O. laevicauda* is dubious. *O. schultzei* is restricted to the vicinity of Aus, *c.* 120 km inland (Lamoral 1979; Prendini 1995).

[35]Moritz & Fischer (1980) listed the following syntypes of *O. undulatus*: ZMHB 14993 (14 expl.); ZMHB 14994 (2♂); ZMHB 14995 (2♂); ZMHB 14996 (1♂); ZMHB 14997 (1♂). They omitted to mention ZMHB 10880 (1♂), deposited in AMGS. Four additional syntypes (3♂, 1♀; not examined) are deposited in ZMUH (Weidner 1959).

[36]Lawrence (1961: 151) cited the collection date as 'December 1932', whereas Lamoral (1979: 753) cited the date as 'Oct–Dec 1937'. As the expeditions of H.W. Bell-Marley were conducted in 1932 (M. Cochrane, pers. comm.), Lamoral's (1979) date is incorrect.

[37]In addition to the lectotype of *O. ugabensis,* two additional conspecifics (1 juv. ♂, 1 juv. ♀), not mentioned by Hewitt (1934) or Lamoral (1979), were accessioned as AMGS 6574.

[38]The original description was based on 1♂, 5♀ and 2 juv. According to Forcart (1961), two additional syntypes (not examined) are deposited in Basel (NHMB 99-b). M. Vachon apparently transferred the remaining two syntypes from MHNC to MNHN (pers. comm.: B. Hauser, M.S. Jacquat).

[39]Lamoral (1979) examined only one of the two syntypes of *O. wahlbergii* (NHRM 58/48), which he mistakenly referred to as the holotype.

[40]Purcell (1901) cited specimens of *O. wahlbergi gariepensis* from Naroep as the types. Lamoral (1979) erroneously listed the 23 specimens from Hunitsamas (SAMC 2184) as syntypes.

[41]Syntypes with accession numbers SAMC 2202, 2232, 2235 and 2971 were originally crammed together in the same container, such that it was impossible to assign specimens to numbers and, hence, collection data (M. Cochrane, pers. comm.). These specimens differ only in date of collection.

APPENDIX 1. Synonyms in the genus *Opistophthalmus* C.L. Koch, 1837.

O. anderssonii Thorell, 1876 = *O. carinatus* (Peters, 1861). First synonymized by Kraepelin (1894).
O. austerus monticola Hewitt, 1927 = *O. austerus* Karsch, 1879. **Syn. n.**
O. betschuanicus Penther, 1900 = *O. glabrifrons* Peters, 1861. First synonymized by Kraepelin (1908).
O. breviceps Pocock, 1896 = *O. nitidiceps* Pocock, 1896. First synonymized by Hewitt (1918).
O. calvus L. Koch, 1867 = *O. latimanus* C.L. Koch, 1841. First synonymized by Purcell (1899).
O. carinatus scabriceps Lawrence, 1966 = *O. brevicauda* Lawrence, 1928. First synonymized by Lamoral (1979).
O. colesbergensis Simon, 1880 = *O. austerus* Karsch, 1879. First synonymized by Kraepelin (1894).
O. curtus Thorell, 1876 (part) = *O. pugnax* Thorell, 1876. First synonymized by Kraepelin (1894).
O. ecristatus Pocock, 1899 = *O. boehmi* (Kraepelin, 1896). **Syn. n.**
O. fallax Thorell, 1876 = *O. macer* Thorell, 1876. First synonymized by Kraepelin (1894).
O. gaerdesi Lawrence, 1961 = *O. brevicauda* Lawrence, 1928. First synonymized by Lamoral (1979).
O. histrio Thorell, 1876 = *O. carinatus* (Peters, 1861). First synonymized by Kraepelin (1894).
O. karrooensis rugosus Lawrence, 1946 = *O. karrooensis* Purcell, 1898. **Syn. n.**
O. laevicauda Roewer, 1943 = *O. schultzei* Kraepelin, 1908. First synonymized by Lamoral (1979).
O. laeviceps Thorell, 1876 = *O. glabrifrons* Peters, 1861. First synonymized by Kraepelin (1894).
O. laticauda crinita Lawrence, 1955 = *O. pallipes* C.L. Koch, 1842. **Syn. n.**
O. latimanus austeroides Hewitt, 1914 = *O. latimanus* C.L. Koch, 1841. **Syn. n.**
O. latimanus kalaharicus Hewitt, 1935 = *O. pugnax* Thorell, 1876. **Syn. n.**
O. longiceps Lawrence, 1946 = *O. adustus* Kraepelin, 1908. First synonymized by Lamoral (1979).
O. lundensis Monard, 1937 = *O. wahlbergii* (Thorell, 1876). **Syn. n.**
O. maxillosus C.L. Koch, 1837 = *O. capensis* (Herbst, 1800). First synonymized by Kraepelin (1894).
O. opinatus bradfieldi Hewitt, 1931 = *O. opinatus* Simon, 1888. First synonymized by Lamoral (1979).
O. pictus nigrocarinatus Lawrence, 1969 = *O. setifrons* Lawrence, 1961. First synonymized by Lamoral (1979).
O. pilosus C.L. Koch, 1837 = *O. capensis* (Herbst, 1800). First synonymized by Peters (1861).
O. pilosus Werner, 1936 = *O. flavescens* Purcell, 1898. **Syn. n.**
O. pugnax natalensis Hewitt, 1915 = *O. praedo* Thorell, 1876. **Syn. n.**
O. setiventer Lawrence, 1969 = *O. intercedens* Kraepelin, 1908. First synonymized by Lamoral (1979).
O. undulatus Kraepelin, 1908 (part) = *O. schultzei* Kraepelin, 1908. First synonymized by Lamoral (1979).
O. vivianus Lawrence, 1969 = *O. setifrons* Lawrence, 1961. First synonymized by Lamoral (1979).
O. wahlbergi gariepensis Purcell, 1901 = *O. wahlbergii* (Thorell, 1876). First synonymized by Lamoral (1979).
O. wahlbergi nigrovesicalis Purcell, 1901 = *O. wahlbergii* (Thorell, 1876). First synonymized by Lamoral (1979).
O. wahlbergi robustus Newlands, 1969 = *O. wahlbergii* (Thorell, 1876). **Syn. n.**
O. werneri Lamoral & Reynders, 1975 = *O. flavescens* Purcell, 1898. **Syn. n.**
Petrovicus furcatus Simon, 1888 = *O. carinatus* (Peters, 1861). First synonymized by Kraepelin (1894).