

A further division of the African Burrowing Asps, *Atractaspis* Smith 1849 with the erection of a new genus and two new subgenera.

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ABSTRACT

The so-called Burrowing Asps or Mole Vipers, Atractaspididae Günther, 1858 are endemic to Africa and the Middle-east. As of early 2012, all were placed within a single genus *Atractaspis* Smith, 1849.

However Hoser (2012b) used morphological and molecular data to remove species with smaller dorsal scales and a divergent venom apparatus (*microlepidota* and *andersoni*) from the genus and place them into a new genus *Hoseraspea*, Hoser, 2012.

The genus *Atractaspis* as defined as of start 2013 consists of about 20 recognized species, including quite morphologically diverse forms.

This paper now removes other divergent species from *Atractaspis*, based on both molecular and morphological evidence, placing them into the genus *Georgekonstandinouous gen. nov.* in turn placed in a new tribe *Georgekonstandinouini tribe nov.*, being within the family *Homoroselapidae* Hoser, 2012, thereby necessitating a redefinition of the family *Homoroselapidae* and tribe *Homoroselapiini* Hoser, 2012 (Hoser, 2012a), as well as refinement to the diagnosis for the family *Atractaspididae*.

Georgekonstandinouous gen. nov. is further divided in three, with the creation of the subgenera *Slatteryaspus subgen. nov.* and *Wellingtonaspus subgen. nov.*

The species *Atractaspis boulengeri* Mocquard, 1897, is divergent relative to the remaining species within the genus, both morphologically and based on molecular studies. As a result it is placed in a new subgenus *Benjaminswileus subgen. nov.*

The divergent species *A. duerdeni* Gough, 1907 is also placed in a monotypic subgenus *Lowryus subgen. nov.*

All new taxon groups are defined according to the Zoological Code (Ride *et al.* 1999).

The species *A. engaddensis* Haas, 1950; *A. fallax* Peters, 1867; *A. magrettii* Scortecci, 1928; *A. phillipsi* Barbour, 1913; *A. watsoni* Boulenger, 1908 are transferred to *Hoseraspea* Hoser, 2012.

While as a result of the actions within this paper about 10 species remain within *Atractaspis* Smith, 1849, further investigations may lead to a further re-arrangement of the genus in the future both in terms of generic placement of existing species and also potential recognition and/or descriptions of similar species.

Keywords: Taxonomic revision; Atractaspididae; Homoroselapidae; *Atractaspis*; new tribe; *Georgekonstandinouini*; *Homoroselapiini*; new genus; *Georgekonstandinouous*; new subgenus; *Slatteryaspus*; *Wellingtonaspus*; *Benjaminswileus*; *Lowryus*; species; *microlepidota*; *andersoni*; *Hoseraspea*; *Hoseraspini*; *Atractaspidini*; *bibroni*; *boulengeri*; *duerdeni*; *irregularis*; *battersbyi*; *congica*; *engdahli*; *reticulata*; asp; small-scaled burrowing asp; burrowing asp; stiletto snake; mole viper; side-stabbing snake; harlequin snake.

INTRODUCTION

The so-called Burrowing Asps or Mole Vipers, Atractaspididae are endemic to Africa and the Middle-east. As of early 2012, all were placed within a single genus, *Atractaspis* Smith, 1849.

However Hoser (2012b) used morphological and molecular data as cited within the paper as a basis to remove the highly divergent two species with smaller dorsal scales and a divergent

venom apparatus (*microlepidota* and *andersoni*) from the genus and place them into a new genus *Hoseraspea* Hoser, 2012.

The genus *Atractaspis* Smith, 1849 as defined at the time preceding publication of this paper, consisted/consists of about 20 recognized species, including quite morphologically diverse forms.

Published studies relevant to the taxonomy of the genus

Atractaspis as widely recognized, include Auerbach (1987), Bauer *et al.* (1995), Boulenger (1896, 1897, 1901, 1905a, 1905b, 1908, 1910), Bourgeois (1968), Branch (1993), Broadley (1991a, 1991b, 1998), Broadley *et al.* (2003), Cadle (1994), Chifundera (1990), Chippaux (2006), Chirio and Ineich (2006), Chirio and Lebreton (1997), Corkill, and Kirk, (1954), Deufel and Cundall (2003), de Witte (1959), Dobbie and Vogel (2007), Duméril *et al.* (1854), Gough (1907), Gravlund (2001), Griffin *et al.* (1989), Günther (1866, 1872, 1888), Kochva (2002), Kochva *et al.* (1967), Kurnic, *et al.* (1999), Lanza (1990), Lagen and Spawls (2010), Laurent (1945, 1950, 1956), Lönnberg and Andersson (1913), Minton (1968), Mocquard (1897), Moyer and Jackson (2011), Pauwels and Mierle (1996), Pauwels and Vandeweghe (2008), Perret (1960, 1961), Peters (1877), Pfeffer (1893), Pyron *et al.* (2011, 2013), Rasmussen and Hughes (1896), Reinhardt (1843), Schmidt (1923, 1943), Segniabeto *et al.* (2011), Shine *et al.* (2006), Sjöstedt (1896), Smith (1849), Spawls and Branch (1995), Spawls *et al.* (2001), Trape and Roux-Estève (1995), Trape *et al.* (2006), Underwood and Kochva (1993), Wagner *et al.* (2009), Warrall, *et al.* (1976), Werner (1897, 1899), sources cited within and others. Between them, their evidence provided a compelling argument to remove the species-level taxa *Atractaspis microlepidota* Günther, 1866 and the closely related *A. andersonii* Boulenger, 1905 (long regarded as a subspecies of the former) from genus *Atractaspis* (type species being *A. inornatus* Smith 1849, a synonym of *A. bibroni*) and this was in fact done by Hoser (2012b), with the creation of the new genus *Hoseraspea* Hoser, 2012.

Inadvertently the similar taxa *A. engaddensis* Haas, 1950, *A. fallax* Peters, 1867, *A. magretti* Scortecchi, 1928, *A. phillipsi* Barbour, 1913 and *A. watsoni* Boulenger, 1908 at times regarded as a synonym of *H. microlepidota* (Günther, 1866) were left in *Atractaspis* by Hoser (2012b) and so are transferred to the new genus (*Hoseraspea* Hoser, 2012) herein.

Another taxon that has been placed within the genus *Atractaspis* is the species known as the Variable Burrowing Asp, originally described as *Elaps irregularis* Reinhardt, 1843 and placed within *Atractaspis* by most authors since commencing with Pfeffer in 1893.

Morphological differences between this species and other *Atractaspis*, including the type species *A. bibroni* has been known for some time and it has even been asserted that the species *Elaps irregularis* Reinhardt, 1843 is in fact more closely related to *Homoroselaps* Jan, 1858 than *Atractaspis* as seen from the molecular data presented in the online paper by Pyron, Burbrink and Weins (2013).

As a result of this, the species is now placed in a new genus named *Georgekonstandinouus gen. nov.* and tribe, *Georgekonstandinouini tribe nov.* named in accordance with the Zoological Code (Ride *et al.* 1999).

Simultaneously, four other similar species, sharing relevant morphological traits not seen in the remaining species within *Atractaspis* are transferred to the same genus, but then also placed in two new subgenera, namely *Slatteryaspus subgen. nov.* and *Wellingtonaspus subgen. nov.*, also obviously within the same tribe.

The species *Atractaspis boulengeri* Mocquard, 1897, is divergent relative to the remaining species within the genus, the rest apparently forming a well-defined group, both morphologically and based on molecular studies. As a result *Atractaspis boulengeri* is placed in a new subgenus *Benjaminswileus subgen. nov.*

Up-to-date diagnoses are given for all of the four tribes now assigned within the Atractaspididae and Homoroselapidae after the descriptions of the component genera and subgenera.

FAMILY ATRACTASPIDIDAE GÜNTHER, 1858

(Terminal taxon: *Atractaspis inornatus* Smith 1849)

Diagnosis: *Atractaspis* has to date been recognized as a genus

of venomous snakes found in Africa and the middle-east.

In terms of this paper, there are about 15 recognized species within the genus as now defined, although some are obviously composite, with either undescribed species or subspecies currently recognized likely to be elevated to full species status in the future.

They are found mostly in sub-Saharan Africa, with the center of species distribution around the vicinity of Congo, with a limited distribution in the Middle-east.

They are recognized under various common names including: Burrowing Vipers, Burrowing Asps, Mole Vipers, Stiletto Snakes, Side-stabbing Snakes, all of which relate to their appearance, venomous bites or burrowing habits.

They are smallish snakes, rarely exceeding 1 metre in total length and usually mature at about 45 cm.

The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and one or two labials entering the orbit. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 17 to 27 dorsal mid-body rows, ventrals are rounded. Tail short.

The subcaudals are always single, except for the species *A. boulengeri* Mocquard, 1897, and the anal plate is always single.

The single anal plate separates morphologically similar snakes, formally placed in this family and as of this paper, removed from the family and placed in Homoroselapidae Hoser, 2012, within the newly erected genus *Georgekonstandinouus gen. nov.*, being five species formerly placed within the genus *Atractaspis* Smith, 1849.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour.

Content: *Atractaspis* Smith 1849; *Hoseraspea* Hoser, 2012.

GENUS ATRACTASPIS SMITH, 1849.

Type species: *Atractaspis inornatus* Smith 1849.

Currently more widely known as *Atractaspis bibroni* Smith, 1849.

Diagnosis: *Atractaspis* has to date been recognized as a genus of venomous snakes found in Africa and the Middle-east.

In terms of this paper, there are now presently about 15 recognized species although final resolution as to the exact number of species involved is likely to take some time and will in part depend on access to the areas species occur, noting the political instability in some areas and the fact that a number of recognized subspecies will almost certainly be elevated to full species status at later dates.

They are found mostly in sub-Saharan Africa, with the center of species distribution around the vicinity of Congo, with a limited distribution in the middle-east.

These snakes are recognized under various common names including: Burrowing Vipers, Burrowing Asps, Mole Vipers, Stiletto Snakes, Side-stabbing Snakes, all of which relate to their appearance, venomous bites or burrowing habits.

They are smallish snakes, rarely exceeding 1 metre in total length and usually mature at about 45 cm.

The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck"

methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and one or two labials entering the orbit. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 17-27 rows (and also see the redescription of *Hoseraspea* Hoser, 2012 below); ventrals are rounded. Tail short; subcaudals are either single in all species (or sometimes with some divided only) except for *A. boulengeri* Mocquard, 1897 which has all divided subcaudals and is diagnostic for the species and subgenus it is placed in (*Benjaminswileus subgen. nov.*).

Diagnostic for all members of the genus and family (including *A. boulengeri* Mocquard, 1897) is a single anal plate.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour.

Content: *A. bibronii* Smith, 1849 (type species); *Atractaspis aterrima* Günther, 1863; *A. boulengeri* Mocquard, 1897; *A. coalescens* Perret, 1960; *A. corpulenta* (Hallowell, 1854); *A. dahomeyensis* Bocage, 1887; *A. duerdeni* Gough, 1907; *A. leucomelas* Boulenger, 1895; *A. micropholis* Günther, 1872; *A. scortecii* Parker, 1949.

SUBGENUS *BENJAMINSWILEUS* SUBGEN. NOV.

Type species: *Atractaspis boulengeri* Mocquard, 1897.

Diagnosis: The subgenus *Benjaminswileus subgen. nov.* is unique in the genus *Atractaspis* in that the subcaudals are all divided. For all other members of the genus *Atractaspis* subcaudals are either all or mainly single.

This subgenus has normal-sized venom glands, as opposed to the enlarged ones sometimes seen in other *Atractaspis* (e.g. *A. micropholis* Günther, 1872).

Also diagnosed by the following suite of characters: a medium-sized, fairly thick-bodied snake (large adults often very stout), adults average 30-50 cm long in total length and rarely exceed 60 cm; wide and rounded snout and a rostral two times wider than high. There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and supralabials 3 and 4 entering the orbit. Five supralabials in total. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 23 midbody rows (and also see the redescription of *Hoseraspea* Hoser, 2012 below); ventrals are rounded and range from 185 to 201 and most commonly in the vicinity of 191-195. Tail short; subcaudals are all divided and from 65-72 and being divided is diagnostic for the species and subgenus it is placed in (*Benjaminswileus subgen. nov.*).

Diagnostic for all members of the genus and family (including *A. boulengeri* Mocquard, 1897) is a single anal plate and separates these snakes from the family Homoroselapidae Hoser, 2012 identified by a divided anal plate.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish, brown or gray above although specimens of this subgenus occasionally have some form of transverse bands or flecks dorsally. The venter is lighter, being usually a whitish color

For the diagnosis of the genus *Atractaspis*, see the earlier description within this paper.

Distribution: *Benjaminswileus subgen. nov.* is known from Gabon, Cameroon, Democratic Republic of Congo (Zaire),

Congo (Brazzaville) and the Central African Republic. It may also occur in other adjacent countries.

Etymology: Named in honour of Benjamin Swile of Athlone, (Cape Town), South Africa in recognition of his valuable contributions to the herpetology of Africa. Of potential interest is that Swile is an African word that means "hairy feet"!

Content: *Atractaspis (Benjaminswileus) boulengeri* Mocquard, 1897.

SUBGENUS *LOWRYUS* SUBGEN. NOV.

Type species: *Atractaspis duerdeni* Gough, 1907.

Diagnosis: Separated from all other species within the genus *Atractaspis* by the following suite of characters either alone or in combination/s: The snout has a sharp horizontal angle at the tip. There are 23-25 dorsal mid body rows of scales, 193-228 ventrals, 19-27 single subcaudals and single anal plate; 5-6 upper labials, with the entire top of numbers 3 and 4 entering the orbit; 6 (occasionally 5 or 7) lower labials; 1 preocular and 1-2 postoculars, the postocular/s of which (combined) are larger than the eye (versus about the same size as the eye in most other *Atractaspis*) and variable temporals. The colour is a uniform grey to black and the belly is a uniform white which extends onto the flanks.

Distribution: Two populations are known. These are one in south-eastern Botswana and adjacent Transvaal and another in central Namibia. The western form is separated from the Eastern one by having 200-209 ventrals in males and 217-228 ventrals in females, versus 195-202 in males and 209-216 in females for the nominate Eastern form.

Branch (1998) reported that the Western form was being described as a new taxon, but no description was published.

Etymology: Named in honour of Andrew Lowry of Cheltenham, Victoria, Australia, formerly of Mentone, Victoria, Australia for his many contributions to herpetology in Australia spanning three decades.

Content: *Atractaspis (Lowryus) duerdeni* Gough, 1907.

GENUS *HOSERASPEA* HOSER, 2012

Type species: *Atractaspis microlepidota* Günther, 1866.

Diagnosis: The genus *Hoseraspea* Hoser, 2012 is separated from all species in the genus *Atractaspis* by having 29 to 37 mid body rows (of dorsal scales) (versus 27 or less in all *Atractaspis* and *Georgekonstandinouus gen. nov.* as described in this paper), a number higher than seen in any species of *Atractaspis*: there are 212-245 ventrals; single anal and 26-37 single subcaudals, there are six supralabials, numbers 3 and 4 entering the orbit.

They are smallish snakes, never exceeding 75 cm total length and usually mature at about 45 cm.

Hoseraspea develops long venom glands, whereas *Atractaspis* develops short venom glands.

The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil.

The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, ventrals are rounded. Tail is short.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour.

Distribution: The distribution of the genus includes the Middle-

east and north-central Africa.

The distribution of each species within the genus is given separately below:

Hoseraspea microlepidota is found in West Africa including Nigeria, Benin and Togo, extending east towards East Africa in Sudan.

H. andersoni is found in southwestern Saudi Arabia and Oman.

H. engaddensis is found in Israel, Sinai, Jordan, Saudi Arabia, Jordan and Lebanon.

H. fallax is found in Ethiopia, Somalia and Kenya.

H. magrettii is found in Ethiopia, Eritrea and southern Sudan.

H. phillipsi is found in southern Sudan

H. watsoni is found in central and western Africa including: Mauritania, Senegal, Mali, Burkina Faso, Niger, Nigeria, Cameroon, Chad, the Central African Republic and Benin.

Common name: Small-scaled burrowing Asp.

Other common names (less used): Small-scaled Stiletto Snake, Small-scaled Side Stabbing Snake, Small-scaled Mole Viper, Small scaled-burrowing Adder.

The common name Small-scaled Burrowing Asp, is particularly apt as the smaller scales (reflecting in a higher mid-body scale row count) differentiates this genus from *Atractaspis*.

Etymology: Named in honour of the long-suffering wife of the author Raymond Hoser, namely Shireen Hoser, who happens to come from the same part of the world where the Burrowing Asps come from, namely Africa.

Content: *Hoseraspea microlepidota* (Günther, 1866) (type species); *H. andersoni* (Boulenger, 1905); *H. engaddensis* Haas, 1950; *H. fallax* Peters, 1867; *H. magrettii* Scortecci, 1928; *H. phillipsi* Barbour, 1913; *H. watsoni* Boulenger, 1908.

FAMILY HOMOROSELAPIDAE HOSER, 2012.

(Terminal Taxon: *Homoroselaps lacteus*)

Diagnosis: Separated from all other Elapids, Colubrids and Atractaspididae by the following suite of characters best defined as one or other of:

A/ Never more than 75 cm total length as an adult, usually averaging 20-50 cm; very thin with a build bordering on cylindrical with body thickness being very thin and very similar along the entire length of the body to near the tail; head small, relatively short and marginally distinct from the neck; 15 dorsal mid body rows, 160-239 ventrals, divided anal plate (versus single in Atractaspididae), 22-43 paired subcaudals (all are single (or mainly so) in Atractaspididae, except in the divergent taxon *Atractaspis boulengeri* Mocquard, 1897), tail medium to short in length; 6 upper labials, numbers 3 and 4 entering the eye, 5-6 lower labials, as well as one pre-ocular and one post-ocular, temporals are either 0+1 or 1+1; while colour is somewhat variable, the pattern and configuration is quite unlike any other snake; it invariably is glossy and blackish on top, with orange running along the mid dorsal line either broken or unbroken, often running on top of a dorsal pattern of large black blotches etched with thick yellow reticulations, the pattern sometimes being reduced to black with a white spot in the centre of each scale, or somewhere between the two configurations listed, or alternatively mainly black dorsally with a thick yellow or orange line running along the spine, commencing at the snout and yellow or orange along the flanks, separated from the black by a well-defined boundary on the mid flanks; in all cases the yellow or orange mid-dorsal line commences on the head from in front of the eye, even if broken by black (Tribe Homoroselapiini Hoser, 2012), or;

B/ They are smallish snakes, rarely exceeding 1 metre in total length and usually mature at about 45 cm. The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods,

due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and one or two labials entering the orbit. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 19-27 dorsal mid body rows; ventrals are rounded. Tail short; subcaudals and anal plate are all divided. These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour (Tribe Georgekonstandinouini *tribe nov.*).

Further notes: All possesses fangs and venom; are oviparous, with clutches up 16 eggs recorded, although less than half this number is more common; recorded diet consists exclusively of smaller reptiles.

Homoroselapidae is separated from Atractaspididae by the presence of a divided anal plate.

Furthermore, with the exception of *Atractaspis boulengeri*, all Atractaspididae have all or mainly single subcaudals, as opposed to divided in all Homoroselapidae.

Content: *Homoroselaps* Jan, 1858; *Georgekonstandinouous gen. nov.*

GEORGEKONSTANDINOUS GEN. NOV.

Type species: *Elaps irregularis* Reinhardt, 1843.

Currently most widely known as *Atractaspis irregularis* (Reinhardt, 1843).

Diagnosis: The molecular evidence published in the online paper by Pyron, Burbrink and Weins (2013) indicated that this genus as defined herein is more closely associated with *Homoroselaps* Jan, 1858 than *Atractaspis* Smith, 1849. Morphological evidence also supports this view.

As a result, this genus as defined herein is placed within the family Homoroselapidae Hoser, 2013 (not Atractaspididae Günther, 1858) and also in a separate tribe to the genus *Homoroselaps* Jan, 1858.

The family Homoroselapidae Hoser, 2013, including the genera *Georgekonstandinouous gen. nov.* and *Homoroselaps* Jan, 1858 are readily separated from the superficially similar genera *Atractaspis* Smith, 1849 and *Hoseraspea* Hoser, 2012 by the divided subcaudals, as opposed to all or mainly single in *Atractaspis* Smith, 1849 (with the exception of the species *boulengeri*) and also single in *Hoseraspea* Hoser, 2012.

Homoroselapidae Hoser, 2013 are separated from Atractaspididae Günther, 1858 by the presence of a divided anal as opposed to a single one in Atractaspididae Günther, 1858.

Within the family Homoroselapidae Hoser, 2012, the genus *Georgekonstandinouous gen. nov.* is separated from *Homoroselaps* Jan, 1858 by having 19-27 midbody rows, versus 15 in *Homoroselaps* Jan, 1858.

Georgekonstandinouous gen. nov. is further separated from *Homoroselaps* Jan, 1858 by having a postocular present; one pair of sublinguals and three-five gulars (rather than two pairs of sublinguals).

Homoroselaps Jan, 1858 is also readily separated from *Georgekonstandinouous gen. nov.* by the liberal amount of yellow and/or orange on the upper body, in the form of a striped, spotted or semi-banded pattern. By contrast *Georgekonstandinouous gen. nov.* are generally a uniform glossy purple-brown to black above. *Homoroselaps* Jan, 1858 are further separated by distinct yellow markings on the upper or lower labials, either not seen in *Georgekonstandinouous gen. nov.* or if so, only to a tiny extent.

Distribution: Widespread in sub-Saharan Africa from Guinea and South Sudan in the North to the Caprivi Strip, Namibia.

Etiology: Named in honour of George Konstandinou of Park Orchards and Doncaster in Victoria, Australia in recognition of his hard work as a mechanic keeping the Snakebusters reptile education motor vehicles on the road, including doing major repairs at short or no notice. The vehicles are used by myself and staff to conduct Australia's best reptile education displays, field research and other essential tasks and without George's efforts over the past decade the contribution to conservation by the Snakebusters team would simply not have happened.

The spelling of the genus and lower tribe names is deliberate and should not be changed unless mandated by the Zoological Code or an ICZN ruling.

Content: *Georgekonstandinouus irregularis* (Reinhardt, 1843) (type species); *G. battersbyi* (De Witte, 1959); *G. congica* (Peters, 1877). *G. engdahli* (Lönnerberg and Andersson, 1913); *G. reticulata* (Sjöstedt, 1896).

WELLINGTONASPUS SUBGEN. NOV.

Type species: *Atractaspis engdahli* Lönnerberg and Andersson, 1913.

Diagnosis: The genus *Georgekonstandinouus gen. nov.* consists of three quite distinct groupings of snakes. These are most easily separated from one another on the basis of their mid-body scale row counts and combined total of ventrals and subcaudals.

The nominate subgenus *Georgekonstandinouus subgen. nov.* has 21-23 dorsal mid-body rows.

Other diagnostic features of *Georgekonstandinouus subgen. nov.* are as follows: divided anal, 219-240 ventrals; 20-32 divided subcaudals, head small and not distinct from neck; snout very short and rounded; rostral is visible from above; internasals are smaller than the prefrontals, suture between the internasals and between the prefrontals are of equal length; hexagonal frontal is as broad as it is long or a little longer, much longer than the small supraocular, shorter than the large parietals which are about one and half times longer; sometimes up to three occipital shields; large to enormous wedge-shaped anterior temporal that almost separates the fourth and fifth upper labials; temporals 1+3 or 1+4, sometimes a single post temporal; five upper labials with numbers 3 and 4 entering the orbit and 2 and 3 in contact with the post nasal; 3 and 4 are long (eye to lip), 6 (rarely 5 or 7) lower labials; eye minute and pupil round; scales smooth and without apical pits; body cylindrical; tail is stumpy or stubby, terminating abruptly into a tiny almost horny spike or spine.

Wellingtonaspus subgen. nov. has 19 dorsal mid-body rows and is separated on this basis on its own.

Slatteryaspus subgen. nov. is separated from the other two subgenera by one or other of the following suites of characters:

A/ 25-27 dorsal mid-body rows and over 275 ventrals and subcaudals (combined total) versus a lower number in the other two subgenera; or

B/ Less than 275 ventrals and subcaudals (combined total) and 21-23 mid-body rows, 193-225 ventrals, 18-25 divided subcaudals; 5 upper labials with numbers 3 and 4 entering the orbit; 5 lower labials; 1 preaeocular and one postocular; 1+2 temporal formula; with the colour being a uniform purple-brown to black, dorsally and ventrally.

Wellingtonaspus subgen. nov. is separated from the other two subgenera by having five (instead of four) gulars and six (instead of five) supralabials.

Wellingtonaspus subgen. nov. are also characterized by elongate venom glands.

Slatteryaspus subgen. nov. are characterized by normal-sized venom glands.

The subgenus *Wellingtonaspus subgen. nov.* is also diagnosed by the following suite of characters: Head very flat, depressed; snout is broad and rounded. Portion of the rostral visible from

above measuring about a third its distance from the frontal; suture between the internasals slightly shorter than that between the prefrontals; frontal a little broader than long, about equal to its distance from the end of the snout, much shorter than the parietals. Eye very small and about equal in size to the nostril which is pierced between two nasals, the anterior of which is larger. One preaeocular and one postocular. Temporals usually 1+2, the anterior situated below the postocular and wedged in between the fourth and fifth labials; the upper posterior temporal in contact with the postocular, sometimes very narrowly. Of the six upper labials, the fourth is by far the largest, in contact with the preaeocular, the eye and postocular. First lower labials are entirely separated by the symphyseal being in contact with the large chin shields; three infralabials in contact with the chin shields; fourth infralabial is very large. 19 mid body rows, 224-232 ventrals, divided anal, and 19-22 divided subcaudals. The tail is thick and bluntly pointed. Colour is uniform dark brown to black above and somewhat paler ventrally.

Distribution: *Wellingtonaspus subgen. nov.* are found in Somalia and North-east Kenya.

Etiology: Named in honour of Cliff Ross Wellington, Australian herpetologist, currently living in Woy Woy, NSW and having spent most of his life in New South Wales. Although best known as co-author of a series of landmark taxonomic papers with Richard Wells in the 1980's, Wellington has had a diverse career in herpetology, including in government administration and developing conservation programs for threatened and endangered species. At times he has worked with utmost integrity in State Government wildlife regulatory bureaucracies where corruption was endemic, including in the notoriously corrupt and dysfunctional New South Wales National Parks and Wildlife Service (NPWS NSW) for many years.

Content: *Georgekonstandinouus (Wellingtonaspus) engdahli* (Lönnerberg and Andersson, 1913) (type species).

SLATTERYASPUS SUBGEN. NOV.

Type species: *Atractaspis congica* Peters, 1877.

Diagnosis: The genus *Georgekonstandinouus gen. nov.* consists of three quite distinct groupings of snakes. These are most easily separated from one another on the basis of their mid-body scale row counts and combined total of ventrals and subcaudals.

The nominate subgenus *Georgekonstandinouus subgen. nov.* has 21-23 dorsal mid-body rows.

Other diagnostic features of *Georgekonstandinouus subgen. nov.* are as follows: divided anal, 219-240 ventrals; 20-32 divided subcaudals, head small and not distinct from neck; snout very short and rounded; rostral is visible from above; internasals are smaller than the prefrontals, suture between the internasals and between the prefrontals are of equal length; hexagonal frontal is as broad as it is long or a little longer, much longer than the small supraocular, shorter than the large parietals which are about one and half times longer; sometimes up to three occipital shields; large to enormous wedge-shaped anterior temporal that almost separates the fourth and fifth upper labials; temporals 1+3 or 1+4, sometimes a single post temporal; five upper labials with numbers 3 and 4 entering the orbit and 2 and 3 in contact with the post nasal; 3 and 4 are long (eye to lip), 6 (rarely 5 or 7) lower labials; eye minute and pupil round; scales smooth and without apical pits; body cylindrical; tail is stumpy or stubby, terminating abruptly into a tiny almost horny spike or spine.

Wellingtonaspus subgen. nov. has 19 dorsal mid-body rows and is separated on this basis on its own.

Slatteryaspus subgen. nov. is separated from the other two subgenera by one or other of the following suites of characters:

A/ 25-27 dorsal mid-body rows and over 275 ventrals and subcaudals (combined total) versus a lower number in the other two subgenera; or

B/ Less than 275 ventrals and subcaudals (combined total) and

21-23 mid-body rows, 193-225 ventrals, 18-25 divided subcaudals; 5 upper labials with numbers 3 and 4 entering the orbit; 5 lower labials; 1 preaeocular and one postocular; 1+2 temporal formula; with the colour being a uniform purple-brown to black, dorsally and ventrally.

Wellingtonaspus subgen. nov. is separated from the other two subgenera by having five (instead of four) gulars and six (instead of five) supralabials.

Wellingtonaspus subgen. nov. are also characterized by elongate venom glands.

Slatteryaspus subgen. nov. are characterized by normal-sized venom glands.

The subgenus *Wellingtonaspus subgen. nov.* is also diagnosed by the following suite of characters: Head very flat, depressed; snout is broad and rounded. Portion of the rostral visible from above measuring about a third its distance from the frontal; suture between the internasals slightly shorter than that between the praefrontals; frontal a little broader than long, about equal to its distance from the end of the snout, much shorter than the parietals. Eye very small and about equal in size to the nostril which is pierced between two nasals, the anterior of which is larger. One preaeocular and one postocular. Temporals usually 1+2, the anterior situated below the postocular and wedged in between the fourth and fifth labials; the upper posterior temporal in contact with the postocular, sometimes very narrowly. Of the six upper labials, the fourth is by far the largest, in contact with the preaeocular, the eye and postocular. First lower labials are entirely separated by the symphysial being in contact with the large chin shields; three infralabials in contact with the chin shields; fourth infralabial is very large. 19 mid body rows, 224-232 ventrals, divided anal, and 19-22 divided subcaudals. The tail is thick and bluntly pointed. Colour is uniform dark brown to black above and somewhat paler ventrally.

Distribution: Sub-Saharan Africa, except for the far west, far south and parts of the east.

Etymology: Named in honour of Paul Slattery of Park Orchards, Victoria, Australia, in recognition to his immense contribution to local government in the city of Manningham, Victoria, Australia. At the time of writing this paper, he was unfortunately diagnosed with advanced prostate cancer at age 67 and as with all such cancers the prognosis for his long-term survival is not good. It is appropriate his lifetime's work and efforts are recognized before his death.

Content: *Georgekonstandinouous (Slatteryaspus) congica* (Peters, 1877) (type species); *G. (Slatteryaspus) battersbyi* (De Witte, 1959); *G. (Slatteryaspus) reticulata* (Sjöstedt, 1896).

GEORGEKONSTANDINOUS SUBGEN. NOV.

Type species: *Elaps irregularis* Reinhardt, 1843.

Currently most widely known as *Atractaspis irregularis* (Reinhardt, 1843).

Diagnosis: The genus *Georgekonstandinouous gen. nov.* consists of three quite distinct groupings of snakes. These are most easily separated from one another on the basis of their mid-body scale row counts and combined total of ventrals and subcaudals.

The nominate subgenus *Georgekonstandinouous subgen. nov.* has 21-23 dorsal mid-body rows.

Other diagnostic features of *Georgekonstandinouous subgen. nov.* are as follows: divided anal, 219-240 ventrals; 20-32 divided subcaudals, head small and not distinct from neck; snout very short and rounded; rostral is visible from above; internasals are smaller than the praefrontals, suture between the internasals and between the praefrontals are of equal length; hexagonal frontal is as broad as it is long or a little longer, much longer than the small supraocular, shorter than the large parietals which are about one and half times longer; sometimes up to three occipital shields; large to enormous wedge-shaped anterior temporal that almost separates the fourth and fifth upper labials; temporals

1+3 or 1+4, sometimes a single post temporal; five upper labials with numbers 3 and 4 entering the orbit and 2 and 3 in contact with the post nasal; 3 and 4 are long (eye to lip), 6 (rarely 5 or 7) lower labials; eye minute and pupil round; scales smooth and without apical pits; body cylindrical; tail is stumpy or stubby, terminating abruptly into a tiny almost horny spike or spine.

Wellingtonaspus subgen. nov. has 19 dorsal midbody rows and is separated on this basis on its own.

Wellingtonaspus subgen. nov. is separated from the other two subgenera by having five (instead of four) gulars and six (instead of five) supralabials.

Wellingtonaspus subgen. nov. are also characterized by elongate venom glands.

The subgenus *Wellingtonaspus subgen. nov.* is also diagnosed by the following suite of characters: Head very flat, depressed; snout is broad and rounded. Portion of the rostral visible from above measuring about a third its distance from the frontal; suture between the internasals slightly shorter than that between the praefrontals; frontal a little broader than long, about equal to its distance from the end of the snout, much shorter than the parietals. Eye very small and about equal in size to the nostril which is pierced between two nasals, the anterior of which is larger. One preaeocular and one postocular. Temporals usually 1+2, the anterior situated below the postocular and wedged in between the fourth and fifth labials; the upper posterior temporal in contact with the postocular, sometimes very narrowly. Of the six upper labials, the fourth is by far the largest, in contact with the preaeocular, the eye and postocular. First lower labials are entirely separated by the symphysial being in contact with the large chin shields; three infralabials in contact with the chin shields; fourth infralabial is very large. 19 mid-body rows, 224-232 ventrals, divided anal, and 19-22 divided subcaudals. The tail is thick and bluntly pointed. Colour is uniform dark brown to black above and somewhat paler ventrally.

Slatteryaspus subgen. nov. is separated from the other two subgenera by one or other of the following suites of characters: A/ 25-27 dorsal mid body rows and over 275 ventrals and subcaudals (combined total) versus a lower number in the other two subgenera; or

B/ Less than 275 ventrals and subcaudals (combined total) and 21-23 mid-body rows, 193-225 ventrals, 18-25 divided subcaudals; 5 upper labials with numbers 3 and 4 entering the orbit; 5 lower labials; 1 preaeocular and one postocular; 1+2 temporal formula; with the colour being a uniform purple-brown to black, dorsally and ventrally.

Slatteryaspus subgen. nov. are characterized by normal-sized venom glands.

It is almost certain that more than one species are currently being identified within *Georgekonstandinouous irregularis* (Reinhardt, 1843) as currently recognized, some or all of which may have already been recognized as species or subspecies prior and more recently been synonymized.

Distribution: Sub-Saharan Africa, including the West and arid East, but excluding South Africa and nearby areas.

Etymology: See for the genus.

Content: *Georgekonstandinouous (Georgekonstandinouous) irregularis* (Reinhardt, 1843) (type species).

HIGHER CLASSIFICATION

While it may be regarded as trite by some people for me to herein formalize the higher level of classification for small groups of snakes such as the Atractaspididae and Homoroselapidae, I regard it as important from the point of view of consistency at all levels of classification across all families of the Serpentes when reconciled with morphological and known genetic differences (refer for example to the results of Pryon *et al.* 2011, Fig. 2). Therefore I herein formally redefine the previously named tribes within both families and diagnose a new monotypic tribe to accommodate *Georgekonstandinouous gen.*

nov. namely *Georgekonstandinouini* *tribe nov.*, and separate the component species from the other genus and tribe in the family Homoroselapidae.

FAMILY ATRACTASPIDIDAE GÜNTHER, 1858.

(See above for details).

TRIBE HOSERASPINI HOSER, 2012.

(Terminal Taxon: *Hoseraspea microlepidota*)

Diagnosis: Tribe Hoseraspini Hoser, 2012 is separated from all species in the tribe Atractaspini Hoser, 2012 by having 29 to 37 mid body rows (of dorsal scales) (versus 25 or less in all Atractaspini), a number higher than seen in any species of Atractaspini: there are 212-245 ventrals; single anal and 26-37 single subcaudals, there are six supralabials, numbers 3 and 4 entering the orbit.

They are smallish snakes, never exceeding 75 cm total length and usually mature at about 45 cm.

Hoseraspini Hoser, 2012 develops long venom glands, whereas Atractaspini usually develops short venom glands.

The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil.

The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, ventrals are rounded. Tail is short.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour.

Content: *Hoseraspea* Hoser, 2012.

TRIBE ATRACTASPINI HOSER, 2012.

(Terminal Taxon: *Atractaspis bibroni*)

Diagnosis: Tribe Atractaspini Hoser, 2012 is separated from all species in the tribe Hoseraspini Hoser, 2012 by having 25 or less dorsal mid body rows of snakes, versus 29 to 37 mid body rows (of dorsal scales) in Hoseraspini.

Hoseraspini Hoser, 2012 develops long venom glands, whereas Atractaspini Hoser, 2012 usually develops short venom glands.

These are smallish snakes, never exceeding 75 cm total length and usually mature at about 45 cm.

The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone.

There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil.

The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, ventrals are rounded. Tail is short.

These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour.

Content: *Atractaspis* Günther, 1858.

FAMILY HOMOROSELAPIDAE HOSER, 2012.

(See above for details).

TRIBE HOMOROSELAPIINI HOSER, 2012.

(Terminal Taxon: *Coluber lacteus* Linnaeus, 1758).

Currently most widely known as *Homoroselaps lacteus* (Linnaeus, 1758).

Diagnosis: Separated from all other Elapids, Colubrids and Atractaspidae by the following suite of characters: Never more than 75 cm total length as an adult, usually averaging 20-50 cm; very thin with a build bordering on cylindrical with body thickness being very thin and very similar along the entire length of the body to near the tail; head small, relatively short and marginally distinct from the neck; 15 dorsal mid-body rows, 160-239 ventrals, divided anal plate (versus single in Atractaspidae), 22-43 paired subcaudals (all are single (or mainly so) in Atractaspidae, except in the divergent taxon *Atractaspis boulengeri* Mocquard, 1897), tail medium to short in length; 6 Upper labials, numbers 3 and 4 entering the eye, 5-6 lower labials, as well as one pre-ocular and one post-ocular, temporals are either 0+1 or 1+1; while colour is somewhat variable, the pattern and configuration is quite unlike any other snake; it invariably is glossy and blackish on top, with orange running along the mid dorsal line either broken or unbroken, often running on top of a dorsal pattern of large black blotches etched with thick yellow reticulations, the pattern sometimes being reduced to black with a white spot in the centre of each scale, or somewhere between the two configurations listed, or alternatively mainly black dorsally with a thick yellow or orange line running along the spine, commencing at the snout and yellow or orange along the flanks, separated from the black by a well-defined boundary on the mid flanks; in all cases the yellow or orange mid-dorsal line commences on the head from in front of the eye, even if broken by black (Tribe Homoroselapiini Hoser, 2012).

The other tribe in this family; *Georgekonstandinouini* *tribe nov.* is defined as follows: They are smallish snakes, rarely exceeding 1 metre in total length and usually mature at about 45 cm. The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and one or two labials entering the orbit. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 19-27 dorsal mid-body rows; ventrals are rounded. Tail short; subcaudals and anal plate are all divided. These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour (Tribe *Georgekonstandinouini* *tribe nov.*).

Distribution: Southern Africa (essentially only South Africa).

Content: *Homoroselaps*, Jan, 1858.

TRIBE GEORGEKONSTANDINOIINI TRIBE NOV.

(Terminal Taxon: *Elaps irregularis* Reinhardt, 1843)

Diagnosis: *Georgekonstandinouini* *tribe nov.* is defined as follows: They are smallish snakes, rarely exceeding 1 metre in total length and usually mature at about 45 cm. The venom apparatus and fangs in particular are well developed and the snakes can often bite from the side, which reflects in one of their common names. This unusual feature makes these snakes risky to handle by using the usual "hand gripping neck" methods, due to the heightened risk of "needle-stick" wound from one of the sideways oriented fangs.

There are a few teeth on the palatines, none on the pterygoids; mandibles edentulous anteriorly, with 2 or 3 very small teeth in the middle of the dentary bone. There's no postfrontal bone. The head is small and indistinct from the neck and covered with large symmetrical shields; nostril is set between 2 nasals; no loreal; eye is minute, with a round pupil and one or two labials entering the orbit. The body is cylindrical and of similar thickness along its entire length; the dorsal scales smooth and shiny, without apical pits, in 19-27 dorsal mid-body rows; ventrals are rounded. Tail short; subcaudals and anal plate are all divided. These snakes are designed for a burrowing existence and are usually drab in appearance, being typically a blackish colour (Tribe *Georgekonstandinouini* *tribe nov.*).

The other tribe in the family, Tribe *Homoroselapiini* Hoser, 2012 is separated from *Georgekonstandinouini* *tribe nov.* by the following suite of characters: Never more than 75 cm total length as an adult, usually averaging 20-50 cm; very thin with a build bordering on cylindrical with body thickness being very thin and very similar along the entire length of the body to near the tail; head small, relatively short and marginally distinct from the neck; 15 dorsal mid-body rows, 160-239 ventrals, divided anal plate (versus single in *Atractaspididae*), 22-43 paired subcaudals (all are single (or mainly so) in *Atractaspididae*, except in the divergent taxon *Atractaspis boulengeri* Mocquard, 1897), tail medium to short in length; 6 Upper labials, numbers 3 and 4 entering the eye, 5-6 lower labials, as well as one pre-ocular and one post-ocular, temporals are either 0+1 or 1+1; while colour is somewhat variable, the pattern and configuration is quite unlike any other snake; it invariably is glossy and blackish on top, with orange running along the mid dorsal line either broken or unbroken, often running on top of a dorsal pattern of large black blotches etched with thick yellow reticulations, the pattern sometimes being reduced to black with a white spot in the centre of each scale, or somewhere between the two configurations listed, or alternatively mainly black dorsally with a thick yellow or orange line running along the spine, commencing at the snout and yellow or orange along the flanks, separated from the black by a well-defined boundary on the mid flanks; in all cases the yellow or orange mid-dorsal line commences on the head from in front of the eye, even if broken by black (Tribe *Homoroselapiini* Hoser, 2012).

Distribution: Widespread in sub-Saharan Africa from Guinea and South Sudan in the North to the Caprivi Strip, Namibia.

Content: *Georgekonstandinouini* *gen. nov.*

FIRST REVISOR NOTES: In the unlikely event that a subsequent worker seeks to subsume or merge genera or subgenera named within this paper, they must be done so in order of priority in terms of hierarchy in the first instance, or if of same hierarchical position, then by page priority within this paper, as in that which comes first, either on a page or by page number, takes precedence.

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CONFLICT OF INTEREST

The author has no conflicts of interest in terms of this paper or conclusions within.