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A reclassification of the Rattlesnakes; species formerly exclusively referred to the Genera *Crotalus* and *Sistrurus* and a division of the elapid genus *Micrurus*.

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ABSTRACT

The genus *Crotalus* as referred to by most taxonomists up to now failed to properly distinguish relationships within the group commonly defined as “rattlesnakes”.

This paper principally redefines the phylogenetic rattlesnakes at genus and subgenus levels, formally naming well-recognised species and species groups at genus level for the first time in a configuration never previously published.

In contrast to all previous classifications of the rattlesnakes this paper subdivides them into 9 genera, for which names were previously available for a total of five. For the other four genera, they are formally defined, diagnosed and named for the first time.

A further eight well-defined subgenera are also defined and named for the first time.

The Coral Snake genus *Micrurus* Wagler 1824 *sensu lato*, consists of in excess of 70 species level taxa. Notwithstanding the conservative physical attributes of the genus as recognised, clear and obvious divisons warrant recognition at genus level. One new genus is named herein. In turn it is divided into three subgenera.

***Keywords*:** new taxa; snake; rattlesnake; taxonomy; *Crotalus*; *Sistrurus*; *Micrurus*; *Piersonus*; *Cummingea*; *Hoserea*; *Matteoea*; *Caudisona*; *Aechmophrys*; *Uropsophus*; *Rattlewellsus*; *Edwardsus*; *Cottonus*; *Smythus*; *Pillotus*; *Sayersus*; *Mullinsus*; *Crutchfieldus; Hoserelapidea; Troianous; Binghamus*.

INTRODUCTION

Rattlesnakes are among the most well-studied serpents in the world. For a detailed appraisal of these snakes, see for example Gloyd (1940), Klauber (1972), McDiarmid (1999), Schuett, et. al. (2002), Campbell and Lamar (2004) and the many sources cited therein and other more recent publications that are readily available.

Both predating and postdating those major publications there has been the inevitable disputes among herpetologists in terms of the status of given populations in terms of their species, or subspecies status (see examples below).

However only a handful of new hitherto unknown or overlooked taxa have been formally named since Klauber’s seminal 1972 work, with the bulk of new work (post 2000) involved in resolving the specific status of snakes referred to at the subspecies level for some time prior, largely through the use of new molecular methods.

Newly named taxa based on apparently previously unseen rattlesnakes include: *Crotalus lannomi* Tanner, 1966, *C. tancitarensis* Alvarado-Diaz and Campbell, 2004 and *C. ericsmithi* Campbell and Villela 2008, but even these distinct new species have close affinities with other earlier named (species-level) taxa as seen in their generic and subgeneric placements below and would in the absence of contrary

evidence readily key out to other species within their assigned genus or subgenus and not another.

(For the above trio of species taxa, *Iannomi* and *ericsmithi* to *Cummingea* gen. nov. and *tancitarensis* to *Cottonus* subgen. nov.).

As mentioned, other taxa first described as subspecies have been elevated to full species ranking or relegated to synonymy based on a number of detailed studies, including molecular.

Some of these studies (post 1990) and results have been ignored for the purposes of this paper pending further confirmation of the results by other herpetologists.

Most authors have referred to the rattlers with (usually nine) large plates on the crown of the head to the genus *Sistrurus*. This is often touted as a "primitive form", with the rest being assigned to the catch-all genus *Crotalus*.

Within the generally recognised genus *Sistrurus*, one of the three species, *S. ravus* is regarded by most authors as quite separate from the other two (e.g. Knight, et. al. 1993, McCranie 1988), with recent papers sometimes reassigning the taxon to "*Crotalus*" (e.g. Bryson, 2007, Valencia Hernandez et. al. 2007, Meik and Pires-dasilva 2009).

This itself creates further problems in that in too many ways the taxon has affinities with other *Sistrurus*.

In reality the only sensible options are to subsume *Sistrurus* within *Crotalus* (as in to "lump") or alternatively to create a new genus for the taxon.

In line with the above and as the placement of *ravus* in *Crotalus* isn't in accordance with all the evidence, it is herein placed in a new formally named genus of it's own, namely *Piersonus* gen. nov.

Within the genus *Crotalus* as recognised to 2008, there are numerous distinct subgroups which should be recognised as genera in their own right, including for example the so-called *atrox* group, *adamanteus*, the so-called long-tailed rattlers and others.

Authors who have tackled the problem of grouping rattlesnakes into their most obvious subgroups include: Gloyd (1940), Klauber (1956) and again in (1972), Brattstrom (1964) and Foote and MacMahon (1977) all as detailed and summarized in Murphy et. al. (2002).

Global studies incorporating rattlesnakes are many and include Pyron et. al. (2010).

Unnamed subgroups are formally named for the first time.

As mentioned in the abstract, the total number of well-defined species groups for all rattlesnakes is now nine (9) well-defined genera, along with an additional eight (8) well-defined subgenera within these.

Some of the herein named subgenera may be elevated by other herpetologists to the rank of full genus.

All are named here either by resurrection of available names or the designation of new ones in accordance with the current zoological code (Ride et. al. 1999).

Numerous phylogeny's have been published, including by Klauber 1972 and more recently several by Murphy et. al. 2002 and others, including those cited already.

The relationships between the species as indicated by the authors have been broadly consistent in spite of various means used to derive their results.

Newly described species (post 1990) derived from the splitting of species into more than one, generally in accordance with subspecies designations, are obviously (and in the absence of evidence to the contrary) to be placed in the same genus or subgenus, even if not recognised or mentioned in the text of this paper.

Molecular methods are currently being used to identify new species on a regular basis and so it is obvious that the species list/s within this paper will not be complete.

The results of Murphy et. al. (2002), or Pyron et. al. (2010) using molecular data to identify groups of rattlesnakes by relationships broadly accord with those of Klauber (1972) who at the time was relying on virtually everything but molecular data.

Where the results differ, the main cause appears to be a lack of information or data, especially in the case of early conclusions by Klauber (1972 or earlier), shown to be in error by later authors.

Most of Klauber's errors related to rarer or little known taxa for which Klauber had little if any access to specimens.

The purpose of this paper is not to voluminously rehash the detail of these earlier studies, including all the intricate details of their studies and the results.

This paper does not by any means seek to rehash the general knowledge base for rattlesnakes or for that matter provide elaborate descriptions of taxa beyond that deemed necessary to formally resolve the taxonomy and nomenclature of this group of snakes.

Instead this paper's main aim is to formally describe and name the relevant groups at either the genus level or the subgenus level as appropriate to resolve and stabilize the taxonomy and nomenclature of the rattlesnakes in accordance with the ICZN's rules as published in 1999 (effective 2000) (cited here as ICZN 1999 and again as Ride et. al. 1999) and similar conventions.

In the main the phylogeny accepted is similar to that published by Murphy et. al. 2002, with relevant changes in accordance with findings by other authors since then and allowing for the formal descriptions or redefinitions of new taxa at various levels that have been accepted herein.

A logical question that will be asked by some, is why should the "established" genus "*Crotalus*" be split up into the obvious subgroups with their own genus names?

In retort, I'd ask, why hasn't it been split up already?

In answer to the second question, which in part answers the first I note the following.

Klauber's seminal works on the rattlesnakes including Klauber 1972, were regarded by many as the defining tome/s on these snakes. He recognised just two genera (*Sistrurus* and *Crotalus*) in line with most other herpetologists of the time.

As a matter of convenience this position has remained until now.

Reptile taxonomists have tended to look elsewhere in terms of the discovery of new taxa at all levels (for example the South American pitvipers), although for the rattlesnakes there has recently been renewed interest at the species level as new diagnostic methods have been employed.

It's also well-known that there are other available names for some of the subgroups if elevated to the status of genus. In terms of this, there has been confusion among biologists and taxonomists as to which names are available, which are not and which major groups do in fact have names and which don't, as well as the true affinities of the various taxa, which have to a large extent been masked by convergent evolution between species that are not necessarily as close as their similar forms may indicate.

Molecular data published by several authors, as cited in this paper indicates a more ancient split for the various groups than their morphology would imply, giving further weight to the need to split the group up according to obvious phylogenies.

This paper resolves this issue by resurrecting names when available and by assigning new names when none is available.

The net result being an effective tidying up of the taxonomy of the snakes placed until now into the genera "*Crotalus*" and "*Sistrurus*" with all rattlesnake taxa being properly assigned at the genus and subgenus level.

Based in Australia, and looking at this group of snakes (mainly) from the outside, it seems patently obvious that the snakes grouped into the genus "*Crotalus*" until now, should have been split into subgroups, each at the genus level a long time ago.

Comparative splits of taxa as diverse as "*Egernia*" skinks and pythons in Australia (Wells and Wellington (1984) and (for the "*Egernia*"), supported by Gardner et. al. (2008)), and other groups initially lumped in large genera for convenience's sake have long ago had their phylogeny's sorted out and then been split into genera more reflective of the origins and relationships of the component species.

Put simply, the time has come for the same to be done for the group generally known as the rattlesnakes, now consisting of about fifty described and broadly accepted species level taxa and who's ancient origins are now not in doubt.

NOTES ON THE FOLLOWING DESCRIPTIONS

Detail has been kept to a minimum.

For simplicity's sake, generally recognised or named subspecies have been generally ignored unless taxonomically significant in terms of the context of this paper or otherwise worthy of mention.

If a subspecies is relevant in terms of this paper, it is dealt with within this paper.

For convenience's sake the three species often (formerly) assigned to the genus "*Sistrurus*" have been dealt with first and more-or-less separately as they have been readily separated from the others on the basis of head scalation for many years (the large shields at the center of the top of the head) and a suite of other distinctive characters.

This is followed by a brief diagnosis of the genus "*Crotalus*" herein and now restricted to the taxa *C. horridus*, *C. viridis* (and six other species-level taxa formerly treated as subspecies of this taxon) and C*. scutulatus.*

Note that recent authors such as Ashton and de Queiroz (2001) and Campbell and Lamar (2004) elevated *C. oreganus* from *C. viridis,* to be a species in it's own right and *viridis* has also had a further five species extracted from synonymy.

This genus is in turn subdivided to include two subgenera, with one containing *C. horridus* (as the nominate group) and the other the remaining eight recognised species-level taxa (seven derived from (recent) synonymy with *viridis* (*Sayersus* subgen. nov.)

Following are descriptions and diagnosis of the other relevant genera and subgenera, firstly being those for which names are available, but including descriptions, diagnosis and formal naming of the relevant subgroups as subgenera in the context of what is now known and to provide a usable diagnosis for each genus.

In effect each genus has been redescribed and rediagnosed for the first time.

Then are the descriptions, diagnosis and formal naming of the new genera and appropriate subgenera.

Then there is a checklist of known rattlesnakes (as applied in this paper) and their new designations by genus and species.

When listing known species in given genera, the species assigned to subgenera within the genus are listed under the subgenus heading. However they are also incorporated within the genus preceding it, (above) and listed in the subgenus as would be the case when the genus is partitioned into the various subgenus components, and/or in the event that later workers choose to elevate the subgroups to full species level.

The various species within each newly diagnosed and described genus, including those resurrected from the synonymy of "*Crotalus*" as "available names" are generally identified under the name of the new genus, but are readily identifiable by their species names (unchanged from earlier literature), including for example Murphy et. al. 2002 (excluding new taxa described since including for example "*C. tancitarensis*" (2004) and "*C. ericsmithi*"(2008)), both now assigned herein to genera outside "*Crotalus*".

Excluding the newly named taxa as identified herein, all others are described and diagnosed in Klauber 1972 either as species or subspecies, or Campbell and Lamar (2004).

Those descriptions are relied upon herein as the simplest and most expedient means to identify the said taxa in greater detail in the event of conflict in terms of the species names used and/or as alternative means to place in appropriate genus or subgenus as named here and as added diagnostic information for each group if required or needed. Having said that, each species/description does in turn refer back to the original description and the associated museum-based holotype or similar, as applicable by the relevant zoological code/s, which is what is ultimately of utmost importance.

A number of well-recognised subspecies (e.g. "*Crotalus viridis oreganus*") have been shown to be species in their own right by recent authors (e.g. Ashton and de Queiroz 2001 and Douglas et. al. 2002) and are in terms of this paper adopted herein.

The latter authors went even further, splitting what was originally known as *viridis* into a group of seven full species, all previously named as subspecies, but listed here as full species within the subgenus *Sayersus* subgen. nov..

Listed below with their common names the taxa are:

C. viridis - Prairie rattlesnake (including the previously named subspecies *viridis* and *nuntius*, the latter being treated by most authors as a synonym of *C. viridis*)
C. oreganus - Northern Pacific rattlesnake
C. abyssus - Grand Canyon rattlesnake
C. cerberus - Arizona black rattlesnake
C. concolor - Midget faded rattlesnake
C. helleri - Southern Pacific rattlesnake (including the conventional subspecies *caliginis*, which is considered a synonym of *helleri*)
C. lutosus - Great Basin rattlesnake

Some of the many divisions by Grismer (2002) are ignored for the purposes of this paper, although it is my view that the findings of Grismer will be broadly validated by further research.

Furthermore as new methods of research are employed on rattlesnakes, further hidden species may be yielded.

Failure to recognise such newly proposed taxonomic divisions in this paper does not necessarily mean I do not agree with their views.

However exclusion of recently diagnosed species derived from earlier descriptions of subspecies and "races" of species does not alter the generic and subgeneric placement of taxa. That is in that no new groups or potential new groups, genera, subgenera or the like are excluded or potentially excluded and "new" taxa can be readily assigned to the same genus or subgenus group as from where the taxa was "split" by the relevant author (unless compelling contrary information arises).

Taxa, generally regarded as subspecies until recently and since elevated to the status of full species, would as a matter of course be placed in the same genus or subgenus as the taxon from which they were previously regarded as synonymous at the species level unless compelling evidence to the contrary emerges that is not noted in this paper or dealt with by means of species placement within this paper.

If there are any exceptions to this, they are noted in this paper and dealt with appropriately.

In terms of references cited, these have been kept to a bare minimum. Many useful studies inspected and assessed are not cited in this paper or at it's end as they are not directly referred to in the text of this paper and/or key findings and conclusions are mirrored in material cited herein. The majority of referred to papers are however cross-cited in the limited number of references provided.

Hence all cited references should be treated as also incorporating those cited within those texts.

In terms of the diagnosis for each genus or subgenus, all other diagnoses in this paper should as needed by incorporated into the given diagnosis. This is because assigning a given taxon to a given group may be made either by directly using the diagnosis and/or by alternatively using the others in a process of elimination.

Alternatively, species level descriptions and/or diagnosis are available for all species level taxa described prior to 1972, in Klauber 1972. Some are described and diagnosed in the Klauber text as subspecies, but listed as full species here.

The species not included in Klauber 1972, but described since (e.g. "*Crotalus ericsmithi*") are readily aligned to other taxa in their respective groupings at genus or subgenus levels and in the absence of other information, would be easily diagnosed in the subgenus they are listed in and would key to another species in that grouping as opposed to a taxon in another genus or subgenus (for *ericsmithi*, it would automatically diagnose as another taxon in *Cummingea* gen. nov. as opposed to any other rattlesnake species listed in another genus or subgenus).

DEFINITION OF THE RATTLESNAKES

Rattlesnakes for the purposes of this paper are defined as follows:

They are (venomous, with fangs to inject venom) pitvipers within what's treated here as the family Crotalidae Oppell 1811. There is considerable published evidence to relegate Crotalidae to the rank of subfamily within the so-called "True vipers" (Viperidae), thereby making pitvipers the Crotalinae subfamily.

I agree with this position and also that of Smith, Smith and Sawin (1977) and assign them all to the tribe Crotalini Oppel, 1811.

The rattlesnake snakes, called rattlesnakes are known only from the western hemisphere (most species in lower North America, including southern USA and Mexico), which has been guessed by most herpetologists as being the center of evolution for the group.

This however may not be the case as there is a counter-argument that some so-called primitive taxa may in fact have derived their present forms secondarily in relatively recent geological times.

The rattlesnakes are moderate to large and thickset snakes, often with keeled scales.

They are separated from all other venomous pitvipers by the possession of a rattle or pre-button segment which is different to the tail arrangement in any other kind of snake. This assumes that the tail end has not been cut-off, otherwise removed and/or the snake has not suffered an extremely aberrant birth defect, all of which would be self-evident.

Pitvipers, which include numerous genera outside the rattlesnakes genera, are venomous snakes distinguished from other "true vipers" and similar snakes by the presence of a distinct heat-sensing pit organ located between the eye and the nostril on either side of the head.

Excluding the rattlesnakes, the number of named and widely recognised genera has increased in recent times.

GENUS *SISTRURUS* GARMAN 1883

Type species: *Crotalinus catenatus* Rafinesque 1918.

Diagnosis: Large plates on the crown, including the centre, 21-25 mid body rows. Those with 21 mid-body rows and an average tail length (for entire tails in adults) of 9.8 percent or less males or 7.7 percent or less in females (as compared to total body length), (namely *ravus*) are herein referred to the new genus described below, namely *Piersonus* gen. nov.

In *Sistrurus* the lateral hook of the squamosal makes an acute angle (45 to 80 degrees) with the main part of the bone. In *Piersonus* gen. nov., the lateral process of the squamosal is substantially at right angles to the main part of the bone.

In *Sistrurus*, the upper preocular is in contact with the postnasal, the rostral is not curved over the snout, cathus rostralis is sharply angled, dorsal body blotches are square or wider than long. By contrast in *Piersonus* gen. nov. the upper preocular is not in contact with the postnasal, the rostral is curved over the snout, canthus rostralis is rounded, the dorsal body blotches are longer than wide or the colour is black.

Sistrurus are found only in the United States of America and nearby Canada. Records for *Sistrurus* from far northern Mexico, are either doubtful or outliers.

Piersonus gen. nov. occurs in Mexico only and away from the US border.

Species in genus:

S. catenatus (Rafinesque 1818)

S. miliarius (Linne 1766)

GENUS *PIERSONUS* GEN. NOV.

Type Species: *Crotalus ravus* Cope 1865

Diagnosis: Large plates on the crown including the centre. 21 mid-body rows. Relatively short tail as compared to the snakes in the genus *Sistrurus*. For *Piersonus* gen. nov. males have an average tail length of 9.8 percent of the total body length and females 7.7 percent of the total body length.

In *Sistrurus* the lateral hook of the squamosal makes an

acute angle (45 to 80 degrees) with the main part of the bone. In *Piersonus* gen. nov., the lateral process of the squamosal is substantially at right angles to the main part of the bone.

In *Sistrurus*, the upper preocular is in contact with the postnasal, the rostral is not curved over the snout, cathus rostralis is sharply angled, dorsal body blotches are square or wider than long. By contrast in *Piersonus* gen. nov. the upper preocular is not in contact with the postnasal, the rostral is curved over the snout, canthus rostralis is rounded, the dorsal body blotches are longer than wide or the colour is black.

McCranie (1988) has also identified significant features and differences in the hemipenes between this and those snakes in the genera *Sistrurus/Crotalus* (as defined prior to this paper).

Sistrurus are found only in the United States of America and nearby Canada. Records for *Sistrurus* from far northern Mexico, are either doubtful or outliers.

Piersonus gen. nov. occurs in Mexico only and away from the US border.

Piersonus gen. nov. is found only in mountainous areas of central and southern Mexico.

Known from the Mexican states of Hidalgo, Mexico, Morelos, Oaxaca, Puebla, Tlaxcala, Veracruz and Federal District.

It's common name is the Mexican Pygmy Rattlesnake.

Etymology: Americans historically have cherished the freedom of the individual.

Included here is the freedom of individuals to keep and study snakes and other wildlife. In recent years this right has come under threat from a raft of ridiculous bureaucratic impediments. In Australia in the early 1970's these rights were removed from most Australians. It was only as a result of the publication of two different books, *Smuggled* and *Smuggled-2* (Hoser 1993 and 1996) that led to these rights being restored to most Australians.

The success in Australia in terms of these books and their legislative outomes reverberated around the world and in the case of the United States, meant that a major push to outlaw private ownership of reptiles in 1993 was also stopped in it's tracks.

Charles Pierson as publisher of the first book, took an incredibly courageous step in publishing the book.

For North Americans reading this, it should be noted that the Australian government (at all levels) has considerably more powers than their North American counterparts and persons publishing material critical of government run the risk of immense fines, jail or similar.

I have suffered both!

The book *Smuggled: The Underground Trade in Australia's Wildlife* (Hoser 19993) was (as totally expected), illegally banned by the NSW National Parks and Wildlife Service, NPWS, NSW in May 1993 and as a result of a supreme effort by Pierson and an extremely brave and courageous journalist Fia Cumming, the ban was lifted.

(Cumming subsequently lost her job as a result of this, but the book became a best-seller).

Fighting the ban ultimately cost Pierson his home in the expensive Sydney suburb of Mosman and he lost his business.

However this huge life-altering sacrifice against the tyranny of a corrupt and oversized bureaucracy should be permanently recognised. This is especially so in the context of reptiles, those who choose to study them and their conservation, including those many people who have the right to keep live reptiles as pets, solely as a consequence of Pierson's selfless actions.

Pierson also put wildlife conservation on the global agenda, with the publication of the seminal works *Endangered Animals of Australia*, (Hoser 1991) and *Australian Reptiles and Frogs* (Hoser 1989), the latter used extensively by the late Steve Irwin and other television "personalities" as a reference source to bring Australian animals to TV viewers globally.

Unfortunately as this paper goes to press in 2012 there are new assaults on the rights of reptile keepers and herpetologists both in the USA (refer to the "Giant Constrictor ban" with further bans planned to follow) and Australia with new restrictions either passed or about to be passed in both jurisdictions.

Species in genus *Piersonus* gen. nov.

P. ravus (Cope 1865)

OTHER RATTLESNAKE GENERA AS DIAGNOSED AS NEW GENERA BELOW

As part of the diagnosis for each, all are separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head. This difference is not necessarily repeated for the individual diagnoses below, but is of course an obvious part of each diagnosis and should be treated as such.

GENUS *CROTALUS* LINNE 1758

Type Species: *Crotalus horridus* Linne 1758

Diagnosis:

Medium to large rattlesnakes.

They are separated from all other rattlesnake genera by the following suite of characters, either individually and/or in any combination.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

There are two or more internasals. The tail has rings which may or may not be distinct, unless the tail is black.

The pattern is generally of blotches, as opposed to say crossbands (like in *Uropsophus*).

Unlike the genus *Hoserea* gen. nov. (below) the tail does not have distinct dark and light bands of similar width and/or if they do, they merge into the dorsal pattern anterior to this, as opposed being of a distinct cocoon-like appearance as distinct from the dorsal pattern before it.

All *Hoserea* gen. nov. are separated from other rattlesnakes by their tail markings. In the case of *Hoserea*, there are distinct thickened dark and light cross-bands of similar width, which are separate from the rest of the snake's dorsal markings, giving the tail a cocoon-like appearance. This bold patterning is not seen in other rattlesnakes.

Another diagnostic for that genus is that the line markings on the face run up at a sharp 45 degree angle which exceeds that of other rattlesnake genera, excluding *Crotalus* (as

diagnosed here).

However *Crotalus* (as diagnosed here) is separated from the genus *Hoserea* gen. nov. by the tail markings which merge into the dorsal patterning anterior to this, as opposed to being of a separate cocoon-like appearance.

Also *Hoserea* gen. nov. have distinct diamond shaped blotches with light edges running down the spinal region, quite unlike markings seen in other rattlesnakes excluding *Caudisona*, which are in turn readily separated from that subgenus by other factors (see both diagnoses).

C. horridus lacks any vertical or near vertical line running anterior or posterior to the eye.

For *Cummingea* gen. nov., as diagnosed in this paper, they are separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

The simplest diagnostic trait of *Cummingea* gen. nov. is that there are more than 40 subcaudals in males and more than 35 in females. In all other rattlesnakes, including *Crotalus* as defined here, there are fewer than 40 subcaudals in males and fewer than 35 in females.

For *Matteoea* gen. nov. those snakes are highly rugose rattlesnakes, separated from other rattlesnakes by distinct salt and pepper markings across the dorsal surface, often giving the appearance of mite faeces, and otherwise described as a "mite phase". This is especially so for *M. mitchellii*, but also applies to others in the genus, namely *M. tigris* and *M. angelensis*.

These snakes also have small scales between the rostral and prenasals. The supraoculars are pitted and creased.

For separation from *Aechmophrys*, *Uropsophus, Caudisona*, *Matteoea*, *Hoserea* and *Cummingea*, see the diagnoses below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Species in genus:

C. horridus Linne 1758

Species in subgenus *sayersus* subgen. nov.

C. viridis (Rafinesque 1818)

C. scutulatus (Kennicott 1861)

C. oreganus Holbrook 1840

C. abyssus Klauber 1930
C. cerberus Klauber 1949
C. concolor Klauber 1936
C. helleri Meek 1905
C. lutosus Klauber 1930

SUBGENUS *SAYERSUS* SUBGEN. NOV.

Type species: *Crotalinus viridis* Rafinesque 1818

Diagnosis: The diagnosis for the subgenus includes as for the genus *Crotalus* above.

In terms of separating the taxa within *Sayerus* subgen. nov. from *Crotalus* (now restricted to *C. horridus*), the following applies. Dark tail rings contrast with a lighter background in *Sayersus* subgen. nov. For the remaining *Crotalus* as in *C. horridus* (not in this subgenus), the tail is uniform black or at best with very indistinct rings.

There are more than two internasals in snakes of this subgenus as opposed to only two internasals for *C. horridus*, herein restricted to *Crotalus*. C. *scutulatus* is separated from *C. horridus* by the presence of 2 or 3 large scales on the top of the head between the supraoculars.

C. horridus lacks any vertical or near vertical line running anterior or posterior to the eye, which all *Sayersus* subgen. nov. have.

Dorsal pattern and colouration of specimens is highly variable.

Etymology: In honour of the late Ron Sayers, a mainly USA-based herpetologist for his many contributions to our understandings of reptiles in the 20th century, through his practical work as well as many articles, photos and the like. I first met him when catching Death Adders (*Acanthophis antarcticus*) in the late 1970's on the now famous West Head Road, in NSW, Australia, as part of a research project (NSW/NPWS scientific permit number SLF486).

Species in subgenus *Sayersus subgen. nov.*

C. viridis (Rafinesque 1818)

C. scutulatus (Kennicott 1861)

C. oreganus Holbrook 1840

C. abyssus Klauber 1930
C. cerberus Klauber 1949
C. concolor Klauber 1936
C. helleri Meek 1905
C. lutosus Klauber 1930

GENUS *AECHMOPHRYS* COUES 1875

Type species: *Crotalus cerastes* Hallowell 1854

Diagnosis: A group of smaller sized rattlesnakes all with 21 mid body scale rows. One of the group is separated from all other rattlesnakes by the fact that the outer edges of the supraoculars are extended into raised and flexible hornlike processes that are distinctly pointed at the tip. That is the species *cerastes*, known commonly as a "sidewinder" in reference to one of it's preferred forms of motion across sand dunes.

For *A. polystictus*, also placed in this genus but herein placed in the subgenus *Rattlewellsus* subgen. nov., it is separated from all other rattlesnakes by the presence of two squarish darker blotches on the upper labials, one at about the eye and running into it and the other anterior to it. *A. polystictus* is further separated from all other rattlesnakes by a dorsal pattern consisting of a series of longitudinal ellipses. It also has a pair of slim intercanthals, each about twice as long as wide.

All others in this genus *Aechmorphrys*, herein transferred to the subgenus *Cottonus* subgen. nov. have a distinct whitish streak running across the upper labials running slightly higher towards the snout, and terminating around the back of the mouth region at the posterior end.

Other rattlesnakes with a similar streak invariably have the streak running through the eye, even if only the lower part, which is not the case for this genus.

In the rest of *Aechmorphrys* that is not part of the subgenus *Cottonus* subgen. nov., namely *A. cerastes* and *A. polystictus*, there is no such line. In *A. cerastes*, at best there is a squarish light blotch under the eye, while in *A. polystictus*, any white line terminates before (posterior to) the eye.

Cottonus subgen. nov. taxa have distinctly smaller and

narrower heads than those taxa in the nominate subgenus and likewise as compared to the defined (here) genera *Crotalus, Caudisona* and *Hoserea*.

For separation from *Crotalus*, *Uropsophus Caudisona*, *Matteoea*, *Hoserea* and *Cummingea* see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Uropsophus is separated from this genus by the fact that males have less than 40 subcaudals and females less than 35.

Species in genus:

A. cerastes (Hallowell 1854)

Species in subgenus *Cottonus* subgen. nov.

A. intermedius (Troschel 1865)

A. pricei (Van Denburgh 1895)

A. tancitarensis (Alvarado-Diaz and Campbell 2004

A. transversus (Taylor 1940)

A. willardi (Meek 1905)

Species in subgenus *Rattlewellsus* subgen. nov.

A. polystictus (Cope 1865)

SUBGENUS *COTTONUS* SUBGEN. NOV.

Type species: *Crotalus intermedius* Troschel 1865

Diagnosis: Separated from all other *Aechmorphrys* as diagnosed above in this same paper by having a small narrow head.

As for others in the genus, all have 21 mid body scale rows.

Cottonus subgen. nov. as recognised at least in part by Smith (1946) and Klauber (1972) although obviously not by this name (*Cottonus*), is separated from other rattlesnakes and characterised by a dorsal scale row formula of 21-21-17, 8-10 labials (a low number for rattlesnakes), a relatively small head, weak or no keeling in the parietal region, and simple arrangement of relatively few scales on the side of the head.

Further separated from all other *Aechmorphrys* by a distinct white line running across the upper labial region including below the eye and terminating around the back of the mouth region at the posterior end. In the rest of *Aechmorphrys* that is not part of this subgenus, namely *A. cerastes* and *A. polystictus*, there is no such line. In *A. cerastes*, at best there is a squarish light blotch under the eye, while in *A. polystictus*, any white line terminates before (posterior to) the eye.

Cottonus subgen. nov. taxa have distinctly smaller and narrower heads than those taxa in the nominate subgenus and likewise as compared to the defined (here) genera *Crotalus, Caudisona* and *Hoserea*.

Uropsophus is separated from this subgenus (and genus) by the fact that males have less than 40 subcaudals and females less than 35.

Etymology: Named after Australian wildlife demonstrator Tom Cotton in honour of his conservation work with our company “Snakebusters” which leads the way in wildlife conservation in Australia. Tom’s educational efforts have brought countless people in contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

Species in subgenus *Cottonus* subgen. nov.

A. intermedius (Troschel 1865)

A. pricei (Van Denburgh 1895)

A. tancitarensis (Alvarado-Diaz and Campbell 2004)

A. transversus (Taylor 1940)

A. willardi (Meek 1905)

SUBGENUS *RATTLEWELLSUS* SUBGEN. NOV.

Type species: *Caudisona polystictus* Cope 1865

Diagnosis: *Rattlewellsus* subgen. nov. is separated from all other rattlesnakes (including others in the subgenus *Aechmorphrys*) by the presence of two squarish darker blotches on the upper labials, one at about the eye and running into it and the other anterior to it. *A. polystictus* is further separated from all other rattlesnakes by a dorsal pattern consisting of a series of longitudinal ellipses. It also has a pair of slim intercanthals, each about twice as long as wide.

This snake is placed within the subgenus *Aechmorphrys*, which is a group of smaller sized rattlesnakes all with 21 mid body scale rows. One of the group is separated from all other rattlesnakes by the fact that the outer edges of the supraoculars are extended into raised and flexible hornlike processes that are distinctly pointed at the tip. That is the species *cerastes*, known commonly as a “sidewinder” in reference to one of it’s forms of motion over sand dunes.

All others in the genus *Aechmorphrys*, herein transferred to the subgenus *Cottonus* subgen. nov. have a distinct whitish streak running across the upper labials running slightly higher towards the snout, and terminating around the back of the mouth region at the posterior end.

Other rattlesnakes with a similar streak invariably have the streak running through the eye, even if only the lower part, which is not the case for this genus.

In the rest of *Aechmorphrys* that is not part of the subgenus *Cottonus* subgen. nov., namely *A. cerastes* and *A. polystictus* (subgenus *Rattlewellsus* subgen. nov.), there is no such line. In *A. cerastes*, at best there is a squarish light blotch under the eye, while in *A. polystictus*, any white line terminates before (posterior to) the eye.

Cottonus subgen. nov. taxa have distinctly smaller and narrower heads than those taxa in the nominate subgenus and likewise as compared to the defined (here) genera *Crotalus, Caudisona* and *Hoserea*.

For separation from *Crotalus*, *Uropsophus Caudisona*, *Matteoea*, *Hoserea* and *Cummingea* see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Uropsophus is separated from this genus by the fact that males have less than 40 subcaudals and females less than 35.

Etymology: Named after well-known Australian reptile taxonomist Richard Wells. The subgenus name is a play on words in several ways.

It obviously reflects on the kind of snake (rattlesnake) and his own name, “Wells”. It also relates to what he did in terms of Australian taxonomy when he published a pair of major papers in 1983 and 1985 (Wells and Wellington 1983, 1953), which “rattled well” many other hereptologists in Australia with his large number of then controversial taxonomic and nomenclatural acts.

Species in subgenus *rattlewellsus* subgen. nov.

A. polystictus (Cope 1865)

GENUS *CAUDISONA* LAURENTI 1768

Type species: *Crotalus durissus* Linne 1758

Diagnosis: The best known taxon in the genus is the so-called Neotropical Rattlesnake, *C. durissus*. It is listed here as the type species, even though the form originally described was "*terrificus*", now regarded as a subspecies, including herein.

A number of the recognised species in the genus, were in the first instance described as subspecies of *C. durissus* and later found to be valid species in their own right as herein recognized.

These include: *C. culminates*, *C. simus* and *C. tzabcan*.

Quijada-Mascarenas and Wüster, W. (2006) found the group as defined here and similarly in their paper, diverged from all other rattlesnakes about 13 million years ago, making the placement of these snakes in a genus apart from *Crotalus* as previously defined an inevitable position.

The name *Caudisona* Laurenti 1768 is available and herein used.

Snakes of the genus *Caudisona* are defined as follows.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

Prenasals contact the rostral. The body pattern comprises diamonds, hexagons, rectangles or ellipses, or if bands, not made up of conspicuous dots; dorsoventral width of the proximial rattle in the head length more than two and a half times. The anterior subocular fails to reach any supralabial. There are two internasals only. The upper preocular is not split vertically, or if split the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular, dorsal body blotches occupy more longitudinal space than the interspaces, and the pattern of diamonds, hexagons, rectangles or ellipses usually exceeds 24 in number.

There are more than 164 ventrals.

Tail rings are indistinct or absent. There are usually four or less often six or more large flat scales occupying the internasal/prefrontal area and not including the subcanthals or supraloreals.

For further separation from *Aechmophrys*, *Uropsophus, Crotalus*, *Matteoea*, *Hoserea* and *Cummingea*, see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Species in genus:

C. durissus (Linne 1758)

C. culminatus (Klauber 1952)

C. simus (Latreille 1801)

C. tzabcan (Klauber 1952)

C. vegrandis (Klauber 1941)

C. unicolour (van Lidth de Jeude 1887)

Species in subgenus *Pillotus* subgen. nov.

C. enyo Cope 1861

Species in subgenus *Smythus* subgen. nov.

C. basiliscus Cope 1864

C. estebanensis (Klauber 1949)

C. molossus (Baird and Girard 1853)

C. totonacus (Gloyd and Kauffeld 1940)

SUBGENUS *PILLOTUS* SUBGEN. NOV.

Type species: *Caudisona enyo* Cope 1861

Diagnosis: The above diagnosis for *Caudisona* Laurenti 1768 defines and separates this subgenus from all other rattlesnakes in combination with the following.

Pillotus subgen nov. is further separated from all other *Caudisona* by scales in the internasal and prefrontal area totalling 12 or more as opposed to 12 or less for all other *Caudisona*. Scales in the crown and in the frontal area are rough, ridged and knobby in *Pillotus* (subgen. nov.) *enyo*, as opposed to the same scales being smooth in all other *Caudisona* species.

Etymology: Named after Australian reptile enthusiast Christian Pillot in honour of his conservation work with our company "Snakebusters – Australia's best reptiles" which leads the way in wildlife conservation in Australia. Christian's educational efforts have brought countless people in contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

Species in subgenus *Pillotus* subgen. nov.

Caudisona enyo Cope 1861

SUBGENUS *SMYTHUS* SUBGEN. NOV.

Type species: *Crotalus molossus* (Baird and Girard 1853)

Diagnosis: The above diagnosis for *Caudisona* Laurenti 1768 defines and separates this subgenus from all other rattlesnakes in combination with the following.

Pillotus subgen nov. is further separated from all other *Caudisona* and this subgenus by scales in the internasal and prefrontal area totalling 12 or more as opposed to 12 or less for all other *Caudisona*. Scales in the crown and in the frontal area are rough, ridged and knobby in *Pillotus* (subgen. nov.) *enyo*, as opposed to the same scales being smooth in all other *Caudisona* species.

Caudisona that remain in the nominate subgenus as a rule are separated from other *Caudisona* by the fact that on the neck there are a pair of regular dark stripes, one to three scale rows wide separated by a single light mid-dorsal stripe two to three scale rows wide, these stripes extending from one to four head lengths behind the head before they meet the first dorsal blotches.

The only exception in terms of this diagnosis and as part of the diagnosis for the nominate subgenus (above), is for specimens without the above mentioned markings, which are in turn separated from other *Caudisona*, including *Smythus* subgen. nov. by a black or dark bar bordered before and after with cream or buff, crossing the head between the anterior points of the supraoculars (namely specimens of *C. totonacus*).

Snakes in the subgenus *Smythus* subgen. nov. do not have the transverse bar in the prefrontal area as just described, the preceding, excluding *C. totonacus*, which is herein also placed within *Smythus* gen. nov..

In *Smythus* subgen. nov. on the neck there are no regular dark stripes, one to three scale rows wide separated by a

single light mid-dorsal stripe two to three scale rows wide, and no stripes extending from one to four head lengths behind the head before they meet the first dorsal blotches, separating *Smythus* subgen. nov. from other *Caudisona,* either alone or when used in combination with any or all other diagnostic information within this paper.

Separation of other *Smythus* subgen. nov. from *C. totonacus* is given above.

Pillotus subgen nov. is separated from all other *Caudisona* including subgenus *Smythus* subgen. nov. by scales in the internasal and prefrontal area totalling 12 or more as opposed to 12 or less for all other *Caudisona.* Scales in the crown and in the frontal area are rough, ridged and knobby in *Pillotus* (subgen. nov.) *enyo*, as opposed to the same scales being smooth in all other *Caudisona* species.

Klauber 1972, provides keys to further separate the species herein listed under the subgenus *Smythus* subgen. nov.

Etymology: Named after Australian wildlife demonstrator Michael Smyth in honour of his conservation work with our company "Snakebusters – Hand on reptiles" which leads the way in wildlife conservation in Australia. Michael's educational efforts have brought countless people in contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

Species in subgenus *Smythus* subgen. nov.

C. basiliscus Cope 1864

C. estebanensis (Klauber 1949)

C. molossus (Baird and Girard 1853)

C. totonacus (Gloyd and Kauffeld 1940)

GENUS *UROPSOPHUS* WAGLER 1830

Type species: *Uropsophus triseriatus* Wagler 1830

Diagnosis: A group of small rattlesnake species found in Mexico and adjacent southern USA.

They are separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tail has rings which may or may not be distinct, unless the tail is black.

The tip of the snout and the canthus rostralis are not raised into a sharp ridge.

There are no thin, black-bordered transverse lines on the supraoculars; no clearly outlined round or oval blotch below the eye and the intercanthals, if paired aren't long and slim. The mid body scale rows plus the supralabials on both sides of the head total 42 or more.

The nominate form (*triseriatus*) is separated from others in the genus by the fact that the upper preocular isn't split vertically, or if split, the anterior section isn't conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular. The dorsal body blotches occupy more longitudinal space than the interspaces and there are usually more than 24 primary body blotches.

Members of *Uropsophus* can be easily separated from *Aechmorphrys* and the herein inclusive subgenus *Cottonus* subgen. nov. by the presence of prefoveals, usually 23 or more mid body scale rows (versus 21), a relatively larger and broader head and a stouter body (Dorcas 1992, Klauber 1972 and Smith 1946).

For separation from *Aechmophrys*, *Caudisona, Crotalus*, *Matteoea*, *Hoserea* and *Cummingea*, see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Species in genus *Uropsophus*:

U. triseriatus Wagler 1830

U. aquilus (Klauber 1952)

U. lepidus (Kennicott 1861)

U. pusillus (Klauber 1908)

***CUMMINGEA* GEN NOV.**

Type species: *Crotalus stejnegeri* Dunn 1919

Diagnosis: Separated from all other rattlesnake genera by the following suite of characters.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

The simplest diagnostic trait of *Cummingea* gen. nov. is that there are more than 40 subcaudals in males and more than 35 in females. In all other rattlesnakes, there are fewer than 40 subcaudals in males and fewer than 35 in females.

In common with larger rattlesnakes, snakes in this genus also have a high number of ventral scales as compared to other small montane rattlesnake species.

All are slender in habit and moderate in size (50-75 cm), canthals not in contact at dorsal midline, separated by 1-3 scales.

The description by Dunn 1919 for the species *stejnegeri* also serves as an excellent description for the genus *Cummingea* gen. nov., noting that at the time of his description the other two species in the genus were not known to science. He wrote: "A small *Crotalus* with a long slender tail, a very small rattle with the first pair of lower labials long and produced backwards broadly in contact behind the symphysial". Obviously The word "*Crotalus*" should be substituted with the word "rattlesnake" to make the diagnosis for *Cummingea* gen. nov. accurate and relevant and for the purpose of this description, the sentence is repeated here with the correction:
"A small Rattlesnake with a long slender tail, a very small rattle with the first pair of lower labials long and produced backwards broadly in contact behind the symphysial."

In all *Cummingea* the rostral is wider than high.

For further separation from *Aechmophrys*, *Uropsophus, Caudisona, Crotalus*, *Matteoea*, and *Hoserea*, see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Etymology: In honour of leading Australian journalist Fia Cumming, who over a 20 year period was often the only news reporter employed with the mainstream media with the courage to take on the corruption and lies from government

officials who sought to outlaw all private ownership of reptiles in Australia.

Without her efforts, including her being the first and main reporter to break the news story of the illegal banning of the book *Smuggled:The Underground Trade in Australia's Wildlife* (Hoser 1993) in May 1993, there would be no person in Australia allowed to have contact with reptiles in any way, save for a handful of privileged persons in government run zoos and the like.

That was the legal situation in most of Australia before the publication of the *Smuggled* books in 1993 and 1996 (Hoser 1993, 1996).

See also for *Piersonus* gen. nov. above.

Species in genus *Cummingea* gen. nov.

C. stejnegeri (Dunn 1919)

C. ericsmithi (Campbell and Flores-Villella 2008)

C. lannomi (Tanner 1966)

***HOSEREA* GEN. NOV.**

Type species: *Crotalus atrox* Baird and Girard 1853

Diagnosis: Separated from other rattlesnakes by the following characteristics (this diagnosis) either individually and/or in any combination, including or excluding by reference to the diagnoses for any of the other genera of rattlesnakes herein (this paper)(alone and/or in any combination) and/or including or excluding the diagnoses for the component species as listed herein, via reference to the texts of Klauber (1972) (taxa may be identified as subspecies within), or Campbell and Lamar (2004).

Hoserea gen. nov. are generally large species and include the largest recorded living rattlesnakes recorded since European settlement, with *H. adamanteus* being quoted as exceeding 180 cm in total length and *H. atrox* being recorded at slightly lesser lengths.

Records above this length are usually doubtful or exaggerated.

Also see Jones, (1997).

However Klauber (1972) and others do quote larger measurements for these taxa.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

All *Hoserea* gen. nov. are separated from other rattlesnakes by their tail markings. In the case of *Hoserea*, there are distinct thickened dark and light cross-bands of similar width, which are separate from the rest of the snake's dorsal markings, giving the tail a cocoon-like appearance. This bold patterning in this manner is not seen in other rattlesnakes, excluding in *Caudisona*, whose differentiating characters are given below.

Hoserea gen. nov. are also identified by having a body pattern of diamonds, hexagons and similar blotches as opposed to crossbands. These are bordered by rows of lighter scale colour.

Another diagnostic for the genus is that the line markings on the face run up at a sharp 45 degree angle, the angle of which exceeds that of other rattlesnake genera, excluding *Crotalus* (as diagnosed above), noting the differences between *Crotalus* and *Hoserea* gen. nov. as given here and elsewhere in this paper.

However *Crotalus* (as diagnosed above) is separated from this genus (*Hoserea* gen. nov.) by the tail markings which merge into the dorsal patterning anterior to this, as opposed to being of a distinct and separate cocoon-like appearance and not related to the body pattern.

This only applies to subgenus *Sayersus* subgen. nov. (as diagnosed here) as for the remaining *Crotalus* (namely *horridus* only), there are of course no obvious tail crossbands as the tail is invariably black or near black in colour and without obvious banding.

The species *atrox* is separated from all others in the genus *Hoserea* by the following suite of characters. Above, it is grey, brown or pink with brown diamond or hexagonal blotches on the back and fainter smaller blotches on the side. Markings are usually indistinct and peppered with small but distinct dark spots, giving a dusty or speckled appearance, (but not "mite phase" as seen in the genus *Matteoea* gen. nov. as described in this paper).

There are 25 mid body scale rows, rarely 23 or 27, five or less scales between the supraoculars and it is rare for the first infralabials to be transversely divided.

Snakes of the genus *Caudisona* are defined and separated from *Hoserea* gen. nov. as follows.

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

Prenasals contact the rostral. The body pattern comprises diamonds, hexagons, rectangles or ellipses, or if bands, not made up of conspicuous dots; dorsoventral width of the proximial rattle in the head length more than two and a half times. The anterior subocular fails to reach any supralabial. There are two internasals only. The upper preocular is not split vertically, or if split the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular, dorsal body blotches occupy more longitudinal space than the interspaces, and the pattern of diamonds, hexagons, rectangles or ellipses usually exceeds 24 in number.

There are more than 164 ventrals.

Tail rings are indistinct or absent. There are usually four or less often six or more large flat scales occupying the internasal/prefrontal area and not including the subcanthals or supraloreals.

The species *Hoserea atrox* is separated from the similar in appearance *H. ruber*, by the fact that *H. ruber* has a more reddish colouration, less distinct markings and the first lower labial is divided transversely.

All other *Hoserea* species, excluding *H. tortugensis*, but including *ruber* and *adamanteus* have been assigned to other subgenera, namely *Edwardsus* subgen. nov., *Mullinsus* subgen. nov., and *Crutchfieldus* subgen. nov.. They are further in turn separated from *H. atrox* by the diagnoses within those descriptions within this paper and incorporated herein as part of this genus diagnosis.

The diagnosis for *H. atrox* as given in keys and elsewhere in Klauber (1972) for "*Crotalus atrox*" also applies to the taxon.

H. tortugensis remains in the *Hoserea* subgenus nov. and is diagnosed as for *H. atrox* above save for what follows.

It is however separated from *H. atrox* by the fact that the upper preocular is not in contact with the postnasal and there is no loreal present. In *H. atrox*, the upper preocular is generally in contact with the postnasal and/or such contact is prevented by an upper loreal. The taxon *H. tortugensis* is known only from Isla Tortuga located in the Gulf of California. Isla Tortuga is the remnant of a volcano. The island's landscape is dry and barren.

Castoe et. al. 2006, suggest that *H. tortugensis* (named in their paper as *Crotalus tortugensis*) should be placed in synonymy with *H. atrox*. This placement is based on DNA evidence, phylogeny and also their definition of "species", the latter not clearly defined in their paper.

Regardless of the placement of the taxon, it is clear that *tortugensis* is most closely affiliated with *atrox*, in terms of the rattlesnakes (see also Klauber 1972).

While this paper treats *H. tortugensis* as a full species (as seems to be the case for most herpetologists in terms of this taxon as of the period 1998-2012), it is my view that the current evidence suggests that subspecies is in fact a more appropriate definition.

The subspecies level treatment of the taxon is also more in line with the current views in Australia for taxa isolated in similar circumstances, most notably being those in the genus *Notechis* (see Keogh et. al. (2004) and reference sources therein.

Similar applies for the *H. atrox* taxon, from Santa Cruz Island in the Gulf of California.

Some authors have listed it as a species-level taxon (Murphy et. al. 2002), while others have treated it as synonymous with *H. atrox* (Castoe et. al. 2006).

Regardless as to the placement of the taxon at the species level, it will readily be identified as being of the genus *Hoserea* gen. nov. and nominate subgenus *Hoserea* when the genus is in turn subdivided. Likewise applies in the event that the eastern and western clades of *H. atrox* are split, based on their recent (in geological terms) phylogenetic history, notwithstanding recent evidence of gene flow between the clades.

All are treated as *H. atrox* for the purposes of this paper.

For further separation from *Aechmophrys*, *Uropsophus, Caudisona, Crotalus*, *Matteoea*, and *Cummingea*, see the diagnoses above or below.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

Etymology: In honour of my wife, Shireen Hoser who must put up with myself with all imperfections (there's not too many) and long absences for a whole host of matters, herpetological and otherwise and also for untold assistances in terms of running "Snakebusters", Australia's best known wildlife rescue business and the first company in Australia to be licenced to remove so-called nuisance snakes, which prior to my receipt of such a licence in 1982, were always killed on site. Even as of 2009, most Australians think that the best snake is a dead one and it is a sad fact that Australia's wildlife conservation record is absolutely abysmal.

As recently as late 2008 at a VCAT (Tribunal) hearing the head of the (Australian) Victorian Wildlife Department's licencing branch (DSE, WAGLS), Mr Ron Waters, told the tribunal that he was happy to see licenced snake catchers go to houses and kill snakes, including by using metal "snake tongs". This he has repeated a number of times including at a VCAT tribunal hearing in 2012.

Interstate counterparts have expressed similar views.

Unfortunately the attitude of Ron Waters is typical of wildlife bureaucrats in Australia and also reflected by a sizeable chunk of the general public who are unfortunately educated by the government and the money they spend on "information" (sometimes better described as propaganda). This view has also been upheld by two snake-hating Judges at the Victorian Government tribunal called VCAT, the judges names being Anne Coghlan and Pamela Jenkins.

Species in genus *Hoserea* gen. nov.

H. atrox (Baird and Girard 1853)

H. tortugensis (Van Denburgh and Slevin 1921)

Species in the subgenus *Edwardsus* subgen. nov.

H. adamanteus (Beauvois 1799)

Species in the subgenus *Mullinsus* subgen. nov.

H. ruber (Cope 1892)

H. exsul (Garman 1883)

H. lorenzoensis (Radcliffe and Maslin 1975)

Species in the subgenus *Crutchfieldus* subgen. nov.

H. catalinensis (Cliff 1954)

***EDWARDSUS* SUBGEN. NOV.**

Type species: *Crotalus adamanteus* Beauvois 1799

Diagnosis: At the present time, *Edwardsus* subgen. nov. is monotypic with only one taxon within, namely *H. adamanteus.*

While the diagnosis for *Hoserea* (above) and *Mullinsus* subgen. nov. below applies to this subgenus, the following separates this subgenus from *H. atrox*.

This species *E. adamanteus* the only taxon in this subgenus is the largest species of rattlesnake in the world. Fossils attributable to this taxon are also believed to be from specimens larger than those in existence today.

The taxon is easily separated from *Hoserea atrox* by its dorsal patterning. For *adamanteus*, it is a distinctive row of diamonds running along the spinal ridge, with each dark area separated by thinner white edges, over a mid-shade background.

For *H. atrox*, the patterning is far less distinct (see also *Mullinsus* subgen. nov. below). Also see the diagnosis for *H. atrox* above.

In *H. adamanteus*, the upper pre-ocular is not split vertically or if split, the anterior section is not conspicuously higher than the posterior and not curved over the canthus rostralis in front of the supraocular.

There is a vertical light line (sometimes slightly triangular) on the posterior edges of the prenasals and first supralabials in *H. adamanteus*. These are not present in *H. atrox, H. tortugensis*, any other *Hoserea*, or any other rattlesnakes except (occasionally) for those in the genera *Sistrurus* and *Piersonus* gen. nov., both readily identifiable (and separated from *Hoserea*) by their large symmetrically placed enlarged shields (usually nine) arranged in the middle of the head.

The diagnosis for *H. adamanteus* as given in keys and elsewhere in Klauber (1972) for "*Crotalus adamanteus*" also applies to the taxon.

Crutchfieldus subgen. nov. is separated from all other rattlesnakes by the fact that the rattle matrix is shrunken. There is no loose rattle segment.

That subgenus is endemic to to Isla Santa Catalina, Mexico.

Etymology: In honour of Queensland, Australia-based Euan Edwards for his many contributions to herpetology in Australia, Madagascar, the USA and elsewhere.

Species in the subgenus *Edwardsus* subgen. nov.

H. adamanteus (Beauvois 1799)

***MULLINSUS* SUBGEN. NOV.**

Type species: *Crotalus ruber* Cope 1892

Diagnosis: While the diagnosis for *Hoserea* gen. nov. (above) and *Edwardsus* subgen. nov. as applicable above applies to this subgenus, the following separates this subgenus from *H. atrox*, *H. tortugensis* and *H. adamanteus*.

In the subgenus *Mullinsus* subgen. nov. the first pair of lower labials are divided transversely. This separates the taxa within the subgenus from *Hoserea atrox*, *H. adamanteus* and *H. tortugensis.*

All taxa within *Mullinsus* gen. nov. have a distinct white marking on the scales of the upper labials more or less between the eye and the nostril. Instead of being in the form of an upward facing diamond or line as seen in other rattlesnakes, it presents as a partly broken diamond shape, with the anterior point flattened out and the posterior pointing towards the eye.

Crutchfieldus subgen. nov. (a monotypic subgenus containing the taxon *H. catalinensis*) is separated from all other rattlesnakes by the fact that the rattle matrix is shrunken. There is no loose rattle segment. That subgenus is endemic to to Isla Santa Catalina, Mexico.

Etymology: Named after Australian wildlife demonstrator Dylan Mullins in honour of his conservation work with our company "Snakebusters – Handle the animals" which leads the way in wildlife conservation in Australia, doing reptile shows that let people "hold the animals". Dylan's educational efforts have brought countless people in contact with reptiles and created a whole generation of herpetologists, scientists and conservationists.

Species in the subgenus *Mullinsus* subgen. nov.

H. ruber (Cope 1892)

H. exsul (Garman 1883)

H. lorenzoensis (Radcliffe and Maslin 1975)

***CRUTCHFIELDUS* SUBGEN. NOV.**

Type species: *Crotalus catalinensis* Cliff 1954

Diagnosis: While the diagnosis for *Hoserea* (above) and other relevant subgenera as also named herein applies to this subgenus, the following separates this subgenus from other *Hoserea* and for that matter all other rattlesnakes.

This subgenus is separated from all other rattlesnakes by the fact that the rattle matrix is shrunken. There is no loose rattle segment.

It is endemic to to Isla Santa Catalina, Mexico.

Etymology: Named after herpetologist, breeder and dealer, Tom Crutchfield, mainly based in Florida, USA, for his many contributions to herpetology.

Species in the subgenus *Crutchfieldus* subgen. nov.

H. catalinensis (Cliff 1954)

***MATTEOEA* GEN. NOV.**

Type species: *Caudisona mitchellii* Cope 1861

Diagnosis: A group of small rattlesnakes, (adults well under 100 cm in length).

The top of the head has scales of various sizes, more than one scale in the frontal area and the parietals, if enlarged are not in contact or symmetrical.

The outer edges of the supraoculars are not extended into raised and flexible hornlike processes that are distinctly pointed at the tip.

Males have less than 40 subcaudals and females less than 35.

The tip of the snout and the anterior canthus rostralis is not raised into a sharp ridge.

These snakes are highly rugose rattlesnakes, separated from other rattlesnakes by distinct salt and pepper markings across the dorsal surface, often giving the appearance of mite faeces, and otherwise described as a "mite phase". This is especially so for *M. mitchellii*, but also applies to others in the genus, namely *M. tigris* and *M. angelensis*. All three taxa are separated from all other rattlesnakes by their distinctive crossband pattern.

These snakes also have small scales between the rostral and prenasals. The supraoculars are pitted and creased.

Compared to other rattlesnakes the head is smallish and the rattle large (note this combination).

M. tigris is separated from other *Matteoea* gen. nov. by the fact that the prenasals contact the rostral (it doesn't in *M. mitchelli* and *M. angelensis*).

All snakes in the genus *Matteoea* gen. nov. have a body pattern of 35 or more crossbands on a buff, pink or grey background.

For separation from *Aechmophrys*, *Uropsophus, Caudisona, Crotalus*, *Hoserea*, and *Cummingea*, see the diagnoses elsewhere in this paper.

Separated from *Sistrurus* and *Piersonus* gen. nov. (described above) by the absence of large head shields at the center of the crown of the head.

The taxon referred to here as *M. mitchelli* clearly consists of more than one species, (see for example Douglas et. al. 2007 or Grismer 2002). However they are not identified here separately pending further research on the species group, including all currently named subspecies.

Etymology: In honour of Cathryn Matteo, a close personal friend, with no direct interest in herpetology, but whom over 20 years has provided untold and immense assistance's in all kinds of projects the net result including there being a legal regime in most parts of Australia, whereby as of 2009 most people can legally obtain, keep and study reptiles.

Species in genus *Matteoea* gen. nov.

M. mitchellii (Cope 1861)

M. angelensis (Klauber 1963)

M. tigris (Kennicott 1859)

IN EVENT OF CONFLICT OF NAMES (RATTLESNAKES)

In the event of any name conflicts arising as a result of findings by other researchers and any "first revisor" issues that may arise in terms of nomenclature and current ICZN rules and codes the following should be adopted specifically with reference to the names used herein.

As a formality, I should note that, if there is a conflict in that two names assigned herein are designated and "available"

for a given genus group as redefined by a later worker or author, the order of priority should always be as follows: Genus name should always take priority and precedence over a subgenus name.

Within each group, the order of rank or priority in event of conflict herein should be as follows: For genus it is: *Hoserea*, *Cummingea*, *Piersonus*, *Matteoa*. For those names at the subgenus level the order of priority should be: *Sayersus*, *Edwardsus*, *Cottonus*, *Smythus*, *Rattlewellsus*, *Pillotus*, *Mullinsus*, *Crutchfieldus*.

NEW WORLD CORAL SNAKES, GENUS *MICRURUS*, WAGLER 1824

Within the Tribe Elapini Boie 1827, are the new world coral snakes.

These are the only elapid snakes in the Americas.

These are snakes characterized by hollow, fixed fangs at the front of the mouth through which they inject venom.

Therefore on close inspection they can't be confused with other local New World species due to their distinctive pteroglyph venom apparatus, as well as their distinctive shiny smooth scales and generally cylindrical build.

These new world snakes are invariably gaudily ringed with red, black and yellow and are most numerous in central and south America both in terms of abundance and abundance of species.

While all were for many years placed in the single genus *Micrurus*, some quite divergent taxa have been since moved to other erected genera.

On inspection, Schmidt removed the taxon *euryxanthus* (Kennicott 1861) from the genus *Micrurus* in 1928 on the basis of colour and lepidosis (hemipene morphology). That taxon remains the sole member of the genus *Micruroides* Schmidt 1928.

In 1937 Schmidt was the first to recognise that two South American species of coral snake differed in having the first pair of infralabials reduced in size and failing to meet along the ventral midline, thus permitting contact of the mental with the anterior pair of chinshields. These slender coral snakes also had a distinctive colour pattern of whitish, yellow or red ventral spots on an otherwise uniformly black body, leading him to place them in the genus *Leptomicrurus* Schmidt, 1937.

Slowinski (1995) synonymised *Leptomicrurus* with *Micrurus* because he found it's phylogeny rooted with *Micrurus*, however more recent workers including Campbell and Lamar (2004) have rejected this merger of genera.

Since then, the remaining morphologically conservative species within the ever increasing in size genus *Micrurus* have remained grouped within this genus.

That there has been no dissent among taxonomists is astounding as it is patently clear on many grounds that the group must be paraphyletic at the genus level, even if by means of crude assessment of the geological and distributional evidence.

Campbell and Lamar (2004), quite adequately split the genus as recognised into two main groups based on hemipene characteristics, a split that has been noted by later authors, including for example O'Shea (2005).

The first group, he called the "Monadal Group", based on their colouration, (those patterned with a single black band between each pair of red bands, i.e. red/yellow/black/yellow/red) which included two additional species he included in a so-called "Central American Triad Bearing Group" of different colouration, but similar hemipenal morphology as well as a group of several South American species in which accessory black rings are sometimes present (the bicoloured group).

Clearly this major group warrents recognition at the genus level and this is done here.
The new genus *Hoserelapidea* gen. nov. is then subdivided three ways, including the nominate subgenus (*Hoserelapidea* subgen. nov.).

The two species in the "Central American Triad Bearing Group" are placed in a new subgenus herein, namely *Binghamus* subgen. nov. as they do not appear to be related from the lower Central American and South American "Triad coral snakes", which remain in the genus *Micrurus.*

The group of several South American species in which accessory black rings are sometimes present (the so-called "bicoloured group") are placed in a new subgenus (of *Hoserelapidea* gen nov.) namely *Troianous* subgen. nov..

Triad coral snakes, those remaining in *Micrurus*, are those patterned with three black rings between each pair of red rings, (i.e. red/black/yellow/black/yellow/black/red).

It should be noted that some very recently described taxa placed within the (broadly interpreted) genus *Micrurus* have been ignored in terms of this paper. However all can be readily assigned to the genera and/or subgenera diagnosed herein on the basis of the characters given.

***HOSERELAPIDEA* GEN. NOV.**

Type species: *Micrurus fulvius* (Linnaeus, 1766) originally described as *Coluber fulvius* Linnaeus, 1766.

Diagnosis: A group of coral snakes differentiated from those (remaining) in genus *Micrurus* by hemipenal morphology; this group includes the species with mondal black rings (including *M. fulvius*) as well as the two species with triads found in Mexico and Guatemala (*elegans* and *laticollaris*); and several South American species in which accessory black rings are sometimes present, all have hemipenes that closely resemble those of genus *Micruroides*; members of this group of snakes have long, slender, strongly bifurcate organs that extend from 8 to 15 subcaudals (up to 19); the length of the lobes is equal to about one third to one half that of the base; a deep, naked furrow extends parallel to the sulcus spermaticus from the base of the organ to the base of a lobe; this furrow is situated dorsomedially when the organ is inverted; in these species the sulcus spermaticus bifurcates at the level of the fifth to tenth subcaudal and extends to the apex of each lobe; each lobe is tapered (strongly attenuate in *browni*), and *fulvius* has spinulate awns that terminate in a papilla; proximally the organ posesses tiny spines (naked on the asulcate side in some species) that gradually increase in size distally; the proximal one-half of each lobe bears long, slender spines that diminish in size toward the apex; the crotch and areas flanking each branch of the sulcus on the proximal position of each lobe are naked.

By contrast members of the other group of coral snakes, including the South American species with a pattern of triads (including the type species for existing genus *Micrurus*, namely *spixii*) have short, rotund, bilobed hemipenes that often extend only about 5-6 subcaudals, but may be as long as 10-11 subcaudals in some species. The lobes are correspondingly short, one fourth to one third the length of the base. The deep, naked furrow so conspicuous in the first group is absent. The sulcus spermaticus is bifurcate and extends to the apices. All but the proximal postion of the base of the organ, which has tiny spinules, is covered by moderate-sized, subequal, somewhat flexible spines.

Most species in the widespread genus *Hoserelapidea* gen. nov. have black rings arranged singly in a red-yellow-black-red-yellow-red sequence. A few species depart from this colour pattern and may be only red and black (*bernardi*, *limbatus* and some *nigrocinctus*). *Hoserelapidea* gen. nov. are the dominant group of coral snakes in North and Central America, with many species also found in South America.

Some South American species have melanized patterns in which the red colouration has become strongly or totally obscured. Some populations of otherwise monadal patterned coral snakes have clearly independently evolved a triad pattern in the form of poorly developed accessory black rings (*dumerilii*, *sangilensis*), but they appear to belong in this genus.
The tail is relatively long, at least 11 percent of the total length in males and up to 18-20 percent in species such as *averyi* and *dumerilii*; females have tails that are usually 7-12 percent of the total length.
As already mentioned, the hemipenis in this genus is strongly bilobed and slender with lobes that are distinct from the base.

Etymology: Named in honour of my oldest daughter Adelyn Hoser. In mid 2012, she bravely volunteered to publicly be bitten by our venomoid snakes, in this case a Death Adder (*Acanthophis cummingi*) and an Inland Taipan (*Parademansia microlepidota*) to shatter ongoing lies by business rivals and their friends in the government wildlife department, (DSE), who had falsely claimed that the snakes had regenerated venom and were a public safety risk.

Adelyn's bravery didn't relate to the snakes, as they were totally harmless. Instead it came from the inevitable hatred and reprisals that came from the others, now publicly exposed as pathological liars. The DSE officers exposed as liars attacked her at home in a heavily armed 11 man, 9 hour raid, conducted 7 days after the lie busting video was publicly released (the armed raid being on 17 August 2011).

Species in the genus *Hoserelapidea* subgen. nov.

H. albicinctus (Amaral 1926)
H. alleni (Schmidt 1936)
H. annellatus (Peters 1871)
H. averyi (Schmidt 1939)

H. bernadi (Cope 1887)

H. bocourti (Jan 1872)

H. bogerti (Roze 1967)
H. browni (Schmidt and Smith 1943)
H. catamayensis (Roze 1989)
H. circinalis (Dumeril and Bibron 1854)

H. clarki (Schmidt 1936)

H. corallinus (Merrem 1820)

H. diastema (Dumeril, Bibron and Bibron 1854)

H. distans (Kennicott 1861)

H. dumerilii (Jan 1858)
H. elegans (Jan 1858)

H. ephippifer (Cope 1886)
H. fulvius (Linnaeus 1766)

H. hippocrepis (Peters 1862)
H. langsdorffi (Wagler 1824)
H. laticollaris (Peters 1869)
H. latifasciatus (Schmidt 1933)
H. limbatus (Fraser 1964)
H. margaritiferus (Roze 1967)

H. medemi (Roze 1967)

H. mertensi (Schmidt 1936)
H. mipartitus (Dumeril, Bibron and Dumeril 1854)
H. multifasciatus (Jan 1858)

H. multiscutatus (Rendahl and Vestergren 1940)
H. nebularis (Rose 1989)
H. nigrocinctus (Girard 1855)
H. oligoanellatus (Ayerbe and Lopez 2002)

H. ornatissimus (Jan 1858)

H. pachecogili (Campbell 2000)

H. paraensis (Cunha and Nascimento 1973)

H. peruvianus (Schmidt 1936)

H. petersi (Roze 1967)

H. proximans (Smith and Chrapliwy 1958)

H. psyches (Daudin 1803)

H. putumayensis (Lancini 1962)

H. remotus (Roze 1987)

H. ruatanus (Gunther 1895)

H. sangilensis (Niceforo-Maria 1942)

H. spurelli (Boulenger 1914)
H. steindachneri (Werner 1901)

H. stewarti (Barbour and Amaral 1928)
H. stuarti (Roze 1967)
H. tener (Baird and Girard 1853)

***BINGHAMUS* SUBGEN. NOV.**

Type species: *Micrurus elegans* (Jan 1858)

Originally described as *Elaps elegans* Jan 1858

Diagnosis: This subgenus is a phenetic grouping of two known species endemic to Mexico whose triad pattern was apparantly derived independently from the monad group of coral snakes consisting the majority of *Hoserelapidea* gen. nov.; both species have distinct triads although individual white rings are reduced to paired transverse series of pale scales in the taxon *elegans*, and both species have relatively long tails; the tail comprises 12-15 percent of the total length in *elegans* males and 8-9 percent of the total length in females; in *laticollaris* the tail comprises 11-13 percent of the total length in males and 10-11 percent of the total length in females; the hemipenes in this group are essentially the same as for the genus *Hoserelapidea* gen. nov.; triad bearing species are unusual in middle America, noting again that both are restricted in distribution to Mexico.

Troianous subgen. nov. snakes are sometimes called the "bicoloured group" of coral snakes and are separated from *binghamus* subgen. nov. snakes by the following: members of that group have body rings of black and orange (red) or black and white; the parietal and tail rings of the black-and-white species may be orange or red-orange; the body form is very elongated and slender for coral snakes with short tails that comprise 6-10 percent of the total length in males and 4-9 percent in females;

Trioanus subgen. nov. snakes have a distribution from Nicaragua in lower central America into South America, which is outside the known range for *binghamus* subgen. nov. species..

By a process of elimination, snakes not conforming to placement within the subgenera *Binghamus* subgen. nov. or *Troianus* subgen. nov. remain within the subgenus *Hoserelapidea* subgen. nov..

All within the genus *Hoserelapidea* gen. nov including these two species within this subgenus have hemipenes that closely resemble those of genus *Micruroides*; members of

this group of snakes have long, slender, strongly bifurcate organs that extend from 8 to 15 subcaudals (up to 19); the length of the lobes is equal to about one third to one half that of the base; a deep, naked furrow extends parallel to the sulcus spermaticus from the base of the organ to the base of a lobe; this furrow is situated dorsomedially when the organ is inverted; in these species the sulcus spermaticus bifurcates at the level of the fifth to tenth subcaudal and extends to the apex of each lobe; each lobe is tapered (strongly attenuate in *browni*), and *fulvius* has spinulate awns that terminate in a papilla; proximally the organ posesses tiny spines (naked on the asulcate side in some species) that gradually increase in size distally; the proximal one-half of each lobe bears long, slender spines that diminish in size toward the apex; the crotch and areas flanking each branch of the sulcus on the proximal position of each lobe are naked.

By contrast members of the other group of coral snakes, those remaining in the genus *Micrurus*, including the South American species with a pattern of triads (including the type species for existing genus *Micrurus*, namely *spixii*) have short, rotund, bilobed hemipenes that often extend only about 5-6 subcaudals, but may be as long as 10-11 subcaudals in some species. The lobes are correspondingly short, one fourth to one third the length of the base. The deep, naked furrow so conspicuous in the first group is absent. The sulcus spermaticus is bifurcate and extends to the apices. All but the proximal postion of the base of the organ, which has tiny spinules, is covered by moderate-sized, subequal, somewhat flexible spines.

Etymology: Named in honour of snake handler Jarrod Bingham, who has many credits, including doing 24 hour wildlife rescue in Melbourne. Unlike a number of other snake catchers in Melbourne who use “killer tongs” to catch (and at the same time painfully kill) snakes, Jarrod is able to catch snakes quickly, efficently and painlessly for the snakes.

Species in subgenus *Binghamus* subgen. nov.

H. elegans (Jan 1858)
H. laticollaris (Peters 1869)

***TROIANOUS* SUBGEN. NOV.**

Type species: *Micrurus mipartitus* (Dumeril, Bibron and Dumeril 1854)

Originally described as *Elaps mipartitus* Dumeril, Bibron and Dumeril 1854

Diagnosis: *Troianus* subgen. nov. snakes are sometimes called the “bicoloured group” of coral snakes because members of this group have body rings of black and orange (red) or black and white; the parietal and tail rings of the black-and-white species may be orange or red-orange; the body form is very elongated and slender for coral snakes with short tails that comprise 6-10 percent of the total length in males and 4-9 percent in females; The hemipenes are strongly bilobed and slender, with lobes that are distinct from the base.

The snakes have a distribution from Nicaragua in lower central America into South America and are separated from *Binghamus* subgen. nov. snakes by distribution, the latter being endemic to Mexico.

The *Binghamus* subgenus is a phenetic grouping of two known species endemic to Mexico whose triad pattern was apparantly derived independently from the monad group of coral snakes consisting the majority of *Hoserelapidea* gen. nov.; both species have distinct triads although individual white rings are reduced to paired transverse series of pale scales in the taxon *elegans*, and both species have relatively long tails; the tail comprises 12-15 percent of the total length in *elegans* males and 8-9 percent of the total length in females; in *laticollaris* the tail comprises 11-13 percent of the total length in males and 10-11 percent of the total length in females; by a process of elimination, snakes not conforming to placement within the subgenera *Binghamus* subgen. nov. or *Troianus* subgen. nov. remain within the subgenus *Hoserelapidea* subgen. nov..

All within the genus *Hoserelapidea* gen. nov including the four species within this subgenus have hemipenes that closely resemble those of genus *Micruroides*; members of this group of snakes have long, slender, strongly bifurcate organs that extend from 8 to 15 subcaudals (up to 19); the length of the lobes is equal to about one third to one half that of the base; a deep, naked furrow extends parallel to the sulcus spermaticus from the base of the organ to the base of a lobe; this furrow is situated dorsomedially when the organ is inverted; in these species the sulcus spermaticus bifurcates at the level of the fifth to tenth subcaudal and extends to the apex of each lobe; each lobe is tapered (strongly attenuate in *browni*), and *fulvius* has spinulate awns that terminate in a papilla; proximally the organ posesses tiny spines (naked on the asulcate side in some species) that gradually increase in size distally; the proximal one-half of each lobe bears long, slender spines that diminish in size toward the apex; the crotch and areas flanking each branch of the sulcus on the proximal position of each lobe are naked.

By contrast members of the other group of coral snakes, those remaining in the genus *Micrurus*, including the South American species with a pattern of triads (including the type species for existing genus *Micrurus*, namely *spixii*) have short, rotund, bilobed hemipenes that often extend only about 5-6 subcaudals, but may be as long as 10-11 subcaudals in some species. The lobes are correspondingly short, one fourth to one third the length of the base. The deep, naked furrow so conspicuous in the first group is absent. The sulcus spermaticus is bifurcate and extends to the apices. All but the proximal postion of the base of the organ, which has tiny spinules, is covered by moderate-sized, subequal, somewhat flexible spines.

Etymology: Named in honour Christopher Troiano, a valued staff member at Snakebusters, hold the animals, known widely as Australia’s best reptile shows. For many years he has carried out essential education and conservation work in terms of reptiles in the Australian state of Victoria.

His job has been made all the more difficult due to the commercially motiviated lies and misinformation peddled by newly licenced and unethical business operators who “compete” in the same space, corruptly aided and abetted by their close friends within the State Government authorities. The attacks have included the sending of thugs to our public displays to create trouble, steal and damage property, attack and steal reptiles and make false complaints.

The situation is made worse here in that those who compete against us also regulate us in what is clearly an improper situation, the main competitor in our space being the dysfunctional government run “Zoos Victoria” encompassing three very poorly run facilities (Melbourne Zoo, Werribee Zoo and Healesville Zoo), in which mistreatment and poor husbandry of animals is endemic, as is the dissemination of false and misleading information.
On 9 March 2012, the Victorian government authority (DSE) (part of the “Zoos Victoria” umbrella) and the government

regulator of Snakebusters, made a false claim that the Snakebusters venomoid snakes had regenerated venom (not possible) and then claimed that Snakebusters were therefore unsafe, leading them to unlawfully cancel my own (Raymond Hoser) operating licences.

As a result they effectively closed down the most successful independent wildlife education business in the state's history. As a result about 1,000 bookings had to be cancelled immediately.
To his credit Christopher Troiano and Michael Laidlaw, in association with (independently licenced) Federico Rossignolli quickly got their own licences independent of myself to allow vitally important Snakebusters education to continue (albiet at a very reduced scale) and for the company to honour a number of pre-booking commitments that were able to be resurrected.
The importance herein is that had these established clients gone and seen the less experienced imitators (their mobile wildlife shows), then they would have been at safety risk, due in part to the consistently wrong and dangerous advice given by these people and equally significantly due to their extremely dangerous public displays of highly venomous elapid snakes without appropriate safety protocols, barriers that fail to comply with government regulations and with snakes that have not been surgically devenomized.

By way of telling example on 1 April 2012 (yes, April fool's day!) a man followed advice peddled by the inexperienced imitators and their friends in the DSE to the effect that "dry bites" are common from Tiger Snakes and failed to seek treatment after being bitten.

The man had allegedly used tongs to catch the snake at Albanvale in Melbourne's west.
After he collapsed, he was rushed to hospital where he remained in a critical condition for some days due to internal blood clots and other complications. He was fortunate not to have died.

In 2011 two other well-known snake handlers, including Aleta Stacey of the USA, died from snakebites after receiving false advice from Snakebusters competitors that"dry bites" from venomous snakes are common and happen most of the time. It was reported in the media, that Stacey had received this advice from anti-venomoid campaigner Al Coritz, who also posts various bits of tripe on the internet under various names including "Viperkeeper".

The false "dry bite" claims are part of the elaborate hoax being peddled to the effect that venomoid snakes are a public safety risk. The dry bite claim is raised to enable an explanation of the situation whereby myself and others can sustain numerous bites, with no ill effect, while the claim is maintained that they have regenerated venom and therefore are a public safety risk (the claim being that I am extremely fortunate to have had a few hundred venomous venomoid bites and all have been "dry bites", even though the snakes must have regenerated venom).
The exact same claims are peddled on "Wikipedia" and other internet sites edited by Wolfgang Wüster and others, where they appear credible, are widely believed and continue to put people at risk.

Species in subgenus *Troianus* subgen. nov.

H. mipartitus (Dumeril, Bibron and Dumeril 1854)
H. multifasciatus (Jan 1858)

H. multiscutatus (Rendahl and Vestergren 1940)
H. spurelli (Boulenger 1914)

***HOSERELAPIDEA* SUBGEN. NOV.**

Type species: *Micrurus fulvius* (Linnaeus, 1766)
Originally described as *Coluber fulvius* Linnaeus, 1766.

Diagnosis: As for genus *Hoserelapidea* (see above). Separated from subgenera *Binghamus* subgen. nov. and *Troianus* subgen. nov. by the following:

Troianus gen. nov. snakes are sometimes called the "bicoloured group" of coral snakes because members of this group have body rings of black and orange (red) or black and white; the parietal and tail rings of the black-and-white species may be orange or red-orange; the body form is very elongated and slender for coral snakes with short tails that comprise 6-10 percent of the total length in males and 4-9 percent in females; The hemipenes are strongly bilobed and slender, with lobes that are distinct from the base.

The snakes have a distribution from Nicaragua in lower central America into South America and are separated from *Binghamus* subgen. nov. snakes by distribution, the latter being endemic to Mexico.

The *Binghamus* subgenus is a phenetic grouping of two known species endemic to Mexico whose triad pattern was apparantly derived independently from the monad group of coral snakes consisting the majority of *Hoserelapidea* gen. nov.; both species have distinct triads although individual white rings are reduced to paired transverse series of pale scales in the taxon *elegans*, and both species have relatively long tails; the tail comprises 12-15 percent of the total length in *elegans* males and 8-9 percent of the total length in females; in *laticollaris* the tail comprises 11-13 percent of the total length in males and 10-11 percent of the total length in females; by a process of elimination, snakes not conforming to placement within the subgenera *Binghamus* subgen. nov. or *Troianus* subgen. nov. remain within the subgenus *Hoserelapidea* subgen. nov..

All within the genus *Hoserelapidea* gen. nov including the species within this subgenus have hemipenes that closely resemble those of genus *Micruroides*; members of this group of snakes have long, slender, strongly bifurcate organs that extend from 8 to 15 subcaudals (up to 19); the length of the lobes is equal to about one third to one half that of the base; a deep, naked furrow extends parallel to the sulcus spermaticus from the base of the organ to the base of a lobe; this furrow is situated dorsomedially when the organ is inverted; in these species the sulcus spermaticus bifurcates at the level of the fifth to tenth subcaudal and extends to the apex of each lobe; each lobe is tapered (strongly attenuate in *browni*), and *fulvius* has spinulate awns that terminate in a papilla; proximally the organ posesses tiny spines (naked on the asulcate side in some species) that gradually increase in size distally; the proximal one-half of each lobe bears long, slender spines that diminish in size toward the apex; the crotch and areas flanking each branch of the sulcus on the proximal position of each lobe are naked.

By contrast members of the other group of coral snakes, those remaining in the genus *Micrurus*, including the South American species with a pattern of triads (including the type species for existing genus *Micrurus*, namely *spixii*) have short, rotund, bilobed hemipenes that often extend only about 5-6 subcaudals, but may be as long as 10-11 subcaudals in some species. The lobes are correspondingly short, one fourth to one third the length of the base. The deep, naked furrow so conspicuous in the first group is absent. The sulcus spermaticus is bifurcate and extends to the apices. All but the proximal postion of the base of the organ, which has tiny spinules, is covered by moderate-sized, subequal, somewhat flexible spines.

Etymology: Named in honour of the author's daughter Adelyn Hoser (see for genus).

Species in subgenus *Hoserelapidea* subgen. nov.

H. albicinctus (Amaral 1926)
H. alleni (Schmidt 1936)
H. annellatus (Peters 1871)
H. averyi (Schmidt 1939)
H. bernadi (Cope 1887)
H. bocourti (Jan 1872)
H. bogerti (Roze 1967)
H. browni (Schmidt and Smith 1943)
H. catamayensis (Roze 1989)
H. circinalis (Dumeril and Bibron 1854)
H. clarki (Schmidt 1936)
H. corallinus (Merrem 1820)
H. diastema (Dumeril, Bibron and Bibron 1854)
H. distans (Kennicott 1861)
H. dumerilii (Jan 1858)
H. ephippifer (Cope 1886)
H. fulvius (Linnaeus 1766)
H. hippocrepis (Peters 1862)
H. langsdorffi (Wagler 1824)
H. latifasciatus (Schmidt 1933)
H. limbatus (Fraser 1964)
H. margaritiferus (Roze 1967)
H. medemi (Roze 1967)
H. mertensi (Schmidt 1936)
H. nebularis (Rose 1989)
H. nigrocinctus (Girard 1855)
H. oligoanellatus (Ayerbe and Lopez 2002)
H. ornatissimus (Jan 1858)
H. pachecogili (Campbell 2000)
H. paraensis (Cunha and Nascimento 1973)
H. peruvianus (Schmidt 1936)
H. petersi (Roze 1967)
H. proximans (Smith and Chrapliwy 1958)
H. psyches (Daudin 1803)
H. putumayensis (Lancini 1962)
H. remotus (Roze 1987)
H. ruatanus (Gunther 1895)
H. sangilensis (Niceforo-Maria 1942)
H. steindachneri (Werner 1901)
H. stewarti (Barbour and Amaral 1928)
H. stuarti (Roze 1967)
H. tener (Baird and Girard 1853)

GENUS *MICRURUS*, WAGLER 1824

Type species: *Micrurus spixii* Wagler 1824

(New) Diagnosis: Members of this other group of coral snakes, including the South American species with a pattern of triads (including the type species for existing genus *Micrurus*, namely *spixii*) have short, rotund, bilobed hemipenes that often extend only about 5-6 subcaudals, but may be as long as 10-11 subcaudals in some species. The lobes are correspondingly short, one fourth to one third the length of the base. The deep, naked furrow so conspicuous in the other genera of coral snakes formerly placed within this genus is absent. The sulcus spermaticus is bifurcate and extends to the apices. All but the proximal postion of the base of the organ, which has tiny spinules, is covered by moderate-sized, subequal, somewhat flexible spines.

The other coral snakes formerly placed in genus *Micrurus* are separated from *Micrurus* by hemipenal morphology; this group described herein as *Hoserelapidea* gen. nov. includes the species with mondal black rings as well as the two species with triads found in Mexico and Guatemala (*elegans* and *laticollaris*); and several South American species in which accessory black rings are sometimes present, all have hemipenes that closely resemble those of genus *Micruroides*; members of this group of snakes have long, slender, strongly bifurcate organs that extend from 8 to 15 subcaudals (up to 19); the length of the lobes is equal to about one third to one half that of the base; a deep, naked furrow extends parallel to the sulcus spermaticus from the base of the organ to the base of a lobe; this furrow is situated dorsomedially when the organ is inverted; in these species the sulcus spermaticus bifurcates at the level of the fifth to tenth subcaudal and extends to the apex of each lobe; each lobe is tapered (strongly attenuate in *browni*), and fulvius has spinulate awns that terminate in a papilla; proximally the organ posesses tiny spines (naked on the asulcate side in some species) that gradually increase in size distally; the proximal one-half of each lobe bears long, slender spines that diminish in size toward the apex; the crotch and areas flanking each branch of the sulcus on the proximal position of each lobe are naked.

Most species in the widespread genus *Hoserelapidea* gen. nov. have black rings arranged singly in a red-yellow-black-red-yellow-red sequence. A few species depart from this colour pattern and may be only red and black (*bernardi*, *limbatus* and some *nigrocinctus*). *Hoserelapidea* gen. nov. are the dominant group of coral snakes in North and Central America, with many species also found in South America.

Some South American species have melanized patterns in which the red colouration has become strongly or totally obscured. Some populations of otherwise monadal patterned coral snakes have clearly independently evolved a triad pattern in the form of poorly developed accessory black rings (*dumerilii*, *sangilensis*), but they appear to belong in this genus.

The tail is relatively long, at least 11 percent of the total length in males and up to 18-20 percent in species such as *averyi* and *dumerilii*; females have tails that are usually 7-12 percent of the total length.

As already mentioned, the hemipenis in the genus *Hoserelapidea* gen. nov. is strongly bilobed and slender with lobes that are distinct from the base.

Etymology: Derives from the Greek *mikros*, meaning "small" and *oura*, meaning "tail", with reference to the short tail in these snakes.

Species within genus *Micrurus* (as defined herein)

M. altirostris (Cope 1860)
M. ancoralis (Jan 1872)
M. baliocoryphus (Cope 1860)
M. brasiliensis (Roze 1967)
M. decoratus (Jan 1858)
M. diana (Roze 1983)
M. dissoleucus (Cope 1860)
M. filiformis (Gunther 1859)
M. frontalis (Dumeril, Bibron and Dumeril 1854)
M. hemprichii (Jan 1858)
M. ibiboboca (Merrem 1820)
M. isozonus (Cope 1860)

M. lemniscatus (Linnaeus 1758)

M. meridensis (Roze 1989)

M. pyrrhocryptus (Cope 1862)

M. serranus (Harvey, Aparicio-E and Gonzalez-A 2003)

M. spixii (Wagler 1824)
M. surinamensis (Cuvier 1817)

M. tschudii (Jan 1858)

IN EVENT OF CONFLICT OF NAMES (CORAL SNAKES)

In the event of any name conflicts arising as a result of findings by other researchers and any "first revisor" issues that may arise in terms of nomenclature and current ICZN rules and codes the following should be adopted specifically with reference to the names used herein.

As a formality, I should note that, if there is a conflict in that two names assigned herein are designated and "available" for a given genus group as redefined by a later worker or author, the order of priority should always be as follows: Genus name should always take priority and precedence over a subgenus name.

For those names assigned herein at the subgenus level the order of priority should be: *Binghamus, Troianous*.

SUMMARY AND END COMMENTS

Based on recent reclassifications of other reptile groups and the undisputed evidence of phylogeny of the rattlesnakes as detailed in the papers cited herein, the group arrangement of rattlesnakes as described herein is simply a statement of the obvious.

It also is a different arrangement in terms of nomenclature to all previous published to date.

Likewise for the above reclassification of the traditional genus *Micrurus* (although the comments below relate more to the rattlesnakes).

I do not by any stretch of the imagination claim to be the first to group known rattlesnakes into distinct subgroups for which genus level classification is the obvious next step.

Amazingly however, I do herein claim to be the first to actually take that logical step and define and name the main genera of rattlesnakes, beyond the now antiquated "catch all" genus "*Crotalus*", effectively abandoned here (excluding taxa remaining in the genus).

The division of rattlesnakes into just nine genera is in fact very conservative in terms of modern classification methods and taxonomy.

In reality, the 17 named genera model, incorporating the seven named subgenera, elevated subsequently to be full genera, may be the consensus position of most herpetologists some decades from now.

Rather than naming all 16 groups as genus level, I have taken the most conservative position possible, while allowing for a consistent position in terms of defining the various main groups of rattlesnakes at the genus level.

The delineation of the main groups, largely reflective of the evidence as tabled in Murphy et. al. (2002), at the genus level in this paper effectively names all major groups based on earliest divergences.

Secondarily divergent groups have been named at the subgenus level, so as to allow future workers the option of continuing the conservative arrangement herein, or if so inclined to elevate the subgenera to full genus level.

Rather than having this happen at an ad-hoc basis within given groups, I have dealt with all rattlesnakes globally to keep matters consistent and for the benefit of other herpetologists working on one or more groups of rattlesnakes.

An advantage of the process within this paper is that evident affinities between subgroups remain identified, while allowing all obvious subgroups to have valid names.

The genera and subgenera as defined herein can be reasonably inferred to have been separate groups for a long time. In the case of the genera defined and based on the references cited, it can be reasonably inferred that all have been separated from one another for at least ten million years.

By way of example Quijada-Mascarenas and Wüster 2006 claim a 13 million year divergence between *Caudisona* (as defined herein) and *Smythus* subgen. nov. as defined here, making the designation at the subgenus level conservative indeed.

By any reasonable stretch, this time span allows for differentiation at the genus level, making this name available in the event this becomes the consensus position later.

The results of Murphy et. al. 2002 show that for other herein named generic groups the divergence almost certainly well predates the 13 million year figure for the *Caudisonal Smythus* split.

Referring to the species taxon *ravus*, it is clear from the molecular evidence, that short of lumping all former *Sistrurus* and *Crotalus* into a single genus, there is absolutely no realistic alternative but to place the taxon in another genus, herein named *Piersonus* gen. nov.

For the lay person, I can simply compare the current taxonomy and nomenclature of the great apes (defined herein as Humans, Chimpanzees, Gorillas and Orang-utans) and the taxonomy and nomenclature of the rattlesnakes.

Humans, Chimpanzees, Gorillas and Orang-utans have all been placed in separate genera (by most biologists for many years), namely *Homo*, *Pan*, *Gorilla* and *Pongo* and yet have had their divergence dates (from the human line) reliably plotted in the vicinities of 4, 8 and 12 million years, all being under the time frames postulated for the various rattlesnake groups within this paper. See for example, Hobolth, A., Christensen O. F., Mailund T, Schierup M. H. (2007), Stauffer et. al. (2001), Chen and Li (2001), Carroll (2003) and sources cited within these papers, the primary (2007) paper quoting a 4.1 million-year-old date for the Human/Chimp split.

For Gibbons, with a diversion from the human lineage plotted at between 18 and 12 Million years ago, biologists have gone so far as to place them in a separate family, *Hylobatidae*, which if cross applied consistently to the rattlesnakes would place some genera as defined here within the same realm.

Please note, I do not advocate such a split for these snakes (at family level).

However of note is that no species of *Homo* is known from more than three million years ago, with most authorities putting the furthest date at about two million years ago.

LIKELY REACTIONS TO THE NEW CLASSIFICATION OF RATTLESNAKES

Upon publication of this paper, I can safely anticipate the likely result in the herpetological community.

If consistency means that the four higher ape genera of *Homo*, *Pan*, *Gorilla* and *Pongo* remain separate, then surely the same must apply to the rattlesnakes described above.

Some will accept the classification within and use it forthwith

and others won't.

However by relying on published data, including the molecular and morphological and consistent criteria, two sets of arguments should be avoided.

One argument raised at times of reclassification, is to question the evidence. The papers of Murphy et. al. 2002 and data within, as well as other cited studies of the molecular biology of these snakes provides more than sufficient evidence of differentiation between named genus and subgenus groups.

As the differences between groups are not in dispute (except perhaps by so-called "flat earthers"), the only potential for argument is to where one draws the line in terms of defining "genus", or "subgenus".

Reference to recent reclassifications elsewhere involving reptiles also shows that it is consistent to apply the same reasoning to the rattlesnakes to derive the said genera, at the above identified points of division as a most conservative position.

On that basis, I see it as inevitable that the broad thrust of what is presented here, will be accepted in total by herpetologists within a generation (20 years).

In the short term there will be two main lines of resistance.

One will be from those opposed to any change and prefer to use nomenclature they know is wrong, but know (as in remember) nonetheless.

For some herpetologists, there is short-term argument this way.

However over time this will subside.

More insidious is the inevitable resistance from a small group of so-called herpetologists and others, who oppose anything I do. Known generally as the "truth haters", they include individuals by the names of Wulf Schleip, Wolfgang Wüster and David Williams, who between them have a consistent and long track record of form including repeated scientific frauds, plagiarisation, lies, misrepresentations, convictions for wildlife smuggling, animal cruelty, illegal rigging of online hotel competitions and more.

If their past (last 10 years) performance is anything to go by, you can expect them to threaten journal editors who dare to publish so-called "Hoser nomenclature", and to stalk and harass internet sites that use any "Hoser names".

For a better appraisal of the tactics of these men see Hoser (2009), or Hoser (2012).

The warnings against these people and their tactics apply here again.

While arguments with merit are always worthwhile, I'd have trouble recalling any from any of these people (or their aliases and assumed names they post under), at any stage in the last ten years in terms of claims against my papers and the like.

There is no doubt that this small group of "truth haters" will present the greatest resistance to the adoption of the taxonomy and nomenclature within this paper.

However I liken their expected resistance to that of a man trying to stop the tide from coming in.

Fortunately the ultimate test of science is the truth and not which group of individuals makes the most "noise".

RATTLESNAKE AND REPTILE CONSERVATION

While this paper isn't about this topic, it is clear that it is close to my heart as indicated by the names assigned to some taxa and the histories of those persons so honoured.

It is a fact of life that people only desire to protect and study animals if they have access to them.

To that extent I have worked for this ideal in Australia, the USA and elsewhere for more than 30 years.

It is no co-incidence that my greatest adversaries are also included among the greatest threats to the conservation cause.

In Australia, the very group of people just named who have spent years doing little more than stalking the web and attacking my interests, have also been responsible for the recent attempts to remove the hard-won rights of private individuals to keep reptiles as pets in this jurisdiction.

They have also perpetuated the idea that is acceptable to inflict cruelty and death to snakes by mishandling with back-breaking tongs and other brutal methods, which when copies lead to increased deaths of reptiles and humans alike.

Convicted smuggler David John Williams (posting on the internet under countless pseudonyms, including "toxinologist"), for many years himself a private keeper of reptiles was one such person who's own interests could be conceivably impacted from any government ban in keeping reptiles.

His actions against private keepers have however been fuelled in part by his own recently found security in that he has associated himself with Melbourne University as a newly incarnated "academic" and can run around the countryside collecting and keeping reptiles under their government owned umbrella.

His close friend Wolfgang Wüster has been in a similar position in Wales (UK) and actively aided and abetted the removal of the rights of private keepers in his jurisdiction, happy in the knowledge that this helps remove his potential "competitors".

In the USA, where until recently individual freedoms were greatly cherished, the same threats to private ownership of reptiles has re-emerged with the recently enacted Giant Constrictors ban of 2012, the first in a long list of restrictions likely to be imposed.

The two above-named men have worked hard to white-ant resistance to these newly enacted and further proposed bans on keeping and studying reptiles.

This includes inflammatory posts on internet forums and elsewhere with a view to attacking and discrediting the main advocates in favour of retaining the rights of private individuals to have contact with wildlife (including all reptiles).

The attempts to ban ownership start on species perceived as "dangerous", like rattlesnakes and "killer pythons", as seen in proposals like that recently enacted on pythons by the US Federal government.

Once "law" the anti's use this success as encouragement to go further and to seek to ban other "pets", the endpoint being a total removal of public access to wildlife.

At that point a general desire to study and conserve these species is also removed.

The long term endpoint is a heightened risk of extinction for taxa for several reasons.

This includes the fact that there are few if any captive stocks to protect against any calamity that may exterminate wild stocks.

At the present time, few rattlesnakes are regarded as threatened, however as seen with the frogs declining through

Chytrid fungus (*Batrachochytrium dendrobatidis*) over the last three decades (Di Rosa, et. al. 2007, Stuart, et. al. 2004), it is entirely possible for common and "secure" species to become rare, endangered or even "extinct" within a few short years.

Noting that numerous pathogens have been spread worldwide, the details of which are generally little known, it'd be reckless to do anything that may reduce the chances of survival for any higher vertebrate taxa, including rattlesnakes, coral snakes and all other reptiles.

To that end, readers are asked to use common sense and support the right of all sections of the community to have (as a general right) legal and unfettered access to wildlife including rattlesnake species.

The claims of danger and the like in terms of the snakes do not carry weight either.

The number of people killed annually be these creatures is nothing compared to the millions who die from smoking, driving motor vehicles, skin cancer and diet/obesity related diseases, and yet there are no major pushes to ban people from smoking, sunbaking, driving motor vehicles or eating rubbish food.

Keeping younger (under 18 year-old) people away from so-called dangerous snakes like rattlesnakes does not do any benefit to the long-term safety of the majority.

With common sense, bites (of humans) are virtually unheard of and children discouraged from interacting with wildlife, including rattlesnakes are more likely to turn to harmful alternatives like drugs, violence and the like.

Many teenagers are mature and capable enough of interacting with venomous reptiles without undue risk of harm to either themselves or the snakes.

In other words it is in our own self-interest and that of our children to conserve wildlife including the rattlesnakes and to ensure that public have access to this wildlife.

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Most have been named previously either at the end of other papers or in the relevant sections of my nine books.

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SUMMARY OF KNOWN LIVING RATTLESNAKE (SPECIES) TAXA AND THEIR NEW GENERIC AND SUBGENERIC PLACEMENTS (HOSER 2012)

GENUS *SISTRURUS* GARMAN 1883

Type species: *Crotalinus catenatus* Rafinesque 1918.

S. miliarius (Linne 1766)

GENUS *PIERSONUS* GEN. NOV.

Type Species: *Crotalus ravus* Cope 1865

P. ravus (Cope 1865)

GENUS *CROTALUS* LINNE 1758

Type Species: *Crotalus horridus* Linne 1758

SUBGENUS *SAYERSUS* SUBGEN. NOV.

Type species: *Crotalinus viridis* Rafinesque 1818

C. scutulatus (Kennicott 1861)

C. oreganus Holbrook 1840

C. abyssus Klauber 1930
C. cerberus Klauber 1949
C. concolor Klauber 1936
C. helleri Meek 1905
C. lutosus Klauber 1930

GENUS *AECHMOPHRYS* COUES 1875

Type species: *Crotalus cerastes* Hallowell 1854

SUBGENUS *COTTONUS* SUBGEN. NOV.

Type species: *Crotalus intermedius* Troschel 1865

A. pricei (Van Denburgh 1895)

A. tancitarensis (Alvarado-Diaz and Campbell 2004

A. transversus (Taylor 1940)

A. willardi (Meek 1905)

SUBGENUS *RATTLEWELLSUS* SUBGEN. NOV.

A. polystictus (Cope 1865)

GENUS *CAUDISONA* LAURENTI 1768

Type species: *Crotalus durissus* Linne 1758

C. culminatus (Klauber 1952)

C. simus (Latreille 1801)

C. tzabcan (Klauber 1952)

C. vegrandis (Klauber 1941)

C. unicolour (van Lidth de Jeude 1887)

SUBGENUS *PILLOTUS* SUBGEN. NOV.

Type species: *Caudisona enyo* Cope 1861

SUBGENUS *SMYTHUS* SUBGEN. NOV.

Type species: *Crotalus molossus* (Baird and Girard 1853)

C. basiliscus Cope 1864

C. estebanensis (Klauber 1949)

C. totonacus (Gloyd and Kauffeld 1940)

GENUS *UROPSOPHUS* WAGLER 1830

Type species: *Uropsophus triseriatus* Wagler 1830

U. aquilus (Klauber 1952)

U. lepidus (Kennicott 1861)

U. pusillus (Klauber 1908)

GENUS *CUMMINGEA* GEN NOV.

Type species: *Crotalus stejnegeri* Dunn 1919

C. ericsmithi (Campbell and Flores-Villella 2008)

C. lannomi (Tanner 1966)

GENUS *HOSEREA* GEN. NOV.

Type species: *Crotalus atrox* Baird and Girard 1853

H. tortugensis (Van Denburgh and Slevin 1921)

SUBGENUS *EDWARDSUS* SUBGEN. NOV.

Type species: *Crotalus adamanteus* Beauvois 1799

SUBGENUS *MULLINSUS* SUBGEN. NOV.

Type species: *Crotalus ruber* Cope 1892

H. exsul (Garman 1883)

H. lorenzoensis (Radcliffe and Maslin 1975)

SUBGENUS *CRUTCHFIELDUS* SUBGEN. NOV.

Type species: *Crotalus catalinensis* Cliff 1954

***MATTEOEA* GEN. NOV.**

Type species: *Caudisona mitchellii* Cope 1861

M. angelensis (Klauber 1963)

M. tigris (Kennicott 1859)

SUMMARY OF KNOWN LIVING NEW WORLD CORAL SNAKES (SPECIES) TAXA AND THEIR NEW GENERIC AND SUBGENERIC PLACEMENTS (HOSER 2012)

GENUS *HOSERELAPIDEA* GEN. NOV.

Type species: *Coluber fulvius* Linnaeus, 1766.

H. albicinctus (Amaral 1926)
H. alleni (Schmidt 1936)
H. annellatus (Peters 1871)
H. averyi (Schmidt 1939)
H. bernadi (Cope 1887)
H. bocourti (Jan 1872)
H. bogerti (Roze 1967)
H. browni (Schmidt and Smith 1943)
H. catamayensis (Roze 1989)
H. circinalis (Dumeril and Bibron 1854)
H. clarki (Schmidt 1936)
H. corallinus (Merrem 1820)
H. diastema (Dumeril, Bibron and Bibron 1854)
H. distans (Kennicott 1861)
H. dumerilii (Jan 1858)
H. ephippifer (Cope 1886)
H. hippocrepis (Peters 1862)
H. langsdorffi (Wagler 1824)
H. latifasciatus (Schmidt 1933)
H. limbatus (Fraser 1964)
H. margaritiferus (Roze 1967)
H. medemi (Roze 1967)
H. mertensi (Schmidt 1936)
H. nebularis (Rose 1989)
H. nigrocinctus (Girard 1855)
H. oligoanellatus (Ayerbe and Lopez 2002)
H. ornatissimus (Jan 1858)
H. pachecogili (Campbell 2000)
H. paraensis (Cunha and Nascimento 1973)
H. peruvianus (Schmidt 1936)
H. petersi (Roze 1967)
H. proximans (Smith and Chrapliwy 1958)
H. psyches (Daudin 1803)
H. putumayensis (Lancini 1962)
H. remotus (Roze 1987)
H. ruatanus (Gunther 1895)
H. sangilensis (Niceforo-Maria 1942)
H. steindachneri (Werner 1901)
H. stewarti (Barbour and Amaral 1928)
H. stuarti (Roze 1967)
H. tener (Baird and Girard 1853)

SUBGENUS *BINGHAMUS* SUBGEN. NOV.

Type species: *Elaps elegans* Jan 1858

H. laticollaris (Peters 1869)

***TROIANOUS* SUBGEN. NOV.**

Type species: *Elaps mipartitus* Dumeril, Bibron and Dumeril 1854

H. multifasciatus (Jan 1858)
H. multiscutatus (Rendahl and Vestergren 1940)
H. spurelli (Boulenger 1914)

GENUS *LEPTOMICRURUS* SCHMIDT 1937

Type species: *Elaps collaris* Schlegel 1837

L. narducci (Jan 1863)
L. renjifoi (lamar 2003)
L. scutiventris (Cope 1870)

GENUS *MICRUROIDES* SCHMIDT 1928

Type species: *Elaps Euryxanthus* Kennicott 1861

GENUS *MICRURUS* WAGLER 1824

Type species: *Micrurus spixii* Wagler 1824

M. altirostris (Cope 1860)
M. ancoralis (Jan 1872)
M. baliocoryphus (Cope 1860)
M. brasiliensis (Roze 1967)
M. decoratus (Jan 1858)
M. diana (Roze 1983)
M. dissoleucus (Cope 1860)
M. filiformis (Gunther 1859)
M. frontalis (Dumeril, Bibron and Dumeril 1854)
M. hemprichii (Jan 1858)
M. ibiboboca (Merrem 1820)
M. isozonus (Cope 1860)
M. lemniscatus (Linnaeus 1758)
M. meridensis (Roze 1989)
M. pyrrhocryptus (Cope 1862)
M. serranus (Harvey, Aparicio-E and Gonzalez-A 2003)
M. surinamensis (Cuvier 1817)
M. tschudii (Jan 1858)