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Synopsis of recent developments in venomous snake systematics, No. 3

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Abstract

We present recent findings in the systematics of venomous snakes, with emphasis on those which affect the nomenclature and our understanding of species limits in these animals. Changes in systematics reviewed here include particularly the genera *Acanthophis*, *Elapsoidea*, *Bitis*, *Lachesis*, *Porthidium*, *Trimeresurus/Tropidolaemus* and *Vipera*. Other new publications of more general interest to toxinologists are also presented. © 1999 Elsevier Science Ltd. All rights reserved.

1. Introduction

This paper represents the third instalment of our series of synopses of recent changes in venomous snake systematics (see Wüster et al., 1997a, 1998). The aim of these reviews is to introduce developments in our understanding of the systematics of venomous snakes in a journal read by toxinologists. The series was prompted by a widespread recognition that confusion about the systematics of venomous snakes is all too common in the toxinological and clinical literature, often with the consequence that research results are almost uninterpretable

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(Warrell, 1986; Wüster and McCarthy, 1996). It is hoped that these reviews will improve of this situation.

2. Family Elapidae

2.1. *Acanthophis*: Australasian death adders

Acanthophis is one of the more complex and poorly understood genera of Elapids. Considerable morphological diversity (for example, see illustrations in O'Shea, 1996) was until now covered under very few names, and there have been no comprehensive revisions of the genus.

In a regional herpetological publication, Hoser (1998) reviewed this complex genus and described five new species and one subspecies.

This taxonomic arrangement has not yet been critically evaluated, and the data presented in Hoser's paper do not allow an independent assessment of the situation. It appears that several of the names used by Hoser may be unavailable under the provisions of the International Code of Zoological Nomenclature and should not be used (Aplin, in press; Aplin and Donnellan, in press). This genus deserves a much more substantial and authoritative review, and there is a real danger that Hoser's review will create further confusion rather than help to rationalise the taxonomy of this medically important group. Fortunately, one of the species described by Hoser is now being redescribed and redefined in a peer-reviewed scientific journal (Aplin and Donnellan, in press).

The publication of major revisions of species complexes of venomous snakes in regional journals is controversial due to potential problems of quality control (McCranie and Wilson, 1979; Aplin, in press) and availability to other researchers (Wüster and McCarthy, 1996; Wüster, 1998). In the words of the International Code of Zoological Nomenclature, article 7, recommendation 7A: "Wide dissemination — Authors have a responsibility to ensure that new scientific names, nomenclatural acts and information likely to affect nomenclature are made widely known. This responsibility is most easily discharged by publication in appropriate scientific journals or well-known monographic series." It is unfortunate that this recommendation is often ignored in herpetological systematics. It should also be noted that, at the time when Hoser's publication was written, the description of one of his species by another author was already in press (Aplin, in press; Aplin and Donnellan, in press); careful adherence to the Code of Ethics (Appendix A) of the International Code of Zoological Nomenclature would have prevented this unfortunate situation.

In situations such as this, where our understanding of the systematics of a group is incomplete but evolving rapidly, the question of nomenclature is always going to be problematical, and it is impossible to make recommendations. The main consideration, as always, is that any snake or experimental venom should be identifiable, irrespective of future developments. This is best achieved by providing

as much information as possible about the origin of animals and venoms used in a study, and a frank and open discussion of the problems of the identification and nomenclature of specimens at hand. Researchers working with *Acanthophis* and their venoms would be well advised to ensure that they have *precise* information on the locality of origin of the snakes. The animals involved should be preserved in a natural history collection, so that their identity can be verified and related to further developments in the systematics of this complex genus. Given the uncertain status of many populations of this genus, this kind of information is likely to be taxonomically more informative and more durable than potentially unstable or short-lived scientific names.

2.2. *Elapsoidea*: African garter snakes

Jakobsen (1997) describes *Elapsoidea broadleyi* from southern Somalia. In addition, he provides a key to the entire genus. The systematics of other taxa of the genus from eastern and northeastern Africa are reviewed, and *Elapsoidea loveridgei scalaris* is synonymised with *E. guentherii*. These snakes have not been documented to be of public health importance, but little is known about their venoms, the incidence of accidents and the effects of their bites.

2.3. *Ephalophis*

Shea (1996) notes that the specific name of the only species of the genus should be spelled *greyae*, not *greyi*. Since the species had been named in honour of a Mrs. Beatrice Grey, the specific name must bear the feminine ending.

2.4. *Hydrophis*

Rasmussen and Smith (1997) studied the status of the sea snakes *Hydrophis czeblukovi*, described by Kharin (1984) and *H. geometricus*, described by Smith (1986). The two species were found to be identical and *H. geometricus* is therefore a synonym of *H. czeblukovi*.

2.5. *Naja*: cobras

Wüster et al. (1997b) redescribe *Naja siamensis*, a cobra species only recently confirmed as being distinct from *N. kaouthia* (Wüster and Thorpe, 1994; Wüster et al., 1995). The paper includes a diagnosis to distinguish this species from other Southeast Asian cobra species. Khow et al. (1997) tested the cross-neutralisation of Thai Red Cross *N. kaouthia* antivenom against the venom of *N. siamensis* using the conventional method of preincubation of venom and antivenom before injection into mice. No clinical tests of efficacy have been carried out.

3. Family Viperidae

3.1. *Bitis*: African vipers

Branch (1997) described the new species *Bitis rubida* from the mountains of the Western Cape Province, South Africa. The species was previously discussed and illustrated (as the Cedarberg population of *Bitis inornatus*) by Spawls and Branch (1995).

3.2. *Lachesis*: bushmasters

Zamudio and Greene (1997) used phylogenetic analysis of mitochondrial DNA sequence information to investigate the population systematics of the genus *Lachesis*, hitherto thought to consist of a single species, *L. muta*. Three well-defined lineages were identified, and these are regarded as separate species. The genus *Lachesis* therefore now consists of the following species: *Lachesis muta* (South America east of the Andes, including the Atlantic rainforest of Brazil), *L. melanocephala* (southwestern Costa Rica) and *L. stenophrys* (Atlantic versant of Central America). The status of populations from the Pacific coasts of Colombia and Ecuador remains uncertain. The subspecies *Lachesis muta rhombeata*, from the Atlantic forest of Brazil, is weakly differentiated from the Amazonian populations of *L. muta*, and its recognition appears to be optional.

This reclassification of the bushmasters illustrates the need for information on the locality of origin of venoms or snakes in toxinological publications. Older papers on *Lachesis* venoms with adequate locality information can now be related to the new classification. On the other hand, this is not possible in papers in which venoms or snakes are simply designated as '*Lachesis muta*'. Similarly, in future papers, it will be important to state which *Lachesis* classification is being followed, especially if locality information is not available. A statement describing a venom simply as '*Lachesis muta*', without locality information, would not be sufficient, since this may be interpreted either under the new concept for that name, or under the older, more inclusive, concept. Venom suppliers have a responsibility to ensure the correct identification of their venoms, and of supplying this information to their customers.

3.3. *Porthidium*/*Ophryacus*: Central American pitvipers

Gutberlet (1998) investigated the phylogenetic position of the Mexican black-tailed pitviper, referred to as *Porthidium melanurum* by Campbell and Lamar (1989). His analyses of various morphological characters showed *melanurum* to be the sister species of the Mexican horned pitviper, *Ophryacus undulatus*, and the species was consequently also assigned to the genus *Ophryacus*, becoming *O. melanurus*.

3.4. *Trimeresurus*: Asian pitvipers

Orlov and Helfenberger (1997) described a new species of *Trimeresurus* from high altitudes in the Nepalese Himalayas: *Trimeresurus karanshahi*. This species is most similar to *T. tibetanus*, from which it differs in aspects of scalation (19 rather than 21 midbody scale rows) and pattern.

3.5. *Trimeresurus*/*Tropidolaemus*: Asian pitvipers

David and Vogel (1998) analysed the phylogenetic affinities of the enigmatic southern Indian pitviper hitherto known as *Trimeresurus huttoni*, and found it to be more closely related to *Tropidolaemus wagleri* than to any species of *Trimeresurus*. Consequently, the species should now be known as *Tropidolaemus huttoni*. Only two specimens of this species have been collected since its first description in 1949, so it is unlikely to be of any medical significance.

3.6. *Vipera*: Palaearctic vipers

Joger et al. (1997) studied the phylogeny of the *Vipera berus* complex with the specific aim of elucidating the phylogenetic position of the poorly known species *V. barani* and *V. nikolskii*. Based on morphology, hemipenis structure and mtDNA information, the authors conclude that *nikolskii* should be regarded as a subspecies of *V. berus*, and that *bosniensis* (hitherto regarded as a subspecies of *V. berus*) and *barani* might either constitute subspecies of a single species distinct from *V. berus*, or that they might represent two distinct species within the *V. berus* complex. No definitive new classification is proposed.

4. Other publications

Cox et al. (1998) produced a pocket-sized field guide to the reptiles of Thailand, Peninsular Malaysia and Singapore, with photographs and descriptions of all but three of the region's venomous species.

Das and Whitaker (1996) provided a comprehensive bibliography of the king cobra (*Ophiophagus hannah*).

Those interested in a largely jargon-free introduction to snake biology and evolution can now choose between two useful books, Ernst and Zug (1996) and Greene (1997). The first of these is aimed more at non-biologists, whereas the second is more suited for biologists with an interest in the subject and, in addition to being exceptionally readable and scientifically accurate and thought-provoking, boasts a particularly fine selection of photographs of many species.

Manthey and Grossmann (1997) provide the first field guide to the reptiles and amphibians of Southeast Asia (the Malayan Peninsula and the Indonesian islands of Sumatra, Borneo, Java and intervening smaller islands). Most of the venomous

snakes occurring in the area are illustrated. Unfortunately, some important information on the cobras is wrong and may mislead attempts at identification: *Naja sputatrix* is not found on the Malayan Peninsula; *N. sumatrana* reaches lengths of at least 160 cm and *N. kaouthia* can exceed 200 cm; *N. sumatrana* is only yellowish in southern Thailand and northern Malaysia; specimens from other areas can be black (Malaysia, Borneo) or any shade from tan to blackish (Sumatra), with or without lighter banding. *N. sumatrana* invariably has 179–201 ventrals (not 162–193) and 15–19 dorsal scale rows at midbody (not 17–25); *N. sputatrix* has 17–21 dorsal scale rows at midbody (not 19–25).

Murphy (1997) has produced the first guide to the reptiles and amphibians of Trinidad and Tobago. All venomous species are illustrated and described. This book should also be of considerable use to those working in adjoining parts of the South American mainland.

Zhao and Zhao (1994) provide a very complete survey of the Chinese Herpetological literature, which is otherwise largely inaccessible to western researchers.

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