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An evaluation of the nomina for death adders (*Acanthophis* Daudin, 1803) proposed by Wells & Wellington (1985), and confirmation of *A. cryptamydros* Maddock *et al.*, 2015 as the valid name for the Kimberley death adder

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Abstract

We assess the availability of four names proposed by Wells & Wellington (1985) for Australian death adders (*Acanthophis*). In agreement with previous literature, *A. hawkei* is an available name, whereas *A. armstrongi*, *A. lancasteri*, and *A. schistos* are not described in conformity with the requirements of Articles 13.1.1 or 13.1.2 of the *International Code of Zoological Nomenclature* and are therefore considered *nomina nuda*. Consequently, *A. cryptamydros* Maddock *et al.*, 2015, is confirmed as the valid name for the Kimberley death adder of Western Australia. We comment on the need for greater clarity in the *Code*, and emphasise that the responsibility for establishing the availability of new nomina rests with their authors, not subsequent researchers.

Key words: Nomenclature, taxonomy, *nomen nudum*, Australia, Reptilia, Serpentes, Elapidae

Introduction

Death adders (genus *Acanthophis* Daudin, 1803) are a group of uniquely specialised Australasian elapid snakes best known for their morphological and ecological similarity to vipers (Shine 1980; Greene 1997; Shine *et al*. 2014). The species-level taxonomy of the genus has remained poorly understood, in part as a consequence of contributions by authors operating outside the peer-reviewed scientific literature (see Aplin 1999; Aplin & Donnellan 1999). Among these, Wells & Wellington (1985) proposed four new names for putative species of *Acanthophis*: *A. armstrongi*, *A. hawkei*, *A. lancasteri*, and *A. schistos*. None of the four descriptions provided any morphological or other descriptive information associated with the designated holotype specimens, and largely referred to the published works of other authors for diagnoses and descriptions, including specimen images. While these descriptions were initially ignored in the subsequent literature, the confirmation of considerable cryptic diversity in death adders (Aplin & Donnellan 1999; Wüster *et al*. 2005; Maddock *et al*. 2015) brought these names back into contention as potentially available nomina. This has resulted in taxonomic confusion and nomenclatural instability, particularly in the case of northern Australian *Acanthophis*, which had long been considered part of *A. praelongus* Ramsay, 1877 (e.g., Storr 1981; Cogger 1983, 2000; Ehmann 1992; Storr *et al.* 2002; Wilson & Swan 2003, 2013).

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Wells & Wellington (1985) named *A. lancasteri* from the Kimberley region of Western Australia (WA) and the 'Top End' of the Northern Territory (NT). Several authors (Shea 1987; Aplin 1999; Aplin & Donnellan 1999; Maddock *et al.* 2015; Wüster, 2021) have explicitly considered *A. lancasteri* a *nomen nudum*: the diagnosis was outsourced to Storr (1981), but in these authors' view, Storr did not provide diagnoses compliant with Article 13 of the *International Code of Zoological Nomenclature* (hereafter, the *Code*; ICZN 1999), making the species epithet *lancasteri* unavailable. Shea (1987: 258) identified *A. lancasteri* as one of the many species described by Wells & Wellington (1985), for which "the attempted diagnosis of new species on the basis of previously published photographs or previously published descriptions [does] not provide a statement in words of characters that are purported to differentiate the taxon (Article 13a (i–ii)," and he further stated (p. 259) that "In a few of these cases, the publication cited provides a diagnosis of the taxon in question as part of a redescription. However, in none of the instances cited above does such a diagnosis differentiate between the population described and the typical population."

Since the original publication of *A. lancasteri*, the name had not been used as valid in the scientific herpetological literature (i.e., in peer-reviewed publications; Kaiser *et al*., 2013) until a plea for acceptance by Wellington (2016). The populations concerned were generally included in *A. praelongus* (e.g., Storr *et al.* 1986; Cogger 1986, 1992, 1996, 2000; Ehmann 1992; Storr *et al.* 2002; Wilson & Swan 2003, 2008, 2010, 2013) or, after the phylogeographic study of Wüster *et al*. (2005), in *A. rugosus* by some (e.g., Eipper 2012; Cogger 2014).

Maddock *et al*. (2015) found that death adders from the Kimberley region of WA constitute a separate species from the populations of the *A. rugosus* complex (*sensu* Wüster *et al*. 2005: 11) in the NT and elsewhere. Noting the status of *A. lancasteri* as a *nomen nudum*, they described this taxon as a new species, *A. cryptamydros* Maddock *et al*., 2015. However, Wellington (2016) argued that, contrary to Shea (1987) and Aplin (1999), Storr's (1981) description should be considered sufficient as the primary diagnosis to make the name *A. lancasteri* available, which would relegate *A. cryptamydros* to the status of its junior synonym. The result of this dispute is that the nomenclature of the Kimberley death adder is currently split in the scientific literature, with some sources, primarily field guides (Swan 2017; Wilson & Swan 2017, 2020; Cogger 2018; Eipper & Eipper 2019), regarding *A. lancasteri* as the valid name, whereas others (White 2016; Ellis 2017; Mirtschin *et al*. 2017; WHO 2017; Chapple *et al*. 2019; Altherr & Lameter 2020; Boundy 2020; de Solan *et al*. 2020; Wüster 2021) use the younger name *A. cryptamydros*. Databases are similarly divided: the Australian Reptile Online Database (Macdonald 2021), the Integrated Taxonomic Information System (ITIS 2020), the Reptile Database (Uetz *et al*. 2020), the International Union for the Conservation of Nature (Cogger *et al*. 2017), and the Western Australian Naturemap (DBCA 2020) are using *A. cryptamydros*, whereas the Australian Faunal Directory (ABRS 2020) uses *A. lancasteri*.

Settling the status of contentious names requires careful analysis to assess their availability under the *Code* (e.g., Iverson *et al.* 2001). To alleviate the regrettable confusion over the scientific name of the Kimberley death adder, in the following paragraphs we analyse in detail the availability and validity of the nomen *A. lancasteri* under the *Code*. To further clarify the nomenclature of the genus, we also reanalyse the availability of the other three death adder names coined by Wells & Wellington (1985): *A. armstrongi*, *A. hawkei*, and *A. schistos*.

The assessment of these names raises questions as to the applicable version of the *Code*. Wells & Wellington (1999) claimed that their 1985 paper may have predated the third edition of the *Code*. The issue of nomina coined by Wells & Wellington (1985) thus potentially extends to three editions of the *Code*, published in 1964, 1984, and 1999. However, as is clear from Article 86.3, older editions of the *Code* "have no force unless reaffirmed" in the latest edition, and only as specified in that edition. Moreover, in any case, a review of all three editions of the *Code* shows their equivalence with respect to the current Article 13 and its application to this case. Our discussion herein is therefore based on the text of the current, fourth edition of the *Code* (ICZN 1999).

Article 13 of the *Code*

The key article of the *Code* that governs all four names coined by Wells & Wellington (1985) is Article 13. This article is augmented by Recommendation 13A, which is not binding but serves to further explain the intentions of the article itself. The article states (words printed in ***bold, italic*** text indicate our emphasis):

"**Article 13. Names published after 1930.**

13.1. **Requirements.** To be available, every new name published after 1930 must satisfy the provisions of Article 11 and must

13.1.1. be ***accompanied*** by a description or definition that states in words characters that are purported to differentiate ***the taxon***, or

13.1.2. be ***accompanied*** by a bibliographic reference to such a published statement, even if the statement is contained in a work published before 1758, or in one that is not consistently binomial, or in one that has been suppressed by the Commission (unless the Commission has ruled that the work is to be treated as not having been published [Art. 8.7]), or

13.1.3. be proposed expressly as a new replacement name (nomen novum) for an available name, whether required by any provision of the Code or not.

Recommendation 13A. Intent to differentiate. When describing a new nominal taxon, an author should make clear his or her purpose to differentiate ***the taxon*** by including ***with it*** a diagnosis, that is to say, a summary of the characters that differentiate the new nominal taxon from related or similar taxa."

We note particularly the use of the expression "the taxon" in Article 13.1.1. and Recommendation 13A, which unambiguously refers to the taxon being named (Dubois *et al*. 2021). This formulation must therefore exclude any description or diagnosis (even as it relates to Article 13.1.2.) that is explicitly based on any composite sample stated to include not only the focal taxon but also others. We also note the use of the verb "accompanied" in Article 13.1.1. and the phrase "with it" in Recommendation 13A. The use of this verb and phrase indicates that Article 13.1.1 requires a direct, explicit association between the proposed name and the required description or definition in the self-same document or, according to Article 13.1.2., to allow direct, explicit association with "such a published statement."

This requirement for a close association of name proposal and character listing was recently affirmed by a decision of the International Commission on Zoological Nomenclature (ICZN 2020) to place the genus name *Caucasilacerta* Harris *et al*., 1998 on the *Official Index of Rejected and Invalid Generic Names in Zoology*. This nomen threatened the stability of *Darevskia* Arribas, 1999, based on a listing of differentiating characters over 100 lines of text before the proposal of the taxon name (Busack *et al*. 2016; Arribas *et al*. 2018). Arribas *et al.* (2018) argued successfully that *Caucasilacerta* should be considered a *nomen nudum*, using, in part, the following argument:

"a) the lack of diagnosis or reference to it "accompanying" (sic!, mandatory in the Code) the new name; b) the alleged possible diagnosis (*vide* Busack *et al*.) is 102 lines away (two pages, including a figure and its legend) and there is no reference to it accompanying the new name"

Although we recognize that votes by the Commission do not follow the principle of "case law," the Commission's vote to suppress *Caucasilacerta* was nearly unanimous, indicating the Commissioners' agreement with the inseparableness of taxon name proposal and purported differentiating characters. In the description of any taxon, the required content to satisfy the aforementioned articles must appear in the text section(s) immediately following the "announcement" (i.e., the listing of the nomen) or be referred to therein.

Availability of *Acanthophis lancasteri* Wells & Wellington, 1985

Wells & Wellington's description. The entire account (including diagnosis and description) of *Acanthophis lancasteri* was published as follows, reproduced here as in the original, including errors in spelling and punctuation (Wells & Wellington 1985: 43–44):

"Acanthophis lancasteri sp.nov.

Holotype: An adult specimen in the Western Australian Museum R70690. Collected at 45 km NNE of Halls Creek, Western Australia.

Diagnosis: A member of the *Acanthophis antarcticus* complex, most closely related to *Acanthophis praelongus*, and readily identified by the description in Storr (1981:209-210) the material utilised by Storr, excluding those specimens from the Northern Territory, is referable to *Acanthophis lancasteri*, rather than *A. praelongus*). *Acanthophis lancasteri* is believed confined to northwestern Australia and across the 'Top End' of the Northern Territory. *Acanthophis praelongus* is believed confined to Cape York, Peninsula

Queensland. Excellent diagnostic illustrations of *Acanthophis lancasteri* appear in Storr (1981: Fig.4), Cogger (1983: Plate 764 - cited as '*Acanthophis praelongus*'), in Gow (1977: Plate 22 - cited as '*Acanthophis antarcticus*') and in Gow (1982: Plate 3 - cited as '*Acanthophis praelongus*'). Etymology: Named for actor and philosopher Burt Lancaster."

Apart from clearly failing to conform to Recommendation 13A, the description of *A. lancasteri* provided no statement of characters purported to differentiate the species. The references to "diagnostic illustrations" do not furnish "a description or definition that states in words characters that are purported to differentiate the taxon" (Article 13.1.1.). Consequently, the availability of the nomen *A. lancasteri* hinges solely on Storr (1981) and its conformity with Articles 13.1.1. and 13.1.2.

Storr's "taxon" and incomplete diagnosis. There are two reasons why Storr's (1981) diagnoses are insufficient to make *A. lancasteri* available. The first is that Storr recognised three species of *Acanthophis* in WA, based on specimens housed at the Western Australian Museum (WAM): *A. antarcticus* (Shaw & Nodder, 1802), *A. pyrrhus* Boulenger, 1898, and *A. praelongus* Ramsay, 1877. Storr's (1981) concept of *A. praelongus* included the type specimen of *A. praelongus* from Cape York, Queensland, as well as the subspecies *A. antarcticus rugosus* Loveridge, 1948, whose type specimen is from New Guinea and which is listed in the synonymy of *A. praelongus* in Storr's account. Storr's morphological description was based on material from the Kimberley Region of WA and from the NT, but he did not in any way intend ("purport" in the words of the *Code*) to diagnose the Kimberley population from other *A. praelongus*. His "Key to Western Australian Species" unambiguously sought to differentiate what he considered *A. antarcticus*, *A. pyrrhus*, and *A. praelongus*, but without any indication that the use of the key was restricted to WA, or that the WA populations of any of these species should be considered distinct from populations elsewhere. Nowhere did Storr diagnose or suggest the existence of "*Acanthophis praelongus* sensu Storr 1981 nec Ramsay, 1877," as argued by Wellington (2016). A diagnosis or key that differentiates between three widespread species occurring in a particular area, without any indication of geographic variation in any of them, cannot act as a diagnosis for only a part of one of those widespread species – ***the taxon*** sensu Article 13.1.1.

In his defence of the nomen *lancasteri*, Wellington (2016: 74) himself admitted this fatal shortcoming by stating that

"in the context of the taxonomy proposed by Wells and Wellington in 1985 for the species of the genus *Acanthophis*, this differential diagnosis (via Storr 1981) was incomplete, as it did not provide explicit differential traits between *A. praelongus* and *A. lancasteri*."

This statement undermines the entire argument for the availability of *A. lancasteri* by confirming that Storr did not diagnose ***the taxon***. Wellington (2016) attempted to justify the use of *A. lancasteri* by stating that explicit differentiating traits were also not provided by "Maddock *et al.* (2015) for *A. cryptamydros* vs. *A. praelongus*, despite the fact that a specimen of *A. praelongus* was included in their molecular analysis." However, the diagnosis of *A. cryptamydros* in Maddock *et al.* (2015) did state that their new species was "Distinguishable from all other Australian *Acanthophis*," thereby plainly including *A. praelongus*. Moreover, based on Wüster *et al*. (2005), there was no starting assumption of conspecificity with *A. praelongus*, unlike at the time of Storr (1981) or Wells & Wellington (1985).

Storr's mixed specimens. The second major failing of the naming of *A. lancasteri* is that, according to Wells & Wellington (1985) themselves, Storr's (1981) description of *A. praelongus* was based on heterogeneous material belonging to two different species: these authors explicitly excluded Storr's NT material from their concept of *A. lancasteri* (although, inconsistently, they described its distribution as including "the 'Top End' of the Northern Territory"). However, Storr made no attempt to differentiate between Kimberley and NT specimens in his text and referred to all specimens as *A. praelongus*. In his account of *A. praelongus*, Storr (1981: 210) referred to 16 specimens under 'Material', of which 13 were from the Kimberley region of WA (WAM specimen numbers R5709, R10628, R11241, R34078–79, R37761–64, R41457, R46836, R70690, R70968) and three from two localities in the extreme northeast of the Top End (WAM R13517a–b) and the eastern edge of the NT near the Queensland border (WAM R21519). From the sample sizes provided by Storr, meristic data and scale counts were only scored for up to 15 specimens for any one characteristic presented in the description section. Storr's unpublished data sheets housed in the WAM show that meristic data and scale counts were collected from all 16 specimens. Due to damage to some specimens, only six have full data for all characters scored or measured (WAM R37761–64, R13517a–b; Table 1),

TABLE 1. Characteristics scored for each specimen of '*Acanthurus praelongus*' examined by Storr (1981). Characters marked with '●' indicate character scored or measured for specimen, grey shading indicates those not scored or measured (Storr, unpublished data).

Registration		Characters scored																							
						Scale rows (#)			Subcaudals (#)								Keels on dorsum (strength)								
WAM number	Locality (State)	Total length (mm)	Tail length (mm)	SVL (mm)	Tail (% of SVL)	Anterior	Midbody	Posterior	Single	Paired	Total	Supralabials (#)	Temporals (#)	Anal Scale (#)	Ventrals (#)	Head scales rugose (strength)	Anterior	Posterior	Preocular (#)	Postocular (#)	Subocular (#)	Tail tip (color)	Rostral (width to length)	Prefrontals (#)	Reduction of MBSR anteriorly (#)
R5709	WA								●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
R10628	WA			●			●	●								●	●	●						●	
R11241	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
R34078	WA	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●						●	
R34079	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●
R37761	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R37762	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R37763	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R37764	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R41457	WA	●	●	●	●	●	●	●	●	●	●						●	●							●
R46836	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
R70690	WA	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
R70968	WA					●		●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	
R13517a	NT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R13517b	NT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
R21519	NT	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●

of which the latter two are NT specimens, indicating that the NT specimens had a disproportionate influence on the ranges and averages presented by Storr. The meristic data and scale count ranges presented by Storr (1981) in the diagnosis and description of *A. praelongus* thus include data from both Kimberley region and NT specimens, and it is not possible to determine what specimens the numbers in the ranges refer to (Table 1). The same applies to the text of the descriptions in Storr's diagnostic and description sections.

As a result, Wells & Wellington's (1985) explicit exclusion of Storr's NT specimens from their concept of *A. lancasteri*, thereby characterising Storr's material as polyspecific, invalidates the name: a description of what is explicitly stated to be a mixed sample of two species cannot act as a diagnosis for one of them (***the taxon*** sensu Article 13.1.1.), thereby making the description non-compliant with Article 13.1. We stress the importance of the fact that Wells & Wellington (1985) themselves considered Storr's material heterogeneous: whereas the discovery by subsequent authors that a description or definition is based on heterologous material does not make a name unavailable, it is the statement to that effect in the description of *A. lancasteri* itself that does.

To summarise, Storr's (1981) concept of *A. praelongus* and the description he created to characterise this taxon cannot make the name *A. lancasteri* Wells & Wellington, 1985 available because (i) Storr's account explicitly defines his concept of *A. praelongus* Ramsay, 1877 as including populations from the Kimberley, the Top End, northern Queensland and New Guinea, without any attempt to differentiate the Kimberley material, and (ii) according to Wells & Wellington (1985) themselves, Storr's (1981) concept of *A. praelongus* was based on mixed data from two species and consequently cannot act as the "description or definition […] purported to differentiate ***the taxon***" mandated by Article 13.1.1. for one of them.

In this context, we wish to note for the record that Maddock *et al*. (2015) erroneously listed the NT specimens examined by Storr (1981) as *A. cryptamydros* from WA in their appendix. However, these NT specimens were not analysed and thus have no bearing on the diagnostic characters of *A. cryptamydros*.

Does *A. hawkei* rescue *A. lancasteri*? Under the description of *A. hawkei*, Wells & Wellington (1985: 43) provided a comparison between the juvenile patterns of *A. hawkei* and *A. lancasteri*, which would satisfy the need for "characters that are purported to differentiate the taxon" (Article 13.1.1.). However, this diagnosis does not directly ***accompany*** the introduction of *A. lancasteri* but precedes it, and is not referenced in the *A. lancasteri* species account. Instead, Wells & Wellington explicitly cited only Storr (1981) as the only source of a written diagnosis for *A. lancasteri*, thereby definitively excluding all other text references from that role – including their own section on *A. hawkei*. The combination of a lack of a definition or description directly ***accompanying*** the description of *A. lancasteri* and the explicit reference to Storr (1981) as the sole source of a diagnosis therefore preclude the disconnected account of the taxon *hawkei* from also conferring availability on the name *lancasteri*. It is not the responsibility of subsequent authors to search Wells & Wellington's (1985) paper for reasons to make nomina available when the outside source explicitly and exclusively indicated by them fails to do so.

For these reasons, in strict accordance with the *Code* and the Commission's recent decision (ICZN 2020), the description of *A. lancasteri* does not satisfy the provisions of Article 13.1. We therefore reject Wellington's (2016) arguments and conclude that the name *A. lancasteri* Wells & Wellington, 1985 is a *nomen nudum.* As the description of *A. cryptamydros* Maddock *et al*., 2015 (Fig. 1A) meets all the requirements of the *Code* and subsequent amendments (ICZN 1999, 2012), it is the oldest available name under the Principle of Priority for the Kimberley death adder and must replace any erroneous usage of the *nomen nudum A. lancasteri*.

Availability of *Acanthophis armstrongi* Wells & Wellington, 1985

The name *Acanthophis armstrongi* has not given rise to much discussion since its initial establishment. Shea (1987), Aplin (1999), and Aplin & Donnellan (1999) regarded it as a *nomen nudum,* noting that Storr (1981) treated the populations concerned as part of his concept of *A. pyrrhus*, without any attempt to differentiate between populations. The name has remained unused in the peer-reviewed scientific literature (*sensu* Kaiser *et al*. 2013) since then. The description of *A. armstrongi* reads as follows, reproduced here as in the original, including errors in spelling and punctuation (Wells & Wellington 1985: 43):

FIGURE 1. The four death adder species, genus *Acanthophis*, whose valid nomina we discuss herein. (A) *A. cryptamydros* Maddock *et al.*, 2015 from the Mueller Ranges, ca. 110 km southwest of Halls Creek, Western Australia. (B) *A. pyrrhus* Boulenger, 1898 from 40 km south of Port Hedland, Western Australia. (C) *A. hawkei* Wells & Wellington, 1985 from the Barkly Tableland, Northern Territory, Australia. (D) *A. antarcticus* (Shaw & Nodder, 1802) from Canning Dam, near Ashendon, Western Australia. Photos by Ray Lloyd (A, B, D) and Tom Parkin (C).

> ***"Acanthophis armstrongi sp.nov.***
> Holotype: An adult specimen in the Western Australian Museum R61357. Collected at 5 km East of Giralia, Western Australia.
> Diagnosis: A member of the *Acanthophis pyrrhus* complex, readily distinguished by the excellent diagnostic illustations and data in the existing literature. Storr (1981:207-208) provided a description of a species from north western Australia that he regarded as *Acanthophis pyrrhus*. However, we consider that this is really an undescribed species, herein named *Acanthophis armstrongi*, and that the species *Acanthophis pyrrhus* is confined to central Australia. *Acanthophis armstrongi* is believed confined to the Pilbara and Kimberley regions of Western Australia and can be identified by referring to the illustrations in Storr (1981: Fig.3) and Gow (1983: Plate 15, (upper), specimen from Port Hedland, Western Australia vide Gow, pers. comm.). A comparative illustration of *Acanthophis pyrrhus* can be found in Cogger (1983: Plate 765 from Alice Springs, Northern Territory). Etymology: Named for Neil Armstrong, first man on the Moon."

The name *A. armstrongi* is unavailable for the same reasons we outlined for *A. lancasteri*. Gow (1983) and Cogger (1983) are only cited as sources for images and have no bearing on establishing the nomen. In Storr (1981: 207), the only possibility to validate the name according to Article 13.1.2., an account for *Acanthophis pyrrhus* Boulenger, 1898 begins halfway down the page. Storr provided what he inappropriately termed a "diagnosis," which in actuality is a paragraph listing the features of *A. pyrrhus* (i.e., a description in the meaning of the *Code*'s Glossary). This description is based on specimens from four land divisions of Western Australia (Kimberley, North-West, South-West, Eastern), listed on the following page (Storr 1981: 208). As in the case of *A. lancasteri*, Storr was describing

A. pyrrhus, not a subset thereof. Thus, there is no description "purported to differentiate ***the taxon***," as required by Article 13.1.1. Furthermore, as in the case of *A. lancasteri*, Wells & Wellington themselves regarded the specimens and populations described by Storr (1981) as polyspecific: only the specimens from the Kimberley and Pilbara were regarded as *A. armstrongi*, yet the set of specimens on which the "diagnosis" of Storr is based pertains to a mixed sample that also includes material that Wells & Wellington explicitly excluded from *A. armstrongi*. As in the case of *A. lancasteri*, a description of a sample explicitly stated to consist of multiple species cannot be used to differentiate only one of them (i.e., ***the taxon*** *sensu* Article 13.1.). This therefore confirms the views of Shea (1987), Aplin (1999), and Aplin & Donnellan (1999) that *Acanthophis armstrongi* Wells & Wellington, 1985 is a *nomen nudum* under the *Code*. The current valid name of these snake populations is *A. pyrrhus* (Fig. 1B).

Availability of *Acanthophis hawkei* Wells & Wellington, 1985

Wells & Wellington (1985) named *A. hawkei* from the Barkly Tableland of the Northern Territory. The name has generally been considered available (Aplin 1999; Aplin & Donnellan 1999) and has been widely used for the blacksoil plains death adders of the northern NT in the subsequent literature (e.g., Wüster *et al*. 2005; Eipper 2012; Cogger 2014, 2018; Wallach *et al*. 2014; Wilson & Swan 2017, 2020; Boundy *et al*. 2020). The description of the taxon reads as follows, reproduced here as in the original, including errors in spelling and punctuation (Wells & Wellington 1985: 43):

> ***"Acanthophis hawkei sp.nov.***
> Holotype: An adult specimen in the Northern Territory Museum, Darwin R3677. Collected 1.5 miles south west of Brunette Downs Station Homestead, Barkly Tablelands, Northern Territory by Hans van Dyk on 20 April, 1977.
> Diagnosis: A large member of the *Acanthophis antarcticus* complex, believed confined to the blacksoil plains of the Barkly Tablelands, Northern Territory. This species is the largest of the genus *Acanthophis*, reaching a maximum total length of 1.2m. It is an abundant snake, particularly in the Anthony's Lagoon area, N.T., during favourable weather. This most spectacular of the death adders feeds on small mammals and has large quantities of highly toxic venom that may have application for medical research. It was first discovered by Dr Ross K. Pengilley, a scientist carrying out wildlife survey work in the region, whilst employed by the Conservation Commission of the Northern Territory. Specimens were sent to the Northern Territory Museum in Darwin where they have remained largely unstudied. It is understood that an amateur herpetologist in Darwin has bred this species in captivity but as yet nothing has been published on this exciting event. Juveniles of this species are distinctly yellowish orange with grey and black flecking in contrast to its near relative *A. lancasteri sp.nov.* which tends to be more uniform brown with lighter transverse banding. Wells and Peterson, (1985 in press) provide an illustration of this species and its relatives, as well as ecological and morphological data. Etymology: Named for the Prime Minister of Australia, The Rt. Hon. Robert J. Hawke, in recognition of his part in saving the Tasmanian Wilderness."

The species description includes a comparison of character states between this taxon and *A. lancasteri* that ***accompanies*** the description of *A. hawkei*. As a consequence of the sentence contrasting juvenile colouration, this diagnosis fulfils the conditions of Article 13.1.1. for *A. hawkei* (Fig. 1C), thereby making the naming *Code*-compliant and the name itself available. It does not simultaneously make *A. lancasteri* available, because the text in the *A. hawkei* account does not ***accompany*** the naming of *A. lancasteri* and was explicitly excluded from a role in naming that species by Wells & Wellington's reference to Storr (1981) (see above).

Availability of *Acanthophis schistos* Wells & Wellington, 1985

The name *Acanthophis schistos* has remained unused in the peer-reviewed scientific literature *sensu* Kaiser et al. (2013) since Shea (1987), Aplin (1999) and Aplin & Donnellan (1999) declared it a *nomen nudum*. The original description by Wells & Wellington (1985) reads as follows, reproduced here as in the original, including errors in spelling and punctuation (Wells & Wellington 1985: 44):

"Acanthophis schistos sp.nov.
Holotype: An adult specimen in the Western Australian Museum R64698. Collected at Canning Dam, Western Australia.
Diagnosis: A short bodied, thickset, highly venomous snake of the genus *Acanthophis*, most closely related to *Acanthophis antarcticus*, and readily distinguished by the data given in Storr (1981:206-207, Fig. 2). Cogger (1983:423, Figs 185,763) provides an adequate diagnostic description of its nearest relative *Acanthophis antarcticus*."

Storr (1981: 206), the only diagnostic work listed by Wells & Wellington (1985) for text to diagnose this taxon, began his *A. antarcticus* account with specimens from the South West and Eucla Divisions of Western Australia. Once again, it is clear that Storr was describing and diagnosing his concept of the single species *A. antarcticus*, in which he included the type locality of Sydney, New South Wales. Nothing in Storr's paper explicitly restricts the applicability of his description to Western Australian *A. antarcticus*. Consequently, as in the cases listed earlier, Storr's description cannot act as a "description or definition […] purported to differentiate ***the taxon***." *Acanthophis schistos* Wells & Wellington, 1985 is therefore not compliant with Article 13.1. of the *Code*, and a *nomen nudum*. The current valid name of these snake populations is *A. antarcticus* (Fig. 1D).

Conclusions and parting thoughts

Our analysis confirms the published verdicts of previous authors, who stated that three of the four *Acanthophis* names proposed by Wells & Wellington (1985) are unavailable for the purposes of zoological nomenclature, and that the valid scientific name for the Kimberley death adder must therefore be *Acanthophis cryptamydros*. The preceding passages serve as a reminder that many clauses of the *Code* that were presumably intended to protect older, established names can end up being misinterpreted as loopholes for poor taxonomy, allowing the intent of the *Code* as an accounting tool for taxonomic scientists to be negated. We note that Recommendation 8F of the *Code* places the "responsibility to ensure that works containing new names, nomenclatural acts, or information likely to affect nomenclature are self-evidently published within the meaning of the *Code*" on authors, editors, and publishers, which in the case of the Wells & Wellington papers are one and the same. The same should apply to the responsibility to ensure that new names are "self-evidently" available within the meaning of the *Code*. As is made explicit in the *Code*, authors of new taxon names must provide a diagnosis or a reference to one with their descriptions. Where such a diagnosis does not "self-evidently" fulfil the criteria of Article 13, it cannot be the responsibility of subsequent authors to contrive reasons and stretch science, logic, or language to formulate an interpretation of the *Code* or the text of a species description that renders a nomen available (Wüster *et al.* 2021). In this context, we urge the Commission to re-evaluate Article 13 as it prepares the next edition of the *Code*, to prevent any attempts at twisting logic or indulging special pleading that can sow the seeds of taxonomic confusion and nomenclatural instability. Empowering subsequent authors to more easily reject names of questionable validity will enhance *Code*-compliance and reduce the need for community self-help initiatives outside the provisions of the *Code* (e.g., Kaiser *et al*. 2013; Wüster *et al*. 2021). We also strongly recommend that the next edition of the *Code* should eliminate Article 13.1.2 for nomina established after its entry into force. We cannot see any sensible reason why an author should not be required to provide a diagnosis for a taxon in the publication naming it, specifically in the section where the nomen is formally established. Consolidating name establishment and diagnosis will be a service to future readers, especially in an age of potentially ephemeral electronic publications.

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