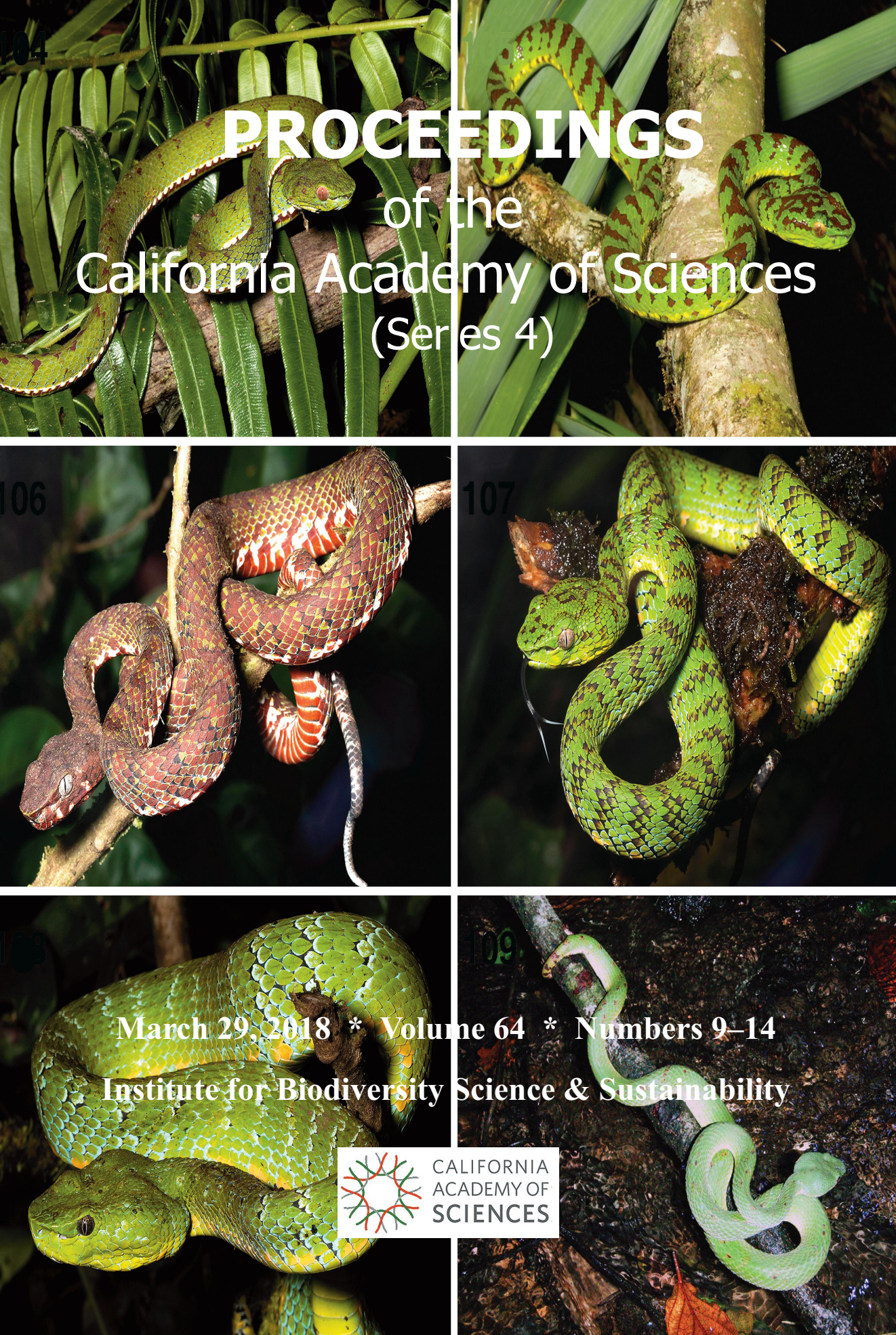

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Figures 104–109, *Trimeresurus flavomaculatus* from several localities in the Philippines (pg. 566) in Alan E. Leviton, Cameron D. Siler, Jeffrey L. Weinell, and Rafe M. Brown: Synopsis of the Snakes of the Philippines: A Synthesis of Data from Biodiversity Repositories, Field Studies, and the Literature

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Chromosome Numbers of Some Cultivated Acanthaceae with Notes on Chromosomal Evolution in the Family

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Chromosome numbers are reported for 22 species of Acanthaceae, all of which pertain to plants under cultivation or from wild-collected plants that are cultivated. Counts for nine species are the first reports of chromosome numbers for them: *Barleria obtusa* (*n* = 20 or 21), *Dyschoriste thunbergiiflora* (*n* = 15), *Justicia scheidweileri* (*n* = 14), *Megaskepasma erythrochlamys* (*n* = ca. 26), *Odontonema callistachyum* (*n* = ca. 63 and *n* = ca. 42–50), *Pseuderanthemum graciliflorum* (*n* = 21), *Strobilanthes hamiltoniana* (*n* = 11), *Thunbergia mysorensis* (*n* = 32–34), and *Whitfieldia elongata* (*n* = ca. 21). A rationale is offered for providing approximate numbers for several of the meiotic (haploid) counts reported. Basic chromosome numbers and probable occurrences of both polyploidy and dysploidy are discussed for genera and for some suprageneric taxa based on recent phylogenetic studies.

KEYWORDS: meiotic counts, approximate counts, basic numbers, polyploidy, dysploidy

Meiotic chromosome counts are reported for 22 species in 15 genera of Acanthaceae: *Barleria*, *Brillantaisia*, *Crossandra*, *Dyschoriste*, *Graptophyllum*, *Justicia*, *Megaskepasma*, *Odontonema*, *Peristrophe*, *Pseuderanthemum*, *Ruellia*, *Sanchezia*, *Strobilanthes*, *Thunbergia*, and *Whitfieldia*. All of the species studied here are commonly cultivated for ornament (see Fig. 3 [p. 329] for sample photos), except for *Ruellia costaricensis*, which is only rarely grown. These counts were made over a period of 12 years in collaboration with the late T.I. Chuang, an expert cytologist, and Fei-Mei Chuang, a gifted microscopist and technician. Several of them were not included in our series of publications on chromosomes of Acanthaceae (e.g., Daniel and Chuang 1989, 1993, 1998; Daniel et al. 1990) because they were approximate determinations, which we had hoped to clarify with additional sampling. Because it is unlikely that additional sampling will be undertaken by us, I felt it was important to make our results known. At least some of the approximate counts can be useful for determining ploidal levels of the plants studied.

Daniel (2000a) discussed some patterns of chromosome numbers with respect to suprageneric relationships among Acanthaceae. Since then, additional chromosome number reports and subsequent studies of phylogenetic relationships based on DNA sequence data allow for a broader perspective of and some additional hypotheses on the evolution of chromosome numbers among numerous genera and suprageneric taxa in the family (e.g., Tripp et al. 2013; Kiel et al. 2017). Herewith, discussions of chromosome number patterns within some of these taxa and others are reviewed, updated, and augmented, especially with respect to presumed polyploidy, dysploidy, and basic numbers.

METHODS

Floral buds and herbarium vouchers were collected from gardens and native habitats. Buds were fixed, stained, and studied as described previously (e.g., Daniel and Chuang 1998; Daniel 2000a). For ease of comparative purposes, all references to previous counts are noted here as haploid/gametic (*n*) numbers, regardless of whether they were originally reported as diploid/somatic (2*n*) or haploid numbers. Identifications of voucher specimens, when cited in publications of chromosome counts by other authors, have not been reconfirmed, except where noted. Camera lucida drawings were made of our preparations, and at least one representative cell of each species for which an exact count was obtained is provided in Figures 1 and 2. Because our results over the years agree with

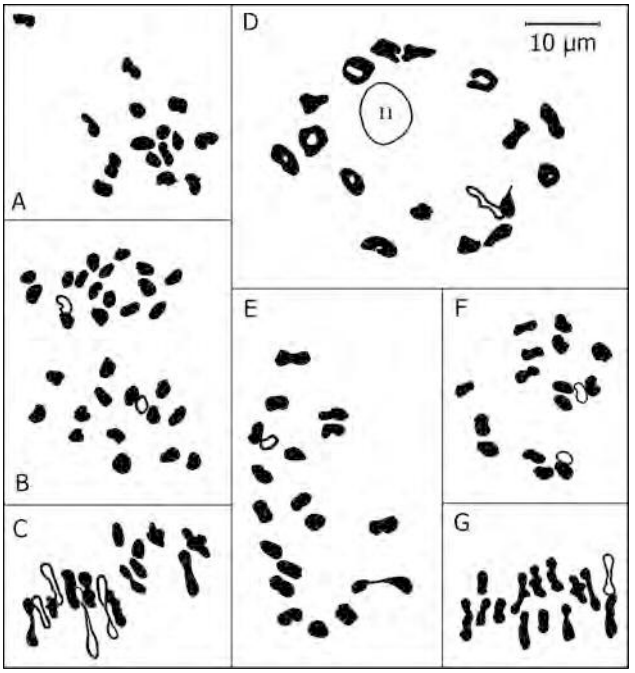

FIGURE 1 (upper right). Chromosomes of Acanthaceae in pollen mother cells. A. *Dyschoriste thunbergiiflora*, metaphase II (only half of cell shown), *n* = 15. B. *Brillantaisia owariensis*, telophase I, *n* = 16 (with one lagging chromosome toward "upper" pole). C. *Brillantaisia owariensis*, metaphase I, *n* = 16. D. *Ruellia elegans*, diakenesis (showing nucleolus, n), *n* = 17. E. *Crossandra infundibuliformis*, metaphase I, *n* = 19. F. *Ruellia dipteracanthus*, metaphase I, *n* = 17. G. *Justicia scheidweileri*, metaphase I, *n* = 14. Chromosomes shown in outline only are touching or overlapping other chromosomes. Scale applies to all figures. See Table 1 for voucher information.

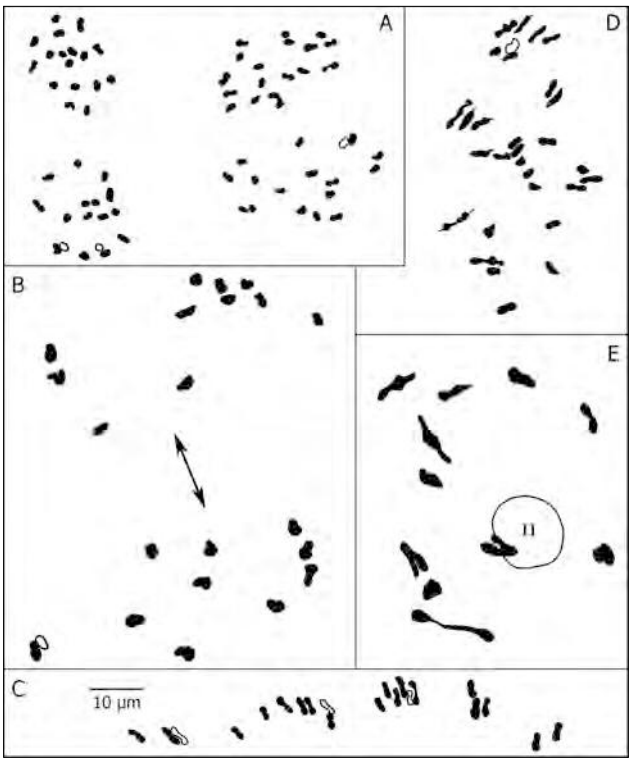

FIGURE 2 (lower right). Chromosomes of Acanthaceae in pollen mother cells. A. *Ruellia costaricensis*, telophase II, *n* = 17. B. *Strobilanthes hamiltoniana*, telophase I (distance between poles of cell reduced for presentation), *n* = 11. C. *Pseuderanthemum graciliflorum*, metaphase I, *n* = 21. D. *Peristrophe speciosa*, metaphase I, *n* = 30. E. *Strobilanthes hamiltoniana*, diakinesis (showing nucleolus, n), *n* = 11. Chromosomes shown in outline only are touching or overlapping other chromosomes. Scale applies to all figures. See Table 1 for voucher information.

the observation of Sugiura (1939:207) that the "pollen mother cells of Acanthaceae are much larger than those of other families, while the chromosomes they contain are much smaller in comparison," the entire cell is not shown in the drawings. After squashing, pollen mother cells from which counts were obtained herein vary from 58 to 204 μm at their widest extent (number cells = 34, mean = 186 μm). In the discussions below, basic numbers (*x*) refer to the lowest haploid number of a polypoid series, whereas an ancestral basic number refers to the probable original chromosome number of a taxon.

For an estimate of pollen viability in species of *Odontonema*, grains from herbarium vouchers of the two collections of *O. callistachyum* for which approximate counts were determined were mounted in analine blue in lactophenol and examined with a compound microscope after 24 hours (cf. Daniel 2007). An additional collection of a species of *Odontonema* for which an exact chromosome number had been previously determined (i.e., *n* = 21 for *Daniel & Bartholomew 4991*, a collection of *O. tubaeforme*; Daniel et al. 1990) was also studied for pollen stainability as a control. For each of the three samples all pollen encountered during nine non-overlapping sweeps of the mounted media was scored as either stained or not stained, and the resulting percentages were determined.

Results and Discussions

Table 1 summarizes the 22 species studied, sources of plants used, chromosome numbers determined, and voucher information. A discussion of the results for counts in each genus is provided below. Common reasons for approximate counts include: clumping of chromosomes, heavily stained cytoplasm, and meiotic irregularities (e.g., see *Odontonema* below).

***Barleria* L.**— *Barleria* consists of about 270 species concentrated in Africa, but with native occurrences in Asia and the New World. The approximate count of *n* = 20 or 21 is the first for *B. obtusa* Nees, a species native to southern Africa. Although a diversity of numbers has been reported for 18 species, counts of *n* = 20 have been reported for 16 of them. Counts of *n* = 21 have been reported for two species, *B. cristata* L. and *B. strigosa* Willd. (De 1966); however, all or most other counts for these two species are *n* = 20. If accurate, counts of *n* = 21 for these species probably represent dysploidy within the species. As noted by Daniel and Chuang (1998), *x* = 20 would appear to be the likely ancestral basic number for this genus.

***Brillantaisia* P. Beauv.**— Thirteen species of *Brillantaisia* are known from tropical Africa and Madagascar. Chromosome counts of *n* = 16 have been reported for two of them, *B. lamium* (Nees) Benth. and *B. owariensis* P. Beauv. (Mangenot and Mangenot 1958, 1962; the latter species reported as *B. nitens* Lindau). Our count of *n* = 16 for the tropical African *B. owariensis* (Fig. 1B, C) confirms the previous counts for this species.

Brillantaisia pertains to Ruellieae: Hygrophilinae along with one other genus, *Hygrophila* R. Br., which contains nearly 100 species. A chromosome number of *n* = 16 has been reported for six of the 11 species of *Hygrophila* studied to date (Tripp et al. 2013; Cordeiro et al. 2017), including species native to Africa (e.g., *H. senegalensis* (Nees) T. Anders.; Miege 1962), Asia (e.g., *H. polysperma* T. Anders.; Grant 1955), and the New World (e.g., *H. costata* Nees & T. Nees; Grant 1955, as *H. lacustris* (Schltdl. & Cham.) Nees). An ancestral basic number of *x* = 16 is possible for both *Brillantaisia* and the subtribe; however, the diversity of other numbers reported for *Hygrophila* (summarized by Tripp et al. 2013) reveal possible euploidy based on *x* = 6 and probable dysploidy as well.

***Crossandra* Salisb.**— *Crossandra* consists of about 45 species native to Africa, Madagascar, Arabia, India, and Sri Lanka. Our count of *n* = 19 for *C. infundibuliformis* (L.) Nees (Fig. 1E), a species occurring in both Africa and the Indian Subcontinent, agrees with nine of the 11 previous

TABLE 1. Species of Acanthaceae, gametic chromosome numbers, vouchers at CAS, and sources for plants studied.

Species	Chromosome number (*n*)	Voucher: collection (herbarium)	Source
Barleria obtusa	20 or 21	*Daniel s.n.* (CAS 715914)	Mildred E. Mathias Botanical Garden, California, USA
Brillantaisia owariensis	16	*Daniel s.n.* (CAS 966639, 966640)	San Francisco Conservatory of Flowers, California, USA
Crossandra infundibuliformis	19	*Daniel s.n.* (CAS 965238)	San Francisco Conservatory of Flowers, California, USA
Dyschoriste thunbergiiflora	15	*Daniel s.n.* (CAS 966742)	San Francisco Conservatory of Flowers, California, USA
Graptophyllum pictum	31 or 32	*Almeda et al. 6377* (CAS 811770)	cultivated in Chiriquí, Panama
Justicia fulvicoma	ca. 14	*Daniel & Baker 3637* (CAS 745146)	wild collected in Nuevo León, Mexico
Justicia scheidweileri	14	*Daniel s.n.* (CAS 966739)	San Francisco Conservatory of Flowers, California, USA
Megaskepasma erythrochlamys	ca. 26	*Daniel s.n.* (CAS 1242912)	San Francisco Conservatory of Flowers, California, USA
Odontonema callistachyum	ca. 63	*Daniel & Bartholomew 5013* (CAS 754858)	wild collected in Chiapas, Mexico
Odontonema callistachyum	ca. 42-50	*Daniel 5368* (CAS 937005)	wild collected in Guerrero, Mexico
Odontonema tubaeforme	ca. 20-30	*Daniel et al. 5463* (CAS 768060)	wild collected in Coclé, Panama
Peristrophe speciosa	30	*Daniel s.n.* (CAS 966122)	San Francisco Conservatory of Flowers, California, USA
Pseuderanthemum graciliflorum	21	*Daniel s.n.* (CAS 967559, 967560)	San Francisco Conservatory of Flowers, California, USA
Ruellia costaricensis	17	*Daniel 8158cv* (CAS 966638)	San Francisco Conservatory of Flowers, California, USA
Ruellia dipteracanthus	17	*Daniel s.n.* (CAS 966651)	San Francisco Conservatory of Flowers, California, USA
Ruellia elegans	17	*Daniel s.n.* (CAS 965239)	San Francisco Conservatory of Flowers, California, USA
Ruellia makoyana	ca. 17	*Daniel s.n.* (CAS 842990)	San Francisco Conservatory of Flowers, California, USA
Sanchezia parvibracteata	ca. 36-40	*Breedlove & Daniel 71315* (CAS 809713)	Jardín Botánico Dr. Faustino Miranda Chiapas, Mexico
Strobilanthes hamiltoniana	11	*Daniel s.n.* (CAS 1242913)	San Francisco Conservatory of Flowers, California, USA
Thunbergia erecta	ca. 30	*Daniel et al. 6237* (CAS 838854)	cultivated in Cartago, Costa Rica
Thunbergia grandiflora	ca. 28	*Breedlove & Daniel 70841* (CAS 809093)	cultivated in Chiapas, Mexico
Thunbergia mysorensis	32-34	*Daniel s.n.* (CAS 1242914)	San Francisco Conservatory of Flowers, California, USA
Whitfieldia elongata	ca. 21	*Daniel & Butterwick 6636* (CAS 872847)	Waimea Arboretum and Botanical Garden, Hawaii, USA

counts for this species (sometimes reported as *C. undulaefolia* Salisb.). The other two counts for this species are both $n = 30$, and possibly represent counts for a morphologically similar taxon, *C. nilotica* Oliver, which is often misidentified, and for which $n = 30$ has been reported and confirmed (see Daniel and Chuang 1998). Counts have been reported for two other species of *Crossandra*, *C. flava* Hook. and *C. pungens* Lindau, both of which are $n = 21$ (Daniel and Chuang 1998). De (1966) suggested $x = 10$ as a basic number for *Crossandra*. This number is not currently known among species of the genus, but based on counts reported to date for four species, it seems possible and would indicate both polyploidy and dysploidy among species.

***Dyschoriste* Nees**.— *Dyschoriste* (including *Apassalus* Kobuski, *Chaetacanthus* Nees, and *Sautiera* Decne.) is a genus of 80 or more species that occur in tropical and warm-temperate regions of the Americas, Africa, Madagascar, and Asia. Our count of $n = 15$ for *D. thunbergiiflora* (S. Moore) Lindau (Fig. 1A) is the first count for this species of eastern Africa, and the first count for an African representative of genus (*D. nagchana* (Nees) Bennet occurs in both Africa and Asia, but only plants from the latter region have apparently been studied cytologically). Our count for an African species demonstrates the occurrence of a common number ($n = 15$) throughout the distributional range of the genus: North America (6 species with this number; Daniel 2000a; Daniel et al. 1990), South America (1 species; Piovano and Bernardello 1991), and Asia (1 species; Govindarajan and Subramanian 1985). This same number occurs in three of the "geographically cohesive" and weakly to strongly supported New World clades of the genus as revealed by the molecular phylogenetic studies of Chumchim et al. (2015). Counts of both $n = 15$ (Govindarajan and Subramanian 1985) and $n = 30$ (e.g., Saggoo and Bir 1982) have been reported for *Dyschoriste nagchana* (as *D. depressa* Nees) in Asia, and the only count for *D. hirsutissima* (Nees) Kuntze from Mexico is $n = 30$ (Daniel et al. 1990). Thus, polyploidy within a species and also possibly at the specific level is evident in the genus. A basic number of $x = 15$ appears likely for *Dyschoriste*, as noted by Daniel (2000a). The only other counts reported for the genus are $n = 14$ for *D. madurensis* (Burm.f.) Kuntze (Narayanan 1951; as *D. littoralis* (L.f.) Nees) and $n = 28$ for *D. vagans* (Wight) Kuntze (Kaur 1969), both Asian species. If those latter counts and are accurate, then another possible basic number in the genus is $x = 14$, and dysploidy is potentially also involved in the evolution of some species.

Based on counts to date, apparent dysploidy and polyploidy would appear to be evident among genera related to *Dyschoriste*. The genus pertains to Ruellieae: Petalidiinae (Tripp et al. 2013) where its relatives consist of five other genera related as follows: (*Ruelliopsis* + *Phaulopsis*) + ((*Petalidium* + *Duosperma*) + (*Dyschoriste* + *Strobilanthopsis*)). Chromosome numbers have been reported for two other genera of the subtribe. A count of $n = 16$ has been reported several times for *Petalidium barlerioides* Nees (summarized in Tripp et al. 2013), and counts for 11 species of *Phaulopsis* reveal $n = 16$ (or ca. 16) in nine of them (Manktelow 1996). Daniel and Chuang (1998) suggested a basic number of $x = 16$ for the latter genus, in which polyploidy (i.e., $n =$ ca. 32) has been reported for three species (Manktelow 1996), and possible dysploidy (i.e., $n = 17$) has been reported for two species that have otherwise been counted as $n = 16$ (Daniel & Chuang 1998).

***Graptophyllum* Nees**.— *Graptophyllum* consists of about 15 species that occur mostly in the southwestern Pacific region. All previous chromosome counts for the genus are for the widely cultivated *G. pictum* (L.) Griff, often known as caricature plant. Counts of wild-collected plants in Papua New Guinea ($n = 20, 21$; Daniel 2000b), which lack the characteristic colored markings on the leaves, are different from those reported for cultivated plants with the foliar color patterns ($n = 18, 30$; see Daniel 2000b). Our count of $n = 31$ or 32 is similar to most of the other counts for cultivated plants of this species. Daniel (2000b) discussed possible native occurrences of *G. pictum*, the diversity of chromosome numbers known for it, and a possible basic number of $x = 10$.

Based on morphological characters, *Graptophyllum* would appear to pertain to the "*Pseuderanthemum* lineage" (sensu McDade et al. 2000) of Justicieae. A meiotic complement of 21 is widespread among a clade of morphologically similar genera (i.e., *Chileranthemum* Oerst., *Odontonema* Nees, *Oplonia* Raf., *Pseuderanthemum* Radlk. ex Lindau, *Ruspolia* Lindau, and *Ruttya* Harv.) of that lineage (McDade et al. 2000; Daniel 2000b; Daniel et al. 1990, 2000), here referred to as Odontoneminae *sensu stricto* (see below under *Odontonema* and *Pseuderanthemum*). It is noteworthy that this number is also known among plants of *G. pictum*. Additional counts from this species, and especially from other species of *Graptophyllum*, will be necessary to formulate hypotheses about the evolution of chromosome numbers in that genus. A better understanding of the relationship between cultivated plants and their putative wild relatives would also be useful.

***Justicia* L.**— Daniel (2000a) discussed chromosome numbers, as then known, in this rich (ca. 700 species) and widely distributed genus. Kiel et al. (2017, 2018) provided a detailed phylogenetic framework for *Justicia* and its relatives and discussed chromosome numbers in lineages treated therein. Our approximate count of n = ca. 14 for a wild-collected plant of *J. fulvicoma* Schltdl. & Cham., a species endemic to Mexico, generally agrees with the two previous counts of n = 14 for this species, one cultivated (e.g., Daniel and Chuang 1998) and the other wild-collected (Daniel et al. 1990). This same number is common (but not exclusive) among the other sampled members of the "Brandegeeana clade" to which *J. fulvicoma* pertains (Kiel et al. 2018). Our count of n = 14 for the Brazilian *J. scheidweileri* V.A.W. Graham (Fig. 1G) is the first count for the species, which is often referred to as *Porphyrocoma pohliana* (Nees) Lindau in older literature, and was not included in the sampling by Kiel et al. (2017, 2018). A haploid complement of 14 is also the most common chromosome number reported for the more than 100 species of the genus studied to date (cf. Daniel 2000 for a frequency histogram of chromosome numbers reported for the genus). Based on the diversity of chromosome numbers reported for this large and nonmonophyletic, as currently treated, genus (i.e., n = 7, 9–18, 20, 22–31, 34; Daniel 2000a, 2006; Daniel et al. 2000), it is ikely that both polyploidy and dysploidy have played roles in the evolution of these taxa, and that a knowledge of chromosomal data will be useful in unraveling the taxonomy of justicioids. An ancestral basic number of x = 7 has been proposed for *Justicia* (e.g., Piovano and Bernardello 1991; Daniel 2000a).

***Megaskepasma* Lindau**.— *Megaskepasma* is a unispecific genus of Justicieae: Justiciinae that is presumably native to northern South America, but known primarily only from cultivation. Our approximate count of n = ca. 26 for *M. erythrochlamys* Lindau is the first one for the genus. Based on molecular data, Kiel et al. (2017) showed that *Megaskepasma* is resolved in the "South American *Poikilacanthus* clade" of the New World "justicioid lineage," sister to the other sampled members of that clade. The only previous count for *Poikilacanthus* Lindau (i.e., for *P. macranthus* Lindau in the "Brandegeeana clade," which also consists of several North and Central American species of that genus and *Justicia*) is n = 14 (Daniel 2000a), which number agrees with counts for at least five other members of its clade (Kiel et al. 2017). The only previous count for another member of the South American *Poikilacanthus* clade is n = 28 for *J. tweediana* (Nees) Griseb. (Piovano and Bernardello 1991). Our count, undoubtedly a polyploid (and possibly also a dysploid), would appear to be more in accordance with that of a member of the clade in which it has been resolved based on molecular data, than with species in the Brandegeeana clade. One might hypothesize that other members of the South American *Poikilacanthus* clade will have similarly high chromosome numbers.

***Odontonema* Nees**.— *Odontonema* consists of 29 species restricted to tropical and subtropical regions of the New World. Although Sarkar et al. (1980) reported n = 17 for *O. bracteolatum* (Jacq.) Kuntze (as *Thyrsacanthus bracteotus* Nees), chromosome counts of n = 21 have been

reported for five other species of the genus (Takizawa 1957, as *Thyrsacanthus rutilans*; Daniel 2000; Daniel et al. 1990). This latter number is also common to relatives of *Odontonema* in Justicieae: Odontoneminae *sens. str.* (e.g., *Chileranthemum*, *Oplonia* and *Pseuderanthemum,* among genera from the New World; see above under *Graptophyllum*). Indeed, De (1966) noted both common chromosome numbers and karyotypic affinities between species of *Pseuderanthemum* and *Odontonema*. Here, we report approximate counts for *O. callistachyum* (Schltdl. & Cham.) Kuntze (Mexico and northern Central America) of n = ca. 63 and n = ca. 42–50 and for *O. tubaeforme* (Bertol.) Kuntze (Mexico and Central America) of n = ca. 20–30. There are no previous reports of a chromosome number for *O. callistachyum*; however, there is at least one previous report of n = 21 for *O. tubaeforme* (Daniel et al. 1990). Although both species are commonly cultivated, our study plants were wild-collected.

Given the likely basic number of x = 21 for *Odontonema*, and based on these approximate counts, the plants sampled for *O. callistachyum* would appear to be polyploids. Difficulties in obtaining an accurate count for these plants resulted from clumping of chromosomes, darkly staining cytoplasm, and/or meiotic irregularities (e.g., univalents, bivalents, and trivalents at metaphase I and anaphase I; lagging chromosomes). Similar meiotic irregularities are sometimes associated with hybrids, triploids, and/or sterility (e.g., Long 1966). Indeed, the approximate number for *Daniel & Bartholomew 5013* is suggestive of triploidy. The very low percentage of non-staining pollen for both collections of *O. callistachyum* (*Daniel 5368*: number of grains = 377, 1% not staining; *Daniel & Bartholomew 5013*: number of grains = 97, 3% not staining) is similar to that for the sample of *O. tubaeforme* for which Daniel et al. (1990) reported n = 21 (*Daniel & Bartholomew 4991*: number of grains 205, 3% not staining). Thus, based on pollen stainability, the two collections of *O. callistachyum* with apparent meiotic irregularities would not appear to be sterile, and thus probably neither triploids nor interspecific hybrids.

Peristrophe* Nees.—Peristrophe* consists of about 45 species that occur in Africa, Madagascar, Asia, Malesia, and possibly Australia (cf. Barker 1996). The genus pertains to Justicieae: Diclipterinae. Some evidence suggests that the genus could be treated as conspecific with *Dicliptera* Juss. (see discussion in Kiel et al. 2017), and phylogenetic analyses based on molecular data reveal that the genus is not monophyletic as currently circumscribed (Kiel et al. 2017). Our count of n = 30 for *P. speciosa* (Roxb.) Nees (Fig. 2D), a species of the Indian Subcontinent (Bhutan, India, Nepal), agrees with the previous count for this species by Sareen and Sanjogta (1976). A report of n = 15 for *P. speciosa* (Vasudevan 1976) suggests euploidy (presumably diploid and tetraploid occurrences) in this species. Elsewhere in the genus, n = 15 has been reported for *P. paniculata* (Forssk.) Brummitt (see summary of at least eight counts, all reported as *P. bicalyculata* (Retz.) Nees, in Daniel et al. 2000). Other counts in the genus are n =10 (Narayanan 1951 for *P. paniculata,* as *P. bicalyculata*), n = 24 (Ge et al. 1989 for *P. japonica* (Thunb.) Bremek.), and n = 21 (Takizawa 1957 for *P. hyssopifolia* (Burm.f.) Merr.*, as P. salicifolia* Hassk.). It is noteworthy that counts of n = 15 are known for species of *Peristrophe* in each of the two clades of Diclipterinae (Kiel et al. 2017) that contain species of that genus.

The closest relatives of species of *Peristrophe* in Diclipterinae are *Dicliptera*, *Hypoestes* Sol. ex R. Br., and *Rhinacanthus* Nees. All of these genera share a common chromosome number of n = 15, which is likely the ancestral basic number of the monophyletic "core Diclipterinae" lineage noted by Kiel et al. (2017). Within "core Diclipterinae" polyploidy (e.g., n = 30) is also known for *Dicliptera*, *Hypoestes*, and *Peristrophe*. Polyploidy is not known for *Rhinacanthus* (Daniel and Chuang 1998; Daniel et al. 2000), and no chromosome numbers have been reported for the Australian genus *Xerothamnella* C.T. White, a species of which is nested in a clade of *Peristrophe* (Kiel et al. 2017).

***Pseuderanthemum* Radlk.**— *Pseuderanthemum* consists of about 65 species that occur in tropical regions worldwide. Our count of $n = 21$ for *P. graciliflorum* (Nees) Ridl. (Fig. 2C) is the first for this native of southeastern Asia. The species was treated as conspecific with *P. crenulatum* Wall. ex Lindl. by Hu et al. (2011), but the taxonomy of Asian/Malesian species of the genus remains to be fully resolved. Plants from which the chromosome count was made differ from the description of *P. crenulatum* in Hu et al. (2011) by their shorter bracts (2–4 vs. ca. 7 mm long).

At least 10 counts of $n = 21$ have been made previously for 7 species of *Pseuderanthemum* from North America, eastern Africa, India, and islands of the southern Pacific Ocean (De 1966; Kaur 1966; Govindarajan and Subramanian 1985; Daniel 2000a; Daniel and Chuang 1989, 1993, 1998; Daniel et al. 1990, 2000). Thus, a common number would appear to occur from throughout most of the range of the genus; counts of species in South America remain unknown. Although $n = 30$ was reported for *P. laxiflorum* Hubb. ex L.H. Bailey by Kaur (1969), $n = 21$ appears to be widespread both in the genus and among species in related genera of Justicieae: Odontoneminae *sensu stricto.* (see above under *Graptophyllum* and *Odontonema*). This number may be postulated to be the ancestral basic number for both *Pseuderanthemum* and Odontoneminae *sensu stricto.*

***Ruellia* L.**— *Ruellia* (Ruellieae: Ruelliinae) consists of about 350 species worldwide, with most of them occurring in the Western Hemisphere. The chromosome number $n = 17$ is common to at least 43 species occurring throughout its range in the New World (i.e., North America, Central America, South America, and the West Indies). Our counts of $n = 17$ (or ca. 17) for four Neotropical species confirm this number for them. Chromosomes of *R. costaricensis* (Oerst.) Tripp & McDade (Fig. 2A), a species of Nicaragua, Costa Rica, and Panama, were previously counted by Daniel (2000a, as *Blechum costaricense* Oerst.) for this rarely cultivated species. Our count for *R. dipteracanthus* (Nees) Hemsl. (Fig. 1F), presumably native to Mexico, agrees with previous counts by Grant (1955, as *R. squarrosa* (Fenzl) Schaffnit, and as "R. fluviatilis Leonard," nom. ined., voucher at US seen). The counts for two Brazilian species, *R. elegans* Poir. (Fig. 1D) and *R. makoyana* Closon confirm previous counts for them by De (1966, as *R. formosa* Andr.) and by Grant (1955), respectively. The taxonomic relationships of *R. makoyana* to its morphologically similar congeners *R. devosiana* E. Morren (also $n = 17$; e.g., Daniel and Chuang 1998) and *R. portellae* Hook. f., all attributed to Brazil, are worthy of additional study. The only other chromosome numbers reported for species of *Ruellia* native in the New World (discounting two counts of $n = 18$ by Sugiura (1939) because no vouchers were cited, identities of the species are questionable because no authors of names were given and one of the names applies to multiple species, and the counts reported differ from all subsequent reports for those species) are $n = 16$ for *R. tuberosa* L. (the majority of counts for this species is $n = 17$, see summaries of counts in Daniel 2000b) and $n = 24$ for Brazilian *R. macrantha* (Nees) Mart. ex B.D. Jacks. (Daniel & Chuang 1998).

In the Old World, there is a single report of $n = 17$ for *R. prostrata* Poir. (Sarkar et al. 1980); however, other numbers have also been reported for this species (e.g., $n = 16$, Subramanian and Govindarajan 1980; $n = 24$, Daniel and Chuang 1998), and $n = 22$ has been reported for it several times (e.g., De 1966; Kaur 1966; Govindarajan and Subramanian 1983; Saggoo and Bir 1983). All of the counts for this African and Asian species apparently pertain to plants from India. Other counts for Paleotropical species of *Ruellia* consist of $n = 16$ for African *R. cordata* Thunb. (Rao and Mwasumbi 1981) and for Asian *R. patula* Jacq. (e.g., Baquar et al. 1966; Rao and Mwasumbi 1981; Subramanian and Govindarajan 1980; Govindarajan and Subramanian 1983) and $n = 12$ for Asian/Malesian *R. repens* L. (Daniel 2000b).

Based on the small sampling of species in the Old World, the diversity of chromosome numbers there appears to be greater than that for taxa in the New World. Tripp (2007) indicated that

taxa in the New World appear to be monophyletic and derived from African stock. Radiation from a single introduction in the New World might explain the widespread occurrence of $n = 17$ among diverse taxa there. Numbers common to both Neotropical and Paleotropical species are $n = 16$, 17, and 24. At least the latter suggests potential polyploidy in the genus. Meiotic complements of $n = 16$ are common elsewhere among Ruellieae (see discussions herein for *Brillantaisia*, *Dyschoriste*, and *Strobilanthes*). Based on numbers reported to date, $x = 12$ or 16 would appear to be potential basic numbers in *Ruellia*, from which numbers of $n = 17$ and 24 may have arisen via dysploidy and polyploidy. If counts of both $n = 16$ and 17 for *R. tuberosa* are accurate, then dysploidy likely also occurs in some species. Although not currently known for any species of the genus, an ancestral basic number of $x = 8$ for either *Ruellia* (or Ruellieae) might account for lineages with $n = 16$ and 24. Given a potential ancestral basic number of $x = 7$ for the family (e.g., Piovano and Bernardello 1991; Daniel 2000a), such an hypothesis has some appeal. No chromosome numbers have been reported for any of the other genera of Ruelliinae (i.e., *Acanthopale* C.B. Clarke, *Dischistocalyx* T. Anderson ex Benth., and *Satanocrater* Schweinf.; Tripp et al. 2013). Counts for these genera and additional counts for species of *Ruellia* in the Old World are needed to better formulate a potential ancestral basic number for and to understand patterns of evolution and migration in the genus. Counts are especially desired for species native to Madagascar and Australia, from which regions no chromosome numbers have been reported for any Ruelliinae.

***Sanchezia* Ruiz & Pav**.— This genus of about 55 species is native to tropical America. Our approximate count of n = ca. 36–40 for *S. parvibracteata* Sprague & Hutch., native to tropical South America and possibly southern Central America, is similar to the only previous count for this species, $n = 40$ (Narayanan 1951). The only other species of *Sanchezia* to have been counted is *S. oblonga* Ruiz & Pav., a species native to Bolivia, Ecuador and Peru, with counts of $n = 68$ (Singh 1951; Kaur 1970; both as *S. nobilis* Hook.f.) and n = ca. 66 (Grant 1955, as *S. nobilis*)–the highest haploid numbers so far reported for the family (Daniel 2000a; Tripp et al. 2013).

Sanchezia pertains to and is the largest genus in Ruellieae: Trichantherinae. Based on Tripp et al. (2013) the six genera of this subtribe are generally related as follows: *Louteridium* + (*Trichosanchezia* + (*Suessenguthia* + *Sanchezia*)) + (*Trichanthera* + *Bravaisia*)). No counts have been published for any other genera in the subtribe. However, several approximate counts (Daniel unpublished) for *Bravaisia* and *Louteridium* reveal relatively high numbers for these genera and further suggest that polyploidy and probably also dysploidy were involved in the evolution of both the subtribe and its constituent genera (Daniel 2000a).

***Strobilanthes* Blume**.— The Asian genus *Strobilanthes* Blume consists of about 400 species. Our count of $n = 11$ for *S. hamiltoniana* (Steud.) Bosser & Heine (= *Goldfussia colorata* Nees; Fig. 2B, E), native to the Himalayan region of southern Asia, is the first count for this species. At least two other species of the genus (in the broad sense in which it is currently recognized, e.g., Hu et al. 2011; and also including *Clarkeasia* and *Stenosiphonium* as per discussion in Tripp et al. 2011; and taking into account synonymies based on Venu 2006 and Karthikeyan et al. 2009) share this same number: *S. bracteata* (Nees) J.R.I. Wood (e.g., Vasudevan 1976, as *S. quadrangularis* Clarke) and *S. discolor* (Nees) T. Anderson (e.g., Pandey and Pal 1980).

An array of chromosome numbers (n = 8–16, 20, 21, 28, and 30) has been reported for at least 38 species in *Strobilanthes*, with $n = 16$ for 18 species being the most commonly reported number (Daniel and Chuang 1998). The genus pertains to Ruellieae: Strobilanthinae where all its subtribal relatives (e.g., *Goldfussia* Nees, *Hemigraphis* Nees) are probably best included within an expanded concept of *Strobilanthes* to achieve generic monophyly (e.g., Tripp et al. 2013). An ancestral basic number of $x = 7$, 8, or 10 seems likely for the genus, with both polyploidy and dysploidy accompanying evolution of taxa therein. Indeed, based on numbers reported for *S. pavala* J.R.I.

Wood (= *Hemgraphis latebrosa* (Heyne ex Roth) Nees; i.e., *n* = 12–14, 28; e.g., Kaur 1965, as *H. rupestris* Heyne ex T. Anderson; Vasudevan 1976; Saggoo and Bir 1982; Bala and Gupta 2011) both euploidy and dysploidy appear to be likely within that species.

***Thunbergia* Retz**.— *Thunbergia* consists of about 150 species that are native to tropical (and subtropical) regions of the Old World. Our approximate counts for *T. erecta* (Benth.) T. Anderson (*n* = ca. 30), native to western tropical Africa and for the white-flowered form of *T. grandiflora* Roxb. (*n* = ca. 28), native to southern Asia, generally agree with at least some prior counts for these species. Previously, *n* = 28 has been reported for *T. grandiflora* at least six times and *n* = 14 (or ca. 14) has been reported twice (Daniel 2000b). In compiling previous counts for *T. erecta* (i.e., *n* = 8, 14, 26, ca. 28, 28, 30, 31, and 32), Daniel and Chuang (1998) noted their own difficulties in obtaining definitive counts for this species. They concluded that if previous counts for it are accurate, a diversity of chromosome numbers and ploidal levels are characteristic of the species. Our approximate count of *n* = 32–34 for the Indian endemic *T. mysorensis* (Wight) T. Anderson is the first for this species, and would appear to represent a ploidal level similar to the majority of counts for both *T. erecta* and *T. grandiflora*.

Chromosome numbers are known for 10 species of *Thunbergia*. The lowest numbers reported to date are *n* = 8 (e.g., Govindarajan and Subramanian 1983 for *T. erecta*), *n* = 9 (at least 13 counts: e.g., Daniel and Chuang 1989 for *T. alata* Bojer ex Sims, e.g., Grant 1955 for *T. reticulata* Hochst. ex Nees), and *n* = 10 (e.g., Sharma 1970 for *T. coccinea* Wall.). Multiples of *n* = 8 and *n* = 10 are known among species of *Thunbergia*, and these numbers may represent basic numbers in the genus. Daniel and Chuang (1998) proposed the former as a likely basic number. Unfortunately, chromosome numbers remain unknown for the two most likely generic relatives in subfamily Thunbergioideae, *Pseudocalyx* Radlk. and *Meyenia* Nees. From the diversity of numbers reported for the 10 species of *Thunbergia* studied to date, and considering the variation apparent within some species, it would appear that whatever the ancestral basic number is for this large genus, knowledge of chromosome numbers could be informative in phylogenetic studies of both *Thunbergia* and its relatives.

***Whitfieldia* Hook**.— *Whitfieldia* consists of 12 species restricted in distribution to tropical Africa. Our approximate count of *n* = ca. 21 for *W. elongata* (P. Beauv.) De Wild. & T. Durand, a widespread species in tropical Africa, is the first for a species in the genus. Chromosomes of *Whitfieldia* are unusual among those we've observed among Acanthaceae in that they are heterochromatic. Most or all of the bivalents exhibit both darkly and lightly stained areas. Depending on interpretation of the preparations, cells showed 20, 21, or 22 bivalents at metaphase I of meiosis.

Manktelow et al. (2001) treated the genus in tribe Whitfieldieae along with two other genera that yielded the following phylogenetic relationship: *Lankesteria* + (*Chlamydacanthus* + *Whitfieldia*). These genera were shown to form a well-supported monophyletic group sister to Barlerieae. McDade et al. (2008) confirmed and refined composition and relationships both of and within the tribe; they added three Malagasy genera to Whitfieldieae, and the tribe was treated as sister to Barlerieae + Andrographidieae. Tripp et al. (2013) revealed *Zygoruellia* Baill. to pertain to Whitfieldieae, as well. No chromosome number has been reported previously for *Whitfieldia*, and the only number reported to date in the tribe is an older count of *n* = 25 for *Lankesteria elegans* T. Anders. (Mangenot and Mangenot 1962). Given the dearth of chromosome numbers for this tribe of seven genera and 31 species (Daniel unpublished data), it seems premature to postulate a basic number for it.

FIGURE 3. Flowers of some species for which chromosome numbers are reported here. A. *Ruellia costaricensis*. B. *Graptophyllum pictum*. C. *Ruellia elegans*. D. *Brillantaisia owariensis*. E. *Justicia fulvicoma*. F. *Ruellia dipteracanthus*. G. *Ruellia makoyana*. H. *Thunbergia grandiflora* (white-flowered form). I. *Megaskepasma erythrochlamys*. J. *Odontonema tubaeforme*. K. *Thunbergia mysorensis*. L. *Strobilanthes hamiltoniana*. M. *Justicia scheidweileri*. N. *Peristrophe speciosa*. Photos by the author.


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Redescription of Two Indian Stigmina (Hymenoptera: Crabronidae)

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Two Indian species of Stigmina: *Stigmus cuculus* Dudgeon and *Carinostigmus aterrimus* (R. Turner), not studied since their descriptions a century ago, are redescribed, and their diagnostic characters are provided. The hitherto unknown male of *Carinostigmus aterrimus* is described, with the first image of genitalia for the whole genus. The current generic assignment of the two species (Bohart and Menke, 1976) is confirmed.

This paper is a result of our efforts at understanding and identifying Oriental *Carinostigmus*. The first step toward that goal was a study of two species described in *Stigmus*: *S. cuculus* Dudgeon, 1903 and *S. aterrimus* R. Turner, 1917 (the latter being later transferred to *Carinostigmus*). They have never been studied since their descriptions a century ago, and the original description of the first of these two species is highly insufficient. The type material of these two species, preserved in The Natural History Museum, London, United Kingdom, was kindly sent for examination by Mr. David Notton. Their redescription is given below.

The following are the institutional abbreviations used in the text:

BMNH: The Natural History Museum (formerly British Museum Natural History), London, United Kingdom.
CAS: California Academy of Sciences, San Francisco, California, USA.
NBAIR: Division of Molecular Entomology, National Bureau of Agricultural Insect Resources, Bangalore, India.

Stigmus cuculus Dudgeon

Stigmus cuculus Dudgeon in Nurse, 1903:12, ♀. Syntypes: ♀, India: Himachal Pradesh: Kangra Valley: Holta in Palampur (BMNH), one syntype examined. – Ramakrishna Aiyar, 1916:556 (in catalog of Indian aculeates described after Bingham, 1897); Tsuneki, 1954:5 (in key to Eurasian *Stigmus*), 29 (in revision of Eurasian *Stigmus*); R. Bohart and Menke, 1976:189 (in checklist of world Sphecidae).

This species was described in one brief sentence: "Differs from *S. congruus* (Walk.) in being less than half the size, in the whole of the antennae being testaceous, clypeus subtriangular and slightly produced; tubercles not white." The reference to *S. congruus,* now placed in *Carinostigmus*, suggests that *S. cuculus* is also a *Carinostigmus*. In fact, the species is a *Stigmus*, as indicated by the hindwing submedian cell not reduced and the crossvein cu-a positioned next to the origin of media (Finnamore, 1995). In addition, the midfrontal carina and the paraorbital groove are lacking, and the gastral petiole is longitudinally carinate. Also, the interantennal tubercle is

absent, the mesopleuron is mostly unsculptured, shiny (as opposed to the coarsely sculptured mesopleuron of *Aykhustigmus*), and the hindwing vein cu-a originates at some distance from apex of submedial cell.

As far as we know, no specimens of this species have been collected since its description.

Recognition.— Of the 24 described species of *Stigmus* other than *S. cuculus*, we could examine 12, and we have also seen a number of undescribed species. It appears that *S. cuculus* has a unique combination of the nonemarginate free margin of the clypeal lobe and of the paraorbital sulcus on the frons, whereas the black pronotal lobe is a subsidiary recognition feature. Also, the area between the scrobal sulcus and the hypersternaulus is aciculate, almost unsculptured. An undescribed species from Thailand is similar, but differs in having the mesopleuron conspicuously ridged and rugose above the hypersternaulus, and the anterolateral corner of the clypeal lobe more prominent than in *S. cuculus*.

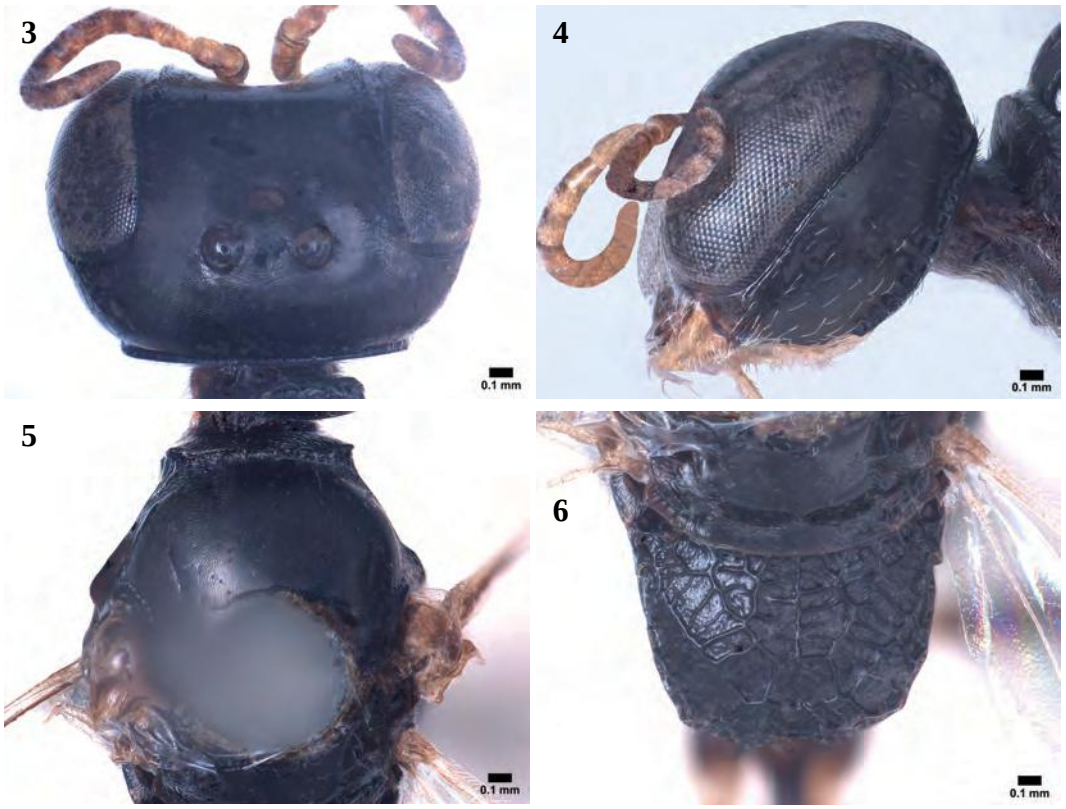
Redescription.— ♀. Inner eye margins slightly converging below (Fig. 1). Head subquadrate in dorsal view, lateral margins relatively slightly converging behind eyes (Fig. 3). Gena in profile narrower than eye (Fig. 4). Middle clypeal lobe truncate apically (Fig. 2), not subtriangular as stated in original description. Free margin of labrum truncate. Frons aciculate up to the level of scape length, unsculptured above, with smooth sulcus adjacent to inner eye orbit and extending to upper level of aciculate area; upper frons without longitudinal impression (that is present in *S. pendulus* Panzer). Ocellocular distance 2.0 × as long as interocellar distance. Prothorax side striate. Area between scrobal sulcus and hypersternaulus aciculate, almost unsculptured; area above scrobal sulcus dull, minutely, irregularly ridged longitudinally. Scutum aciculate, with scattered punctures (Fig. 5). Propodeum markedly reticulate (Fig. 6). Hindwing median vein emerging from apex of anal cell (it emerges a short distance from apex of anal cell in *S. convergens* Tsuneki, *S. japonicus* Tsuneki, and *S. quadriceps* Tsuneki, see Budrys, 1987). Gastral petiole with a pair of longitudinal carinae, finely ridged longitudinally on each side of carinae; petiole length in dorsal view equal to hindtarsomeres I and II combined.

Head, thorax, propodeum, and gaster all black (including pronotal lobe), but mandible yellow (except apically) and antenna largely testaceous. Foretrochanter testaceous, mid- and hindtrochanter testaceous anteriorly, black posteriorly; femora black; tibiae and tarsi testaceous.

♂.— Unknown.

Records (Fig. 7).— Known only from the type locality.

Figures 1–2. *Stigmus cuculus* Dudgeon, syntype female. (1) Head in frontal view; (2) Clypeus and adjacent frons.



FIGURES 3–6. *Stigmus cuculus* Dudgeon, syntype female. (3) Head in dorsal view; (4) Head in lateral view; (5) Scutum in dorsal view; (6) Propodeal dorsum.

Carinostigmus aterrimus (R. Turner)

Stigmus aterrimus R. Turner, 1917:174, ♀. Holotype: ♀, India: Tamil Nadu: Nilgiri Hills: Coonoor (BMNH), examined. – Tsuneki, 1954:3 (in key to Eurasian *Stigmus*), 10 (original description copied). – As *Carinostigmus aterrimus*: R. Bohart and Menke, 1976:191 (new combination, in checklist of world Sphecidae).

Tsuneki (1954) included this species in his revision of the Eurasian *Stigmus*, but had seen no specimens. Based on the original description, however, he correctly recognized that the species was a *Carinostigmus* (treated as a subgenus of *Stigmus* at that time). He also correctly recognized the diagnostic characters.

RECOGNITION.— *Carinostigmus aterrimus* differs from its congeners in having the mandible black at least basally (brownish apically to mostly brown) rather than yellow, and the trochanters black (at least mid- and hindtrochanters) rather than testaceous.

REDESCRIPTION.— Inner eye margins slightly converging below in female (Fig. 8), more so in male (Fig. 15). Frons microareolate, outside of scapal basin also minutely ridged. Paraorbital groove crenulate, moderately broad along anterior head surface. Horizontal portion of frons and postocellar area almost unsculptured, with only widely spaced microscopic punctures. Midfrontal carina well defined but markedly thinner just before midocellus, below midlength forming narrow, erect projection. Occipital carina narrow, not crenulate in female, crenulate ventrally in male

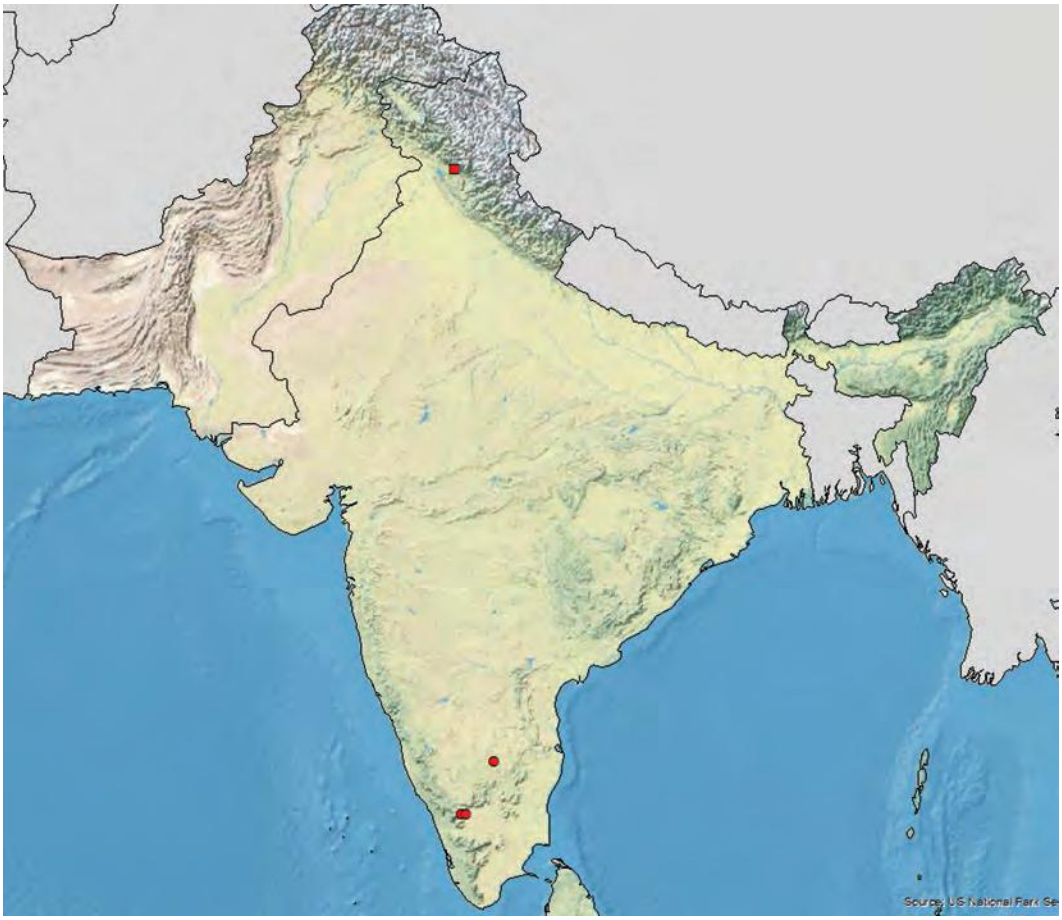
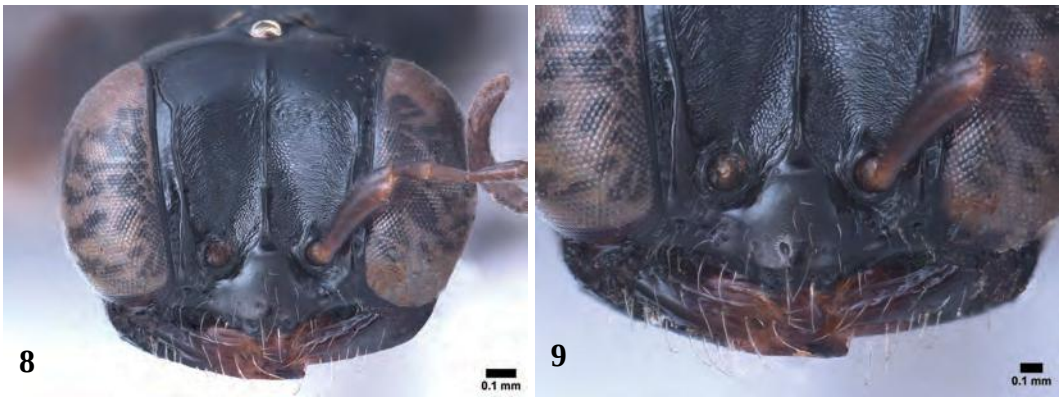
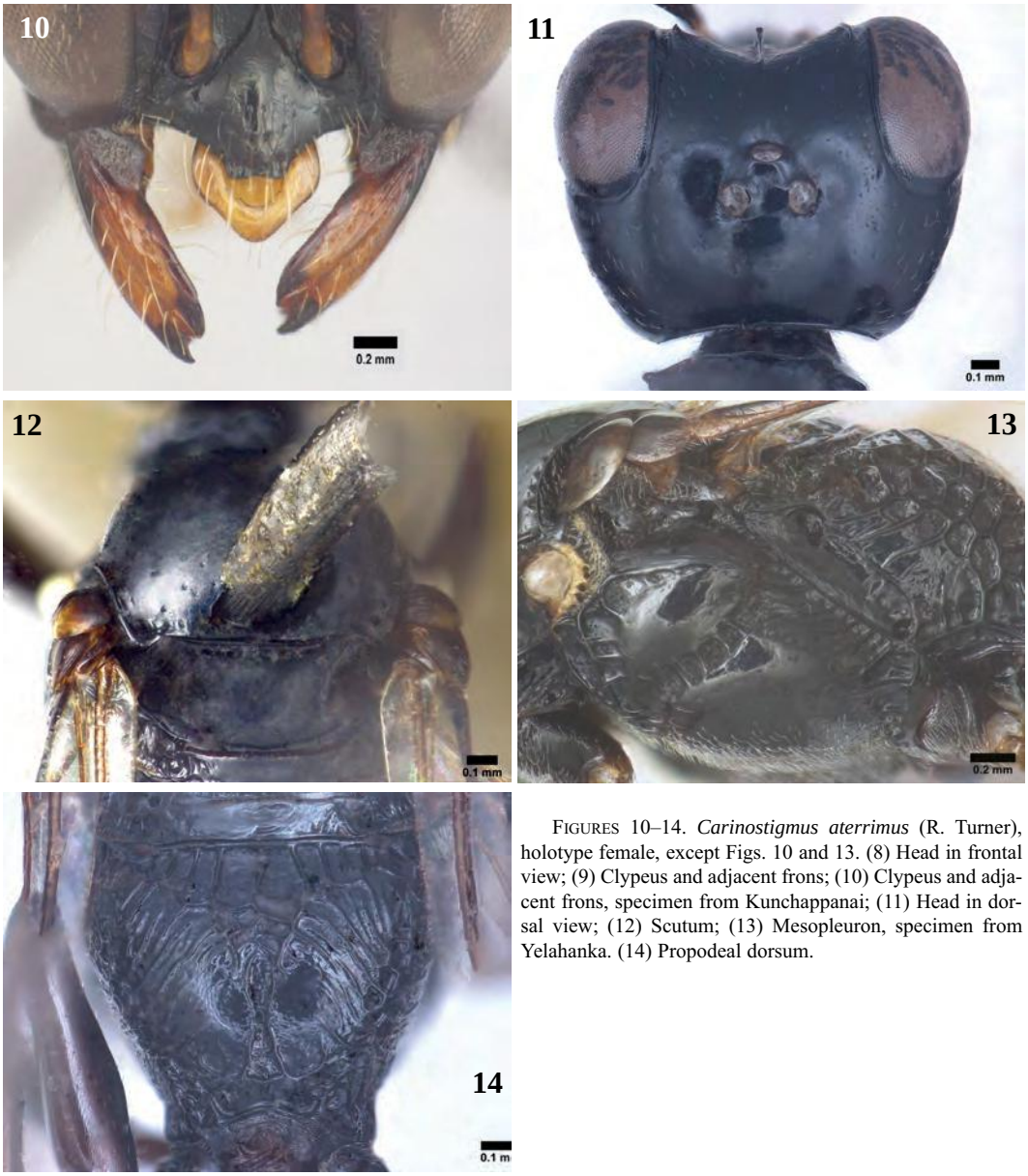


FIGURE 7. Map of Indian subcontinent with collecting localities of *Stigmus cuculus* Dudgeon (square) and *Carinostigmus aterrimus* (R. Turner) (circles).



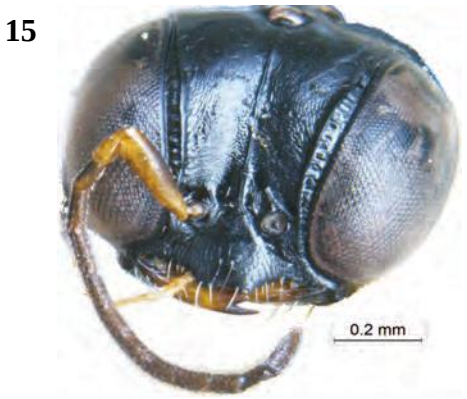
FIGURES 8–9. *Carinostigmus aterrimus* (R. Turner), holotype female,. (8) Head in frontal view; (9) Clypeus and adjacent frons.

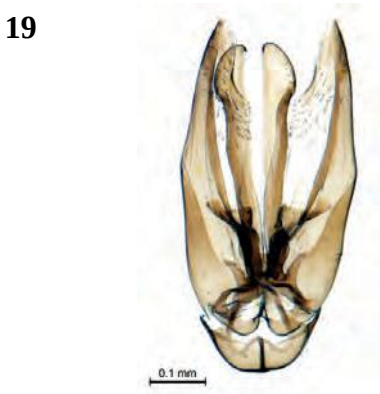


FIGURES 10–14. *Carinostigmus aterrimus* (R. Turner), holotype female, except Figs. 10 and 13. (8) Head in frontal view; (9) Clypeus and adjacent frons; (10) Clypeus and adjacent frons, specimen from Kunchappanai; (11) Head in dorsal view; (12) Scutum; (13) Mesopleuron, specimen from Yelahanka. (14) Propodeal dorsum.

(Fig. 18). Underside of head lineate laterally but not mesally (Fig. 18). Free margin of clypeal lobe shallowly emarginate, slightly more so in male (Fig. 15) than in female (Figs 9, 10), free margin laterally of lobe gently incurved, not forming projection (Figs. 9, 10, 15). Transverse carina of pronotal collar well defined, spicate laterally, not emarginate mesally in female, slightly emarginate in male (emargination smaller than in *C. costatus* Krombein). Scutum with scattered punctures slightly larger and denser than those on head, not foveate along flange (Fig. 12); notaulus impressed, crenulate, shorter than distance between notauli; parapsidal line inconspicuous in female, conspicuous in male; posterior part of scutum conspicuously foveolate adjacent to hind-

margin (middle pair of foveae the largest). Scutellum with deeply impressed, crenulate groove along foremargin, with a few scattered punctures on disk. Postscutellum unsculptured mesally, rugulose laterally. Omalus well defined, broader than hypersternaulus, divided into two sulci that are separated by vertical carina (not divided in *C. filippovi* Gussakovskij); crenulation along omalus posterior margin varying: markedly less conspicuous than that of hypersternaulus in holotype, but equal in size or larger than hypersternaulus in other specimens examined; omalus joining scrobal sulcus; scrobal sulcus in holotype about one midocellar diameter wide next to pronotal lobe, but soon narrowing and forming narrow sulcus posteriorly, longer than in holotype in one female from Yelahanka and in male; area between hypersternaulus and scrobal sulcus unsculptured





FIGURES 15–19. *Carinostigmus aterrimus* (R. Turner), male. (15) Head in frontal view; (16) Clypeus and adjacent frons; (17) Head in dorsal view; (18). Underside of head; (19) Genitalia.

or nearly so, markedly larger than greatest width of hypersternaulus (smaller in *C. costatus*); ridges along mesopleuron posterior margin (between hypersternaulus and midcoxa) fine, somewhat conspicuous in female from Kunchappanai, and well defined in male. Propodeal enclosure with median carina and oblique, somewhat irregular ridges emerging from it (Fig. 14), without unridged area apically; propodeal dorsum outside of enclosure obliquely ridged; propodeal side longitudinally ridged; posterior surface coarsely rugose ventrally, in holotype dorsally unsculptured on each side of median sulcus (unsculptured area attaining apex of enclosure), but all rugose in other specimens examined. Gastral petiole in dorsal view 6.0 × as long as wide at middle in female, 8.2 × in male.

Body black, shiny except for pale yellow pronotal lobe, with the following testaceous: scape ventrally in some specimens, labrum, palpi, articulation between trochanters and femora, foretrochanter in one female from Yelahanka and in male, also articulation between forefemur and foretibia in male, anterior surface of foretibia, posterior surfaces of mid- and hindtibia, and tarsi; mandible black except brownish apically, but brown except black basally in female from Kunchappanai, and black basally and apically and light brownish mesally in male.

♀.— Head moderately narrowed behind eyes in dorsal view (Fig. 11), its width next to occipital carina equal to 0.56 × its greatest width. Postocellar area elongate (Fig. 11). Labrum (invisible in holotype) pentagonal, its lateral margins diverging ventrally near base, converging and straight over most of their length, apex rounded (Fig. 10). Pygidial plate oval, microsculptured. Length 4.7-5.3 mm

♂.— Head markedly narrowed behind eyes in dorsal view (Fig. 17), its width next to occipital carina equal to 0.33-0.35 × its greatest width. Postocellar area markedly shorter than in female (Fig. 17). Labrum shallowly, broadly emarginate apically (Fig. 18). Three apical flagellomeres with placoids. Genitalia: Fig. 19. Length 5.6-5.9 mm.

Records (Fig. 7).— **India**: **Karnataka**: Attur: Yelahanka at 13°10′N 77°56′E (1 ♀, CAS; 1 ♀, 2 ♂, NBAIR:). **Tamil Nadu**: Nilgiri Hills: Coonoor at 11.3530°N 76.7959°E (1 ♀, BMNH, holotype of *Stigmus aterrimus* R. Turner) and Kunchappanai 15 km SE of Kotagiri at 11°22′N 76°56′E (1 ♀, CAS).

Acknowledgments

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PROCEEDINGS OF THE CALIFORNIA ACADEMY OF SCIENCES

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Macrosiphum edrossi Essig, 1953 (Hemiptera, Aphididae): Second World Record, Redescription and Biological and Taxonomic Notes

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In memoriam of Prof. Edward Oliver Essig (1884-1964) and
Dr. Edward Shearman Ross (1916-2016), renowned Californian entomologists.

***Macrosiphum edrossi* Essig, 1953 (Hemiptera, Aphididae) is recorded for first time since description also from Peru. Apterous and alate viviparous females are redescribed from paratypes and other recently collected specimens. The identity of the plant that hosts the species is discussed as well as the taxonomic assignment of the species. An updated description of the species is provided herein.**

KEYWORDS: aphids, Aphididae, Macrosiphum, Peru, plant host

Se cita *Macrosiphum edrossi* Essig (Hemiptera Aphididae) por primera vez desde su descripción, también del Perú. Se redescriben las hembras vivíparas ápteras y aladas a partir de paratipos y de otros especímenes recientemente recogidos. Se discute la identidad de la planta hospedadora de la especie. Se comenta la adscripción taxonómica de la especie.

Macrosiphum edrossi Essig, 1953 (Hemiptera, Aphididae, Aphidinae, Macrosiphini) is one of the 55 species listed by Essig (1953) in his study of aphids collected in Southern and Western South America by Dr. A.E. Michelbacher, who, in company with Dr. E.S. Ross, and their respective wives, carried out "an intensive insect-collecting expedition in Chile, in particular, and less extensively also in Argentina, Bolivia and Peru […] [which] was a part of the activities of the California Academy of Sciences which institution arranged for the ocean transportation and supplied a truck for travel on land" from December 1950 to April 1951 (Essig 1953:59).

In addition to *M. edrossi*, Essig (1953) included in the genus *Macrosiphum* Passerini, 1860, another five new species described by him and eight previously described. As of the date of this contribution, only three of the 14 species listed by Essig are currently classified in this genus: *M. rosae* (Linnaeus, 1758), *M. solanifolii* (Ashmead, 1882) — currently *M. euphorbiae* (Thomas, 1878) — and *M. edrossi* Essig, 1953. The first two species are Euro-Asiatic in origin and are currently cosmopolitan; *M. edrossi* is known only from the type-locality, and it is the only *Macrosiphum* species that can be considered endemic to South America. Nieto Nafría et al. (2017) report that the type locality of *M. edrossi*, originally cited by Essig (1953) as «Rio Pampas», is, more precisely, Ayacucho, near Pampas River.

Macrosiphum edrossi was named in honor of Edward S. Ross, at that time Curator of Entomology at the California Academy of Sciences museum. The species was described from 28 apterous and 7 alate viviparous female specimens collected on a plant "what appears to be a nettle (ortiga) [in Spanish], *Urtica* sp." (Essig 1953:119). On the labels of the aphid microscopic slides is handwritten "nettle ?". The written description of *M. edrossi* is as brief as Essig's aphid descriptions usually are and as was frequent at the time; the description is complemented by a group of drawings, which are very informative. The holotype and several paratypes are in the entomological collections of the California Academy of Sciences, Department of Entomology [CAS] in San Francisco; additional paratypes are in the Natural History Museum in London [NHM-L].

Macrosiphum edrossi has remained in *Macrosiphum* after the extensive taxonomic revisions implicitly made by Eastop and Hille Ris Lambers (1967) and Blackman and Eastop (2008 and 2017), although several features lead us to think that this taxonomic position may not the best option, i.e., because of the few reticulation in the apex of siphunculi.

One of the authors (J.O.) collected several aphids in Pisac (Peru) on *Baccharis latifolia* (Ruiz & Pav.) Pers., that have been identified by us as *M. edrossi* based upon the original description and comparison with the paratypes of the species.

A complete re-description of apterous viviparous females and thoughts about the taxonomic status, plant host, and distribution of the species are presented here.

***Macrosiphum edrossi* Essig, 1953**

1953 *Macrosiphum edrossi* Essig. *Proceedings of the Californian Academia of Sciences*, ser. 4, 28 (3):118.

Material examined.— PERU, Ayacucho department, Ayacucho, near Pampas River, 8 March 1951, on "nettle ?", A.E. Michelbacher *leg*., E.O. Essig *det.*, 13 viviparous apterous females and 6 alate viviparous females (4 apt. and 3 al. in CAS collection and 9 apt. and 3 al. in NHM collection), paratypes. PERU, Cusco department, Pisac (13º26′S 71º50′W and 2,980 m a.s.l. aprox.), 25 May 2010, on *Baccharis latifolia*, J. Ortego *leg*., J.M. Nieto Nafría & J. Ortego *det.*, 4 apterous viviparous females, *Universidad de León* collection.

Redescription.— From above mentioned specimens and original description by Essig (1953).

Apterous viviparous females (Figs. 1, 2A, 2B, 3, 4).— Color when alive pale green with brown antennae, legs and siphunculi. When mounted very light yellow, with head including clypeous and mandibular and maxillary lames, rostrum, legs, siphunculi, anal plate and cauda more or less pigmented (Fig. 1A). Body length, 2.325–3.275 mm (3.38–4.65 times siphunculus) including cauda and 2.025–2.950 mm (2.97–4.05 times siphunculus) without cauda. Head brownish yellow, and smooth, with 2+2+4 dorsal setae in addition to the other four placed on the edge of the frons (Fig. 1B); they are 22–35 μm and 0.5–0.9 times subarticular diameter of the antennal segment III [from here *D*], fine, pointed and very pale. Ventral setae similar in shape and pigmentation to dorsal ones and somewhat longer than them. Frontolateral tubercles tall, divergent, apically rounded and marking a frontal sinus, and frontomedial tubercle lower than those (Fig. 1B). Antennae 3.398–4.480 mm and 1.25–1.54 times body length with cauda (1.39–1.75 times without cauda). Antennal segments I and II smooth and colored like head (Fig. 1A), with setae similar in shape, length and lack of pigmentation to those of head. Antennal segment III, 0.73–0.92 mm, near smooth, very dark brown except a small basal portion (8.2–13.8% of its total length) that is pale like head (Fig. 2B); 2–9 secondary sensoria, small, more or less circular and aligned on the 2/3 of the dark part of segment at most. Segment IV, 0.53–0.81 mm, softly imbricated and dark brown; segment V, 0.43–0.65 mm, imbricated and brown to dark brown; both two without secondary

sensoria. Antennal segment VI imbricate and brown to dark brown (Fig. 2A); base of antennal segment VI, 0.16– 0.20 mm; processus terminalis, 0.99–1.24 mm, 5.5–6.6 times base and 1.2–1.5 times antennal segment III. Setae on antennal segments III to VI also very pale, but lower (on segment III, 12–23 µm, 0.3–0.6 times *D*) than those on head and truncated or widened at apex. Rostrum extends back to slightly beyond hind coxae. Ultimate rostral segment, 0.14–0.16 mm, robust (2.2–3.1 times its basal width), 1.5–1.9 times base of antennal segment VI and 1.1–1.4 times second segment of hind tarsus, pigmented like penultimate one and darkened than proximal segments and head; with 10–17 accessory setae, pale, delicate, pointed and long, but shorter that primary apical ones. Thorax paler than head and devoid of marked cuticular ornamentation; spiracle sclerites rough and unpigmented, spiracular apertures circular or subcircular. Both dorsal and ventral setae similar in shape and size to those on anterior abdominal segments. Coxae, trochanters more or less pigmented like head, rest of legs progressively pigmented to brown apical portion of tibiae and tarsi (Fig. 3). Setae on legs pale, pointed and relatively robust; those dorsal on hind femora, 13–25 µm; those dorsal on the middle third of hind tibiae, 18–33 µm and 0.4–0.8 times width of segment at point of seta insertion. First segments of tarsi with three setae. Abdomen membranous but something rough; presiphuncular and postsiphuncular sclerites and transverse band on abdominal segment 8 small and very pale, only distinguishable by a tenuous cuticular ornamentation; intersegmental sclerites inconspicuous. Spiracular sclerites and apertures similar to those on thorax. Without marginal tubercles. Dorsal setae relatively thick (more than cephalic) but hardly noticeable by extreme pallor, with blunt or truncated apex; 2–3 marginal on each side of abdominal segments 2 to 4, 12–20 µm and 0.3–0.6 times *D*, similar to spinal ones. Ventral setae pointed, more delicate and much longer than dorsal ones. Abdominal segment 8 with 2–4 setae, thinner than other dorsoabdominal setae, 22–30 µm and 0.6–0.8 times *D*. Siphunculi (Fig. 4) brown, usually darker than head but not as dark as most part of antennae, 0.50–0.87 mm, 0.7–1.0 times antennal segment III, cylindrical over most of its length with a widened and paler proximal portion and a distal portion of diverging edges, relatively thin (5.5–10.0, 12.5–24.0 times as long as wide at the base and in the middle, and 0.6–1.1 times the width of hind tibiae at middle

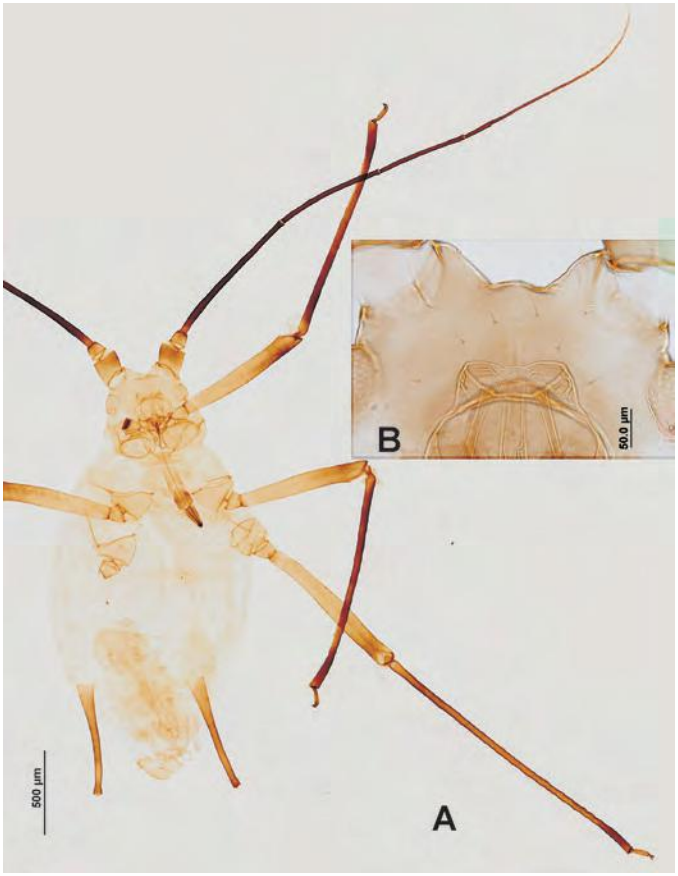
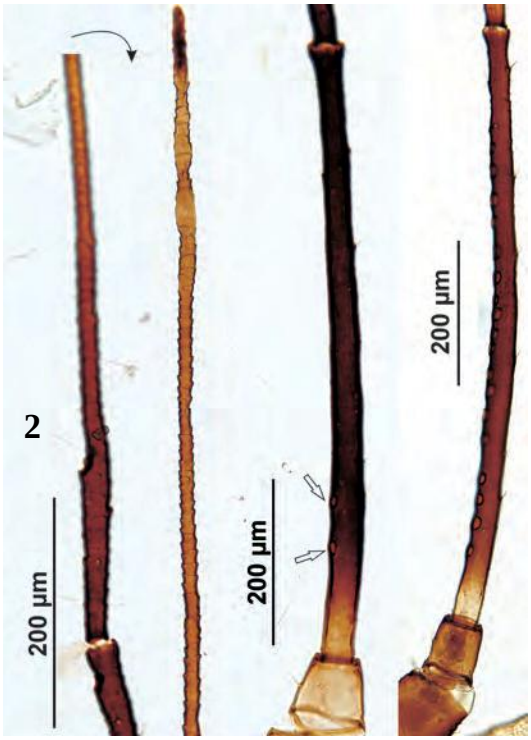
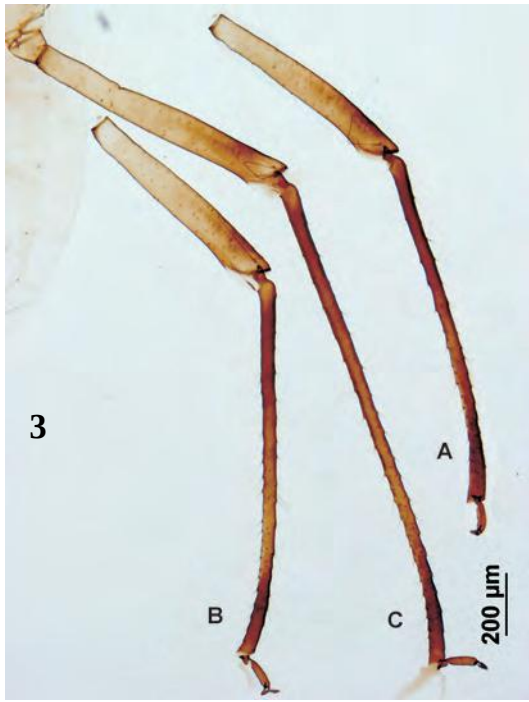


FIGURE 1. *Macrosiphum edrossi*, apterous viviparous female. (A) General appearance, the specimen has lost cauda; (B) Head.





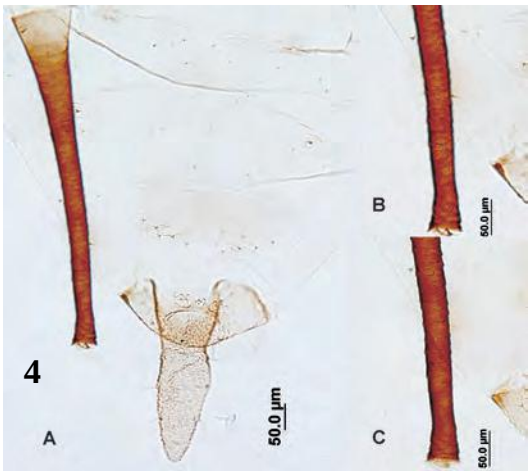


FIGURE 2. *Macrosiphum edrossi*. (A-B) Apterous viviparous female; (C) Alate viviparous female. (A) End of antennal segment V, antennal segment VI; (B) Antennal segments II and III; (C) Antennal segments I, II and III.

FIGURE 3. *Macrosiphum edrossi*, apterous viviparous female. (A) Frontal leg, without coxa and trochanter; (B) Medial leg, without coxa and trochanter; (C) Hind leg, without coxa.

FIGURE 4. *Macrosiphum edrossi*, apterous viviparous female. (A) Left posterior part of abdomen, siphunculus, cauda and genital and anal plates are visible; (B) ventral face of siphunculus. (C) dorsal face of siphunculus.

length), progressively imbricated from its near smooth widened basal portion to apex, with 2–4 lines of small cells on distal 3.8–6.3% of their total length. Genital plate very pale and with setae as usual. Cauda (Fig. 4) lanceolate, pigmented than head and anal plate, 0.30–0.43 mm, 0.5–0.6 times siphunculus, 1.7–1.9 times its basal width, and with 6–8 long, curved, delicate and pointed setae.

Alate viviparous females (Fig. 2C).— When alive "yellowish or greenish […] with head, thorax and all appendages brown to black" from Essig (1953), appendages must be understood: antennae, legs and siphunculi. Prepared specimens very similar to apterous viviparous females, exclud-

ing the thoracic organization (sclerites and wings) and pigmentation (yellowish brown). Other appreciable differences as rapport of apterae are as follows; minimum and maximum limits of not mentioned metric and meristic characteristics are included within the range for each feature in apterae. Antennal segments I and II more pigmented. Antennal segment III, 0.72–0.83 mm; pale proximal portion 7.5–11.3% of total length, carrying 14–19 secondary sensoria extended on two third of the segment length (Fig. 2C). Processus terminalis of antennal segment VI, 1.18–1.33 mm, 6.0–7.1 times base and 1.4–1.7 times segment III; ultimate rostral segment, 0.15–0.17 mm. Femora more pigmented, in extension and intensity. Dorsal setae of middle third of hind tibia, 0.6–0.9 times the width of segment at point of insertion. Marginal sclerites on abdominal segments 2–4, conspicuous, spinuled, sometimes pigmented and carrying 4–5 setae 13–28 µm and 0.3–0.7 times *D*. Setae on abdominal segment 8, 27–40 µm and 0.7–1.7 times D. Siphunculus, 4.28–4.92 times and 3.93–4.50 times included in body length with cauda and without cauda respectively; reticulation provided of 4–5 lines and extended on 6.5–7.8% of total length of siphunculus. Cauda, 2.0–2.3 times its basal width.

BIOLOGY, PLANT HOST.— Two plant species have been mentioned as host plants for *Macrosiphun edrosii*: *Urtica* sp. (?) by Essig (1953) from Michelbacher's collection data, and *Baccharis latifolia* (Ruiz and Pav.) Pers. (Asteraceae, Astereae) in this paper from Ortego's collection data. Both plants have different aspects and in addition *B. latifolia* cannot be confused with a nettle because it lacks the characteristic stinging trichomes. It could be that the specimens collected by Michelhacher were vagrants, although there are many specimens to establish it with certainty, and it could also be that they were collected when beating plants of nettle among which there were twigs of *B. latifolia* that could have gone unnoted; we note that Michebacher collected the type specimens of *Delfinoia peruviana* (Essig, 1953) when beating onto a canvas in the same locality and date. Nevertheless, it is also possible that both plant taxa are hosting *M. edrossi*, because oligophagy or polyphagy are possible in aphids.

The life cycle of the species is unknown, but it would be holocyclic (with sexual generation and winter eggs) to be able to withstand the low winter temperatures of the areas where it has been found.

GEOGRAPHICAL DISTRIBUTION.— *Macrosiphum edrossi* is currently only known in Ayacucho and Pisac (Peru), which are separated one from another about 280 km in a straight line, but it is also very likely that its distribution is much more extensive, because *Baccharis latifolia* is known in Argentinean North-West, Bolivia, Peru, Ecuador, Colombia and Venezuela.

TAXONOMIC DISCUSSION.— Although most of the characters of viviparous females of *Macrosiphum edrossi* suggest it should be placed in the genus *Macrosiphum*, it must be noted that the small surface occupied by the siphuncular apical reticulation is a very peculiar character that generates doubts about this taxonomic assignment. An analysis of nucleic sequences would certainly help clarify its taxonomic status, but it will be necessary to wait to have material fixed in suitable conditions to be able to obtain them. Doubts could be solved if other presumably South American native species sufficiently similar to it were to be discovered.

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Range Extension for the Elusive New England Medicinal Leech, *Macrobdella sestertia* Whitman, 1886 (Hirudinida: Macrobdellidae), in South Carolina, U.S.A., with Notes on Morphology, Coloration, and Biology

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Two species of the leech genus *Macrobdella* (North American medicinal leeches), *M. decora* (Say, 1824) and *M. ditetra* Moore, 1953, have been reported from South Carolina. Collections made in 2008 revealed the presence of a third species, *Macrobdella sestertia* Whitman, 1886, in the state. The species had been collected rarely in the northeastern United States, with only seven specimens collected during the 20th century and the original type specimen(s) lost. The recent South Carolina collections add three locality records and nine specimens, and two other specimens that had been collected in 1984 and 2002 were found in museum collections, resulting in a total of five locations and eleven specimens. This report of *M. sestertia* in South Carolina is a significant southward extension of its distribution (approximately 1,360 km), which formerly included only Massachusetts, Maine, and New Hampshire, and is also the largest sample ever reported for the species. Life colors of *M. sestertia* are shown for the first time. Morphological variations were observed for copulatory gland pore number and for annuli arrangement. Evidence is presented for predation on fish eggs in New Hampshire by *M. sestertia* and *M. decora*. At one location on Sleepy Creek, *M. sestertia* harbored another leech, *Placobdella nuchalis* Sawyer and Shelley, 1976 (Glossiphoniidae), which is a new association. Three new county records of *M. ditetra* in South Carolina also are included.

KEYWORDS: Annelida, Hirudinea, leeches, South Carolina, morphological variation

Currently, there are four valid species of North American medicinal leeches recognized in the genus *Macrobdella*: *M. decora* (Say, 1824), *M. sestertia* Whitman, 1886, *M. ditetra* Moore, 1953, and *M. diplotertia* Meyer, 1975 (Say 1824; Whitman 1886; Moore 1953; Meyer 1975; Smith 1977). All of the species are sanguivorous (or presumed to be), feeding on vertebrates (mainly frogs) and at least *M. decora* and *M. diplotertia* are predators of embryos and juveniles of amphibians (Cory and Manion 1953; Cargo 1960; Schalk et al. 2002; Trauth and Neal 2004; Connior and Trauth 2010). Two species, *M. decora* and *M. sestertia*, are known or presumed to attack and feed on the blood of humans, and *M. decora* has been used in medical practice since the 1800s (Smith 1843, 1845). Sawyer (1973) discussed cases of leech attacks on swimmers in several South Carolina lakes and indicated that *M. decora* was the species involved in the attacks at Lake Jemiki (Oconee Co., SC) in the late 1960s and early 1970s. Smith (1977) documented leech attacks on swimmers at a lake in Massachusetts where *M. sestertia* was collected. The nervous systems of both *M. decora* and *M. sestertia* have been studied in relation to their swimming (Weeks 1982).

Macrobdella decora has a wide distribution in eastern and central North America from north-

ern Mexico to southern Canada (Klemm 1982); however, only a single locality has been reported in South Carolina (Sawyer and Pass 1972). *Macrobdella ditetra* occurs in coastal states from Virginia to Louisiana and inland to Arkansas (Moore 1953; Sawyer and Shelley 1976; Klemm 1982), and has been collected at seven locations on the coastal plain of South Carolina (Sawyer and Shelley 1976). *Macrobdella diplotertia* has been found in Missouri, Kansas, and Arkansas (Meyer 1975; Klemm *et al.* 1979; Turbeville and Briggler 2003). *Macrobdella sestertia* occurs in Massachusetts, Maine, and New Hampshire (Whitman 1886; Smith 1977; Smith and Hanlon 1997; Phillips et al. 2016), with reports from Louisiana (Klemm 1972; Davies 1991) being erroneous (Smith 1977). Phillips et al. (2016) reported a new state record for *M. sestertia* in New Hampshire, listing the collection site as "Suncoop Pond," a misspelling of "Suncook Pond," which is itself an unofficial, local name for Northwood Lake (the correct name that appears on maps; see Bailey 1938; Hoover 1938; Warfel and Fuller 1938). Seven species of leeches were reported from the middle to lower Savannah River (Patrick *et al.* 1967). Since the comprehensive review of leeches of the Carolinas by Sawyer and Shelley (1976), additional information on leeches in South Carolina has been published by Sawyer (1979), Klemm (1995), Moser et al. (2005), Light et al. (2005), Moser et al. (2011), and Phillips et al. (2016). In 2008, specimens of *M. sestertia* were collected from several Savannah River basin streams in South Carolina, which is a significant extension of the known range of this rarely-collected species. In addition, an association between *M. sestertia* and *Placobdella nuchalis* was observed for the first time.

Materials and Methods

Leeches were collected by hand and with dipnets from streams in South Carolina in 2008 and 2011 (Poly 2011). Some leeches were brought from the field alive, and activity, swimming, and feeding were observed in captivity before preservation. Leeches were narcotized by slow addition of 70% ethanol to water in their containers, then were preserved in 70% ethanol. Photos were taken of some *M. sestertia* while alive in an aquarium and of two immediately after preservation. Others were fixed in 70% ethanol in the field without narcotization; however, these had been killed by summer heat and were relaxed prior to preservation. One *M. ditetra* was allowed to attach to several frogs to feed while in captivity. Additional leeches were borrowed from museum collections. Leech identifications were made using morphological characteristics given in original descriptions and subsequent works (Whitman 1886; Moore 1959; Sawyer and Shelley 1976; Klemm 1982; Davies 1991; Govedich et al. 2010). Annuli designations follow Sawyer (1986a). Leech specimens were deposited in the California Academy of Sciences, Invertebrate Zoology collection (CASIZ), San Francisco, California, USA, and the Charleston Museum (ChM), Charleston, South Carolina, USA. Comparative material was borrowed from ChM, the Museum of Comparative Zoology (MCZ), Harvard University, Cambridge, Massachusetts, USA and the North Carolina Museum of Natural Sciences, Raleigh, North Carolina, USA (NCSM; ChM specimens are now housed at NCSM) (see Appendix 1).

Results and Discussion

A total of 10 specimens of *Macrobdella* spp. were collected in South Carolina from four locations in 2008 and 2011. Eight leeches collected in 2008 had the following characteristics that identify them as *Macrobdella sestertia*: 1) male and female gonopores separated by two and one-half annuli, lying on annulus 33 and between annuli 35 and 36, respectively, 2) a total of 24 copulatory gland pores arranged in four rows of six on annuli 42–44, 3) median longitudinal row of 20 pale orange spots along a diffuse mid-dorsal stripe with marginal rows of 20 quadrangular black blotches, and 4) body pigmentation olive green dorsally, orange to reddish-orange with scattered black

blotches ventrally (the number and position of the blotches were variable among specimens Figs. 1, 2). Total lengths of the eight leeches were 39.7, 47.8, 48.1, 53.7, 62.4, 69.1, 79.3, and 93.7 mm; one additional specimen (ninth specimen) from Turkey Creek was considered to be *M. sestertia*; however, it escaped after capture. The copulatory gland pores are inconspicuous and lying hidden between annuli in smaller leeches, becoming more exposed as the glands develop. The three largest leeches had noticeable gland development that appeared white, contrasting with the orange coloration on the ventral side of the body. All *M. sestertia* had dark pigment on the postero-ventral and ventro-lateral margins of the caudal sucker (= acetabulum) (Figs. 1, 2), with the pigment being more extensive in larger leeches. Later, an unidentified leech collected in 1984 was found in ChM and was identified as *M. sestertia* (ChM IO6, 69.3 mm TL); an additional leech collected in 2002 was found in NCSM (as *M. decora*) and was reidentified as *M. sestertia* (NCSM 29791). Both of these collections were from Turkey Creek in Edgefield Co. (Fig. 3, Appendix 1). One *M. sestertia* possessed unusual overlapping annuli (Fig. 4, ChM IO7, 47.8 mm TL), and this condition does not appear to have been reported for any species of *Macrobdella*. The type specimens of *M. sestertia* could not be located, and the only localities mentioned in the original description were on page 382 as "Found in the neighbourhood of Cambridge; geographical limits unknown." and in the legend for Fig. 57 on page 414 as "obtained from Charles River, Watertown, Mass." (Whitman 1886).

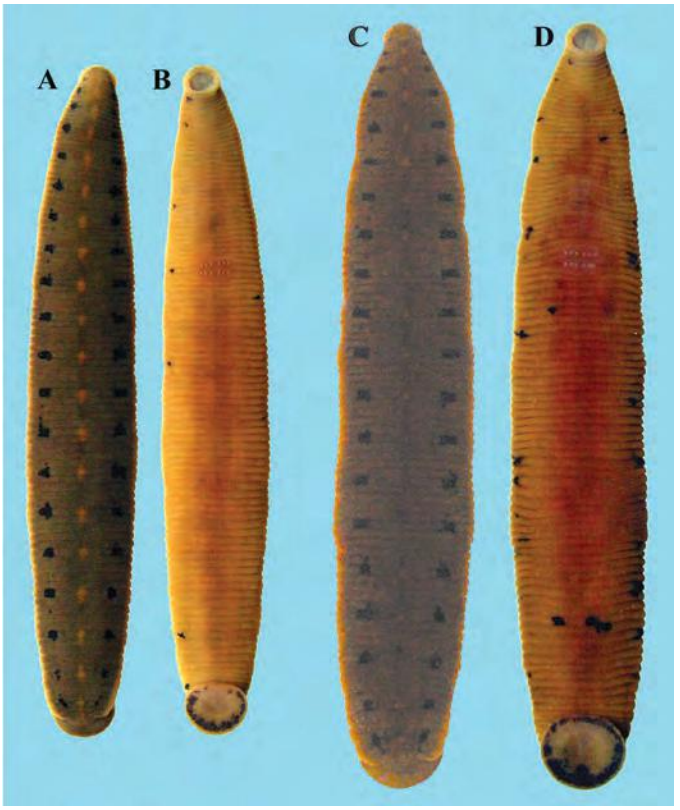


FIGURE 1. *Macrobdella sestertia* Whitman, 1886 from Sleepy Creek, Edgefield Co., South Carolina (dorsal (A, C) and ventral (B, D) views; CASIZ 224101 (69.1 mm TL [A, B]; 79.3 mm TL [C, D]). These two specimens were photographed immediately after preservation in 70% ethanol, and the pigments began to fade rapidly.

In addition to collections of *M. sestertia*, one specimen of *M. ditetra* (44.1 mm TL) was collected from Willow Creek, Florence Co., SC in 2011. This specimen has male and female gonopores separated by two annuli and possesses a total of 8 copulatory gland pores arranged in two rows of four. Its pigmentation was gray/brown dorsally with one wide median dusky stripe, two narrow longitudinal stripes medially, two longitudinal rows of closely-spaced dark blotches medial to the two narrow stripes, and rusty-orange brown (in life) with scattered dark blotches ventrally and was consistent with what has been reported for *M. ditetra* and with museum specimens examined (Fig. 5; see Sawyer and Shelley 1976). Collections of *M. ditetra* from Florence, Hampton-Allendale, and Colleton counties represent new county records for the species in South

FIGURE 2. *Macrobdella sestertia* Whitman, 1886 from Sleepy Creek, Edgefield Co., South Carolina (CASIZ 224101). Specimens were photographed alive on 1 August 2008.

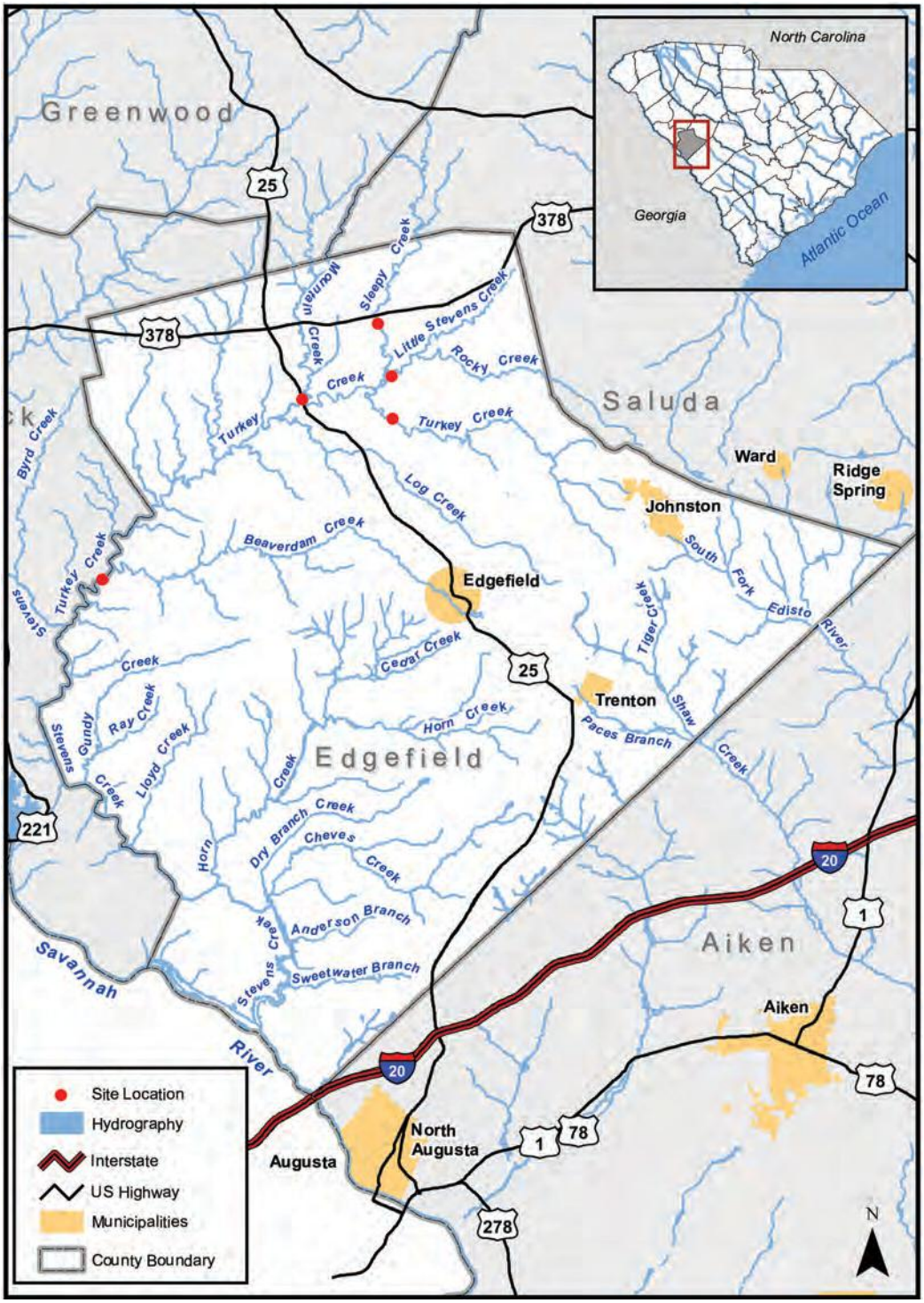


FIGURE 3. Distribution of *Macrobdella sestertia* Whitman, 1886 in Edgefield Co., South Carolina, USA.

FIGURE 4. Unusual overlapping annuli (annuli 48–49) observed on one specimen of *Macrobdella sestertia* (ChM IO7).

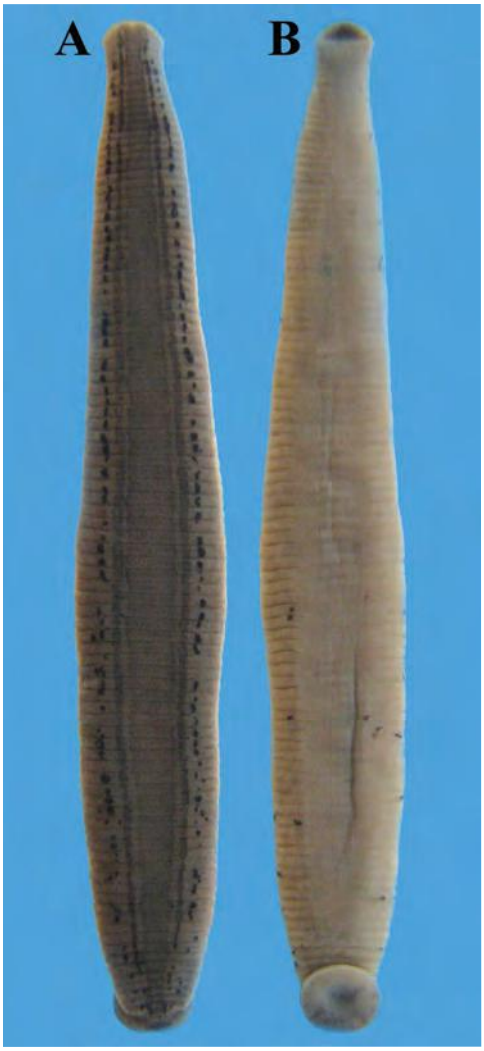


FIGURE 5. *Macrobdella ditetra* Moore, 1953 from Willow Creek, Florence Co., South Carolina (dorsal (A) and ventral (B) views; CASIZ 224103).

Carolina (Appendix 1). Between the time of collection on 10 August 2011 and the date of preservation on 2 September 2011, the *M. ditetra* specimen was allowed to attach to and feed on two green tree frogs, *Hyla cinerea* (Schneider, 1799) (14 and 26 August), and on one southern leopard frog, *Lithobates sphenocephalus* (Cope, 1886) (21 August; Fig. 6). In each case, the leech attached to one of the rear legs of the frogs and was allowed to feed for 30 minutes to nearly two hours before it was removed and the frog hosts were released.

Coloration and pigmentation of *M. decora*, *M. diplotertia*, and *M. sestertia* are similar, with *M. ditetra* differing most from these three species. The coloration and pigmentation of South Carolina specimens of *M. sestertia* appear to be the same as those described by Whitman (1886). In fact, *M. decora* and *M. sestertia* appear to be nearly identical in their coloration and pigmentation as noted by Smith (1977). Ventral pigmentation of the caudal sucker of *M. sestertia* was not mentioned by Whitman (1886) or subsequent authors but is documented herein for the specimens from South Carolina; it agrees closely with Sawyer's (1972) description for *M. decora* and that shown for *M. diplotertia* in McCallum et al. (2008). Pigments were faded on many of the museum specimens, thus, comparisons of pigment differences, particularly on the caudal suckers, could not be made using this material. The two preserved specimens in Fig. 1 were photographed immediately after preservation in 70% ethanol, and the orange-red color on the ventral surface began to fade rapidly (compare with that shown in photographs of live specimens [Fig 2]).

None of the *M. sestertia* or *M. ditetra* collected in South Carolina exhibited any variations in copulatory gland pore number or position. However, specimens of *M. decora* and *M. sestertia* from Maine displayed variations in pore count. One *M. decora* (MCZ 84111, larger specimen of two) was missing one anterior gland and pore, and one *M. sestertia* (MCZ 56624) had three additional pores associated with the two anterior and lateral copulatory glands. Copulatory gland pore number and pattern is one of the primary morphological characteristics used to separate species of *Macrobdella*. Variation in number and arrangement of copulatory gland pores has been noted for *Macrobdella decora* in Ontario, Georgia, South Carolina, and Maine (Moore 1922; Sawyer and Pass 1972; this study), *M. ditetra* in Louisiana (Moore 1953), and *M. sestertia* in Maine (this study). No variation in copulatory gland pore count or arrangement has been found in *M. diplotertia* (Turbeville and Briggler 2003). Most of the reported variants would not cause confusion in determining the species identity; however, one *M. decora* from Georgia had a pore count and pattern typical of *M. ditetra* (Sawyer and Pass 1972).

The unusual overlapping annuli observed on one specimen of *M. sestertia* in this study have not been mentioned for *Macrobdella* spp. by previous authors, but they have been observed occasionally in other genera and species of leeches (e.g., Blanchard 1893, 1894; Roy T. Sawyer, pers. comm.). A recent study of the *Macrobdella* spp. preserved at the National Museum of Natural History did not report any overlapping annuli (or variations in copulatory pores) (Phillips et al. 2016); however, the authors might have overlooked such variations because many museum specimens are contracted and curled due to preservation.

Macrobdella sestertia captured in Sleepy Creek on 31 July 2008 had a smaller species of leech associated with them. The smaller leeches detached during transport; therefore, detailed information on numbers occurring on each *M. sestertia* could not be obtained; however, it appeared that the largest *M. sestertia* had harbored most or all of the leeches. The nine smaller leeches were identified as *Placobdella nuchalis* and based on their sizes represent one adult (engorged with blood) and its offspring (Fig. 7, Appendix 1). The nuchal constriction remained on most of the juveniles after preservation, but the adult specimen contracted enough to obliterate the constriction and alter its morphology. *Placobdella nuchalis* was reported previously from two coastal plain counties in South Carolina (Sawyer and Shelley 1976), and the authors noted that records of *P. montifera* from the Savannah River in Patrick et al. (1967) possibly represented *P. nuchalis*. The specimens reported herein further support the statement of Sawyer and Shelley (1976). The only host reported for *P. nuchalis* was the bluegill, *Lepomis macrochirus* Rafinesque, 1819, collected in North Carolina (Shelley and Braswell 1981).

All of the streams from which *M. sestertia* were collected are in the upper portion of the Stevens/Turkey creek basin (Savannah River drainage) in northern Edgefield County. The streams had rocky bottoms with clear, shallow water, and the streams were under drought conditions when the collections were made. Leeches were found by moving or disturbing cobble-sized rocks. The leeches were agile swimmers, using undulations of the body for locomotion and were very active when disturbed. The coastal plain stream where *M. ditetra* was collected had clay and sand substrates with coarse organic debris.

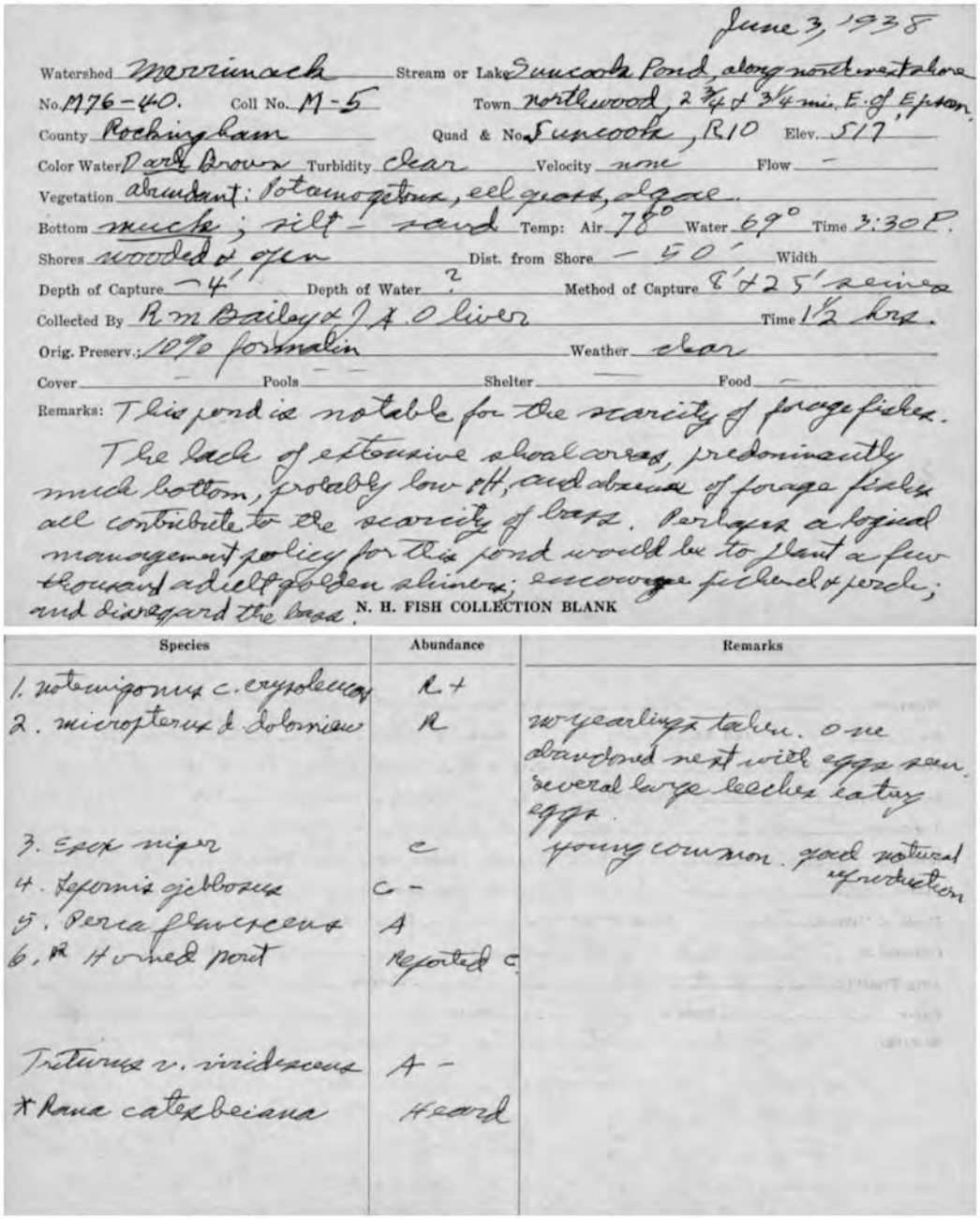
It is unclear whether *M. sestertia* is a native species in South Carolina or is an accidental or intentional introduction. In 1797 in South Carolina, Dr. David Ramsay, "proposed . . . the practicability of introducing the leeches of this country into the practice of physic and surgery." (Waring 1964:124), and in the early- and mid-1800s, advertisements for the sale of leeches appeared in several Charleston, SC newspapers, although many of the leeches were European imports (Hagy 1991). Both the European medicinal leech, *Hirudo medicinalis* Linné, 1758, and the North American medicinal leech, *M. decora*, were used in medicine in the U.S. (Smith 1843, 1845). A letter dated March 26, 1877 from E.M.

FIGURE 6. *Macrobdella ditetra* Moore, 1953 (CASIZ 224103) feeding on *Lithobates sphenocephalus* (Cope, 1886); arrows point to the leech.

Seabrook of Sumter, SC requests that two leeches be shipped to him from an unspecified source (Ephraim Mikell Seabrook Papers, South Caroliniana Library, University of South Carolina). Therefore, historical records indicate the use of and distribution of leeches in the eastern United States and in South Carolina. It is possible that specimens of *M. sestertia* were transported from New England, then were released or escaped. Sawyer (1973) presented information suggesting that *M. decora* in Lake Jemiki, South Carolina could have been introduced through discarded fishing bait. The records of *M. ditetra* from Colleton, Florence, and Hampton-Allendale counties, SC expands the distribution within the state (Sawyer and Shelley 1976).

The first report of *M. sestertia* from New Hampshire was by Phillips et al. (2016) based on a collection from 1938 by Reeve Maclaren Bailey (1911–2011; see Stewart and Smith 2000) and James A. Oliver. Although unknown to Phillips et al. (2016), Bailey's original field notes are available at the Fish Division, University of Michigan Museum of Zoology (UMMZ) and listed the fishes captured, amphibians seen or heard, and a note about large leeches consuming eggs

FIGURE 7. *Placobdella nuchalis* Sawyer & Shelley, 1976 from Sleepy Creek, Edgefield Co., South Carolina (dorsal view; CASIZ 224102); one engorged adult and eight juveniles.



June 3, 1938

Watershed Merrimack Stream or Lake Suncook Pond, along northeast shore
No. M76-40. Coll No. M-5 Town Northwood, 2 ¾ & 3¼ mi. E. of Epsom.
County Rockingham Quad & No. Suncook, R10 Elev. 517'
Color Water Dark Brown Turbidity clear Velocity none Flow —
Vegetation abundant: Potamogeton, eel grass, algae.
Bottom mucky; silt – sand Temp: Air 78° Water 69° Time 3:30 P.
Shores wooded & open Dist. from Shore – 50' Width
Depth of Capture 4' Depth of Water 2' Method of Capture 8' & 25' seines
Collected By R M Bailey & J A Oliver Time 1½ hrs.
Orig. Preserv.: 10% formalin Weather clear
Cover — Pools — Shelter — Food —
Remarks: This pond is notable for the scarcity of forage fishes.
The lack of extensive shoal areas, predominantly mud bottom, probably low pH, and absence of forage fishes all contribute to the scarcity of bass. Perhaps a logical management policy for this pond would be to plant a few thousand adult golden shiners; encourage pickerel & perch; and disregard the bass.

N. H. FISH COLLECTION BLANK

Species	Abundance	Remarks
1. Notemigonus c. crysoleucas	R +	
2. Micropterus d. dolomieu	R	no yearlings taken. one abandoned nest with eggs seen. several large leeches eating eggs.
3. Esox niger	C	young common. good natural reproduction
4. Lepomis gibbosus	C –	
5. Perca flavescens	A	
6. Ameiurus nebulosus	Reported C	
Tributus v. viridescens	A –	
*Rana catesbeiana	Heard	

FIGURE 8. Field notes for *Macrobdella* collections at Northwood Lake (aka Suncook Pond), Rockingham Co., New Hampshire on 3 June 1938 by Reeve M. Bailey and James A. Oliver. Courtesy of Fish Division, University of Michigan Museum of Zoology (UMMZ).

(Fig. 8; also see Bailey 1938). Under remarks for the smallmouth bass (*Micropterus dolomieu*), the notes read: "No yearlings taken. One abandoned nest with eggs seen. Several large leeches eating eggs." The only leech specimens known to have been preserved by Bailey and Oliver from North-

wood Lake (aka "Suncook Pond") on 3 June 1938 are USNM 1405211 (n = 3 *M. sestertia*) and USNM 50162 (n = 1 *M. decora*) (Phillips et al. 2016). This appears to be the first known case of predation on fish eggs by the genus *Macrobdella* and isn't surprising considering that *Macrobdella* spp. prey on amphibian eggs/embryos and young and that other leeches are known to consume fish eggs (Richardson 1948; Light et al. 2005). The presence of American bullfrog, *Lithobates catesbeianus* (Shaw, 1802), and eastern newt, *Notophthalmus viridescens* (Rafinesque, 1820), in Northwood Lake was included in R.M. Bailey's field notes and by Oliver and [J.R.] Bailey (1939). McCallum et al. (2008) noted a mimetic relationship between *N. viridescens* and *M. diplotertia*, and the same likely applies to *M. decora* and *M. sestertia*, which all have similar coloration.

This study documents the first reported occurrence of *Placobdella nuchalis* being attached to another leech, *M. sestertia*. Other leech associations have been reported for *Placobdella ornata* (as "*Clepsine ornata*, Var. b, *stellata*") on *Macrobdella decora* in Connecticut (Verrill 1874; Moore 1952), for *P. picta* on *M. diplotertia* in Arkansas (Turbeville and Briggler 2003; Connior and Trauth 2010), and for other genera and species of leeches (Sawyer 1986b). The nature of these associations of *Placobdella* spp. with *Macrobdella* spp. is unknown but may be worthy of further investigation.

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Appendix 1. Material Examined

Macrobdella decora

MASSACHUSETTS: MCZ 56596 (formerly in University of Massachusetts, Amherst collection as UMA AN.404), n = 2, Rutland Brook, Barre, Worcester Co., 8 August 1988, A. Richmond, S. Jackson; **MAINE**: MCZ 84111, n = 2, Proctor Pond, Albany, Crooked/Presumpscot river system, Oxford Co., 44°14′36″N, 70°47′56″W, 15 July 1992, EMAP Program, U.S. EPA; **SOUTH CAROLINA:** Upper Lake Jemiki [also spelled Jemike] (Notes: the lower [downstream] and smaller of the two ponds is where swimmers were attacked by leeches according to the current landowner, Donald Payne and his two sons. Years ago, the lakes were drained and dried, which apparently eradicated the leech population [in conversation with W.J. Poly, 2011]), approx. 6 km WNW of Walhalla at end of Lake Jemiki Road (WA-3), Oconee Co. (no voucher specimens; Sawyer and Pass [1972]).

Macrobdella ditetra

SOUTH CAROLINA: MCZ 53008, n = 1, Coosawhatchie River, US 321, Hampton-Allendale Co. line, 29 December 1982, F. Rohde; MCZ 53009, n = 2, Ashepoo River, US 17, Colleton Co., 30 December 1982, F. Rohde; CASIZ 224103, n = 1, Willow Creek, approx. 11 km SE of Florence, downstream of Flowers Road (SSR 726), Florence Co., 34.11604°N / -79.67809°W, 10 August 2011, W.J. Poly, K.M. Kubach, M.T. Cribb, A.R. Gelder, J. Johnston, S. Mycko.

Macrobdella sestertia

MASSACHUSETTS: Essex Co.: MCZ 56398 (formerly UMA AN.207), n = 2, Lake Chebacco, along shore at public beach, Hamilton, 25 June 1976 (cited in Smith, 1977); Barnstable Co.: MCZ 56412 (formerly in UMA), n = 1, Herring River, 0.5 mi. S US 6, North Harwich Village, 21 May 1977 (cited in Smith and Hanlon, 1997); **MAINE**: MCZ 56624 (formerly UMA AN.431), n = 1, Mill Brook Pond, Sebec Lake, at end of logging road, Pisquataquis Co., 12 July 1993, EMAP personnel (cited in Smith and Hanlon, 1997); **SOUTH CAROLINA:** ChM IO6 / NCSM 28341, n = 1, Turkey Creek, approx. 10 km NNW of Edgefield, at US Route 25 crossing [Station 61-PSC-84], Edgefield Co., 33.89012°N / -82.02378°W, 13 April 1984, P.S. Coleman & J.F. McKinney; NCSM 29791, n = 1, Turkey Creek, ca. 12.6 air mi. [20.3 km] W of Edgefield, ca. 200 m below Key Road (SSR 68 / SSR 227), Edgefield / McCormick co. line, 33.79473°N / -82.14547°W, 15 May 2002, W.C. Starnes et al; no voucher (escaped after capture), n = 1, Turkey Creek, approx. 10 km NNW of Edgefield, upstream of Elmwood Road (SSR 100), Edgefield Co., 33.88178°N / -81.96879°W, 29 July 2008, W.J. Poly, K.M. Kubach, C.A. Marion, M.T. Cribb, A.R. Gelder, A. Sayer, G. Satterfield, C. Guinn; CASIZ 224100, n = 3, Little Stevens Creek, approx. 13 km N of Edgefield, Edgefield Co., 33.90094°N / -81.96870°W, 29 July 2008, W.J. Poly, K.M. Kubach, C.A. Marion, M.T. Cribb, A.R. Gelder, A. Sayer, G. Satterfield, C. Guinn; ChM IO7 / NCSM 28342, n = 1, Sleepy Creek, upstream of Sleepy Creek Road (SSR 62) and downstream of US Route 378, Edgefield Co., 33.92844°N / -81.97770°W, 29 July 2008, W.J. Poly, K.M. Kubach, C.A. Marion, M.T. Cribb, A.R. Gelder, A. Sayer, G. Satterfield, C. Guinn; CASIZ 224101, n = 4, Sleepy Creek, upstream of Sleepy Creek Road (SSR 62) and downstream of US Route 378, Edgefield Co., 33.92844°N / -81.97770°W, 31 July 2008, W.J. Poly.

Placobdella nuchalis

SOUTH CAROLINA: CASIZ 224102, n = 9, Sleepy Creek, upstream of Sleepy Creek Road (SSR 62) and downstream of US Route 378, Edgefield Co., 33.92844°N / -81.97770°W, 31 July 2008, W.J. Poly [attached to *M. sestertia*].

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Illustrated Key and Synopses of Shallow-water Gorgonians and Pennatulaceans of the Central Philippines, Part 2 (Cnidaria: Anthozoa: Octocorallia)

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This paper represents the second part of a two-part series that covers shallow-water sea fans and sea pens of the central region of the Philippine Archipelago, from the Verde Island Passage in southern Luzon to southern Negros and the Bohol Sea. The first paper (Williams and Chen, 2014), treated commonly encountered species from the region of the Verde Island Passage, and provided an assessment of the regional biogeographic setting, a key to the taxa, and a glossary of terms used in the key and the descriptions. Included were twenty-six genera in twelve octocoral families – Briareidae, Anthothelidae, Subergorgiidae, Melithaeidae, Acanthogorgiidae, Plexauridae, Gorgoniidae, Ellisellidae, Isididae, Veretillidae, Virgulariidae, and Pennatulidae. The present paper provides an illustrated key that deals with an additional ten species in nine genera of the families Keroeididae, Acanthogorgiidae, Plexauridae, Gorgoniidae, Ellisellidae, Ifalukellidae, and Scleroptilidae.

KEYWORDS: Part 2, Illustrated key, gorgonian and pennatulacean octocorals, sea fans, sea pens, central islands of the Philippine Archipelago

During a fifteen year period from the early 1990s to 2017, field research has been conducted by invertebrate zoologists from the California Academy of Sciences regarding coral reef biotic surveys on several of the island groups of the approximately 7100 islands in the extensive Philippine Archipelago. A detailed introduction to this two part treatise, including synopses of the biogeographic setting, coral biodiversity, octocoral biology, and the current status of our knowledge of relevance, is contained in the first part of the study (Williams and Chen 2014:67–71).

MATERIALS AND METHODS

The geographical area covered in this paper extends from the central region of the Philippines from the Lubang and Busuanga Islands in the northwest to Siquijor and Bohol in the southeast (Fig. 1). SCUBA diving operations on numerous coral reefs within this region were conducted between 2010 and 2017 in depths less than 40 m.

Regarding the collected material that was examined and described in this paper, the following fieldwork was conducted in the Philippines between 2010 and 2017: February 2010 Coral Triangle Expedition November; 2012 Coral Triangle Expedition; December 2013 Philippine Deep Reef Expedition; May 2014 Verde Island Passage Expedition; March/April 2015 Verde Island Passage Expedition; April 2016 Verde Island Passage Expedition; March/April 2017 Verde Island Passage Expedition. All material is currently housed in the marine invertebrate collections of the Depart-

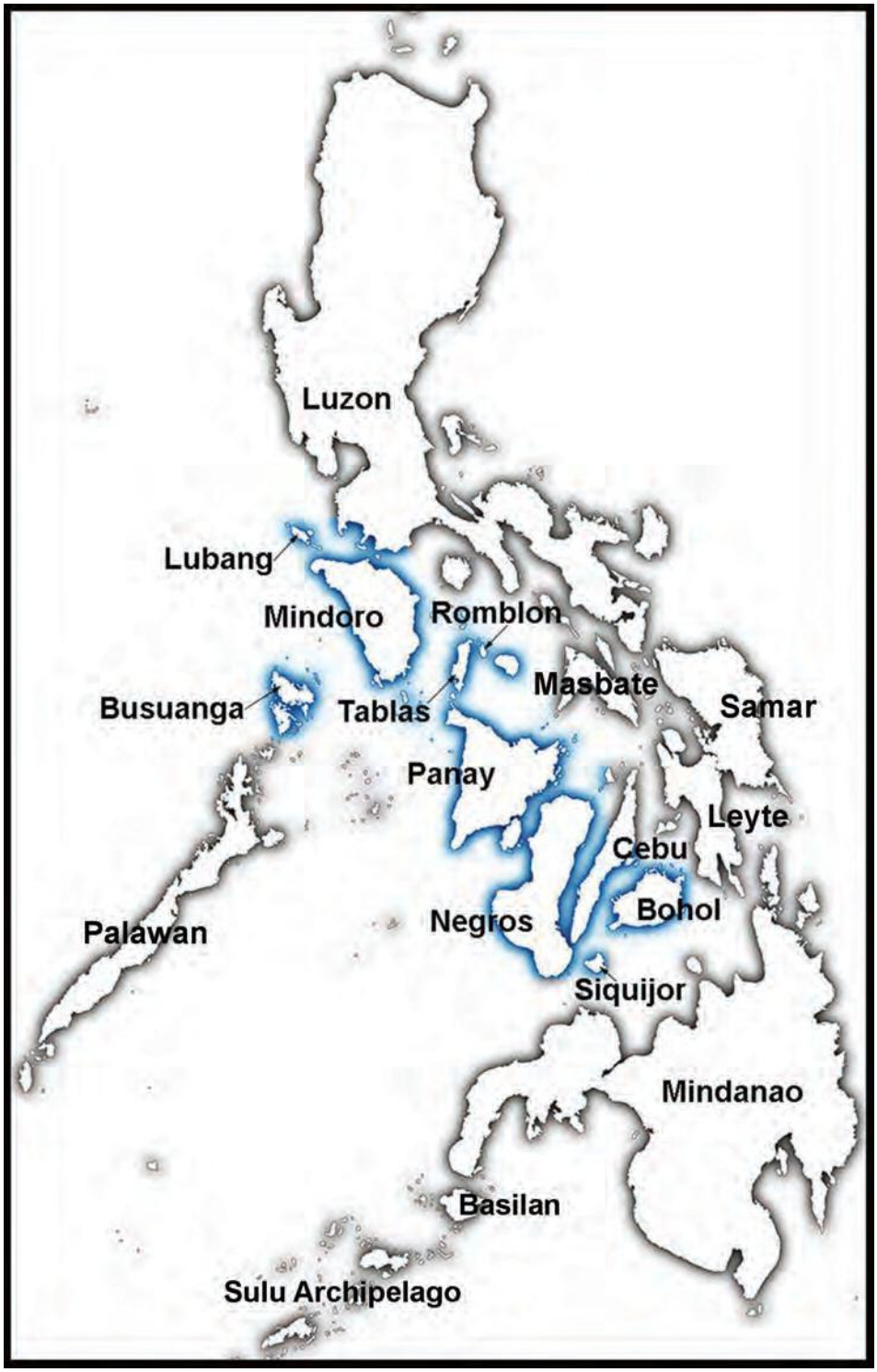

FIGURE 1. Map of the Philippine Archipelago, showing major islands of the central Philippines shaded in blue.

ment of Invertebrate Zoology and Geology, California Academy of Sciences, abbreviated as CASIZG.

Sclerites from octocoral tissues were obtained using the procedure outlined by Williams and Mattison (2018). Scanning electron micrographs were made using a Hitachi SU3500 Scanning Electron Microscope. All skeletal material for SEM examination was coated with gold/palladium using a Cressington 108 Auto Sputter Coater.

Williams and Chen (2014) provides a glossary of terms used in the keys and descriptions. That source is also applicable for use in the present paper. For additional terms used in this paper that may not be present in the 2014 glossary, see Bayer et al. (1983).

Key to additional shallow-water Gorgonians and Pennatulaceans of the Central Philippines

1a. Unbranched octocorals composed of a sterile stalk and polyp-bearing rachis, imbedded in unconsolidated sediments (such as sand, mud or gravelly rubble) by a basal muscular peduncle. Calcified central axis extends throughout length of colony. Sclerites absent. . . . . *Calibelemnon indicum* (Fig. 26A)

1b. Branched octocorals attached to hard substrata by a basal holdfast. Axial material highly variable – composed of sclerites, a hard dark protein, or consolidated calcium carbonate. Sclerites present and abundant, highly variable in shape and size. 2

2a. Axis segmented, composed of alternating swollen, rounded nodes and straight, elongate internodes. Branching occurs at the nodes. Axial sclerites are smooth rods. *Melithaea* spp. (Fig. 2)

2b. Axis uniform throughout, composed of sclerites, a dark proteinaceous material, or a light-colored predominantly calcareous material 3

3a. Axis composed of sclerites, some of which are imbedded in a proteinaceous matrix. Colonies copiously branched, red in color, with conical polyp calyces that are not particularly densely-set or crowded on the branches . . . . . *Keroeides gracilis* (Figs. 3-4)

3b. Axis composed of hard proteinaceous material or with solid calcareous material 4

4a. Axis of hard, usually dark, proteinaceous material in concentric layers around a narrow hollow cross-chambered core. 5

4b. Axis of solid, predominantly calcareous material that can be white to variably-colored 9

5a. Polyps non-retractile, forming long cylindrical or dome-shaped projections perpendicular to the branches. Polyp wall sclerites arranged en chevron . . . . . *Anthogorgia* spp. (Figs. 5–8)

5b. Polyps fully retractile into conical permanent calyces, or retractile forming small mounds . . 6

6a. Polyps retractile into small, conical or hemispherical, permanent calyces 7

6b. Polyps retractile into coenenchyme forming small rounded mounds, calyces absent 8

7a. Sclerites of the calyces and surface of the coenenchyme are rosettes . . . . . *Bebryce grandicalyx* (Figs. 9–11)

7b. Sclerites of the polyps, calyces, and surface coenenchyme are triradiates, thornscales, and spindles . . . . . *Trimuricea inermis* (Figs. 12–15)

8a. Sclerites are clubs, spindles, and large rods . . . . . *Hicksonella princeps* (Figs. 16–18)

8b. Sclerites include curved and irregularly-shaped spindles . . . . *Pinnigorgia flava* (Figs. 19–21)

9a. Sclerites are minute, flattened ovals . . . . . *Plumigorgia hydroides* (Figs. 25–27)

9b. Sclerites are clubs, capstans, and/or double heads 10

10a. Sclerites are clubs and capstans . . . . . *Heliania spinescens* (Figs. 22A, 23)

10b. Sclerites are double heads. . . . . *Verrucella* spp. (Figs. 22B–C, 24)

Systematic Account

Alcyonacea Lamouroux, 1816

Family Melithaeidae Gray, 1870

***Melithaea* spp.**

Figure 2

Remarks.— In part 1 of this study, Williams and Chen (2014:76-77) distinguished the genus *Acabaria* from *Melithaea*. Fabricius and Alderslade (2001) recognized the intermediate nature of of particular morphological features that were used by previous authors to distinguish between several melithaeid genera, and suggested that with future research the several melithaeid genera might eventually be synonymized with the first described genus *Melithaea*. Subsequently, Alderslade (2006) and Reijnen et al. (2014) maintained that there are two valid genera of melithaeids (*Melithaea* Milne Edwards and Haime, 1857, and *Asperaxis* Alderslade, 2006), and that molecular and morphological evidence suggests that five previously recognized genera (*Acabaria, Clathraria, Melitodes, Mopsella,* and *Wrightella*) are best recognized as synonyms of the genus *Melithaea*.

References.— Alderslade (2006), Fabricius and Alderslade (2001), Gosliner et al. (1996), Ofwegen (2016), Reijnen et al. (2014), Williams (1992).

Family Keroeididae Kinoshita, 1910

Genus *Keroeides* Studer, 1887

***Keroeides gracilis* Whitelegge, 1897**

Figures 3, 4

Material Examined.— CASIZG 201396; Philippines, Occidental Mindoro, Lubang Island (13.77°N 120.12°E); ca. 34 m depth; 31 May 2014; coll. G.C. Williams; one whole colony wet-preserved in 95% ethanol.

Remarks.— Colonies of this species are planar or nearly so, are copiously branched, and exhibit lateral branching. The calyces of the polyps are conspicuous and conical in shape, and are not particularly densely set or crowded on the branches. The sclerites of the outer coenenchyme are large spindles with relatively small tubercles that are uniformly-distributed over the sclerite surface. Due to the numerous and densely-disposed spindles of the surface of the colonies, these sea fans are relatively fragile or brittle, not exhibiting a high degree of flexibility without sustaining breakage of some branches. The tissues do not harbor zooxanthellae. The color of the colony examined here is brick red with pale yellow anthocodiae.

Kükenthal (1924) and Bayer (1949) consider *Keroeides gracilis* as a junior synonym of *K. koreni* Wright and Studer, 1889. However, Grasshoff (1999) and Grasshoff and Bargibant (2001) disagree and maintain that they are separate species — *K. gracilis* from mesophotic reefs (30–164 m), red in color with yellow polyps, and *K. koreni* from deeper water (250–450 m), brick red in color throughout. I therefore concur with Grasshoff's assessment and consider *Keroeides gracilis* to as the proper identification in this case.

Species.— There are six described species in the genus. Color of the various species can vary from orange to deep red, or white to light grey or tan.

Occurrence and Distribution.— The genus is widely distributed in the Indo-Pacific, Red Sea to Japan, New Caledonia, and Hawaii; usually encountered below 30 m, mostly in mesophotic depths or deep sea, rarely seen in shallower depths. *Keroeides gracilis* is widely distributed in

and to the east of the Coral Triangle and is known from central Indonesia, the Philippines, New Guinea, Northern Mariana Islands, Palau, Tuvalu, and New Caledonia.

References.— Bayer (1949, 1981); Fabricius and Alderslade (2001); Grasshoff (1999); Grasshoff and Bargibant (2001); Kükenthal (1924); Ofwegen (2010c).

Family Acanthogorgiidae Gray, 1859

Genus *Anthogorgia* Verrill, 1868

***Anthogorgia* spp.**

Figures 5, 6, 7, 8

Material Examined.— CASIZG 207505; Philippines, Romblon Province, Cobrador Island (12.65170 N 122.23086 E); 20 m depth; 20 February 2010; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol. CAS 222412; Philippines, Luzon, Batangas Province, Caban Island, Kirby's Rock (13.69°N 120.84°E); 30 March 2017; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol.

Remarks.— These are mostly planar sea fans often up to or exceeding 0.5 m in height with lateral branching. The coenenchyme is relatively thick giving the branches a thicker appearance compared to most other sympatric sea fans. The polyps are non-retractile and conspicuous, often tall and cylindrical or domelike in shape. Colony color deep orange to reddish brown, tips of polyps often yellowish. Polyp and coenenchyme sclerites are robust spindles with numerous tubercles covering the entire surface. Many of these tubercles are strongly displayed — large and rounded to oval in shape.

Species.— The genus *Muricella* Verrill, 1968, is quite similar to *Anthogorgia* and may eventually be shown to be synonymous with it (Fabricius and Alderslade 2001). There are 34 described species that are currently recognized as belonging to *Muricella*, and thirteen described species in *Anthogorgia*, Serveral species may be present in the Philippines. There has been a considerable amount of confusion in past literature with superficial similarities regarding other gorgonian genera such as *Muricella* (Acanthogorgiidae), *Astrogorgia* (Plexauridae), and *Nicella* (Ellisellidae) pertaining to the gross morphology of whole colonies.

Occurrence and Distribution.— Infrequently encountered on coral reef slopes in the central Philippines. The genus is known from throughout much of the Indo-West Pacific.

References.— Fabricius and Alderslade (2001); Grasshoff (1999); Grasshoff (2000); Grasshoff and Bargibant (2001); Ofwegen (2010d).

Family Plexauridae Gray, 1859

Genus Bebryce Philippi, 1841

***Bebryce grandicalyx* (Kükenthal, 1924)**

Figures 9, 10, 11

Material Examined.— CASIZG 216253; Philippines, Visayas, Siquijor Isalnd, Tambisan Point North (9.18°N 123.45°E); 24 m depth; 2 April 2016; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol. CASIZG 216316 (same data as CASIZG 216253).

Remarks.— The genus *Bebryce* is characterized by the possession of unique sclerites known as rosettes – also referred to as double cups or spiny rosettes (Bayer et al. 1983:18), commonly found in the surface of the coenenchyme. Bayer and Ofwegen (2016) provided a revision and re-examination of type material of all species of the genus. In addition, Matsumoto and Ofwegen (2016) described three additional new species from Japan. According to these works, the two

Philippine specimens examined here most closely resemble the Indonesian species *Bebryce grandicalyx*, by the appearance of the colonies as well as that of the rosettes and other sclerites. The colonies in life are vivid red to red-orange, and change to dark-brown when wet-preserved in ethanol.

Species.— Twenty-seven described species are currently recognized.

Occurrence and Distribution.— The genus *Bebryce* is distributed in the Indian, Pacific, and tropical western Atlantic Oceans. Twenty-four species have been described from the Indo-Pacific. Three species were described by Deichmann (1936) from the Bahamas, Gulf of Mexico, and Caribbean Sea — *Bebryce cinerea, B. grandis,* and *B. parastellata*.

References.— Deichmann (1936); Ofwegen (2010f); Bayer and Ofwegen (2016); Matsumoto and Ofwegen (2016).

Genus *Trimuricea* Gordon, 1826

***Trimuricea inermis* (Nutting, 1910)**
Figures 12, 13, 14, 15

Material Examined.— CASIZG 207510; Philippines, Negros, Siaton Province, Si-it; 21 m depth; 5 April 2016; coll. G.C. Williams; one whole colony wet-preserved in 95% ethanol.

Remarks.— Samimi-Namin and Ofwegen (2016) provided a taxonomic revision of the genus and added several new species from the Indian Ocean. According to their revision, the specimen examined here is most similar to *T. inermis* regarding colony shape and sclerite shape and size, but it would be beneficial to compare it with type material to better elucidate the taxonomic status of the Philippine material. Sclerites of the genus *Trimuricea* are unusual, in that the sclerite complements of the polyps and calyces are dominated by triradiates and thornscales. The color of living colonies of the Philippine material is pinkish red, turning to light brown when preserved in ethanol (Fig. 12).

Species.— Eleven described species, according to Samimi-Namin and Ofwegen (2016) and Ofwegen (2010e). Nine of the eleven species are distributed in the Indian Ocean.

Occurrence and Distribution.— The genus has an Indo-West Pacific distribution, and is rarely or infrequently encountered at many localities.

References.— Grasshoff (1999); Fabricius and Alderslade (2001); Ofwegen (2010e); Samimi-Namin and Ofwegen (2016).

Family Gorgoniidae Lamouroux, 1812

Genus *Hicksonella* Nutting, 1910

***Hicksonella princeps* Nutting, 1910**
Figures 16, 17, 18

Material Examined.— CASIZG 201363; Philippines, Occidental Mindoro Province, Lubang Island (13.79 N 120.09 E); 23 May 2014; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol.

Remarks.— *Hicksonella princeps* is similar in superficial appearance and can be confused with another sympatric zooxanthellate gorgonian, *Rumphella aggregata. H. princeps* differs by having a more gracile appearance, with thinner branches which are often more pointed at the tips. *R. aggregata* is more robust with thicker branches with more rounded tips. Both species are similar in colony color — varying from tan or grey to light brown or yellowish brown. In addition, similarly-shaped club-like sclerites are found in the surface of the coenenchyme of both species

(Fig. 17; Williams and Chen, 2014:119). However, *Hicksonella* differs from *Rumphella* by having some large rods in the inner coenenchyme that are relatively smooth at one end and conspicuously ornamented at the other end (Fig. 18: top row, second from the left). These are often undetected or overlooked. All sclerites in both species are colorless.

Many of the sclerites in the present material examined here differs somewhat from other known material of the species from outside the Philippines by having strongly acute or sharply pointed tips on the lateral tubercles (Figs. 17, 18).

Species.— There are two other described species in the genus, *Hicksonella guishanensis* Zou and Chen, 1984, and *Hicksonella expansa* Alderslade, 1986.

Occurrence and Distribution.— *Hicksonella princeps* is a zooxanthellate species that inhabits shallow-water areas of coral reefs flats and slopes, usually less than 15 m in depth. It has been encountered in the northeastern part of central Philippines — the Calatagan Peninsula and the Lubang Islands Group. The genus *Hicksonella* is known only from the tropical western Pacific.

References.— Alderslade (1986a), Fabricius and Alderslade (2001), Ofwegen (2010b).

Genus *Pinnigorgia* Grasshoff and Alderslade, 1997

***Pinnigorgia flava* (Nutting, 1910)**

Figures 19, 20, 21

Material Examined.— CASIZG 201640; Philippines, Luzon, Batangas Province, Calatagan (13.92°N 120.60°E); 8 m depth; 19 May 2014; coll. G.C. Williams; three partial colonies wet-preserved in 95% ethanol. CASIZG 201407; Philippines, Lubang Island (13.78°N 120.10°E); 12 m depth; 30 May2014; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol. CASIZG 222415; Philippines, Romblon Province, Cobrador Island (12.65°N 122.23°E); 11 m depth; 6 April 2017; coll. G.C. Williams; one whole colony wet-preserved in 95% ethanol.

Remarks.— The colonies are richly-branched, the branches are planar and pinnate, and the tissues harbor zooxanthellae. The Philippine material exhibits similarities to the description of *Pinnigorgia flava* provided by Grasshoff and Alderslade (1997), in that the sclerites are relatively elongate — often >0.1 mm in length and somewhat curved. Color of the colonies in life as well as wet-preserved varies from cream-white or pale yellow to tan.

Species.— There are two other described species in the genus besides *Pinnigorgia flava* – *Pinnigorgia perroteti* (Stiasny, 1940) and *Pinnigorgia platystoma* (Nutting, 1910).

Occurrence and Distribution.— The genus is known from the tropical western Pacific Ocean — the Philippines, Sabah, Indonesia, and Palau. *Pinnigorgia flava* in the Philippines occupies shallow-water reef flats or gentle slopes, usually not in areas with consistenly strong bottom currents.

References.— Grasshoff and Alderslade (1997); Fabricius and Alderslade (2001).

Family Ellisellidae Gray, 1859

Genus *Heliania* Gray 1860

***Heliania spinescens* Gray, 1860**

Figures 22A, 23

Material Examined.— CASIZG 222404; Philippines, Batangas Province, Caban Island, Kirby's Rock; 34 m depth; 30 March 2017; coll. Peri Paleracio, one whole colony wet-preserved in 95% ethanol.

Remarks.— Colonies are richly branched with lateral branching. The contracted polyps form numerous, conspicuous mounds that are congested along the branches. They are digitiform in

shape and often curve upward. Three genera in the family Ellisellidae have club-shaped sclerites in which the head has clusters of upward-facing tubercles — *Dichotella*, *Heliania*, and *Junceella*. Many of the club-like sclerites in *Heliania* have tubercles with acute tips that are relatively sharply pointed. Philippine specimens are bright red to brick-red in color, while colonies from other regions such as Papua New Guinea, Indonesia, Palau, and New Caledonia are usually reddish orange to orange or yellow-orange.

Species.— *Heliania spinescens* is one of only two described species in the genus, the other is *Heliania racemosa* (Wright and Studer, 1889).

Occurrence and Distribution.— Encountered infrequently on deeper reefs, mostly at mesophotic depths in the Philippines (ca. 34–95 m). The genus is widespread in the Indo-West Pacific region from approximately 23–600 m in depth.

References.— Fabricius and Alderslade (2001); Grasshoff (1999); Grasshoff and Bargibant (2001).

Genus *Verrucella* Milne-Edwards and Haime, 1857

***Verrucella* spp.**

Figures 22B, 22C, 24

Material Examined.— CASIZG 197809; Philippines, Batangas Province, Caban Island (13.69°N 120.84°E); 40 m depth; 16 December 2013; coll. Sonia Rowley; one partial colony wet-preserved in 95% ethanol. CASIZG 197824; Philippines, Batangas Province, Caban Island (13.69°N 120.84°E); 27 m depth; 16 December 2013; coll. Sonia Rowley; one partial colony wet-preserved in 95% ethanol.

Remarks.— The genus *Verrucella* is related to *Heliania*, but does not have any club-shaped sclerites. The sclerites in *Verrucella* are double heads (dumbbell-shaped) with a smooth narrow middle or waist. Spindles are also present. Both the double heads and spindles have oval-shaped tubercles with many acute triangular teeth. *Verrucella* has relatively short side branches, which are often more-or-less perpendicular to the main branches. The contracted polyps form low rounded mounds on the branches and are more sparsely distributed — not as highly congested as in *Heliania*.

Species.— There are twenty six described species in the genus.

Occurrence and Distribution.–Several species of *Verrucella* may be present in the central Philippines, occasionally encountered at mesophotic depths (usually below 30 m). The genus has a wide-ranging Indo-Pacific distribution.

References.— Fabricius and Alderslade (2001); Grasshoff (1999); Grasshoff (2000); Grasshoff and Bargibant (2001).

Family Ifalukellidae Bayer, 1955

Genus *Plumigorgia* Nutting, 1910

***Plumigorgia hydroides* Nutting, 1910**

Figures 25, 26B, 26C, 27

Material Examined.— CASIZG 180888; Philippines, Palawan Province, Calamian Group, Busuanga Island; 10 m depth; 24 February 2010; coll. G.C. Williams; one colony in several pieces wet-preserved in 95% ethanol. CASIZG 207506; Philippines, Palawan Province, Calamian Group, Busuanga Island; 12 m depth; 24 February 2010; coll. G.C. Williams; one partial colony wet-preserved in 95% ethanol.

Remarks.— Colonies with branches that are planar and pinnate, very thin, gracile, and flexi-

ble. Sclerites are small plate-like structures, more-or-less ovoid in shape, with coarse surfaces and no tubercles. Some sclerites are slightly restricted in the middle. Retracted polyps form numerous, minute conical bumps on the branches, or they retract completely into the coenenchyme. Colony color in life is white or cream-white.

Species.— There are five described species in the genus — *Plumigorgia hydroides* (Indonesia, Philippines, Northwestern Australia); *P. schuboti* Alderslade, 1986 (Great Barrier Reef, New Caledonia); *P. terminosclera* Alderslade, 1986 and *P. astroplethes* Alderslade, 1986 (Great Barrier Reef) and *P. wellsi* Bayer, 1955 (Marshall Islands).

Occurrence and Distribution.— *Plumigorgia hydroides* is a presumably zooxanthellate species that inhabits shallow coral reef flat and gentle slopes that exhibit frequent periods of substantive water movement. In has been observed in the eastern part of the central Philippines in the vicinity of Busuanga Island.

References.— Alderslade (1986b); Bayer (1955); Bryce and Poliseno (2014); Fabricius and Alderslade (2001); Grasshoff and Bargibant (2001).

Pennatulacea Verrill, 1865

Family Scleroptilidae Jungersen, 1904

Genus *Calibelemnon* Nutting, 1908

***Calibelemnon indicum* (Thompson and Henderson, 1906)**
Figure 26A

Material Examined.— CASIZG 201545; Philippines, Luzon, Batangas Province, Calumpan Peninsula, Balayan Bay (13.72 N 120.87 E); 40 m depth; 2 May 2014; coll. Peri Paleracio; one whole colony wet-preserved in 95% ethanol.

Remarks.— *Calibelemnon indicum* is a very thin and delicate sea pen with two longitudinal columns of polyps, in which the polyps are oppositely arranged along the length of the rachis. The axis is visible through the thin tissues of the rachis and peduncle. Siphonozooids are conspicuous as numerous low mounds in opposite columns along the rachis. Sclerites are absent altogether.

Species.— Four species are described — *Calibelemnon hertwigi* (Balss, 1909), *Calibelemnon symmetricum* Nutting, 1908, *Calibelemnon indicum* (Thomson and Henderson, 1906), and *Calibelemnon francei* Williams and Alderslade, 2011. The latter two species are considered valid, while the status of the former two is uncertain.

Occurrence and Distribution.— *Calibelemnon* is a rarely encountered genus from mesophotic depths and the deep-sea in the Indo-West Pacific (southeastern Africa to Japan and the Philippines, 40-1275 m) and the Western Atlantic (Bahamas Escarpment, 1969 m). In the Philippines, *Calibelemnon indicum* is known only from a single collection off the Calumpan Peninsula at 40 m depth, inhabiting deeper reefs in areas of unconsolidated sediments.

References.— Kükenthal (1915); Ofwegen (2010c); Williams (1990); Williams (1995); Williams (1999); Williams (2011); Williams and Alderslade (2011).

Discussion and Conclusion

The Philippines comprises the northern-most portion of the Coral Triangle in the tropical western Pacific, and covers a relatively extensive longitudinal gradient (Williams and Chen 2014: Figs. 1A, 2A). The Philippine Archipelago, encompassing an estimated 7100 islands, is certainly one of the richest regions in the world (if not the richest region), with regard to coral reef biodiversity.

The first part of this study (Williams and Chen 2014) covered twenty-two genera of gorgoni-

ans and pennatulaceans from the Verde Island Passage region (VIP). The present paper treats several island groups of the central Archipelago as well as the VIP, and an additional ten genera — making a total of thirty-two genera covered, representing approximately forty species.

The number of species inhabiting the Philippine Archipelago belonging to these thirty-two genera is undeterminable at present. This is due in part to the necessity of taxonomic revisions of many Indo-Pacific octocoral genera to determine the actual number of valid species, as well as the relatively recent trend in the scientific community toward a decrease of trained taxonomists to do the necessary work of revision (Fabricius and Alderslade 2001:vii).

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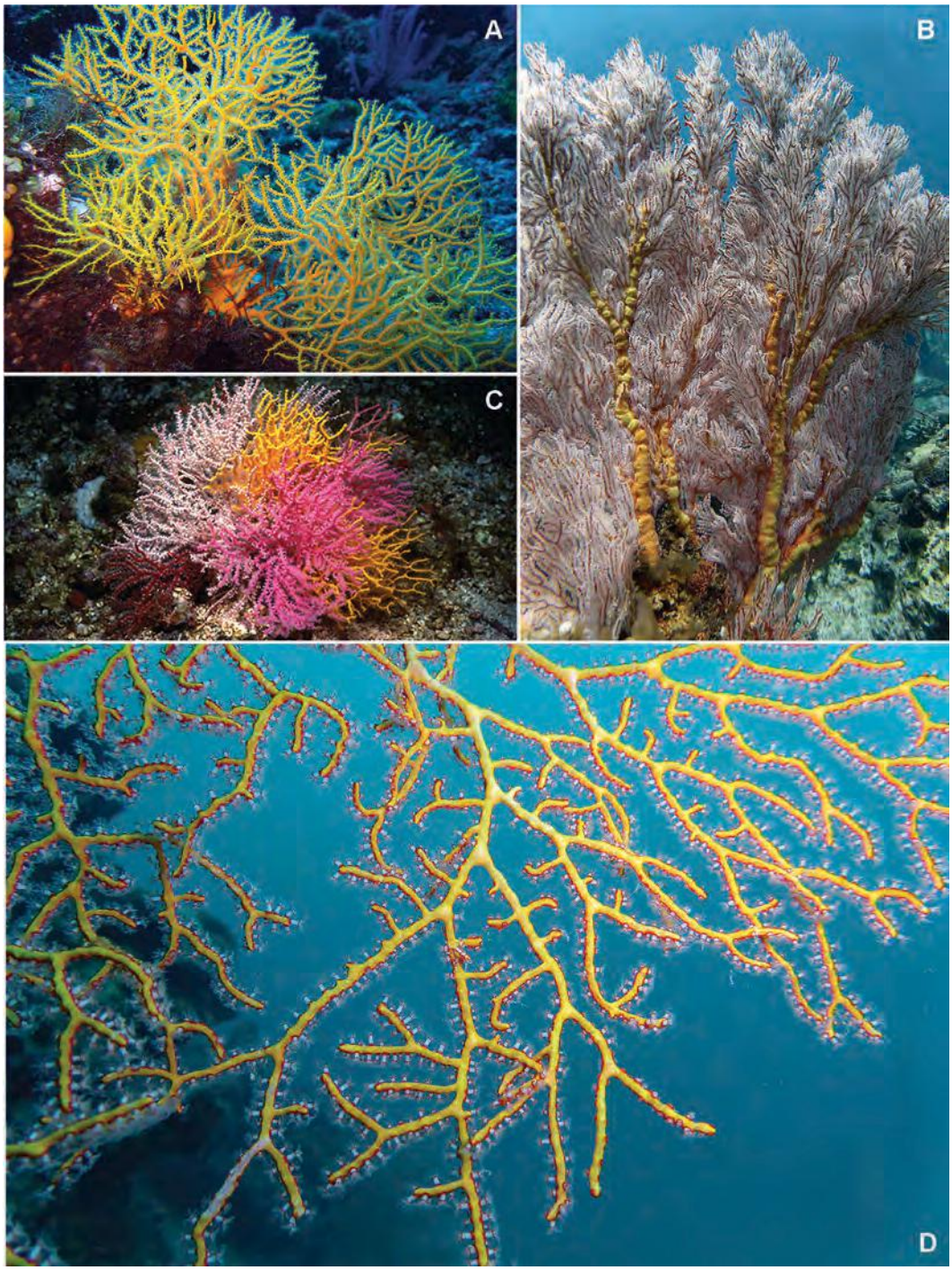


FIGURE 2. Underwater photographs of various species of *Melithaea* from the central Philippine islands; those in A, C, and D were formerly included in the genus *Acabaria*, which is now considered as a junior synonym of *Melithaea*.

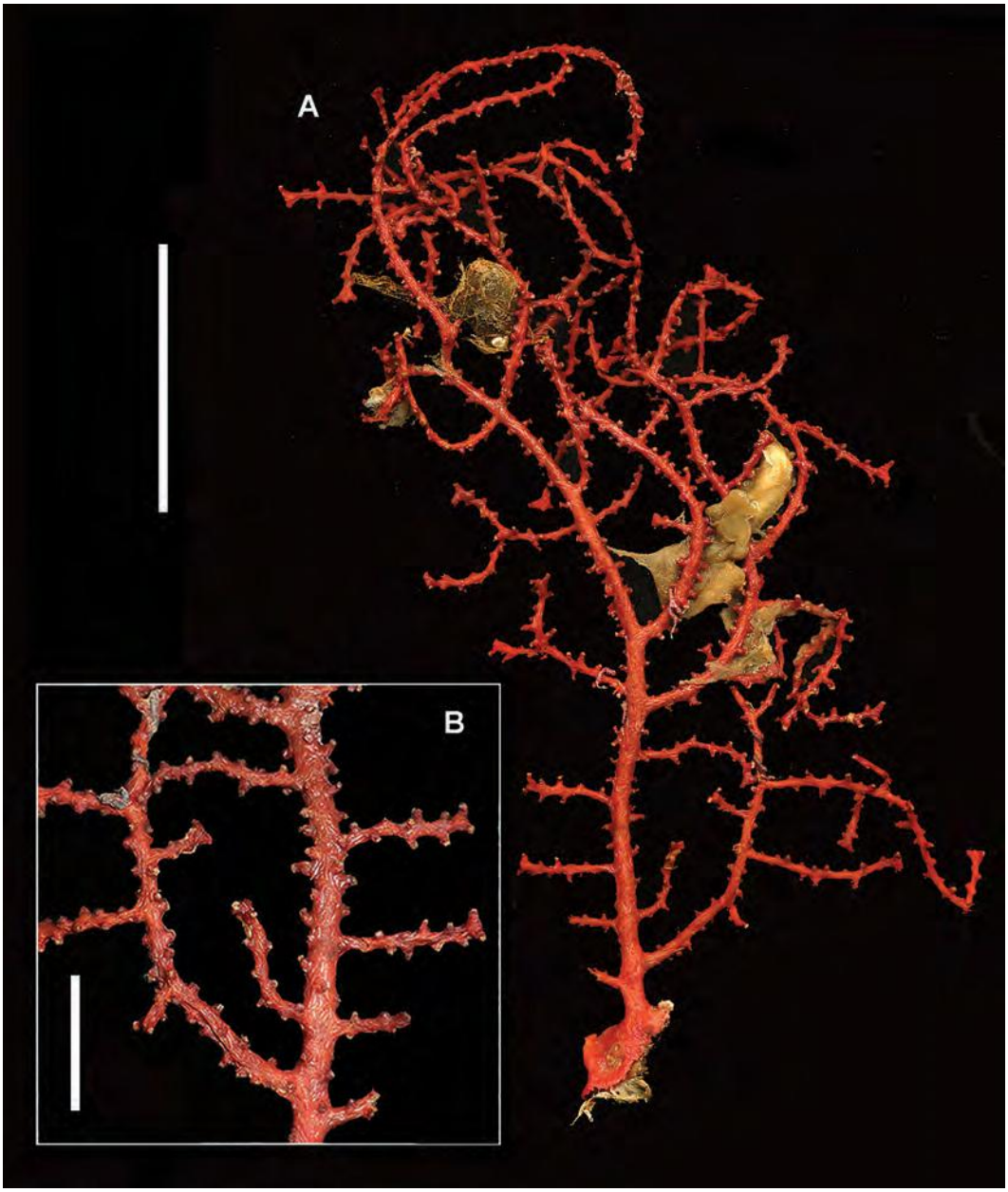


FIGURE 3. *Keroeides gracilis*. A. Entire wet-preserved colony (CASIZ 201396); scale bar = 30 mm. B. Detail of lower portion of colony in A; scale bar = 10 mm.

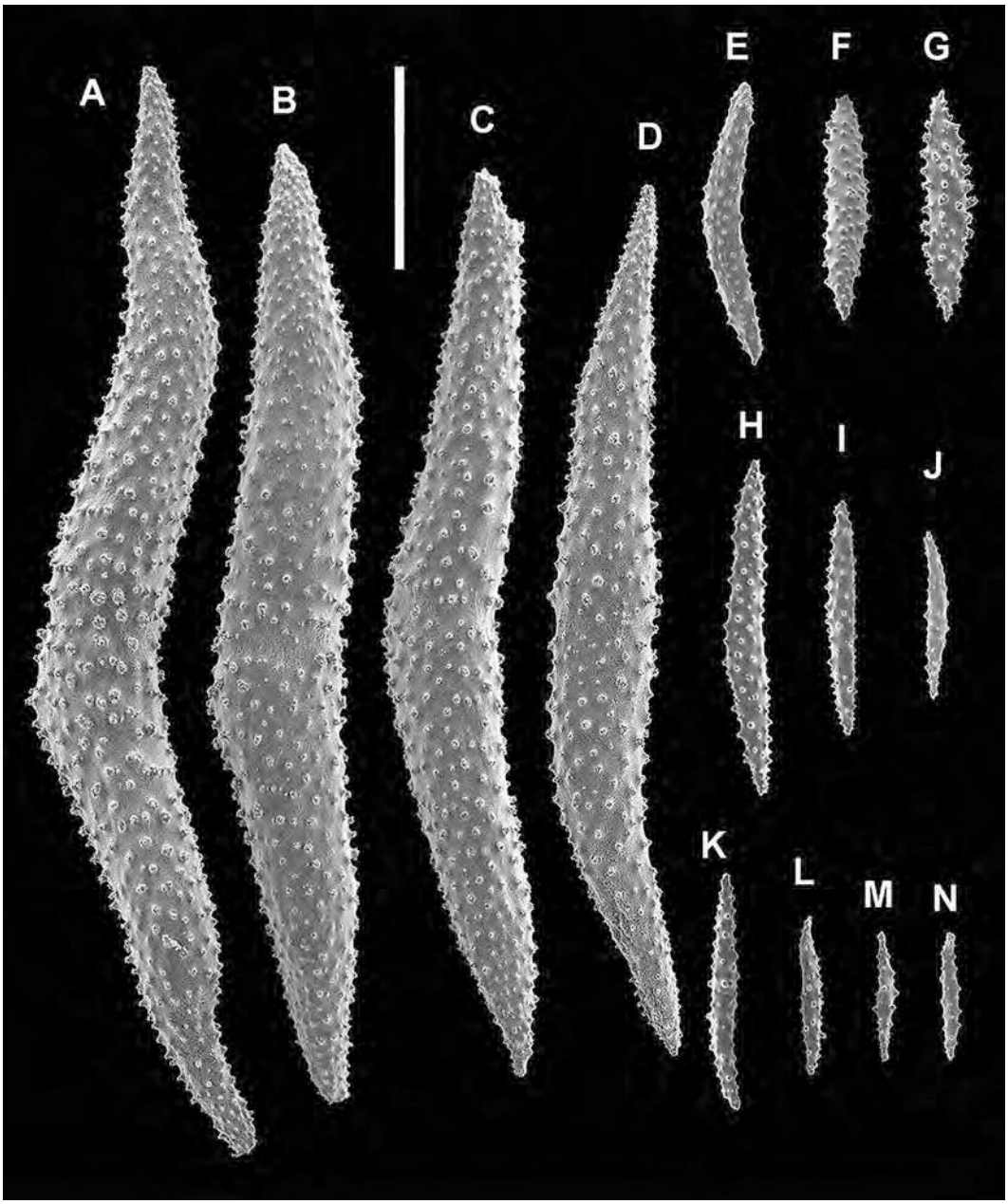


FIGURE 4. *Keroeides gracilis*. Scanning electron micrographs of sclerites from the coenenchyme and calyces (CASIZ 201396). A-D, sclerites from the coenenchymal surface. E-N, sclerites from various calyces. Scale bar = 0.3 mm.

FIGURE 5. *Anthogorgia* sp. indet. Underwater photographs, Calumpan Peninsula, March/April 2017. A. Anthocodiae retracted into the domelike proximal parts of the polyps. B. Anthocodiae fully expanded from the cylindrical proximal parts of the polyps.

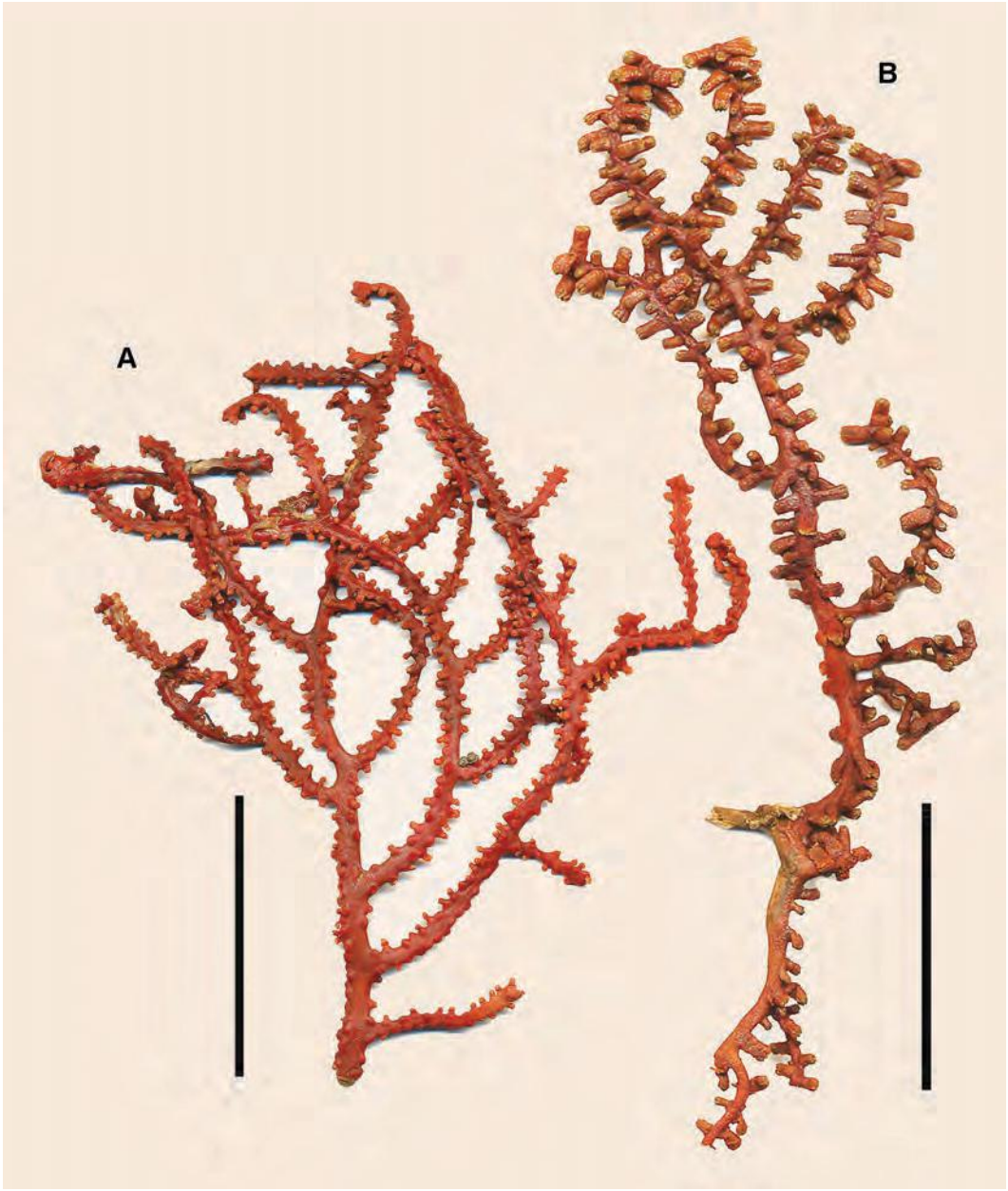


FIGURE 6. *Anthogorgia* spp. Wet-preserved specimens. A. *Anthogorgia* sp. 2, partial colony (CASIZG 207505), scale bar = 50 mm. B. *Anthogorgia* sp. 1, partial colony (CASIZG 222412), scale bar = 30 mm.

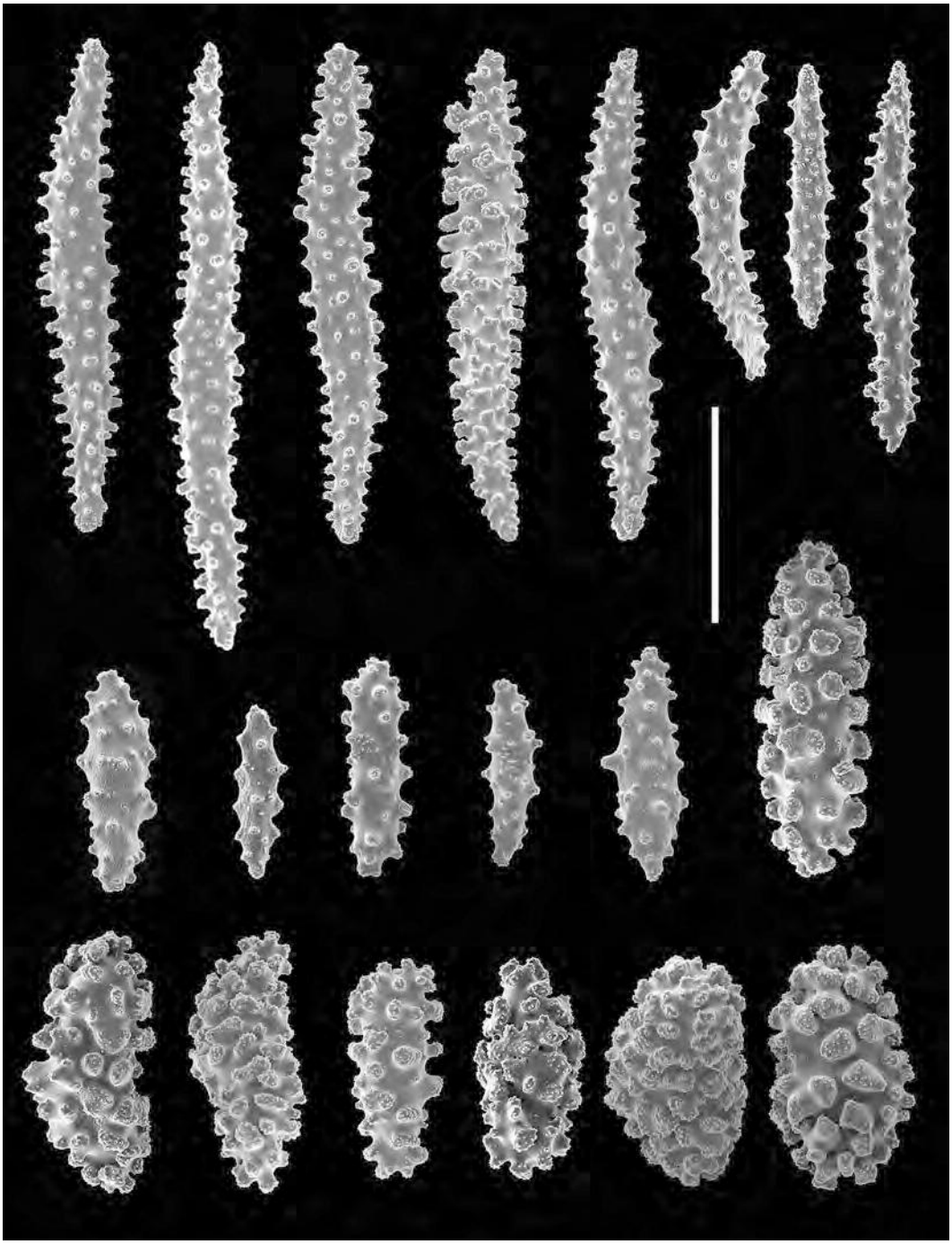


FIGURE 7. *Anthogorgia* sp. 1. Scanning electron micrographs of sclerites from the polyp walls and surface of the coenenchyme (CASIZG 222412), scale bar = 0.20 mm.

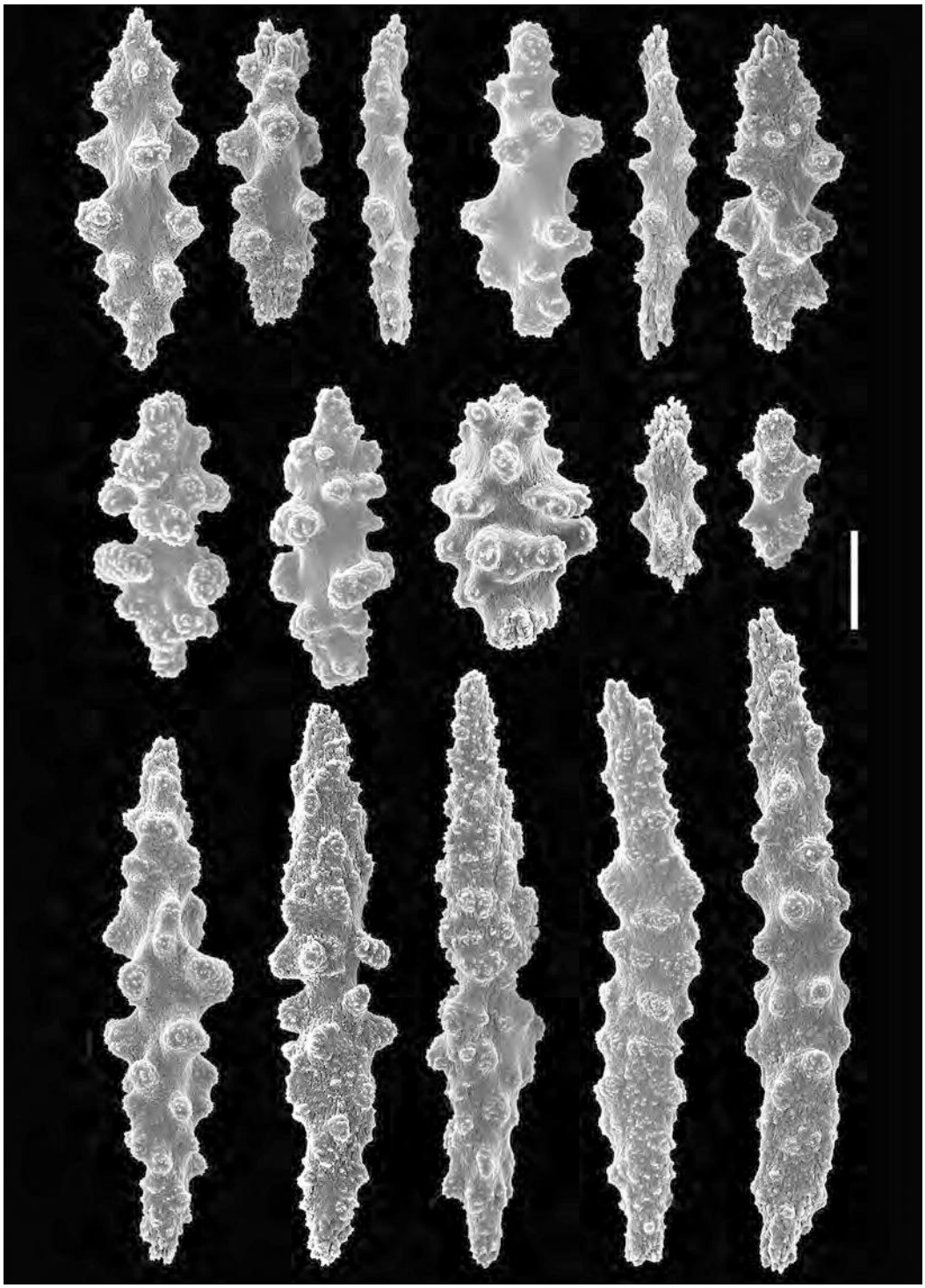


FIGURE 8. *Anthogorgia* sp. 2. Scanning electron micrographs of sclerites from the polyp walls and surface of the coenenchyme (CASIZG 207505), scale bar = 0.03 mm.

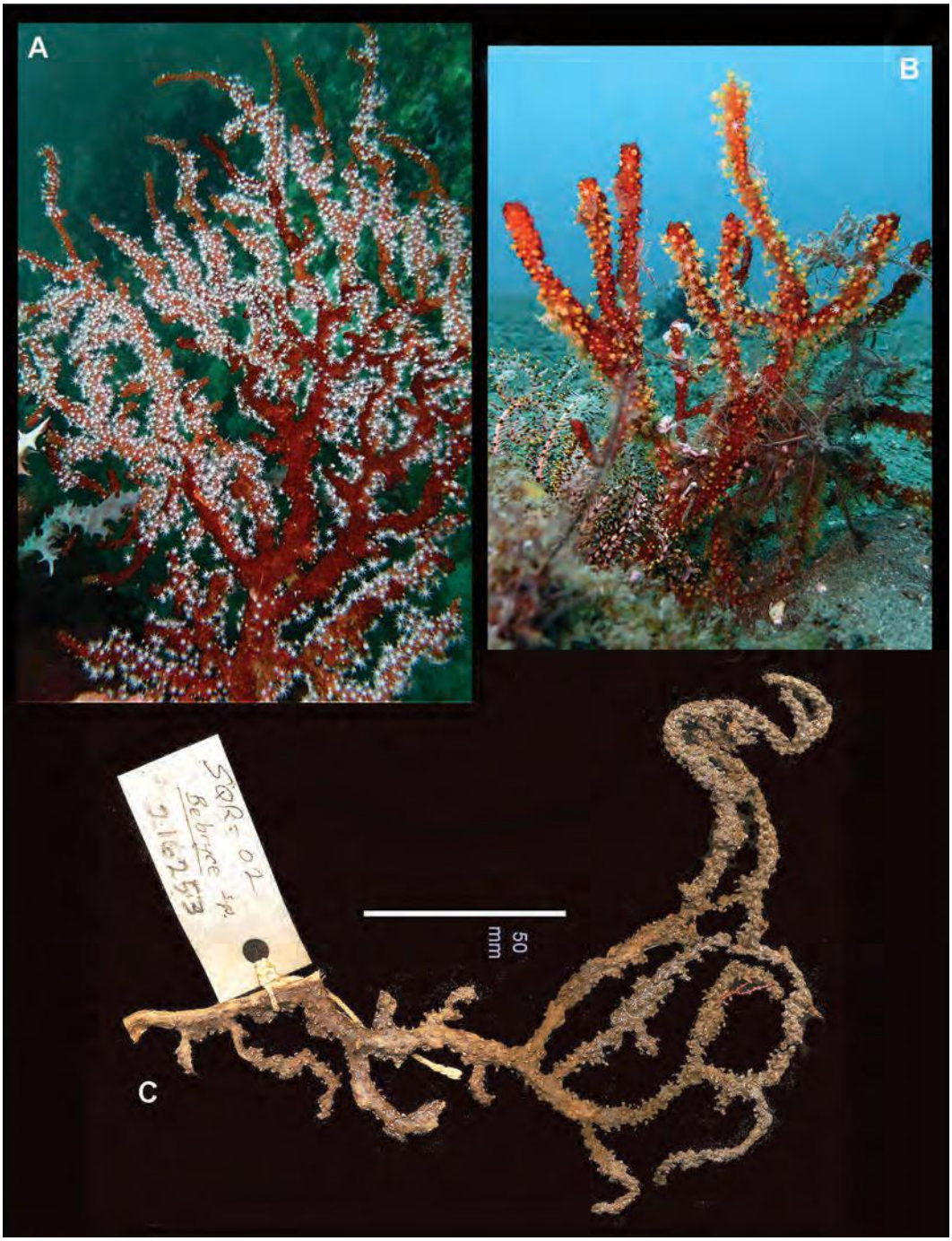


FIGURE 9. A. *Bebryce grandicalyx*. A-B. Underwater photographs of two colonies with polyps extended, southeastern Negros Island. C. Wet-preserved specimen (CASIZ 216253), Siquijor Island, scale bar = 50 mm.

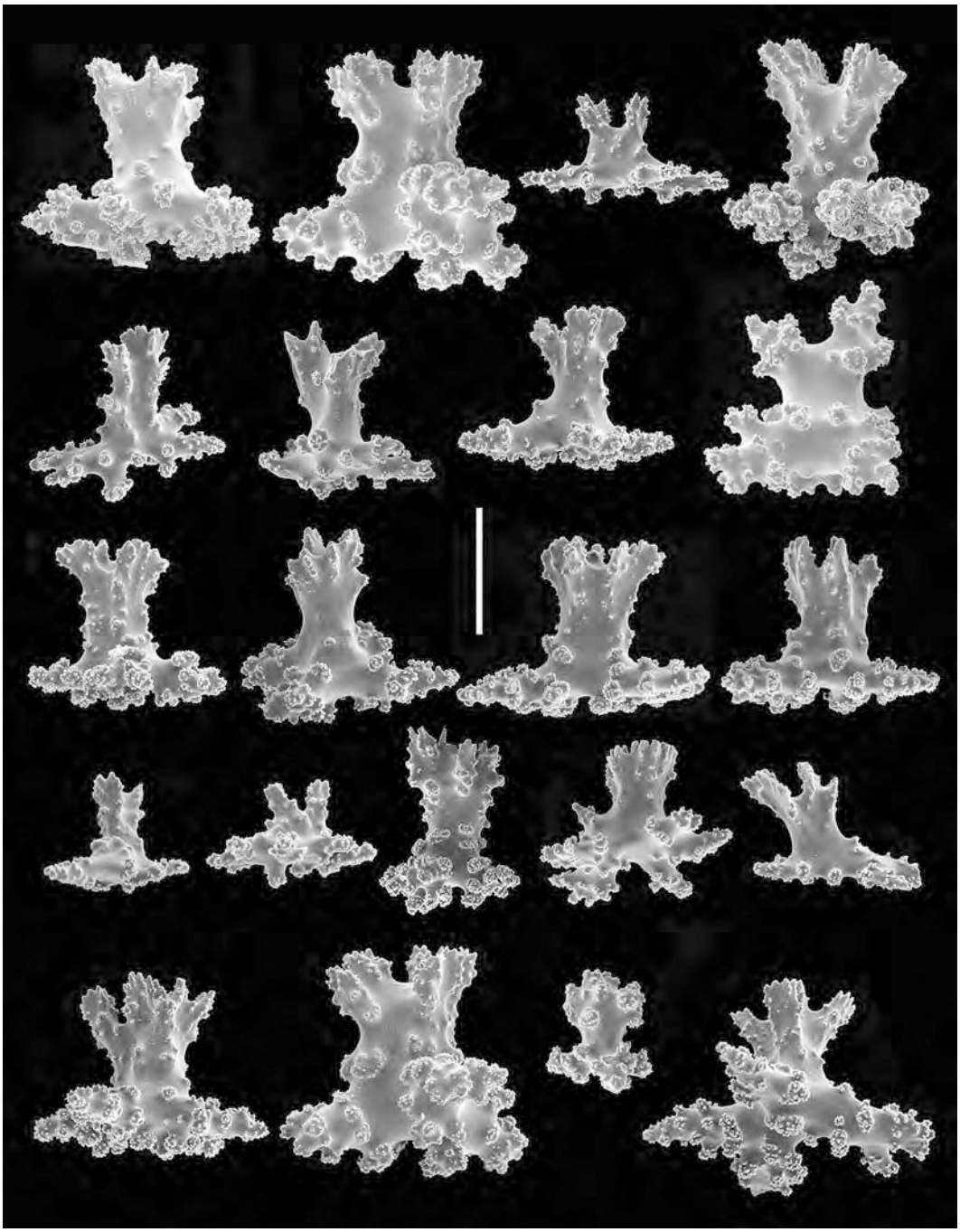


FIGURE 10. *Bebryce grandicalyx*. Scanning electron micrographs of sclerites; rosettes from the surface of the coenenchyme, scale bar = 0.10 mm.

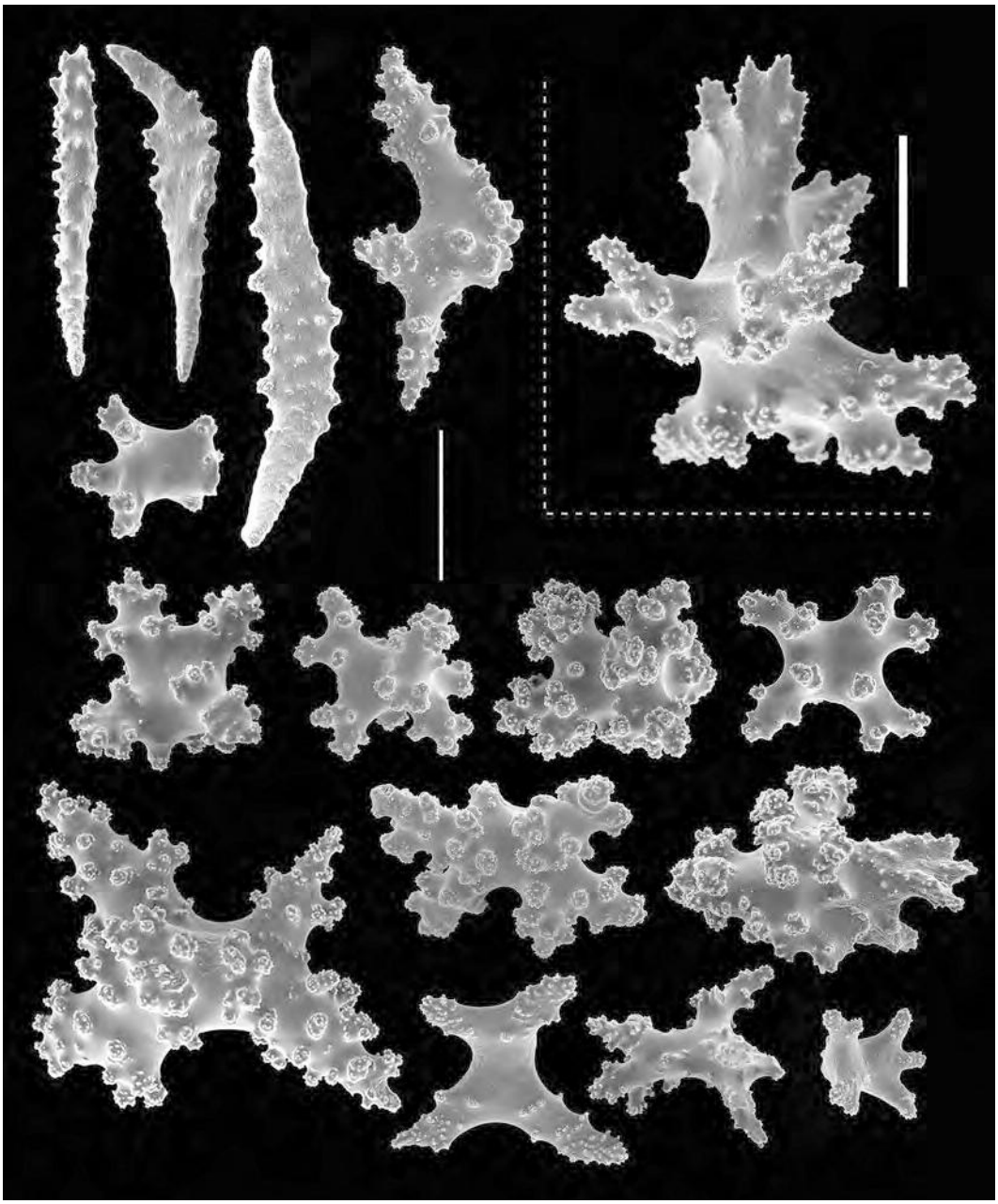


FIGURE 11. *Bebryce grandicalyx*. Scanning electron micrographs of sclerites. Four polyp sclerites (Top left); sclerites of the coenenchyme (Bottom half of figure), scale bar = 0.10 mm. A single rosette (Inset), scale bar = 0.05 mm.

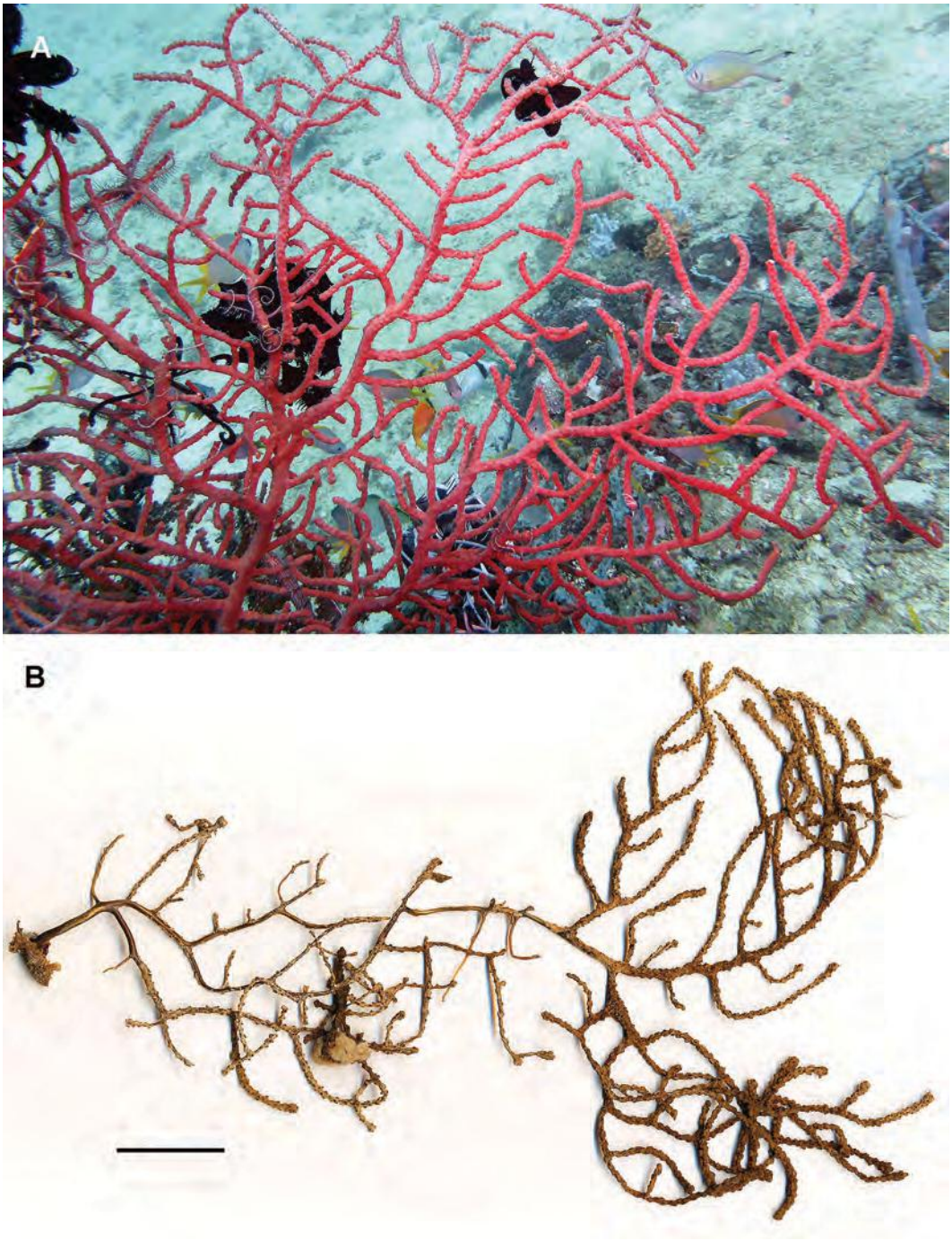


FIGURE 12. *Trimuricea* cf. *inermis* (CASIZ 207510). A. Underwater photograph, Negros (Siaton Province), April 2016. B. Wet-preserved colony, scale bar = 20 mm.

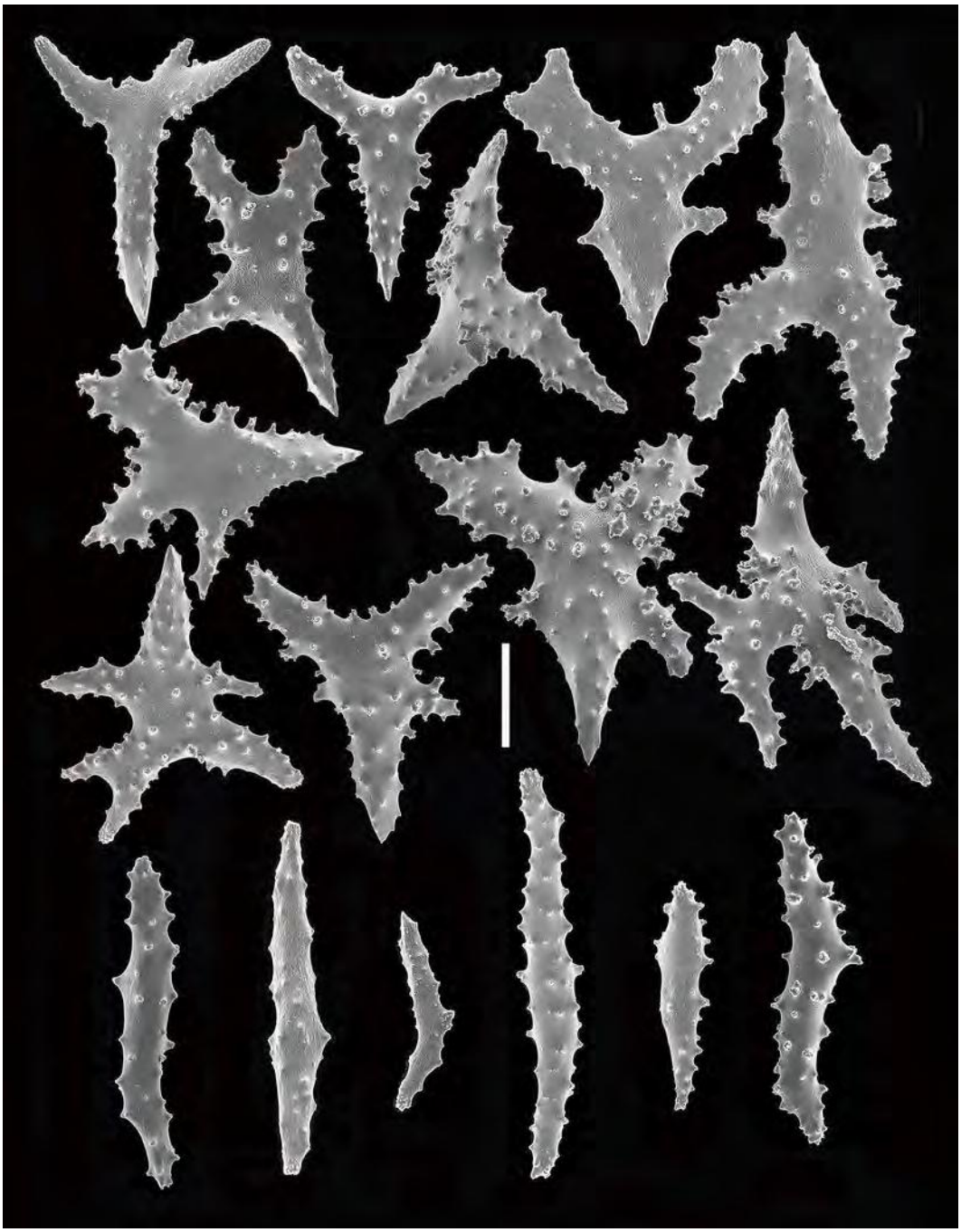


FIGURE 13. *Trimuricea* cf. *inermis*. Scanning electron micrographs of sclerites from the polyps, calyces, and surface coenenchyme, scale bar = 0.10 mm.

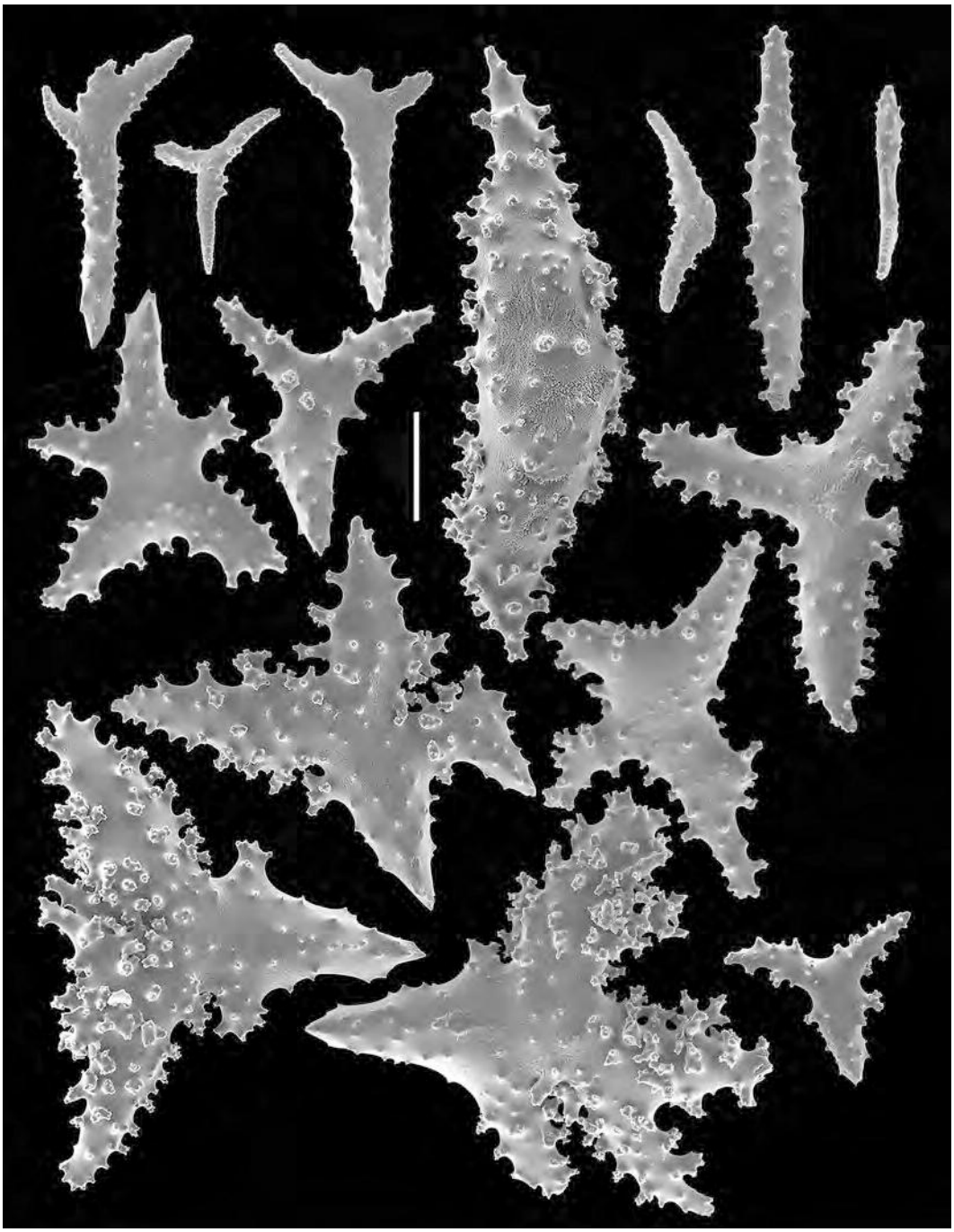


FIGURE 14. *Trimuricea* cf. *inermis.* Scanning electron micrographs of sclerites from the polyps, calyces, and surface coenenchyme, scale bar = 0.10 mm.

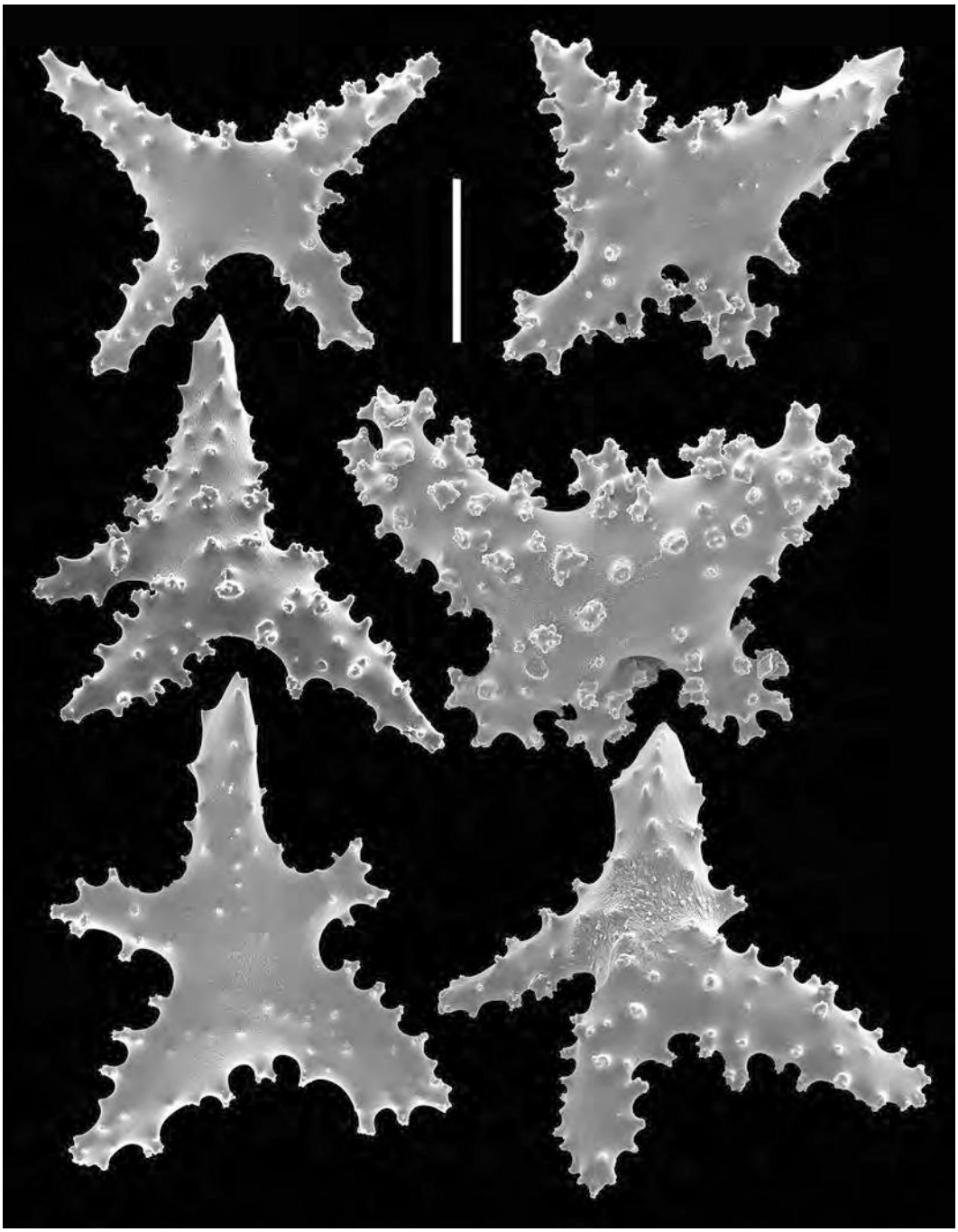


FIGURE 15. *Trimuricea* cf. *inermis.* Scanning electron micrographs of sclerites from the calyces and surface of the coenenchyme. Scale bar = 0.10 mm.

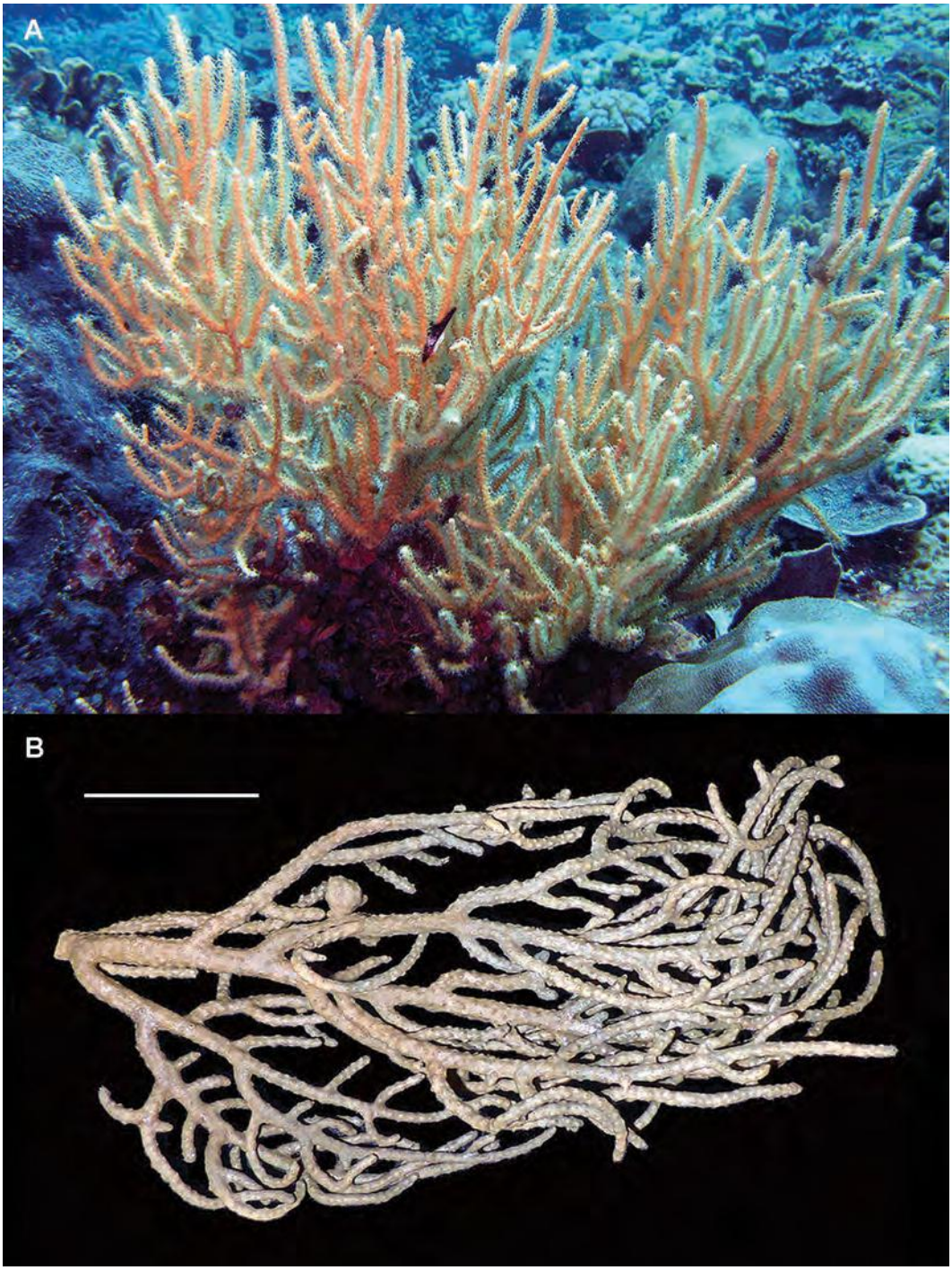


FIGURE 16. *Hicksonella princeps*. A. Underwater photograph, Lubang Island, May 2014. B. Wet-preserved partial colony (CASIZG 201363), Lubang Island, May 2014, scale bar = 25 mm.

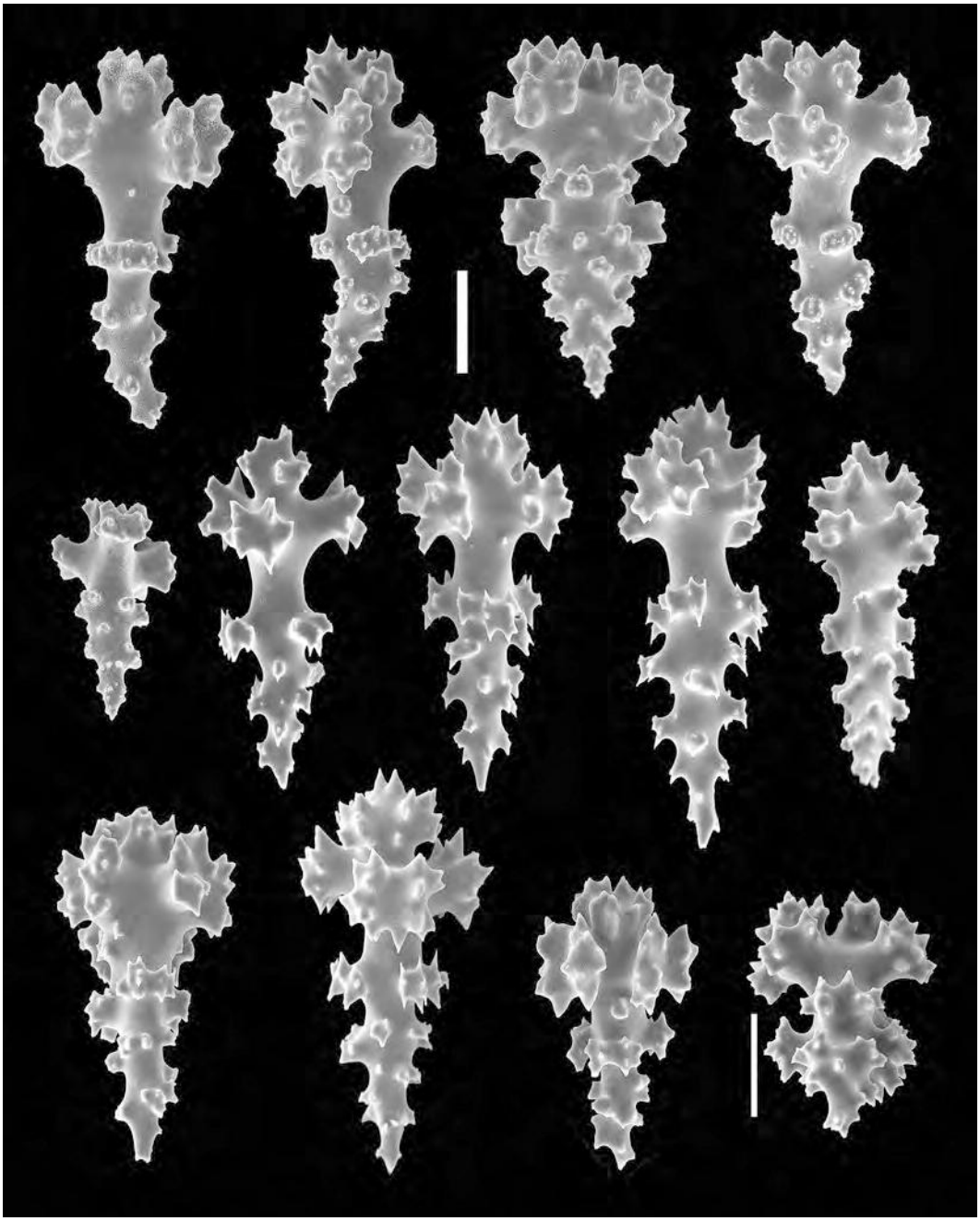


FIGURE 17. *Hicksonella princeps*. Scanning electron micrographs of sclerites from the surface coenenchyme, scale bar = 0.03 mm.

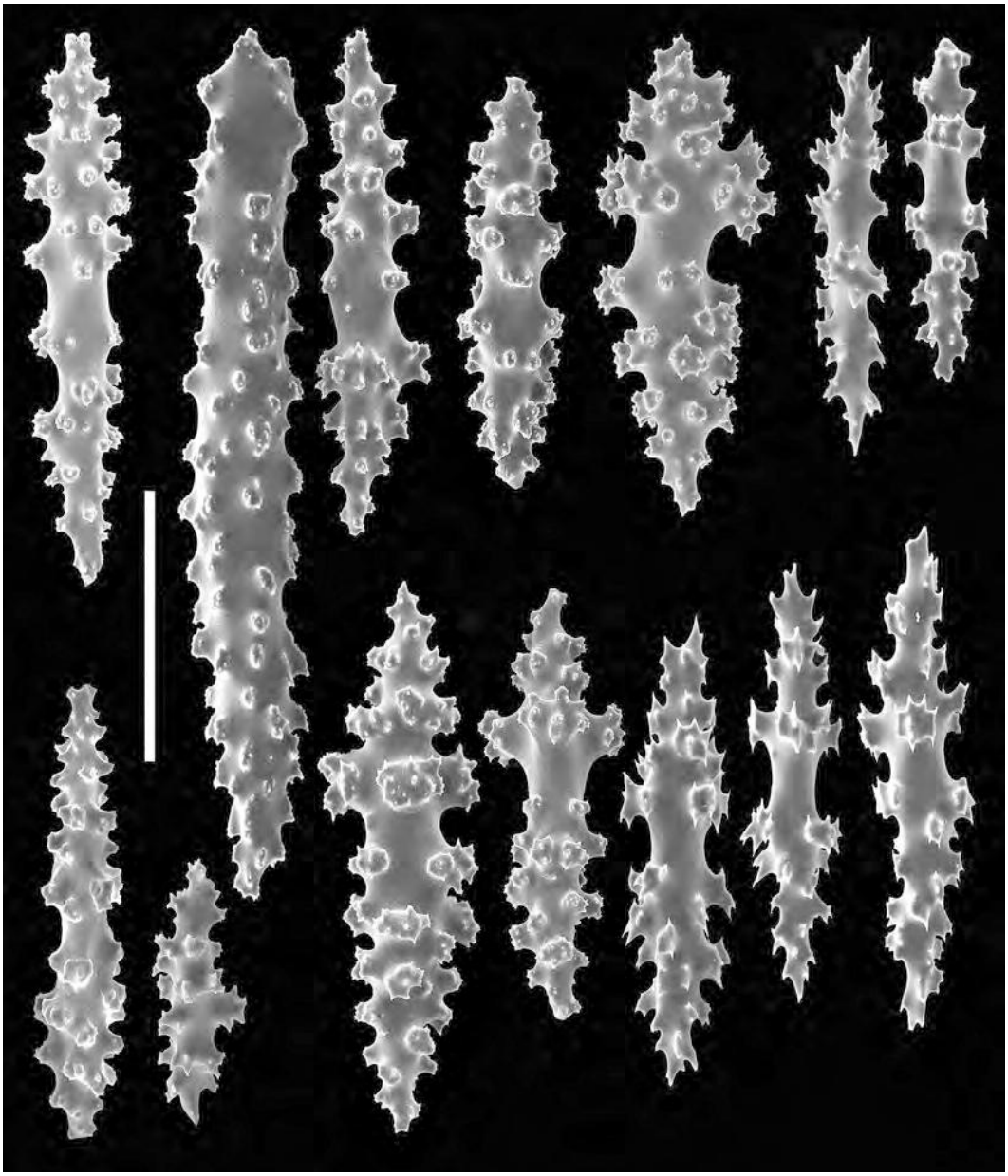


FIGURE 18. *Hicksonella princeps*. Scanning electron micrographs of sclerites from the subsurface coenenchyme, scale bar = 0.10 mm.

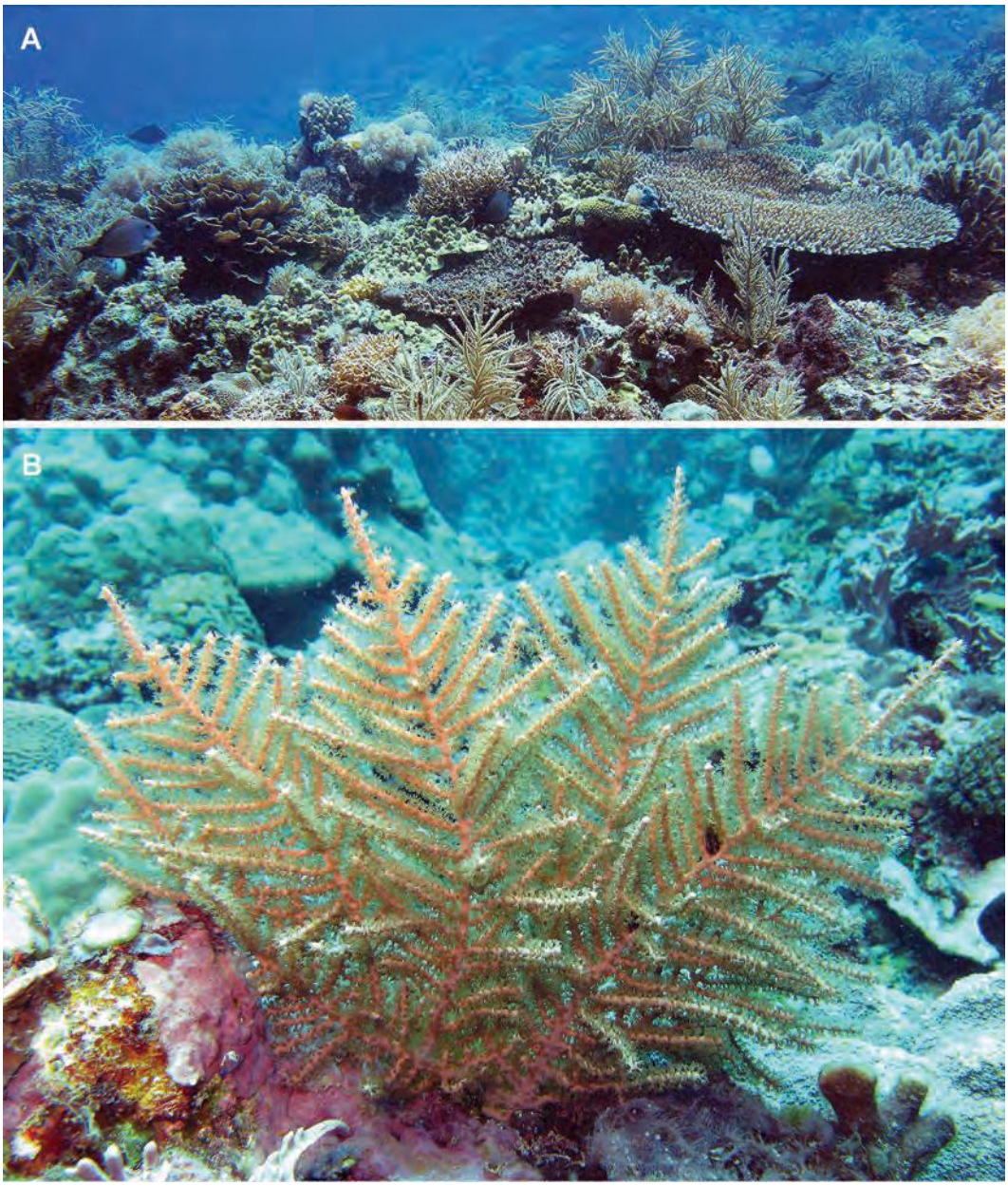


FIGURE 19. *Pinnigorgia flava.* Underwater images. A. Coral reef with numerous colonies, Lubang Island, 14 m depth. B. A single colony, Lubang Island, 12 m depth.

FIGURE 20. *Pinnigorgia flava*. Wet-preserved colonies (CASIZG 201640). A. Scale bar = 20 mm. B. Scale bar = 25 mm. C. Scale bar = 10 mm.

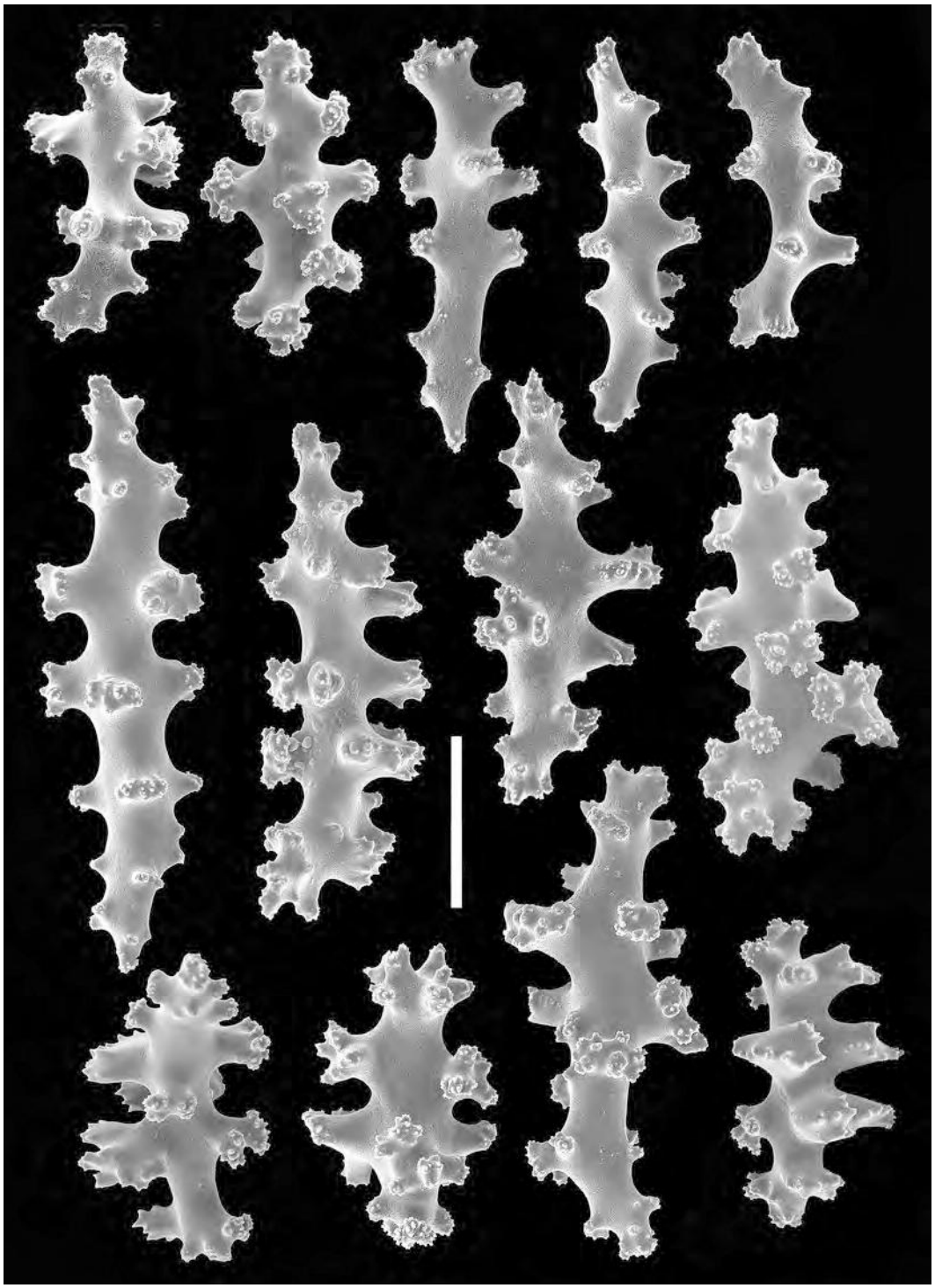
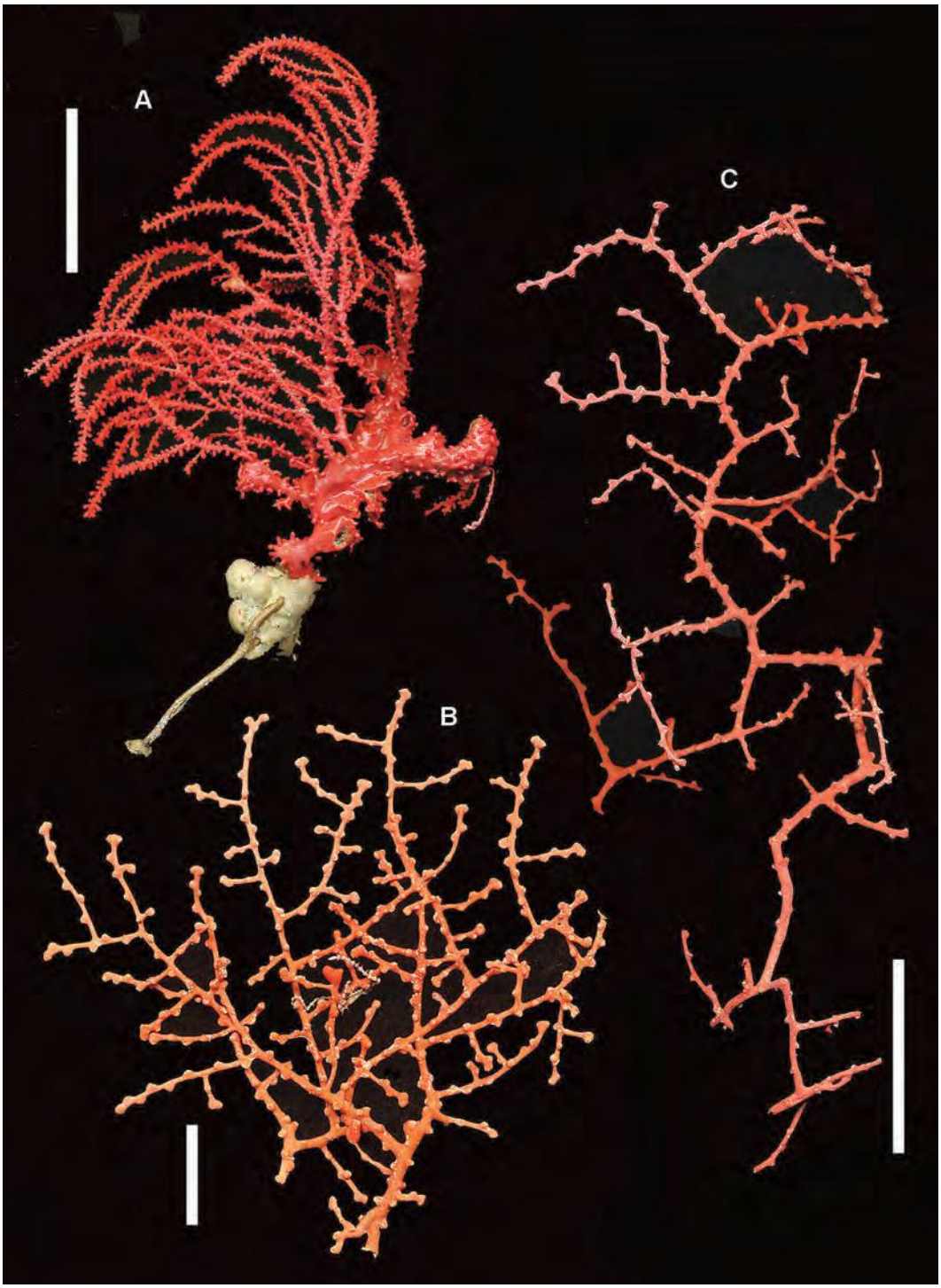


FIGURE 21. *Pinnigorgia flava*. Scanning electron micrographs of coenenchymal sclerites, scale bar = 0.08 mm.



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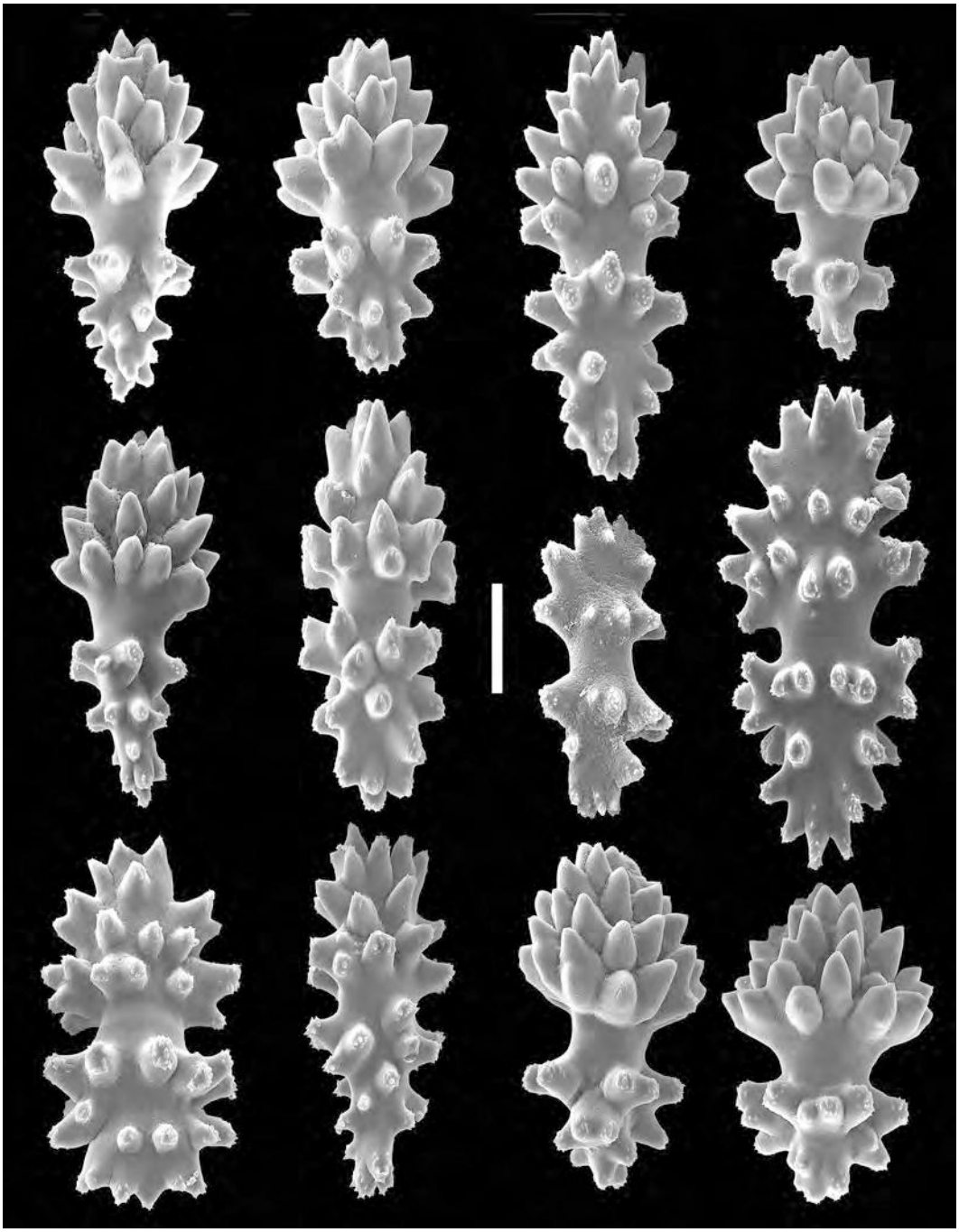


FIGURE 23. *Heliania spinescens*. Scanning electron micrographs of coenenchymal sclerites, scale bar = 0.02 mm.

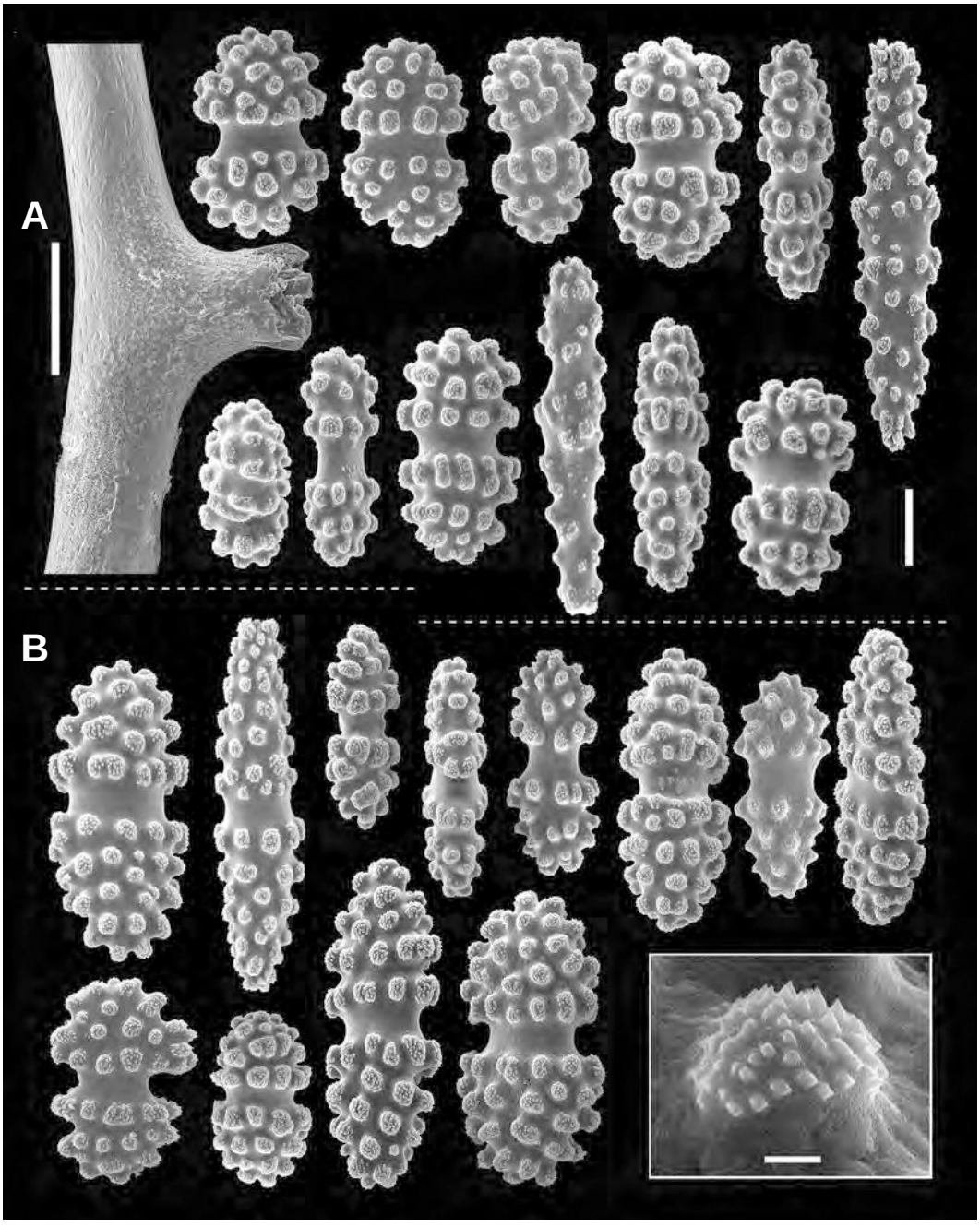
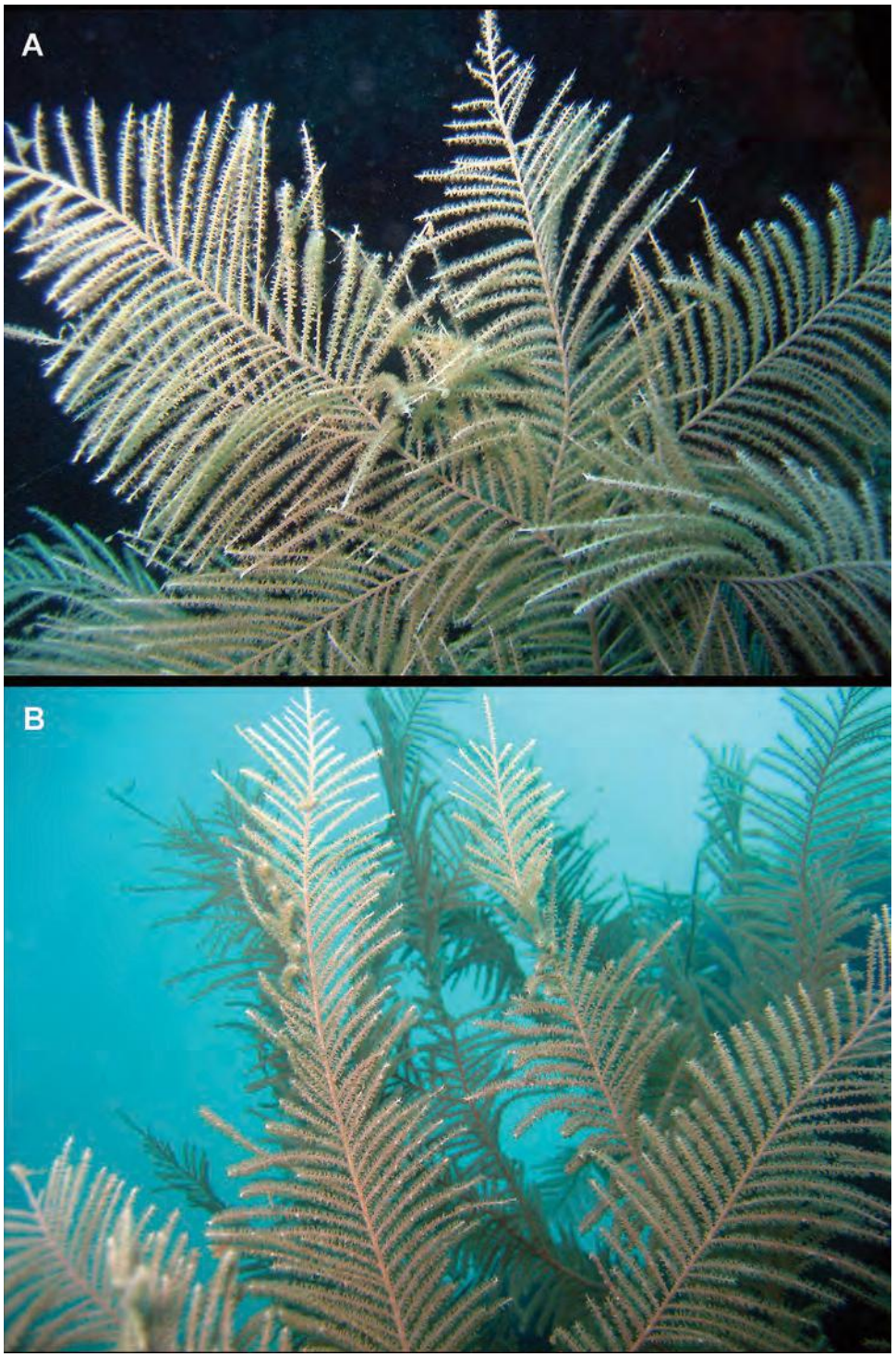


FIGURE 24. *Verrucella* spp. A. Scanning electron micrographs of internal axis and sclerites (CAS 197809). Scale bar for sclerites = 0.02 mm. Upper left, a portion of bare axis from a terminal branch with a lateral branch broken off near its base, scale bar = 0.5 mm. B. Scanning electron micrographs of sclerites (CAS 197824), scale bar = 0.02 mm. Lower right, Detail of a single multi-toothed tubercle from the sclerite on the adjacent left, scale bar = 0.002 mm.



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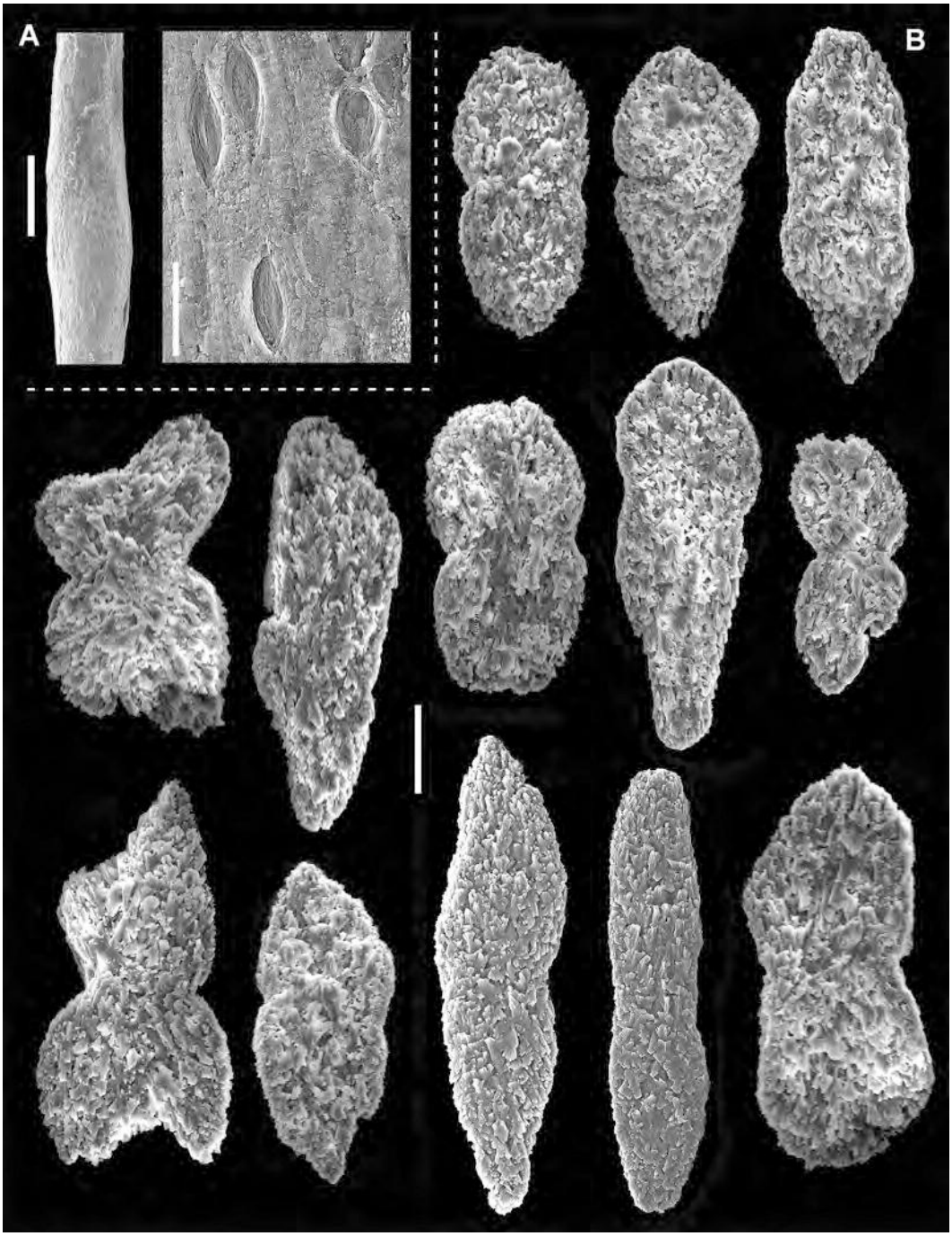

FIGURE 27. *Plumigorgia hydroides*, scanning electron micrographs. A. Surface of axis: Left, portion of axis near a distal branch tip, scale bar = 0.2 mm. Right, magnified detail of surface showing slit-like surface perforations, scale bar = 0.02 mm. B. Coenenchymal sclerites, scale bar = 0.02 mm.

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Synopsis of the Snakes of the Philippines
A Synthesis of Data from Biodiversity Repositories, Field Studies, and the Literature

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The Philippine Archipelago, with major landmasses and other geographical features indicated.
Prepared by Jeffrey L. Weinell.

INTRODUCTION

An up-to-date synopsis of the snake fauna of the Philippine Archipelago is long overdue. Nearly 100 years have elapsed since Edward Harrison Taylor published his comprehensive volume, *The Snakes of the Philippines* (Taylor 1922a), and since then a significant volume of literature has appeared and extensive field survey and site inventory fieldwork has been conducted. The latter, launched in the 1960s with the exploits of Drs. Angel C. Alcala (Silliman University, Dumaguete City, Philippines), and the late Walter C. Brown (Menlo College, Menlo Park, California), has continued in recent years by Charles Ross, Ronald Crombie, and the extensive field studies of Arvin Diesmos, Rafe Brown, Cameron Siler, Maren Gaulke, and their colleagues and students in the Philippines, United States, and Europe.

In this synopsis, we provide basic information relating to each of the currently known species of snakes that has been recorded from the Philippines. The references included with each account provide guidance to literature that contains additional information; for instance, we provide skeletal synonymies (chresonymies, *sensu* Smith and Smith [1972:445]) that include references to literature in which more extensive synonymy compilations are available, notably in the publications of Taylor (1922a), Leviton (1963 *et seq.*), as well as recent compilations by Murphy et al. (2012), McDiarmid et al. (1999), Wallach et al. (2014), Uetz et al. (2018, *The Reptile Database*). We also provide a comprehensive bibliography to the literature and, where possible, photographs of living animals.

We take note of at least one recent compilation that deals with the venomous snakes of the Archipelago by Leviton, Brown and Siler (2014), and of a cluster of recent reports of biodiversity surveys by Brown, Diesmos, Siler, and colleagues (1996–2015) and Gaulke (1986–2011), that have vastly increased our knowledge of the breadth of faunal complexities and species distributions. We highlight the discovery of numerous new species and include these in the archipelago's fauna for the first time. We also call the reader's attention to several earlier seminal articles that dealt with patterns of distribution of the Philippine herpetofauna, among them, Taylor (1922a, 1928), Inger (1954, on amphibian distribution in the Philippines; 1999), Leviton (1963), Brown (WC) and Alcala (1970), Inger and Voris (2001), Siler et al. (2011, 2012, 2013), Diesmos et al. (2014, 2015), Diesmos, Alcala, Siler, and (RM) Brown (2014), Brown et al. (1995, 2000, 2012, 2013), and Sanguila et al. (2016).

Higher-level classification of snakes has changed dramatically over the past decade, primarily as a result of several large, well-sampled phylogenetic analyses of DNA sequence data. Contributions by Vidal (2007), Vidal et al. (2010), Pyron et al. (2011, 2013), Figueroa et al. (2016), and Weinell & Brown (2017) have proposed broad nomenclatural changes to traditional classifications of the last century, many of which have been readily adopted by snake systematists — whereas others have been met with skepticism. For the most part, these studies have been based on molecular data from few loci and, thus, may be expected to change and/or be overturned in the near future by impending combined analyses of genomic and phenotypic data, which show promise for creditable, well-supported phylogenetic estimates, and, we hope, stable resulting classifications. In anticipation of comprehensive phylogenomic snake studies, and acknowledging the subjectivity inherent in currently proposed higher-level ranks, we have adopted a tentative suprafamilial arrangement for this summary of Philippine snakes reflecting current taxonomic summaries (e.g., Wallach et al. 2014). This conservative approach reflects our view that this paper is not the appropriate venue to enter into a discussion of the merits of recently proposed classifications. For example, we do not take a stance on the advisability of partitioning the Colubroidea into named suprafamilial groups, e.g., Pareatoidea, Elapoidea, Viperoidea (*fide* Vidal et al. 2007), because we expect estimates of relationships, and support for many clades, to change significantly in the near future.

Information relating to Conservation Status of included species was retrieved from the online IUCN Red List of Threatened Species (Version 2016–3.1 <*www.iucnredlist.org*>, downloaded on

10 March 2017), which we explored for a crude, preliminary appraisal of the conservation status of the populations of snakes inhabiting the Philippine Islands. Although many of the species are referenced as either "Data Deficient" or "not assessed" for the purposes of determining their conservation status, a number are indeed listed as "Endangered." In our review of these assessments it has become abundantly clear that for many species the heightened level of threatened status is based not on a knowledge of their local abundance, population status, or habitat requirements, but solely on a formulaic interpretation of their geographical area of occurrence (IUCN 2016). This is problematic for several reasons inasmuch as it reduces confidence in the value of the IUCN assessments and throws into question the conservation value of secondary sources, negative data, and conclusions derived from the absence of substantive results (see comments in Brown et al. 2012, 2013), for instance, *Ramphotyphlops suluensis*, known only from two small islands in the Sulu Archipelago that have only once been surveyed (by Gaulke) in the last century since Taylor, *Cerberus microlepis*, known only from a single lake on the Bicol Peninsula of Luzon, or *Lycodon chrysoprateros*, a species originally believed to be restricted only to Dalupiri Island (Ota and Ross 1994). These species illustrate the challenge of drawing conclusions based on negative data. Elevated conservation threat levels inferred in all three cases have involved a primary justification derived from presumed range-restricted geography, which has yet to be assessed empirically (see comments by McLeod et al. 2013; Diesmos et al. 2014; Sanguila et al. 2016). Such inferences, based on negative data, are not conclusive, defensible interpretations of the extent of a species' geographic occurrence data. To make matters worse, recent systematic studies have seriously questioned the validity of *C. microlepis* and *L. chrysoprateros* (Alfaro et al. 2004; Siler et al. 2013), which identifies an even more alarming pattern to conservation status assessments: poorly known species (those encountered once or a few times) tend to end up in elevated threat categories (IUCN 2017). In these instances, we recommend converting such species to "Data Deficient" to flag them, and to draw the attention of future researchers to these gaps in our collective knowledge. They need to be studied inasmuch as there have been no actual new data pertaining to these species for more than 100 years. How can they be anything other than "Data Deficient?"

Distribution maps and photographs of living snake specimens referenced in the species accounts, are incorporated into the Appendix that follows the Bibliography References section.

In closing, we wish to emphasize that we have prepared this historical overview covering the period from the late 18th Century into the early 21st Century to provide an updated foundation upon which our international colleagues, and especially the scientific community in the Philippines, will build. It is our hope that our compilation of Philippine species distributions and taxonomic status, will stimulate future research on poorly-known taxa, snake communities from unexplored areas, natural history studies and, ultimately, hopefully result in biologicaly meaningful, data-informed conservation assessments.

Museum Symbolic Codes

The following symbolic codes are used to designate museums that hold type materials of snake species that have been reported from the Philippines.

BMNH Natural History Museum, London [formerly British Museum (Natural History)] (London, England)
CAS California Academy of Sciences (San Francisco, California, USA)
CAS-SU Stanford University collection at the California Academy of Sciences (**CAS**).
CM Carnegie Museum (Pittsburgh, Pennsylvania, USA)
CNHM Chicago Natural History Museum [see **FMNH**]
EHT Edward Harrison Taylor [field numbers]; now at **CAS, CM**, and **KU**
FMNH Field Museum of Natural History (Chicago, Illinois, USA)
KU University of Kansas Biodiversity Institute [formerly Museum of Natural History] (Lawrence, Kansas, USA)

MCZ Museum of Comparative Zoology, Harvard University (Cambridge, Massachusetts, USA)
MHNB Museum d'Histoire Naturelle de Bâle (see as **NMBA**)
MNHN Muséum national d'Histoire naturelle (Paris, France)
MZUF Museo Zoologico Università Firenze (Florence, Italy)
NMBA Naturhistorisches Museum Basel (Basel, Switzerland)
NMH Naturhistorisches Museum zu Hamburg (also as **ZMH**) (Hamburg, Germany)
NMW Naturhistorisches Museum, Wien (Vienna, Austria)
PNM Philippine National Museum (Manila, Luzon, Philippines)
RMNH Nederlands Centre for Biodiversity Naturalis [merger of Naturalis-Nationaal Natuurhistorisch Museum [formerly Rijksmuseum van Natuurlijke Historie] and Zoological Museum Amsterdam [**ZMA**]).
RNH Rijksmuseum van Natuurlijke Historie (Leiden, Netherlands) (also as **RMNH**)
SMF Senckenberg Forschungsinstitut und Naturmuseum (Frankfurt am Main, Germany)
STUM Santo Thomas University, Museum (Manila, Luzon, Philippines)
SU Stanford University (Stanford, California, USA) (see as **CAS-SU**)
UF Florida Museum of Natural History (University of Florida, Gainsville, Florida, USA)
USNM National Museum of Natural History, [formerly United States National Museum], Snithsonian Institution (Washington, DC, USA)
UZMK (see as **ZMUC**)
ZFMK Zoologisches Forschungsmuseum "Alexander Koening", Bonn (Bonn, Germany)
ZIN (see as **ZISP**)
ZISP Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia) (also as **ZIN**)
ZMB Museum für Naturkunde [formerly Zoologischen Museum], Humboldt-Universität (Berlin, Germany)
ZMH Zoological Museum Hamburg (Hamburg, Germany)
ZMUC Københavns Universitet, Zoologisk Museum (Copenhagen, Denmark) (see also **UZMK**)

Acknowledgments

This report is an outgrowth of many decades of activity on the part of the authors, their institutions, their collaborators, and students. For Philippine snake-specific insight, we thank A.C. Alcala (Silliman University), A.C. Diesmos (PNM), M. Gaulke (GeoBio Center LMU, Germany), and the late W.C. Brown (Menlo College, California), and R.V. Sison (PNM) — all of whom have provided years of collaboration, many discussions, advice, and support. We are grateful to curators and staff at institutions housing critical Philippine snake collections, including G. Zug, R. Crombie, K. de Queiroz, A. Wynn, and the late D. Cochran and J. Peters (USNM), R. Inger, H. Voris, H. Marx, A. Resetar (FMNH), J. Rosado, J. Hanken, L. Ford, and the late A. Loveridge, E. Williams (MCZ), S. Rogers, and the late J. McCoy (CM), T. LaDuc, D. Cannatella (TNHC), A. Grandison, E.N. Arnold (BMNH), I. Ineich, and the late J. Guibé (MNHM), J. Vindum, R. Drewes, M. Koo, and L. Scheinberg (CAS), J. Watters (OU), D. Blackburn (UF), and L. Welton (KU). We deeply appreciate and thank A.C. Diesmos, J.B. Fernandez, V. Garcia, K. Hesed, N.A. Huron, L. Soriano, J. Tashjian, and H. Voris for the use of their photographs. We thank K. Allen, M. Sanguila, N. Huron, J. Watters, C. Linkem, and M. Koo for assistance with data, georeferencing, and maps, and our families for their unwavering support. We thank the Philippine-American Education Foundation (PAEF) for its continued support of student research initiatives.

Philippine field work has been supported by a U.S. National Science Foundation (NSF) grant to W.C. Brown and verification and rectification of CAS specimen-associated data was supported by NSF funds to AEL and J. Vindum. Recent field work (2005–2017) has been supported by NSF grants to RMB (DEB 073199, 0743491, 0910341, 1418895, and 1655553) and CDS (IOS 1353683, DEB 0804115) and Fulbright and Fulbright-Hayes fellowships to CDS.

We deeply appreciate the critical reviews of the manuscript provided by both Drs. Aaron Bauer and George Zug that led to significant improvements of the presentation. Nonetheless, though we accepted most of their suggestions, we are still responsible for errors of omission and commission.

The unpatterned orange morph of Philippine *Boiga cynodon* photographed in 2016 in the University of the Philipines at Los Baños Quezon Land Grant Forest Reserve, Municipality of Siniloan, Quezon Province, southeastern Luzon Island, Photo: Rafe M. Brown.

Synopsis of the Snakes of the Philippines

A Checklist

Reference map illustrating the major Philippine faunal regions as defined by the Pleistocene Aggregate Island Complexes (PAICs). Selected island groups, such as the Babuyans, Batanes, the Romblon Island Group (RIG), and the Sulu Archipelago, are also indicated.

Class Reptilia, Order Squamata, Suborder Serpentes

Superfamily Typhlopoidea (Scolecophidia)

Family Gerrhopilidae Vidal, Marin, Morini, Donnellan, Branch, Thomas, Vences, Wynn, Cruaud, and Hedges 2010

***Gerrhopilus hedraeus* (Savage, 1950)**
Negros Island Blind Snake

Typhlops hedraeus Savage, 1950:49, fig. 1.— Wynn and Leviton, 1993:44.— Wallach, 1993:271.— McDiarmid, Campbell, and Touré, 1999:104.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:457.

Gerrhopilus hedraeus, Vidal, Marin, Morini, Donnellan, Branch, Thomas, Vences, Wynn, Cruaud, and Hedges, 2010:3.— Pyron and Wallach, 2014:43.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170.

Type locality and type specimen(s).— At about 1500 feet above Luzuriaga, 6 mi SW of Dumaguete, Oriental Negros Prov., Negros Id., Philippines. Holotype: CAS-SU (Rept.) 12346.

Philippine distribution (endemic) (Map 14D [p. 125]).— Bohol, Cebu, Marinduque, Mindanao, Mindoro, Negros, Pacijan, Tablas.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Gerrhopilus manilae* (Taylor, 1919)**
Manila Blind Snake

Typhlops manilae Taylor, 1919:106; 1922a:56.— McDiarmid, Campbell, and Touré, 1999:110.
Malayotyphlops manilae, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.
Gerrhopilus manilae, Pyron and Wallach, 2014:43.

Type locality and type specimen(s).— "from type, an unnumbered specimen in Santo Tomas Museum, labeled 'Filipinas;' locality and collector unknown; probably from Luzon." (Taylor [1919:105]). Holotype: STUM unnumbered.

Philippine distribution (endemic) (Map 15A [p. 126]).— Luzon.

Remarks.— See remarks in Pyron and Wallach (2014:44) relating to the transfer of *Typhlops* (also as *Malayotyphlops*) *manilae* to the genus *Gerrhopilus*.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1 (listed under *Typhlops manilae*).

Family Typhlopidae Merrem, 1820

Subfamily Asiatyphlopinae Hedges, Marion, Lipp, Marin, and Vidal, 2014

***Acutotyphlops banaorum* Wallach, Brown (RM), Diesmos, and Gee, 2007** **Photo figure 1**
Balbalan Blind Snake

Acutotyphlops banaorum Wallach, Brown, Diesmos, and Gee, 2007:692, figs. 2, 3b, 4.

Type locality and type specimen(s).— Philippines, near Barangay Balbalasang, Municipality of Balbalan, Kalinga Province, Luzon Id., Philippines. Holotype: PNM 9280.

Philippine distribution (endemic) (Map 2B [p. 113]).— Luzon (Prov.: Kalinga [known only from the type locality]).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Indotyphlops braminus* (Daudin, 1803)** **Photo figure 2**

Common Blind Snake; Brahminy Blind Snake

Eryx braminus Daudin, 1803, 7:279.

Typhlops braminus, Cuvier, 1829, 2:406.— Taylor, 1922a:50, fig. 2; 1922d:136; 1923:542.

Argyrophis truncatus Gray, 1845:138 (type locality: Philippines).

Ramphotyphlops braminus, Ross and Gonzales, 1992:69.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.— Gaulke, 1999:280.— McDiarmid, Campbell, and Touré, 1999:59.— Ferner, Brown, Sison, and Kennedy, 2001:54[21]*.— Diesmos, Brown, and Gee, 2004:71.— Wallach, 2009:34.— Gaulke, 2011:332–333, fig 228.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:190.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:191; 2012:457.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484, fig. 47.— Devan-Song and Brown, 2012:16, fig. 38.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:92.— Wallach, Williams, and Boundy, 2014:614.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:106.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:172.

Indotyphlops braminus, Hedges, Marion, Lipp, Marin, and Vidal, 2014:37.

Type locality and type specimen(s).— Vizagapatam [= Vishakhapatnam], India (see comments in McDiarmid, Campbell, and Touré [1999:59], also Bauer [2015:42]). Type based on pl. 43 ("Rondoo Talooloo Pam") in Russell (1796:48) (*fide* McDiarmid et al., *op. cit.*; see also Bauer, *op. cit.*).

Philippine distribution (Map 19C [p. 130]).— (widely distributed) Babuyan Ids. (Camiguin Norte, Dalupiri), Basilan, Batanes Ids. (Batan, Ivojos), Bohol, Busuanga, Calamian Ids. (Calauit), Camiguin Sur, Cebu, Guimaras (also Panubolon Id.), Luzon (Prov.: Albay, Bataan, Batangas, Cavite, Ilocos Norte, Kalinga, Laguna, Manila, Quezon, Rizal, Sorsogon, Zambales), Mindanao (Prov.: Bukidnon, Lanao del Norte, Sarangani, Zamboanga del Norte), Marinduque, Masbate, Mindoro, Negros (Prov.: Negros Occidental, Negros Oriental), Palawan, Panay (Prov.: Aklan, Antique, Iloilo; also Ids.: Borocay, Gigantes Sur, Semirara, Sibay), Polillo, Samar, Sibuyan, Sulu Archipelago (Jolo [*fide* Taylor [1923:542]), Tablas.

General distribution (other than Philippines).— Widely distributed throughout Southeast and Southwest Asia, Africa, and elsewhere (see Mcdiarmid et al. [1999:61]), Wallach [2009:34 *et seq*.], Wallach et al. [2014:614].

Conservation status [IUCN].— The conservation status of *Indotyphlops braminus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* as *Ramphotyphlops braminus*.

***Malayotyphlops andyi* Wynn, Diesmos, and Brown (RM), 2016**

Andy's Blind Snake

Malayotyphlops andyi Wynn, Diesmos, and Brown, 2016:164, figs. 1 [map], 5.

Type locality and type specimen(s).— Nassiping Reforestation Project area, Barangay Nassiping, Sierra Madre Mt. Range, Municipality of Gattaran, Cagayan Prov., Luzon Id., Philippines. Holotype: PNM 9779).

Philippine distribution (endemic) (Map 23D [p. 134]).— Luzon (Prov.: Cagayan).

Conservation status [IUCN].— The conservation status of *Malayotyphlops andyi* has not been

* Number in brackets, here and elsewhere following the formal publication page number is the page number in the preprint version that was distributed before formal publication.

assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Malayotyphlops canlaonensis* (Taylor, 1917)**
Taylor's Worm Snake; Taylor's Blind Snake

Typhlops canlaonensis Taylor, 1917:354; 1922a:55.— McDiarmid, Campbell, and Touré, 1999:94. *Malayotyphlops canlaonensis*, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.

Type locality and type specimen(s).— Type locality: Canlaon Volcano at ~ 750 m, Negros Id., Philippines. Holotype: CM 2666.

Philippine distribution (endemic) (Map 24A [p. 135]).— Negros (Prov.: Negros Occidental [Canlaon Volcano]).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Malayotyphlops castanotus* (Wynn and Leviton, 1993)**
Brown-bellied Blind Snake; Western Visayan Blind Snake

Typhlops castanotus Wynn and Leviton, 1993:35, fig. 1.— McDiarmid, Campbell, and Touré, 1999:94.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].— Gaulke, 2011:334–335, figs. 229, 230.
Malayotyphlops castanotus, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.

Type locality and type specimen(s).— 8 km W of Pulupandan, Inampulugan Id., Guimares Prov., Philippines. Holotype: CAS-SU (Rept.) 27940.

Philippine distribution (endemic) (Map 24B [p. 135]).— Boracay Id. (Prov.: Aklan), Inampulugan (Guimares Prov.), Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan [northern coast], Antique).

Conservation status [IUCN].— The conservation status of *Malayotyphlops castanotus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Malayotyphlops collaris* (Wynn and Leviton, 1993)**
Light-collared Blind Snake

Typhlops collaris Wynn and Leviton, 1993:41, fig. 3.— McDiarmid, Campbell, and Touré, 1999:95. *Malayotyphlops collaris*, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.

Type locality and type specimen(s).— Mt. Anuling, Caramoan Municipality, Camarines Sur Prov., Luzon Id., Philippines. Holotype: UF 55123.

Philippine distribution (endemic) (Map 24C [p. 135]).— Luzon (Prov.: Camarines Sur [eastern tip of Caramoan Peninsula at 150–250 m elevation]).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Malayotyphlops denrorum* Wynn, Diesmos, and Brown (RM), 2016**
Sierra Madre Blind Snake

Malayotyphlops denrorum Wynn, Diesmos, and Brown, 2016:163, figs. 1 [map], 4.

Type locality and type specimen(s).— Sitio Apaya, Barangay Dibulan, Apaya Creek area, Sierra Madre Mt. Range, San Mariano Municipality, Isabela Prov., Luzon Id., Philippines. Holotype: PNM 9813).

Philippine distribution (endemic) (Map 24D [p. 135]).— Luzon (Prov.: Isabela).

Conservation status [IUCN].— The conservation status of *Malayotyphlops denrorum* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Malayotyphlops hypogius* (Savage, 1950)**
Cebu Blind Snake

Typhlops hypogia Savage, 1950:52, fig. 2.— McDiarmid, Campbell, and Touré, 1999:104.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].
Malayotyphlops hypogius, Hedges, Marion, Lipp, and Vidal, 2014:38.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170, fig. 36.

Type locality and type specimen(s).— Cebu, Philippines. Holotype: CAS-SU (Rept.) 12347.
Philippine distribution (endemic) (Map 25A [p. 136]).— Cebu, Panay (identification with hesitation by Ferner et al. [2001:54{21}]).
Remarks.— See comments under *M. luzonensis*.
Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Malayotyphlops luzonensis* (Taylor, 1919)**
Luzon Worm Snake; Luzon Blind Snake

Typhlops luzonensis Taylor, 1919:105; 1922a:52; 1922d:136.— McDiarmid, Campbell, and Touré, 1999:109.— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.— Oliveros, Ota, Crombie, and Brown, 2011:16.
Typhlops lozonensis [*sic*], Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:190.
Malayotyphlops luzonensis, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.— Wynn, Diesmos, and Brown, 2016:161, figs. 1 [map], 3.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170.

Type locality and type specimen(s).— Mt. Makiling, Laguna Prov., Luzon Id., Philippines. Holotype: CM 2653.
Philippine distribution (endemic) (Map 25B [p. 136]).— Babuyan Claro, Camiguin Norte, Cebu, Luzon (Prov.: Aurora, Laguna), Marinduque, Masbate, Negros (Prov.: Negros Occidental), Pacijan, Poro, Semirara, Siquijor.
Remarks.— See discussion in Supsup et al. (2016:170) relating to the identity of *Malayotyphlops* populations inhabiting the Visayan Island complexes and Luzon (including *M. luzonensis*, *M. ruber*, and *M. hypogius*), also comments by Sanguila et al. (2016:107) regarding specimens of *Malayotyphlops* sp. (cf. "*luzonensis*") from the Mindanao faunal region.
Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Malayotyphlops ruber* (Boettger, 1897)**
Samar Blind Snake

Typhlops ruber Boettger, 1897:164.— Taylor, 1922a:55; 1922d:136.— McDiarmid, Campbell, and Touré, 1999:118.
Malayotyphlops ruber, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.— Wynn, Diesmos, and Brown, 2016:162, figs. 1 [map], 2.

Type locality and type specimen(s).— Samar Id., Philippines. Holotype: SMF 16616.
Philippine distribution (endemic) (Map 25C [p. 136]).— Samar.
Remarks.— See comments under *M. luzonensis*.
Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Malayotyphlops ruficaudus* (Gray, 1845)** **Photo figures 3–4[5]**

Red-tailed Worm Snake; Red-tailed Blind Snake

Anilios ruficauda Gray, 1845:136.

Typhlops jagorii Peters, 1861:684 (type locality: Abhang des Vulkan Ysarog, Luzon; holotype: ZMB 3964 [fide McDiarmid et al. [1999:118]).— Taylor, 1922a:53.

Typhlops petersi Steindachner, 1867:515, pl. 13, figs. 7–9 (type locality: "Philippinen").

Typhlops ruficauda, Taylor, 1922a:54.

Typhlops ruficaudus, Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.— McDiarmid, Campbell, and Touré, 1999:118.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:190, fig. 8E (fig. labeled Typhlops ruficaudatus [sic]).— Devan-Song and Brown, 2012:16.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:457.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:92.

Malayotyphlops ruficauda, Hedges, Marion, Lipp, Marin, and Vidal, 2014:38.

Type locality and type specimen(s).— "Philippines" Syntypes (3): BMNH 1946.1.11.4–1946.1.11.6.

Philippine distribution (endemic) (Map 25D [p. 136]).— Babuyan Ids. (Camiguin Norte), Luzon (Prov.: Bulacan, Camarines Sur, Isabela, Laguna, Manila, Zambales), Marinduque, Negros, Sibuyan, Tablas.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Ramphotyphlops cumingii* (Gray, 1845)** **Photo figures 6–7**

Cuming's Worm Snake; Cuming's Blind Snake

Onychophis Cumingii Gray, 1845:133.

Typhlops longicauda Taylor 1919:108; 1922a:63, pl. 1, figs. 1a–c (type locality: Bunawan, Agusan Prov., Mindanao).

Typhlops rugosa Taylor 1919:109 (type locality: Bunawan, Agusan Prov., Mindanao).

Typhlops cumingii, Taylor, 1922a:66, figs. 4a–c; 1922b:196.

Typhlops dendrophis Taylor, 1922a:60 (type locality: Bunawan, Agusan Prov., Mindanao).

Typhlops mindanensis Taylor 1922a:65 (type locality: Bunawan, Agusan Prov., Mindanao).

Ramphotyphlops cumingii, Wynn and Leviton, 1993:45.— Wallach, 1993:271.— McDiarmid, Campbell, and Touré, 1999:63.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:172, fig. 35.— Supsup, Guinto, Redoblado, and Somez. 2017:9, fig. 5f.

Ramphotyphlops cf. *cumingii*, Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:106.

Type locality and type specimen(s).— "Philippines" and "Indian Ocean" Syntypes (3) BMNH 1946.1.11.19–20, 1946.1.10.83.

Philippine distribution (Map 32C [p. 143]).— Bohol, Cebu, Marinduque, Masbate, Mindanao (Prov.: Davao Oriental), Negros (Prov.: Negros Occidental, Negros Oriental), Polillo, Sibuyan, Sicogon.

General distribution (other than Philippines).— One of the syntypes, without locality, and according to Boulenger (1893, 1:51) collected by Sir. E. Belcher, is listed by McDiarmid et al. (1999:63) as "Indian Ocean" (". . . obviously in reference to an island in the Indian Ocean."). Except for this doubtful record, this species is known only from the Philippines.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Ramphotyphlops marxi* (Wallach, 1993)**
Marx's Worm Snake; Marx's Blind Snake

Typhlops marxi Wallach, 1993:263, figs. 1–2.— McDiarmid, Campbell, and Touré, 1999:110.
Ramphotyphlops marxi, Hedges, Marion, Lipp, Marin, and Vidal, 2014:39.

Type locality and type specimen(s).— Tarabucan (12°13′N, 124°35′E), four miles SE of spur of Sigarag Mountains, Matuguinao Municipality, northern Western Samar Prov., Samar Id., Philippines. Holotype: FMNH 96520.

Philippine distribution (endemic) (Map 32D [p. 143]).— Samar (known only from the type locality).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Ramphotyphlops olivaceus* (Gray, 1845)**
Olive-colored Blind Snake

Onychophis olivaceus Gray, 1845:133.
Typhlops olivaceus, Taylor, 1922a:58 (no Philippine records).
Ramphotyphlops olivaceous, Wynn and Leviton, 1993:45.— Wallach, 1993:271.— McDiarmid, Campbell, and Touré, 1999:71.

Type locality and type specimen(s).— "Philippines". Holotype: BMNH 1946.1.10.57.

Philippine distribution.— Basilan, Samar, Sulu Archipelago (Bubuan, Sibutu).

General Distribution (other than Philippines) (Map 33A [p. 144]).— Indonesia (Ambon, Borneo, Ceram [Seram], Mysool, Sangihe Ids., Sulawesi); Malaysia (Sarawak); (? British Solomon Ids. [Barbour, 1914]).

Conservation status [IUCN].— The conservation status of *Ramphotyphlops olivaceus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Ramphotyphlops suluensis* (Taylor, 1918)**
Sulu Islands Worm Snake

Typhlops suluensis Taylor, 1918a:257–259, 265; 1922a:61, fig. 3a–c; 1922b:196.
Ramphotyphlops suluensis, Gaulke, 1994b:141; 1995b:45, figs. 1–2; 1996:52, fig. 7.— Hedges, Marion, Lipp, Marin, and Vidal, 2014:39.

Type locality and type specimen(s).— Bubuan Id., Sulu Archipelago, Philippines. Holotype: PNM 2001 (type destroyed during WW II).

Philippine distribution (endemic) (Map 33B [p. 144]).— Basilan, Sulu Archipelago (Bubuan, Sibutu).

Remarks.— Treated as a synonym of *R. olivaceous* by McDowell (1974:43) and McDiarmid et al. (1999:71).

Conservation status [IUCN].— Endangered B1ab(iii) [2016] ver. 3.1.

Superfamily Pythonoidea
Family Pythonidae Fitzinger, 1843

***Malayopython reticulatus* (Schneider, 1801)** **Photo figure 8**
Reticulated Python

Boa reticulata Schneider, 1801:264.

Python reticulatus, Taylor, 1922a:68; 122d:136.— Ross and Gonzales, 1992:64.— Gaulke, 1994b:137; 1996:49; 1999:279; 2001:34.— Gaulke and Altenbach, 1994:63.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Gaulke, 1999:279.— McDiarmid, Campbell, and Touré, 1999:179.— Ferner, Brown, Sison, and Kennedy, 2001:51[18].— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.— Oliveros, Ota, Crombie, and Brown, 2011:12.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:191, fig. 37.— Wallach, Williams, and Boundy, 2014:610.

Python reticulatus reticulatus, David, Pauwels, Lays, and Lenglet, 2006:213.— Gaulke, 2011:328–331, figs. 225–227.

Broghammerus reticulatus, Rawlings, Rabosky, Donnellan, and Hutchinson, 2008:619.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484.— Devan-Song and Brown, 2012:11, fig. 22.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:72, fig. 72.

Malayopython reticulatus, Reynolds, Niemiller, and Revell, 2014:206–207, figs. 1–2 [cladograms].— Sy and Tan, 2015:220.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:106.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170.

TYPE LOCALITY AND TYPE SPECIMEN(S).— locality of type specimen not given, restricted to 'Java' by Brongersma (1972:58). Neotype: ZFMK 32378; type locality "Rengit, West Malaysia" (*fide* Auliya et al. [206–207]; see also Wallach et al. [2014:610]).

PHILIPPINE DISTRIBUTION (Map 23C [p. 134]).— (widely distributed) Babuyan Ids. (Cagayan, Dalupiri), Basilan, Bohol, Calamian Ids. (Calauit)., Catanduanes, Cebu, Itbayat, Leyte, Lubang, Luzon (Prov.: Aurora, Ilocos Norte, Isabela, Laguna, Quezon, Sorsogon, Zambales), Marinduque, Masbate, Mindanao (Prov.: Agusan del Norte, Sarangani, South Cotabato, Zamboanga del Sur [Zamboanga City]), Mindoro (Occidental, Oriental), Negros, Palawan, Panay, Polillo, Samar, Siargao, Siquijor, Sulu Archipelago (Bongao, Jolo, Siasi, Sibutu, Tawi-Tawi), Tablas.

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— Widely distributed (see Wallach et al. [2014:610]).

CONSERVATION STATUS [IUCN].— The conservation status of *Malayopython reticulatus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* as *Malayopython reticulatus reticulatus* (Schneider, 1801).

Family Xenopeltidae Bonaparte, 1845

Xenopeltis unicolor Reinwardt *in* F. Boie, 1827

Iridescent Earth Snake; [Asian]Sunbeam Snake

Xenopeltis unicolor Reinwardt in F. Boie, 1827:564; 1865:Livr. 9, pl. 5.— Taylor, 1922a:73, text-fig. 2, pl. 2.— Leviton, 1983:197.— Gaulke, 1994b:141.— McDiarmid, Campbell, and Touré, 1999:159.— Wallach, Williams, and Boundy, 2014:787.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Java, Indonesia. Type unknown.

PHILIPPINE DISTRIBUTION.— Balabac, Palawan, Sulu Archipelago (Bongao, Jolo, Sanga-Sanga).

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES) (Map 37D [p. 148-+-]).— Southeast Asia from Myanmar to Vietnam and south through Malaysian Peninsula and Malaysian Sarawak to western Indonesia (Borneo, Java, Sulawesi, Sumatra). (See McDiarmid et al. [1999] and Wallach et al. [2014] for details.)

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

Superfamily Acrochordoidea

Family Acrochordidae Jan, 1863

***Acrochordus granulatus* (Schneider, 1799)** **Photo figures 9–11**

Marine File Snake; Little File Snake; Wart Snake

Hydrus granulatus Schneider, 1799:243.

Acrochordus granulatus, Cantor, 1847:59.— Smith, 1943:134.— McDiarmid, Campbell, and Touré, 1999:227.— Gaulke and Altenbach, 1994:63.— Gaulke, 1999:278; 2011:232–233; figs. 153–154.— Ferner, Brown, Sison, and Kennedy, 2001:51[18].— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.— Siler and Sy, 2011:280, fig. 1.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente, Diesmos, and Diesmos, 2012:482.— Wallach, Williams, and Boundy, 2014:8.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:167.

Chersydrus granulatus, Gray, 1849:61.— Taylor, 1922a:77, pl. 3, fig. 1; 1922d:136.

Chersydrus granulatus luzonensis Loveridge, 1938:209.

Type locality and type specimen(s).— India (restricted by Smith [1943:134]). Type un-known.

Philippine distribution (Map 2A [p. 113]).— Bantanyan, Calamian Ids. (Calauit), Cebu, Guimaras, Luzon (Prov.: Batangas, Cavite, Ilocos Norte, Laguna, Manila, [Manila Bay], Quezon, Rizal), Masbate, Negros (Prov.: Negros Occidental, Negros Oriental), Palawan, Panay (Prov.: Iloilo), Siquijor.

General distribution (other than Philippines).— Coastal waters from west coast of India (as far north as Bombay), Sri Lanka, east coast of India, coasts of Myanmar, Malaysia, and east throught the Indonesian Archipelago to the north coast of Australia and the Solomon Islands.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Superfamily Colubroidea

Family Pareidae Romer, 1956

***Aplopeltura boa* (H. Boie *in* F. Boie, 1828)** **Photo figure 12**

Blunt-headed Tree Snake; Blunt-headed Slug Snake

Amblycephalus boa H. Boie *in* F. Boie, 1828:1034.

Aplopeltura boa, Duméril, Bibron, and Duméril, 1854:444.— Wallach, Williams, and Boundy, 2014:48.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:105.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:105, fig. 77.— Sy and Binaday, 2016:261.— Supsup, Guinto, Redoblado, and Somez. 2017:7, fig. 5b.

Haplopeltura boa, Boettger, 1892:134.— Taylor, 1922a:281, pl. 34, figs. 7–9.

Type locality and type specimen(s).— Parang, western Java, Indonesia. Holotype: RMNH 984.

Philippine distribution (Map 3B [p. 114]).— Balabac, Bohol, Basilan, Dinagat, Leyte, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Davao City, Davao Oriental, Misamis Oriental, South Cotabato, Zamboanga del Sur [Zamboanga City]), Palawan, Samar (Prov.: Eastern, Western).

General distribution (other than Philippines).— Southeastern Asia, Myanmar, southern Thailand, West and East Malaysia, western Indonesia.

Remarks.— Reported for the first time from Luzon by Sy and Binaday (*q.v.*, 2016) from a single observation (photo voucher). The species' natural occurrence on Luzon is unlikely (the taxon is otherwise restricted to the Mindanao faunal region islands of Mindanao, Samar, Leytre, Bohol, etc), and photo vouchers are not always reliable, so we withhold judgment. However, we note that the Sy and Binaday (*op. cit. supra*) record comes from the extreme southern tip of the Bicol Peninsula, directly across from northern Samar Island, where the species has been documented. Therefore, the Sorsogon record is worth further investigation.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Additional references.— Guo et al., 2011.

Family Homalopsidae Bonaparte, 1845

***Cerberus microlepis* Boulenger, 1896**

Lake Buhi Bockadam; Lake Buhi Dog-faced Water Snake

Cerberus microlepis Boulenger, 1896, 3:18.— Murphy, Voris, and Karns, 2012:13, figs. 6, 10.— Murphy and Voris, 2014:12, fig. 13.— Wallach, Williams, and Boundy, 2014:153.

Hurria microlepis, Taylor, 1922a:114, pl. 6, figs. 1–3; 1923:547.

Type locality and type specimen(s).— Philippines. Syntypes (2): BMNH 1946.1.7.24–25.

Philippine distribution (endemic) (Map 9A [p. 120]).— Luzon (Bicol Peninsula [Camarines Sur Prov. {Lake Buhi}]).

Remarks.— Recent molecular studies by Alfaro et al. (2004) demonstrated that this species is nested within the Philippine *Cerberus schneiderii* complex and that it is scarcely 2% genetically different from nearby populations. However, as observed by Murphy, Voris, and Karns (2012:21), "*Cerberus microlepis* is geographically isolated, as well as ecologically and morphologically distinct and on its own evolutionary trajectory, suggesting it is more than an ecomorph." They point out that in a followup discussion to their 2004 publication, Alfaro et al. (2008) suggested that "divergence of *C. microlepis* from its coastal ancestor is estimated at 2.0 MYA (1.0–3.1 MYA)" (Murphy, Voris, and Karns [2012:21]).

We accept the conclusions of Murphy et al. (2012) and recognize *C. microlepis* as a distinct species.

Conservation status [IUCN].— Endangered B1ab(iii,v) [2016] ver. 3.1.

N.B. Consideration of this taxon as "Endangered," which appears to be based primarily, if not solely, on its known area of occurrence, is problematic for reasons noted above, especially given the lack of survey and inventory data from the surrounding region and/or other freshwater systems of the Bicol Peninsula.

***Cerberus schneiderii* (Schlegel, 1837)** **Photo figure 13**

Dog-faced Water Snake

Homalopsis schneiderii Schlegel, 1837b:341.

Cerberus unicolor Gray, 1849:65 (type locality: Philippines).

Hurria rhynchops, Taylor, 1922a:111; 1923:546.

Cerberus rhynchops, Ross and Gonzales, 1992:65.— Gaulke and Altenbach, 1994:63.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.— Gaulke, 2011:256–257, figs. 169–171.— Devan-Song and Brown, 2012:12.

Cerberus schneiderii, Murphy, Voris, and Karns, 2012:17, figs. 8–9.— Brown, Siler, Oliveros, Wel-

ton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:90, fig. 96.— Murphy and Voris, 2014:13, fig. 15.— Wallach, Williams, and Boundy, 2014:153.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:14.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170, fig. 33.

Type locality and type specimen(s).— Timor, Indonesia. Lectotype: RMNH 1173 (designated by Murphy et al. [2012:18] [*q.v.*]).

Philippine distribution (Map 9B [p. 120]).— "Documented on most major islands of the Philippines . . ." (Brown et al. [2013:90]). Bantayan, Bohol, Catanduanes, Cebu, Cuyo, Dinagat, Luzon (Prov.: Cavite, Laguna, Manila, Rizal, Zambales), Masbate, Negros (Prov.: Negros Oriental), Palawan, Romblon, Panay (Prov.: Aklan, Antique, Capiz, Iloilo), Polillo, Siquijor, Sulu Archipelago (Jolo).

General distribution (other than Philippines).— Coasts of Indonesia, Malaysia, Singapore, Thailand. (See Murphy, Voris, and Karns [2012:17], Murphy and Voris [2014:13], and Wallach et al. [2014:153], for details.)

Remarks.— See Murphy, Voris, and Karns (2012:17) for an extensive synonymy and discussion relating to the adoption of this new combination for what was formerly known in the Philippines as *Cerberus rhynchops* (see also pp. 14–17 for a discussion relating to the restriction of *Cerberus rhynchops* to the South Asian population [i.e., India, Thailand, and the Andaman and Nicobar Islands]).

Conservation status [IUCN].— Not distinguished from *C. rhynchops*, which is listed as of Least Concern [2016] ver. 3.1.

Fordonia leucobalia (Schlegel, 1837)

White-bellied [crab-eating] Water Snake

Homalopsis leucobalia Schlegel, 1837b:345, pl. 13, figs. 8–9.— Taylor, 1922a:115.
Fordonia leucobalia, Gray, 1842:75.— Murphy and Voris, 2014:20.— Wallach, Williams, and Boundy, 2014:293.

Type locality and type specimen(s).— Timor, Indonesia. Lectotype: RMNH 1161 (designated by Iskandar and Colijn [2001:92]).

Philippine distribution.— Mindanao (*fide* Wallach et al. [2014:293]).

General distribution (other than Philippines).— India (Bengal), Myanmar, Vietnam, Nicobar Ids., Malaysia, Singapore, Indonesia (Java, Sumatra, Timor) to northern Australia.

Remarks.— Wallach et al. (2014:293) include Luzon in their distribution statement but we know of no confirmed record for its occurrence there.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Gerarda prevostiana (Eydoux and Gervais, 1837)

Gerard's Water Snake

Coluber (*Homalopsis*) *prevostianus* Eydoux & Gervais, 1837:5, pl. 16, figs. 4–6.
Gerarda bicolor Gray, 1849:77 (*fide* Smith, 1943:394).
Gerarda prevostiana, Cope, 1862:1.— Smith, 1943:394, figs. 125–126.— Murphy and Voris, 2014:20, fig. 27.— Wallach, Williams, and Boundy, 2014:301.

Type locality and type specimen(s).— "Manille", Luzon Id., Philippines. Syntypes (2): MNHN 3758 and 7593 (*fide* Wallach et al. [2014:301]).

Philippine distribution.— Palawan.

General distribution (other than Philippines) (Map 14C [p. 125]).— India (Bombay and

Malabar regions), Sri Lanka, Myanmar (Gulf of Martaban), west coast of Malay Peninsula, East Malaysia (Sarawak).

Remarks.— Wallach et al. (2014:301) note that the "Original description reprinted in Eydoux & Gervais (1837b:7–72, pl. 30, figs. 4–6). Plates incorrectly labeled 15 in text (1837a:5) and 29 in text (1837b:70)."

That this species occurs in or near Manila, Luzon, is highly unlikely and the record for its occurrence there most probably orignated by the syntypical specimens being shipped to the MNHN from the port of Manila.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Family Colubridae Oppel, 1811

Subfamily Ahaetulliinae Figueroa, McKelvy, Grismer, Bell, and Lalivaux, 2016

***Ahaetulla prasina prasina* (Reinwardt *in* F. Boie, 1827)**

Green Vine Snake; Oriental Whipsnake; Gunther's Whip Snake

Dryophis prasinus Reinwardt *in* H. Boie, 1826b:238 (*nomen nudum*); *in* F. Boie, 1827:col. 545.— Boettger, 1895:4–5; 1898:106.— Griffin, 1909:600; 1911:264.— Taylor, 1922a:219.

Ahaetulla prasina prasina, Leviton, 1968:81, fig. 1.— Gaulke, 1999:278.

Type locality and type specimen(s).— Java, Indonesia. Syntypes (2):RMNH 782 (now RMNH 782 and 47582 [*fide* Wallach et al. [2014:20]).

Philippine distribution (Map 2C [p. 113]).— Balabac, Busuanga, Calamian Ids. (Calauit Id.), Coron, Culion, Palawan.

General distribution (other than Philippines).— Indonesia: Borneo (Kalimantan), Riau (also as Riou); East Malaysia: (Borneo [Sabah, Sarawak]), West Malaysia (Malay Peninsula); Singapore.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Ahaetulla prasina preocularis* (Taylor, 1922)** **Photo figures 14–16**

Philippine Vine Snake

Dryophis preocularis Taylor, 1922a:222, text-fig. 19a–b, pl. 28; 1922d:138.

Ahaetulla prasina preocularis, Leviton, 1968:85, fig. 1.— Smith, 1993:96.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Gaulke, 2001:32; 2011:236–238, figs. 155–156.— Ferner, Brown, Sison, and Kennedy, 2001:51[18], fig. 47.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:187.— Oliveros, Ota, Crombie, and Brown, 2011:13, figs. 6A–B.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:482, fig. 41.— Devan-Song and Brown, 2012:11, figs. 23–24.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:72, figs. 73–74.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:89.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:167, fig. 25.— Supsup, Guinto, Redoblado, and Somez. 2017:7, fig. 5b.

Ahaetulla prasina, Diesmos, Brown, and Gee, 2004:71 (identification tentative).

Type locality and type specimen(s).— Bunawan, Agusan del Sur Prov., Mindanao Id., Philippines. Holotype: CM 2617.

Philippine distribution (endemic) (Map 2D [p. 113]).— Babuyan Ids. (Camiguin Norte), Basilan, Batanes Ids. (Batan, Sabtang), Bohol, Camiguin Sur, Cebu, Dinagat, Jolo, Leyte,

Luzon (Prov.: Aurora, Bulacan, Cagayan, Camarines Sur, Ifugao, Ilocos Norte, Isabela, Laguna, Kalinga, Rizal, Sorsogon, Zambales), Marinduque, Masbate, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Bukidnon, Cagayan, Davao del Sur, South Cotabato, Ilocos Norte, Isabela, Lanao del Norte, Maguindanao, Misamis Oriental, Surigao del Sur, Zamboanga del Norte, Zamboanga del Sur [Zamboanga City]), Mindoro, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan, Antique, Capiz, Iloilo), Polillo, Samar, Sibutu, Tablas.

Conservation status [IUCN].— Not distinguished from *A. prasina*, which is listed as of Least Concern [2016] ver. 3.1.

***Ahaetulla prasina suluensis* Gaulke, 1994**

Sulu Vine Snake; Sulu Whipsnake

Ahaetulla prasina suluensis Gaulke, 1994a:45; 1994b:137; 1996:49.

Type locality and type specimen(s).— Sanga-Sanga Id., Sulu Archipelago, Philippines. Holotype: SMF 74845.

Philippine distribution (endemic) (Map 3A [p. 114]).— Sulu Archipelago (Bongao, Sanga-Sanga, Siasi, Sibutu, Tawi-Tawi).

Conservation status [IUCN].— The conservation status of *Ahaetulla prasina suluensis* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Chrysopelea paradisi paradisi* H. Boie *in* F. Boie, 1827**

Paradise Tree Snake; Garden Flying Snake

Chrysopelea paradisi H. Boie, 1826b:237 (*nomen nudum*); H. Boie *in* F. Boie, 1827:547.— Leviton, 1964c:134 (part).— Wallach, Williams, and Boundy, 2014:166 (part).

Chrysopelea paradisi paradisi, Mertens, 1968:202, fig. 4.— Gaulke, 1994b:138; 1996:50.

Type locality and type specimen(s).— Java, Indonesia Neotype: RMNH 885 (see Mertens [1968:203]).

Philippine distribution (Map 9C [p. 120]).— Sulu Archipelago (Sibutu).

General distribution (other than Philippines).— Western Indonesia, Malaysia, Myanmar, Thailand, Andaman Ids.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Chrysopelea paradisi variabilis* Mertens, 1968** **Photo figures [17–18], 19**

Paradise Tree Snake

Chrysopelea ornata, (part) Günther, 1858:146.— Boulenger, 1896:196.— Griffin, 1911:264.— Taylor, 1922a:216, pl. 11, figs. 6–8 (notes typ. err. in his earlier publs.).

Crysopelea [*sic*] *ornata*, Taylor, 1917:366; 1918:261; 1922d:138.

Chrysopelea paradisi, Leviton, 1964b:133 (part).— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:111.— Gaulke, 2011:260–261, figs. 172–176.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 7F.— Oliveros, Ota, Crombie, and Brown, 2011:14.— Devan-Song and Brown, 2012:12, fig. 27.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Wallach, Williams, and Boundy, 2014:166 (part).— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:90.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:167.

Chrysopelea paradisi variabilis Mertens, 1968:204, fig. 5.— Gaulke, 1994b:138.— Gaulke and Altenbach, 1994:63.

Type locality and type specimen(s).— Samar, Philippines. Holotype: SMF 20281.

Philippine distribution (endemic) (Map 9D [p. 120]).— Babuyan Ids. (Calayan, Dalupiri), Balabac, Bantayan, Banton, Basilan, Camiguin, Cebu, Dinagat, Kalotkot, Leyte, Luzon (Prov.: Bataan, Batangas, Bulacan, Cavite, Laguna, Quezon, Rizal, Sorsogon, Zambales), Marongas, Masbate, Medis, Mindanao (Prov.: Agusan del Norte, Zamboanga del Sur [Zamboanga City]), Mindoro, Negros (Prov.: Negros Oriental), Palawan, Panay (Prov.: Aklan, Antique, Iloilo), Polillo, Romblon, Samar, Siagao, Sibuyan, Siquijor, Sulu Archipelago (Bongao, Bubuan, Jolo, Sanga-Sanga, Tawi-Tawi), Tablas.

Conservation status [IUCN].— The conservation status of *Chrysopelea paradisi variabilis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Dendrelaphis flavescens Gaulke, 1994

Sulu Islands Tree Snake

Dendrelaphis caudolineatus flavescens Gaulke, 1994b:138, fig. 2.

Dendrelaphis flavescens, van Rooijen and Vogel, 2012:11, fig. 6.— Wallach, Williams, and Boundy, 2014:214.

Type locality and type specimen(s).— Sanga-Sanga Id., Sulu Archipelago, Philippines. Holotype: SMF 74846.

Philippine distribution (endemic) (Map 12A [p. 123]).— Sulu Archipelago (Bongao, Bubuan, Sanga-Sanga, Tawi-Tawi) (*fide* van Rooijen and Vogel [2012:11–12]).

Remarks.— Wallach, Williams, and Boundy (2014:214) also list in their distribution statement, but without support, "Sitanki", which may refer to Sitangkai, an islet in close proximity to Tawi-Tawi.

Conservation status [IUCN].— The conservation status of *Dendrelaphis flavescens* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Dendrelaphis fuliginosus Griffin, 1909

Philippine Lamp-black Tree Snake

Dendrelaphis fuliginosus Griffin, 1909:55; 1911:261.— Taylor, 1922a:172 (as doubtful synonym of *D. modestus*).— van Rooijen and Vogel, 2012:12, figs. 7–8.— Wallach, Williams, and Boundy, 2014:214.

Dendrelaphis caudolineatus terrificus (part), Leviton, 1970b:389.— Ferner et al., 2000:19.

Dendrelaphis caudolineatus cf. *terrificus*, Gaulke, 2011:272–273, figs. 182–183.

Type locality and type specimen(s).— Negros Id., Philippines. Neotype: FMNH 67409 (see van Rooijen and Vogel [2012:12]).

Philippine distribution (endemic) (Map 12B [p. 123]).— Cebu, Masbate, Mindoro, Negros, Panay (*fide* van Rooijen and Vogel [2012:12–13]).

Conservation status [IUCN].— The conservation status of *Dendrelaphis fulininosus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Dendrelaphis levitoni van Rooijen and Vogel, 2012

Leviton's Bronze-back Tree Snake

Dendrelaphis levitoni van Rooijen and Vogel, 2012:13, fig. 9.— Wallach, Williams, and Boundy, 2014:215.

Type locality and type specimen(s).— Puerto Princesa, Palawan Id., Philippines. Holotype: CAS 15803.

Philippine distribution (endemic) (Map 12C [p. 123]).— Balabac, Candaraman, Palawan (*fide* van Rooijen and Vogel [2012:13–14]).

Conservation status [IUCN].— The conservation status of *Dendrelaphis levitoni* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Dendrelaphis luzonensis Leviton, 1961 **Photo figure 20**

Luzon Bronze-back Tree Snake

Dendrelaphis caudolineatus luzonensis Leviton, 1961:1; 1968:386.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Oliveros, Ota, Crombie, and Brown, 2011:15.— Devan-Song and Brown, 2012:13, fig. 29.

Dendrelaphis luzonensis, van Rooijen and Vogel, 2012:15, fig. 10.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483, fig. 43.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:78, fig. 82.— Wallach, Williams, and Boundy, 2014:215.

Type locality and type specimen(s).— Los Bãnos, Laguna Prov., Luzon Id., Philippines. Holotype: CAS 61134.

Philippine distribution (endemic) (Map 12D [p. 123]).— Babayan Ids. (Calayan, Camiguin Norte, Dalupiri), Luzon (Prov.: Albay, Aurora, Baay, Batangas, Bulacan, Cagayan, Isabela, Camarines Norte, Camarines Sur, Ilocos Norte, Kalinga, Laguna, Pangasinan, Quezon, Rizal, Zambales), Marinduque, Masbate (?), Ticao (?).

Conservation status [IUCN].— The conservation status of *Dendrelaphis luzonensis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Dendrelaphis marenae Vogel and van Rooijen, 2008 **Photo figure 21**

Gaulke's Bronze-back Tree Snake

Dendrelaphis pictus pictus, (part) Gaulke, 1994b:140.— Leviton, 1968:374.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189, fig. 29.— Ferner, Brown, Sison, and Kennedy, 2001:52[19], fig. 48.

Dendrelaphis marenae Vogel and van Rooijen, 2008:13, figs. 9–14, 17.— Gaulke, 2011:276–277, figs. 184–185.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:78, fig. 83.— Wallach, Williams, and Boundy, 2014:215.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:92.— Supsup, Guinto, Redoblado, and Somez. 2017:9, fig. 5d.

Denrelaphis [*sic*] *marenae*, Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169, fig. 28.

Type locality and type specimen(s).— Albay Prov., Luzon Id., Philippines. Holotype: MNHN 1994.059.

Philippine distribution (Map 13A [p. 124]).— Balabac, Bantayan, Basilan, Bohol, Busuanga, Calauit, Camiguin, Candaraman, Carabao, Catanduanes, Cebu, Culion, Guimaras, Kalotkot, Leyte, Luzon (Prov.: Albay, Aurora, Batangas, Cagayan, Isabela, Camarines

Norte, Camarines Sur, Ilocos Norte, Laguna, Manila, Nueva Vizcava, Quezon, Sorsogon, Zambales), Marinduque, Masbate, Mindanao (Prov.: Agusan del Sur, Bukidnon, Davao, Davao Oriental, Lanao, Misamis Oriental, Zamboanga), Mindoro, Negros (Prov.: Negros Occidental, Negros Oriental), Palawan, Panay (Prov.: Aklan, Antique, Capiz, Iloilo), Polillo, Samar, Siagao, Siquijor, Surigao, Sulu Archipelago (Bongao, Cagayan Sulu, Jolo), Tablas. (After Vogel and van Rooijen [2008:20]; stated as based on Leviton [1968]; additional locations based on Siler et al. [2012], and Brown et al. [2013].)

General distribution (other than Philippines).— Indonesia (Sulawesi).

Conservation status [IUCN].— The conservation status of *Dendrelaphis marenae* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Dendrelaphis philippinensis* Günther, 1879**

Philippine Bronze-back Tree Snake

Dendrophis philippinensis Günther, 1879:78.— van Rooijen and Vogel, 2012:17, figs. 12–13.— Wallach, Williams, and Boundy, 2014:216.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Dendrelaphis terrificus, Taylor, 1922a:174, pl. 23.

Dendrelaphis caudolineatus terrificus, Meise and Hennig, 1932:280 (in part).— Leviton, 1970b:389.— Smith, 1993:97.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Gaulke, 2001:27, fig.3.— David, Pauwels, Lays, and Lenglet, 2006:216.— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.

Dendrelaphis philippinensis, Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:93.

Type locality and type specimen(s).— northern Mindanao Id., Philippines. Holotype: BMNH 1946.1.6.69 (formerly BMNH 1877.10.9.62).

Philippine distribution (endemic) (Map 13B [p. 124]).— Basilan, Bohol, Camiguin Sur, Catanduanes, Cebu, Dinagat, Kalotkot, Leyte, Luzon (Prov.: Albay [southern], Camarines Sur, Sorsogon), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Bukidnon, Cotabato, Davao, Davao del Sur, Lanao del Norte, Lanao del Sur, Misamis Occidental, Maguindanao, Sultan Kudarat, South Cotabato, Zamboange del Norte, Zamboanga de Sur), Polillo, Samar, Siargao, Siquijor. (After van Rooijen and Vogel, 2012:19; details for Mindanao modified from details provided by Leviton [1968], Ferner et al. [2001], Gaulke [2001], David et al. [2006], Sanguila et al. [2016].)

Remarks.— Van Wallach et al. (2014:216) include Camiguin, Dinagat, Kalotkot, Samar, Siquijor, and Surigao in their distribution statement for this species and attribute the distribution to van Roojen and Vogel (2012). Curiously, van Rooijen and Vogel do not include Samar or Kalotkot in their distribution statement for the species on page 19 but do so in the discussion on page 21. Otherwise, no where in their paper do they include Camiguin, Dinagat, Siquijor, and Surigao in their distribution statement for *D. philippinensis* (see van Rooijen and Vogel [2012:19, 21]).

Conservation status [IUCN].— The conservation status of *Dendrelaphis philippinensis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Dryophiops philippina* Boulenger, 1896** **Photo figure 22**

Philippine Keeled-bellied Whip Snake

Dryophiops philippina Boulenger, 1896:195, pl. 9, fig. 2.— Taylor, 1922a:213, pl. 6, figs. 4–6;

1922d:138.— Leviton, 1964c:141.— Brown and Alcala, 1970:114.— Smith, 1993:97.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13.— Gaulke, 2011:279–280, figs. 186–188.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Devan-Song and Brown, 2012:13, fig. 30.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:81, fig. 84.— Wallach, Williams, and Boundy, 2014:246.

Type locality and type specimen(s).— Cape Engaño, Cagayan Prov., Luzon Id. (by subsequent selection by Leviton [1964c:142]). Lectotype: BMNH 1946.1.8.7, designated by Leviton (1964c:142).

Philippine distribution (endemic) (Map 13D [p. 124]).— Luzon (Prov.: Bataan, Batangas, Bulacan, Cagayan, Laguna, Nueva Vizcaya, Rizal, [Subic Bay], Zambales), Marinduque, Mindanao (Prov.: Davao del Sur [Mt. Talomo], Zamboanga del Sur [Zamboanga City]), Mindoro, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan, Antique), Romblon, Sibuyan, Siquijor, (?) Samar.

Conservation status [IUCN].— Vulnerable A4c [2016] ver. 3.1.

***Dryophiops rubescens* (Gray, 1834)**

Indonesian [Malaysian] Keeled-bellied Whip Snake; Red [Brown] Whip Snake

Dipsas rubescens Gray, 1834:pl. 84, fig. 2.
Dryophiops rubescens, Boulenger, 1896:194.— Taylor, 1925:99, 110.— Leviton, 1964b:140.— Wallach, Williams, and Boundy, 2014:246.

Type locality and type specimen(s).— "Malay Peninsula ?" (see Boulenger [1896:194]). Holotype: BMNH 1946.1.9.62.

Philippine distribution (Map 14A [p. 125]).— Coron (Peñon de Coron) (*fide* Taylor [1925:99, 110]).

General distribution (other than Philippines).— Western Indonesia, Western Malaysia, Singapore, Thailand Peninsula.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Subfamily Calamarinae Bonaparte, 1838

***Calamaria bitorques* Peters, 1872** **Photo figure 23**

Banded Reed Snake

Calamaria bitorques Peters, 1872:585.— Taylor, 1922a:185.— Inger and Marx, 1965:104, fig. 27.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189, fig. 28.— Diesmos, Brown, and Gee, 2004:71.— Gaulke and Vogel, 2005:19–23, figs. 2–5.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:74, fig. 78.— Wallach, Williams, and Boundy, 2014:133.
Calamaria cf *bitorques*, Gaulke, 2011:252–253, figs. 165–166.

Type locality and type specimen(s).— Luzon Id., Philippines. Holotype: ZMB 7444.

Philippine distribution (endemic) (Map 5C [p. 116]).— Luzon (Prov.: Aurora, Cagayan, Camarines Sur, Ifugao, Isabela, Kalinga, Nueva Vizcaya, Quezon, Rizal, Sorsogon), Panay (Prov.: Aklan).

Remarks.— A single specimen from Sablayan, Mindoro, in the KU collections is most likely a new species, though closely related to *C. bitorques*.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Calamaria gervaisii Duméril, Bibron, and Duméril, 1854

Remarks.— The *C. gervaisi* group of subspecies is in serious need of review. Three of the nominal taxa conform to biogeographic/faunal regions, notably *C. g. hollandi*, *C. g. iridiscens*, *and C. g. gervaisii*, but the status of *C. g. polillensis* is in doubt.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Calamaria gervaisii gervaisii Duméril, Bibron. and Duméril, 1854 **Photo figure 24**

Northern Philippine Reed Snake; Gervais' Reed Snake

Calamaria gervaisii Duméril, Bibron, and Duméril, 1854a:76.— Jan, 1862:5, 8; 1865, Livr. 10, pl. 2, fig. 1.— Taylor, 1922a:187; 1922d:138; 1923:550.— Marx and Inger, 1955:180 (part).— Wallach, Williams, and Boundy, 2014:134 (part).

Calamaria gervaisi, Müller, 1883:283.— Inger and Marx, 1965:106, fig. 28 (part).— Ross and Gonzales, 1992:64.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189.— Gaulke 2011:254–255, figs 167–168.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 7E.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Oliveros, Ota, Crombie, and Brown, 2011:14.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:74, fig. 79.

Calamaria gervaisii gervaisii, Taylor, 1922a:187.

Calamaria mindorensis Boulenger, 1895:481 (type locality: Mindoro Id.; holotype: BMNH [not confirmed]).

Calamaria tropica Taylor, 1922a:194 (type locality: Naujan, Mindoro Id.; holotype: CAS 62069).

Type locality and type specimen(s).— "Java" (in error), otherwise unrestricted (see Inger and Marx, 1965:107). Syntypes (2): MNHN 7202a–b (formerly 2314 and 7202).

Philippine distribution (endemic) (Map 5D [p. 116]).— Babuyan Ids. (Camiguin Norte), Catanduanes, Luzon (Prov.: Albay, Aurora, Bataan, Benguet, Bulacan, Cagayan, Camarines Norte, Camarines Sur, Carabao, Ilocos Norte, Isabela, Kalinga, Laguna, Manila, Nueva Vizcaya, Rizal, Pampangas), Mindoro (Prov.: Occidental Mindoro), Romblon Id. Group (? Carabao, Tablas).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Calamaria gervaisii hollandi Taylor, 1923

Holland's Reed Snake

Calamaria gervaisii Fischer, 1885:80 (part).— Marx and Inger, 1955:180; 1965:106 (part).— Smith, 1993:97.— David, Pauwels, Lays, and Lenglet, 2006:214.— Beukema, 2011.— Wallach, Williams, and Boundy, 2014:134 (part).— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:89, fig. 64**.**

Calamaria hollandi Taylor, 1923:550.— Marx and Inger, 1955:202.

Type locality and type specimen(s).— Port Holland, Basilan Id., Philippines. Holotype: CAS 60471 (formerly EHT 1255).

Philippine distribution (endemic) (Map 6A [p. 117]).— Basilan, Mindanao (Prov.: Agusan del Norte, Bukidnon, Davao City, Davao del Norte, Lanao, Maguindanao, Misamis Oriental, Zamboanga City).

Conservation status [IUCN].— Only reported as *C. gervaisi,* Least Concern [2016] ver. 3.1.

***Calamaria gervaisii iridescens* Taylor, 1917**
Visayan Reed Snake

Calamaria gervaisii, Günther, 1879:77 (part).— Boulenger, 1894a:338 (part).— Marx and Inger, 1955:180; 1965:106 (part).— Ferner, Brown, Sison, and Kennedy, 2001:52[18].— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown. 2012:456.— Wallach, Williams, and Boundy, 2014:133 (part).— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:167, fig. 31.
Calamaria gervaisii iridescens Taylor, 1917:360; 1922a:188.

Type locality and type specimen(s).— Canlaon Volcano, Negros Occidental Prov., Negros Id., Philippines. Holotype: CM [not confirmed].
Philippine distribution (endemic) (Map 6B [p. 117]).— Cebu, Masbate, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Iloilo), Romblon Id. Group (? Carabao).
Conservation status [IUCN].— Only reported as *C. gervaisi,* Least Concern [2016] ver. 3.1.

***Calamaria gervaisii polillensis* Taylor, 1923**
Polillo Island Reed Snake

Calamaria polillensis Taylor, 1923:549.— Marx and Inger, 1955:205.
Calamaria gervaisi Inger and Marx, 1965:106 (part).

Type locality and type specimen(s).— Polillo Id., Philippines. Holotype: CAS 62455.
Philippine distribution (endemic) (Map 6C [p. 117]).— Polillo.
Remarks.— Whether this nominal taxon deserves recognition as distinct from the neighboring Luzon population of *C. g. gervaisi* is an open question.
Conservation status [IUCN].— Only reported as *C. gervaisi,* Least Concern [2016] ver. 3.1.

***Calamaria joloensis* Taylor, 1922a**
Jolo Island Reed Snake

Calamaria joloensis Taylor, 1922b:203, pl. 7, figs. 2–3.— Inger and Marx, 1965:102.— Wallach, Williams, and Boundy, 2014:136.

Type locality and type specimen(s).— Jolo Id., Sulu Archipelago, Philippines. Holotype: CAS 60901 (formerly EHT 1855).
Philippine distribution (endemic) (Map 6D [p. 117]).— Sulu Archipelago (Jolo).
Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Calamaria lumbricoidea* H. Boie *in* F. Boie, 1827** **Photo figures 25–26**
Variable Reed Snake

Calamaria lumbricoidea H. Boie *in* F. Boie, 1827:540.— Inger and Marx, 1965:75, fig. 20.— David, Pauwels, Lays, and Lenglet, 2006:214.— Beukema, 2011.— Wallach, Williams, and Boundy, 2014:137.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:89, fig. 65.
Calamaria philippinica Steindachner, 1867:514–515, pl. 8, figs. 4–6 (type locality: "Philippinen"; holotype: NMW 23441).

Type locality and type specimen(s).— Java, Indonesia (*fide* Schlegel [1837b:27, pl. 1, figs. 14–16]). Lectotype: RMNH 10543, designated by Inger and Mark (1965:77).
Philippine distribution (Map 7A [p. 118]).— Basilan, Biliran, Bohol, Camiguin Sur, Dinagat, Leyte (Prov.: Leyte, Southern Leyte), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Bukidnon, Cotabato, Davao City, Lanao del Norte, Lanao del Sur, Misamis Occidental, Misimas Oriental, Sarangani, South Cotabato, Surigao del Sur, Zamboanga del

Norte, Zamboanga City). (Partly after David, Pauwels, Lays, and Lenglet, 2006:214; for northeastern Mindanao, Sanguila et al., 2016.)

General distribution (other than Philippines).— Malaysia (West Malaysia; Sabah and Sarawak [Borneo]); Indonesia (Borneo, Java, Mentawai Archipelago, Natunas Ids., Nias, Sumatra); Singapore, Thailand. (After David, Pauwels, Lays, and Lenglet [2006:214].)

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Calamaria palavanensis Inger and Marx, 1965

Palawan Reed Snake; Palawan Worm Snake

Calamaria everetti, (part) Boulenger, 1894:340.— Griffin, 1909c:599; 1911:262.— Taylor, 1922a:191, fig. 17.

Calamaria palavanensis Inger and Marx, 1965:134, fig. 35.

Type locality and type specimen(s).— Palawan Id., Philippines. Holotype: CAS 62151.

Philippine distribution (endemic) (Map 7B [p. 118]).— Palawan.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Calamaria suluensis Taylor, 1922d

Sulu Reed Snake; Yellow-bellied Reed Snake

Calamaria suluensis Taylor, 1922d:189.— Inger and Marx, 1965:123, fig. 31.— Wallach, Williams, and Boundy, 2014:140.

Type locality and type specimen(s).— Deramakot, North Borneo (based on neotype selection). Holotype in Bureau of Science, Manila, lost during WWII; Neotype: FMNH (formerly CNHM) 76294, designated by Inger and Marx (1965:123); neotype from locality in North Borneo that is 180 km from original type locality of Cagayan Sulu in the Philippines.

Philippine distribution (Map 7C [p. 118]).— Cagayan Sulu.

General distribution (other than Philippines).— northern Borneo.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Calamaria virgulata H. Boie *in* F. Boie, 1827

Short-tailed Reed Snake

Calamaria virgulata H. Boie *in* F. Boie, 1827:540.— Inger and Marx, 1965:186.— Wallach, Williams, and Boundy, 2014:140.

Calamaria mearnsi Stejneger, 1907b:30 (type locality Tangob, Mindanao Id.). Taylor, 1922a:193.

Calamaria zamboangensis Leviton, 1952:239, fig. 1 (type locality: Zamboanga, Mindanao Id.; holotype: CAS-SU 13476).

Type locality and type specimen(s).— Java, Indonesia but emended to Tjihandjawar, western Java, by Brongersma (1950) (see Wallach et al. [2014:140], for additional details). Holotype: RMNH 39.

Philippine distribution.— Mindanao [see Remarks below], Palawan, Sulu Archipelago.

General distribution (other than Philippines) (Map 7D [p. 118]).— western Indonesia, East Malaysia (Sabah). (See Inger and Marx [1965:186], alsoWallach et al. [2014:140], for details.)

Remarks.— The Mindanao records for *C. virgulata* (see above, Inger and Marx, 1965, and Wallach et al., 2014) most probably should be referred to *C. lumbricoidea* [*q.v.*].

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Pseudorabdion ater* (Taylor, 1922b)** **Photo figure 27**

Zamboanga Burrowing Snake

Typhlogeophis ater Taylor, 1922b:202, pl. 7, figs. 6–7.

Pseudorabdion ater, Leviton and Brown (WC), 1959:486.— Alcala, 1986:156.— Wallach, Williams, and Boundy, 2014:595.

Type locality and type specimen(s).— "Pasananka" [= Pasonanca], Zamboanga del Sur [Zamboanga City] Prov., Mindanao Id., Philippines. Holotype: CAS 62043 (formerly EHT 1103).

Philippine distribution (endemic) (Map 30C [p. 141]).— Mindanao (Prov.: Zamboanga del Sur [Zamboanga City] [Pasonanca]).

Remarks.— Taylor placed this species in *Typhlogeophis* without explanation. He apparently did not compare it with specimens of Philippine *Pseudorabdion.*

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Pseudorabdion longiceps* (Cantor, 1847)**

Cantor's Dwarf Reed Snake

Calamaria longiceps Cantor, 1847:910, pl. 40, fig. 1.

Oxycalamus longiceps, Günther, 1864:199 (redescription of type specimen).

Pseudorhabdion longiceps, Boulenger, 1885:389; 1894:329 (Nias Island).— Boettger, 1891:107 (Sumatra [Deli]).— Boulenger, 1903:175 (listed).— Bourret, 1936:266, fig. 105.— Haas, 1950:562.— Tweedie, 1953:51, 122, 129, fig. 12a–b; 1957:53, 126, 133, fig. 13a–b.— Leviton and Brown (WC), 1959:481, figs. 1–2 (see for extended synonymy).

Pseudorhabdium longiceps, Boulenger, 1894:329.— Griffin, 1911:261 (Luzon Island [after Peters, 1861; probably in error]).— Boulenger, 1912:154 (Philippine Islands [probably in error]).— de Rooij, 1917:146, text-fig. 61 (Philippine Islands [probably in error]).— Taylor, 1922a:178 (distribution compiled; description quoted from Boulenger, 1894).

Pseudorahbdion [*sic*] *longiceps*, Smith, 1930:57.

Rabdion torquatum Duméril, 1853:441 (*nomen nudum*). Duméril, Bibron, and Duméril, 1854:119 (type locality: Macassar; type in MNHN).— Casto de Elera, 1895:426 (various Philippine localities listed, but source of data unknown).

Pseudorabdion torquatum, Jan, 1862:10; 1863:30; 1865, Livr. 10, pl. 3, fig. 3.

Rhabdion torquatum, Peters, 1861:684.— Boettger, 1886:106.

Type locality and type specimen(s).— Pinang, Malay Peninsula. Holotype: BMNH 1946.1.2.13.

Philippine distribution.— Frequently listed but supposed records unverified.

General distribution (other than Philippines).— Indonesia: Borneo (Kuching, Penrissen Road, Pontianak, Sebruang Valley, Simanggang); Celebes (Macassar); Nias; Sumatra (Ajerbangis, Deli, Gunung, Indragiri, Langkat, Oberlangkat, Sahilan, Sing-karah, Tebing Tinggi). Malaya: (Bangnara, Fraser's Hill, Johore, Pa-hang [Gunong Tahan], Perak, Pinang, Selangor, Singapore, Wellesley Province). Riou Archipelago: Pulu Galang. Thailand: (Ban Gnara, Patani).

Remarks.— This is the most widely distributed species of *Pseudorabdion.* It differs from the other species in possessing a preocular scale. In other characters, *P. longiceps* agrees most closely with *P. oxycephalum* and *P. ater.*

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Pseudorabdion mcnamarae* Taylor, 1917b**
McNamara's Dwarf Reed Snake; McNamara's Burrowing Snake

Pseudorhabdium mcnamarae Taylor, 1917:363, text-fig. 2a–e; 1922a:180, text-fig. 15a–c (redescription of type); 1922b:201 (suggests relationship to *P. minutum*).

Pseudorhabdium minutum Taylor, 1922b:200, pl. 7, figs. 4–5 (type locality: Balbalan, Kalinga Subprov., Luzon Id.; holotype: CAS 61544 [formerly Taylor F772]).

Pseudorabdion mcnamarae, Leviton and Brown (WC), 1959:498, fig. 8.— Ferner, Brown, Sison, and Kennedy, 2001:53[20], fig. 50.— Gaulke, 2001:29, fig. 8; 2011:307–308, figs. 208–209.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Wallach, Williams, and Boundy, 2014:596.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Type locality and type specimen(s).— Canlaon Volcano, Negros Id., Philippines. Holotype: CM 2606.

Philippine distribution (endemic) (Map 30D [p. 141]).— Biliran, Cebu, Luzon (Prov.: Isabela), Masbate, Negros (Prov.: Nagros Occidental), Panay (Prov.: Aklan, Antique), Sibuyan, Tablas.

Remarks.— In possessing a lori-ocular scale this species agrees with the Bornean and Celebesian species formerly placed in the genus *Agrophis*. In other characters *P. mcnamarae* approaches *P. oxycephalum*. *Pseudorabdion taylori* from Mindanao is related to *P. mcnamarae*.

Pseudorabdion cf. *mcnamarae* has been reported from Luzon (Prov.: Isabela) by Brown (2013:84, fig. 91), but the authors also suggest that the West Visayan and Luzon populations are likely distinct species (Brown et al., 2013:84–85).

Conservation status [IUCN].— Vulnerable B2ab(ii,iii) [2016] ver. 3.1.

***Pseudorabdion montanum* Leviton and Brown (WC), 1959**
Mountain Burrowing Snake; Mountain Reed Snake

Pseudorabdion montanum Leviton and Brown, 1959:491, figs. 5–6.— Wallach, Williams, and Boundy, 2014:596.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:167.

Type locality and type specimen(s).— north side of north peak of Cuernos de Negros, Negros Oriental Prov., Negros Id., Philippines. Holotype: CAS-SU 21080.

Philippine distribution (endemic) (Map 31A [p. 142]).— Cebu, Negros (Cuernos de Negros).

Conservation status [IUCN].— Endangered B1ab(iii)+2ab(iii) [2016] ver. 3.1.

***Pseudorabdion oxycephalum* (Günther, 1858)**
Gunther's Dwarf Reed Snake; Negros Light-scaled Burrowing Snake

Rhabdosoma oxycephalum Günther, 1858:242.

Oxycalamus oxycephalus, Günther, 1873:168, figs.— Boettger, 1886:105.— Casto de Elera, 1895:425.

Pseudorhabdium oxycephalum, Boulenger, 1894:329.— Griffin, 1911:262.— Taylor, 1917:364; 1922a:179, fig. 14 (description after Boulenger, figs. after Günther [not Boulenger as stated]).

Typhlogeophis brevis Günther, 1879:77 (type locality: Mindanao or Dinagat Island; type BMNH [not confirmed]).— Boettger, 1886:106.— Boulenger, 1894:351, pl. 20.— Griffin, 1911:262.— Taylor, 1922a:183, text-fig. 16, pl. 24, figs. 1–4 (description and figs. after Boulenger); 1922b:202 (comparison with *T. ater*); 1928:236.

Typhlogeophus brevis, Casto de Elera, 1895:425 (listed).

Pseudorabdion oxycephalum, Leviton and Brown (WC), 1959:487, figs. 3–4.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:190, fig. 32.— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Gaulke, 2011:309–310, fig. 210.— Wallach, Williams, and Boundy, 2014:596.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169, fig. 32.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Philippines. Holotype: BMNH 1946.1.1.99.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 31b [p. 142]).— Cebu, Masbate, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan). Localities needing confirmation include: Calamianes Ids., Luzon (Prov.: Aurora, Bataan, Nucva Ecija), Mindanao or Dinagat Ids.

REMARKS.— This small, distinctive species of *Pseudorabdion*, once thought to be rare, has been found with increasing frequency on Negros Island. The species has been reported from other islands, Luzon (Casto de Elera [1895]), Mindanao or Dinagat (type of *Typhlogeophis brevis* Günther), and the Calamianes (specimen in the collection of CAS), but these records need confirmation.

Also, see Leviton and Brown (1959:487 *et seq.*) for a discusion of the status of *Typhlogeophis brevis* Günther, which was based on a single specimen said to have come from Mindanao or Dinagat islands, and was distinguished from *P. oxycephalum* in having its eyes "hidden" beneath the ocular scale.

Pseudorabdion oxycephalum, endemic to the Philippine Islands, does not appear to be close to Sulawesian or Bornean species. Indeed, its closest relative, *P. montanum,* is at present known only from the highlands on Negros Island.

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

***Pseudorabdion talonuran* Brown (RM), Leviton, and Sison, 1999**

Panay Cloud Forest Dwarf Reedsnake

Pseudorabdion talonuran Brown, Leviton, and Sison, 1999:7, figs.1 (map), 2–3, 4 (habitat).— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Gaulke, 2011:311–312.— Wallach, Williams, and Boundy, 2014:597.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Mt. Madja-as, Barangay Allojipan, Culasi Municipality, Antique Prov., Panay Id., Philippines. Holotype: PNM 2712.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 31C [p. 142]).— Panay (Prov.: Antique [Barangay Allojipan, Munic. Culasi]).

REMARKS.— *Pseudorabdion* cf. *talonuran*, Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos (2013:86), from Isabela Prov., Luzon, may represent a distinct species.

CONSERVATION STATUS [IUCN].— Vulnerable D2 [2016] ver. 3.1.

***Pseudorabdion taylori* Leviton and Brown (WC), 1959**

Taylor's Dwarf Reed Snake; Taylor's Burrowing Snake

Pseudorabdion taylori Leviton and Brown, 1959:502, figs. 9–10.— Wallach, Williams, and Boundy, 2014:597.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Saub, Cotabato Prov., Mindanao Id., Philippines. Holotype: MCZ 25749.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 31D [p. 142]).— Mindanao (Prov.: Cotabato [Saub], Davao del Sur).

CONSERVATION STATUS [IUCN].— Data Deficient [2016] ver. 3.1.

Subfamily Colubrinae Oppell, 1811

***Boiga angulata* (Peters, 1861)** **Photo figure 28**

Philippine Blunt-headed Tree Snake

Dipsas (*Dipsadomorphus*) *angulata* Peters, 1861:688.

Boiga angulata, Griffin, 1910:213; 1911:263.— Taylor, 1922a:204, pl. 26, figs. 1–3, pl. 27.— Leviton, 1970a:295.— Ross and Gonzales, 1992:64.— Wallach, Williams, and Boundy, 2014:99.

Boiga cf. *angulata*, Gaulke, 2001:23, figs. 1a–b; 2011:240–241, figs. 157–158.

Type locality and type specimen(s).— Leyte Id., Philippines (restricted to "NE shore of Leyte Is. between Tacloban (11°5′N, 125°00′E) and Dulag (10°57′N, 125°02′E)," by Wallach et al. [2014:99]). Holotype: ZMB 4000.

Philippine distribution (endemic) (Map 3C [p. 114]).— Bohol, Catanduanes, Leyte, Luzon (Prov.: Laguna, Sorsogon, Zambales), Mindanao (Prov.: Bukidnon, North Cotabato, Davao del Sur, Lanao, Zamboanga City), Negros, Panay (Prov.: Alkan, Antique), Panay (Prov.: Antique), Polillo.

Remarks.— According to Taylor (1923:553), *Boiga angulata*, also *B. schultzei*, are related to *B. drapiezii* (see Leviton [1970a:310–311]; also RM Brown, unpublished data). Jeffrey Weinell (2017, pers. comm.) suggested that the following citations for *Boiga angulata* are in error inasmuch as the associated images are of *B. cynodon* (Ferner, Brown, Sison, and Kennedy [2001:51{18}]; Devan-Song and Brown [2012:12, fig. 25]).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Boiga cynodon* (H. Boie *in* F. Boie, 1827)** **Photo figure 29**

Dog-toothed Cat Snake

Dipsas cynodon H. Boie *in* F. Boie, 1827:549.

Boiga cynodon, Taylor, 1922a:206; 1922d:139; 1923:553.— Leviton, 1970a:299.— Smith, 1993:96.— Gaulke, 1994b:137; 1996:49; 2001:26, fig. 2; 2011:243–245, figs. 159–161.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Oliveros, Ota, Crombie, and Brown, 2011:13, figs. 6C, 6D.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190, fig. 30.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:74, fig. 75.— Wallach, Williams, and Boundy, 2014:100.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:89.— Supsup, Guinto, Redoblado, and Somez, 2017:7, fig. 5c.

Boiga cf. *cynodon*, Ferner, Brown, Sison, and Kennedy, 2001:51[18].

Type locality and type specimen(s).— Sumatra, Indonesia (in error); corrected to Java, Indonesia (see Wallach et al. [2014:100]). Holotype: RMNH 974 (see remarks in Wallach et al. [2014:100] in re: recognition of holotype specimen).

Philippine distribution (Map 3D [p. 114]).— Babuyan Ids. (Calayan, Camiguin Norte), Basilan, Bohol, Carabao, Culion, Dinagat, Inampulugan, Lubang, Leyte, Luzon (Prov.: Aurora, Cagayan, Ilocos Norte, Isabela, Laguna, Nueva Ecija, Quezon, Sorsogon), Mindanao (Prov.: Agusan del Sur, Cotabato, Davao Oriental, NE Mindanao, Zamboanga City), Negros (Prov.: Negros Occidental), Paan de Azucar, Palawan, Panay (Prov.: Alkan, Antique), Polillo, Romblon, Siquijor, Sulu Archipelago (Sibutu, Tawi-Tawi), Tablas.

General distribution (other than Philippines).— Indonesia (Sumatra), Malaysia (West and Borneo), Singapore, Camboidia, Thailand, Myanmar, eastern India.

Remarks.— Ferner et al. (2001:51[18]) report the discovery of this species, the first for the

Visayan Island group, but they pose that the identification remains to be firmly established. See also Remarks for *Boiga angulata* (above).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Boiga dendrophila divergens* Taylor, 1922a** **Photo figure 30**

Northern Philippine Mangrove Snake

Boiga dendrophilia divergens Taylor, 1922a:201; 1922c:299; 1922d:139.— Leviton, 1970a:305.— Gaulke, Demegillo, and Vogel, 2005:5 *et seq*., figs. 4–5.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 7D.— Oliveros, Ota, Crombie, and Brown, 2011:14, fig. 7A.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190, fig. 31.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:74, fig. 76.

Type locality and type specimen(s).— Mt. Makiling, Laguna Prov., Luzon Id., Philippines. Holotype: CM 2143.

Philippine distribution (endemic (Map 4A [p. 115]**)**.— Babuyan Ids. (Calayan), Luzon (Prov.: Aurora, Bulacan, Cagayan, Camarines Norte, Camarines Sur, Laguna, Nueva Ecija, Quezon, Sorsogon, Rizal), Polillo.

Conservation status [IUCN].— The conservation status of *Boiga dendrophilia divergens* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Boiga dendrophila latifasciata* (Boulenger, 1896)** **Photo figures 31–32**

Southern Philippine Mangrove Snake

Dipsadomorphus dendrophilus latifasciatus Boulenger, 1896:71.

Boiga dendrophilia latifasciata, Taylor, 1922a:198.— Brongersma, 1934:218, pl. 1, figs. 6, 8, 10, pl. 2, figs. 10, 12.— Leviton, 1970a:307.— Smith, 1993:96.— Gaulke, Demegillo, and Vogel, 2005:5 *et seq*., figs. 6–7.

Type locality and type specimen(s).— Syntypes from Butuan, Agusan del Norte Prov. and Zamboanga del Sur [Zamboanga City] Prov., Mindanao Id., Philippines. Syntypes: BMNH (not confirmed).

Philippine distribution (endemic) (Map 4B [p. 115]).— Dinagat (?), Leyte, Mindanao (Prov.: Agusan del Sur, Bukidnon, Davao del Sur, Zamboanga del Sur [Zamboanga City]), Samar, Siargao.

Conservation status [IUCN].— The conservation status of *Boiga dendrophilia latifasciata* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Boiga dendrophila levitoni* Gaulke, Demegillo, and Vogel, 2005** **Photo figure 33**

Leviton's Mangrove Snake; Panay Mangrove Snake

Boiga dendrophila levitoni Gaulke, Demegillo, and Vogel, 2005:8, figs. 1–3.— Gaulke, 2011:246–249, figs. 162–164.

Boiga cf. *dendrophila*, Ferner, Brown, Sison, and Kennedy, 2001:51[18].

Type locality and type specimen(s).— Sitio Batiw, Barangay Badiangan, Municipality of Pandan, Antique Prov., Panay Id., Philippines. Holotype: PNM 7940.

Philippine distribution (endemic) (Map 4C [p. 115]).— Panay (Prov.: Antique, Iloilo [Gigantes Norte Id.] and probably other islands of the West Visayas region).

Conservation status [IUCN].— The conservation status of *Boiga dendrophilia levitoni* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Boiga dendrophila multicincta* (Boulenger, 1896)** **Photo figure 34**
Palawan Mangrove Snake

Dipsadomorphus dendrophilus multicinctus Boulenger, 1896:71.
Boiga dendrophilia multicincta, Taylor, 1922a:200, pl. 25, pl. 26, figs. 4–6.— Brongersma, 1934:216.— Leviton, 1970a:309.— Minton and Dunson, 1978:107.— Gaulke, Demegillo, and Vogel, 2005:5 *et seq*., figs. 8–9.— Dolorosa, 2014:39, fig. 1.

Type locality and type specimen(s).— restricted to Puerto Princesa, Palawan Id., Philippines by Brongersma (1934:216). Holotype: BMNH (not confirmed).

Philippine distribution (endemic) (Map 4D [p. 115]).— Balabac, Palawan.

Remarks.— For comments on illegal trading in this and other Palawan snakes as well as habitat distruction, see Dolorosa (2014), also Mendizabal (2011) and Ramirez (2012).

Conservation status [IUCN].— The conservation status of *Boiga dendrophilia multicincta* has not been assessed for the IUCN Red List [2016] ver. 3.1.

***Boiga drapiezii* ssp. (H. Boie *in* F. Boie, 1827)**
White-spotted Cat Snake

Dipsas drapiezii H. Boie *in* F. Boie, 1827:549.
Boiga drapiezii, Wallach, Williams, and Boundy, 2014:101.— Binaday and Lobos, 2016:425
Boiga drapiezii drapiezii, Gaulke, 1994b:137.

Type locality and type specimen(s).— Java, Indonesia (see Wallach et al. [2014:101], for restrictions of type locality). Holotype: RMNH 1006.

Philippine distribution.— Luzon (Prov.: Laguna, Quezon, Sorsogon), Mindanao (Prov.: Zamboanga del Sur [Zamboanga City]), Sulu Archipelago (Tawi-Tawi).

General distribution (other than Philippines).— (widely distributed according to Vogel [2015:7]) Thailand, Malaysia (West Malaysia and Borneo), Singapore, Indonesia (Java, Mentawai Ids., Sumatra, Naturna Ids., Borneo); Myanmar (*fide* Lee et al. [2015]).

Remarks.— As noted above under *Boiga angulata*, both *B. angulata* and *B. schultzei* are likely color variants of *B. drapiezii* (see early comments by Taylor [1923:553], also Leviton, [1970a:310–311]).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Boiga philippina* (Peters, 1867)** **Photo figure 35**
Luzon Cat Snake

Dipsas philippina W. Peters, 1867:27.
Dipsadomorphus philippinus, Boulenger, 1896:77.
Boiga philippina, Griffin, 1911:263.— Taylor, 1922a:206.— Leviton, 1970a:312.— Oliveros, Ota, Crombie, and Brown, 2011:14, fig. 7B.— Devan-Song and Brown, 2012:12, fig. 26.— Brown, Siler, Oliveros, Welton, Rock, Swab, van Weerd, van Beijnen, Rodriguez, Jose, and Diesmos, 2013:74, fig. 77.— Wallach, Williams, and Boundy, 2014:104.

Type locality and type specimen(s).— Ylaces (= Ilocos Prov.), Luzon Id., Philippines. Holotype: NMW 23401.

Philippine distribution (endemic) (Map 5A [p. 116]).— Babuyan Ids. (Babuyan Claro), Luzon (Prov.: Cagayan, Camarines Sur, Isabela, Ilocos, Laguna, Zambales).

Remarks.— Although Leviton (1970:312) speculated that this species could be conspecific with *B. angulata*, recent phylogenetic studies (J. Weinell, pers. obser.) seem to rule out the possibilty of a close relationship between the two species. Furthermore, although Vogel

(2015:13) suggested that *B. philippina* belongs to the *B. drapiezii* complex, his comments do not appear to be based on any new accompanying data.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1. The confusion surrounding the identity and distribution of this species suggests it should be classified as "Data Defficient" until field and taxonomic studies clarify its staus.

***Boiga schultzei* Taylor, 1923** **Photo figure 36**

Schultze's Blunt-headed Tree Snake

Boiga schultzei Taylor, 1923:552, pl. 3, fig. 3.— Leviton, 1970a:310.
Boiga drapiezii schultzei, Gaulke, 1994b:138.

Type locality and type specimen(s).— Palawan Id., Philippines. Holotype: MCZ 25791.

Philippine distribution (endemic) (Map 5B [p. 116]).— Palawan.

Remarks.— Related to and possibly conspecific with *Boiga drapiezii* (Taylor [1923:553]; see also Leviton [1970a:310–311], and RMB, unpublished data). See Remarks above for *Boiga angulata*.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Coelognathus erythrurus erythrurus* (Duméril, Bibron, and Duméril, 1854a) Photo figure 37**

Southern Philippine Rat Snake

Plagiodon erythrurus Duméril, Bibron, and Duméril, 1854:175.
Spilotes melanurus, Günther, 1879:78 (Leyte).
Compsosoma melanurum var. *manillensis*, Müller, 1883:285 (Mindanao).
Compsosoma melanurum var. *erythrurum*, Fischer, 1885:80, 101 (süd-Mindanao).— Boettger, 1886:108 (part: Leyte, Samar, Mindanao).
Coluber erythrurus, Boulenger, 1894:62 (part: northern Leyte).— Boettger, 1895:3, 5 (part: Leyte, Mindanao, Samar, Sulu [= Jolo]); 1898:54 (part: Samar).
Elaphe erythrura, Griffin, 1911:260 (part: northern Leyte, Samar).— Taylor, 1918a:260 (Bongao); 1922a:156 (part: Mindanao).— Leviton, 1979:108.
Elaphe erythrura erythrura, Smith, 1993:97.— Gaulke, 1994b:140 (part).
Coelognathus erythrurus, Helfenberger 2001:52.— Wallach, Williams, and Boundy, 2014:169 (part).
Coelognathus erythrura erythrura, David, Pauwels, Lays, and Lenglet, 2006:215.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:92.

Type locality and type specimen(s).— Java (in error), corrected to Samar Id., Philippines (see Leviton [1979:108, 110]). Lectotype: MNHN 7224, designated by Leviton [1979:103]).

Philippine distribution (Map 10A [p. 121]).— Basilan, Bohol, Camiguin Sur, Camotes Ids. (Pacijan, Poro), Dinagat, Leyte (Prov.: Leyte), Mindanao (Prov.: Agusan del Sur, Bukidnon, South Cotabato, Davao, Maguindanao, Misamis Occidental, Sarangani, Zamboanga City), Samar (Prov.: Eastern Samar), Sulu Archipelago (Bongao, Jolo, Siasi). (See summary in David, Pauwels, Lays, and Lenglet [2006:215] [in part].)

General distribution (other than Philippines).— Indonesia (Sulawesi, Butung) (see Remarks below).

Remarks.— Leviton (1979:109) noted that specimens he had seen from Leyte, Samar, and eastern Mindanao appeared to have a more variegated mottled pattern on the tail than specimens he had seen from the Zamboanga Peninsula and the Sulu Archipelago, but because of the small sample size, he could not be sure how variable this might be. However, he

also observed that in view of the differences seen among populations of other snakes inhabiting both eastern and western Mindanao (e.g., *Cyclocorus nuchalis* and *Rhabdophis auriculara*), and given the island's past Pleistocene geological history, future investigations may indeed justify recognition of two taxa.

The population inhabiting the Indonesian islands of Sulawesi and Butung may represent a distinct subspecies, *E. e. celebensis*.

Conservation status [IUCN].— The conservation status of *Coelognathus erythrurus erythrurus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Coelognathus erythrurus manillensis* (Jan, 1863)** **Photo figure 38**

Northern Philippine Rat Snake

Compsosoma melanurus, Duméril, Bibron, and Duméril, 1854:301 (part: var. C ["varieté de Manille"]).

Elaphis melanurus manillensis Jan, 1863:61 (based on Duméril, Bibron, and Duméril, 1854:301); 1867:Livr. 21, pl. 4, fig. 2.

Coluber erythrurus, Boulenger, 1894:62 (part: Luzon).— Boettger, 1895:3, 5 (part: Luzon); 1898: 54 (Luzon).

Elaphe erythrura, Taylor, 1922a:156 (part: Luzon, Polillo); 1922b:138 (Luzon); 1922d:138.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13.

Elaphe erythrura erythrura, Leviton, 1963c:390, 395, 403 (Luzon, Mindoro, Polillo).

Elaphe erythrura manillensis, Leviton, 1979:110.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189.

Coelognathus erythrurus, Wallach, Williams, and Boundy, 2014:169 (part).

Coelognathus erythrurus manillensis, McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Devan-Song and Brown, 2012:12.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:78, fig. 80.

Coelognathus erythrura manillensis, Oliveros, Ota, Crombie, and Brown, 2011:14.

Type locality and type specimen(s).— "Manille". Type based on Duméril, Bibron, and Duméril (1854:301); MNHN (not confirmed).

Philippine distribution (endemic) (Map 10Bb [p. 121]).— Batanes Ids. (Batan), Babuyan Ids. (Barit, Calayan, Dalupiri), Luzon (Prov.: Albay, Aurora, Benguet, Bulacan, Cagayan, Camarines Sur, Cavite, Ifuago, Ilocos Norte, Isabela, Laguna, Manila, Nueva Vizcaya, Quezon, Pampanga, Sorsogon, Zambales), Mindoro (Prov.: Occidental Mindoro), Polillo.

Remarks.— Reported from Catanduanes Id., off the southeast coast of Luzon (see *Elaphe erythrura*, Ross and Gonzales [1992:66], who ascribe color pattern features as most like those of *C. e. psephenourus* of the Visayan Island group). It may well be that the Polillo, southern Luzon, Cantaduanes populations represent a distinct taxon.

Recent observations (and specimens in Kansas University [KU] collections) demonstrate that the "psephenoura-like" phenotype maybe widespread on Bicol Peninsula as well (recent KU specimens from Sorsogon Prov.).

Conservation status [IUCN].— The conservation status of *Coelognathus erythrurus manillensis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Coelognathus erythrurus psephenourus* (Leviton, 1979)** **Photo figure 39**
Western Visayan Rat Snake

Coluber erythrurus, Boulenger, 1894:62 (part: Negros).— Boettger, 1895:3, 5 (part: Negros).
Elaphe erythrura, Griffin, 1911:260 (Negros).— Taylor, 1917:359 (Negros); 1922a:156 (part: Negros).
Elaphe eruthrura erythrura, Leviton, 1963c:384, 298, 402 (part: Cebu, Negros, Panay).
Elaphe erythrura psephenoura Leviton, 1979:111.— Gaulke and Altenbach, 1994:63.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Gaulke, 2001:32; 2011:264–265, figs. 177, 187.
Coelognathus erythrura, Bucol, Alcala, Averia, Alcala, and Alcala, 2011:111.
Coelognathus erythrurus, Wallach, Williams, and Boundy, 2014:169 (part).
Coelognathus erythrurus psephenoura, Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:168, fig. 26.

Type locality and type specimen(s).— Barrio Asia, Negros Occidental Prov., Negros Id., Philippines. Holotype: CAS 110957.

Philippine distribution (endemic) (Map 10C [p. 121]).— Cebu, Guimaras, Inampulugan, Masbate, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan, Antique, Capiz, Iloilo), Siquijor, Tablas.

Remarks.— See Remarks under *Coelognathus erythrurus manillensis* regarding possible presence of this subspecies throughout the Quezon-Bicol Faunal subregion (Catanduanes and Polilllo Ids., and the Bicol Peninsula of Luzon).

Conservation status [IUCN].— The conservation status of *Coelognathus erythrurus psephenourus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Coelognathus philippinus* (Griffin, 1909a)**
Palawan Rat Snake

Coluber erythrurus, Boettger, 1895:3, 5 (Calamian Ids.); 1898:54 (part: Culion).
Elaphe erythrura, Griffin, 1909:597 (Palawan).
Elaphe philippina Griffin, 1909:597; 1911:260 (Palawan).— Taylor, 1922a:159 (part: Balabac, Busuanga, Palawan [Iwahig, Taytay]).
Elaphe erythrura philippina, Leviton, 1963c:382, 385 (Busuanga, Culion, Palawan); 1979:113.— Gaulke, 1994b:140; 1996:50, fig. 3; 1999:278.
Coelognathus philippinus, Helfenberger 2001:52.— Wallach, Williams, and Boundy, 2014:170.

Type locality and type specimen(s).— Iwahig, Palawan Id., Philippines. Lectotype: CAS 62143, designated by Leviton (1979:114).

Philippine distribution (endemic) (Map 10D [p. 121]).— Palawan Archipelago (Balabac, Busuanga, Calamian Ids. [Calauit], Culion, Palawan), Sulu Archipelago (Bongao, Sanga-Sanga, Sibutu, Tawi-Tawi).

Remarks.— For a long time, this species was considered a subspecies of *Coelognathus* (formerly *Elaphe*) *erythrurus* but more recently Helfenberger (2001) demonstrated its distinctness from *C. erythrurus* that justifies its recognition as a separate and only distantly related species.

Conservation status [IUCN].— The conservation status of *Coelognathus philippinus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Dryocalamus philippinus* Griffin, 1909a**
Philippine Bridal Snake

Dryocalamus philippinus Griffin, 1909b:596.— Taylor, 1922a:123, pl. 10, fig. 2, pl. 11, figs. 1, 3.— Wallach, Williams, and Boundy, 2014:248.

Type locality and type specimen(s).— Iwahig, Palawan Id., Philippines. Neotype: CAS 62174, "designated by Leviton herein" (stated designation by Leviton, courtesy of Wallach et al. [2014:245]).

Philippine distribution (endemic) (Map 13C [p. 124]).— Balabac, Palawan (Iwahig, Puerto Princesa).

Remarks.— Leviton (1959:262) expressed his opinion that *D. philippinus* and *D. tristrigatus* were conspecific. Wallach et al. (2014:245) cited Leviton but the question of conspecificity remains unresolved.

Conservation status [IUCN].— Vulnerable A4c [2016] ver. 3.1.

***Gonyosoma oxycephalum* (Reinwardt *in* F. Boie, 1827)** **Photo figures 40–41**
Red-tailed Racer; Red-tailed Green Ratsnake

Coluber oxycephalus Reinwardt *in* F. Boie, 1827:537.

Gonyosoma oxycephalum, Taylor, 1922d:138.— Gaulke, 2011:281–282, figs. 189–191.— Oliveros, Ota, Crombie, and Brown, 2011:14.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Devan-Song and Brown, 2012:13, fig. 31.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:81, fig. 85.— Wallach, Williams, and Boundy, 2014:310.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:94, fig. 67.— Supsup, Guinto, Redoblado, and Somez. 2017:9, fig. 5c.

Gonyosoma oxycephala, Gaulke, 1994b:140.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13, fig. 14.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].

Type locality and type specimen(s).— Java, Indonesia. Holotype: MNHN 677.

Philippine distribution (Map 15B [p. 126]).— Babuyan Ids. (Calayan, Camiguin Norte), Balabac, Batan, Bohol, Dinagat, Leyte, Lubang, Luzon (Prov.: Aurora, Ilocos Norte, Isabela, Laguna, Nueva Vizcaya, Quezon, Sorsogon, Zambales), Marinduque, Mindanao (Prov.: Agusan del Sur, Davao Oriental, South Cotabato, Surigao del Sur, Zamboanga City), Negros, Palawan, Panay (Prov.: Aklan, Antique, Iloilo), Sabtang, Sibuyan, Sulu Archipelago (Bongao).

General distribution (other than Philippines).— Southeast Asia (Andaman Ids., Myanmar, Thailand, Cambodia, Laos, Vietnam, Malaysia, western Indonesia).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Liopeltis philippinus* (Boettger, 1897)**
Philippine Smooth [Reed] Snake

Ablabes philippinus Boettger, 1897:164.— Griffin, 1911:261.

Liopeltis philippinus, Taylor, 1922a:164, pl. 20.— Leviton, 1964a:370.— Mertens, 1967:90.— Gaulke, 1999:278.— Wallach, Williams, and Boundy, 2014:377.

Type locality and type specimen(s).— Culion (restricted by Leviton [1964a:370]; see also Mertens [1967:90]). Lectotype: SMF 19318 (*fide* Mertens [1967:90]; selected from suite of three Syntypes: SMF 8281, 8282 a–b).

Philippine distribution (endemic) (Map 20C [p. 131]).— Busuanga, Calamian Ids. (Calauit),

Culion, Palawan. (Boettger also lists Samar but both Leviton (*op cit.*) and Mertens (*op. cit.*) question this reference.)

Conservation status [IUCN].— The conservation status of *Liopeltis philippinus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Liopeltis tricolor* (Schlegel, 1837)**

Schlegel's Smooth Snake; Malayan Reed Snake; Tricolored Ringsnake

Herpetodryas tricolor Schlegel, 1837b:187, pl. 6, figs. 16–18.
Liopeltis tricolor, Cope, 1860:559.— Taylor, 1922a:162, pl. 11, figs. 3–5, pl. 19.— Leviton, 1964a:372.— Wallach, Williams, and Boundy, 2014:378.
Ablabes tricolor, Boulenger, 1894a:281.— Griffin, 1909:599; 1911:201.— Taylor, 1918a:260.

Type locality and type specimen(s).— Java, Indonesia. Syntypes (3): RMNH 492, 671, 679.

Philippine distribution.— Palawan, Sulu Archipelago (Bubuan).

General distribution (other than Philippines) (Map 20D [p. 131]).— Western Indonesia, Malaysia (Peninsula; Sarawak), Singapore, southern Thailand, southern Cambodia (see Wallach, Williams, and Boundy [2014:378], for details).

Remarks.— See Leviton (1963:372) for additional Philippine synonymy references. See also comments by David and Vogel (1996:93) and a good photo in Stuebing and Inger (1999:158).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Lycodon alcalai* Ota and Ross, 1994** **Photo figures 42–43**

Alcala's Wolf Snake

Lycodon alcalai Ota and Ross, 1994:159–162, figs. 2–5.— Lanza, 1999:89, 98.— Siler, Oliveros, Santanen, and Brown, 2013:268, fig. 3.— Wallach, Williams, and Boundy, 2014:391.
Lycodon cf. *alcalai*, Oliveros, Ota, Crombie, and Brown, 2011:15, fig. 7D.

Type locality and type specimen(s).— ~2.5 km ENE of Basco on west slope of Mt. Iraya [elev. 150 m], Batan Id, Batanes Ids, off of northern Luzon Id., Philippines. Holotype: PNM 990.

Philippine distribution (endemic) (Map 21A [p. 132]).— Babuyan Ids. (Babuyan Claro, Calayan, Camiguin Norte), also Batan and Sabtang Ids., off of northern Luzon.

Remarks .— Siler et al. (2013) sampled both known islands within the distribution of *L. alcalai*, and inferred a very shallow divergence between this species and *L. bibonius* but no genetic divergence between *L. alcalai* and *L. chrysoprateros*, a species described from Dalupiri Island (Ota and Ross [1994]) and with which *L. alcalai* may be conspecific.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Lycodon aulicus* (Linnaeus, 1758)**

See *Lycodon capucinus* below.

***Lycodon bibonius* Ota and Ross, 1994** **Photo figure 4**

Crombie's Asian Wolf Snake

Lycodon bibonius Ota and Ross, 1994:162–165, figs. 6–7.— Lanza, 1999:89. 97.— Gaulke, 2002:89–90.— Oliveros, Ota, Crombie, and Brown, 2011:15, fig. 7C.— Siler, Oliveros, Santanen, and Brown, 2013:268, fig. 3.— Wallach, Williams, and Boundy, 2014:391.

Type locality and type specimen(s).— ca. 1.5 km E of Mambit (elev. 70 m), Camiguin Norte Island, Babuyan Islands, off of northern Luzon Id., Philippines. Holotype: PNM 2044.

Philippine distribution (endemic) (Map 21B [p. 132]).— Babuyan Ids. (Babuyan Claro, Camiguin Norte).

Remarks.— Siler et al. (2013) demonstrated a close relationship between *L. bibonius* and *L. alcalai*.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Lycodon capucinus* (H. Boie *in* F. Boie, 1827)**

Common Asian Wolf Snake

Lycodon capucinus H. Boie, 1826b:238 (*nomen nudum*); H. Boie *in* F. Boie, 1827:551.

Lycodon tessellatus Jan, 1863b:96 (type locality: "Manila". Luzon Id., Philippines; holotype: NMW 21708).— Müller, 1888:288.— Leviton, 1965c:130.— Ota and Ross, 1994:170 et seq.— Lanza, 1999:89, 98.— Ota, 2000:301, figs. 1a–c.— Wallach, Williams, and Boundy, 2014:397.

Ophites tessellatus, Taylor, 1922a:124.

Lycodon aulicus capucina, Boettger, 1898:37.

Ophites aulicus, Taylor, 1922a:120, figs. 11a–b.

Lycodon aulicus capucinus, Leviton, 1965c:131.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13.— Ferner, Brown, Sison, and Kennedy, 2001:53[20], fig. 49.

Lycodon aulicus (part), Lanza, 1999:94–95, 98.— Taylor, 1922d:137.

Lycodon capucinus, Gaulke and Altenbach, 1994:63.— Gaulke, 2011:288–289, figs 194–195.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Devan-Song and Brown, 2012:13.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:81, fig. 88.— Wallach, Williams, and Boundy, 2014:392.— Bauer, 2015:54.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:94, fig. 68.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Lycodon aulicus / capucinus, Siler, Oliveros, Santanen, and Brown, 2013:268, 270–271, fig. 3.

Type locality and type specimen(s).— Java, Indonesia (original description based on pl. 37 in Russell, 1802); pl. 37 in Russell designated as Lectotype by Wallach, Williams, and Boundy (2014:392) (see also comments by Bauer [2015:54]).

Philippine distribution (Map 21C [p. 132]).— Bantayan, Bohol, Carabao, Cebu, Camiguin Sur, Cuyo, Dinagat, Leyte, Luzon (Prov.: Aurora, Bulacan, Cagayan, Camarines Norte, Ilocos Norte, Isabela, Laguna, Manila, Nueva Vizcaya, Quezon, Zambales), Masbate, Mindanao, Mindoro, Negros, Panay, Romblon, Samar, Semirara, Tablas.

General distribution (other than Philippines).— Widely distributed throughout southeasern Asia (see Lanza [1999:95] and Wallach et al. [2014:392] for details).

Remarks.— See Leviton (1965c:131) for an extensive synonymy for Philippine records.

Lycodon capucinus is a problematic species, often considered as a synonym of *Lycodon aulicus* differing only in the highly variable aspects of coloration (see discussion in Lanza [1999:94]). Based on aspects of its distribution in the Philippines, Leviton (1965c:134–135) suggested that its nomen superior, *L. aulicus*, was an introduced species. See also Siler, Oliveros, Santanen, and Brown (2013) for preliminary discussion of the lack of genetic diversity within the *aulicus/capucinus* species group.

Lycodon tessellatus, which, with a degree of hesitation we refer to the synonymy of *L. capucinus*, was formerly treated as a distinct, if somewhat suspect species, known only from the type specimen from Manila, and its placement has been the subject of considerable confusion since its description by Jan in 1863. Most recently, Ota (2000:299–304) reexamined the type specimen and provided new data that led him to suggest that "It is thus probable that *L. tessellatus* is most closely related to *L. aulicus* [*L. capucinus* in the Philippines]. However, [other characters notwithstanding] it differs in having three series of prominent alternating black spots on the dorsum, at least in the anterior part of the body . . . . Detailed character analysis and molecular studies of additional specimens are necessary to clarify the relationships of this enigmatic species." (Ota [2000:302]). We concur.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Lycodon chrysoprateros* Ota and Ross, 1994**

Dalupiri Island Asian Wolf Snake; Ross' Wolf Snake

Lycodon chrysoprateros Ota and Ross, 1994:165–168, figs. 8–9.— Lanza, 1999:89, 98.— Gaulke, 2002:89–90.— Oliveros, Ota, Crombie, and Brown, 2011:15.— Siler, Oliveros, Santanen, and Brown, 2013:268, fig. 3.— Wallach, Williams, and Boundy, 2014:393.

Type locality and type specimen(s).— east side of Dalupiri Id., Babuyan Ids., northern Luzon, Philippines. Holotype: PNM 2045.

Philippine distribution (endemic) (Map 21D [p. 132]).— Dalupiri Id., Babuyan Ids. (off of northern Luzon Id.).

Remarks.— Siler et al. (2013) used a multilocus molecular analysis DNA sequences to demonstrate that *L. chrysoprateros* is nearly genetically identical to *L. alcalai* (the Batanes Islands) as well as all populations on Calayan and Babuyan Claro islands. We suspect that *L. chrysoprateros* and *L. alcalai* may be conspecific.

Conservation status [IUCN].— Critically Endangered B1ab(iii) (IUCN [2016] ver. 3.1). See comments in the Introduction relating to the IUCN assessment of conservation status.)

***Lycodon dumerilii* (Boulenger, 1893)** **Photo figure 45–46**

Duméril's Asian Wolf Snake

Stegonotus dumerilii Boulenger, 1893:368.— Taylor, 1922a:130.

Odontomus mülleri, Günther, 1879:78.

Dryocalamus mccroryi Taylor, 1922b:197, pl. 6, figs. 1–3 (type locality: Abung-Abung, Basilan Ids.; holotype: CAS 60346 [formerly EHT 1517]).

Lycodon dumerili, Leviton, 1965c:121.— Lanza, 1999:89, 98, fig. 3.— Ota and Ross, 1994:170 et seq., fig.12b.— Gaulke, 2002:89–90.

Lycodon dumerilii, Siler, Oliveros, Santanen, and Brown, 2013:268, 272, fig. 3.— Wallach, Williams, and Boundy, 2014:393.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:94, fig. 69.

Type locality and type specimen(s).— Surigao, Surigao del Norte Prov. (formerly Surigao Prov.), Mindanao Id., Philippines. Lectotype: BMNH 1946.1.15.6 (formerly BMNH 77.10.9.67) (Lectotype designated by Leviton, 1965c:123).

Philippine distribution (endemic) (Map 22A [p. 133]).— Basilan, Dinagat, Leyte, Mindanao (Prov.: Agusan del Sur, Cotabato, Davao del Sur, Surigao del Norte, Zamboanga), Samar, Siargao.

Remarks.— Examination of a large adult specimen from Samar in the collections of the California Academy of Sciences (CAS-SU 13233), which almost precisely matches the descrip-

tion of "*Stegonotus muelleri*" in Boulenger (1893:367), appears to suggest that Boulenger's reference can be assigned to *Lycodon dumerilii*. Both the BMNH and CAS-SU specimens are large adults and the typical cross-bars are obscured by a near uniform darkening of the dorsum. The Academy specimen shows the faintest hint of former lighter cross-bars, at best about 20 in number, that were narrower than the darker areas. None encroached upon the ventrals. However, the BMNH specimen and the one we examed here are significantly larger than any known species included in the genus *Lycodon* and thus we recognize *Stegonotus muelleri* (*q.v.*) as a distinct group pending further study. Furthermore, *S. muelleri* has been collected with greatly inceased frequency; indeed, there are now several dozen specimens in the University of Kansas (KU) collections from Samar, Leyte and eastern Mindanao. See additional comments herein under *Stegonotus muelleri.*

Conservation status [IUCN].— The conservation status of *Lycodon dumerilii* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Lycodon fausti Gaulke, 2002

Faust's Asian Wolf Snake

Lycodon fausti Gaulke, 2002:87, figs. 2–3; 2011:292–293, figs. 196–198.— Wallach, Williams, and Boundy, 2014:393.

Type locality and type specimen(s).— Barangay Guia, Municipality Pandan, Antique Province, NW Panay Peninsula, Panay Id., Philippines. Holotype: PNM 7271.

Philippine distribution (endemic) (Map 22B [p. 133]).— Panay (Prov.: Alkan, Antique).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Lycodon ferroni Lanza, 1999

Ferron's Asian Wolf Snake

Lycodon ferroni Lanza, 1999:90, 97, figs. 1–2.— Gaulke, 2002:89–90.— Wallach, Williams, and Boundy, 2014:393.

Type locality and type specimen(s).— Lungib Ginbagsangan, about 32 km by air NNE of Catbalogan ("Barrio Kag-Toto-Og; Provincia Samar Occidental"), Samar Id., Philippines. Holotype: MZUF 36690.

Philippine distribution (endemic) (Map 22C [p. 133]).— Samar (Prov.: Western Samar).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Lycodon muelleri Duméril, Bibron, and Duméril, 1854 **Photo figure 47**

Müller's Asian Wolf Snake

Lycodon mülleri Duméril, Bibron, and Duméril, 1854:382.

Stegonotus dumerili (*nec* Boulenger), Boettger:1898:39.— Griffin, 1911:259 (in part).

Haplonodon philippinensis Griffin, 1910:212 (type locality: Polillo Island; type destroyed; neotype CAS 62425 [designated by Leviton, 1965c:127]).— Taylor, 1922a:126, text-figs. 13a–b, pl. 9.; 1922b:199; 1922d:137.

Lycodon muelleri, Leviton, 1965c:125.— Ross and Gonzales, 1992:67.— Ota and Ross, 1994:170 et seq., fig. 12a.— Lanza, 1999:89, 97.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190, fig. 32.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:84, fig. 89.— Siler, Oliveros, Santanen, and Brown, 2013:268, 272, fig. 3.— Wallach, Williams, and Boundy, 2014:395.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Java (in error); restricted to Luzon Id., Philippines by Leviton (1965:126). Syntypes (2): MNHN 848 and 1320.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 22D [p. 133]).— Batan (Itbayat), Catanduanes, Luzon (Prov.: Albay, Aurora, Camarines Norte, Cavite, Isabela, Laguna, Quezon, Sorsogon), Marinduque, Mindoro, Polillo.

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

Lycodon sealei Leviton, 1955 — Photo figures 48–50

Seale's Banded Asian Wolf Snake

Ophites subcinctus, Taylor, 1922a:124, text-figs. 12a–b, pl. 8.

Lycodon subcinctus, Wallach, Williams, and Boundy, 2014:396 (part).

Lycodon subcinctus sealei Leviton, 1955:195; 1965c:128.— Lanza, 1999:89, 96.— Siler, Oliveros, Santanen, and Brown, 2013:271.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Puerto Princesa, Palawan Id., Philippines. Holotype: CAS 15819.

PHILIPPINE DISTRIBUTION.— Palawan.

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES) (Map 23A [p. 134]).— Possibly also northern Borneo (Mt. Kina Balu [also as Kinabalu], Sandakan, Sungai).

REMARKS.— Siler et al. (2013) used a multilocus phylogenetic study to demonstrate a substantial genetic divergence between *L. subcinctus* from Malaysia, Thailand, and Palawan. This plus the highly distinctive (reduced) banding pattern endemic to Palawan, suggests that this western Philippine lineage ought to be recognized as a distinct species.

CONSERVATION STATUS [IUCN].— The conservation status of *Lycodon sealei* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Lycodon solivagus Ota and Ross, 1994

Northern Luzon Asian Wolf Snake

Lycodon solivagus Ota and Ross, 1994:168–170, figs. 10–11.— Lanza, 1999:89, 97.— Gaulke, 2002:89–90.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:84.— Siler, Oliveros, Santanen, and Brown, 2013:272.— Wallach, Williams, and Boundy, 2014:396.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Cabatacan Barrio, Lasam, Cagayan Prov., Luzon Id., Philippines. Holotype: PNM 2046.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 23B [p. 134]).— Luzon (Prov.: Cagayan, Nueva Vizcaya).

CONSERVATION STATUS [IUCN].— Data Deficient [2016] ver. 3.1.

Lycodon tessellatus, Jan, 1863

Lycodon tessellatus Jan, 1863b:96.— Müller, 1888:288.— Leviton, 1965c:130.— Ota and Ross, 1994:170 et seq.— Lanza, 1999:89, 98.— Ota, 2000:301, figs. 1a–c.— Wallach, Williams, and Boundy, 2014:397.

Ophites tessellatus, Taylor, 1922a:124.

TYPE LOCALITY AND TYPE SPECIMEN(S).— "Manila", Luzon Id., Philippines. Holotype: NMW 21708.

REMARKS.— See Remarks under *Lycodon capucinus*.

***Oligodon ancorus* (Girard, 1857)** **Photo figure 51**

Luzon Kukri Snake; Northern Short-headed Snake

Xenodon ancorus Girard, 1857:182.

Holarchus ancorus, Taylor, 1922a:140, pl. 17, figs. 1–2, pl. 18, fig. 3; 1922d:137; 1923:548.

Oligodon ancorus, Leviton, 1963a:463.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Devan-Song and Brown, 2012:13, fig. 32.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:84.— Wallach, Williams, and Boundy, 2014:483.— Supsup, 2016:428.

Type locality and type specimen(s).— not given but subsequently stated as Manila, Luzon Id., Philippines (Girard [1858:168]). Holotype: USNM 5521.

Philippine distribution (endemic) (Map 27B [p. 138]).— Luzon (Prov.: Albay, Aurora, Bataan, Batangas, Benguet, Bulacan, Cagayan, Camarines Sur, Kalinga, Laguna, Manila, Nueva Ecija, Nueva Vizcaya, Quezon, Rizal, Sorsogon, Quezon, Zambales), Mindoro (Prov.: Oriental Mindoro).

Remarks.— See Leviton (1963a:464) for comments on specimens said to have come from localities other than those mentioned here.

Conservation status [IUCN].— Near Threatened [2016] ver. 3.1.

***Oligodon maculatus* (Taylor, 1918b)** **Photo figures 52–54**

Mindanao Kukri Snake; Barred Short-headed Snake

Holarchus maculatus Taylor, 1918b:364, pl. 1; 1922a:143, pl. 15; 1925:109.

Oligodon maculatus, Leviton, 1963a:469.— Smith, 1993:98.— David, Pauwels, Lays, and Lenglet, 2006:216, fig. 10.— Wallach, Williams, and Boundy, 2014:489.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:96, fig. 70.

Type locality and type specimen(s).— Bunawan, Agusan del Sur Prov., Mindanao Id., Philippines. Holotype: CM 2571.

Philippine distribution (endemic) (Map 27C [p. 138]).— Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Cotabato, Davao del Sur, South Cotabato, Surigao del Norte, Zamboanga City).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Oligodon meyerinkii* (Steindachner, 1891)**

Sulu Kukri Snake; Sulu Short-headed Snake

Simotes meyerinkii Steindachner, 1891:294.

Holarchus meyerinkii, Taylor, 1922a:139, pl. 17, figs. 6–7; 1922c:197.

Oligodon meyerinkii, Leviton, 1963a:471.— Gaulke, 1993b:3–6, figs.1–3; 1994b:140; 1996:50, fig. 4.— Wallach, Williams, and Boundy, 2014:490.

Type locality and type specimen(s).— Sulu-Inseln (= Jolo Id. [Sulu Archipelago]), Philippines. Syntypes (2): NMW 25828a–b.

Philippine distribution (Map 27D [p. 138]).— Sulu Archipelago (Bongao, Jolo, Papahag [also as Papahang], Sibutu, Tawi-Tawi).

General distribution (other than Philippines).— northern Borneo (without exact locality).

Conservation status [IUCN].— Endangered B2ab(iii) [2016] ver. 3.1.

***Oligodon modestus* Günther, 1864**

Spotted-bellied Short-headed Snake; West Visayan Kukri Snake

Oligodon modestus Günther, 1864:210.— Wallach, Williams, and Boundy, 2014:490.
Oligodon modestum, Taylor, 1922a:147, pl. 13, figs. 3–5.— Leviton, 1963a:473.— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Gaulke, 2001:28, figs. 5–6; 2011:296–297, figs. 199–201.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.

Type locality and type specimen(s).— Philippines; restricted to Negros Oriental Prov., Negros Id., Philippine Ids., by Leviton (1963a:474). Holotype: BMNH 1946.1.5.54.

Philippine distribution (endemic) (Map 28A [p. 139]).— Luzon (Prov.: Manila), Mindanao (Prov.: Surigao del Sur), Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan, Antique), Tablas.

Remarks.— We believe that the Luzon and Mindanao records are in error and that the specimens supposedly collected at these locations were not carefully examined or there was a mixup of locality data accompanying the specimens (see comment by Leviton [1963a:474, footnote]). Inasmuch as the type specimen came from Negros Island, it is highly probable that this species is restricted to the West Visayan Island PAIC group, which includes Negros, Panay and Tablas islands, from which specimens have been collected and examined by one or more of the current authors.

Conservation status [IUCN].— The conservation status of *Oligodon modestus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Oligodon notospilus* Günther, 1873** **Photo figures 55–56**

Palawan Kukri Snake; Palawan Short-headed Snake

Oligodon notospilus Günther, 1873:169, pl. 28, fig. A.— Taylor, 1922a:148, pl. 7, fig. 2, pl. 17, figs. 3–5, pl. 18, fig. 1.— Wallach, Williams, and Boundy, 2014:491.
Oligodon vertebralis notospilus, Leviton, 1963a:477.— Gaulke, 1999:279.

Type locality and type specimen(s).— Mindanao Id., Philippines [? in error; see Remarks below]. Holotype: BMNH 1946.1.3.23.

Philippine distribution (endemic) (Map 28B [p. 139]).— Balabac, Busuanga, Calauit, Mindanao (doubtful [see Remarks below]), Palawan (Iwahig, Puerto Princesa, Mt. Mantalingahan, Municipality of Brooke's Point).

Remarks.— We believe that the locality data accompanying the type specimen to be in error inasmuch as this species is known only from islands in the Palawan Archipelago. For details see comments by Leviton (1963a:478 *et seq*.).

Conservation status [IUCN].— The conservation status of *Oligodon notospilus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Oligodon perkinsi* (Taylor, 1925)**

Perkins Kukri Snake; Perkin's Short-headed Snake

*Holarchus perkins*i Taylor, 1925:108.
Oligodon perkinsi, Leviton, 1963a:476.— Wallach, Williams, and Boundy, 2014:491.

Type locality and type specimen(s).— Culion Id., Philippines. Holotype: MCZ 25725 (formerly EHT 1164).

Philippine distribution (endemic) (Map 28C [p. 139]).— Culion.

Conservation status [IUCN].— Near Threatened [2016] ver. 3.1.

***Ptyas carinata* (Günther, 1858)**
Keel-scaled Rat Snake

Coryphodon carinatus Günther, 1858:112.
Zaocys carinatus, Günther, 1864:156.— Taylor, 1922a:136, pl. 12, figs. 2, 4.— Leviton, 1983:202.
Ptyas carinatus, Malkmus, Manthey, Vogel, Hoffmann, and Kosuch, 2002:360.
Ptyas carinata, David and Das 2004.— Wallach, Williams, and Boundy, 2014:604.

Type locality and type specimen(s).— restricted to Borneo by Günther (1864:256). Lectotype: BMNH 1946.1.11.35 (designated by Günther [1864:256]).
Philippine distribution (Map 32A [p. 143]).— Palawan.
General distribution (other than Philippines).— Widely distributed throughout southeastern Asia (see Wallach, Williams, and Boundy [2014:604] for details).
Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Ptyas luzonensis* (Günther, 1873)** **Photo figures 57–59**
Smooth-scaled Rat Snake; Smooth-scaled Mountain Rat Snake; Philippine Rat Snake

Zaocys luzonensis Günther, 1873:165, pl. 18.— Taylor, 1922a:135, pl. 12, figs. 1, 3, pl. 13, figs. 1–2; 1922c:296; 1922d:138.— Leviton, 1983:201.— Ross and Gonzales, 1992:68.— Diesmos, Brown, and Gee, 2004:71.— Gaulke, 2001:30, fig. 10; 2011:316; 2011:316–317, figs. 214–216, 218.— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Diesmos, Brown, and Gee, 2004:71.
Ptyas luzonensis, McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 8C.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483.— Devan-Song and Brown, 2012:14, fig. 33.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:86, fig. 92.— Wallach, Williams, and Boundy, 2014:606.

Type locality and type specimen(s).— Luzon Id., Philippines. Holotype: BMNH 1946.1.7.89.
Philippine distribution (endemic) (Map 32B [p. 143]).— Catanduanes, Leyte, Luzon (Prov.: Albay, Aurora, Bulacan, Cagayan, Camarines del Norte, Camarines del Sur, Ilocos Norte, Kalinga, Laguna, Quezon, Sorsogon, Zambales), Negros, Panay, Polillo.
Remarks.— Preliminary review suggests that the taxonomic relationships of the West Visayan (Negros, Panay) and Mindanao PAIC (Leyte Id.) populations should be reviewed.
Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Stegonotus muelleri* Duméril, Bibron, and Duméril, 1854:682** **Photo figures 60–61**
Müller's Ratsnake

Stegonotus mülleri Duméril, Bibron, and Duméril, 1854:682.
Spilotes samarensis Peters, 1861:685 (type locality: "Cubo-Cubo, Insel Samar"; holotype: ZMB 4294)
Stegonotus muelleri Boulenger, 1893:367.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:96, fig. 71.

Type locality and type specimen(s).— Samar Id., Philippines. Holotype: MNHN 848.
Philippine distribution (endemic) (Map 35C [p. 146]).— Dinagat, Leyte (Prov.: Leyte, Southern Leyte), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Davao del Sur, Misamis Occidental, Misamis Oriental, Sarangani, South Cotabato, Surigao del Norte), Samar.
Remarks.— In his review of the Philippine species of *Lycodon*, Leviton (1965) commented on

Boulenger's reference to *Stegonotus muelleri* (Boulenger [1893:367]), which, according to Boulenger was based on *Stegonotus mülleri* Duméril, Bibron, and Duméril (1854:682). At the time Leviton stated that he was "restricting the nominal genus *Stegonotus* to include but a single species, *S. mülleri*" (Leviton [1965:120]) then known from Samar Island in the Philippines, as had been reported on by Boulenger, who had also included Peters' *Spilotes samarensis* (Peters [1861:685]), also from Samar, in the synonymy of *S. muelleri*. Unfortunately, and at the same time, Leviton overlooked a specimen that was resident in the Stanford University collections, now at the California Academy of Sciences (CAS-SU 13233), that bears the locality Mercedes, Samar Island, Philippines, collected 25 July 1945 by Ralph F. Annereaux. An examination of this animal and with reference to both Duméril, Bibron, and Duméril and to Boulenger, indicates that this is a much larger snake than any of the known species of *Lycodon*, and it likely does indeed represent a distinct group that should be recognized in the Philippines. Furthermore, recent investigations indicate that it is rather widespread throughout the northern Mindanao PAIC islands of Leyte, Samar, Dinagat, and eastern Mindanao (Sanguila et al. [2016]).

Whether or not the Papuan species that have been assigned to the genus *Stegonotus* are indeed related to the Philippine species is an open question as is the possibility of differentiation between Samar-Leyte populations versus those from Mindanao (*sensu* Peters 1861).

Conservation status [IUCN].— Near Threatened [2016] ver. 3.1

Subfamily Natricinae Bonaparte, 1838

***Opisthotropis alcalai* Brown (WC) and Leviton, 1961** **Photo figures 62–63**

Alcala's Mountain Keelback

Opisthotropis alcali Brown (WC) and Leviton, 1961:2, fig. 1.— Wallach, Williams, and Boundy, 2014:498.

Type locality and type specimen(s).— Cugat Creek, west side of Dapitan Peak, Mt. Malindang, Zamboanga del Norte Prov., Mindanao Id., Philippines. Holotype: CAS-SU 22250.

Philippine distribution (endemic) (Map 29A [p. 140]).— Mindanao (Prov.: Zamboanga City [formerly Zamboanga del Sur], Zamboanga del Norte).

Conservation status [IUCN].— Endangered B1ab(iii)+2ab(iii) [2016] ver. 3.1.

***Opisthotropis typica* (Mocquard, 1890a)** **Photo figure 64–65**

Sabah Keelback Snake

Helicopsoides typicus Mocquard, 1890:154.

Opisthotropis typica, Brown (WC) and Leviton, 1961:2, 4.— Wallach, Williams, and Boundy, 2014:500.

Type locality and type specimen(s).— Mt. Kinabalu, North Borneo. Holotype: MNHN 1889.216.

Philippine distribution (Map 29B [p. 140]).— Palawan (Brooke's Point).

General distribution (other than Philippines).— East Malaysia (Sabah [Mt. Kina Balu {also as Kinabalu}]).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Rhabdophis auriculatus auriculatus* (Günther, 1858)** **Photo figure 66**

Günther's Philippine Keelback Snake; Günther's White-lined Water Snake

Tropidonotus auriculata Günther, 1858:80.— Boulenger, 1893:261, pl. 17, fig. 1 (part).
Natrix auriculata, Griffin, 1911:257 (part).— Taylor, 1922a:89, text-fig. 7, pl. 4, figs. 2–4.
Rhabdophis auriculata auriculata, Leviton, 1970c:356, figs. 2–3, 7.— Smith, 1993:98.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:97, fig. 72.
Rhabdophis auriculatus auriculatus, David, Pauwels, Lays, and Lenglet, 2006:218, fig. 12.
Rhabdophis auriculatus, Wallach, Williams, and Boundy, 2014:621 (part).

Type locality and type specimen(s).— Philippines, restricted to Mt. Apo, Davao Prov., Mindanao Id. by Leviton (1970:356). Holotype: BMNH 1946.1.15.16.

Philippine distribution (endemic) (Map 33C [p. 144]).— Dinagat, Leyte, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Cotabato, Davao City, Davao Occidental, Misamis Oriental, South Cotabato, Surigao del Sur), Samar.

Conservation status [IUCN].— The conservation status of *Rhabdophis auriculatus auriculatus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* as *Rhabdophis auriculata* and as such it is listed by IUCN as Least Concern.

***Rhabdophis auriculatus myersi* Leviton, 1970**

Myers' Philippine Keelback Snake; Myers' White-lined Water Snake

Tropidonotus auriculatus, Boulenger, 1893:261 (part).
Natrix auriculata (part), Taylor, 1922c:294; 1923:542.
Rhabdophis auriculata myersi Leviton, 1970c:349, figs. 3–6.
Rhabdophis auriculatus, Beukema, 2011.— Wallach, Williams, and Boundy, 2014:621 (part).

Type locality and type specimen(s).— Dapitan Peak, New Pinan, SW side of Buena Suerte, Misamis Occidental Prov., Mindanao Id., Philippines. Holotype: CAS-SU (Rept.) 23391.

Philippine distribution (endemic) (Map 33D [p. 144]).— Basilan, Bohol, Mindanao (Prov.: Misamis Occidental, Zamboanga del Norte, Zamboanga del Sur [Zamboanga City]).

Conservation status [IUCN].— The conservation status of *Rhabdophis auriculatus myersi* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* as *Rhabdophis auriculata* and as such it is listed by IUCN as Least Concern.

***Rhabdophis barbouri* (Taylor, 1922)**

Barbour's Philippine Keelback Snake

Natrix barbouri Taylor, 1922c:291; 1922d:137.
Natrix crebripunctata, Taylor, 1922a:91.
Macropophis barbouri, Malnate, 1960:48, 52.
Rhabdophis barbouri, Malnate and Underwood, 1988:195.— Wallach, Williams, and Boundy, 2014:621.

Type locality and type specimen(s).— Balbalan, Kalinga Subprov., Luzon Id., Philippines. Holotype: CAS 61552 (formerly EHT 939).

Philippine distribution (endemic) (Map 34A [p. 145]).— Luzon (Prov.: Kalinga, Laguna).

Remarks.— As observed by Malnate and Underwood (1988:195), "In having high counts of ventrals, subcaudals, and maxillary teeth, *barbouri* shows some resemblance to Philippine *Tropidonophis negrosensis* and *dendrophiops*", other characters are "significantly differ-

ent . . . but are present in Philippine species of *Rhabdophis*. *Natrix barbouri* Taylor, therefore, is assigned to *Rhabdophis*."

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Rhabdophis chrysargos* (Schlegel, 1837)**

Speckle-bellied Keelback Snake

Tropidonotus chrysargos Schlegel, 1837b:312, pl. 12, figs, 6–7.

Natrix chrysarga, Taylor, 12922a:87, pl. 4, fig. 5.

Rhabdophis chrysargos, Wallach, Williams, and Boundy, 2014:622.

Type locality and type specimen(s).— Java, Indonesia, suggested by Schlegel who states, "ne m'ont pas permis d'hésiter à adopter les vues de M.M. Kuhl et Reinwardt qui ont découvert ces Tropidonotes à l'île Java" (Schlegel. 1837b:312); further restricted to "Mt. Megamendung, Westjava" (*fide* Manthey and Grossmann, 1997:387). Lectotype: RMNH 10426 (formerly RMNH 1051), designated by Iskandar and Colijin (2001:104) (*fide* Wallach et al., 2014:622).

Philippine distribution (Map 34B [p. 145]).— Balabac, Calamian Ids. (Busuanga, Culion), Palawan.

General distribution (other than Philippines).— Indonesia (Anambas Archipelago, Bali, Flores, Java, Kalimantan, Mentawai Archipelago, Nias, Simeulue, Sumatra, Ternate, Borneo,), Laos, southern Burma (Myanmar), southern Thailand, Cambodia, Vietnam, Malaysia (Malaya and East Malaysia, Pulau Tioman), China (Hainan, Hong Kong)

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Rhabdophis lineatus* (Peters, 1861)** **Photo figure 67**

Zigzag-lined Water Snake

Tropidonotus lineatus Peters 1861:686–687.— Boulenger 1893:262.

Natrix lineata, Taylor 1922a:92, pl. 4, figs. 6–7, pl. 5;.1922c:293.

Rhabdophis lineatus, Bauer et al. 1995:75.— David, Pauwels, Lays, and Lenglet, 2006:219, fig. 13.— Wallach, Williams, and Boundy, 2014:623.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:99, fig. 73.

Type locality and type specimen(s).— Loquilocun, Insel Samar, Philippines. Syntypes (2): ZMB 3976a–b (*fide* Wallach et al. [2014:623] but also see additional comments by Wallach et al. [*op. cit.*] in regard to erroneous recognition of an additional syntype, NMW 23469, by Tiedemann and Häpul [1980:63; 1994:76]).

Philippine distribution (endemic [Map 34C {p. 145}]**)**.— Basilan, Biliran, Bohol, Dinagat, Leyte (Prov.: Leyte, Southern Leyte), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Davao del Sur, Misamis Oriental, South Cotabato, Zamboanga del Sur [Zamboanga City]), Samar (Prov.: Eastern Samar, Samar [formerly Western Samar]).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Rhabdophis spilogaster* (H. Boie *in* F. Boie, 1827)** **Photo figure 68**

Boie's Keelback Snake

Tropidonotus spilogaster H. Boie *in* Schlegel, 1826:237 (*nomen nudum*).— H. Boie *in* F. Boie, 1827:535.— Müller, 1883:286.— Boulenger, 1893:257; 1894:83.

Natrix stolatus, Taylor, 1922a:84.

Natrix spilogaster, Taylor, 1922a:86, pl. 4, fig. 1; 1922d:137.

Rhabdophis spilogaster, Harding and Welch, 1980:99.— Ross and Gonzales, 1992:67.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13, fig. 15.— Brown, McGuire, Ferner, Icarangal, Jr., and Kennedy, 2000:190, fig. 33.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484. fig. 45.— Devan-Song and Brown, 2012:14, fig. 34.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:88, fig. 93.— Wallach, Williams, and Boundy, 2014:624.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Philippines (restricted to Luzon Id. by Wallach et al. [2014:624]). Syntypes (5): RMNH 1048a–b, RMNH 1049a–c (*fide* Wallach et al. [2014:624]).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 34D [p. 145]).— Babuyan Ids. (Camiguin Norte), Batanes Ids. (Batan), Catanduanes, Lubang, Luzon (Prov.: Aurora, Bataan, Batangas, Bulacan, Camarines Norte, Cavite, Ifugao, Ilocos Norte, Isabela, Laguna, Manila, Mountain, Nueva Vizcaya, Pampanga, Quezon, Rizal, Zambales), Polillo.

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

***Tropidonophis dendrophiops* (Günther, 1883)** **Photo figure 69**

Spotted Water Snake

Tropidonotus dendrophiops Günther 1883:136.

Tropidonophis dendrophiops Günther 1883:136.— Malnate and Underwood, 1988:85, figs. 2 [map], 3.— Smith, 1993:99— David, Pauwels, Lays, and Lenglet, 2006:219, fig. 14.— Beukema, 2011a:178, fig. 4.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:88, fig. 94.— Wallach, Williams, and Boundy, 2014:735.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:100, fig. 74.— Supsup, Guinto, Redoblado, and Somez, 2017:9, fig. 5g.

Natrix dendrophiops dendrophiops, Taylor, 1922a:95.

Natrix dendrophiops, Taylor, 1922c:294.

Macropophis dendrophiops, Malnate, 1960:48, 52, fig. 1 [map].

TYPE LOCALITY AND TYPE SPECIMEN(S).— Zamboanga, Mindanao Id., Philippines. Holotype: BMNH 1946.1.15.41 (original number BMNH 82.11.25.13).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 37B [p. 148]).— Basilan, Biliran, Bohol, Camiguin Sur, Dinagat, Leyte, Luzon (Prov.: Cagayan, Isabela), Mindanao (Prov.: Agusan del Sur, Davao, Davao del Sur, Davao Oriental, Misamis Oriental, South Cotabato, Zamboanga del Sur [Zamboanga City]), Samar, Siquijor.

REMARKS.— Malnate and Underwood (1988:85), based largely on body scale characters and dentition, assigned two Philippine species formerly included in the genus *Natrix* and/or *Rhabdophis*, to *Tropidonophis*, i.e., *T. dendrophiops*, and *T. negrosensis*. Although we do not feel comfortable with these assignments and believe that the two nominal species should be reassigned to the now well-established genus *Rhabdophis*, we hesitate to do so pending a thorough genomic analysis. Also, with respect to the placement of the long enigmatic species "*Natrix barbouri* Taylor, 1922", as noted in the Remarks under *Rhabdophis barbouri*, despite similarities in some features with *Tropidonophis*, they referred *barbouri* to *Rhabdophis* (Malnate and Underwood 1988:195).

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

***Tropidonophis negrosensis* (Taylor, 1917b)**
Negros Keelback Snake; Negros Spotted Snake

Natrix dendrophiops negrosensis Taylor, 1917b:356; 1922a:97, fig. 8.
Macropophis barbouri, Malnate, 1960:49, 52, fig. 1 [map].
Tropidonophis negrosensis, Malnate and Underwood, 1988:81, figs. 1, 2 [map].— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Gaulke, 2001:30, fig. 9; 2011:313–315–255, figs. 211–213.— Wallach, Williams, and Boundy, 2014:737.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170, fig. 30.

Type locality and type specimen(s).— Canloan Volcano, Negros Occidental Prov., Negros Id., Philippines. Holotype: CM 2261.

Philippine distribution (endemic) (Map 37C [p. 148]).— Azucar, Cebu, Masbate, Mindoro, Negros (Prov.: Negros Occidental, Negros Oriental), Paan de Azucar, Panay (Prov.: Iloilo), Sicogon (Prov.: Iloilo). Siquijor.

Remarks.— A population identified as *T.* cf. *negrosensis* is herein reported from Lubang Id., based on material in the KU collection (Map 37A [p. 148]). See also Remarls under *T. dendrophiops*.

Conservation status [IUCN].— Vulnerable B1ab(iii)+2ab(iii) [2016] ver. 3.1.

Subfamily Sibynophiinae Dunn, 1928

***Sibynophis bivittatus* (Boulenger, 1894)** **Photo figure 70**
Palawan White-striped Snake

Polydontophis bivittatus Boulenger, 1894:82.
Sibynophis bivittatus, Taylor, 1922a:80, pl. 10, fig. 1.— Leviton, 1964a:376.— Wallach, Williams, and Boundy, 2014:659.
Sibynophis geminatus bivittatus, Gaulke, 1993a:151.

Type locality and type specimen(s).— Palawan Id., Philippines. Syntypes (2): BMNH 1946.1.1.48–49.

Philippine distribution (endemic) (Map 35A [p. 146]).— Busuanga, Culion, Dumaran, Palawan.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Sibynophis geminatus geminatus* (H. Boie, 1826a)**
Boie's Many-tooth Snake; Striped Black-headed Snake

Coluber geminatus Oppel *in* H. Boie, 1826a:col. 211.
Sibynophis geminatus geminatus, Gaulke, 1993a:151; 1994b:141.

Type locality and type specimen(s).— Java, Indonesia. Syntypes (3): MNHN 3392–93 and RMNH 687 (*fide* Wallach et al. [2014:660]).

Philippine distribution (Map 35B [p. 146]).— Sulu Archipelago (Tawi-Tawi).

General distribution (other than Philippines).— Southwestern Indonesia.

Remarks.— Wallach et al. (2014:660) exclude this species from the Philippines and, without explanation, assign the Tawi-Tawi record to *Sibynophis melanocephalus*. Boie (1826a) attributes the name to Oppel although Boie provides the diagnosis.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Family Lamprophiidae Fitzinger, 1843

Remarks.— The placement of the genera *Oxyrhabdium* and *Psammodynastes* in the family Lamprophiidae has been and is the subject of considerable controversy (see Lawson et al. [2005]; Vidal et al. [2007]; Pyron et al. [2011, 2013]; Figueroa et al. [2016]). Indeed, as Pyron et al. (2011:341) observed, "We follow Vidal et al. (2007) in tentatively recognizing Lamprophiidae as a single family, including Aparallactinae, Atractaspidinae, Lamprophiinae, Psammophiinae, and Pseudoxyrophiinae. . . . [however] The genera *Buhoma*, *Oxyrhabdium*, and *Psammodynastes* cannot be placed confidently within the existing subfamilies of Lamprophiidae." But even more recently, Weinell and Brown (2017) provided reasonably conclusive evidence for the placement of *Oxyrhabdium* along with *Cyclocorus* and *Hologerrhum* within the Lamprophiidae clade but as a distinct subfamily group. We do note that whereas *Myersophis* with *Oxyrhabdium* may be congeneric, in this account we treat them as distinct genera, pending further study. Lastly, we have not fully resolved the placement of *Psammodynastes*, which we believe is reasonably associated with the Lamprophiidae, but how it relates to recognized subfamilies with the family is still under investigation.

Subfamily Cyclocorinae Weinell and Brown, 2017

***Cyclocorus lineatus alcalai* Leviton, 1967**

Alcala's Northern Triangle-spotted Snake

Cyclocorus lineatus alcalai Leviton, 1967:529.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Gaulke, 2011:268–269, figs. 179–181.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169, fig. 27.

Cyclocorus lineatus, Wallach, Williams, and Boundy, 2014:200 (part).

Type locality and type specimen(s).— ridge on north side of Maite River, 5 km west of Valencia, Negros Oriental Prov., Negros Id., Philippines. Holotype: CAS 101587 (formerly SU [Rept.] 18191).

Philippine distribution (endemic) (Map 11A [p. 122]).— Cebu, Guimaras, Inampulugan, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Alkan, Antique), Tablas.

Conservation status [IUCN].— The conservation status of *Cyclocorus lineatus alcalai* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Cyclocorus lineatus lineatus* (Reinhardt, 1843)** **Photo figures 71–72**

Northern Triangle-spotted Snake

Lycodon lineatus Reinhardt, 1843:241, pl. 1, figs. 7–9.

Cyclocorus lineatus, Duméril, 1853:461.— Taylor, 1922a:106 (in part); 1922d:137.— Leviton, 1967:528.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— Diesmos, Brown, and Gee, 2004:71.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190.— Wallach, Williams, and Boundy, 2014:200 (part).

Cyclocorus lineatus lineatus, Ross and Gonzales, 1992:65.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:12.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 8A.— Oliveros, Ota, Crombie, and Brown, 2011:14.— Devan-Song and Brown, 2012:13. fig. 28.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, Diesmos, 2013:78, fig. 81.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Manila, Luzon Id., Philippines. Holotype: ZMUC 60489.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 11B [p. 122]).— Babuyan Ids. (Calayan, Camiguin Norte), Cantanduanes, Lubang, Luzon (Prov.: Albay, Aurora, Bataan, Cagayan, Isabela, Kalinga, Laguna, Pampanga, Quezon, Rizal, Sorsogon, Zambales), Mindoro, Marinduque, Mindoro, Polillo.

CONSERVATION STATUS [IUCN].— The conservation status of *Cyclocorus lineatus lineatus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*. Under the nomen *Cyclocorus lineatus*, IUCN shows it as of Least Concern (IUCN [2016] ver. 3.1).

Cyclocorus nuchalis nuchalis Taylor, 1923 — Photo figures 73–74

Southern Triangle-spotted Snake

Cyclocorus nuchalis Taylor, 1923:543, pl. 3, figs. 1–2.— Beukema, 2011.— Wallach, Williams, and Boundy, 2014:200 (part).

Cyclocorus nuchalis nuchalis, Smith, 1993:96.— David, Pauwels, Lays, and Lenglet, 2006:215, fig. 9.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Pasananka [= Pasonanca], Zamboanga del Sur [Zamboanga City] Prov., Mindanao Id., Philippines. Holotype: CAS 62558 (formerly EHT 1428).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 11C [p. 122]).— Basilan, Mindanao (Prov.: Bukidnon, Misamis Occidental, Sarangani, South Cotabato, Zamboanga del Sur [Zamboanga City], Zamboanga del Norte). (See summary David, Pauwels, Lays, and Lenglet [2006:251].)

CONSERVATION STATUS [IUCN].— Least Concern [listed as *C. nuchalis*]; under *C. nuchalis nuchalis*, "This taxon has not yet been assessed for the IUCN Red List, but is in the *Catalogue of Life*: *Cyclocorus nuchalis nuchalis* Taylor, 1923" (IUCN [2016] ver. 3.1).

Cyclocorus nuchalis taylori Leviton, 1967 — Photo figure 75

Taylor's Southern Triangle-spotted Snake

Cyclocorus nuchalis taylori Leviton, 1967:532.— Smith, 1993:97.— Wallach, Williams, and Boundy, 2014:200 (part).— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:92, fig. 66.— Supsup, Guinto, Redoblado, and Somez. 2017:7, fig. 6.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Butuab, Agusan del Norte Prov., Mindanao Id., Philippines. Holotype: CAS 15242.

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 11D [p. 122]).— Camiguin Sur, Dinagat, Leyte (Prov.: Layte), Mindanao (Prov.: Agusan del Norte, Bunawan, Davao City, Davao del Norte, Davao Oriental), Samar, Siargao (Prov.: Surigao del Norte).

CONSERVATION STATUS [IUCN].— The conservation status of *Cyclocorus lineatus taylori* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Hologerrhum dermali Brown (RM), Leviton, Ferner, and Sison, 2000

Dermal's Cylindrical Snake; Crombie's Stripe-lipped Snake

Hologerrhum dernali Brown, Leviton, Ferner, and Sison, 2000:7.— Ferner, Brown, Sison, and Kennedy, 2001:52[19].— Gaulke, 2011:284–287, figs. 192–193.— Wallach, Williams, and Boundy, 2014:328.

TYPE LOCALITY AND TYPE SPECIMEN(S).— 1510 m above sea level in the area known locally as "Hanggud Tubig" ("Big Water"), on the western face of Mt. Madja-as, Barangay Alojipan, Municipality of Culasi, Antique Prov., Panay Id., Philippines. Holotype: PNM 2711.

Philippine distribution (endemic) (Map 16B [p. 127]).— Panay (Prov.: Aklan, Antique), Sibuyan [observed and photographed but no voucher specimens].

Remarks.— We are indebted to Leonard G. Soriano who provided a verifiable photograph to authenticate the first and only known record to date for the occurrence of this species on Sibuyan Island.

Conservation status [IUCN].— Endangered B1ab(iii) [2016] ver. 3.1.

***Hologerrhum philippinum* Günther, 1858** **Photo figure 76**

Philippine Stripe-lipped Snake; Philippine Cylindrical Snake

Hologerrhum philippinum Günther, 1858:186; 1873:171; 1879:78 (specimen *Cyclocorus lineatus*, *fide* Boulenger, 1896:33).— Boettger, 1886:115.— Castro De Elera, 1895:438 (specimen probably an example of *Cyclocorus lineatus*).— Boulenger, 1896:33.— Griffin, 1911:263 (err. typ.).— Taylor, 1922a:116; pl. 7, fig. 1; 1922b:200, 1922d:138.— Ross and Gonzales, 1991:67.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:13, fig. 14.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188, fig. 8B.— Phenix, Phenix, Siler, Brown, and Diesmos, 2011:614, fig. 1.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:81, figs. 86–87.— Wallach, Williams, and Boundy, 2014:328.

Cyclochorus maculatus, Jan, 1870:36 (genus name misspelled; specimen *H. philippinum* with doubtful locality data).

Cyclochorus lineatus var. *maculatus* Fischer, 1885:81.

Type locality and type specimen(s).— Philippines. Holotype: BMNH 1946.1.2.41.

Philippine distribution (endemic) (Map 16C [p. 127]).— Catanduanes, Luzon (Prov.: Bataan, Bulacan, Cagayan, Camarines Norte, Caminares Sur, Isabela, Kalinga, Laguna, Mountain, Quezon, Sorsogon, Zambales), Marinduque, Polillo.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Myersophis alpestris* Taylor, 1963** **Photo figure 77**

Myers' Mountain Snake

Myersophis alpestris Taylor, 1963:430.— Leviton, 1983:212, fig. 4.

Type locality and type specimen(s).— in mountains near Banaue, Ifugao Subprovince, Mountain Prov., Luzon Id., Philippines. Holotype: KU 203012 (formerly EHT-HMS 3109; *fide* Leviton [1983:212]).

Philippine distribution (endemic) (Map 26B [p. 137]).— Luzon (Prov.: Mountain, Nueva Vizcaya [Mt. Palali]).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Oxyrhabdium leporinum leporinum* (Günther, 1858)** **Photo figures 78–79, [80–82]**

Northern Philippine Banded Burrowing Snake

Rhabdosoma leporinum Günther, 1858:12 (part*).

Stenognathus brevirostris Peters, 1872:586 (type locality: Philippines; syntypes ZMB 7440 [2 specimens, *fide* Bauer et al. 1995:74]).

Oxyrhabdium leporinum, Boulenger, 1893:303, pl. 19, fig. 2.— Taylor, 1922a:103, figs. 10a–b; 1922c:296.— Wallach, Williams, and Boundy, 2014:506 (part).

Oxyrhabdium leporinum leporinum, Leviton, 1958:296; 1965a:417.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189, fig. 30.— Diesmos, Brown, and Gee, 2004:71.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and

Brown, 2011:189.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484, fig. 46.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:90, fig. 97.

Type locality and type specimen(s).— "Philippine Islands" but one of the two syntypes was shown to be a specimen of *O. modestum* by Boulenger (1893:303); "Luzon" by subsequent selection by Boulenger (1893:303, pl. 19, fig. 2). Lectotype: BMNH 1946.1.13.98.

Philippine distribution (endemic) (Map 29C [p. 140]).— Babuyan Ids. (Calayan), Luzon (Prov.: Aurora, Batangas, Benguet, Bulacan, Cagayan, Ilocos Norte, Kalinga, Laguna, Nueva Viscaya, Nueva Ecija, Quezon), Marinduque, Mindoro.

Conservation status [IUCN].— The conservation status of *Oxyrhabdium leporinum leporinum* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* under the species name *O. leporinum* and under this nomen it is shown as Least Concern (IUCN [2016] ver. 3.1).

Oxyrhabdium leporinum visayanum Leviton, 1957 **Photo figure 83**

Western Visayan Banded Philippine Burrowing Snake

Oxyrhabdium leporinum visayanum Leviton, 1958:299; 1965a:417.— Gaulke, 2011:300–301, figs. 202–203.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170, fig. 29.

Oxyrhabdium leporinum, Wallach, Williams, and Boundy, 2014:506 (part).

Type locality and type specimen(s).— Maite River at elev. ~ 915 m, Cuernos de Negros, Negros Oriental Prov., Negros Id., Philippines. Holotype: CAS-SU 18907.

Philippine distribution (endemic) (Map 29D [p. 140]).— Cebu, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Antique).

Conservation status [IUCN].— The conservation status of *Oxyrhabdium leporinum visayanum* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* under the species name *O. leporinum* and under this nomen it is shown as Least Concern (IUCN [2016] ver. 3.1).

Oxyrhabdium modestum (Duméril, Bibron, and Duméril 1854a) **Photo figure 84**

Non-banded Philippine Burrowing Snake

Stenognathus modestus Duméril, Bibron and Duméril, 1854:504.

Oxyrhabdium modestum, Boulenger, 1893:302).— Taylor, 1922a:100, figs. 9a–c; 1922c:295.— Leviton, 1958:289; 1965a:410.— Smith, 1993:98— David, Pauwels, Lays, and Lenglet, 2006:217, fig. 11.— Beukema, 2011b:93.— Wallach, Williams, and Boundy, 2014:507.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:104, fig. 76.— Supsup, Guinto, Redoblado, and Somez. 2017:9, fig. 5h.

Type locality and type specimen(s).— "Java" [in error]; Mindanao Id., Philippines (designated by Leviton [1958:291]). Syntypes (2): MNHN 7301a–b.

Philippine distribution (endemic) (Map 30A [p. 141]).— Basilan, Biliran, Bohol, Camiguin Sur, Catanduanes, Dinagat, Leyte, Maripipi, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Bukidnon, Cotabato, Davao, Davao Oriental, Davao del Sur, Misamis Occidental, Misamis Oriental, South Cotabato, Sarangani, Zamboanga del Norte, Zamboanga del Sur [Zamboanga City]), Samar. (Reports from Negros and Panay need confirmation.)

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Subfamily [*incertae sedis*] Pseudaspidinae [*fide* Vidal et al., 2007, *nec* Pyron et al., 2011]

***Psammodynastes pulverulentus* (H. Boie *in* F. Boie, 1827)** **Photo figures 85–86**

Mole viper; Philippine Mock Viper; Dark-spotted Mock Viper

Psammophis pulverulentus H. Boie *in* F. Boie, 1827:547.

Lycodon bairdi Steindachner, 1867:90 (type locality Philippines).

Psammodynastes pulverulentus, Boulenger, 1890:363; 1896:172.— Taylor, 1922a:209, figs. 18a–c; 1922c:298; 1922d:138.— Smith, 1943:268, fig. 117.— Leviton, 1983:205, figs. 2–3.— Brown, McGuire, Ferner, Icarangal Jr., and Kennedy, 2000:189, fig. 31.— Ferner, Brown, Sison, and Kennedy, 2001:53[20].— Gaulke, 2001:28.— Beukema, 2011b:93.— Oliveros, Ota, Crombie, and Brown, 2011:6.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:483, fig. 44.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:84, fig. 90.— Wallach, Williams, and Boundy, 2014:574 (part).— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:105.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Psammodynastes pulverulentus pulverulentus, David, Pauwels, Lays, and Lenglet, 2006:217.— Gaulke, 2011:304–305, figs 204–207.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Java, Indonesia. Lectotype: RMNH 765 (designated by Inger in Van Wallach et al. [2014:574]).

PHILIPPINE DISTRIBUTION (Map 30B [p. 141]).— Balabac, Basilan, Batan Ids. (Batan, Sabtang), Bohol, Calamian Archipelago (Busuanga), Camiguin Sur, Cebu, Dinagat, Leyte, Luzon (Prov.: Albay, Aurora, Cagayan, Camarines Norte, Camarines Sur, Ilocos Norte, Isabela, Laguna, Nueva Vizcaya, Quezon, Sorsogon), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Bukidnon, Davao, Lanao del Sur, Misamis Occidental, Misamis Oriental, South Cotabato, Surigao del Norte, Zamboanga del Norte, Zamboanga del Sur [Zamboanga City]), Negros (Prov.: Negros Occidental, Negros Oriental), Palawan, Panay, Polillo, Samar, Siargao, Sulu Archipelago (Bongao, Jolo).

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— Widely distributed from India and throughout Souteast Asia, southern and eastern China, Taiwan. (See David, Pauwels, Lays, and Lenglet [2006:218]; also Miller and Zug [2016:fig. 1 {distribution map}].)

CONSERVATION STATUS [IUCN].— The conservation status of *Psammpodynastes pulverulentus* has not been assessed for the IUCN Red List [2016] ver. 3.1.

(Dangerously Venomous snakes)

Family Elapidae F. Boie, 1827

Subfamily Elapinae F. Boie, 1827

***Calliophis bilineata* Peters, 1881**

Two-stripped Coral Snake

Calliophis bilineatus Peters, 1881:109.— Boettger, 1886:117.

Doliophis bilineatus, Boulenger, 1896:404.— Griffin, 1909c:600; 1911:266.— Taylor, 1922a:274, pl. 34, figs. 5–6, pl. 35, fig. 3.

Maticora intestinalis bilineata, Leviton, 1964d:532.— Gaulke, 1999:279.

Calliophis intestinalis, Wallach, Williams, and Boundy, 2014:143 (part).

Calliophis bilineata, Leviton, Brown, and Siler, 2014:493, fig. 31.

Type locality and type specimen(s).— "Insula Philippinensis Palawan" [= Palawan], Philippines. Holotype ZMB 10004 [*fide* Bauer et al. 1995:75].

Philippine distribution (endemic) (Map 8A [p. 119]).— Balabac, Busuanga, Calauit, Culion, Palawan.

Conservation status [IUCN].— This taxon has not yet been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Calliophis philippina Günther, 1864 — Photo figures 87–90

Philippine [banded or striped] Coral Snake

Callophis intestinalis var. *Philippina* Günther, 1864:349.
Adeniophis philippinus, Meyer, 1886:614.— Boettger, 1886:117.— Casto de Elera, 1895:441.
Doliophis philippinus, Boulenger, 1896:404.— Griffin, 1911:266.— Taylor, 1918a:261; 1922a:277, pl. 35, figs. 1–2; 1922c:301.
Maticora intestinalis philippina, Leviton, 1964d:533.— Smith, 1993:99.
Calliophis intestinalis, Wallach, Williams, and Boundy, 2014:143 (part).
Calliophis philippina, Leviton, Brown, and Siler, 2014:494, figs. 10, 32A–B.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:14, fig. 75.

Type locality and type specimen(s).— Philippine Ids. Holotype: BMNH [not confirmed].

Philippine distribution (endemic) (Map 8B [p. 119]).— Camiguin Sur, Dinagat, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Davao, Lanao del Sur, Misamis Occidental, Misamis Oriental, Zamboanga City, Zamboanga del Norte), Samar.

Conservation status [IUCN].— The conservation status of *Calliophis philippina* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

Calliophis salitan Brown (RM), Smart, Leviton, and Smith, 2018 — Photo figure 91

Dinagat Island Banded Coral Snake

Calliophis sp., Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:101.
Calliophis salitan. Brown, Smart, Leviton, and Smith, 2018:93, figs. 1, 4–7.

Type locality and type specimen(s).— Mt. Cambinliasa [elev. 195 m], sitio Cambinlia (Studlon), Barangay Santiago, Municipality Loreto, Dinagat Id., Dinagat Ids. Prov., Mindanao PAIC, Philippines. Holotype: PNM 9844 (formerly KU 310164).

Philippine distribution (endemic) (Map 8C [p. 119]).— Dinagat Island.

Conservation status [IUCN].— Not available as of IUCN [2016] ver. 3.1.

Calliophis suluensis Steindachner, 1891

Sulu Islands Banded Coral Snake

Callophis intestinalis suluensis Steindachner, 1891:295.
Maticora intestinalis suluensis, Leviton, 1964d:535.— Gaulke, 1994b:141.
Calliophis intestinalis, Wallach, Williams, and Boundy, 2014:143 (part).
Calliophis suluensis, Leviton, Brown, and Siler, 2014:494.

Type locality and type specimen(s).— Sulu Archipelago, Philippines. Holotype not traced.

Philippine distribution (endemic) (Map 8D [p. 119]).— Sulu Archipelago (Jolo, Siasi).

Conservation status [IUCN].— The conservation status of *Calliophis suluensis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Hemibungarus calligaster* (Wiegmann, 1834b)** **Photo figure 92**

[Annulated or Barred] Philippine False Coral Snake

Elaps calligaster Wiegmann, 1834b:253, pl. 20, fig. 2.

Calliophis caligaster [*sic*], Müller, 1883:289.

Hemibungarus calligaster, Taylor, 1922a:269, pl. 33, figs. 1–2, pl. 34, figs. 1–2; 1922c:300; 1922d:139.— Castoe et al., 2007:809 et seq. (part) — Devan-Song and Brown, 2012:14.— Leviton, Brown, and Siler, 2014:495, figs. 8B, 9, 33.— Wallach, Williams, and Boundy, 2014:319 (part).

Calliophis calligaster calligaster, Leviton, 1964d:543.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.

Hemibungarus calligaster calligaster, McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:188.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190, fig. 33.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:88, fig. 95.

Type locality and type specimen(s).— Manila, Luzon Id., Philippines. Holotype: ZMB 2742.

Philippine distribution (endemic) (Map 15C [p. 126]).— Luzon (Prov.: Albay, Bataan, Bulacan, Camarines Sur, Isabela, Laguna, Manila, Quezon, Rizal, Zambales), Mindoro (Prov.: Mindoro Occidental).

Remarks.— Ross and Gonzales (1992:68) cite two specimens from Catanduanes as well as two from the Bicol region of Luzon that in their view differ from previously recognized "races" of *H. calligaster*, i.e., *H. calligaster* and *H. gemianulus*, and therefore left the matter of assignment to future study.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hemibungarus gemianulis* Peters, 1872**

[Double-barred] Philippine False Coral Snake; Barred Coral Snake

Hemibungarus gemianulis Peters, 1872:587.— Leviton, Brown, and Siler, 2014:495.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Hemibungarus calligaster, Taylor, 1922a:269, pl. 33, figs. 1–2, pl. 34, figs. 1–2 (part).— Castoe et al., 2007:809 et seq. (part)— Wallach, Williams, and Boundy, 2014:319 (part).

Calliophis calligaster gemianulis, Leviton, 1964d:545.— Gaulke and Altenbach, 1994:63.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].

Hemibungarus calligaster gemianulis, Gaulke, 2011:320–321, figs. 219–221.

Type locality and type specimen(s).— "Philippine Ids." Holotype: ZMB 7405 (*fide* Bauer Bauer et al. [1995:76]).

Philippine distribution (endemic) (Map 15D [p. 126]).— Cebu, Guimaras, Masbate, Negros (Prov.: Negros Occidental, Negros Oriental), Panay (Prov.: Aklan, Antique, Iloilo).

Conservation status [IUCN].— The conservation status of *Hemibungarus calligaster* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Hemibungarus mcclungi* Taylor, 1922a** **Photo figure 93**

McClung's Philippine Coral Snake

Hemibungarus mcclungi Taylor, 1922a:272, pl. 33, fig. 3, pl. 34, figs. 3–4; 1922b:300.— Leviton, Brown, and Siler, 2014:495.

Calliophis calligaster mcclungi, Leviton, 1964d:547.

Hemibungarus calligaster mcclungi, Siler and Welton, 2010:428.

Hemibungarus calligaster cf. *mcclungi*, Siler and Welton, 2010:428.
Hemibungarus calligaster, Wallach, Williams, and Boundy, 2014:319 (part).

Type locality and type specimen(s).— Polillo Id., Philippines. Holotype: Philippine Bureau of Science, Manila; destroyed during WWII. Neotype: CAS 62431 (formerly EHT 302**,** designated by Leviton [1964b:547]).

Philippine distribution (endemic) (Map 16A [p. 127]).— Cantanduanes, Luzon (Prov.: Aurora, Bicol Peninsula [Albay, Camarines Sur], Quezon, Sorsogon), Polillo.

Conservation status [IUCN].— The conservation status of *Hemibungarus mcclungi* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life* as *Hemibungarus calligaster mcclungi* Taylor, 1922 (IUCN [2016] ver. 3.1).

Naja philippinensis Taylor, 1922a — Photo figures 94

Northern Philippine Cobra

Naja tripudians caeca, (part) Bouelnger, 1896:383 (specimen o, from Lepanto, Luzon).
Naja naja philippinensis Taylor, 1922a:265; 1922c:301; 1922d:139.— Leviton, 1965b:539.
Naja philippinensis, Gaulke and Altenbach, 1994:63.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.— Diesmos, Brown, and Gee, 2004:71.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484.— Devan-Song and Brown, 2012:15, fig. 35.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:88.— Leviton, Brown, and Siler, 2014:496, figs. 4, 34, 35A–B.— Wallach, Williams, and Boundy, 2014:462.

Type locality and type specimen(s).— Manila, Luzon Id., Philippines. Holotype: Philippine Bureau of Science, Manila; destroyed during WWII. Neotype: (PNM [not confirmed]).

Philippine distribution (endemic) (Map 26C [p. 137]).— Luzon (Prov.: Aurora, Batangas, Benguet, Bulacan, Cavite, Cagayan, Ilocos Norte, Kalinga, Laguna, Nueva Vizcaya, Pampanga, Pangasinan, Quezon, Rizal, Zambales), Marinduque, Masbate, Mindoro.

Conservation status [IUCN].— Near Threatened [2016] ver. 3.1.

Naja samarensis Peters, 1861

Southern Philippine Cobra; Samar Cobra

Naja tripudians var. *samarensis* Peters, 1861:690.
Naja samarensis, Boulenger, 1896:385.— Wüster and Thorpe, 1990:336–341.— Smith, 1993:99.— David, Pauwels, Lays, and Lenglet, 2006:220.— Leviton, Brown, and Siler, 2014:496, fig. 35C.— Wallach, Williams, and Boundy, 2014:462.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:103.
Naja naja samarensis, Taylor, 1922a:259; 1922c:302.— Leviton, 1964b:542.

Type locality and type specimen(s).— Loquilocum, Samar Id., Philippines. Holotype: ZMB 3955.

Philippine distribution (endemic) (Map 26D [p. 137]).— Bohol, Camiguin Sur, Dinagat, Leyte, Mindanao (Prov.: Agusan del Norte, Bukidnon, Davao del Sur, Lanao, Misamis Occidental, South Cotabato, Zamboanga City), Samar.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Naja sumatrana* F. Müller, 1887**
Equatorial or Sumatran Spitting Cobra

Naja tripudians var. sumatrana Müller, 1887:277.

Naja naja miolepis, Taylor, 1922a:262, text-fig. 30.— Leviton, 1965b:538.

Naja sumatrana, Wüster and Thorpe, 1989:336–341.— Broadley, Rage, and Toriba, 1993:192.— David and Ineich, 1999:168.— Gaulke, 1999:279.— Leviton, Brown, and Siler, 2014:497.— Wallach, Williams, and Boundy, 2014:463.— Sy, et al., 2016:427.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Solok, Sumatera Barat Prov., Sumatra, Indonesia. Holotype: NMBA 2244.

PHILIPPINE DISTRIBUTION (Map 27A [p. 138]).— Busuanga, Calamian Ids. (Calauit), Culion, Palawan.

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— Thailand (southern), Malaysia (Peninsula, Borneo), Indonesia (Borneo).

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

***Ophiophagus hannah* (Cantor, 1836)** **Photo figure 95**
King Cobra

Hamadryas hannah Cantor, 1836:87, pls. 10–12; 1838:72.

Ophiophagus hannah, Günther, 1864:341.— Leviton, 1965b:544.— Alcala, 1986a:161; 1986b:161.— Broadley, Rage, and Toriba, 1993:195.— David and Ineich, 1999:171.— Diesmos, Brown, and Gee, 2004:71.— David, Pauwels, Lays, and Lenglet. 2006:220.— Castoe et al., 2007:809 et seq.— Gaulke, 2011:324–327, figs. 322–324.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:189.— Siler, Welton, Brown, Infante, and Diesmos, 2011:297, fig. 1.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:190.— Devan-Song and Brown, 2012:15, fig. 36.— Sy and Wallbank, 2013:110.— Leviton, Brown, and Siler, 2014:497, figs. 7A–B, 36–37.— Wallach, Williams, and Boundy, 2014:497.— Sy, de Layola, Yu, and Diesmos, 2015:220.— Sy and Boos, 2015:220.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:14.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170, fig. 34.— Sy, 2016a:263; 2016b:264.— Sy, Baniqued, and Diesmos, 2016:264.

Naja hannah, Taylor, 1922a:256, text-fig. 29, pl. 31, figs. 2–3; 1922d:139.— Smith, 1943:436.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Sundarbans (also as Sunderbuns), nr. Calcutta, Bengal, India. Holotype: BMNH 1996.451.

PHILIPPINE DISTRIBUTION (Map 28D [p. 139]).— Balabac, Bohol, Catanduanes, Cebu, Dinagat, Leyte (Prov.: Leyte), Luzon (Prov.: Aurora, Benguet, Bulacan, Camarines Norte, Isabela, Kalinga, Laguna, Nueva Ecja, Nueva Vizcaya, Pangasinan, Sorsogon, Zambales), Mindanao (Prov.: Davao del Sur, Zamboanga del Norte, Zamboanga del Sur [Zamboanga City], South Cotabato), Mindoro, Negros (Prov.: Negros Oriental), Palawan, Panay (Prov.: Antique), Polillo, Romblon, Sulu Archipelago (Jolo).

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— Widely distributed throughout Southeast Asia, from Pakistan through South and Southeast Asia, southern China, Malaysia, Singapore, Indonesia. (See Wallach, Williams, and Boundy [2014:497] for details.)

CONSERVATION STATUS [IUCN].— Vulnerable A2acd [2016] ver. 3.1.

Subfamily Hydrophiinae Fitzinger, 1843*

***Aipysurus eydouxii* (Gray, 1849)**
Spine-tailed or Marbled Sea Snake

Tomogaster eydouxii Gray, 1849:59.
Aipysurus eydouxii, Smith, 1926:14, fig. 7.— David and Ineich, 1999:58.— Leviton, Brown, and Siler, 2014:500.— Wallach, Williams, and Boundy, 2014:21.

Type locality and type specimen(s).— Indian Ocean. Holotype: BMNH 1946.1.6.86 (formerly BMNH III.10.1; *fide* Smith [1926:16]).
Philippine distribution.— no verifiable records or voucher specimens.
General distribution (other than Philippines).— Widely distributed in coastal waters off of Australia (Queensland, Northern Territory, Western Australia), New Guinea, Indonesia, Gulf of Thailand, Singapore, Malaysia, South China Sea.
Remarks.— Although reported for the Philippines, no verifiable records or voucher specimens. Taylor (1922a:227) states, "I have seen no specimens. Both Boulenger [1896:304] and Wall [1910:189] give the Philippines as part of its range, and the species is included in the present work on their authority."; Smith (1926:16) also questions the authenticity of Boulenger's report.
Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Emydocephalus annulatus* Krefft, 1869**
Annulated Sea Snake; Turtleheaded Sea Snake

Emydocephalus annulatus Krefft, 1869:322.— Smith, 1926:26, fig. 14.— Alcala, 1986a:162.— David and Ineich, 1999:91.— Leviton, Brown, and Siler, 2014:501.

Type locality and type specimen(s).— "Probably the Australian Seas" (see David and Ineich [1999:91]). Syntypes (2): AMS 454 and 6633.
Philippine distribution (Map 15B [p. 125]).— "Probably all over Philippine seas" (Alcala [1986:163]) but without exact references.
General distribution (other than Philippines).— Australia, Papua New Guinea, Indonesia (Irian), Loyalty Islands.
Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Kolpophis*] *annandalei* (Laidlaw, 1901)**
Annandale's Sea Snake; Bigheaded Sea Snake

Distira annandalei Laidlaw, 1901:579, pl. 35.
Kolpophis annandalei, Smith, 1926:106, fig. 31.— David and Ineich, 1999:121.— Wallach, Williams, and Boundy, 2014:345.
Hydrophis [*Kolpophis*] *annandalei*, Leviton, Brown, and Siler, 2014:502.

* As the authors stated in an earlier publication (Leviton, Brown, and Siler [2014:501–502]), David and Ineich (1999:104) reviewed the controversy surrounding the use of the name *Hydrophis* to include several nominal taxa, *Disteira*, *Leioselasma*, and *Aturia* that had been recognized by various authors. In so doing, they followed Rasmussen (1996), who also recommended recognizing *Astrotia* and *Enhydrina* as distinct genera. More recently, several phylogenetic studies have led to the abandonment of at least 10 heretofore recognized genera by placing them and their included species in the genus *Hydrophis* (Sanders et al. [2013]; Pyron et al. [2013]). Although we have adopted the newly proposed taxonomic arrangements here, we have also indicated where those changes have occurred by including in brackets [ ] the genus name to which the respective species had been previously assigned. It should be noted that the bracketed name does not imply a subgenus designation. The authors mistakenly assigned *Microcephalophis gracilis* to *Hydrophis*, neglecting to note that Sanders et al. (2013:584) specifically recommended continued recognition of *Microcephalophis* as a distinct genus from the *Hydrophis* core group to include *M. gracilis* and *M. cantoris*.

Type locality and type specimen(s).— Patani Bay, Malaysia Peninsula. Holotype: BMNH 1946.1.17.56 (formerly BMNH 1926.10.18.1; *fide* Smith [1926:107]).

Philippine distribution.— Philippines (not yet reported from the Philippines but has been reported from coastal waters of northern Borneo [Brunei] and Vietnam in the South China Sea as well as the Gulf of Thailand).

General distribution (other than Philippines).— Indonesia (Java), Singapore, Malaysia, and Thailand (see David and Ineich [1999:121] for references).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Hydrophis [*Thalassophis*] *anomalus* Schmidt, 1852

Anomalous Sea Snake

Thalassophis anomalus Schmidt, 1852:81.— Smith, 1926:104, fig. 30.— David and Ineich, 1999:197.— Stuebing and Inger, 1999:221.— Wallach, Williams, and Boundy, 2014:702.

Hydrophis [*Thalassophis*] *anomalus*, Leviton, Brown, and Siler, 2014:502.

Type locality and type specimen(s).— Java, Indonesia. Holotype: ZMH 3342 (formerly ZMH 402 [*fide* Wallach et al. {2014:702}]),

Philippine distribution.— Not yet reported from coastal Philippine waters but one record for the northern coast of Borneo [Brunei] and elsewhere in the Gulf of Thailand.

General distribution (other than Philippines).— Indonesia (Java, Kalimantan, Moluccas), Malaysia, Singapore, Thailand, Vietnam.

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Hydrophis atriceps Günther, 1864

Southeast Asian Sea Snake; Blackheaded Banded Sea Snake

Hydrophis atriceps Günther, 1864:371, fig.— McCarthy, 1993c:230.— David and Ineich, 1999:104.— Rasmussen, 2001:4001, 1 fig.— Leviton, Brown, and Siler, 2014:503, figs. 19B, 23A, 24A.— Wallach, Williams, and Boundy, 2014:334.

Disteira cincinnatii Van Denburgh and Thompson, 1908:41, pl. (type locality: Manila Bay, off Cavite, Luzon Id.; holotype: CAS 15016).

Hydrophis fasciatus atriceps, Smith, 1926:97, fig. 27; 1943:465.

Hydrophis fasciatus, Alcala, 1986a:164.

Type locality and type specimen(s).— Siam. Syntypes (2): BMNH 1946.1.2.62 (formerly BMNH 62.11.1.255), and BMNH 63.9.29.5; *fide* Smith [1926:98]; see also Wallach et al. [2014:334]).

Philippine distribution (Map 16D [p. 127])— Luzon (Prov.: Cavite [Manila Bay]), Mindanao, Samar, Sulu Archipelago, Visayan Sea.

General distribution (other than Philippines).— coastal waters off the east coast of Malaysia, Gulf of Thailand,Vietnam, southern China, Indonesia to western New Guinea, and northern Australia.

Remarks.— This species is so similar in appearance to *H. fasciatus* that the two have been regarded as conspecific, though treated as distinct subspecies (Smith [1926, 1943]), but recent studies have treated tham as distinct species (see McCarthy [1993:230, 234]; David and Ineich [1999:104, 109]; Wallach et al. [2014:462]). Alcala (1986:164) referred to records from the Visayan Sea and areas around Samar, Mindanao, and the Sulu islands to *H. fasciatus* but David and Ineich (1999:105) noted that "According to A. R. Rasmussen (pers. comm., June 1996), all references of *Hydrophis fasciatus* based on specimens taken East

of Malacca Strait, from Gulf of Thailand to southern China and to the north coast of Australia, belong to *Hydrophis atriceps*; we follow his interpretation." We accept this interpretation as well.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Chitulia*] *belcheri* (Gray, 1849)**

Belcher's Sea Snake; Faint-banded Sea Snake

Aturia belcheri Gray, 1849:46.

Hydrophis belcheri, Smith, 1926:52.— McCarthy, 1993c:230.— David and Ineich, 1999:105.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].— Rasmussen et al., 2011:5.— Leviton, Brown, and Siler, 2014:503.

Chitulia belcheri, Wallach, Williams, and Boundy, 2014:163.

Type locality and type specimen(s).— New Guinea. Holotype: BMNH 1946.1.1.97 (formerly BMNH III.3.2.a; *fide* Smith [1926:53]).

Philippine distribution (Map 17A [p. 128]).— Philippines, unknown, although Alcala (1986a:166) states that it "has been recorded from the central Philippine sea."; see also comment by Ferner et al. (2001:54[21]), who cite Alcala (1986). Otherwise, it has been reported from the coastal waters off of Vietnam in the South China Sea (Rasmussen et al. [2011:5]).

General distribution (other than Philippines).— Gulf of Thailand, Vietnam, Indonesia, and New Guinea. (N.B.: David and Ineich [1999:105], citing earlier discussions by McDowell [1972:217] and McCarthy and Warrell [1991:162–163], refer the Australasian records to *Hydrophis pacificus*, but see also Kharin [2005:161], whose observations heighten the confusion regarding the identification of samples of populations supposedly belonging to *H. belcheri.* See also comments by Rasmussen [2001] relating to *H. coggeri*.)

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Hydrophis brookii* Günther, 1872**

Brook's Sea Snake

Hydrophis brookii Günther, 1872:597, fig.— Smith, 1926:99.— David and Ineich, 1999:106.— Stuebing and Inger, 1999:207.— Rasmussen et al., 2011:5.— Leviton, Brown, and Siler, 2014:504.

Type locality and type specimen(s).— Sarawak [coast], Borneo, Malaysia. Holotype: BMNH 1946.1.1.57 (formerly BMNH 72.2.16.58; *fide* Smith [1926:101]).

Philippine distribution.— Unknown in the Philippines, but it has been reported from South China Sea, along the coast of Sarawak, Borneo (Smith [1926:101]; Stuebing and Inger, [1999:207]), and Vietnam (David and Ineich [1999:106]; Rasmussen [2011:5]).

General distribution (other than Philippines).— Thailand, Indonesia, Malaysia, Singapore, Vietnam, Sarawak coast of Borneo.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis caerulescens* (Shaw, 1802)**

Blue-grey Sea Snake; Dwarf Sea Snake

Hydrus caerulescens Shaw, 1802:561.

Hydrophis caerulescens, Smith, 1926:90, fig. 26.— David and Ineich, 1999:106.— Sanders, Lee,

Mumpuni, Bertozzi, and Rasmussen, 2013:579 *et seq*.— Pyron, Burbrink, and Wiens, 2013:28, fig. 24.

Polyodontognathus caerulescens, Wallach, Williams, and Boundy, 2014:563.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Indian Ocean. Holotype: BMNH 1946.1.3.90 (formerly BMNH III.6.13.a; *fide* Smith [1926:92]).

PHILIPPINE DISTRIBUTION .— Philippines (this species has not been recorded from the Philippines but it has been reported from off the Sarawak Coast of northern and western Borneo (Stueling and Inger [1999:208]).

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— Widely distributed from coastal Pakistan to western Indonesia, Australia (see David and Ineich [199:106] for details).

REMARKS.— According to Stueling and Inger (1999:208) off the Sarawak coast (Borneo) this snake on occasion has been caught up in shrimp trawls, more frequently in sheltered embayments rather than the open sea. The authors also note that although a small non-aggressive snake, with "a small mouth and tiny fangs", it possesses a dangerous venom, and it can produce a "serious, even fatal bite."

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis [*Leioselasma*] *coggeri* Kharin, 1984

Cogger's Sea Snake; Pacific Yellow-banded Sea Snake; Slender-necked Sea Snake

Leioselasma coggeri Kharin, 1984a:1538, fig. b.— David and Ineich, 1999:107.— Rasmussen, 2001:4002, figs.— Wallach, Williams, and Boundy, 2014:358.

Hydrophis coggeri, Leviton, Brown, and Siler, 2014:504.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Port Suva, Fiji Ids. Holotype ZISP 19681**.**

PHILIPPINE DISTRIBUTION.— said to occur in the Philippines (Rasmussen [2001:4002] and distribution map; also Zug [2013:229]) but most likely *H. melanocephalus* (see Rasmussen et al. [2011:6]).

GENERAL DISTRIBUTION (OTHER THAN PHILIPPINES).— north coast of Australia, New Caledonia, east to Vanuatu and Fiji.

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis [*Lapemis*] *curtus* Shaw, 1802 **Photo figure 96**

Short or Hardwicke's Sea Snake

Lapemis curtus Shaw, 1802:562.— Zhao and Adler, 1993:269.— Gritis and Voris, 1990:1–11.— Whitaker and Captain, 2004:398, photo (p. 399). McCarthy, 1993d:244.— David and Ineich, 1999:121.— Wallach, Williams, and Boundy, 2014:354.

Lapemis hardwickii Gray *in* Hardwicke and Gray, 1835, vol. 2, pl. 87.— Smith, 1926:108, fig. 32, pl. 1, fig. 3; 1943:468, figs. 148–149.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].— Devan-Song and Brown, 2012:14.

Lapemis curtus hardwickii, McCarthy, 1993d:244.

Hydrophis curtis, Sanders, Lee, Mumpuni, Bertozzi, and Rasmussen, 2013:579 *et seq*.— Pyron, Burbrink, and Wiens, 2013:28, fig. 24.

Hydrophis [*Lapemis*] *curtus*, Leviton, Brown, and Siler, 2014:504, figs. 27D, 28–29, 37–38.

TYPE LOCALITY AND TYPE SPECIMEN(S).— India. Holotype: BMNH 1946.1.17.59 (formerly BMNH III.2.2.a; *fide* Smith [1926:110]).

PHILIPPINE DISTRIBUTION (Map 17B [p. 128]).— Luzon (Prov.: Cavite [Manila Bay], Manila

[Manila Bay], Pangasian [Lingayen Gulf], Rizal, Zambales), Mindanao (Prov.: Zamboanga del Sur [Zamboanga City]), Negros (Prov.: Negros Occidental), (also reported from the Visayan Sea [*fide* Alcala {1986:170}], and listed from Negros and Panay [*fide* Wallach et al. {2014:355}]).

General distribution (other than Philippines).— Widely distributed, from the Persian Gulf to Austrakalia, along the southeast coast of India to Straits of Malacca, Indonesia, Australia, and north to China, Taiwan, and Japan. (See Wallach et al. [2014:354] for details.)

Remarks.— Gritis and Voris (1990) do not recognize *Lapemis hardwickii* [now *Hydrophis hardwicki*] as a distinct species, placing it in the synonymy of *L. curtus*. McCarthy (1993) recognized it as a subspecies of *L. curtus*, allowing that the nominate form inhabits coastal waters from the Persian Gulf to the shores of western India, and *L. curtus hardwickii* ranges from the coastal waters of Sri Lanka and eastern India to New Guinea and Australia and north to the coast of China, the Philippines, and Japan (see also David and Ineich [1999:121–122]). Smith (1926:113, 1943:471) argued that *L. curtus* ranges from the Persian Gulf to the west coast of India as far as Sri Lanka but that it is unknown along the east coast of India. We follow Gritis and Voris inasmuch as theirs is the most comprehensive analysis of character variation done so far, and based on their study there are no mophological features that justify recognizing two species although we emphasize that recent phylogenetic studies (Sanders et al. [2013]) place the genus *Lapemis* and its included species in the genus *Hydrophis*.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis cyanocinctus Daudin, 1803 — Photo figure 97

Annulated Sea Snake; Many-banded Sea Snake; Bluebanded Sea Snake

Hydrophis cyanocinctus Daudin, 1803, 7:383.— Smith, 1926:56, fig. 20; 1943:454.— David and Ineich, 1999:108.— Whitaker and Captain, 2004:392, photo (p. 303).— Leviton, Brown, and Siler, 2014:505, figs. 19B, 20B, 23B, 25B, 26A–B, 39.— Sanders, Lee, Mumpuni, Bertozzi, and Rasmussen, 2013:579 *et seq*.— Pyron, Burbrink, and Wiens, 2013:28, fig. 24.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Leioselasma cyanocincta, Wallach, Williams, and Boundy, 2014:358.

Type locality and type specimen(s).— Sunderbunds [= Sunderbans] (Ganges Delta), India. Holotype: BMNH 1946.1.9.23 (formerly BMNH 96.3.25.6; *fide* Smith [1926:61]) (see also Russell [1801:pl. 9] [*fide* David and Ineich {1999:108}]).

Philippine distribution (Map 17C [p. 128]).— Cebu, Luzon (Prov.: Cavite [Manila Bay]; Manila [Manila Bay]), Mindanao (Prov.: Basilan [Pilas Id.]), Visayan region [*fide* Alcala {1986a:164}]).

General distribution (other than Philippines).— Extensive range from Persian/Arabian Gulf east to Indonesia and north to the Idzu Sea, Japan (see David and Ineich [1999:108] for details).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis inornatus (Gray, 1849)

Remarks (Map 17D [p. 128]).— According to David and Ineich (1999:111), Rasmussen (1989) referred records of Philippine and Indonesian *H. inornatus* to *H. ornatus* (see Rasmussen synonymy [1989:399], also comments on p. 410). Rasmussen also states, "However, the acceptance of *H. inornatus* as a separate species is explicitly preliminary and further study

may show that the type specimen of *H. inornatus* is an aberrant specimen of *H. ornatus*." (Rasmussen [1989:415]). (See also Leviton, Brown, and Siler [2014:506]).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Hydrophis* [*Kerilia*] *jerdoni* Gray, 1849**

Jerdon's Sea Snake

Kerilia jerdoni Gray, 1849:57.— Smith, 1926:31, fig. 15.— David and Ineich, 1999:120.— Stuebing and Inger, 1999:214.— Rasmussen et al., 2011:8.— Wallach, Williams, and Boundy, 2014:345.

Hydrophis [*Kerilia*] *jerdoni*, Leviton, Brown, and Siler, 2014:507.

Type locality and type specimen(s).— Madras, India. Holotype: BMNH 1946.1.10.11 (formerly BMNH III.8.1.a; *fide* Smith [1926:32]).

Philippine distribution.— Philippines (not recorded from the Philippines but reported from coastal waters of northern Borneo and elsewhere in the South China Sea north to Taiwan).

General distribution (other than Philippines).— Widely distributed from coastal waters of southeast Indian Peninsula, Sri Lanka, Myanmar, Thailand, Mergui Archipelago, Malacca Straits, Singapore, and west and northwest coast of Borneo.

Remarks.— Two subspecies of *Kerilia jerdoni* have been recognized, but not all authors agree on their status. *Kerilia j. jerdoni* is the form that would be encountered in the Bay of Bengal along the coasts of southeast India, Sri Lanka, and Myanmar, whereas *K. j. siamensis* ranges from the east coast of Peninsular Thailand to the Borneo coast (Rasmussen and Anderson [1990]).

We have assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Although not yet recorded from the Philippines, its occurrence in shallow coastal waters off the coast of northern Borneo suggests it will likely be found in coastal waters off of the Palawan Island group and perhaps in the Sulu Sea.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Mediohydrophis*] *klossi* Boulenger, 1912**

Kloss's Sea Snake

Hydrophis klossi Boulenger, 1912:190.— Smith, 1926:68, fig. 21.— Stuebing and Inger, 1999:210.— David and Ineich, 1999:112.— Leviton, Brown, and Siler, 2014:507.

Mediohydrophis klossi, Wallach, Williams, and Boundy, 2014:422.

Type locality and type specimen(s).— Selangor, Malaysia Peninsula. Holotype: BMNH 1946.1.10.8 (formerly BMNH 1920.6.3.7; *fide* Smith [1926:69]).

Philippine distribution.— Philippines (not yet reported from Philippine waters; Stuebing and Inger [1999:210] report one specimen off the coast of northern Borneo).

General distribution (other than Philippines).— east coast of Malay Peninsula, Thailand, Singapore, western Indonesia (Sumatra).

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

***Hydrophis* [*Chitulia*] *lamberti* Smith, 1917**

Lambert's Sea Snake

Hydrophis lamberti Smith, 1917:340.— Rasmussen, 1989:410.— David and Ineich, 1999:112.— Rasmussen et al., 2011:6.— Leviton, Brown, and Siler, 2014:507.

Hydrophis ornatus, (part) Smith, 1926:81.— Dunson and Minton, 1978:281.— Minton, 1978:151.
Chitulia lamberti, Wallach, Williams, and Boundy, 2014:163.

Type locality and type specimen(s).— Bight of Bangkok, Thailand. Holotype: BMNH 1946.1.9.20 (formerly BMNH 1921.2.11.13' *fide* Smith [1926:83]).

Philippine distribution (Map 18A [p. 129]).— Gigantes Ids. (Prov.: Iloilo), Luzon (Manila Bay).

General distribution (other than Philippines).— Singapore, Gulf of Thailand, Vietnam.

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013:583) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis [*Leioselasma*] *melanocephalus* Gray, 1849

Black-headed Sea Snake; Slender-necked Sea Snake

Hydrophis sublaevis var. *melanocephalus* Gray, 1849:53.
Hydrophis melanocephalus, Smith, 1926:64.— McCarthy, 1993c:237.— David and Ineich, 1999:114.— Leviton, Brown, and Siler, 2014:508.
Leioselasma melanocephala, Wallach, Williams, and Boundy, 2014:359.

Type locality and type specimen(s).— Indian Ocean ? (questioned by Smith [1926:65]); "'China Sea or even . . . the Ryukyus' via lectotype selection" (Wallack et al. [2014:359]). Lectotype: BMNH 1946.1.9.22 (formerly BMNH 47.3.4.68; *fide* Smith [1926:65]).

Philippine distribution.— Philippines (*fide* Rasmussen [2011]; David and Ineich [1999]) but without locality details.

General distribution (other than Philippines).— Vietnam, China, Taiwan, Japan (Ryukyu Ids.).

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Data Deficient [2016] ver. 3.1.

Hydrophis [*Chitulia*] *ornatus* (Gray, 1842)

Ornate Sea Snake; Reef Sea Snake; Spotted Sea Snake

Aturia ornata Gray, 1842b:61.
Hydrophis ornatus, Smith, 1926:81, fig. 24.— David and Ineich, 1999:116.— Whitaker and Captain, 2004:394, photo (p. 395).— Leviton, Brown, and Siler, 2014:508, figs. 24B, 40–41.
Hydrophis ornatus ornatus, Smith, 1943:460.— McCarthy, 1993c:239.
Chitulia oprnata, Wallach, Williams, and Boundy, 2014:164.

Type locality and type specimen(s).— Indian Ocean. Holotype: BMNH 1946.1.23.72 (formerly BMNH III.3.1.a; *fide* Smith [1926:83]).

Philippine distribution (Map 18B [p. 129]).— Gigantes Sur, Luzon (Prov.: Cavite [Manila Bay], Rizal [Manila Bay]), Panay.

General distribution (other than Philippines).— Persian [Arabian] Gulf to New Guinea and Australia and north along the coast of China to the Ryukyu Ids. (See also comments by Zug [2013:230] relating to reports of occurrence in the Gilbert Islands.)

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Acalyptophis*] *peronii* (A.H.A. Duméril, 1853)**
Spiny-headed Sea Snake or Horned Sea Snake

Acalyptus peronii A.H.A. Duméril, 1853:522.
Acalyptophis peronii, Boulenger, 1896:269.— Smith, 1926:102, figs. 28–29.— David and Ineich, 1999:55.— Wallach, Williams, and Boundy, 2014:2.
Hydrophis [*Acalyptophis*] *peronii*, Leviton, Brown, and Siler, 2014:509, figs. 20C, 42.

Type locality and type specimen(s).— New Holland (but questioned by Smith, 1926:103). Holotype: MNHN 7177.

Philippine distribution.— Philippines (unknown, but it has been reported from the coast of the Malaysian Peninsula and Vietnam in the South China Sea).

General distribution (other than Philippines).— Gulf of Siam, including coastal Thailand, Vietnam, Malaysia, Indonesia, South China Sea north to Taiwan, and east to New Guinea, New Caledonia, and Australia.

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013:583) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Pelamis*] *platurus* (Linnaeus, 1758)** **Photo figure 98**
Pelagic Sea Snake; Yellow-bellied Sea Snake

Anguis platura Linnaeus, 1766:391.
Pelamis platurus, Smith, 1926:116, fig. 33; 1943:476.— McCarthy, 1993e:245.— David and Ineich, 1999:174.— Whitaker and Captain, 2004:402, photo (p. 403).
Pelamis platura, Rasumssen et al., 2011:9.— Wallach, Williams, and Boundy, 2014:529.
Hydrophis [*Pelamis*] *platurus*, Leviton, Brown, and Siler, 2014:509, figs. 27A, 27C, 30, 43–44.
Hydrophis platyurus [*sic*], Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:103.

Type locality and type specimen(s).— Not stated. Holotype not traced (see Wallach et al. [2014:529]).

Philippine distribution (Map 18C [p. 129]).— Gigantes Ids., Luzon (but said to be widely distributed), Mindanao (Prov.: Zamboanga Sibugay [Sibuguey Bay]), Sulu Archipelago (Jolo, Sibutu), Surigao.

General distribution (other than Philippines).— Most widely distributed of all sea snakes, from east coast of Africa throughout southern and eastern coastal Asia, as far north as southern Siberia, throughout Indonesia to Australia and Tasmania, also from Gulf of Panama north to Baja California in western North America and Hawaiian Islands. (See Wallach et al. [2014:529] for details.)

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Enhydrina*] *schistosus* (Daudin, 1803)** **Photo figure 99**
Beaked Sea Snake; Hooked-nosed Sea Snake

Hydrophis schistosus Daudin, 1803, 7:386.
Enhydrina schistosa, Smith, 1926:36, fig. 17; 1943:449, fig. 144.— McCarthy, 1993b:227.— David and Ineich, 1999:92.— Whitaker and Captain, 2004:390, photo (p. 391).— Wallach, Williams, and Boundy, 2014:265.

Disteira schistosa, McDowell, 1972:239–244.

Hydrophis [*Enhydrina*] *schistosus*, Leviton, Brown, and Siler, 2014:510, figs. 20A, 21B, 22, 45.

Type locality and type specimen(s).— "Restricted to Tranquebar [= Tharangambadi], Tamil Nadu State, SE India . . . *fide* M.A. Smith (1926a: 39)" (Wallach et al. [2014:265]; see also Bauer [2015:46]). Type based on Russell, 1801, p. 11, pl. x and p. 13, pl. xi. According to Wallach et al. (*op. cit.*), "Holotype, BMNH 1946.1.10.7 (formerly RCSM & BMNH 1921.7.28.1) . . ."

Philippine distribution.— Philippines (although there are no specific records, its wide range and occurrence in the South China Sea in muddy bottoms of coastal waters and at the mouths of streams, makes its occurrence in the coastal waters of southwestern Philippines likely).

General distribution (other than Philippines).— Persian/Arabian Gulf (Iraq, Iran), Oman, Pakistan, India, Myanmar, Thailand, Malaysia, Singapore, Indonesia, east to New Guinea and Australia (David and Ineich [1999:92]).

Remarks.— Stuebing and Inger note that "The Beaked Sea Snake is a dangerous species, with potent venom and a reputation in Peninsula Malaysia for biting fishermen. Because of its preference for muddy bottoms, it is sometimes trod upon in shallow tidal flats by people who wade barefoot while netting prawns." (Stuebing and Inger [1999:207].)

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Hydrophis [*Leioselasma*] *semperi* Garman, 1881 — Photo figure 100

Lake Taal Sea snake

Hydrophis semperi Garman, 1881:85.— Smith, 1926:63.— McCarthy, 1993c:240.— David and Ineich, 1999:118.— Leviton, Brown, and Siler, 2014:511, fig. 46.

Leioselasma semperi, Wallach, Williams, and Boundy, 2014:360.

Type locality and type specimen(s).— Lake Taal, Luzon Id., Philippines. Holotype: MCZ 4352.

Philippine distribution (endemic) (Map 18D [p. 129]).— Luzon (Prov.: Batangas [Lake Taal]).

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Vulnerable B1ab(iii,v); D2 [2016] ver. 3.1.

Hydrophis [*Leioselasma*] *spiralis* (Shaw, 1802) — Photo figure 101

Yellow Sea Snake

Hydrus spiralis Shaw, 1802:564, pl. 125.

Hydrophis spiralis, Smith, 1926:48.— David and Ineich, 1999:118.— Leviton, Brown, and Siler, 2014:511, figs. 25A, 26C–D.

Leioselasma spiralis, Wallach, Williams, and Boundy, 2014:360.

Type locality and type specimen(s).— Indian Ocean. Holotype: BMNH 1946.1.6.94 (formerly BMNH III.6.10.c) (see comment by Smith [1926:50], also Bauer [2015:57[).

Philippine distribution (Map 19A [p. 130]).— Philippines (a single record, juvenile, from Mergusi [Smith {1926:50}] has been repeatedly cited without further evidence of presence in Philippine coastal waters; Wallach et al. [2014:360] include Tablas in their distribution list).

General distribution (other than Philippines).— Widely distributed from the Persian/Ara-

bian Gulf east to Malaysia and Indonesia (see David and Ineich [1999:118]; Wallach et al. [2014:360]).

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al.(2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Astrotia*] *stokesii* (Gray, 1846)**

Malayan [or Stokes'] Sea Snake

Hydrus stokesii (part) Gray in Stokes, 1846:502.

Astrotia stokesi, Wall, 1909:250.

Astrotia stokesii, Smith, 1926:113.— Dunson and Minton, 1978:282.— David and Ineich, 1999:63.— Wallach, Williams, and Boundy, 2014:59.

Hydrophis [*Astrotia*] *stokesii*, Leviton, Brown, and Siler, 2014:512, figs. 27B, 47.

Type locality and type specimen(s).— Australian seas. Holotype: BMNH 1946.1.17.12 (formerly BMNH III.9.1.d; *fide* Smith [1926:115]).

Philippine distribution (Map 19B [p. 130]).— Gigantes Sur (Prov.: Iloilo) (see Dunson and Minton [1978:282]).

General distribution (other than Philippines).— Widely distributed from India to Australia and north into the South China Sea. (See David and Ineich [1999:63], and Wallach, et al. [2014:59] for details.)

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Hydrophis* [*Praescutata; Thalassophina*] *viperinus* (Schmidt, 1852)**

Grey Sea Snake

Thalassophis viperina Schmidt, 1852:79, pl. 3.

Thalassophina viperina, Smith, 1926:33, fig. 16.— Rasmussen, 1997:23.— Wallach, Williams, and Boundy, 2014:702.

Praescutata viperina, David and Ineich, 1999:177.— Stuebing and Inger, 1999:220.

Hydrophis [*Praescutata*] *viperinus*, Leviton, Brown, and Siler, 2014:512.

Type locality and type specimen(s).— Java, Indonesia. Holotype: NMH (also as ZMH) 404 (*fide* Smith [1926:35]).

Philippine distribution.— Philippines (not yet reported from coastal Philippine waters but present in the South China Sea and Gulf of Thailand).

General distribution (other than Philippines).— Widely distributed from Persian/Arabian Gulf to eastern Asia, including off the coasts of northern Borneo (Sarawak), Thailand, Vietnam, China, as far north as Taiwan (for details see David and Ineich [1999:177]; Stuebing and Inger [1999:220]; Wallach et al. [2014:702]), as well as eastward to northern Australia and into the western Pacific (Zug [2013:231]).

Remarks.— We have tentatively assigned this species to *Hydrophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013).

Conservation status [IUCN].— The conservation status of *Hydrophis viperinus* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Microcephalophis gracilis* (Shaw, 1802)**
Common Small-headed Sea Snake

"Kadell nagam" Russel, 1801:15, pl. 13.
Hydrus gracilis Shaw, 1802:560.
Microcephalophis gracilis, Smith, 1926:121, fig. 34. — David and Ineich, 1999:110.— Rasmussen, Elmberg, Gravlund, and Ineich, 2011:6.— Sanders, Lee, Mumpuni, Bertozzi, and Rasmussen, 2013:584.— Wallach, Williams, and Boundy, 2014:431.
Hydrophis gracilis, Leviton, Brown, and Siler, 2014:506, fig. 19C.

Type locality and type specimen(s).— Type locality unknown. Holotype: BMNH 1946.1.17.37 (formerly BMNH III.4.1.a; *fide* Smith [1926:123]).

Philippine distribution (Map 26A [p. 137]).— Luzon (Manila Bay).

General distribution (other than Philippines).— Widely distributed from Persian/Arabian Gulf (coastal Saudi Arabia, Kuwait, Iraq, Iran, and Oman) east to the Bay of Bengal, Gulf of Thailand, Malaya and Singapore, South China Sea, and Indonesia, to New Guinea (Gulf of Guinea). (See Wallach et al., 2014:431, for details.)

Remarks.— We have retained this species in the genus *Microcephalophis* consistent with the treatments of *Hydrophis* and related nominal genera by Sanders et al. (2013) and Pyron et al. (2013) (see also footnote p. 60 herein).

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Subfamily Laticaudinae Cope, 1879

***Laticauda colubrina* (Schneider, 1799)** **Photo figure 102**
Yellow-lipped sea krait

Hydrus colubrinus Schneider, 1799:238.
Laticauda colubrina, Taylor, 1922a:231, pl. 29.— Smith, 1926:6; 1943:443.— McCarthy, 1993a:146.— David and Ineich, 1999:123.— Brown, Ferner, Sison, Gonzales, and Kennedy, 1996:14.— Ferner, Brown, Sison, and Kennedy, 2001:54[21].— Whitaker and Captain, 2004:386, photo (p. 387).— Bucol, Alcala, Averia, Alcala, and Alcala, 2011:112.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Rasmussen et al., 2011:9.— Devan-Song and Brown, 2012:15.— Siler, Swab, Oliveros, Diesmos, Averia, Alcala, and Brown, 2012:456, fig. 23.— Leviton, Brown, and Siler, 2014:513, figs. 16A, 17B, 18B, 48.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:169.

Type locality and type specimen(s).— Type locality "Ostindischens Meer" in the ZMB catalog (Bauer [1998:139] and Wallach et al. [2014:355]). Holotype: ZMB 9078 (*fide* Smith [1926:8]).

Philippine distribution (Map 19D [p. 130]).— Babuyan Ids. (Babuyan Claro, Barit, Calayan, Dalupiri, Mabag). Bantayan, Bohol, Cebu, Luzon (Manila Bay, Verde Island Passage; [Prov.: Zambales {Subig Bay}]), Maestre de Campo (Romblon Id. group), Mindanao (Prov.: Zamboanga City), Negros (Prov.: Negros Oriental), Panay, Siquijor, Sulu Archipelago (Jolo, Sitanki).

General distribution (other than Philippines).— Smith (1943:444) states that this species is not commonly met in "Indian and Indo-Chinese waters" though it is not uncommon at Singapore. Minton (1975:26, Table 1) suggests that although rare in the Bay of Bengal, it may not be uncommon along the Myanmar coast and the west coast of the Malayasian Peninsula. Also coastal waters of Thailand, Malaysia, western Indonesia as far east as Polynesia and north along the east Asian coast to southern Japan.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Laticauda laticaudata* (Linnaeus, 1758)** **Photo figure 103**

Brown-lipped Sea Krait; Black-banded Sea Krait

Coluber laticaudatus Linnaeus, 1758:222 (part).

Laticauda laticaudata, Taylor, 1922a:4.— Smith, 1926:4, fig. 5; 1943:442.— McCarthy, 1993a:146.— David and Ineich, 1999:124.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Rasmussen et al., 2011:9.— Leviton, Brown, and Siler, 2014:514, figs. 17A, 18A, 49.— Supsup, Puna, Asis, Redoblado, Panaguinit, Guinto, Rico, Diesmos, Brown, and Mallari, 2016:170.

Type locality and type specimen(s).— "In Indiis". Lectotype: NHR Lin-87, designated by Stejneger (1907a:402) (see Wallach et al. [2014:356]).

Philippine distribution (Map 20A [p. 131]).— [coastal waters of the islands of] Babuyan Ids. (Calayan), Bantayan, Gato, Jolo, Luzon, Mindanao, Mindoro [northern], Samar, Sulu Archipelago (Jolo).

General distribution (other than Philippines).— Smith (1943:443) states that it is "rare in the Oriental region (Calcutta and Little Nicobar Harbour)." On the other hand, Minton (1975:26, table 1) suggests that although rare in the Bay of Bengal, it may not be uncommon along the west coast of the Malayan Peninsula. Also western Indonesia (Sumatra and Java) to Australia, Melanesia and Polynesia, and north along the east coast of Asia to southern Japan. (See Wallach et al., 2014:356 for a summary of its reported distribution.)

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Laticauda semifasciata* (Reinwardt *in* Schlegel, 1837)**

Half-banded Sea Krait

Platurus semifasciatus Reinwardt in Schlegel, 1837b:516.

Laticauda semifasciata, Taylor, 1922a:234, pl. 3, fig. 2, pl. 30; 1923:554.— Smith, 1926:10, fig. 6.— David and Ineich, 1999:125.— Oliveros, Ota, Crombie, and Brown, 2011:16.— Rasmussen et al., 2011:9.— Leviton, Brown, and Siler, 2014:514.

Pseudolaticauda semifasciata, Kharin, 1984b:135.— Wallach, Williams, and Boundy, 2014:592.

Type locality and type specimen(s).— Moluccas. Holotype: RMNH 1468 (see also comments by Stejneger [1907a:409]).

Philippine distribution (Map 20B [p. 131]).— [coastal waters of the islands of] Babuyan Ids. (Babuyan Claro), Bohol, Capones, Cuyo, Gato, Luzon (Prov.: Zambales [coast of]), Negros (Prov.: Negros Oriental), Palawan, Sulu Id., Visayas (see David and Ineich [1999:125] and Wallach [2014:592]).

General distribution (other than Philippines).— China, Taiwan, Japan, Russia, Indonesia (*fide* David and Ineich [1999:125]; Rasmussen et al. [2011:9]; Wallach et al. [2014:592]).

Remarks.— We know of no recent genomic data to evaluate the status of the generic affiliation of *Laticauda semifasciata* or its congener, *L. schistorhynchus*. Based on morphological considerations, Kharin (1984) proposed the genus *Pseudolaticauda* to accommodate these two species, and this arrangement has been recognized by Wallach et al. (2014:592). However, we note that Rasmussen et al. (2011:9) retain this species in *Laticauda*, as did David and Ineich (1999:125) for reasons given, and we herein accept this assignment.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

Family Viperidae Oppel, 1811

Subfamily Crotalinae Oppell, 1811

***Trimeresurus* (*Parias*) *flavomaculatus* (Gray, 1842)** **Photo figures 104–109**

Philippine Pit Viper

Magaera flavomaculata Gray, 1842:49.

Parias flavomaculata, Gray, 1849:11.

Trimeresurus flavomaculatus, Günther, 1879:79.— Taylor, 1922a:288; 122d:139.— Leviton, 1964c:257.— Ross and Gonzales, 1992:69.— David and Ineich, 1999:284.— Gumprecht, Tillack, Orlov, Captain, and Ryabov, 2004:32, 25 col. photos (pp. 181–186).— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:190, fig. 8D.— Oliveros, Ota, Crombie, and Brown, 2011:16, figs. 8B, 8C.— Brown, Oliveros, Siler, Fernandez, Welton, Buenavente. Diesmos, and Diesmos, 2012:484, fig. 48.— Devan-Song and Brown, 2012:15, fig. 37.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:93

Trimeresurus flavomaculatus flavomaculatus, Leviton, 1964c:257.— Toriba, 1993a:98.— David & Ineich, 1999:284.— Gaulke, 2001:33, figs. 11–12.

Trimeresurus halieus Griffin 1910:214 (type locality: Polillo Islands).— Taylor, 1922a:286.

Trimeresurus flavomaculatus halieus, Leviton, 1964c:262.— Toriba, 1993a:98.— David & Ineich, 1999:284.

Parias flavomaculatus, David, Pauwels, Lays, and Lenglet, 2006:220, figs. 15–16.— Beukema, 2011:178, fig. 3.— Gaulke, 2011:336–339, figs 231–233.— Siler, Welton, Siler, Brown, Bucol, Diesmos, and Brown, 2011:191, fig. 34–36.— Wallach, Williams, and Boundy, 2014:526 (part).

Parias cf. *flavomaculatus*, Oliveros, Ota, Crombie, and Brown, 2011:16, figs. 8B, 8C.

Trimeresurus schadenbergi Fischer, 1885:116 (type locality: "Süd-Mindanao").

Trimeresurus (*Parias*) *flavomaculatus*, Leviton, Brown, and Siler, 2014:515, figs. 11A, 15A–B, 50A–G.

Trimeresurus cf. *flavomaculatus*, Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:107, fig. 78.

Type locality and type specimen(s).— Luzon Id., Philippines (restricted by Leviton, 1964c:260). Lectotype: BMNH 1946.1.19.34 (formerly BMNH i.3.1a), designated by Iskandar and Colijn (2001:158).

Philippine distribution (Map 35D [p. 146]).— Babuyan Ids. (Babuyan Claro, Calayan, Camiguin Norte, Dalipiri), Biliran, Catanduanes, Leyte, Luzon (Prov.: Aurora, Bataan, Bulacan, Cagayan, Camarines Norte, Ilocos Norte, Ifugao, Isabela, Kalinga, Laguna, Quezon, Sorsogon, Zambales), Mindanao (Prov.: Davao del Norte, Davao del Dur, Lanao del Sur), Mindoro (Prov.: Oriental Mindoro), Negros (Negros Occidental), Panay (Prov.: Aklan, Antique), Polillo, Samar (Prov.: Eastern Samar, Western Samar), Siquijor. (*T.* cf. *flavomaculatus*: Dinagat, Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Misamis Oriental).

General distribution (other than Philippines).— Endemic to the Philippines.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

***Trimeresurus* (*Parias*) *mcgregori* (Taylor, 1919)** **Photo figure 110–113**

McGregor's Philippine Pitviper

Trimeresurus mcgregori Taylor, 1919:110; 1922a:284.— Gumprecht, Tillack, Orlov, Captain, and Ryabov, 2004:35, 18 col. photos (pp. 246–250).

Trimeresurus flavomaculatus mcgregori, Leviton, 1964c:261.— Toriba, 1993a:98.— David and Ineich, 1999:284.

Parias mcgregori, Oliveros, Ota, Crombie, & Brown 2011:6.

Trimeresurus (*Parias*) *mcgregori*, Leviton, Brown, and Siler, 2014:517, figs. 14, 51.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Batan Id., Batanes Group, off northern Luzon Id., Philippines. Holotype: PNM 748 (destroyed during WWII); Neotype: CAS 60525, designated by Leviton (1964c:261).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 36A [p. 147]).— Babuyan Ids. (Calayan, Camiguin Norte), Batan Id.

CONSERVATION STATUS [IUCN].— Data Deficient [2016] ver. 3.1.

***Trimeresurus* (*Parias*) *schultzei* (Griffin, 1909)**

Schultz's Philippine Pitviper

Trimeresurus schultzei Griffin, 1909:601; 1911:267.— Taylor, 1922a:292, pl. 36.— Leviton, 1964c:263.— Toriba, 1993a:105.— David & Ineich, 1999:290.— Gumprecht, Tillack, Orlov, Captain, and Ryabov, 2004:37, 9 col. photos (pp. 288–289).

Trimeresurus (*Parias*) *schultzei*, Leviton, Brown, and Siler, 2014:518, fig. 13.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Palawan [Iwahig]. Holotype: PNM 315 (destroyed during WW II).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 36B [p. 147]).— Balabac, Palawan.

CONSERVATION STATUS [IUCN].— Least Concern [2016] ver. 3.1.

***Tropidolaemus philippensis* (Gray, 1842)** **Photo figure 114**

Philippine Temple Pitviper

Trimeresurus philippensis Gray, 1842:48.— Taylor, 1922a:295, pl. 37, fig.1.

Tropidolaemus hombronii Guichenot in Jacquinot and Guichenot [*q.v.*], 1853:23, pl. 2, fig. 3.

Trimeresurus wagleri, Leviton, 1964c:265.

Tropidolaemus wagleri, Toriba, 1993b, 108.— David & Ineich, 1999:295 (doubtfully included in *T. wagleri*).

Tropidolaemus philippensis, Vogel, David, Lutz, van Rooijen, and Vidal, 2007:31, figs. 25–26.— Leviton, Brown, and Siler, 2014:518, figs. 52B, E–F.— Wallach, Williams, and Boundy, 2014:734.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:119, fig. 80.

TYPE LOCALITY AND TYPE SPECIMEN(S).— Philippines. Holotype: BMNH 1946.1.17.67 (*fide* Vogel et al. [2007:31]).

PHILIPPINE DISTRIBUTION (ENDEMIC) (Map 36C [p. 147]).— Dinagat, Leyte, Mindanao (Prov.: Agusan del Norte, Bukidnon, Cotabato, Davao City, Davao del Norte, Misamis Oriental), Samar.

REMARKS.— *Tropidolaemus philippensis* and *T. subannulatus* were formerly included in the ubiquitous species *T. wagleri*, but the assignment was seriously questioned by David and Ineich (1999:295–296). Indeed, recent studies have demonstrated that several recognizeable species have been inappropriately parading under the nominal taxon *T wagleri*, *T. philippensis* among them, as well as populations known from southern Mindanao and the Zamboanga Peninsula. On the large and topographically diverse island of Mindanao, and on careful examination, the Zamboanga population appears to be quite distinct from populations inhabiting other parts of the island, although Vogel et al. (2007) referred it to *T. philippensis*. Recent unpublished studies by Brown et al. suggest otherwise, and it is likely that the taxon *T. hombronii* (type locality, Zamboanga) will have to be resurrected from the synonymy of *T. philippensis* to accommodate the Zamboanga and, possibly, the

Basilan populations. Furthermore, recently documented populations of tropidolaemids found on Leyte, Dinagat, Samar, and northeast Mindanao bear strong resemblances to *T. philippensis* but also to *T. subannulatus* (see Vogel et al. [2007:30, fig. 24] from Negros; also figs. 79–80 in Sanguila et al. [2016]). We have refrained from suggesting any changes at this time because this too is said to be under study by Vogel and David (see also remarks under *Trimeresurus* [*Parias*] *flavomaculatus* and *Tropidolaemus subannulatus*). For additional details, see Leviton, Brown, and Siler (2014:518 and figs. 52B, E–F).

Conservation status [IUCN].— The conservation status of *Tropidolaemus philippensis* has not been assessed for the IUCN Red List [2016] ver. 3.1, but IUCN notes that it is listed in the *Catalogue of Life*.

***Tropidolaemus subannulatus* (Gray, 1842)** **Photo figures 115–119**

Philippine Temple Pitviper; Northern Philippine Temple Pit Viper; Bornean Keeled Green Pit Viper

Trimesurus subannualtus Gray, 1842:48.

Trimeresurus wagleri (part), Taylor, 1922a:296.— Leviton, 1964c:265.— Toriba, 1993b:108.— David & Ineich, 1999:295.

Trimeresurus wagleri alboviridis Taylor, 1917:366 (type locality Isabela, Occidental Negros, Negros Id., Philippines; holotype: CM R2433).

Trimeresurus wagleri wagleri, Taylor, 1922c:302.

Tropidolaemus wagleri, Burger, 1971:2, 20, 41, 86 (part).— Gaulke, 1994b:141 (part); 1996:51, figs. 5–6.— McDiarmid, Campbell, and Touré, 1999:349 (part).— Gumprecht, Tillack, Orlov, Captain, and Ryabov, 2004:41–42 (part), 8 col. photos (pp. 339–340).

Tropidolaemus cf. *wagleri*, Ferner, Brown, Sison, and Kennedy, 2001:55[22], figs. 51–52.

Tropidolaemus subannulatus, Vogel, David, Lutz, van Rooijen, and Vidal, 2007:23, figs. 12–16.— Gaulke, 2011:340–341, figs. 234–236.— McLeod, Siler, Diesmos, Diesmos, Garcia, Arkonceo, Balaquit, Uy, Villaseran, Yarra, and Brown, 2011:190.— Brown, Siler, Oliveros, Welton, Rock, Swab, Van Weerd, van Beijnen, Jose, Rodriguez, Jose, and Diesmos, 2013:93.— Leviton, Brown, and Siler, 2014:519, figs. 5A–B, 11, 12A–C, 52A, C–D.— Sanguila, Cobb, Siler, Diesmos Alcala, and Brown, 2016:109, fig. 79.

Type locality and type specimen(s).— Philippines. Syntypes (2): BMNH 1946.1.19.32–33 (formerly BMNH i.2.7a).

Philippine distribution (Map 36D [p. 147]).— Balabac; Basilan, Bohol, Dinagat, Leyte, Luzon (Prov.: Albay, Bulacan, Cavite, Cagayan, Camarines Norte, Isabela, Laguna, Quezon), Mindanao (Prov.: Agusan del Norte, Agusan del Sur, Lanao del Norte, Misamis Oriental, Zamboanga City), Negros (Prov.: Negros Occidental, Negros Oriental), Palawan, Panay (Prov.: Alkan, Antique), Samar, Sulu Archipelago (Jolo, Siasi, Sibutu, Tawi-Tawi), Tumindao.

General distribution (other than Philippines).— Malaysia (Borneo [Sabah, Sarawak]); Indonesia (Belitung, Borneo [Kalimantan], Buton, Kalimantan, Sangihe Archipelago, Sulawesi) (see Vogel, et al. [2007:23, 31] for details).

Remarks.— Given the variation observed among samples of this species studied by Vogel et al. (2007), they concluded, "We refrain from giving a more detailed description here, as the variation among this species or complex of species will be discussed in the next and forthcoming paper of the series. A splitting into several taxa seems to be likely." (Vogel et al., 2007:23). As noted by Gaulke (1994:141), these seemingly non-aggressive but dangerously venomous snakes are actually beneficial to humans because their dietary preferences include agricultural pest species, rodents, and even large rats.

Conservation status [IUCN].— Least Concern [2016] ver. 3.1.

General geographic distribution of snakes in the Philippine Archipelago

Azucar
- *Tropidonophis negrosensis*

Babuyan Claro (Babuyan Ids.)
- *Boiga philippina*
- *Lycodon* cf. *alcalai*
- *Lycodon bibonius*
- *Laticauda colubrina*
- *Laticauda semifasciata*
- *Trimeresurus* (*Parias*) cf. *flavomaculatus*

Balabac
- *Xenopeltis unicolor*
- *Aplopeltura boa*
- *Ahaetulla prasina prasina*
- *Boiga cynodon*
- *Boiga dendrophila multicincta*
- *Chrysopelea paradisi variabilis*
- *Coelognathus philippinus*
- *Dendrelaphis levitoni*
- *Dendrelaphis marenae*
- *Dryocalamus philippinus*
- *Gonyosoma oxycephalum*
- *Oligodon notospilus*
- *Psammodynastes pulverulentus*
- *Rhabdophis chrysargos*
- *Calliophis bilineata*
- *Ophiophagus hannah*
- *Trimeresurus* (*Parias*) *schultzei*
- *Tropidolaemus subannulatus*

Bantayan
- *Acrochordus granulatus*
- *Cerberus schneiderii*
- *Chrysopelea paradisi variabilis*
- *Dendrelaphis marenae*
- *Lycodon capucinus*
- *Laticauda colubrina*
- *Laticauda laticaudata*

Banton
- *Chrysopelea paradisi variabilis*

Barit (Babuyan Ids.)
- *Coelognathus erythrurus manillensis*
- *Laticauda colubrina*

Basilan
- *Indotyphlops braminus*
- *Ramphotyphlops olivaceus*
- *Ramphotyphlops suluensis*
- *Malayopython reticulatus*
- *Aplopeltura boa*
- *Ahaetulla prasina preocularis*
- *Boiga cynodon*
- *Calamaria gervaisii hollandi*
- *Calamaria lumbricoidea*
- *Chrysopelea paradisi variabilis*
- *Coelognathus erythrurus erythrurus*
- *Cyclocorus nuchalis nuchalis*
- *Dendrelaphis marenae*
- *Dendrelaphis philippinensis*
- *Lycodon dumerilii*
- *Oxyrhabdium modestum*
- *Psammodynastes pulverulentus*
- *Rhabdophis auriculatus myersi*
- *Rhabdophis lineatus*
- *Tropidonophis dendrophiops*
- *Tropidolaemus subannulatus*

Batan (Batanes Ids.)
- *Indotyphlops braminus*
- *Python reticulatus*
- *Ahaetulla prasina preocularis*
- *Coelognathus erythrurus manillensis*
- *Gonyosoma oxycephalum*
- *Lycodon alcalai*
- *Lycodon muelleri*
- *Psammodynastes pulverulentus*
- *Rhabdophis spilogaster*
- *Trimeresurus* (*Parias*) *mcgregori*

Biliran
- *Calamaria lumbricoidea*
- *Oxyrhabdium modestum*
- *Pseudorabdion mcnamarae*
- *Rhabdophis lineatus*
- *Tropidonophis dendrophiops*

Bohol
- *Gerrhopilus hedraeus*
- *Gerrhopilus manilae*
- *Indotyphlops braminus*
- *Ramphotyphlops cumingii*
- *Malayopython reticulatus*

Cerberus schneiderii
Aplopeltura boa
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Calamaria lumbricoidea
Coelognathus erythrurus erythrurus
Dendrelaphis marenae
Dendrelaphis philippinensis
Gonyosoma oxycephalum
Lycodon capucinus
Oxyrhabdium modestum
Psammodynastes pulverulentus
Rhabdophis auriculatus myersi
Rhabdophis lineatus
Tropidonophis dendrophiops
Naja samarensis
Ophiophagus hannah
Laticauda colubrina
Laticauda semifasciata
Tropidolaemus subannulatus

Bongao (Sulu Archipelago)
Indotyphlops braminus
Malayopython reticulatus
Xenopeltis unicolor
Ahaetulla prasina suluensis
Chrysopelea paradisi variabilis
Coelognathus philippinus
Dendrelaphis flavescens
Dendrelaphis marenae
Gonyosoma oxycephalum
Oligodon meyerinkii
Psammodynastes pulverulentus

Boracay (off of Panay)
Indotyphlops braminus
Malayotyphlops castanotus

Bubuan (Sulu Archipelago)
Ramphotyphlops olivaceus
Ramphotyphlops suluensis
Chrysopelea paradisi variabilis
Dendrelaphis flavescens
Liopeltis tricolor
Oligodon vertebralis notospilus

Busuanga (Calamian Archipelago)
Indotyphlops braminus
Ahaetulla prasina prasina
Coelognathus philippinus
Dendrelaphis marenae
Liopeltis philippinus
Oligodon notospilus
Psammodynastes pulverulentus
Rhabdophis chrysargos
Sibynophis bivittatus
Calliophis bilineata
Naja sumatrana

Cagayan Sulu (Sulu Archipelago)
Calamaria suluensis
Dendrelaphis marenae

Calamian Ids. (see also Calauit)
Malayopython reticulatus
Acrochordus granulatus
(?) *Pseudorabdion oxycephalum*

Calauit (Calamian Archipelago)
Indotyphlops braminus
Malayopython reticulatus
Acrochordus granulatus
Ahaetulla prasina prasina
Dendrelaphis caudolineatus caudolineatus
Dendrelaphis marenae
Coelognathus philippinus
Liopeltis philippinus
Oligodon notospilus
Calliophis bilineata
Naja sumatrana

Calayan (Babuyan Ids.)
Malayopython reticulatus
Boiga dendrophila divergens
Chrysopelea paradisi variabilis
Coelognathus erythrurus manillensis
Cyclocorus lineatus lineatus
Dendrelaphis luzonensis
Gonyosoma oxycephalum
Lycodon cf. alcalai
Oxyrhabdium leporinum leporinum
Laticauda colubrina
Laticauda laticaudata
Trimeresurus (*Parias*) cf. *flavomaculatus*

Camiguin (unspecified Norte or Sur)
Indotyphlops braminus
Chrysopelea paradisi variabilis
Dendrelaphis marenae
Psammodynastes pulverulentus
Tropidonophis dendrophiops
Trimeresurus (*Parias*) *flavomaculatus*

Trimeresurus (*Parias*) *mcgregori*

Camiguin Norte (Babuyan Ids.)
Indotyphlops braminus
Malayotyphlops luzonensis
Malayotyphlops ruficaudus
Ahaetulla prasina preocularis
Boiga cynodon
Calamaria gervaisii
Cyclocorus lineatus lineatus
Dendrelaphis luzonensis
Gonyosoma oxycephalum
Lycodon cf. alcalai
Lycodon bibonius
Lycodon chrysoprateros
Rhabdophis spilogaster
Trimeresurus (*Parias*) cf. *flavomaculatus*

Camiguin Sur
Ahaetulla prasina preocularis
Calamaria lumbricoidea
Coelognathus erythrurus erythrurus
Oxyrhabdium modestum
Tropidonophis dendrophiops
Calliophis philippinus

Camotes Ids. (see Pacijan, Poro)

Candaraman
Dendrelaphis levitoni
Dendrelaphis marenae

Capones
Laticauda semifasciata

Carabao
Calamaria gervaisii gervaisii
Dendrelaphis marenae
Lycodon capucinus

Catanduanes
Malayopython reticulatus
Cerberus schneiderii
Boiga angulata
Boiga dendrophila latifasciata
Calamaria gervaisii gervaisii
Cyclocorus lineatus lineatus
Dendrelaphis marenae
Dendrelaphis philippinensis
Hologerrhum philippinum
Lycodon muelleri
Oxyrhabdium modestum
Ptyas luzonensis
Rhabdophis spilogaster
Hemibungarus mcclungi
Ophiophagus hannah
Trimeresurus (*Parias*) *flavomaculatus*

Cebu
Gerrhopilus hedraeus
Indotyphlops braminus
Malayotyphlops hypogius
Malayotyphlops luzonensis
Ramphotyphlops cumingii
Malayopython reticulatus
Acrochordus granulatus
Cerberus schneiderii
Ahaetulla prasina preocularis
Calamaria gervaisii iridiscens
Chrysopelea paradisi variabilis
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai
Dendrelaphis fuliginosus
Dendrelaphis marenae
Dendrelaphis philippinensis
Lycodon capucinus
Oxyrhabdium leporinum visayanum
Psammodynastes pulverulentus
Pseudorabdion mcnamarae
Pseudorabdion montanum
Pseudorabdion oxycephalum
Tropidonophis negrosensis
Hemibungarus gemianulis
Ophiophagus hannah
Hydrophis cyanocinctus
Laticauda colubrina
Laticauda laticaudata

Coron (Calamian Archipelago)
Ahaetulla prasina prasina
Dendrelaphis philippinensis
(?) *Dryophiops rubescens*

Culion (Calamian Archipelago)
Ahaetulla prasina prasina
Boiga cynodon
Coelognathus philippinus
Dendrelaphis marenae
Liopeltis philippinus
Oligodon perkinsi
Rhabdophis chrysargos
Sibynophis bivittatus

Calliophis bilineata
Naja sumatrana

Cuyo
Cerberus schneiderii
Lycodon capucinus
Laticauda semifasciata

Dalupiri (Babuyan Ids.)
Indotyphlops braminus
Malayotyphlops luzonensis
Python reticulatus
Boiga philippina
Chrysopelea paradisi variabilis
Coelognathus erythrurus manillensis
Dendrelaphis luzonensis
Lycodon chrysoprateros
Laticauda colubrina
Trimeresurus (*Parias*) cf. *flavomaculatus*

Dinagat
Cerberus schneiderii
Ahaetulla prasina preocularis
Boiga cynodon
(?) *Boiga dendrophila latifasciata*
Calamaria lumbricoidea
Calliophis salitan
Chrysopelea paradisi variabilis
Gonyosoma oxycephalum
Lycodon dumerilii
Oxyrhabdium modestum
Psammodynastes pulverulentus
(?) *Pseudorabdion oxycephalum*
Rhabdophis lineatus
Stegonotus muelleri
Tropidonophis dendrophiops
Naja samarensis
Ophiophagus hannah
(?) *Tropidolaemus philippensis*
(?) *Tropidolaemus subannulatus*

Dumaran
Sibynophis bivittatus

Gato
Laticauda laticaudata
Laticauda semifasciata

Gigantes (off of Panay)
Hydrophis [*Chitulia*] *lamberti*
Hydrophis [*Pelamis*] *platurus*

Gigantes Sur (off of Panay)
Indotyphlops braminus
Hydrophis [*Chitulia*] *ornatus*
Hydrophis [*Astrotia*] *stokesii*

Guimaras
Indotyphlops braminus
Acrochordus granulatus
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai
Dendrelaphis marenae
Dendrelaphis philippinensis
Hemibungarus gemianulis

Inampulugan
Malayotyphlops castanotus
Boiga cynodon
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai

Itbayat
Lycodon muelleri
Malayopython reticulatus

Ivojos (Babuyan Ids.)
Indotyphlops braminus

Jolo (Sulu Archipelago)
Indotyphlops braminus
Malayopython reticulatus
Xenopeltis unicolor
Cerberus schneiderii
Ahaetulla prasina preocularis
Calamaria joloensis
Chrysopelea paradisi variabilis
Coelognathus erythrurus erythrurus
Dendrelaphis marenae
Oligodon meyerinkii
Psammodynastes pulverulentus
Calliophis suluensis
Ophiophagus hannah
Hydrophis [*Pelamis*] *platurus*
Laticauda colubrina
Laticauda laticaudata
Trimeresurus (*Parias*) *flavomaculatus*
Tropidolaemus subannulatus

Kalotkot
Chrysopelea paradisi variabilis
Dendrelaphis marenae
Dendrelaphis philippinensis

Leyte

Malayopython reticulatus
Aplopeltura boa
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Boiga dendrophila latifasciata
Calamaria lumbricoidea
Chrysopelea paradisi variabilis
Coelognathus erythrurus erythrurus
Cyclocorus nuchalis taylori
Dendrelaphis marenae
Dendrelaphis philippinensis
Gonyosoma oxycephalum
Lycodon capucinus
Lycodon dumerilii
Oxyrhabdium modestum
Psammodynastes pulverulentus
Ptyas luzonensis
Rhabdophis auriculatus auriculatus
Rhabdophis lineatus
Stegonotus muelleri
Tropidonophis dendrophiops
Naja samarensis
Ophiophagus hannah
Trimeresurus (*Parias*) *flavomaculatus*
(?) *Tropidolaemus philippensis*
(?) *Tropidolaemus subannulatus*

Lubang

Malayopython reticulatus
Cyclocorus lineatus lineatus
Gonyosoma oxycephalum
Rhabdophis spilogaster

Luzon

Gerrhopilus manilae
Acutotyphlops banaorum
Indotyphlops braminus
Malayotyphlops andyi
Malayotyphlops collaris
Malayotyphlops denrorum
Malayotyphlops luzonensis
Malayotyphlops ruber
Malayotyphlops ruficaudus
Malayopython reticulatus
Acrochordus granulatus
Cerberus microlepis
Cerberus schneiderii
(?) *Gerarda prevostiana*
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Boiga dendrophila divergens
Boiga drapiezii ssp.
Boiga philippina
Calamaria bitorques
Calamaria gervaisii gervaisii
Chrysopelea paradisi variabilis
Coelognathus erythrurus manillensis
Cyclocorus lineatus lineatus
Dendrelaphis luzonensis
Dendrelaphis marenae
Dendrelaphis philippinensis
Dryophiops philippina
Gonyosoma oxycephalum
Hologerrhum philippinum
Lycodon capucinus
Lycodon muelleri
Lycodon solivagus
(?) *Lycodon tessellatus*
Myersophis alpestris
Oligodon ancorus
Oligodon modestus
Oxyrhabdium leporinum leporinum
Psammodynastes pulverulentus
Pseudorabdion mcnamarae
(?) *Pseudorabdion oxycephalum*
Ptyas luzonensis
Rhabdophis auriculatus auriculatus
Rhabdophis barbouri
Rhabdophis spilogaster
Hemibungarus calligaster
Hemibungarus mcclungi
Naja philippinensis
Ophiophagus hannah
Hydrophis atriceps
Hydrophis [*Lapemis*] *curtus*
Hydrophis cyanocinctus
Hydrophis [*Chitulia*] *lamberti*
Hydrophis [*Chitulia*] *ornatus*
Hydrophis [*Pelamis*] *platurus*
Hydrophis [*Leioselama*] *semperi*
Microcephalophis gracilis
Laticauda colubrina
Laticauda laticaudata
Laticauda semifasciata
Trimeresurus (*Parias*) *flavomaculatus*
Tropidolaemus subannulatus

Mabag (Babuyan Ids.)

Laticauda colubrina

Marinduque
Indotyphlops braminus
Malayopython reticulatus
Gerrhopilus hedraeus
Malayotyphlops luzonensis
Malayotyphlops ruficaudus
Ramphotyphlops cumingii
Ahaetulla prasina preocularis
Cyclocorus lineatus lineatus
Dendrelaphis luzonensis
Dendrelaphis marenae
Dryophiops philippina
Gonyosoma oxycephalum
Hologerrhum philippinum
Lycodon muelleri
Oxyrhabdium leporinum leporinum
Naja philippinensis

Maripipi
Oxyrhabdium modestum

Marongas
Chrysopelea paradisi variabilis

Masbate
Indotyphlops braminus
Malayotyphlops luzonensis
Ramphotyphlops cumingii
Malayopython reticulatus
Acrochordus granulatus
Cerberus schneiderii
Ahaetulla prasina preocularis
Calamaria gervaisii iridescens
Chrysopelea paradisi variabilis
Coelognathus erythrurus psephenourus
Dendrelaphis fuliginosus
(?) *Dendrelaphis luzonensis*
Dendrelaphis marenae
Lycodon capucinus
Pseudorabdion mcnamarae
Tropidonophis negrosensis
Hemibungarus gemianulis
Naja philippinensis

Medis
Chrysopelea paradisi variabilis

Mindanao
Gerrhopilus hedraeus
Indotyphlops braminus
(?) *Malayotyphlops luzonensis*
Ramphotyphlops cumingii
Malayopython reticulatus
Aplopeltura boa
Cerberus schneiderii
(?) *Fordonia leucobalia*
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Boiga dendrophila latifasciata
Boiga drapiezii ssp.
Calamaria gervaisii hollandi
Calamaria lumbricoidea
Calamaria virgulata
Chrysopelea paradisi variabilis
Coelognathus erythrurus erythrurus
Cyclocorus nuchalis nuchalis
Cyclocorus nuchalis taylori
Dendrelaphis marenae
Dendrelaphis philippinensis
(?) *Dryophiops philippina*
Gonyosoma oxycephalum
Lycodon capucinus
Lycodon dumerilii
Oligodon maculatus
Oligodon modestus
(?) *Oligodon notospilus* (doubtful)
Opisthotropis alcalai
Oxyrhabdium modestum
Psammodynastes pulverulentus
Pseudorabdion ater
(?) *Pseudorabdion oxycephalum*
Pseudorabdion taylori
Rhabdophis auriculatus auriculatus (eastern)
Rhabdophis auriculatus myersi (western)
Rhabdophis lineatus
Stegonotus muelleri
Tropidonophis dendrophiops
Calliophis philippina
Naja samarensis
Ophiophagus hannah
Hydrophis atriceps
Hydrophis [*Lapemis*] *curtus*
Hydrophis cyanocinctus
Hydrophis [*Pelamis*] *platurus*
Laticauda colubrina
Laticauda laticaudata
Trimeresurus (*Parias*) *flavomaculatus*
(?) *Tropidolaemus hombronii*
(?) *Tropidolaemus philippensis*
(?) *Tropidolaemus subannulatus*

Mindoro

Gerrhopilus hedraeus
Indotyphlops braminus
Malayotyphlops ruber
Malayopython reticulatus
Ahaetulla prasina preocularis
Calamaria gervaisii gervaisii
Chrysopelea paradisi variabilis
Coelognathus erythrurus manillensis
Cyclocorus lineatus lineatus
Dendrelaphis fuliginosus
Dendrelaphis marenae
Dryophiops philippina
Lycodon capucinus
Lycodon muelleri
Oligodon ancorus
Oxyrhabdium leporinum leporinum
Tropidonophis negrosensis
Hemibungarus calligaster
Naja philippinensis
Ophiophagus hannah
Laticauda laticaudata
Trimeresurus (*Parias*) *flavomaculatus*

Negros

Gerrhopilus hedraeus
Indotyphlops braminus
Malayotyphlops canlaonensis
Malayotyphlops castanotus
Malayotyphlops luzonensis
Malayotyphlops ruficaudus
Ramphotyphlops cumingii
Malayopython reticulatus
Acrochordus granulatus
Cerberus schneiderii
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Calamaria gervaisii iridiscens
Chrysopelea paradisi variabilis
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai
Dendrelaphis fuliginosus
Dendrelaphis marenae
Dryophiops philippina
Gonyosoma oxycephalum
Lycodon capucinus
Oligodon modestus
Oxyrhabdium leporinum visayanum
(?) *Oxyrhabdium modestum*
Psammodynastes pulverulentus
Pseudorabdion mcnamarae
Pseudorabdion montanum
Pseudorabdion oxycephalum
Ptyas luzonensis
Tropidonophis negrosensis
Hemibungarus gemianulis
Ophiophagus hannah
Hydrophis [Lapemis] curtus
Laticauda colubrina
Laticauda semifasciata
Trimeresurus (*Parias*) *flavomaculatus*
Tropidolaemus subannulatus

Paan de Azucar

Boiga cynodon
Tropidonophis negrosensis

Pacijan (Camotes Ids.)

Gerrhopilus hedraeus
Malayotyphlops luzonensis
Malayotyphlops ruber
Coelognathus erythrurus erythrurus

Palawan

Indotyphlops braminus
Malayopython reticulatus
Xenopeltis unicolor
Acrochordus granulatus
Aplopeltura boa
Cerberus schneiderii
Gerarda prevostiana
Ahaetulla prasina prasina
Boiga cynodon
Boiga dendrophila multicincta
Boiga schultzei
Calamaria palavanensis
Calamaria virgulata
Chrysopelea paradisi variabilis
Coelognathus philippinus
Dendrelaphis levitoni
Dendrelaphis marenae
Dryocalamus philippinus
Gonyosoma oxycephalum
Liopeltis philippinus
Liopeltis tricolor
Lycodon sealei
Oligodon notospilus
Opisthotropis typica
Psammodynastes pulverulentus
Ptyas carinata
Rhabdophis chrysargos
Sibynophis bivittatus
Calliophis bilineata

Naja sumatrana
Ophiophagus hannah
Laticauda semifasciata
Trimeresurus (*Parias*) *flavomaculatus*
Trimeresurus (*Parias*) *schultzei*
Tropidolaemus subannulatus

Panay
Indotyphlops braminus
Malayotyphlops castanotus
(?) *Malayotyphlops hypogius*
Malayopython reticulatus
Acrochordus granulatus
Cerberus schneiderii
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Boiga dendrophila levitoni
Boiga drapiezii ssp.
Calamaria bitorques
Calamaria gervaisii iridescens
Chrysopelea paradisi variabilis
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai
Dendrelaphis fuliginosus
Dendrelaphis marenae
Dryophiops philippina
Gonyosoma oxycephalum
Hologerrhum dermali
Lycodon capucinus
Lycodon fausti
Oligodon modestus
Oxyrhabdium modestum
Psammodynastes pulverulentus
Pseudorabdion mcnamarae
Pseudorabdion talonuran
Ptyas luzonensis
Tropidonophis negrosensis
Hemibungarus gemianulis
Ophiophagus hannah
Laticauda colubrina
Trimeresurus (*Parias*) *flavomaculatus*
Tropidolaemus subannulatus

Panubolon (see also Guimaras)
Indotyphlops braminus

Papahag [also as Papahang] (Sulu Archipelago)
Oligodon meyerinkii

Polillo
Indotyphlops braminus
Ramphotyphlops cumingii
Malayopython reticulatus
Cerberus schneiderii
Ahaetulla prasina preocularis
Boiga angulata
Boiga cynodon
Boiga dendrophila divergens
Calamaria gervaisii polillensis
Chrysopelea paradisi variabilis
Coelognathus erythrurus manillensis
Cyclocorus lineatus lineatus
Dendrelaphis marenae
Dendrelaphis philippinensis
Hologerrhum philippinum
Lycodon muelleri
Psammodynastes pulverulentus
Ptyas luzonensis
Rhabdophis spilogaster
Hemibungarus mcclungi
Ophiophagus hannah
Trimeresurus (*Parias*) *flavomaculatus*

Poro (Camotes Ids.)
Malayotyphlops luzonensis
Malayotyphlops ruber
Coelognathus erythrurus erythrurus

Romblon
Cerberus schneiderii
Boiga cynodon
Chrysopelea paradisi variabilis
Dryophiops philippina
Lycodon capucinus
Ophiophagus hannah
Laticauda colubrina

Sabtang (Batanes Ids.)
Ahaetulla prasina preocularis
Gonyosoma oxycephalum
Lycodon alcalai
Psammodynastes pulverulentus

Samar
Indotyphlops braminus
Malayotyphlops ruber
Ramphotyphlops marxi
Ramphotyphlops olivaceus
Malayopython reticulatus

Aplopeltura boa
Ahaetulla prasina preocularis
Boiga dendrophila latifasciata
Chrysopelea paradisi variabilis
Coelognathus erythrurus erythrurus
Cyclocorus nuchalis taylori
Dendrelaphis marenae
Dendrelaphis philippinensis
Dryophiops philippina (?)
Lycodon capucinus
Lycodon dumerilii
Lycodon ferroni
Oxyrhabdium modestum
Psammodynastes pulverulentus
Rhabdophis auriculatus auriculatus
Rhabdophis lineatus
Stegonotus muelleri
Tropidonophis dendrophiops
Calliophis philippina
Naja samarensis
Hydrophis atriceps
Laticauda laticaudata
Trimeresurus (*Parias*) *flavomaculatus*
(?) *Tropidolaemus philippensis*
(?) *Tropidolaemus subannulatus*

Sanga Sanga (Sulu Archipelago)
Xenopeltis unicolor
Ahaetulla prasina suluensis
Chrysopelea paradisi variabilis
Coelognathus philippinus
Dendrelaphis flavescens

Semirara (off of Panay)
Indotyphlops braminus
Malayotyphlops luzonensis
Lycodon capucinus

Siargao
Malayopython reticulatus
Boiga dendrophila latifasciata
Chrysopelea paradisi variabilis
(?) *Cyclocorus nuchalis taylori*
Dendrelaphis marenae
Lycodon dumerilii
Psammodynastes pulverulentus

Siasi (Sulu Archipelago)
Malayopython reticulatus
Ahaetulla prasina suluensis
Coelognathus erythrurus erythrurus
Calliophis suluensis
Tropidolaemus subannulatus

Sibay (off of Panay)
Indotyphlops braminus

Sibutu (Sulu Archipelago)
Ramphotyphlops olivaceus
Ramphotyphlops suluensis
Malayopython reticulatus
Ahaetulla prasina preocularis
Ahaetulla prasina suluensis
Boiga cynodon
Chrysopelea paradisi paradisi
Coelognathus philippinus
Dendrelaphis ? (*caudolineatus*)
Oligodon meyerinkii
Hydrophis [*Pelamis*] *platurus*
Tropidolaemus subannulatus

Sibuyan
Indotyphlops braminus
Malayotyphlops ruficaudus
Ramphotyphlops cumingii
Chrysopelea paradisi variabilis
Dryophiops philippina
Gonyosoma oxycephalum
Pseudorabdion mcnamarae

Sicogon
Ramphotyphlops cumingii
Tropidonophis negrosensis

Siquijor
Malayotyphlops luzonensis
Boiga cynodon
Chrysopelea paradisi variabilis
Dendrelaphis marenae
Dryophiops philippina
Tropidonophis dendrophiops
Trimeresurus (*Parias*) *flavomaculatus*

Sicogon
Ramphotyphlops cumingii
Tropidonophis negrosensis

Sitanki (Sulu Archipelago)
Laticauda colubrina

Sulu Archipelago (unspecified ids.)
Calamaria virgulata
Hydrophis atriceps

Sulu (= Jolo, Sulu Archipelago)
Laticauda laticaudata
Laticauda semifasciata

Surigao
Dendrelaphis marenae
Hydrophis [*Pelamis*] *platurus*

Tablas
Indotyphlops braminus
Gerrhopilus hedraeus
Malayotyphlops ruber
Malayotyphlops ruficaudus
Ahaetulla prasina preocularis
Boiga cynodon
Calamaria gervaisii gervaisii
Chrysopelea paradisi variabilis
Coelognathus erythrurus psephenourus
Cyclocorus lineatus alcalai
Dendrelaphis marenae
Lycodon capucinus
Oligodon modestus
Pseudorabdion mcnamarae
(?) *Hydrophis* [*Leioselasma*] *spiralis*

Tawitawi (Sulu Archipelago)
Malayopython reticulatus
Ahaetulla prasina suluensis
Boiga cynodon
Boiga drapiezii ssp.
Chrysopelea paradisi variabilis
Coelognathus philippinus
Dendrelaphis flavescens
Dendrelaphis marenae
Oligodon meyerinkii
Sibynophis geminatus geminatus
Tropidolaemus subannulatus

Ticao
(?) *Dendrelaphis luzonensis*

Tumindao
Tropidolaemus subannulatus

Visayan Sea area
Hydrophis atriceps
Hydrophis cyanocinctus
Hydrophis [*Lapemis*] *curtus*
Laticauda semifasciata

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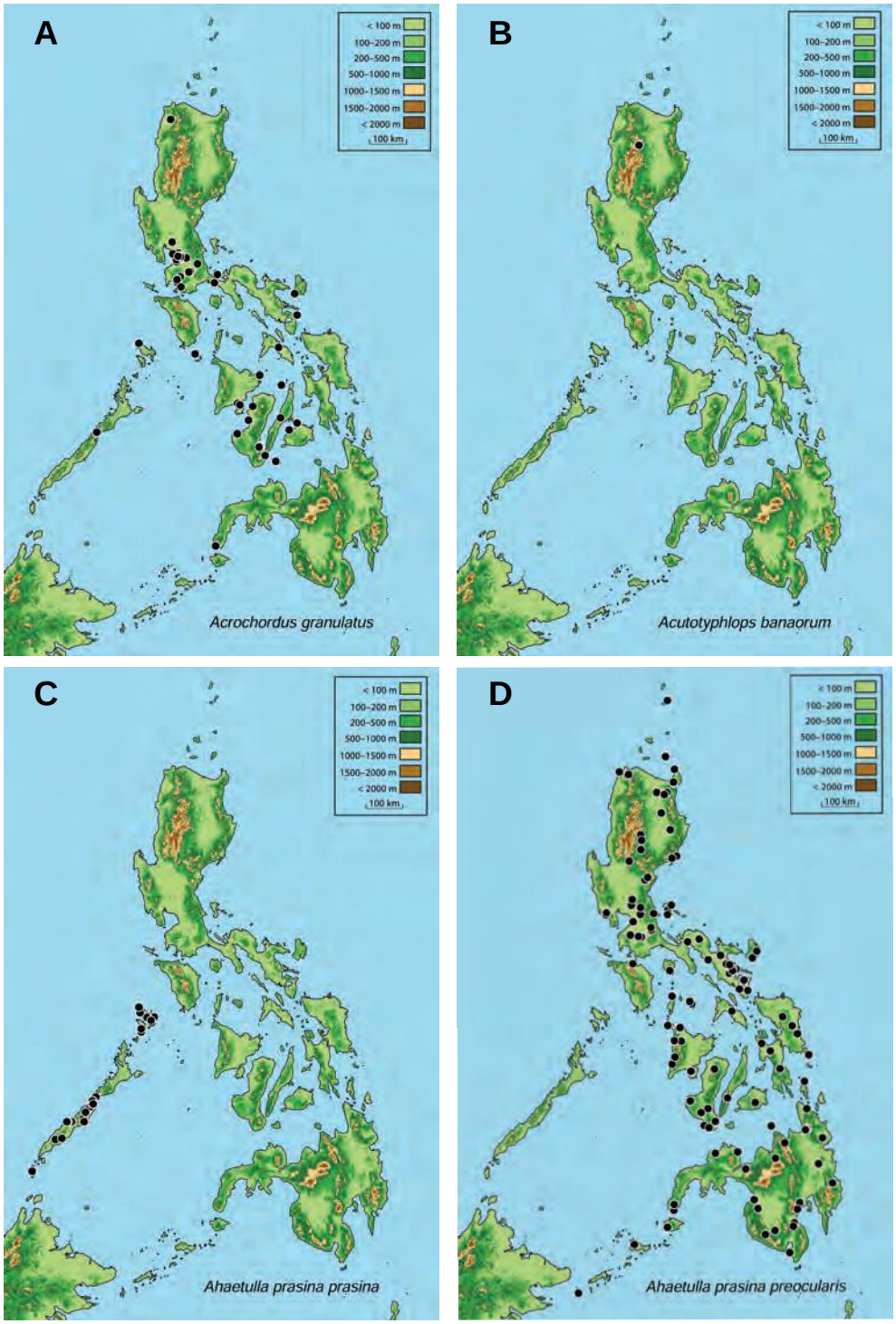
Appendix

Distribution Maps and Photographs

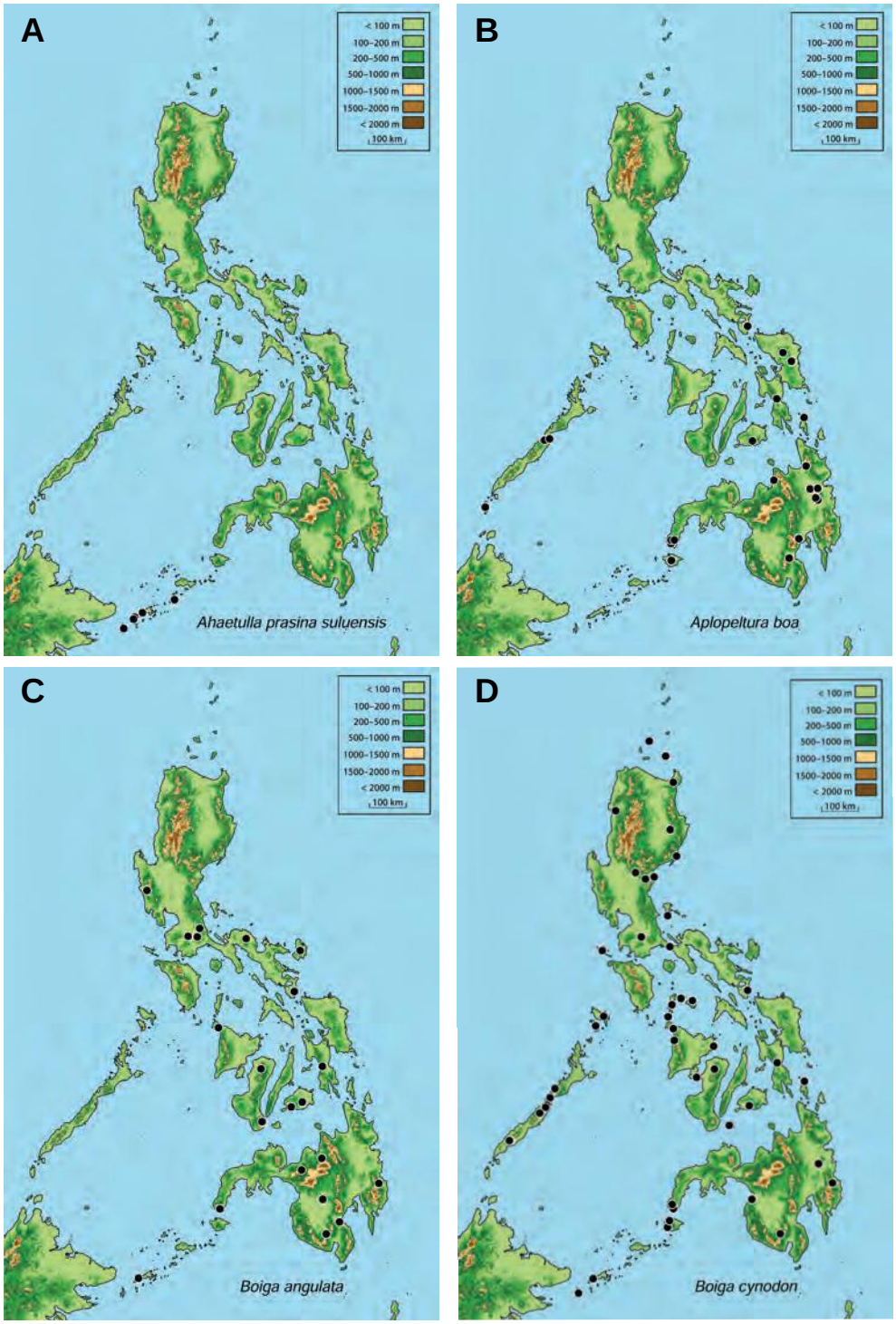
Distribution maps (pages 510–546) arranged alphabetically by genus and species; Map sheets numbered 1–37 (145 maps)

Photo figures (pages 547-568) numbered sequentially 1–119 and ordered by Superfamily, Family, and Subfamily groups and within the groups, alphabetically by genus and species

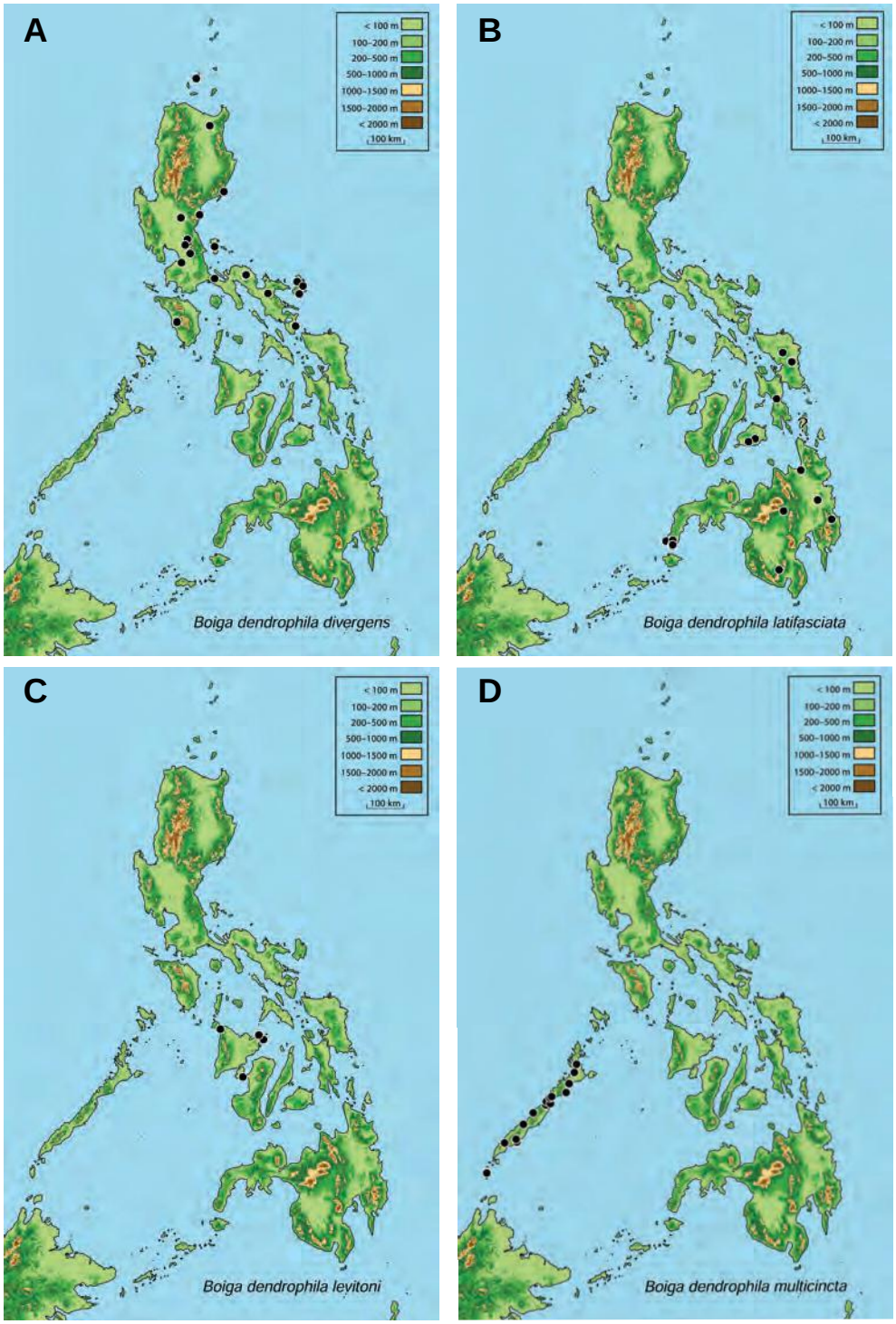
MAP 1. Topographic base map for the Philippine Archipelago.



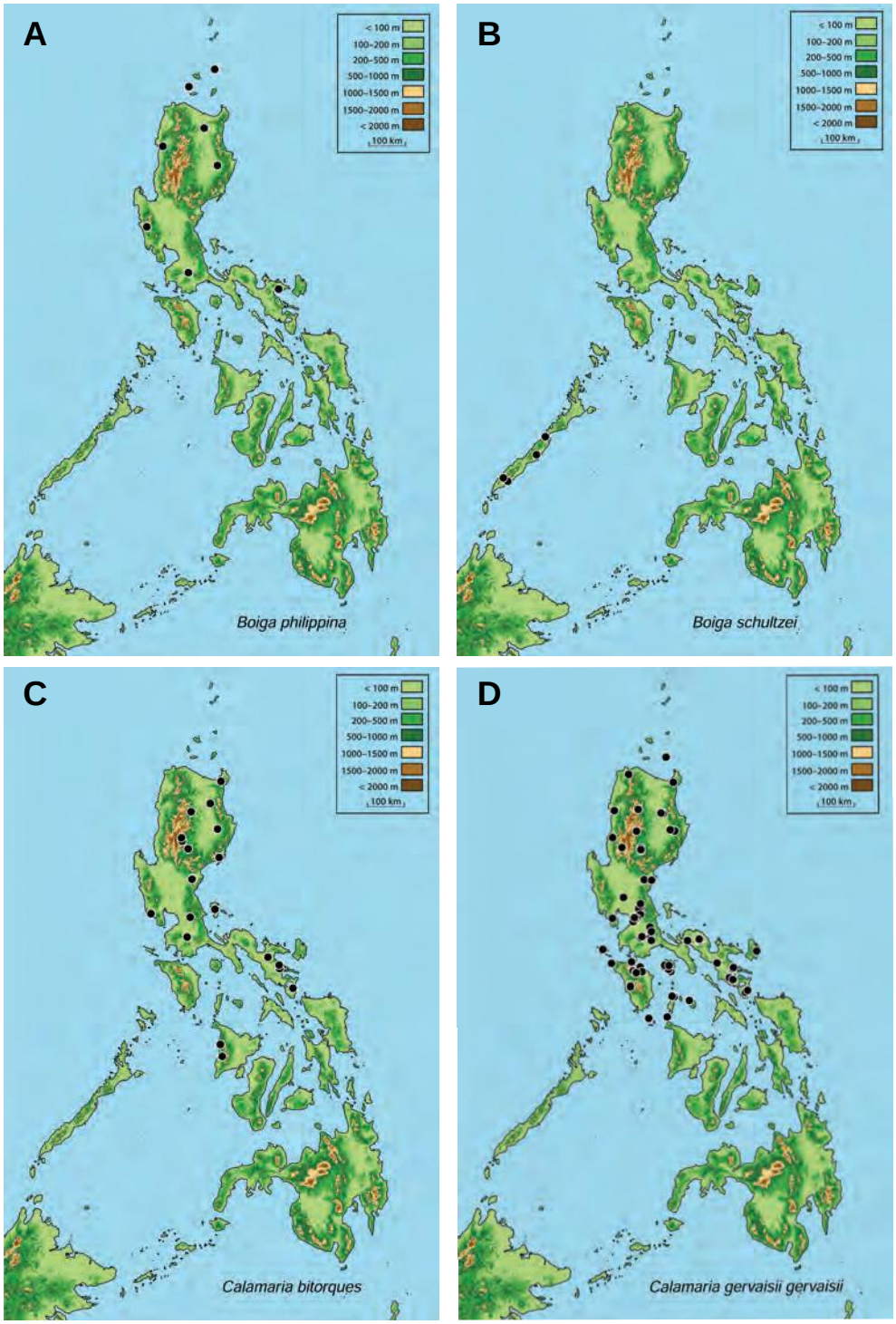
MAPS 2A–D. Geographic range maps for Philippine records of (A) *Acrochordus granulatus*; (B) *Acutotyphlops banaorum*; (C) *Ahaetulla prasina prasina*; (D) *Ahaetulla prasina preocularis*.



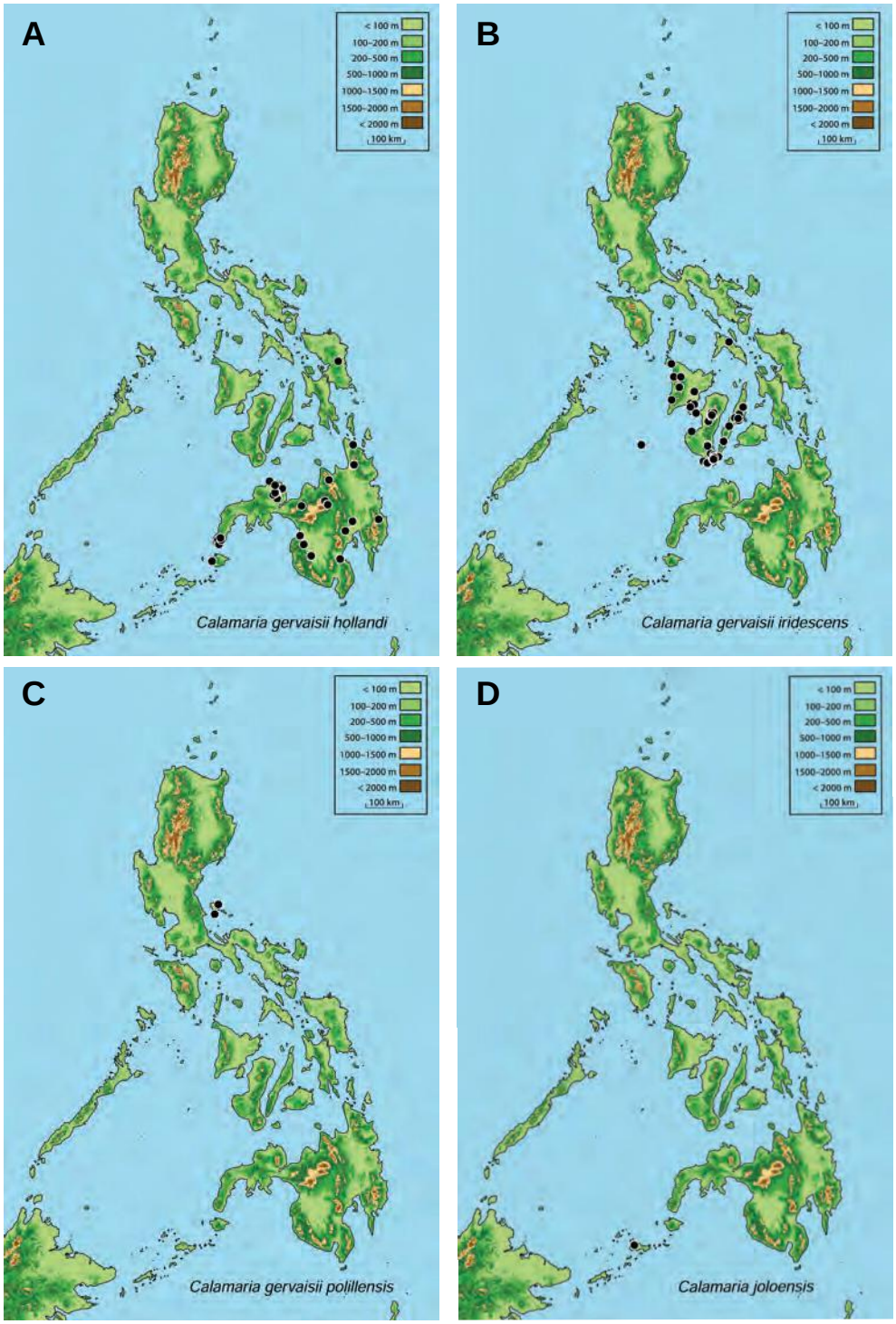
MAPS 3A–D. Geographic range maps for Philippine records of (A) *Ahaetulla prasina suluensis*; (B) *Aplopeltura boa*; (C) *Boiga angulata*; (D) *Boiga cynodon*.



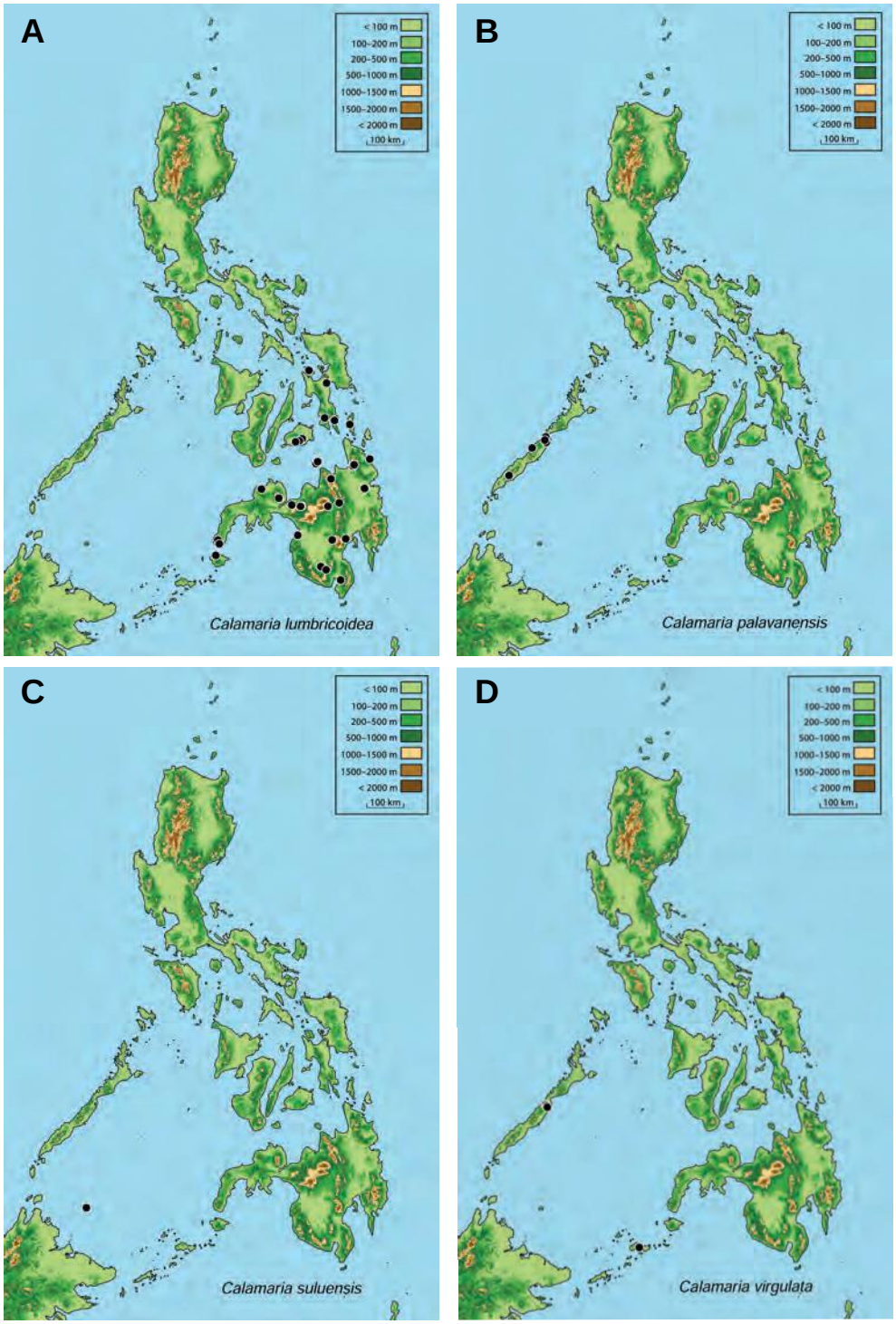
MAPS 4A–D. Geographic range maps for Philippine records of (A) *Boiga dendrophila divergens*; (B) *Boiga dendrophila latifasciata*; (C) *Boiga dendrophila levitoni*; (D) *Boiga dendrophila multicincta*.



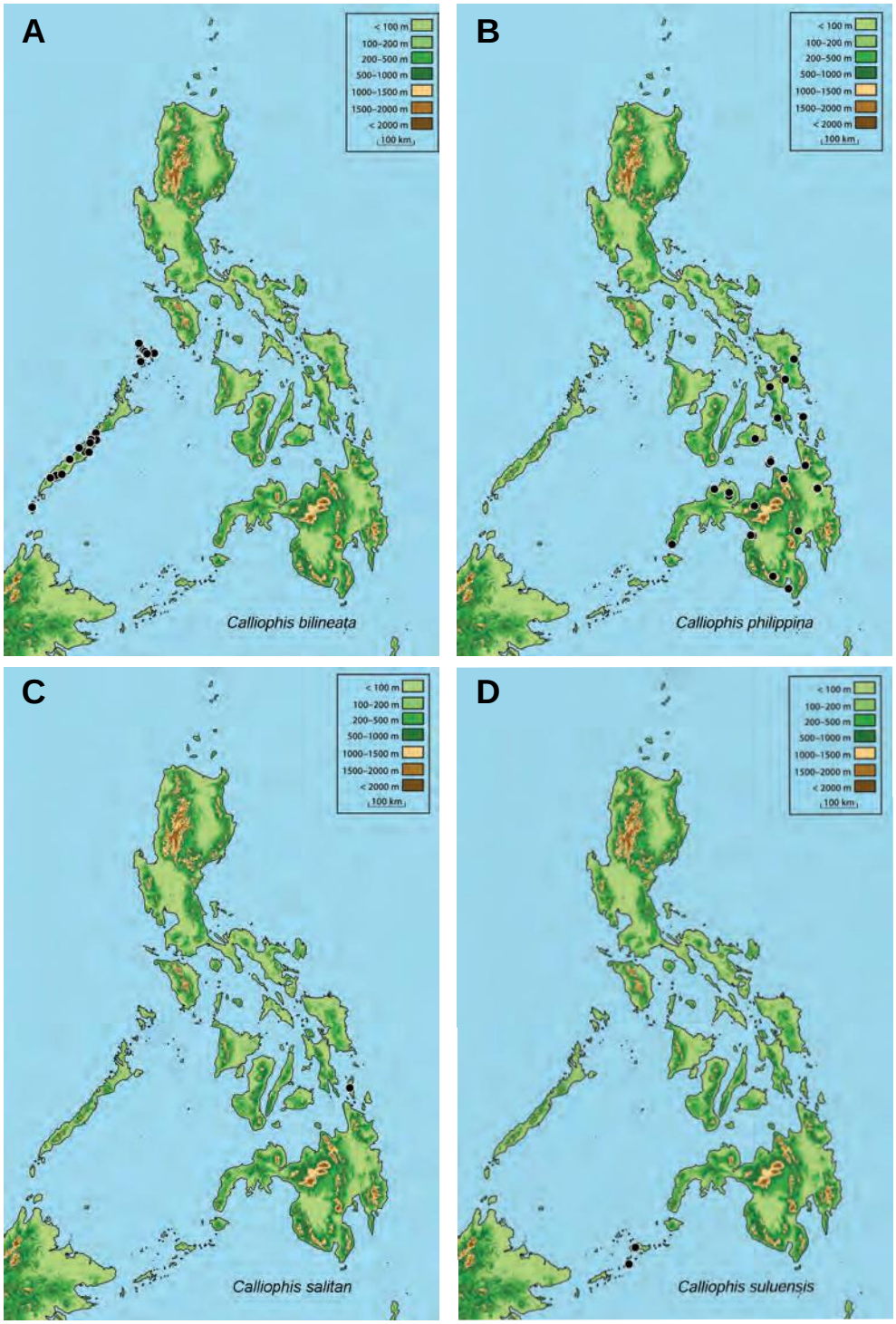
MAPS 5A–D. Geographic range maps for Philippine record of: (A) *Boiga philippina*; (B) *Boiga schultzei*; (C) *Calamaria bitorques*; (D) *Calamaria gervaisii gervaisii*.



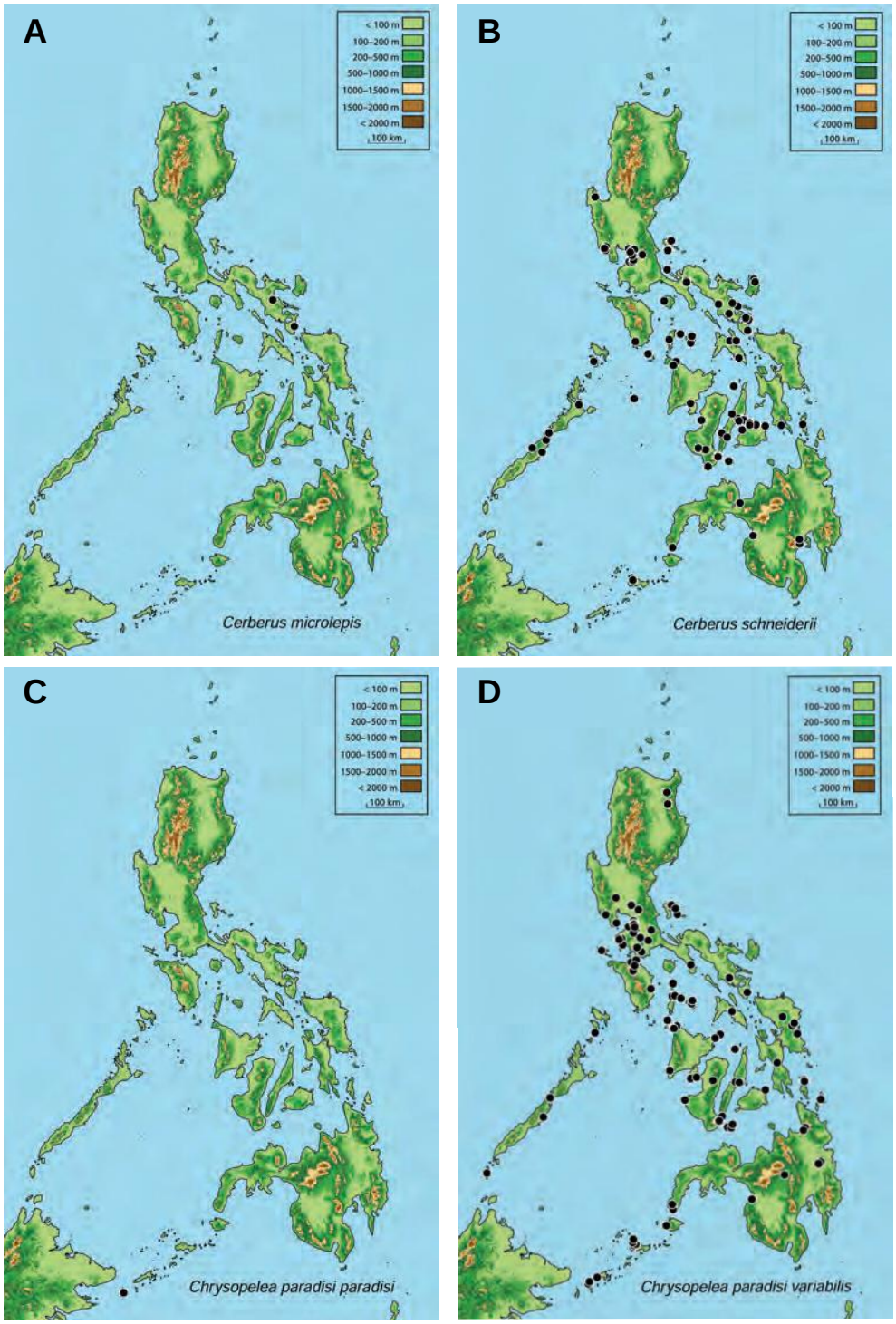
MAPS 6A–D. Geographic range maps for Philippine records of (A) *Calamaria gervaisii hollandi*; (B) *Calamaria gervaisii iridescens*; (C) *Calamaria gervaisii polillensis*; (D) *Calamaria joloensis*.



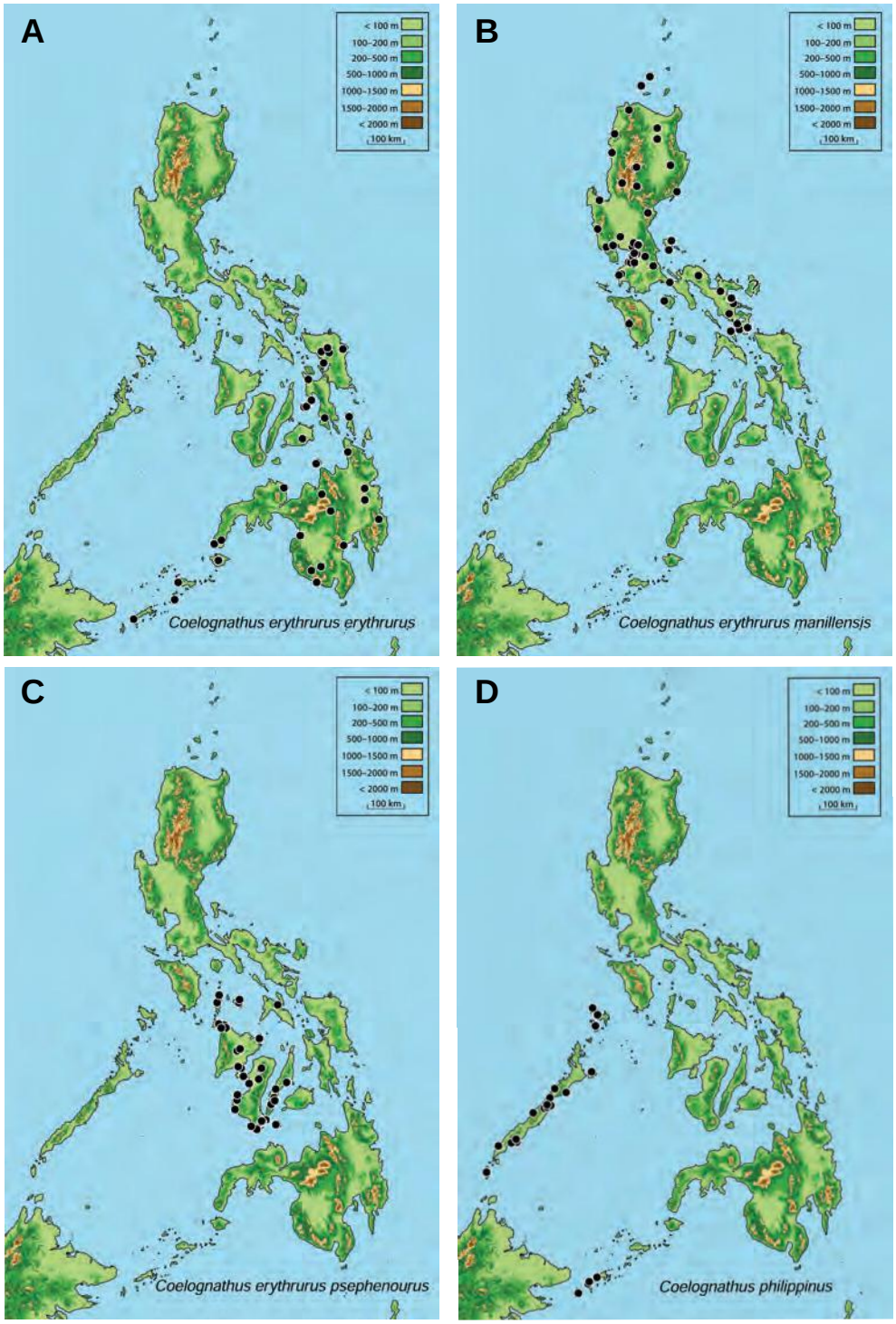
MAPS 7A–D. Geographic range maps for Philippine records of (A) *Calamaria lumbricoidea*; (B) *Calamaria palavanensis*; (C) *Calamaria suluensis*; (D) *Calamaria virgulata*.



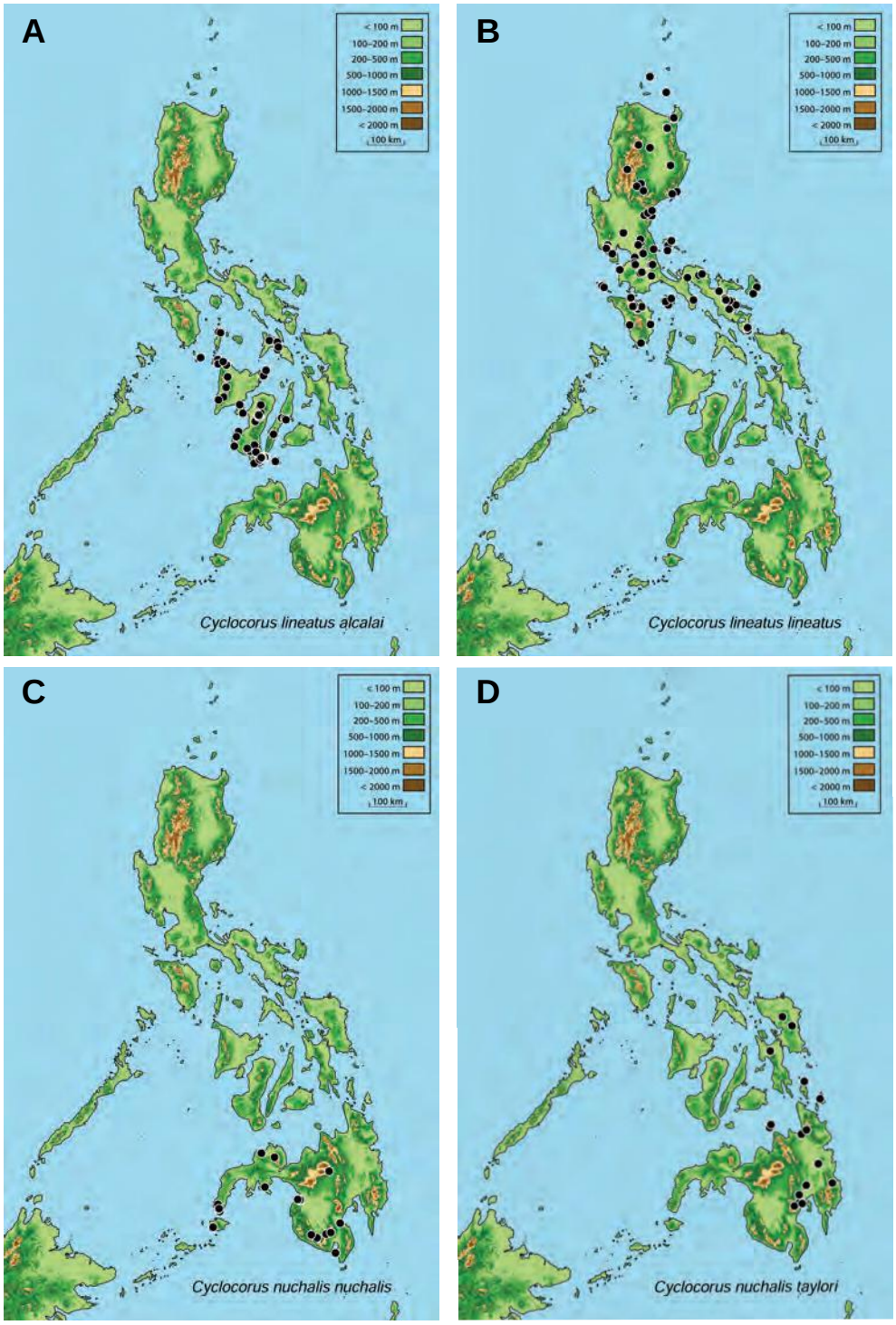
MAPS 8A–D. Geographic range maps for Philippine records of (A) *Calliophis bilineata*; (B) *Calliophis philippina*; (C) *Calliophis salitan*; (D) *Calliophis suluensis*.



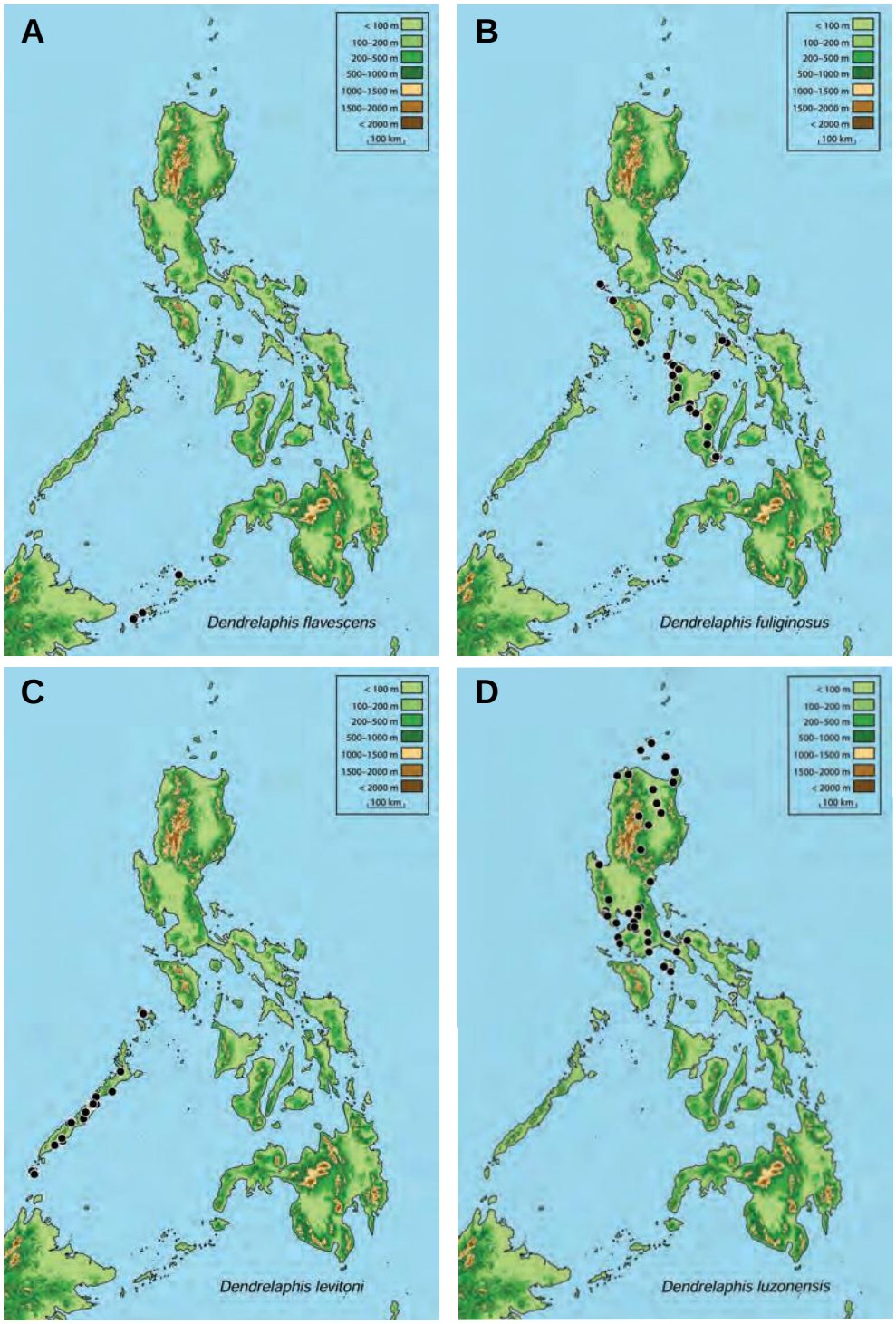
MAPS 9A–D. Geographic range maps for Philippine records of (A) *Cerberus microlepis*; (B) *Cerberus schneiderii*; (C) *Chrysopelea paradisi paradisi;* (D) *Chrysopelea paradisi variabilis*.



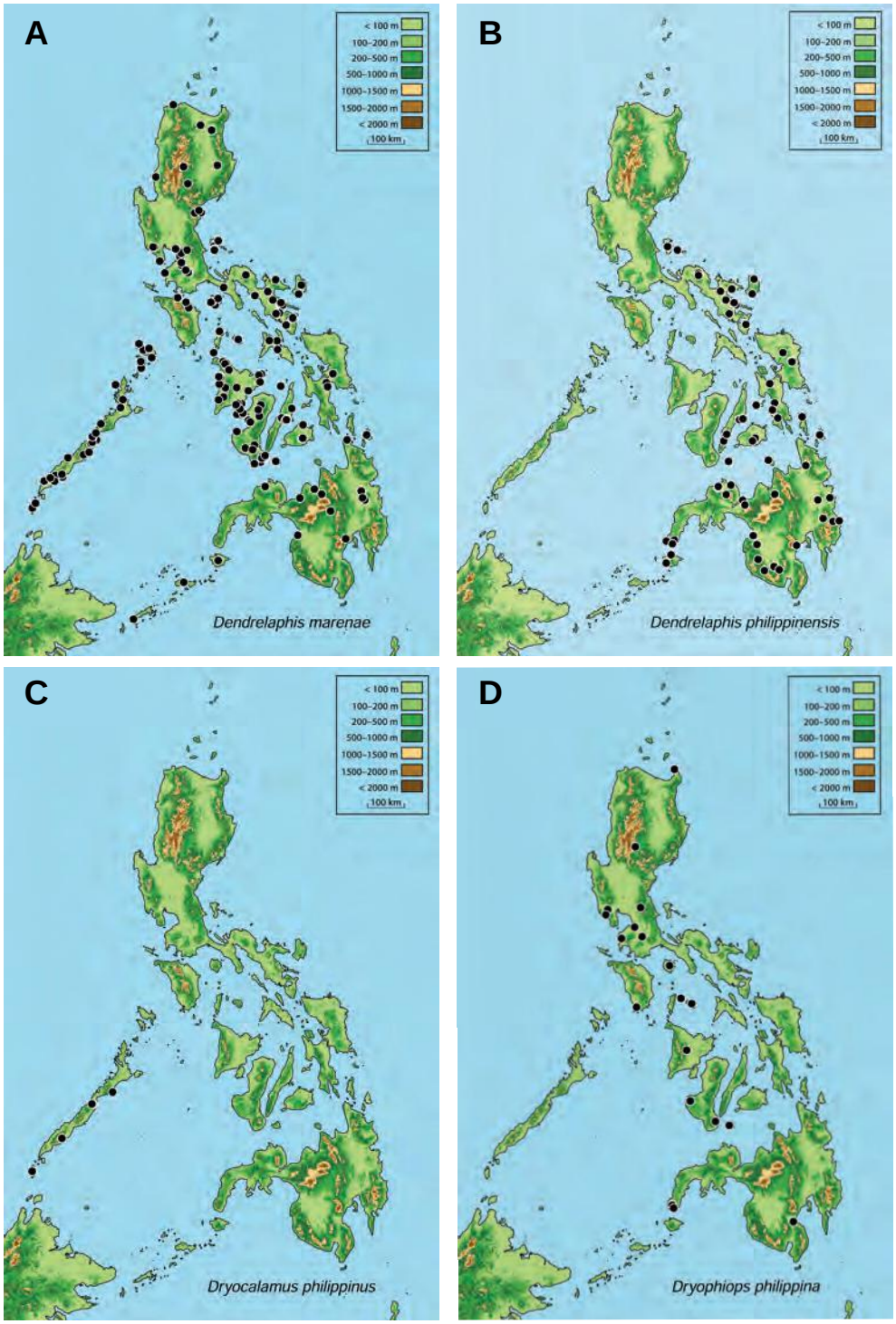
MAPS 10A–D. Geographic range maps for Philippine records of (A) *Coelognathus erythrurus erythrurus*; (B) *Coelognathus erythrurus manillensis*; (C) *Coelognathus erythrurus psephenourus*; (D) *Coelognathus philippinus*.



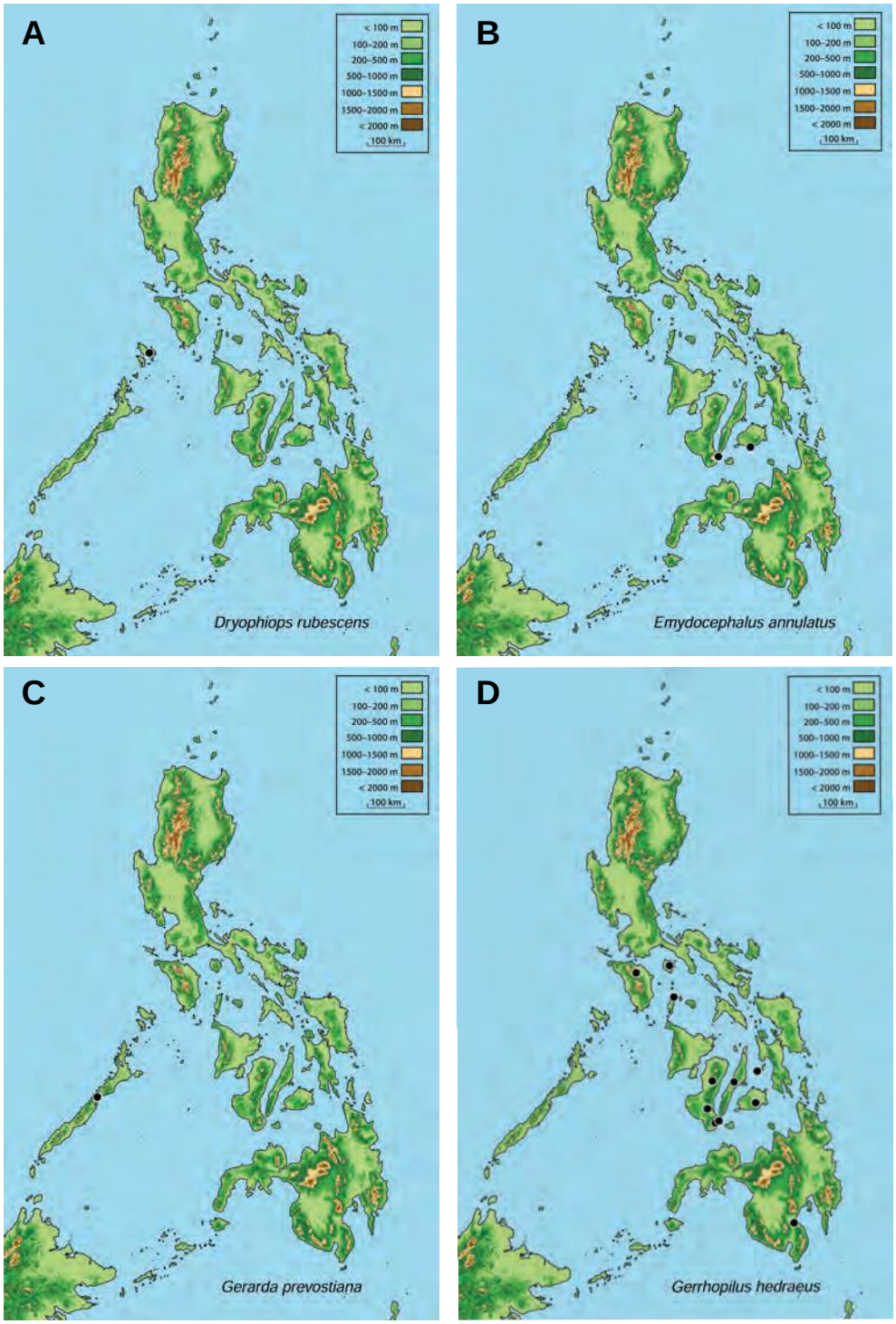
MAPS 11A–D. Geographic range maps for Philippine records of (A) *Cyclocorus lineatus alcalai*; (B) *Cyclocorus lineatus lineatus*; (C) *Cyclocorus nuchalis nuchalis*; (D) *Cyclocorus nuchalis taylori*.



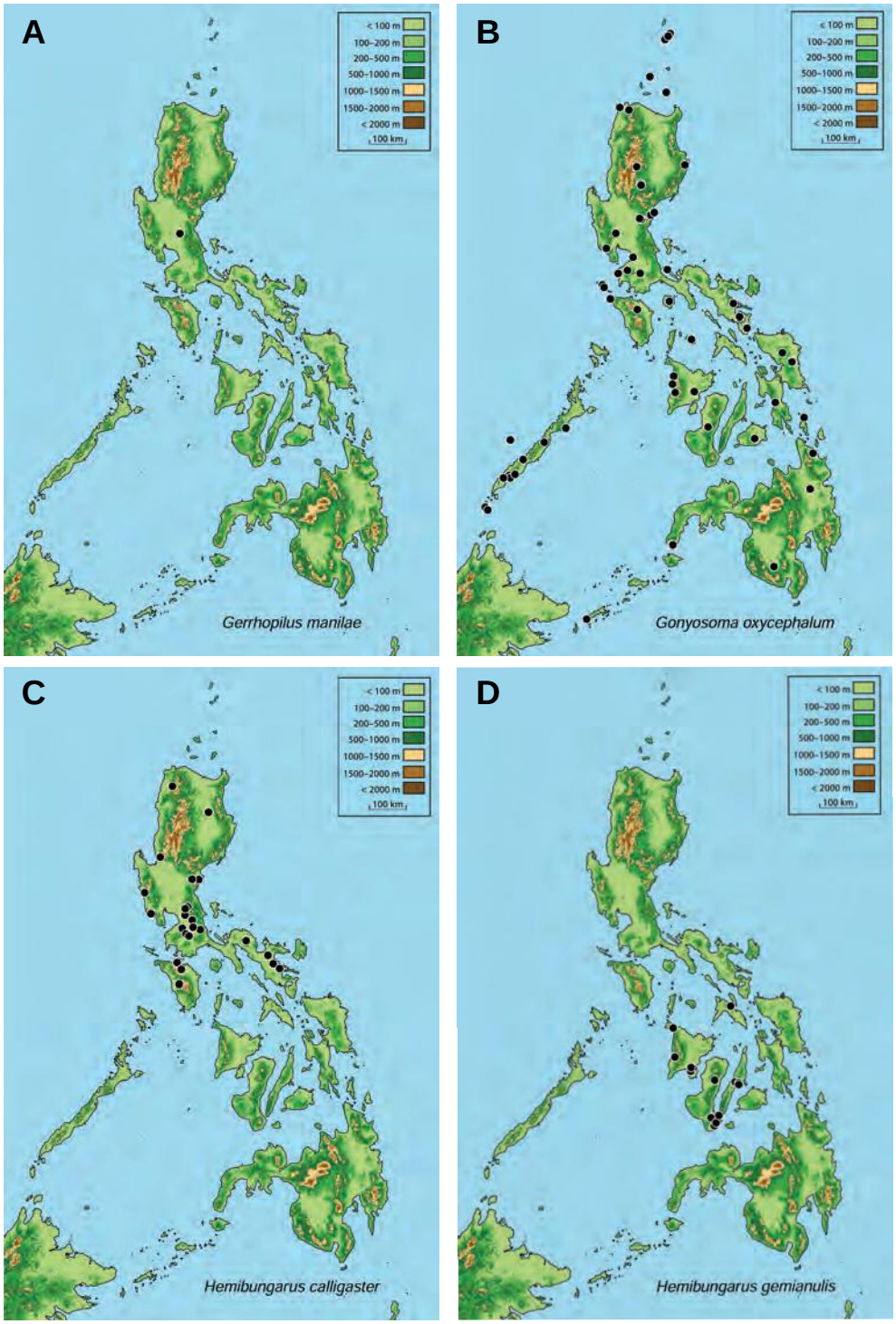
MAPS 12A–D. Geographic range maps for Philippine records of (A) *Dendrelaphis flavescens*; (B) *Dendrelaphis fuliginosus*; (C) *Dendrelaphis levitoni*; (D) *Dendrelaphis luzonensis*.



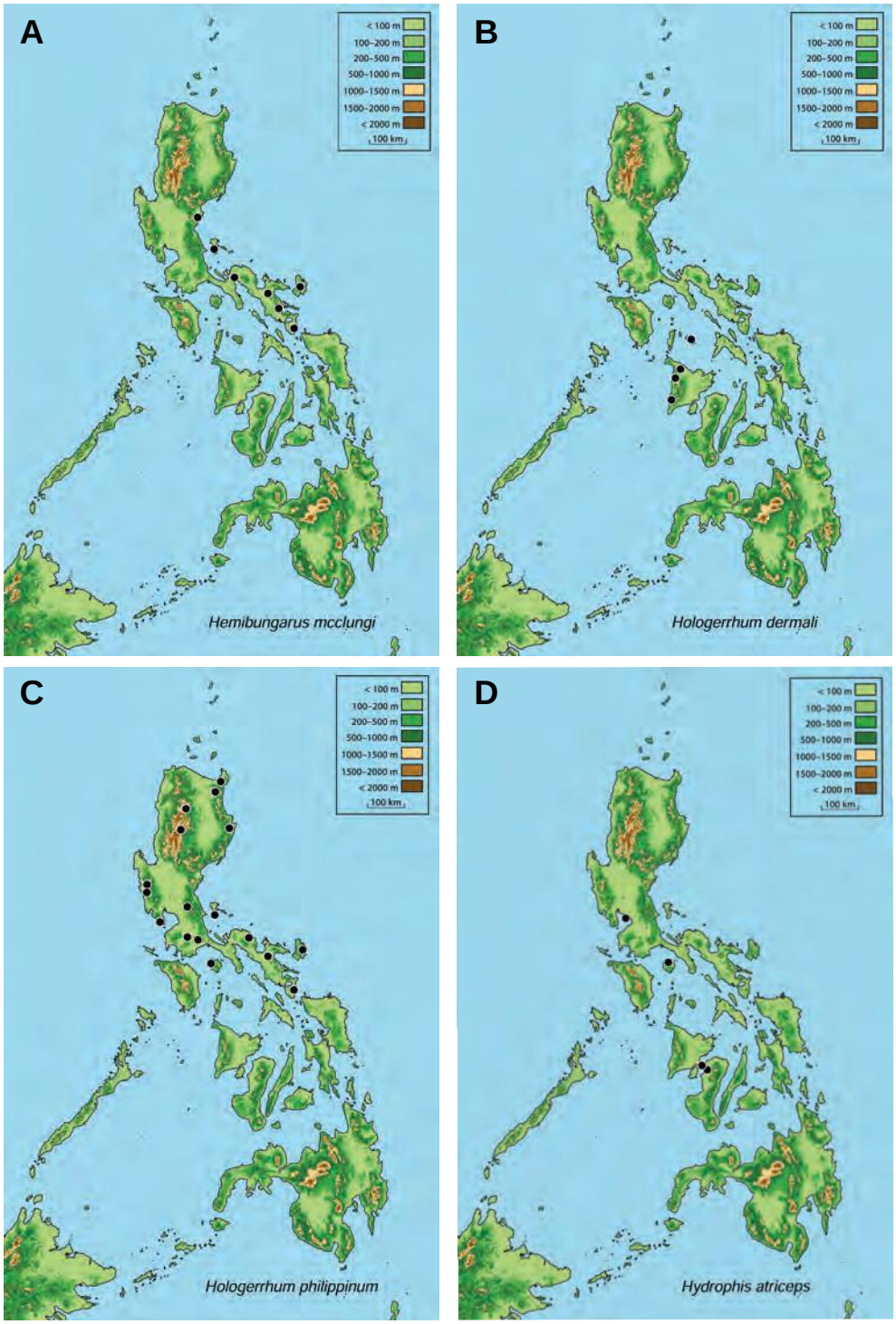
MAPS 13A–D. Geographic range maps for Philippine records of (A) *Dendrelaphis marenae*; (B) *Dendrelaphis philippinensis*; (C) *Dryocalamus philippinus*; (D) *Dryophiops philippina*.



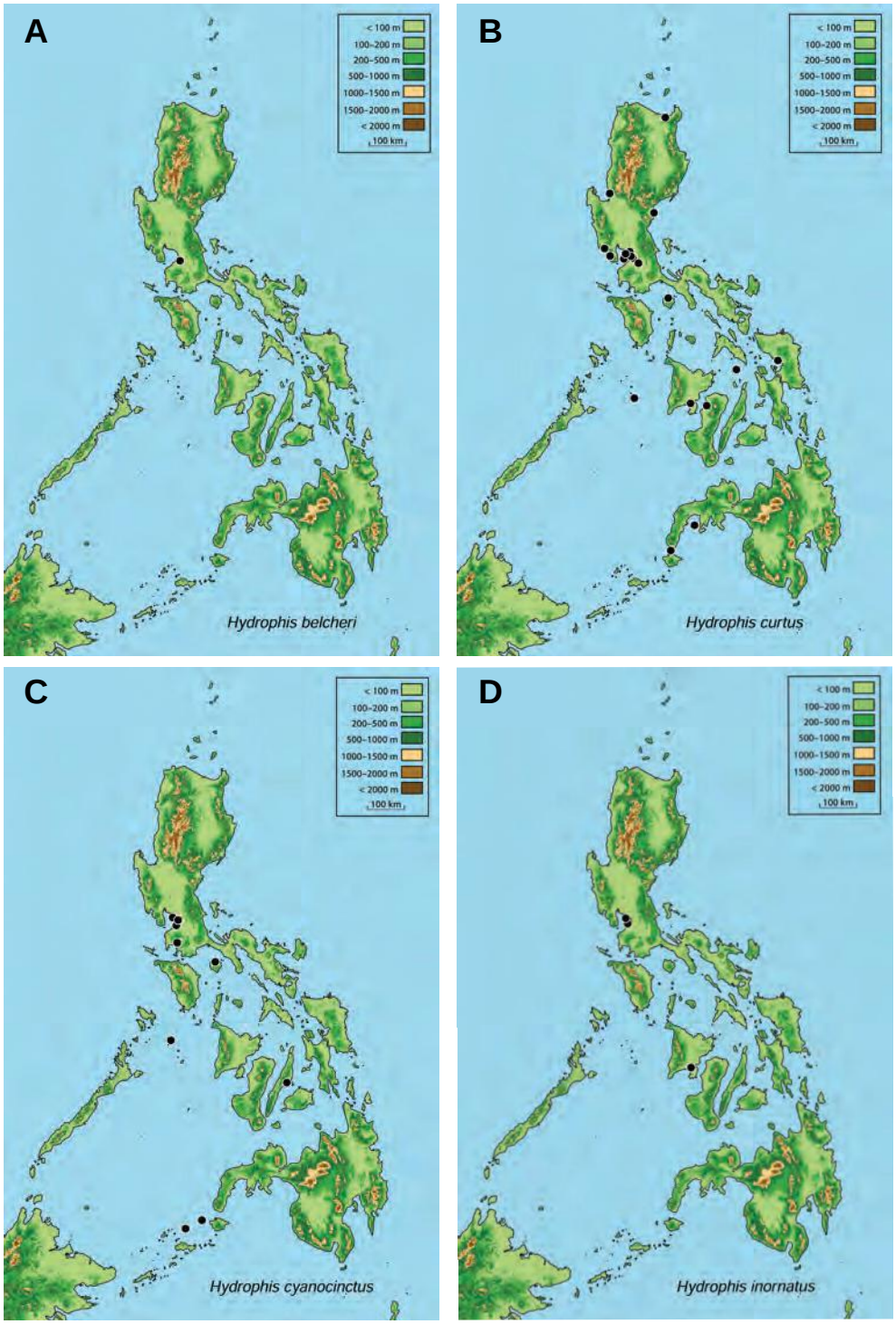
MAPS 14A–D. Geographic range maps for Philippine records of (A) *Dryophiops rubescens*; (B) *Emydocephalus annulatus*; (C) *Gerarda prevostiana*; (D) *Gerrhopilus hedraeus*.



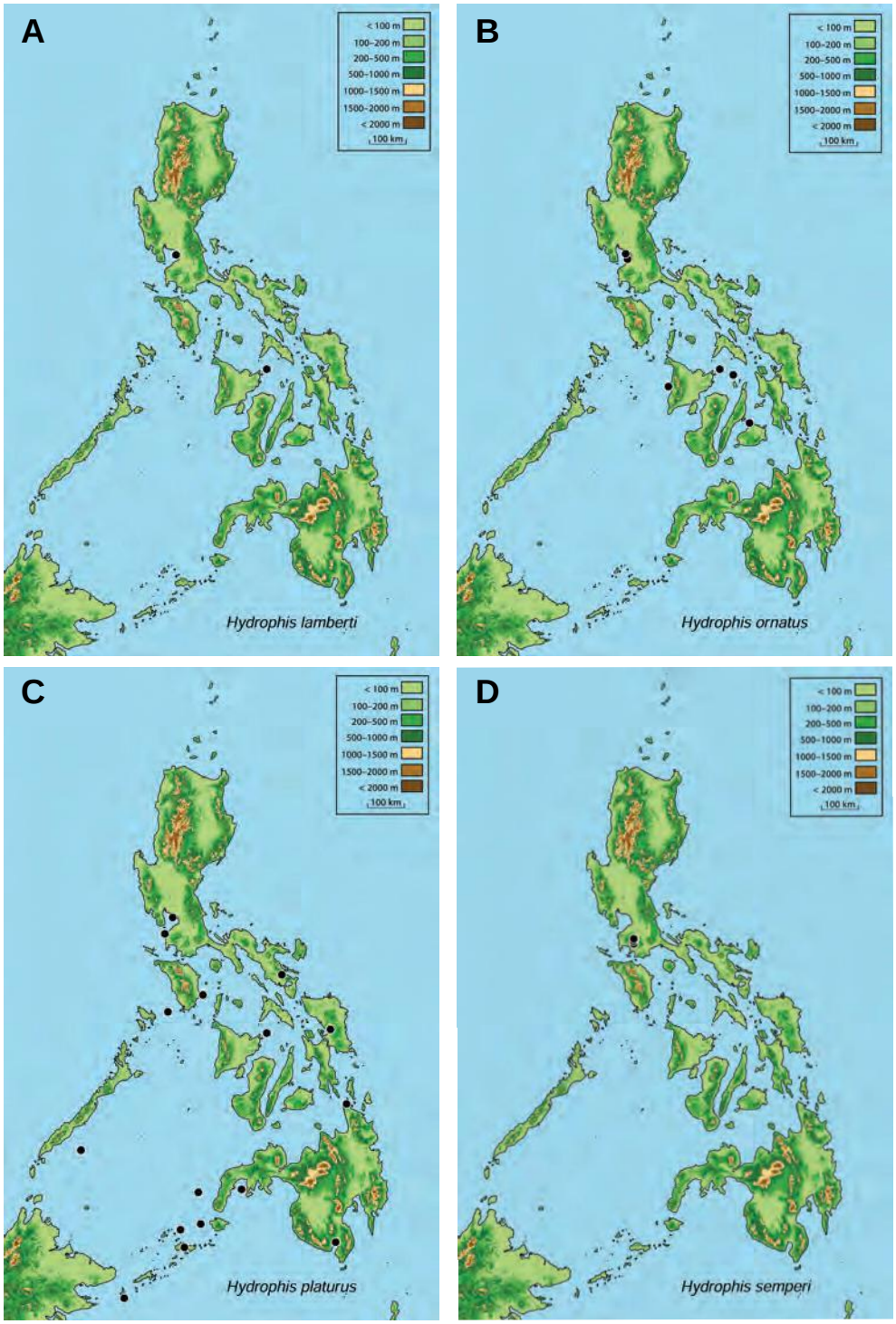
MAPS 15A–D. Geographic range maps for Philippine records of (A) *Gerrhopilus manilae*; (B) *Gonyosoma oxycephalum*; (C) *Hemibungarus calligaster*; (D) *Hemibungarus gemianulis*.



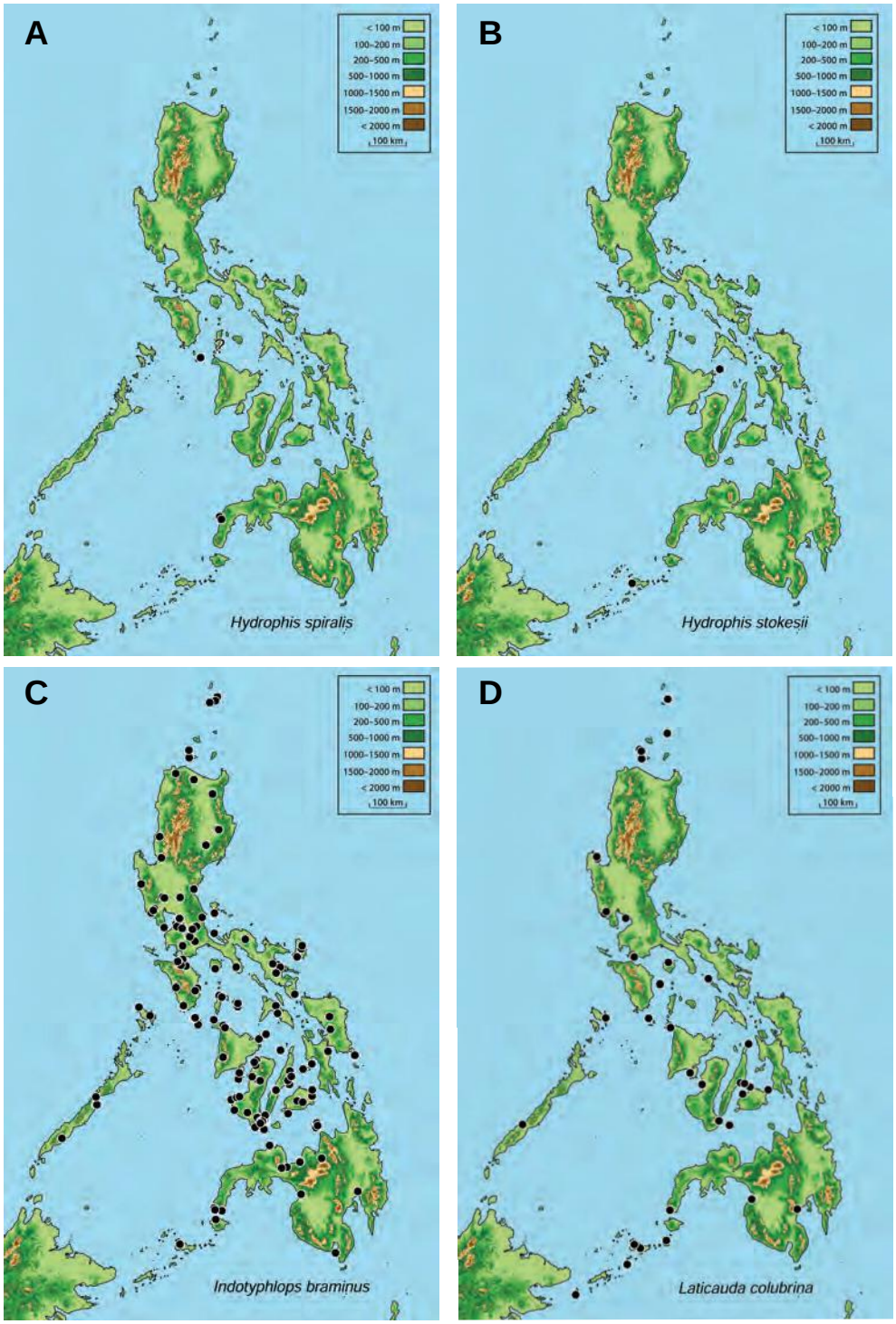
MAPS 16A–D. Geographic range maps for Philippine records of (A) *Hemibungarus mcclungi*; (B) *Hologerrhum dermali*; (C) *Hologerrhum philippinum*; (D) *Hydrophis atriceps*.



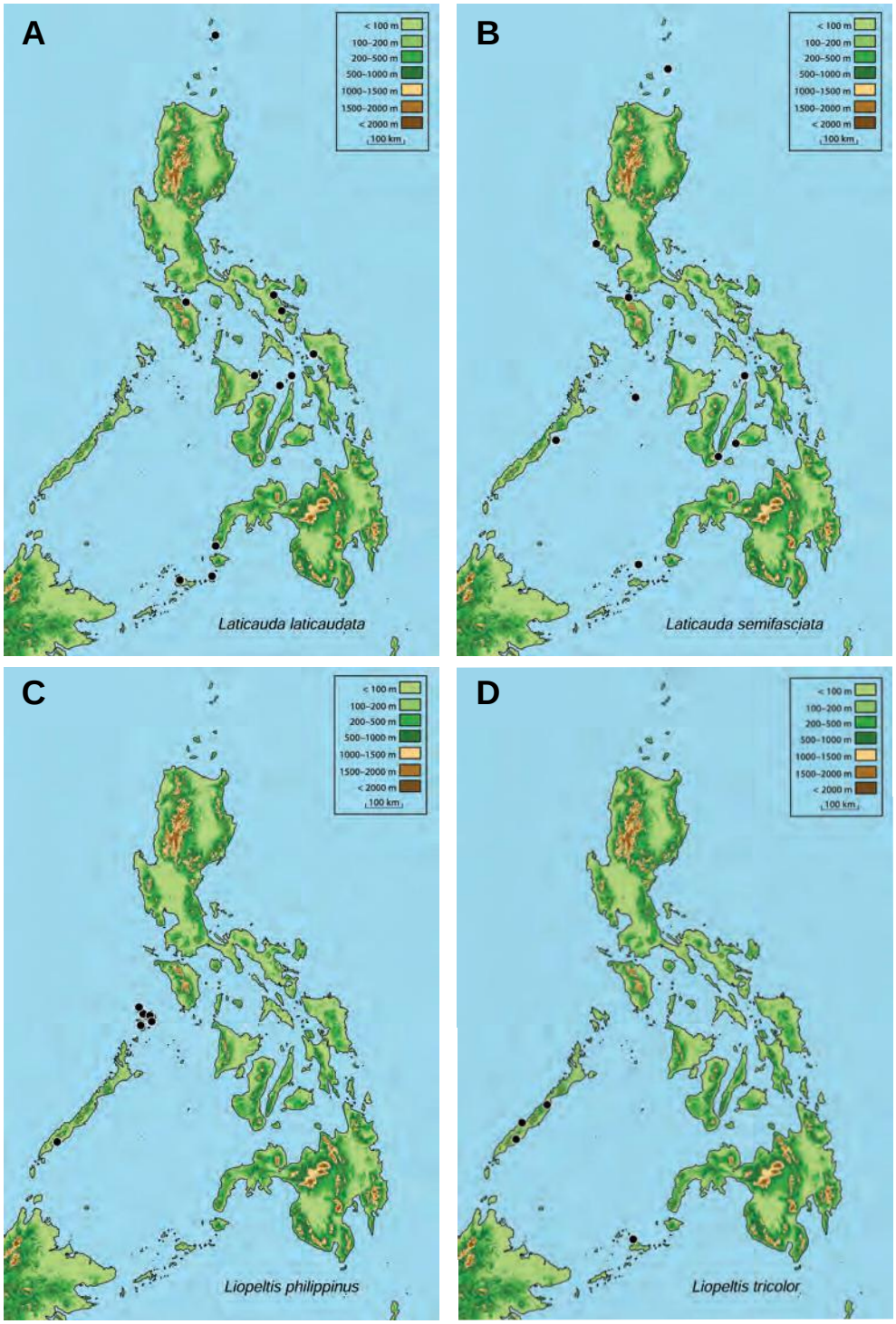
MAPS 17A–D. Geographic range maps for Philippine records of (A) *Hydrophis belcheri*; (B) *Hydrophis curtus*; (C) *Hydrophis cyanocinctus*; (D) *Hydrophis inornatus*.



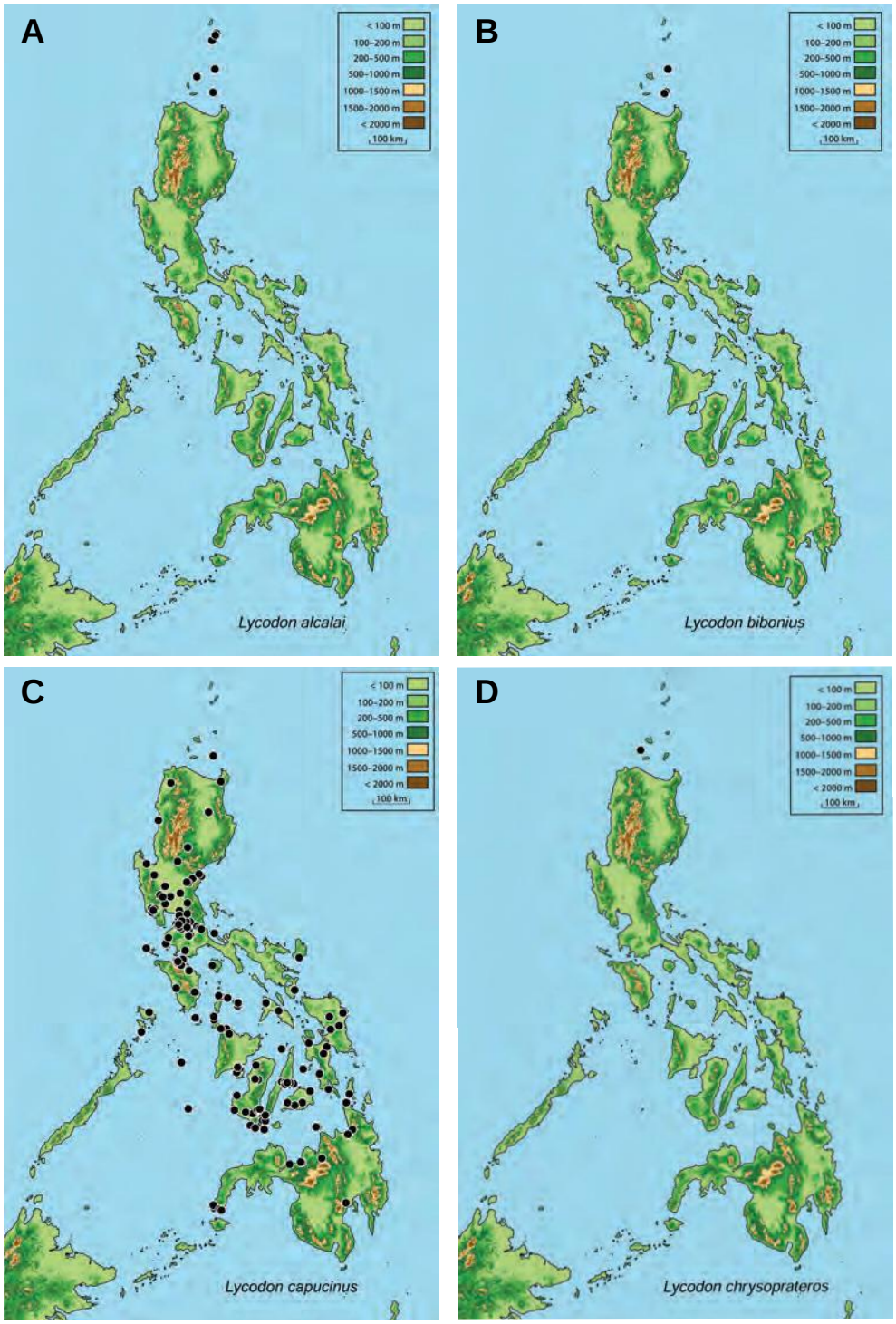
MAPS 18A–D. Geographic range maps for Philippine records of (A) *Hydrophis lamberti*; (B) *Hydrophis ornatus*; (C) *Hydrophis platurus*; (D) *Hydrophis semperi*.



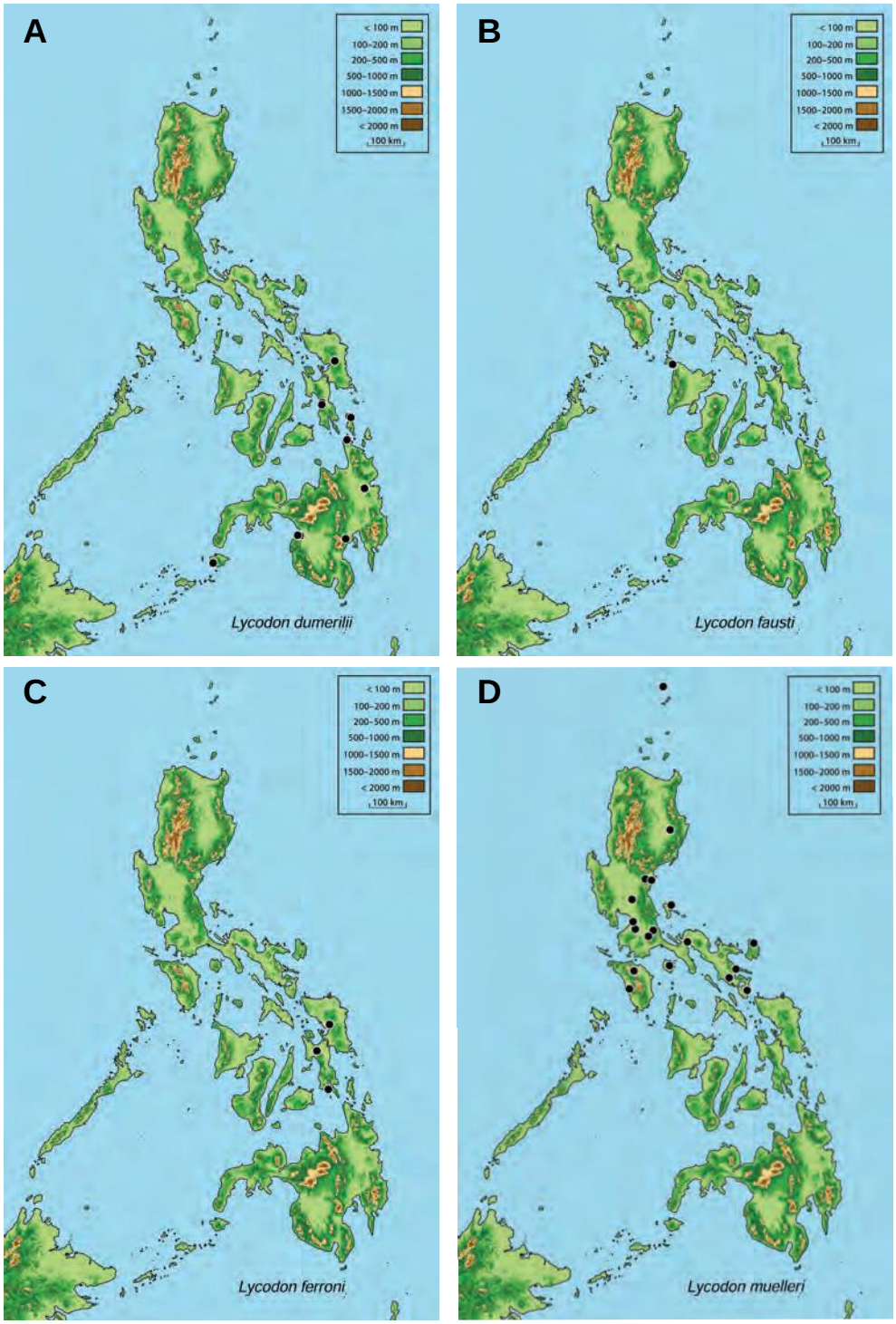
MAPS 19A–D. Geographic range maps for Philippine records of (A) *Hydrophis spiralis*; (B) *Hydrophis stokesii*; (C) *Indotyphlops braminus*; (D) *Laticauda colubrina*.



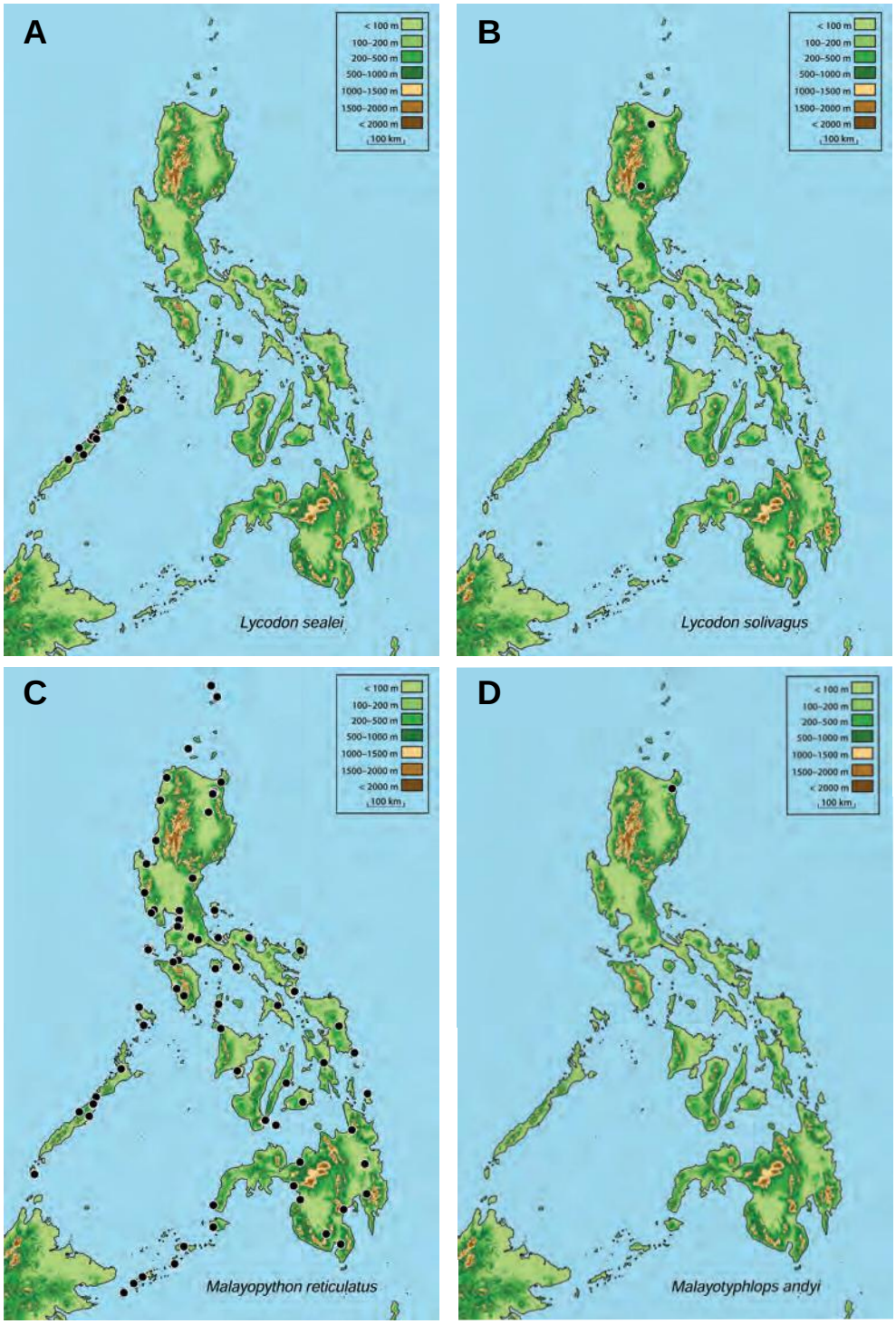
MAPS 20A–D. Geographic range maps for Philippine records of (A) *Laticauda laticaudata*; (B) *Laticauda semifasciata*; (C) *Liopeltis philippinus*; (D) *Liopeltis tricolor*.



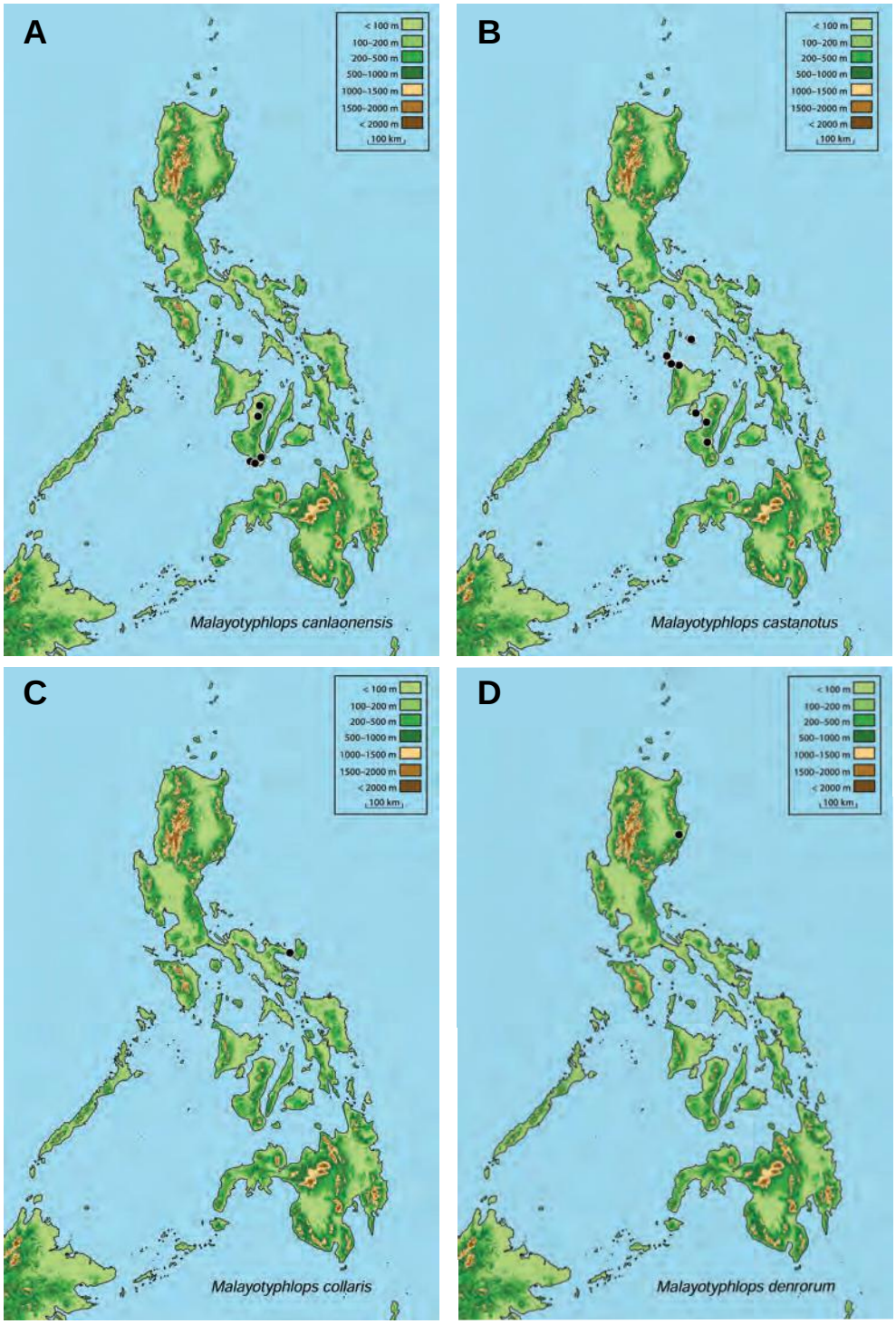
MAPS 21A–D. Geographic range maps for Philippine records of (A) *Lycodon alcalai*; (B) *Lycodon bibonius*; (C) *Lycodon capucinus*; (D) *Lycodon chrysoprateros*.



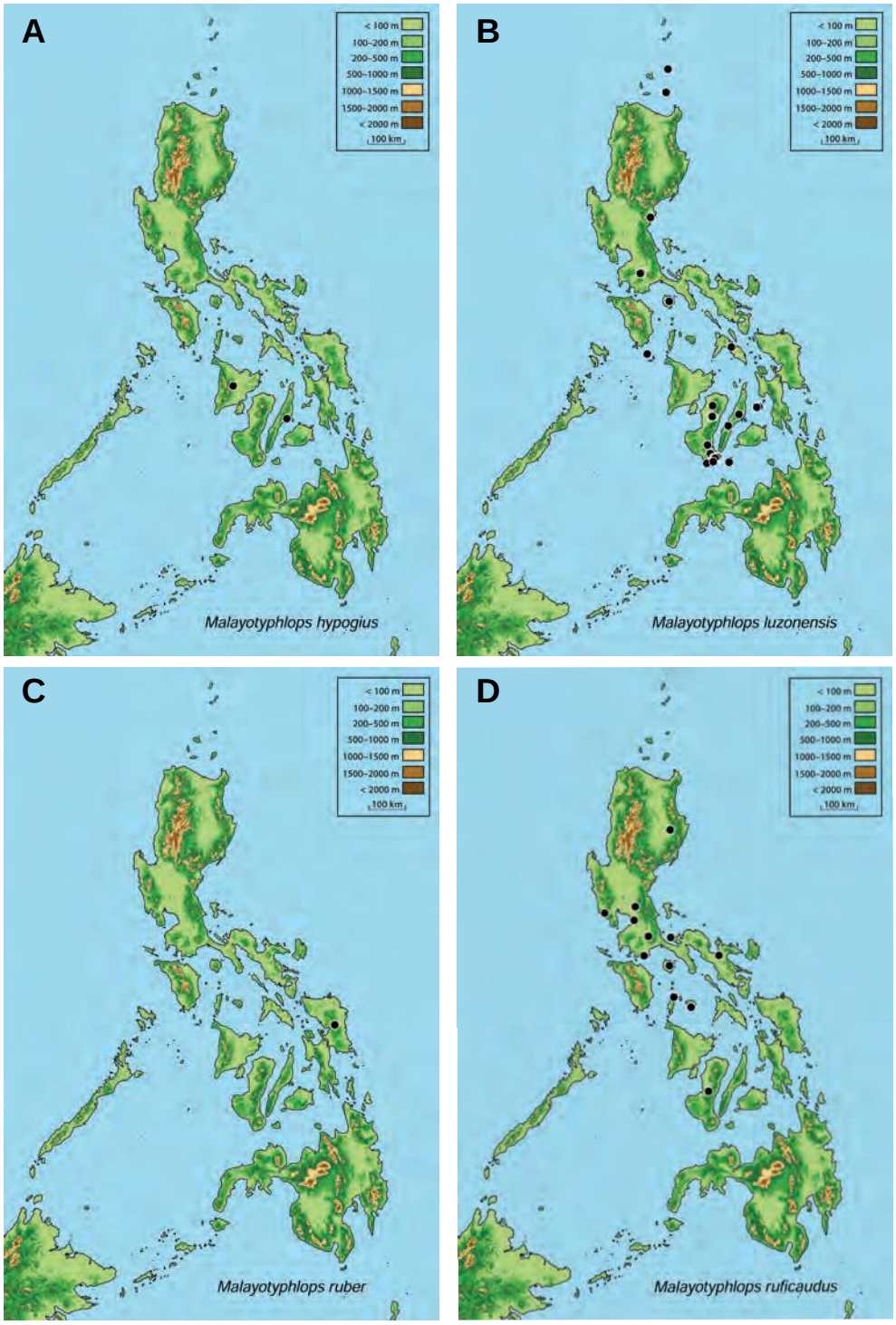
MAPS 22A–D. Geographic range maps for Philippine records of (A) *Lycodon dumerilii*; (B) *Lycodon fausti*; (C) *Lycodon ferroni*; (D) *Lycodon muelleri*.



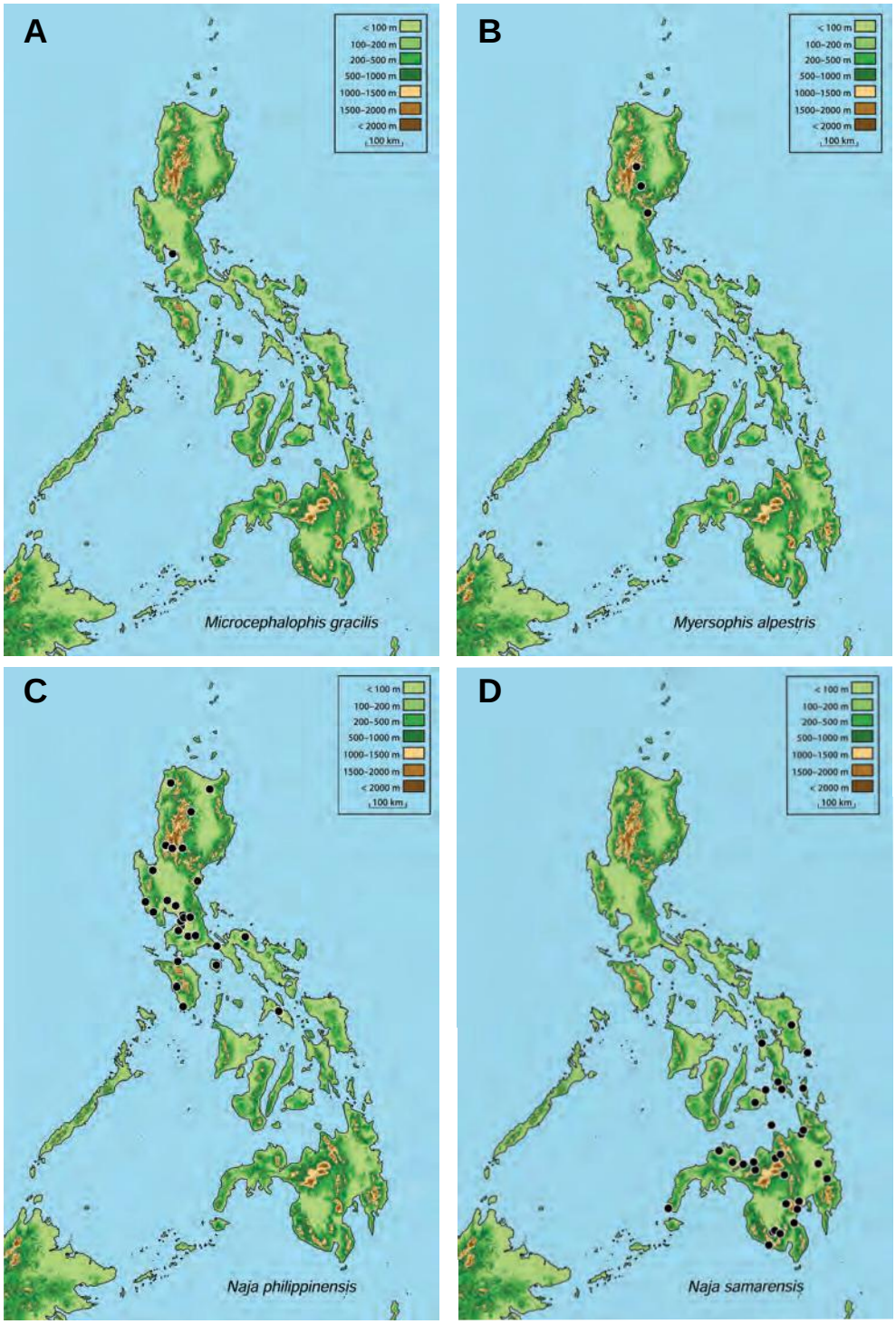
MAPS 23A–D. Geographic range maps for Philippine records of (A) *Lycodon sealei*; (B) *Lycodon solivagus*; (C) *Malayopython reticulatus*; (D) *Malayotyphlops andyi*.



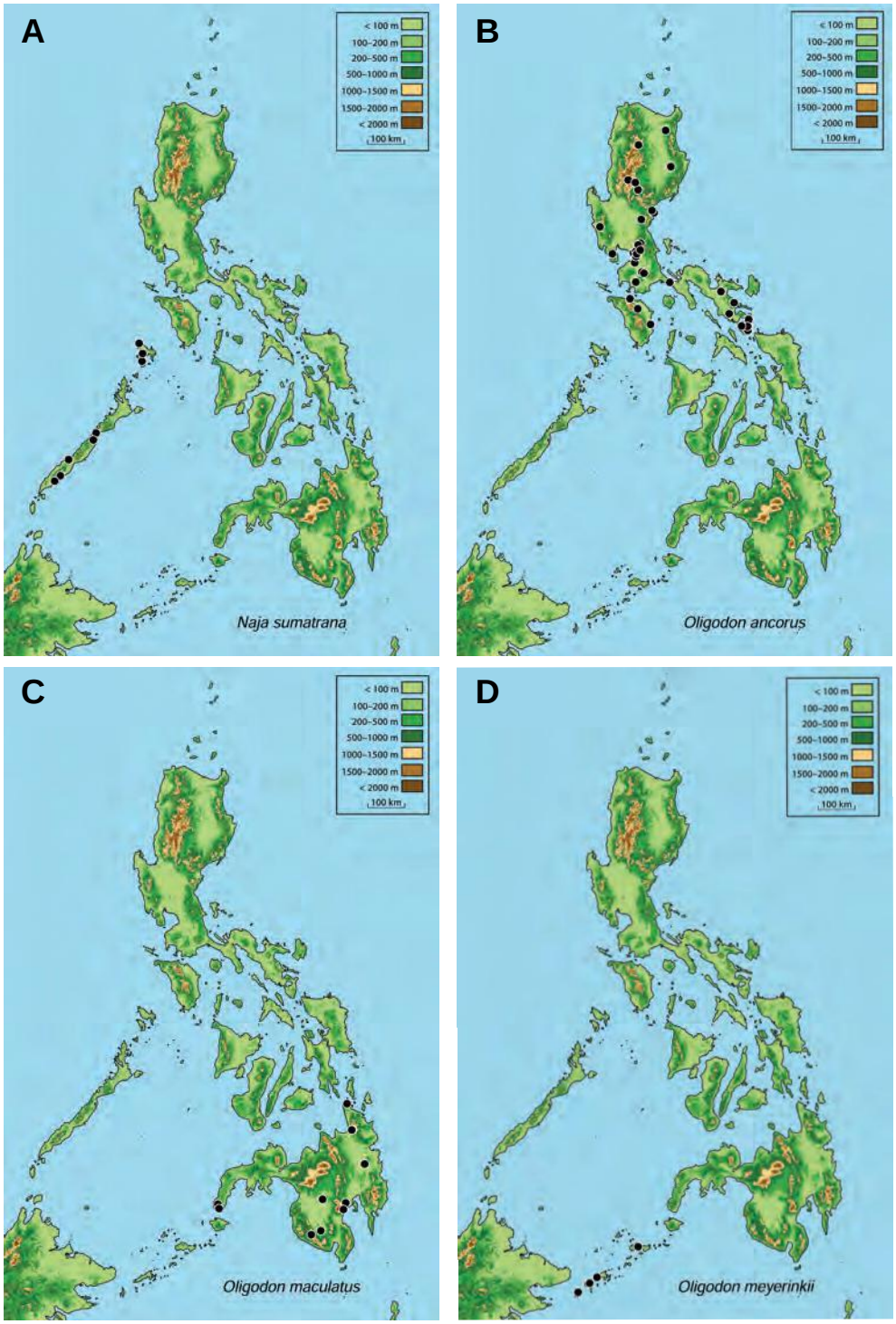
MAPS 24A–D. Geographic range maps for Philippine records of (A) *Malayotyphlops canlaonensis*; (B) *Malayotyphlops castanotus* ; (C) *Malayotyphlops collaris*; (D) *Malayotyphlops denrorum*.



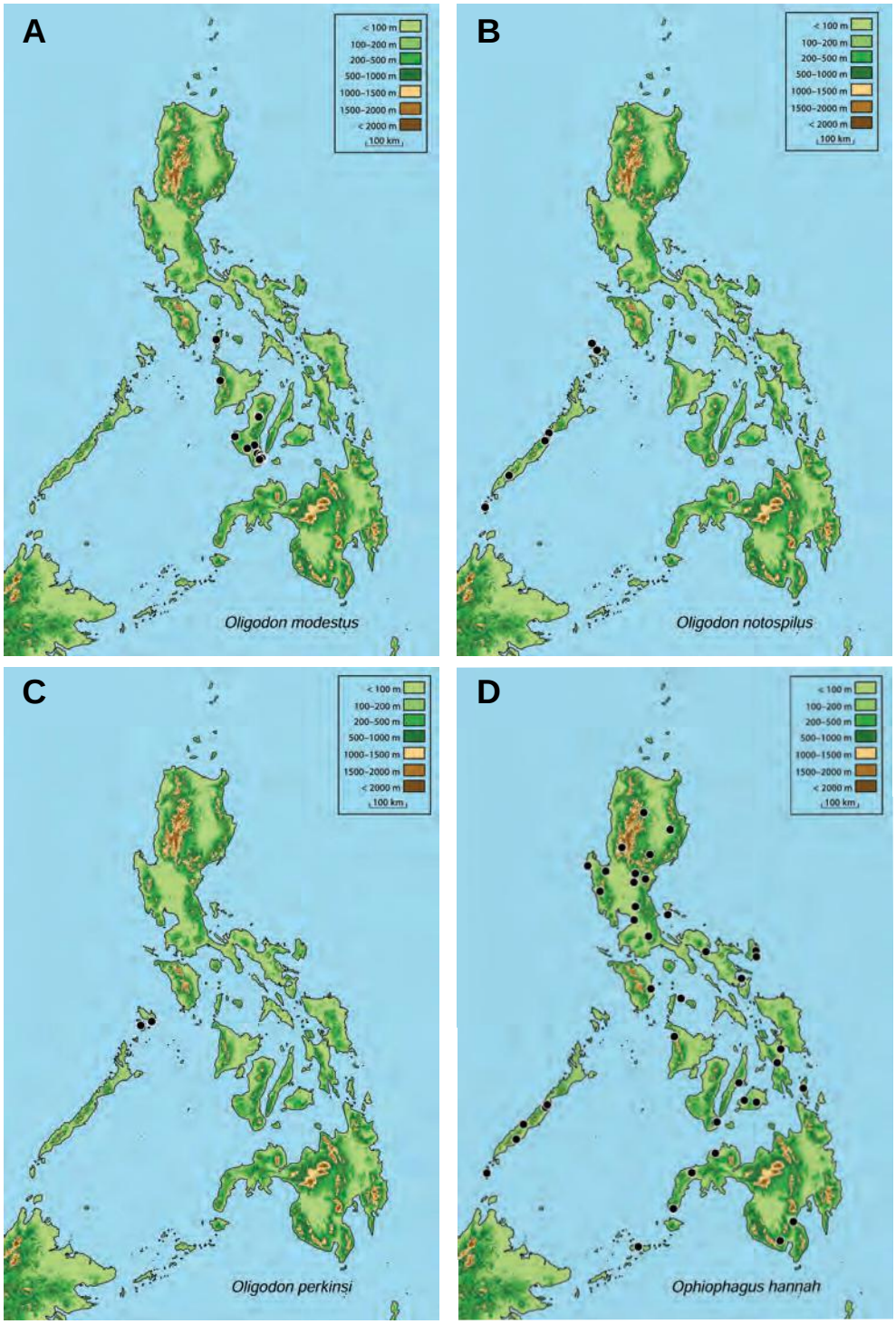
MAPS 25A–D. Geographic range maps for Philippine records of (A) *Malayotyphlops hypogius*; (B) *Malayotyphlops luzonensis*; (C) *Malayotyphlops ruber*; (D) *Malayotyphlops ruficaudus*.



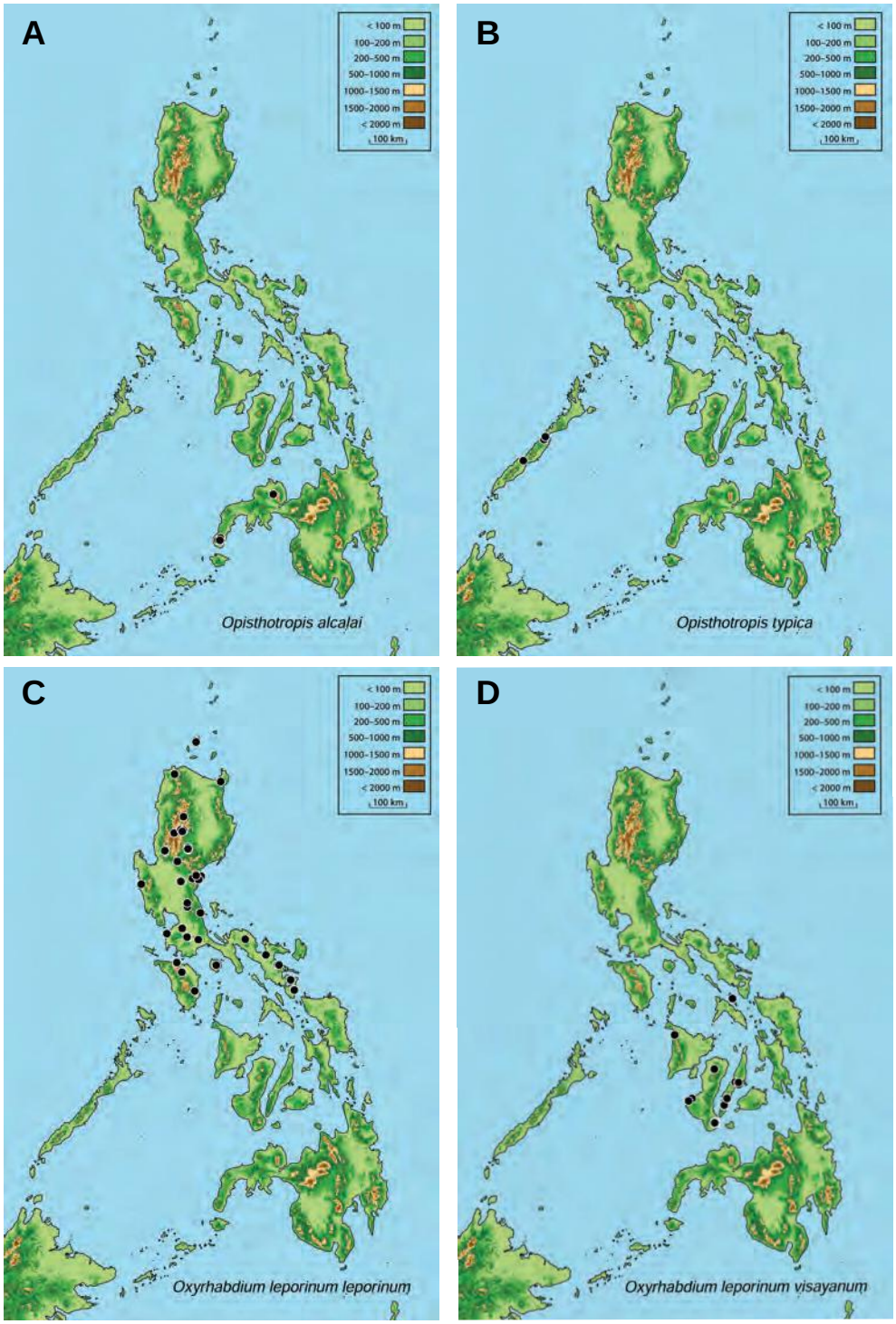
MAPS 26A–D. Geographic range maps for Philippine records of (A) *Microcephalophis gracilis*; (B) *Myersophis alpestris*; (C) *Naja philippinensis*; (D) *Naja samarensis*.



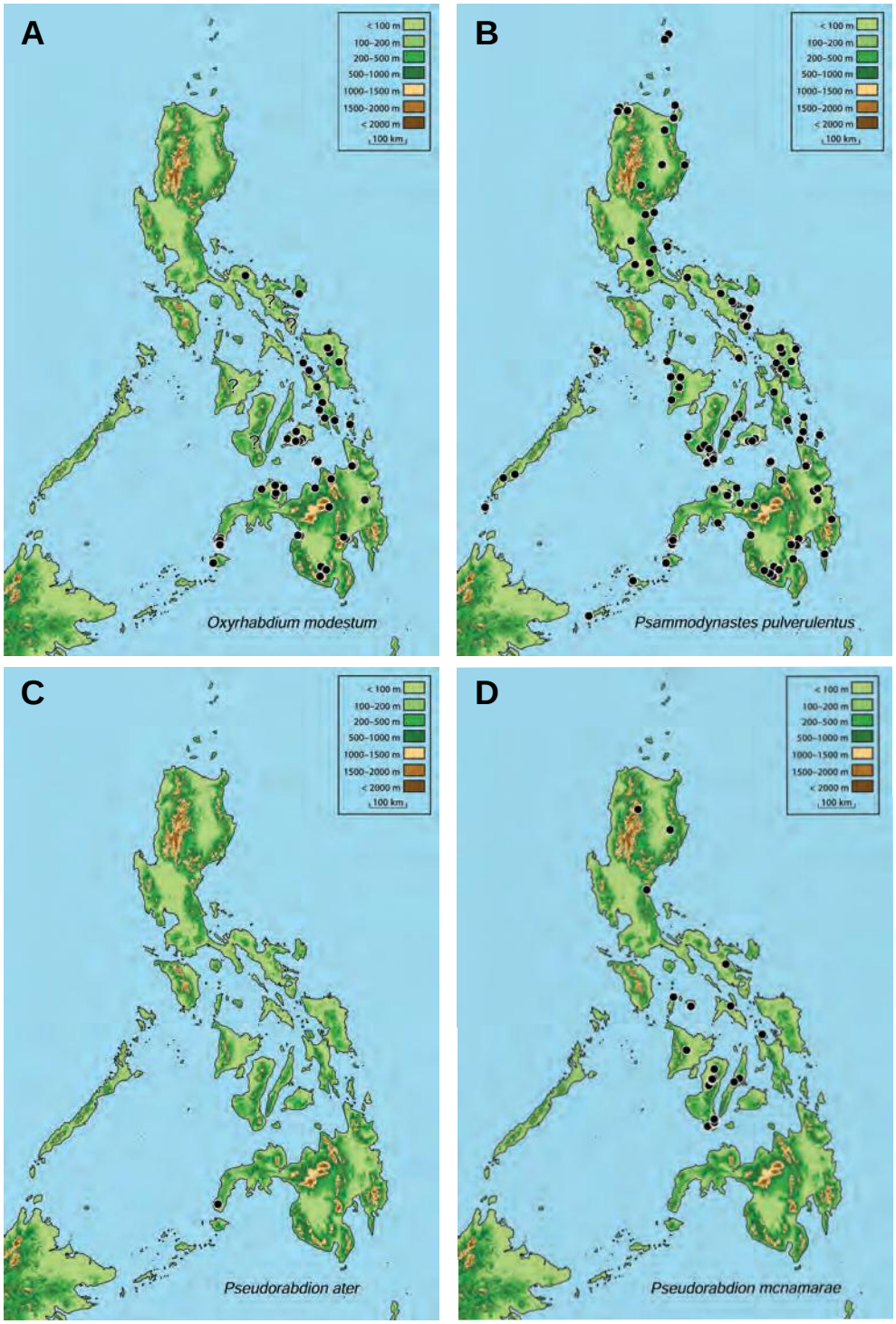
MAPS 27A–D. Geographic range maps for Philippine records of (A) *Naja sumatrana*; (B) *Oligodon ancorus*; (C) *Oligodon maculatus*; (D) *Oligodon meyerinkii*.



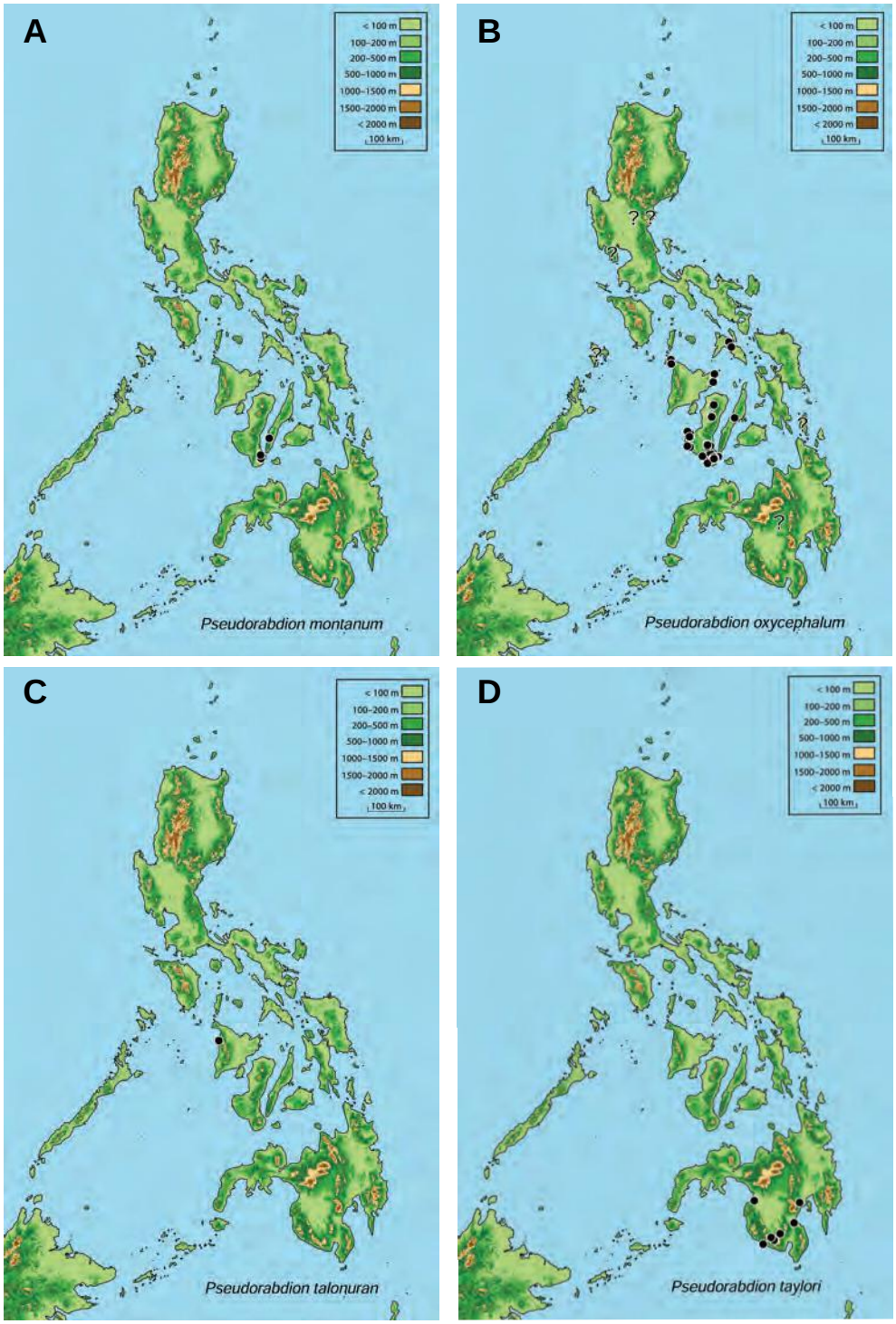
MAPS 28A–D. Geographic range maps for Philippine records of (A) *Oligodon modestus*; (B) *Oligodon notospilus*; (C) *Oligodon perkinsi*; (D) *Ophiophagus hannah*.



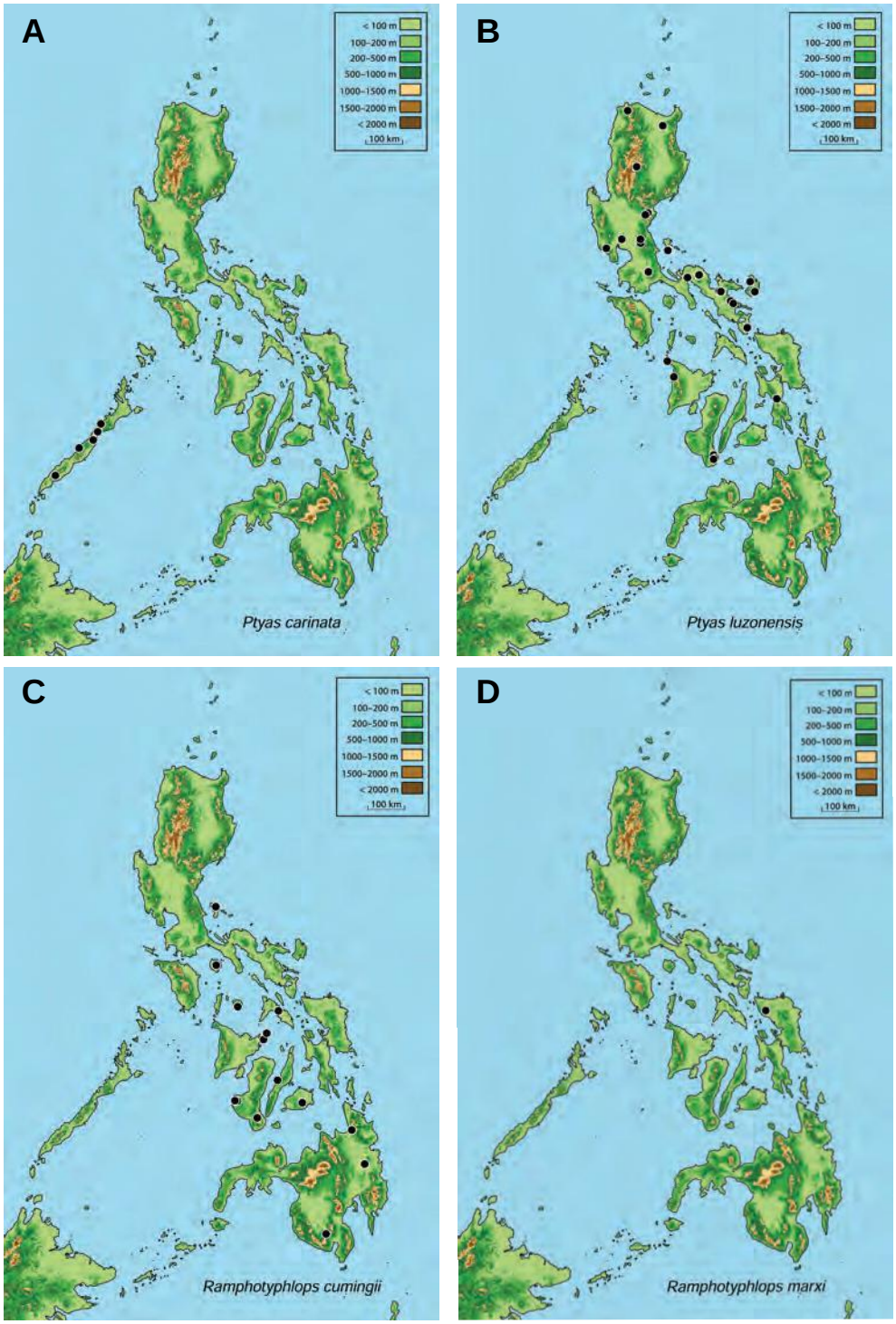
MAPS 29A–D. Geographic range maps for Philippine records of (A) *Opisthotropis alcalai*; (B) *Opisthotropis typica*; (C) *Oxyrhabdium leporinum leporinum*; (D) *Oxyrhabdium leporinum visayanum*.



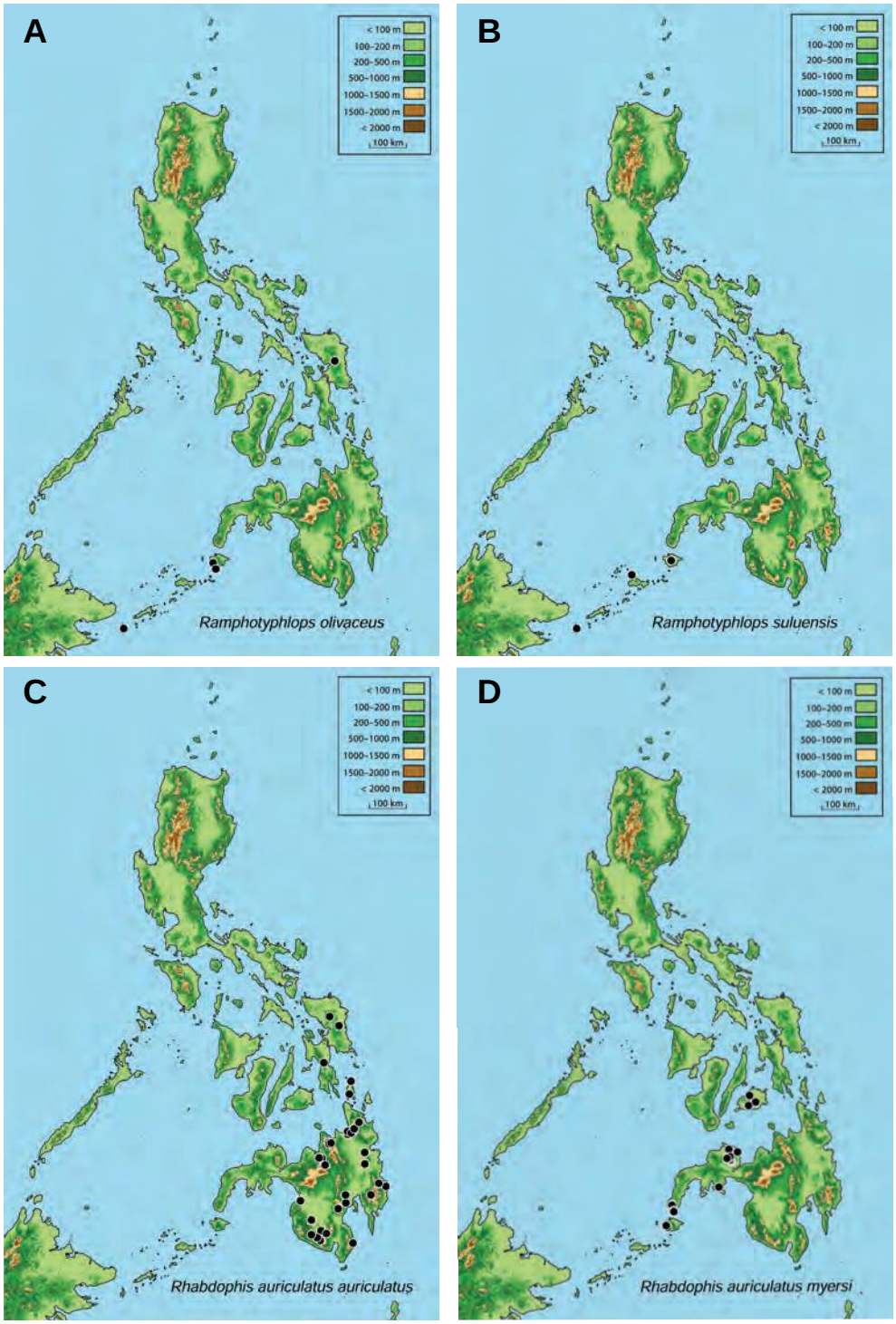
MAPS 30A–D. Geographic range maps for Philippine records of (A) *Oxyrhabdium modestum*; (B) *Psammodynastes pulverulentus*; (C) *Pseudorabdion ater*; (D) *Pseudorabdion mcnamarae*.



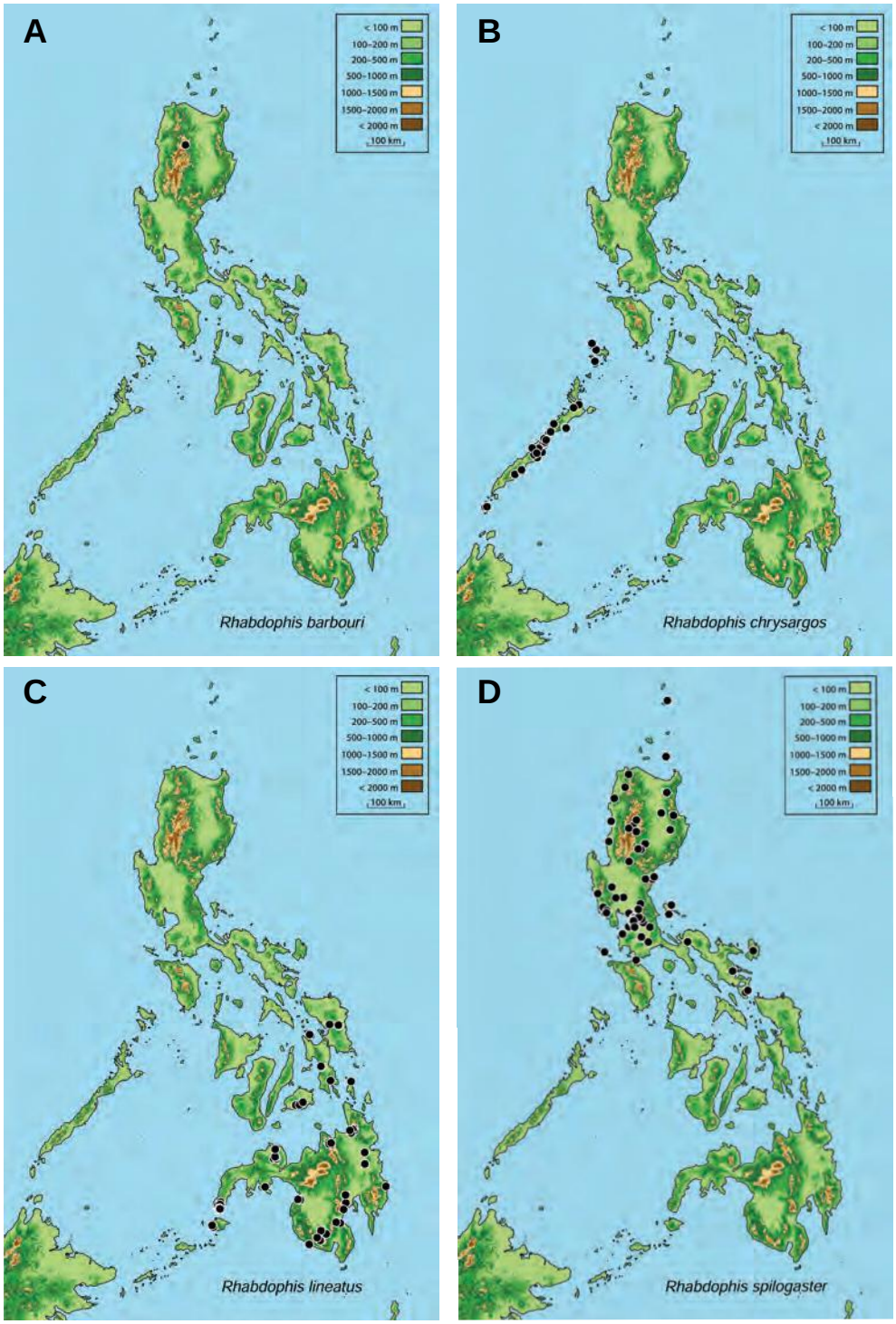
MAPS 31A–D. Geographic range maps for Philippine records of (A) *Pseudorabdion montanum*; (B) *Pseudorabdion oxycephalum*; (C) *Pseudorabdion talonuran*; (D) *Pseudorabdion taylori*.



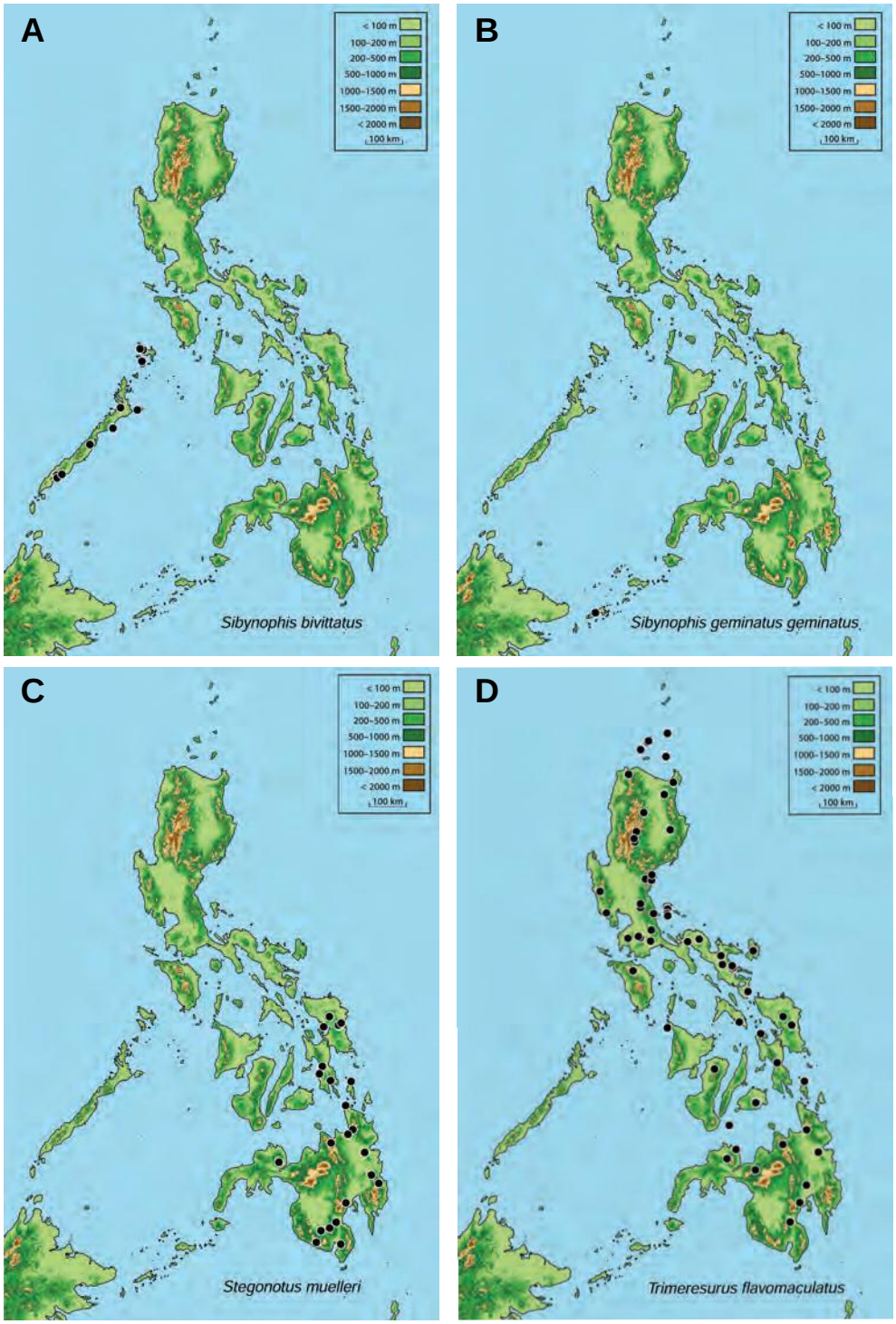
MAPS 32A–D. Geographic range maps for Philippine records of (A) *Ptyas carinata*; (B) *Ptyas luzonensis*; (C) *Ramphotyphlops cumingii*; (D) *Ramphotyphlops marxi*.



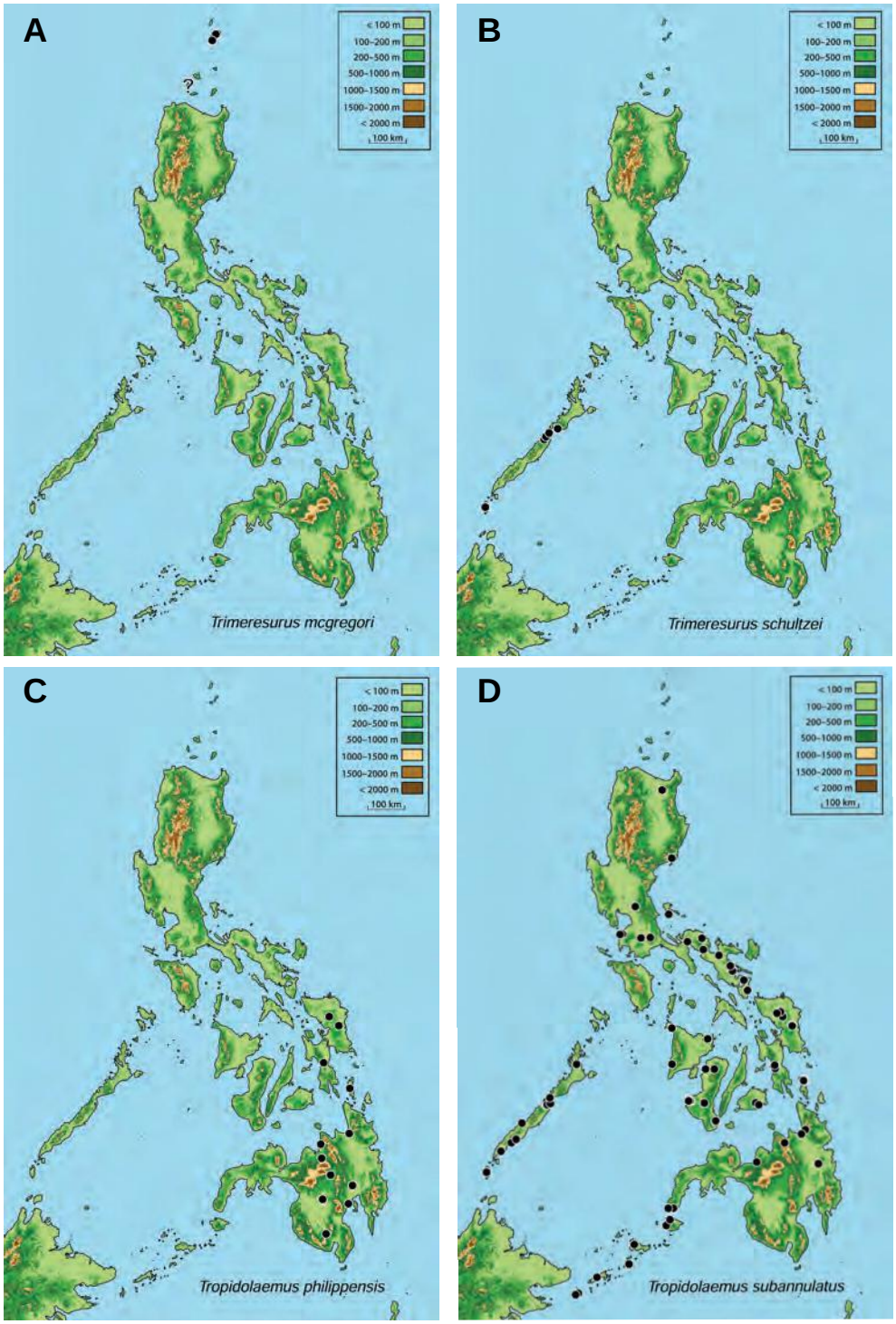
MAPS 33A–D. Geographic range maps for Philippine records of (A) *Ramphotyphlops olivaceus*; (B) *Ramphotyphlops suluensis*; (C) *Rhabdophis auriculatus auriculatus*; (D) *Rhabdophis auriculatus myersi*.



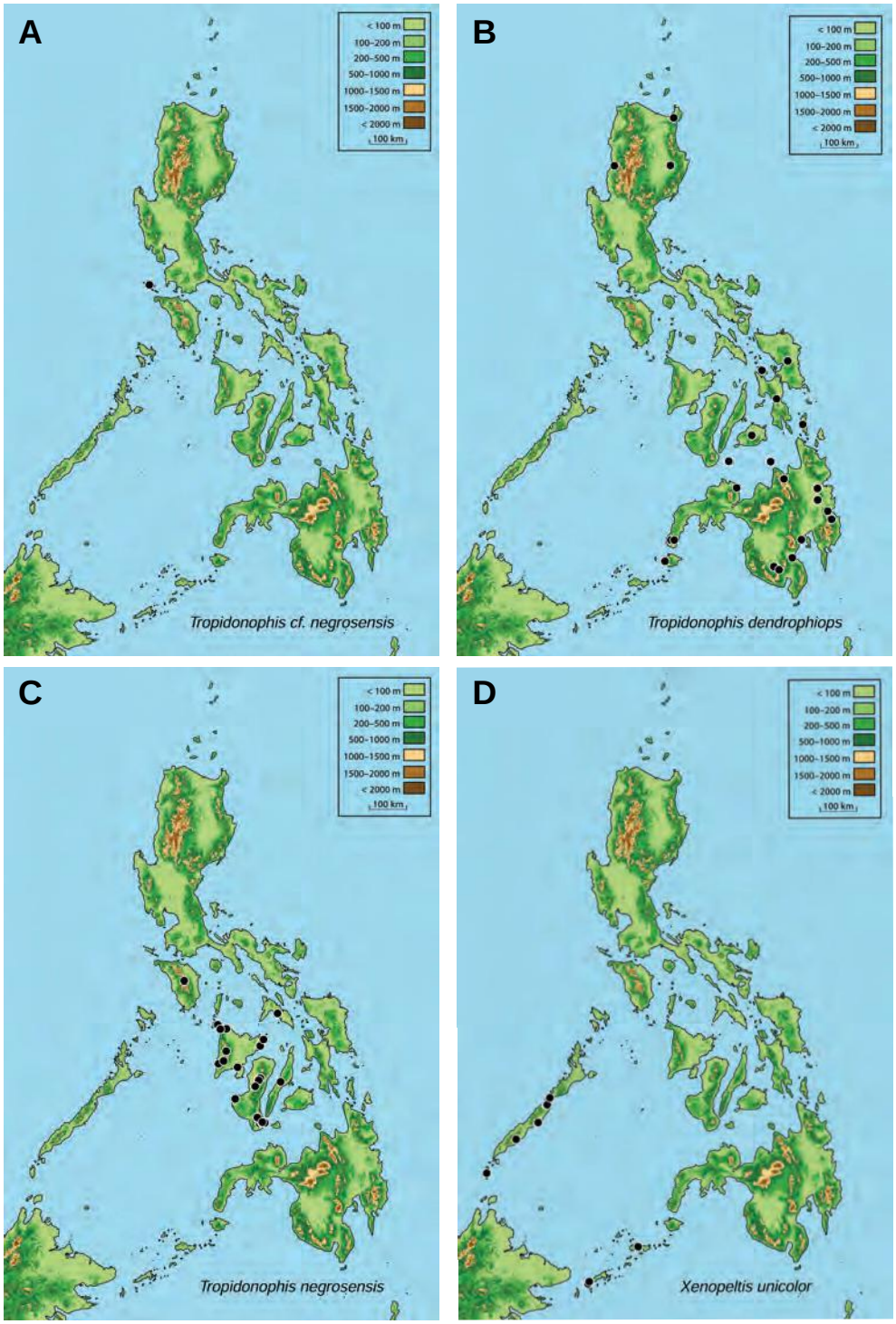
MAPS 34A–D. Geographic range maps for Philippine records of (A) *Rhabdophis barbouri*; (B) *Rhabdophis chrysargos*; (C) *Rhabdophis lineatus*; (D) *Rhabdophis spilogaster*.



MAPS 35A–D. Geographic range maps for Philippine records of (A) *Sibynophis bivittatus*; (B) *Sibynophis geminatus geminatus*; (C) *Stegonotus muelleri*; (D) *Trimeresurus flavomaculatus*.



MAPS 36A–D. Geographic range maps for Philippine records of (A) *Trimeresurus mcgregori*; (B) *Trimeresurus schultzei*; (C) *Tropidolaemus philippensis*; (D) *Tropidolaemus subannulatus*.



MAPS 37A–D. Geographic range maps for Philippine records of (A) *Tropidonophis* cf. *negrosensis*; (B) *Tropidonophis dendrophiops*; (C) *Tropidonophis negrosensis*; (D) *Xenopeltis unicolor*.

Photographs

Photographers: Rafe Brown (RMB), Arvin C. Diesmos (ACD), Jason B. Fernandez and Rafe Brown (JBF/RMB), Vhon Garcia (VG), Kyle Hesed (KH), Nicholas A. Huron (NAH), Cameron Siler (CDS), John Tashjian (JT), Harold Voris (HV), Jeffrey L. Weinell (JF)

N.B.: Within Superfamily-Family-Subfamily groups, photographs are arranged alphabetically by genus and within a genus, by species.

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Superfamily Typhlopoidea
Family Typhlopidae

FIGURE 1. *Acutotyphlops banaorum* (Kalinga Prov., Luzon Id.) (FMNH 262249 [paratype]). Photo © RMB.

FIGURE 2. *Indotyphlops braminus* (Ilocos Norte Prov., Luzon Id.) (KU 329680). Photo © RMB.

FIGURE 3. *Malayotyphlops ruficaudus* (Camarines Sur Prov., Luzon Id.) (TNHC 62474). Photo © RMB.

FIGURE 4. *Malayotyphlops* cf. *ruficaudus* (Cagayan Prov., Calayan Id.) (KU 323931). Photo © RMB.

FIGURE 5. *Malayotyphlops* sp. (Laguna Land Grant, Luzon Id.) (KU uncat.; field no. RMB 20573). Photo © RMB.

FIGURE 6. *Ramphotyphlops cumingii* (Augsan del Norte Prov., Mindanao Id.) (KU 334468). Photo © RMB.

FIGURE 7. *Ramphotyphlops cumingii* (head) (Augsan del Norte Prov., Mindanao Id.) (KU 334468). Photo © RMB.

Superfamily Pythonoidea
Family Pythonidae

FIGURE 8. *Malayopython reticulatus* (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 23519). Photo © JBF/RMB.

Superfamily Acrochordoidea
Family Acrochoridae

FIGURE 9. *Acrochordus granulatus* (locality unknown, Philippine Ids.) (KU 327186). Photo © CDS.

FIGURE 10. *Acrochordus granulatus* (albino) (locality unknown, Philippine Ids.) (KU 327187). Photo © CDS.

FIGURE 11. *Acrochordus granulatus* (blotched) (locality unknown, Philippine Ids.) (KU 327188). Photo © CDS.

Superfamily Colubroidea

Family Pareidae

FIGURE 12. *Aplopeltura boa* (Zamboanga City Prov., Mindanao Id.) (KU 315147). Photo © RMB.

Family Homalopsidae

FIGURE 13. *Cerberus schneideri* (Guimaras Prov., Guimaras Id.) (KU 302979). Photo © CDS.

Family Colubridae: Subfamily Ahaetulliinae

FIGURE 14. *Ahaetulla prasina preocularis* (Zambales Prov., Luzon Id.) (TNHC 62721). Photo © RMB.

FIGURE 15. *Ahaetulla prasina preocularis* (Ilocos Prov., Luzon Id.) (KU 329698). Photo © RMB.

FIGURE 16. *Ahaetulla prasina preocularis* (yellow phase) (Camiguin Norte, Luzon Id.) (KU 304666). Photo © RMB.

FIGURE 17. *Chrysopelea paradisi* (adult) (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 22665). Photo © RMB.

FIGURE 18. *Chrysopelea paradisi* (juvenile) (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 23230). Photo © RMB.

FIGURE 19. *Chrysopelea paradisi variabilis* (Eastern Samar Prov., Samar Id.) (KU 337270). Photo © CDS.

FIGURE 20. *Dendrelaphis luzonensis* (Quezon Land Grant, Luzon Id.) (KU uncat.; field no. RMB 20371). Photos © JBF/RMB.

FIGURE 21. *Dendrelaphis marenae* (Eastern Samar Prov., Samar Id.) (KU 344197). Photo © RMB.

FIGURE 22. *Dryophiops philippina* (Zamboanga City Prov., Mindanao Id.) (KU 315167). Photo © RMB.

Family Colubridae: Subfamily Calamarinae

FIGURE 23. *Calamaria bitorques* (Nueva Vizcaya Prov., Luzon Id.) ([KU 325970). Photo © RMB.

FIGURE 24. *Calamaria gervaisii gervaisii* (Ilocos Norte Prov., Luzon Id.) ([KU 329684). Photo © RMB.

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FIGURE 26.*Calamaria lumbricoidea* (juvenile) (Misamis Oriental Prov., Mindanao Id.) (KU 334478). Photo © RMB.

FIGURE 27. *Pseudorabdion ater* (male) (Zamboanga City Prov., Mindanao Id.) (KU 315197). Photo © RMB.

Family Colubridae: Subfamily Colubrinae

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FIGURE 29. *Boiga cynodon* (Sorsogon Prov., Luzon Id.) (TNHC 62721). Photo © RMB.

FIGURE 30. *Boiga dendrophila divergens* (Luzon Id.) (KU uncat.; field no. RMB19986). Photo © RMB.

FIGURE 31. *Boiga dendrophila latifasciata* (male) (Zamboanga City Prov., Mindanao Id.) (KU 334994). Photo © RMB.

FIGURE 32. *Boiga dendrophila latifasciata* (hunting) (West Mindanao Id.). Photo © RMB.

FIGURE 33. *Boiga dendrophila levitoni* (Iloilo Prov., Gigante Norte Id.) (KU 302959). Photo © CDS.

FIGURE 34. *Boiga dendrophila multicincta* (Puerto Princessa, Palawan Id.) (KU309444). Photo © RMB.

FIGURE 35. *Boiga philippina* (Cagayan Prov., Babuyan Claro Id.) (KU 304855). Photo © RMB.

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FIGURE 38. *Coelognathus erythrurus manillensis* (Isabella Prov., Luzon Id.) (PNM uncat.; field no. ACD 3092). Photo © ACD/KH.

FIGURE 39. *Coelognathus erythrurus psephenourus* (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 23101). Photo © RMB.

FIGURE 40. *Gonyosoma oxycephalum* (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 22921). Photo © JBF/RMB.

FIGURE 41. *Gonyosoma oxycephalum* (head) (Eastern Samar Prov., Samar Id.) (KU 344269). Photo © JBF/RMB.

FIGURE 42. *Lycodon alcalai* (Cagayan Prov., Camiguin Norte Id.) (KU 304589). Photo © RMB.

FIGURE .43. *Lycodon alcalai* (head) (Cagayan Prov., Camiguin Norte Id.) (KU 304589). Photo © RMB.

FIGURE 44. *Lycodon bibonius* (Cagayan Prov., Babuyan Claro Id.) (KU 304852). Photo © RMB.

FIGURE 45. *Lycodon dumerilii* (Leyte Prov., Leyte Id.) (PNM 7751). Photo © RMB.

FIGURE 46. *Lycodon dumerilii* (Eastern Samar Prov., Samar Id.) (KU 344364). Photo © JBF/RMB.

FIGURE 47. *Lycodon muelleri (*Laguna Land Grant, Luzon Id.) (KU uncat.; field no. RMB 20574). Photo © RMB.

FIGURE 48. *Lycodon sealei* (all black adult) (Puerto Princessa, Palawan Id.) (KU 309447). Photo © RMB.

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FIGURE 50. *Lycodon sealei* (juvenile) (Narra, Palawan Id.) (KU 327571). Photo © RMB.

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FIGURE 53. *Oligodon maculatus* (juvenile) (Zamboanga City Prov., Mindanao Id.) (KU 315172]). Photo © RMB.

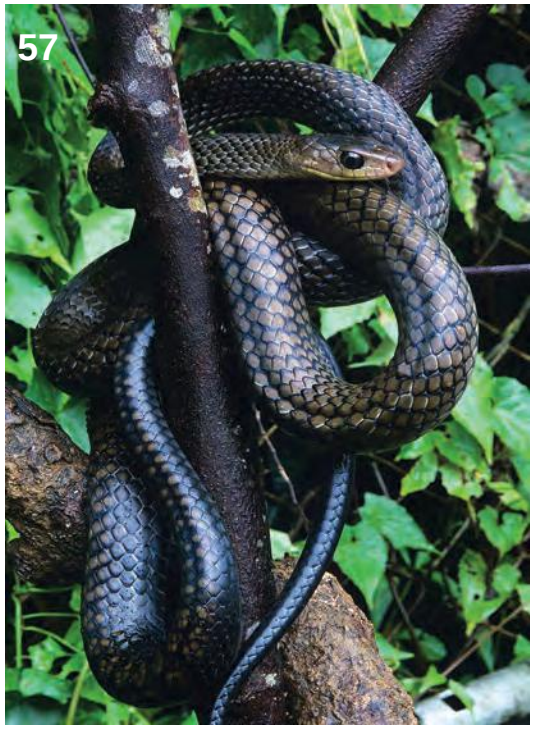

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FIGURE 56. *Oligodon notospilus* (head) Brooke's Point, Palawan Id.) (KU 309637). Photo © RMB.

FIGURE 57. *Ptyas luzonensis* (Sorsogon, Salvacion, Luzon Id.) (KU uncat.; field no. RMB 23519). Photo © JBF/RMB.

FIGURE 58. *Ptyas luzonensis* (male) (Camarines Norte Prov., Luzon Id.) (KU 313912). Photo © RMB.

FIGURE 59. *Ptyas luzonensis* (Sorsogon Prov., Luzon Id.) (KU uncat.; field no. RMB 23519). Photo © JBF/RMB.

Family Colubridae: Subfamily Natricinae

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FIGURE 61. *Stegonotus muelleri* (head) (Eastern Samar Prov., Samar Id.) KU 344536. Photo © RMB.

FIGURE 62. *Opisthotropis alcalai* (Zamboanga City Prov., Mindanao Id.) (KU 315173). Photo © RMB.

FIGURE 63. *Opisthotropis alcalai* (head) (Zamboanga City Prov., Mindanao Id.) (KU 315173). Photo © RMB.

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FIGURE 65. *Opisthotropis typica* (head) (Municipality Quezon, Palawan Id.) (KU 334754). Photo © RMB.

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FIGURE 68. *Rhabdophis spilogaster* (Subic, Zambales Prov., Luzon Id.) (TNHC 62735). Photo © RMB.

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Family Lamprophiidae: Subfamily Cyclocorinae

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FIGURE 81. *Oxyrhabdium* cf. *leporinum* (Laguna Prov., Luzon Id.) (KU uncat.; field no. RMB 20570. Photo © RMB

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Family Elapidae: Subfamily Elapinae

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FIGURE 96. *Hydrophis* [*Lapemis*] *curtus*. Photo © HV.

FIGURE 97. *Hydrophis cyanocinctus*. Photo © HV.

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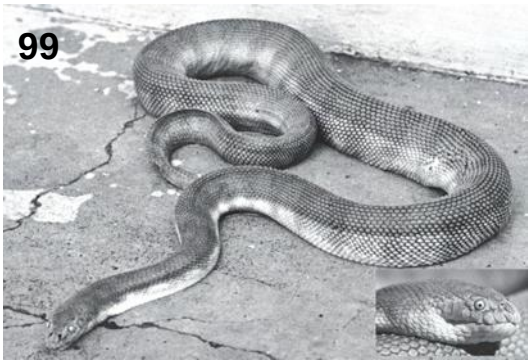

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