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RESULTS OF THE DOUGLAS BURDEN EXPEDITION TO THE ISLAND OF KOMODO

II.—SNAKES FROM THE EAST INDIES[1]

By Emmett Reid Dunn

The snakes mentioned herein were taken by the Douglas Burden Expedition to the Island of Komodo in the summer of 1926. They come from the islands of Java, Bali, Lombok, Komodo, and Wetar, and number twenty species and sixty-six specimens. There are no new species or races, but seven are new to Komodo, and five to Wetar, while Russell's viper, which was taken on Komodo, is new to the Lesser Sundas, and has for a long time been considered not to exist at all in the East Indies.

Typhlops braminus (Daudin).—Three specimens (Nos. 32112–4) from Bali. This very wide-spread form had not previously been taken on Bali.

Typhlops lineatus Boie.—Four specimens from Buitenzorg, Nos. 31953–6.

Liasis mackloti Duméril and Bibron.—Two specimens from Uhak, on the north coast of Wetar, Nos. 32264–5. These make a new record for the island. They have a slightly greater number of scale rows (57–60) than the 49–55 given by de Rooij (1917, 'The Reptiles of the Indo-Australian Archipelago,' II, p. 17) for specimens from Timor, Savu, and Samao. Her largest specimen was 1680 mm. long, but one we had which disintegrated in transit measured 2200 mm. The native name is "sawa," a name also used on Wetar for *Elaphe* and *Lycodon*.

Ptyas korros (Schlegel).—A young specimen, No. 31948, from Buitenzorg. A small specimen of this snake from the same locality served as the type of Barbour's *Liopeltis libertatis* (1910, Proc. Biol. Soc., Washington, XXIII, p. 169). The two descriptions are identical, and many points, especially the two loreals, of *L. libertatis* indicate a very different snake from the other *Liopeltis*. Miss Cochran and Dr. Stej-

[1]Contributions from the Department of Zoölogy, Smith College, No. 144.

neger have kindly examined the type in the National Museum, and assured me that my opinion is correct.

Liopeltis tricolor (Schlegel).—One from Buitenzorg, No. 31951.

Elaphe oxycephala (Boie).—One from Buitenzorg, No. 31946. This specimen has no loreal.

Elaphe subradiata (Schlegel).—Five specimens: one from Komodo, near the coast (No. 31973), and four from Uhak on Wetar (Nos. 32251–4). New record for both islands. Another was seen on Komodo at 2000 feet, half digested by a cobra, which was a good deal smaller than the *Elaphe*. Both from Komodo had four dark lines anteriorly. Those from Wetar had rather irregular dark streaking anteriorly. The Komodo specimen has one preocular, a very large subocular, eight upper labials, and the subocular, the fourth and the fifth upper labials enter the eye. The Wetar specimens have one preocular, no subocular, nine upper labials, and the fourth, fifth, and sixth enter the eye. Obviously, the subocular of the Komodo snake is the same scale as the fourth labial of the Wetar ones. All the Wetar snakes have 23 scale rows and the ventrals are 234–245. The Komodo snake has 25 scale rows and 251 ventrals.

At first sight one might define these as races, but the snake is known from seven other islands. Stripes are known to occur and known to break up elsewhere in the range. De Rooij gives the scale rows as 23–25 and the ventrals as 226–248. The specimen recorded by Boulenger (1897, Ann. Mag. Nat. Hist., (6) XIX, p. 506) from Sumba has the "subocular fused with the fourth upper labial so that three labials enter the eye." The two recorded by Roux (1911, Zool. Jahrb., Abt. Syst., XXX, p. 502) from Lombok have (*a*) the right subocular much deeper, so that it looks like a supralabial, and (*b*) the subocular fused with the fourth supralabial, and three labials entering the eye. Consequently, the Wetar snakes have their chief peculiarity repeated in Sumba and in Lombok, and, as a matter of fact, far away to the west in the island of Engano, south of Sumatra, by *Elaphe enganensis*. Practically the only character separating this last from *subradiata* is the presence of three labials entering the eye. I am inclined to doubt whether the distinction between the two can be maintained. At any rate, their presence in these separated regions indicates their age.

Dendrophis formosus Boie.—One specimen from Buitenzorg, No. 31947.

Dendrophis pictus (Gmelin).—Eight specimens from Buitenzorg (No. 31949), Suela on Lombok (No. 31934), Komodo near the coast (No. 31968), Komodo at 2000 feet (No. 31960), and Uhak on Wetar (Nos. 32247–50). It has not previously been recorded from Komodo or Wetar. The lateral stripe seems to die out gradually in the east. The Wetar specimens lack the stripe entirely and belong to Smith's recently described race *Dendrophis pictus timorensis*. One of the Wetar specimens had eaten the only specimen of *Sphenomorphus undulatus* which we met with. The hemipenis of this snake is unforked with unforked sulcus, the basal one-third is longitudinally flounced and set with tiny hooks, about one-fourth is of larger hooks, then comes a fourth of calyces with a free posterior border, and the whole ends with a smooth awn (No. 31949). The calyces have small spines. The native name on Wetar is "sagaloi."

Lycodon aulicus (Linné).—Three from Komodo, near the coast (No. 31967), and from Uhak on Wetar (Nos. 32245–6). It reaches 2000 feet on Komodo, for a piece of one was found in a cobra's stomach at that altitude. It had not been recorded from Komodo. The hemipenis of No. 31967 is single, the sulcus is unforked, proximal half with hooks, distal with flounces. The Komodo specimen was climbing on a tree at night.

Natrix chrysarga (Schlegel).—Three specimens from Tjibodas in Java, Nos. 31939–40.

Natrix subminiata (Schlegel).—Two from Buitenzorg (Nos. 31950–1). In one of these on the left side only two labials enter the eye. In the other there are only seven labials, two entering the eye. Barbour (1912, Mem. Mus. Comp. Zoöl., XLIV, p. 111) has noticed this unusual variation in another Buitenzorg specimen.

Calamaria linnæi Boie.—Two specimens from Tjibodas in Java, Nos. 31942–3. The former had a red, the latter a yellow, belly. The latter had five upper labials, on the left side, the fourth was very small. The hemipenis is calyculate and forked.

Calamaria virgulata Boie.—One specimen from Tjibodas, No. 31944. In this species the hemipenis is calyculate and forked, and there is an apical awn.

Psammodynastes pulverulentus (Boie).—Nine from Tjibodas in Java (4500 ft., No. 31938), Sembalun (3500 feet, Nos. 31932–3, 31937) and Tanganea (5000 feet, No. 31935) on Lombok, and Komodo at 2000 feet (Nos. 31936, 31961–3). The Komodo examples seem slightly paler than the Javanese. This species had not yet been recorded from Komodo.

The hemipenis is forked and so is the sulcus, hooked throughout. On the distal half the hooks are in close-set flounces.

Homalopsis buccata (Linné).—One specimen from Buitonzorg, No. 31945.

Naja naia sputatrix (Boie).—Five specimens from Komodo; three from sea-level (Nos. 31957–9) and two from 2000 feet (Nos. 31974–5). At least two others were seen. One had eaten a *Lycodon aulicus*, and one an *Elaphe subradiata*. They had feebly developed hoods which they seldom spread.

I use the Javanese racial name for this easternmost cobra, already recorded from Lombok, Sumbawa, Flores and Alor. Not hitherto taken on Komodo. Javanese cobras have ventrals 163–183. Our five have 170–177. In the matter of marking and color, all were dull brown; three had faint dark bars across the throat; the hood marking varied from merely two light dots on the skin to a light V on the scales. This is the coloration and ventral count of *sputatrix*, as given by Barbour (1912). The number of scale rows was in three, 21 on neck and 19 on body, and in two, 23 on neck and 19 on body. Javanese cobras have usually 25 on neck and 21 on body, but the range on the neck is 25–23, and on the body, 19–23. Roux (1911) had one from Sumbawa and one from Lombok. These had 23 on the neck and 19 on the body. Boulenger (1897) had one from Flores with 21 on the neck and 19 on the body. The Lesser Sunda cobra has then in eight specimens the color and ventral count of Javanese cobras. It apparently always has 19 scale rows on the body, while about 80 per cent of Javanese cobras have 21–23, and only 20 per cent have 19. It has equally 21 or 23 rows on the neck, while Javanese never have 21 and rarely 23. But only half the specimens could be absolutely distinguished apart from locality, and I am opposed on principle to the recognition of local races unless the great majority of one race is outside the range of variation of the other.

Laticauda colubrina (Schneider).—One specimen from Uhak on Wetar, No. 32244, not hitherto recorded from the coast of this island.

Vipera russellii (Shaw).—Two from Komodo (Nos. 31971–2). Not hitherto recorded from this island. These two specimens of Russell's viper have been carefully compared with specimens from India, kindly loaned me by Dr. Barbour, and found not to differ. They have 29 scale rows and 154 ventrals. Both Duméril and Bibron (1854, Erp. Gén., VII, p. 1435) and Boulenger (1896, 'Cat. Sn. Brit. Mus. Nat. Hist.,'

III, p. 490) have recorded each a single specimen from Java. Ditmars (1910, 'Reptiles of the World,' p. 323) mentions some from Sumatra collected by Mr. Rudolf Weber. The snake is not known from the Malay Peninsula and no recent specimens are known from Java, so that de Rooij was inclined to doubt the earlier records. Now, however, they appear more plausible, although it is very remarkable to find a true viper so far east. They were taken in the lower hills of the island.

Trimeresurus gramineus fasciatus (Boulenger).—Thirteen specimens from Komodo (sea-level, Nos. 31969–70), (2000 feet, Nos. 31964–6) and Uhak on Wetar (Nos. 32257–61). They were very common at Uhak and several more were seen. One of those taken at sea-level on Komodo had eaten a mouse, and two from 2000 feet had eaten *Kaloula pulchra*. It had not previously been recorded from Komodo or Wetar.

I have examined a number of other specimens of this snake from Chekiang, Formosa, Hainan, Siam, Java, and India. The last is the type locality and these specimens (Mus. Comp. Zoöl., No. 4490 "India") may be taken as the true *gramineus*. There are apparently two intergrading races. One is represented by the specimens from Chekiang and Formosa. Specimens from India and Siam are intermediate between it and the other which includes those from Hainan, Java, Komodo, and Wetar. In the former, the nasal and the first labial are completely separate, and there is one (occasionally two) well-developed loreal. In specimens from India and Siam the nasal and the first labial are incompletely fused, and the loreal is rudimentary. In the rest there is no loreal and the nasal and first labial are completely fused. This situation has recently been treated by Werner (1924, Sitz. Akad. Wiss. Wien, I, 133, p. 47) who regards the northern race as true *gramineus*, and the southern as *fasciatus* Boulenger, described from Djampea Island, south of Celebes. This is open to two criticisms: first, if races are to be recognized at all, the northern as well as the southern must be named and the term *gramineus* restricted to the intermediates; second, *fasciatus* was described as having quite large supraoculars, in opposition to the small size of these plates in *gramineus*. De Rooij seems to have seen the type of *fasciatus* and recognizes it as distinct. Werner seems not to have seen it, but claims the character lacks significance. I am inclined to think that he may be right and therefore prefer not to name the southern race myself. Schmidt (1925, Amer. Mus. Novit., No. 157, p. 4) has given two names to Chinese specimens. His *stejnegeri*, from Fukien, I am inclined to believe the same as the Chekiang and Formosan form,

although his character of the separated chin plates (also a character of his *yunnanensis*) I have seen in no *gramineus*. Like Werner, he ignores the question of the identity of true *gramineus*. The forms then stand as *stejnegeri* with separated supranasals, separated nasal and first labial, and with a loreal; *yunnanensis* with lower scale count, otherwise like *stejnegeri; gramineus* with rudimentary loreal, supranasals separated by one scale, and partially fused nasal and first labial, from Siam and India; and a southeastern form, for which the name *fasciatus* is quite likely available, which I have seen from Hainan, and Werner from Assam, and which probably inhabits the islands of the East Indies (Werner mentions Sumba, and I have seen it from Java, Komodo, and Wetar).

Further characters of this race are that all from Komodo and Wetar have 21 scale rows and the supranasals in contact.

The native name on Wetar is "oily."

Remarks

Of the eight species of terrestrial snakes taken on the course of the expedition on the islands east of Wallace's Line, seven show Asiatic affinities and one (*Liasis mackloti*) Australian. Of the seven Asiatics, one (*Elaphe subradiata*) is not known from west of Wallace's Line, and this form is so like *Elaphe enganensis* of Engano Island, south of Sumatra, that it appears less like an endemic Lesser Sunda form than a relict form of an earlier fauna, now lingering in two very slightly differentiated species in the Lesser Sundas and in Engano. The *Liasis*, found on Wetar for the first time, was already known from Savu, Samao, and Timor, and is very slightly different from Australian and Papuan species. The headquarters of the genus is eastwards, however, and the genus marks as clearly an Australian element in the snake fauna of Wetar as the species of *Lycodon*, *Dendrophis*, *Elaphe*, and *Lachesis* on the same easternmost island of the chain indicate an even stronger Asiatic element. The one Australian type found is distinct, as is only one out of seven of the Asiatics.

Of the thirty-three terrestrial snake species known from the Lesser Sundas ten are restricted to these islands. Of these, four, *Liasis mackloti*, *Python timoriensis*, *Typhlops elberti*, and *Typhlops florensis* may well be eastern. Three have definite western affinities and three, while as definitely western in their affinities, have more alliance with an endemic or an earlier fauna which may be found in the Moluccas or in Celebes. This last element does not necessarily mean migration to or from these regions to the Lesser Sundas. More probably this series of forms passed

out from Asia along a northern and a southern route. Whatever may have been the means of migration, it has been much easier for snakes to get from Asia to Wetar, more than a thousand miles of sea and islands, than from Cuba to Haiti over a strait of fifty miles. Four snakes are known in common from the first two (out of seven species known from Wetar), while only one species of snake is common to Cuba and Haiti, although each island has about twelve species.

Of the forms not restricted to the Lesser Sundas, four seem definitely eastern, one Moluccan and eighteen western.

Thus, there is a great difference in the quality of the emigration. Over half the snake fauna has come over unchanged from the west, and only three of this group have changed. Of the eight easterners four have undergone modification. The slight trace of an endemic or a Moluccan element consists of three species restricted to the region, and one more wide ranging (*Brachyorrhus albus*), and all are definitely western in their larger affinities.

This seems to indicate an overwhelming modern unmodified Asiatic element, a small and rather modified Australian element, and a minute and modified old Asiatic element. For mammals, of course, this situation is well known to exist in the East Indies, with the old Asiatic element best marked in Celebes.

The eastern element is naturally strongest in the more eastern islands, although of the species considered eastern, one occurs on Lombok, and two on Flores. The snakes of the eastern-most isolated island of Wetar are six out of seven western types, and only one of them is modified (*Cylindrophis boulengeri*).

The difference in island speciation to be found in the same group in the East Indies and in the West Indies, has, of course, nothing to do with the provenance of the fauna. The chief difference between the islands on which these phenomena are most marked is that the Greater Antilles are nonvolcanic, while the Sundas are noted for the number and activity of their volcanoes. The correlation is sufficiently obvious. It would seem that migration from island to island is easier when these islands are volcanic in nature.

A point of interest is the high proportion of venomous individuals and species on Komodo. Of the seven species, three were harmless, one slightly poisonous, and three very poisonous. Of twenty-five specimens seen there, seven were cobras, five tree-vipers, two Russell's vipers, and four the opisthoglyph *Psammodynastes*, while only seven individuals of the three harmless species were met with.