

skin is slightly warty above rather than smooth; the throat and chest are light with dark dots rather than the reverse; and the toes are less fully webbed. There are minor differences in proportions of the snout, length of the femur relative to the body length, and length of third finger relative to length of snout; these discrepancies may result from different methods of taking measurements. In general, the differences between this specimen and the type description do not appear to be of taxonomic significance, but rather to fall within a normal range of variation.

The diagnostic characters of CM 24693 are: small size (female sexually mature at 17 mm. snout-vent length), small toe pads present, a tarsal tubercle and a small tubercle on heel joint, extended heel reaches a little beyond anterior border of eye, skin of dorsum slightly warty. The toes are webbed as follows (the toe pad includes the terminal phalanx):

Toe number	1	2	3	4	5
Free phalanges	2½	2	2	3	2½

The color of the preserved specimen is: dorsum dark brownish gray, a darker bar connecting eyelids and indistinct darker markings on back; an irregular dark band along side from above shoulder region to groin, indistinctly continuous with oblique dark stripe from eye to shoulder; rear of thigh with a pair of longitudinal dark stripes separated by a grayish stripe, exposed dorsal surfaces of femur and tibia banded; throat, chest, and underside of femur finely speckled with dark; lower lip irregularly spotted with dark.

This appears to be the second known specimen of *P. accraensis*.

Pelomedusa subrufa olivacea (Schweigger).—A juvenile, CM 24695, collected on May 29 from a rain puddle on a dirt road. Carapace length 33.5 mm., width 28 mm., height 13 mm. The specimen appears to be intermediate between typical *subrufa* and the doubtfully distinct *olivacea*. The left pectoral shield reaches the median line, but the right one is excluded.

Amphisbaena leucura Duméril and Bibron.—A single specimen, CM 24688, found dead on May 9, on the surface of freshly-dug clay soil. Total length ± 178 mm. (snout-to-vent ± 134, tail 24); 217 annular rings on body, 27 (+ tip) on tail; 23–25 segments in midbody annulae; 6 anal scales; 10 preanal pores; postmental scale present.

Philothamnus semivariatus nitidus (Günther).—A female, CM 24685, found in a mango tree on April 22. Midbody scale rows 15, ventrals 170, caudals 100+ (tail incomplete), upper labials 9 (5th and 6th enter orbit, 4th barely excluded), temporals 1 + 2. Total length of alcoholic skin approximately 1134 mm. (snout-to-vent length ± 820, tail 314 +). Color green in life. The stomach contained a large toad.

Psammophis elegans (Shaw).—A juvenile male, CM 24687, found in a small bush on May 6. Scale rows 17–17–11, ventrals 186, caudals 159, left preocular partly divided, 2 postoculars, temporals 2 + 2. Total length 545 mm. (344 + 201). The color pattern appears to be entirely typical, although somewhat obscured by darkening.

Psammophis sibilans sibilans (Linnaeus).—Two females, CM 24686 and 24696, collected in a dry grassy area on April 24 and June 3, respectively. Mid-dorsal scale rows 17 in both, ventrals 168 and 161; caudals 104 in the first specimen, 50 plus regenerated tip (*vide* Loveridge, 1940: 3–4) in the sec-

ond specimen. In both, 5 lower labials are in contact with the anterior chin shields; upper labials 8, lower labials 11, temporals 2 + 3. Both specimens are partly skinned out. The total length and tail length are approximately 927 mm. and 312 mm. in CM 24686, and 625 mm. and 140 + mm. in CM 24696. In both snakes there is a pair of well defined sublateral dark lines on the ventrals extending nearly the full length of the body and tail, beginning just behind the neck region.

Causus rhombeatus (Lichtenstein).—Two specimens, CM 24689–90. The former is a skinned-out female collected on May 17. The midbody scale rows are 19, ventrals 139, caudals 19. Total length approximately 482 mm., tail length 42 mm. The much-elongated poison glands were left intact when the specimen was skinned. The second specimen, of which only the head was saved, was found in a rock pile on May 21. The stomach of each snake contained a toad.

LITERATURE CITED

- AHL, ERNST
1923 Ueber neue afrikanische Frösche der Familie Ranidae. *Sitzber. Ges. Natf. Freunde Berlin*, 1923: 96–106.
- LOVERIDGE, ARTHUR
1940 Revision of the African snakes of the genera *Dromophis* and *Psammophis*. *Bull. Mus. Comp. Zool.*, 87: 1–69.
- CARNEGIE MUSEUM, PITTSBURGH, PENNSYLVANIA, and SEWICKLEY, PENNSYLVANIA.

Notes on *Crocodylus novae-guineae*

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DURING military operations in Papua in 1943 and 1944 the writer had some opportunity to make observations on the New Guinean endemic crocodile, *Crocodylus novae-guineae* Schmidt.

This freshwater crocodile was found to be fairly common about 12 miles north of Port Moresby, Papua. The locality was one of shallow lakes, choked with reeds, cat-tails, water-lilies, and hydrophytic grasses. The lake margins supported dense stands of "curly-bark" (*Melaleuca*), palms, casuarinas, pandanus, figs, eucalypts, and other forms. Such areas, set amid arid grasslands, were veritable oases for the animal life of the region. Deer (*Cervus hippelaphus*) and wild swine (*Sus papuensis*) abounded. Characteristic waterfowl included cormorants (*Phalacrocorax*), grebes (*Podiceps*), gallinules (*Porphyrio* and *Gallinula*), lotus-birds (*Irediparra*), darters (*Anhinga*), and

egrets (*Egretta*). The most abundant reptiles in the swamp were *C. novae-guineae* and a species of *Emydura*. About the margins *Natrix mairii*, *De-mansia olivacea*, *Physignathus temporalis*, and various scincids were often collected. Frogs occurred by the thousands, *Hyla mcgregori*, *H. infrajuncta*, *H. nasuta*, and a large ranid (tentatively identified as *Rana daemeli*) the forms most frequently taken.

During the day, specimens of *C. novae-guineae* were found to secrete themselves around the edges of the marshes, either in thick grass or beneath piles of fallen timber. None was observed to bask in the open. When disturbed, individuals often ran for some distance through the shallow water and then attempted to hide amid clumps of aquatic vegetation. At night they were found in deeper water, resting almost vertically with the neck bent over at such an angle as to bring the eyes and nostrils to a level with the surface. Position was maintained by occasional strokes of the fore or hind limb. Several examples were seen to "dog-paddle" a considerable distance in this fashion. When approached, they would sink to a depth of a foot or more, then dive deeply to reappear at the surface 15 or 20 yards away. Individuals were found in the same spots night after night; after heavy rains and consequent flooding of the swamps, however, the crocodiles would distribute themselves over the area in a new pattern. It was found that small specimens, carefully stalked by boat, could be grasped by hand if first blinded by a light. One juvenile example, taken in this manner, voiced a series of high-pitched shrieks that provoked a large adult into charging savagely in the direction of the sound. The charge was not completed, the irate reptile submerging abruptly when but a few yards away. Such behavior suggests that the young are cared for by at least one parent for some time after hatching.

On November 8, 1943, a five-foot crocodile was discovered lying beside a large, hemispherical mound of dried grass in a patch of dense marginal vegetation. Upon the hasty departure of the beast, the writer examined the mound; it contained the remains of a young wild hog (*Sus papuensis*) in an advanced state of putrefaction. (Although the crocodile was not collected, it was almost certainly *novae-guineae*. *Crocodylus porosus* of that size was never observed in the area.) Farther on, a similar mound was found, this one also containing a small *Sus*. The guardian reptile had evidently been frightened away, for its tracks were plainly visible in the mud. Some species of crocodiles are said to cache large prey beneath submerged logs or overhanging banks, remaining in the vicinity until the carcass, softened by decay, can readily be torn apart and devoured; *novae-guineae* would appear to have evolved a technique more in keeping with its palustrine habitat. Small individuals seemed to feed primarily upon waterfowl. Stomach contents usually consisted of masses of black feathers, apparently those of the various rallid birds so common in the area. One specimen contained a fledgling "willy-wagtail" (*Rhipidura*). Another was seen to leap upward and seize a *Physignathus temporalis* that was sleeping on a reed overhanging the water.

Nests and eggs of the species were found in November, 1943. The nesting site was usually 20 or 30 feet back from the swamp, often on the higher ground bordering a lagoon, and invariably placed in an almost impenetrable tangle of vines and bushes. The crocodile usually lay in a well-worn path

between the nest and the water's edge. The nests were roughly hemispherical, about 45 inches in diameter and 26 inches in height. They were generally built at the base of a tree. The lower half of the nest consisted of pandanus leaves, reeds, and sticks embedded in a matrix of mud; the upper portion, containing the eggs, was a soft, dry mixture of *Melaleuca* bark, grass, and leafy debris, surrounded by a thin shell of mud and twigs. Slow oxidation of the nesting material generated considerable heat; one nest, completely shielded from sunlight by dense vegetation, showed a temperature of 39° C. on the inside. The eggs averaged 77 mm. in length and 49 mm. in diameter. The shells were hard but not brittle; they could be dented without breaking. The number of eggs in a nest varied from 23 to 35, such clutches being guarded by females of about 5 feet in length. On one occasion, a large specimen approached within a few yards of the writer as he was investigating a nesting site. The reptile hissed and thrashed about angrily until a movement in its direction brought about a precipitate retreat.

On July 8, 1943, a crocodile fell over Rouna Falls, on the Laloki River about 16 miles northeast of Port Moresby. Battered and stunned, it lodged at last in a rocky pool some distance below the falls. The writer reached it with considerable difficulty; it proved to be a *C. novae-guineae* 68 inches in length. This was the largest example of the species noted in eight months of collecting in the region.

C. porosus was taken in the Laloki River as far up as its junction with the Goldie River; none was observed above Rouna Falls, however. Occasional twelve- and fifteen-foot crocodiles, seen in the marshes, were undoubtedly *porosus*; a nine-foot example of this form was killed by soldiers in Waigani Swamp, an extensive marshy tract about 7 miles north of Port Moresby. Such specimens were probably wanderers from the near-by river, where both large and small *porosus* were common. According to the Papuan natives, very large crocodiles not only travel for long distances overland, but even occasionally take up residence for some time in thickets or bamboo groves, where they lie beside game trails in wait for prey!

A comparison was made of a living specimen of *novae-guineae* 790 mm. in length, and a living *porosus* of 863 mm. Certain differences were immediately evident. The former individual was olive-yellow above, with 5 or 6 black cross-bands. The proximal third of the tail was black-spotted, the remainder strongly banded with black. The belly was immaculate white, while the subcaudal region was dark brown. In contrast, the *porosus* was greenish-gray above with small black spots vaguely arranged in 7 or 8 transverse rows. The tail was also marked with black spots, which became larger and more band-like toward the terminal third. The belly was ivory, as was the subcaudal region. In this specimen the nape was covered with rather fine scales, with little trace of enlarged occipital scutes; in the *novae-guineae* all the scales of the nape (with the exception of the nuchals) were proportionately larger, and there were well-defined occipitals. The cranial table was barely trapezoidal in the *novae-guineae*, subrectangular in the *porosus*. The preorbital ridge was slightly larger and longer in the latter species. Both specimens agreed in having the dorsal shield composed of 10 longitudinal and 17 transverse rows of scutes, and in having 20 caudal verticils double-crested and

18 single-crested. When grasped, the *novae-guineae* often everted the scent glands on the ventral surface of the lower jaw. These organs were well opened, often being extended to a distance of about 20 mm. Such action not noted in the *porosus*, although the specimen was a male and external traces of the glands. In disposition the *novae-guineae* was considerably less irascible.

The foregoing notes indicate that *C. novae-guineae* is a small, inoffensive species of palustrine habitat, thus bearing out the observations of Schmidt in the Sepik River area.

LITERATURE CITED

- SCHMIDT, K. P.
1932 Notes on New Guinean crocodiles. *Publ. Field Mus. Nat. Hist. Zool.*, 18: 165-172, pls. 6-7.

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Egg Size in Poeciliid Fishes¹

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IN the Poeciliidae, a viviparous family of cyprinodont fishes, are found two species whose eggs appear to be the smallest recorded for any fish. Both *Heterandria formosa* and *Aulophallus elongatus* have attained a high degree of dependence on the mother for nourishment after fertilization. Their eggs show a great reduction in yolk. The other members of the family are generally considered to be ovoviviparous.² In the course of studies on embryonic development (Scrimshaw, 1944a, 1945) and of superfetation (Scrimshaw, 1944b) in poeciliid fishes, egg sizes and ovisac diameters were recorded.

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² It has recently been pointed out that these species are not ovoviviparous in the strict sense of the word as are the "viviparous" perches. The mother contributes nourishment equivalent to about 1/3 the initial dry weight of the egg to the embryo during development (Scrimshaw, 1945).

TABLE I³
EGG SIZE IN POECILIID FISHES

Species	Source	Material	Maximum Size of Unfertilized Ova in millimeters	Minimum Size of Fertilized Ova in millimeters
<i>Allegambusia tridentiger</i>	Panama	Live	.....	1.35
<i>Aulophallus bladeri</i>	Guatemala	Preserved	.....	1.65
<i>Aulophallus elongatus</i>	Panama	Live	.61	1.58
<i>Balantsea bolsonis</i>	Guatemala	Preserved	.....	4.0
<i>Brachyphobos epiplatensis</i>	Canal Zone	Live	2.02	1.9
<i>Brachyphobos epiplatensis</i>	Canal Zone	Live	1.78	1.65
<i>Brachyphobos terrestris</i>	Panama	Preserved	.....	3.4
<i>Dariochthys dartensis</i>	Panama	Live	1.84	2.74
Unnamed form	Guatemala	Preserved	1.76	1.68
<i>Gambusia affinis holbrooki</i>	Florida	Live	.....	1.6
<i>Gambusia donati</i>	Canal Zone	Preserved	1.89	1.9
<i>Gambusia nobilis nobilis</i>	Texas	Preserved	.....	1.95
<i>Heterandria formosa</i>	Florida	Live	.40	.37
<i>Lebistes reticulatus</i>	Laboratory Stock	Live	2.1	2.0
<i>Mollisnesia sphenops</i>	Canal Zone	Live	.....	1.87
<i>Mollisnesia velifera</i>	.....	Preserved	2.1	.....
<i>Poecilia vivipara</i>	Puerto Rico and British Guiana	Preserved	.....	1.47
<i>Poecilia reticulata</i>	Mexico	Preserved	1.7	1.60
<i>Poecilia occidentalis</i>	Arizona	Preserved	2.02	1.86
<i>Poecilia phenacoptera</i>	Guatemala	Preserved	1.96	1.55
<i>Pseudoxiphanes bimaculatus</i>	Guatemala	Preserved	2.56	2.08

³ Figures in italics represent the best value available although ova near the time of fertilization were not obtained.