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A New Leptodactylid Frog of the Genus *Notaden* from Northern Australia

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The present paper is the first of several reports being prepared to cover the extensive collections of amphibians and reptiles from Australia recently obtained by two expeditions from the American Museum of Natural History. The Spalding-Peterson Expedition of 1959 secured 678 specimens from north Queensland, Papua, and Australian New Guinea, and the Spalding-Hosmer Expedition of 1960 collected 1400 amphibians and reptiles in northwestern Queensland, the Northern Territory, and the lower Kimberley Division of Western Australia.

This preliminary report deals with a new frog of the genus *Notaden*; it differs so strikingly from the two species hitherto known that recognition of a third species seems warranted.

MEASUREMENTS EMPLOYED: The snout to vent length is the distance between the tip of the snout and the cloacal opening, with the body straightened. Measurements of the tibia are from the knee fold to the tibiotarsal joint, with the limb bent. The leg length, with the limb straightened at right angles to the body, is the distance from the cloacal opening to the tip of the fourth toe. The diameter of the eye is considered to be the distance across the eyelids from corner to corner. The length of the snout is the distance from the anterior corner of the eye to the nostril. The width of the head, measured with calipers adjusted to make a neat fit, is the distance across the head immediately posterior to the eyes. The internarial space represents the measurement obtained between the inner borders of the nares. Other measurements in the text are self explanatory.

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***Notaden melanoscapus*, new species**

HOLOTYPE: A.M.N.H. No. 67161,¹ a subadult male from Borroloola, latitude 16° 05' S., longitude 136° 20' E., Northern Territory, Australia, collected by William Hosmer on April 26, 1960.

DIAGNOSIS: The single specimen obtained differs from representatives of its two congeners in having a black metatarsal tubercle (pale in other species) and a distinctive dorsal pattern comprised of dark blotches margined with yellow. On the head a somewhat triangular interorbital

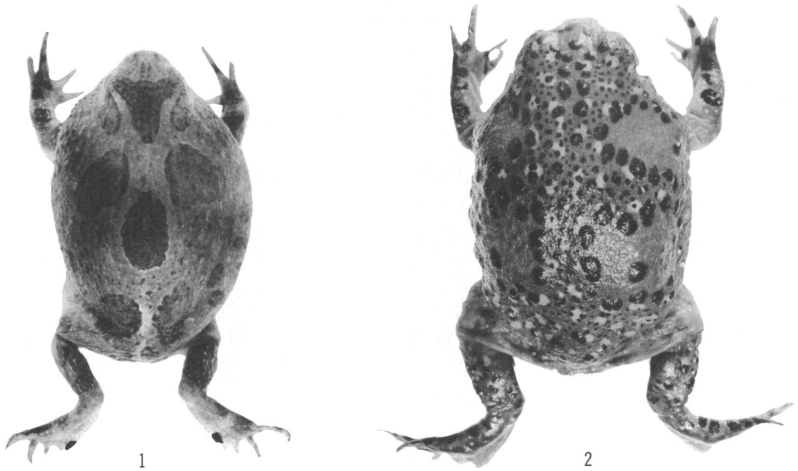


FIG. 1. Dorsal aspect of *Notaden melanoscapus*, new species. Natural size.
FIG. 2. Dorsal aspect of *Notaden bennetti*. Natural size.

blotch is flanked by smaller blotches in the parotoid regions. There are five black, yellow-margined blotches on the body, an anterior pair, a median, and two smaller blotches posteriorly, the latter separated by a prominent yellow coccygeal stripe. The dorsal tubercles are very rough, coalescing in the interorbital and vertebral regions to form glandular ridges. In both the other species the dorsal tubercles are smoothly rounded and not confluent.

DESCRIPTION OF TYPE: Maxillary teeth are absent. The vomerine bones are vestigial and without teeth, their presence being indicated by two small, bony, bolitoid processes situated between the posterior borders of the choanae. The tongue is thick and subcircular, slightly free and

¹ In accordance with the regulations of Australian museums, the specimen will be deposited in the National Museum of Victoria.

indented behind. The head is broader than long; its width of 11.0 mm. is contained 3.5 times in the distance from the tip of the snout to the vent; the snout to vent length is 39.0 mm. The snout is short, blunt, and not prominent, with a curved, rounded canthus rostralis and an oblique loreal region. The nostril is nearer the eye than to the tip of the snout; eye to naris, 2.4 mm.; naris to tip of snout, 3.4 mm. The internarial distance is 2.4 mm. The interorbital distance, 3.0 mm., is narrower than the width of the upper eyelid, 3.4 mm. The tympanum is not visible externally.



FIG. 3. Dorsal aspect of *Notaden nicholli*, adult. Natural size.

FIG. 4. Dorsal aspect of *Notaden nicholli*, juvenile. Natural size.

The fingers are moderately short, the first slightly longer than the second, their order of length being $3 > 1 > 2 > 4$. There are small subarticular tubercles at the proximal joints of the fingers and two metacarpal tubercles. The fourth finger is somewhat swollen distally.

The toes are moderately short and depressed, with thick fleshy fringes and webbing extending between the third and fourth to the middle of the proximal phalanx of the third toe. The subarticular tubercles are indistinct. The inner metatarsal tubercle is strongly compressed, with an acute cutting edge directed inward, its length being equal to its distance from the tip of the inner toe. The legs are short; the tibia length is 11.0 mm. The ratio of the tibia length to the snout to vent length is 0.28.

The dorsal and lateral surfaces of the body are roughly tubercular, except for the loreal region and the end of the snout, which are more or

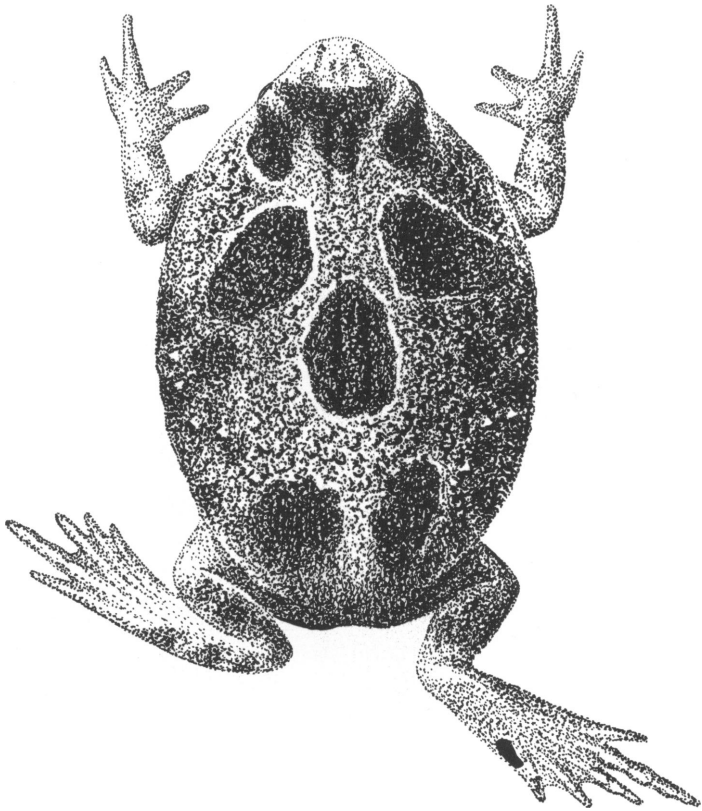


FIG. 5. Dorsal pattern of *Notaden melanoscapus*, new species.

less smooth. The most conspicuous tubercles are those of the interorbital region which are very rough and coalesce to form short ridges following the outlines of the triangular interorbital pattern. From the scapular region there are four strong folds running in a posterior direction, the inner ones closing together to form a distinct median furrow, whereas the outer pair are widely separated, becoming indistinct at midbody. The upper surfaces of the limbs are moderately tubercular. The throat, chest, and hind sides of the thighs are pustulate, and the belly is shagreened.

COLOR IN LIFE: The dorsal surface is reddish brown, with a darker brown patch on the snout, separated mesially by a short vertical stripe of light brown. There is a black vertical bar below the eye. Another extends from the posterior corner of the eye, broadening above the tympanic re-

TABLE 1
DIFFERENTIAL CHARACTERS OF THE THREE SPECIES OF *Notaden*

Character	<i>bennetti</i>	<i>nichollsi</i>	<i>melanoscapus</i>
Loreal region	Vertical	Slightly oblique	Moderately oblique
Fingers	First shorter than second	First as long as or longer than second	First a little longer than second
Upper surface	Smoothly tubercular	Smoothly tubercular	Moderately tubercular
Inner metatarsal tubercle	Yellowish, 1.2-2.0 times as long as its distance from inner toe	White, as long as its distance from inner toe	Black, as long as its distance from inner toe
Dorsal pattern	Cruciform, following arrangement of smooth tubercles. Accentuated by four large smooth areas. Interorbital region smooth	Indistinct, no smooth areas on back. Interorbital region smoothly tubercular. (Juveniles with faint traces of cruciform. Cruciform not margined with yellow)	A dark interorbital, two parotoid, and five dorsal blotches margined with yellow. Tubercles on back and in interorbital region very rugose

gion, and there is also a black triangular interorbital blotch with its apex directed posteriorly, flanked by a pair of smaller black blotches in the parotoid region. The zone between the lateral borders of the interorbital and parotoid blotches is bright yellowish orange. There are five black dorsal blotches margined with yellow, an anterior pair, a median, and two smaller spots posteriorly, the latter separated by a bright yellowish orange coccygeal stripe. Smaller black blotches along the flanks are irregularly disposed and finely outlined with yellow. The areas between the dorsal and dorsolateral markings are finely spotted with red, orange, and black; small, white-tipped pustules occur above the shoulder and on the flanks. The upper surfaces of the limbs are banded in dark brown. The under parts are dull yellowish white. The throat is somewhat darker,

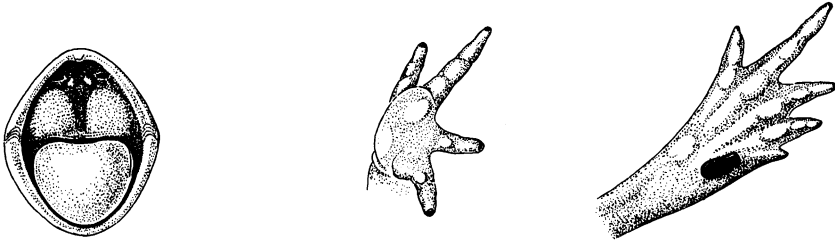


FIG. 6. Open mouth and ventral surfaces of hand and foot of *Notaden melanoscapus*, new species.

with a few distinct, white-tipped pustules. The metatarsal tubercle is black.

HABITAT: The type was taken at night on a sandy trail in sparsely timbered savanna consisting of eucalypt woodland 20 to 30 feet high and a mixture of kangaroo grass (*Themeda australis*) and perennial sorghum (*Sorghum plumosum*). Approximately 0.4 inch of rain had fallen in the afternoon, and the night was warm and humid.

RELATIONSHIP: *Notaden melanoscapus* is not close to either of its congeners, but perhaps bears more resemblance to *N. nichollsi*, the juvenile of which has a similar dorsal pattern. The very rugose skin, the simple, yet distinctive dorsal color pattern, and the black inner metatarsal tubercle

TABLE 2
RELATIVE LEG LENGTHS, TIBIA LENGTHS, AND HEAD WIDTHS, EXPRESSED AS THE RATIO OF THE SNOUT TO VENT LENGTH, IN THE THREE SPECIES OF *Notaden*

Species	<i>bennetti</i>	<i>nichollsi</i>	<i>melanoscapus</i>
Leg length/snout-vent	0.93-1.00	0.90-1.00	0.92
Tibia length/snout-vent	0.29-0.32	0.27-0.33	0.28
Head width/snout-vent	0.27-0.32	0.26-0.34	0.28
Number of specimens	10	46	1

are characteristics that readily distinguish this species from *N. nichollsi* and *N. bennetti*. Andersson (1913, pl. 1) figures a specimen of *N. nichollsi* under the name of *N. bennetti*. The dorsal pattern of the specimen figured (his fig. 7) is remarkably close to that of *N. melanoscapus*. This similarity is seen in juveniles from Elliott, Northern Territory, an individual of which is shown in figure 4 of the present paper. Differences between the three species are summarized in table 1. The more general distribution of dorsal tubercles and the geographical proximity (200 miles distant) also indicate that *N. nichollsi* is the nearest relative of *N. melanoscapus*. *Notaden bennetti* occupies a more southern habitat, being confined to the dry plains country of northern New South Wales and southwestern Queensland. *Notaden nichollsi* is known to occur from the west coast of north Western Australia, eastward as far as longitude 134° E. in the Northern Territory.

LOCALITY RECORDS: Specimens examined are indicated by museum numbers, and the following abbreviations are used: A.M.N.H., the American Museum of Natural History; C.N.H.M., the Chicago Natural History Museum.

Notaden bennetti: Queensland: St. George (A.M.N.H. No. 65566); St. George (C.N.H.M. Nos. 97654-97657, 97659-97663); Wilson's River

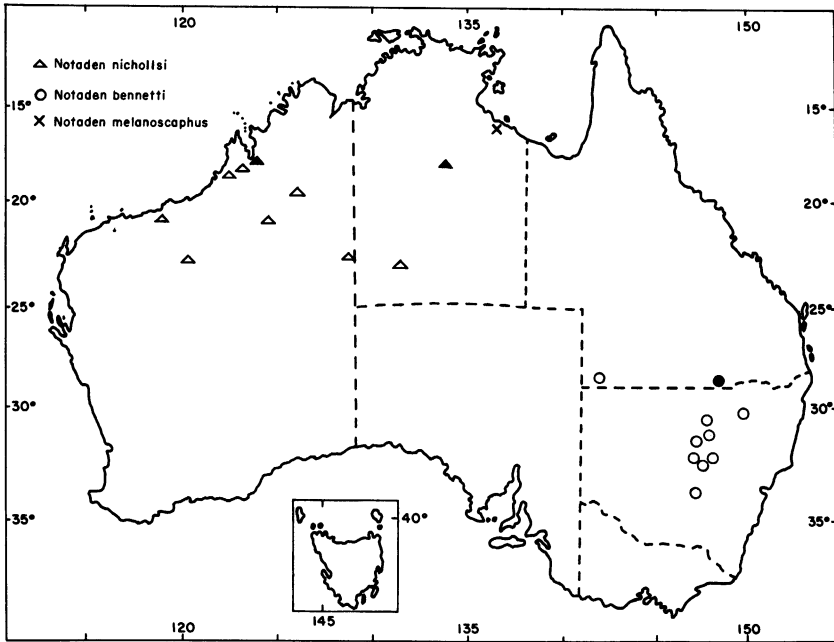


FIG. 7. Geographic distribution of the three species of *Notaden*. Closed symbols indicate specimens examined; open symbols represent literature records.

(Boulenger, 1882). *New South Wales*: Type locality, Castlereagh River (Günther, 1873), Moree (Loveridge, 1935), Warren, Narrabri, and Dandaloo (Fletcher, 1890), Trangie, Forbes, and Macquarie River (Fletcher, 1891).

Notaden nichollsi: *Northern Territory*: Elliott (A.M.N.H. Nos. 67162–67194). *Western Australia*: Derby (A.M.N.H. Nos. 67195–67207). Type locality, Roebuck Bay (Parker, 1940), Rabbit-proof Fence No. 1 and Noonkambah (Parker, 1940), St. George Range and Mowla Downs Station, Mt. Alexander (Andersson, 1913), Port Hedland (Healey and Main, 1960), Jigalong (Lindgren, 1960). Specimens that have been seen by me and to my knowledge not previously recorded: Langi Crossing on the Fitzroy River and Lake Mackay in Western Australia, also Mt. Doreen Station in the Northern Territory.

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