

CONTRIBUTIONS TO A MORE EXACT KNOWLEDGE
OF THE GEOGRAPHICAL DISTRIBUTION OF
AUSTRALIAN BATRACHIA. No. I.

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On turning to the British Museum "Catalogue of Batrachia Salientia" (Second Edition by G. A. Boulenger, 1882) together with the "First and Second Reports on Additions to the B. M. Collection" (P.Z.S. 1886, p. 411; 1890, p. 323), it will be found that about fifty-two species are distributed among the different colonies approximately as follows—allowance being made for certain additional species, as noted below, of which in the B. M. Collection there do not happen to be specimens from every colony in which they are known to occur :—*

Queensland	31 + 1† = 32
New South Wales	30 + 4‡ = 34
Victoria.....	7 + 2§ = 9
South Australia.....	2¶
West Australia.....	14
Tasmania.....	8

* Some general observations on geographical distribution will be found in two papers by the late G. Krefft in *Papers and Proc. Roy. Soc. Tasmania*, 1865, p. 16, and *Industr. Prog. N.S.W.*, 1871, p. 741, both, however, now somewhat out of date.

† *Mixophyes fasciolatus*.

‡ *Limnodynastes dorsalis*, *Hyla aurea*, *H. rubella*, *Phanerotis* (*antea*, p. 593); excluding *Crinia georgiana* as doubtful for reasons previously recorded.

§ *Limnodynastes dorsalis* (*vide* McCoy's *Prodromus*, Dec. V. pl. 42, fig. 2) and *L. peronii* of which I sent a specimen from Warragul to the British Museum, along with the type of *Crinia victoriana*, Blgr. (both collected by Mr. R. T. Baker).

¶ From the Abstract in *Archiv für Naturgesch.* Jahrg. xxx., Bd. ii., p. 208, it appears that Peters (*Mon. Berl. Ac.* 1863, p. 228) described or recorded six species [including *Helioporus* (*Neobatrachus*) *pictus*] from S. Australia; but I am unable to refer to this paper.

The broad facts relating to the geographical distribution of these species may be summed up somewhat as follows :—

- (1) Certain species are apparently very widely distributed, twelve of the fourteen species recorded from the West Coast occurring also on the East Coast, as well as, in some cases, in intermediate (coastal) districts.
- (2) Some species are widely distributed in, but as far as present knowledge goes appear to be confined to, one or other of these regions, such species at present being more numerously represented in Eastern Australia (possibly in some measure due to more systematic collecting in more accessible localities).
- (3) Other species are still less widely distributed, some being remarkably local, or at least recorded only from single localities (e.g. *Hyla jervisiensis*, *H. dimolops*).
- (4) Little is known of the Batrachia of districts remote from the coast, the habitats recorded being with but very few exceptions and these for only few specimens (e.g. *Chiroleptes platycephalus*, *Notaden bennettii*, *Helioporus pictus*) coastal.
- (5) The falling off in the number of species in the southern colonies is possibly and very probably in some degree rather apparent than real.

As Batrachia are not confined to the coastal districts, and as the species were originally described chiefly in instalments as representatives of new species reached Europe or America, and without reference to the general batrachian fauna of the particular localities whence the types came, it is obvious that the subject of geographical distribution is not yet exhausted. Indeed, Port Jackson perhaps excepted, it is hardly possible at present to draw up an exhaustive list of the frogs of any particular place, notwithstanding that some species have been recorded from numerous localities.

As a first small contribution towards a more detailed knowledge I now propose to record three collections from localities in this colony sufficiently remote from one another to be of interest, two

of them west of the Dividing Range, several other smaller and less complete inland collections also being taken into account.

(i.) *The Coastal division of N.S.W. (East of the Dividing Range).*

(a) From Dunoon, Richmond River (collected by R. Helms).

This collection comprising about eighty individuals referable to twelve species was obtained during a month's general collecting (March-April, 1890), under very unfavourable conditions of weather, floods and impassable roads confining the collector to a limited area. The species obtained were :—

CYSTIGNATHIDÆ—*Mixophyes fasciolatus*, Gthr.

Limnodynastes peronii, D. & B.

salminii, Stdchr.

tasmaniensis, Gthr.

Cryptotis brevis, Gthr.

Phanerotis fletcheri, Blgr.

BUFONIDÆ—

Pseudophryne bibronii, Gthr.

coriacea, Keferst.

HYLIDÆ—

Hyla cærulea, White.

dentata, Keferst.

lesueurii, D. & B.

As regards individuals, *H. cærulea* was most numerously represented, examples in many stages being present. The adults, as also those of *Mixophyes* and *H. lesueurii*, are large and very fine specimens, considerably larger than any I have had from other parts of N.S.W. Of most interest were five specimens of *Phanerotis*, of which the two largest are 48 and 42 mm. respectively from snout to vent; both have the two inner fingers fringed on the sides; and while one is almost devoid of rosy spots, the other is more profusely blotched than the type specimen, as for example on the upper surface of the fore-limbs, and edging the dark border on the hind limbs, as well as indications of a few less conspicuous blotches on the dorsal surface of the body. Mr. Helms informs me that *Phanerotis* is a brush-haunting species, and is well endowed with saltatory powers.

Good collections have several times been obtained in the equally favourable neighbouring district of the Clarence, so that it is not surprising that only two species in the above list (viz. *H. dentata*, and *Phanerotis*) are new to the portion of the colony in question, or that, from the circumstances already mentioned, three species previously recorded (from the Clarence) should not have been represented, viz., *Chiroleptes australis*, *Hyla peronii*, and *H. nasuta*.

(b) From Illawarra (specimens collected by Messrs. A. G. Hamilton, T. G. Sloane, and myself).

Omitting *Limnodynastes salminii*, *Phanerotis*, *Pseudophryne coriacea* (perhaps also *Cryptotis*) from the above list we shall get very much such a collection as one can make with a little trouble in the Illawarra district whence I know of the following species :—

<i>Mixophyes fasciolatus</i>	<i>Hyla cærulea</i>
<i>Limnodynastes peronii</i>	<i>peronii</i> , Bibr.
<i>dorsalis</i>	<i>dentata</i>
<i>Crinia signifera</i>	<i>ewingii</i> var. <i>calliscelis</i>
<i>Pseudophryne australis</i>	<i>aurea</i>
<i>Hyla phyllochroa</i> , Gthr.	<i>lesueurii</i>

Hyla jervisiensis, D. & B., from Jervis Bay is not known to me.

(c) From Burrawang about 20 miles inland but adjoining Illawarra, and at an elevation of about 2000 feet I have on various visits collected the following :—

<i>Mixophyes fasciolatus</i>	<i>Pseudophryne bibronii</i>
<i>Limnodynastes peronii</i>	<i>Hyla phyllochroa</i>
<i>tasmaniensis</i>	<i>ewingii</i> var. <i>calliscelis</i>
<i>Crinia signifera</i>	<i>krefftii</i> , Gthr.
<i>Hyperolia marmorata</i> , var.	<i>aurea</i>
<i>Hyla lesueurii</i>	

In this locality *Limnodynastes peronii*, *Crinia signifera*, and *Pseudophryne bibronii* are extremely common. Of *Mixophyes*, *L. tasmaniensis*, and *H. aurea* I have taken only a single example in each case.

(d) From the Blue Mts. [Springwood (1500 ft.) to Mount Wilson (3400 ft.)]—I have collected the following except *Helioporus albo-punctatus*, received from Mr. Hamilton whose son found it between Mt. Victoria and Hartley Vale.

<i>Mixophyes fasciolatus</i>	<i>Pseudophryne australis</i>
<i>Limnodynastes peronii</i>	<i>bibronii</i>
<i>dorsalis</i>	<i>Hyla phyllochroa</i>
<i>Cryptotis brevis</i>	<i>ewingii</i> var. <i>calliscelis</i>
<i>Crinia signifera</i>	<i>peronii</i>
* <i>Helioporus albo-punctatus</i> (?)	<i>citropus</i>

Of these I have seen *Hyla citropus* only from Mt. Wilson, and *Cryptotis brevis* only from Springwood. *Hylella bicolor* is recorded by Mr. Krefft from the Blue Mts., but I have not met with it.

For comparison a list of the twenty species occurring in the neighbourhood of Sydney (County of Cumberland) is appended ; of the species included I have myself collected specimens of all but *Hyla lesueurii* of which Mr. Helms recently brought me a specimen from Clifton ; and *H. dimolops*, and *Hylella bicolor* of which as yet I have no personal knowledge.

<i>Limnodynastes peronii</i>	<i>Hyla dentata</i>
<i>tasmaniensis</i>	<i>ewingii</i> , var. <i>calliscelis</i>
<i>dorsalis</i>	<i>kreffti</i>
<i>Crinia signifera</i>	<i>citropus</i>
<i>Hyperolia marmorata</i>	<i>aurea</i>
<i>Pseudophryne australis</i>	<i>latopalmata</i>
<i>bibronii</i>	<i>lesueurii</i>
<i>Hyla phyllochroa</i>	<i>freycineti</i>
<i>cærulea</i>	<i>dimolops</i>
<i>peronii</i>	<i>Hylella bicolor</i>

* This specimen is referred with some doubt to *H. albo-punctatus*, the tympanum not being hidden.

(ii.) *The inland division of N.S.W. (West of the Dividing Range).*

(e) From Narrabri on the Namoi (collected by Messrs. Henry Deane, and T. G. Sloane).*

Limodynastes tasmaniensis *Hyperolia marmorata*

Pseudophryne bibronii *Notaden bennettii*

(f) From Nundle on the Namoi (Mr. Froggatt, Senr.)

Crinia signifera.

(g) From Coolah on the Talbragar (collected by Mr. Albert Cox).

Limnodynastes tasmaniensis *Hyla cærulea*

Pseudophryne bibronii *peronii*

(h) From Guntawang and Cullenbone, near Mudgee, on the Cudgegong (collected by Messrs. A. G. Hamilton and J. D. Cox).

Limnodynastes peronii *Hyperolia marmorata*

tasmaniensis *Helioporus pictus*, Ptrs.

fletcheri, Blgr. *Pseudophryne bibronii*

dorsalis *Hyla cærulea*

ornatus *peronii*

Crinia signifera *aurea*

Hyla lesueurii

Mr. Hamilton sent me all the above from Guntawang; Mr. Cox sent me living specimens of *L. dorsalis*, and *H. lesueurii* from Cullenbone. This is an interesting collection remarkable for the presence of what Mr. Boulenger considers to be a new species, as well as for the unexpected occurrence of *L. ornatus*, and *H. lesueurii*, both of which from previous records would appear to be coastal species; the latter especially is very common in the

* The morning after the meeting at which this paper was read Mr. C. T. Musson, F.L.S., arrived from Narrabri, and very kindly handed over to me a number of frogs, enabling me to supplement the above list as follows:—

(a) From Narrabri:—*Limnodynastes salminii*

Hyla cærulea

peronii

(β) From Tamworth on the Peel:—*Hyla cærulea*

peronii

lesueurii

Mr. Musson tells me that he also had a specimen of *Notaden* from Narrabri, but that it was unfortunately left behind.

Mudgee district. From its occurrence in some of the other collections *L. salminii* might have been expected. *Helioporus pictus* must be rare as there is only a single specimen in the collection; its only other recorded locality in N.S.W. is Rylstone in the same district.

(i) At Capertee (2700 feet) close to or almost on the Divide, I found the following species common:—

Limnodynastes tasmaniensis *Crinia signifera*

Pseudophryne bibronii *Hyla ewingii* var. *calliscelis*

(j) From Warren on the Macquarie (collected by Mr. C. Thacker).

Limnodynastes salminii *Notaden bennettii*

(k) From Dandaloo on the Bogan (collected by Mr. Alleine Fletcher). Eighty specimens referable to the following species:—

Limnodynastes salminii *Notaden bennettii*, Gthr.

tasmaniensis *Hyla cærulea*

Chiroleptes platycephalus, Gthr. *peronii*

Hyperolia marmorata *rubella*

Hyla latopalmata

This also is an interesting collection, though *Limnodynastes dorsalis*, *Crinia signifera*, and *H. aurea* at least might have been expected. Of greatest interest perhaps is the occurrence of *Hyla rubella* (seven specimens), a species not previously recorded from New South Wales, except by Keferstein (who merely gives N.S.W.), in reference to which it may be remarked that though Keferstein was indebted to Mr. Krefft and Dr. Schuette for the specimens described in his paper, nevertheless Mr. Krefft writing two years after Keferstein says of the distribution of *H. rubella* "North-east and North" [Coast of Australia], nor does he mention it as a N.S.W. species in any of his papers. The presence of *H. latopalmata* (fourteen specimens), previously recorded only from coastal localities is also interesting. The species most numerous represented was *L. tasmaniensis* (27 specimens).

This collection which was made chiefly in the hope of getting *Notaden bennettii*, was sent to me in two instalments, the first representing the frogs obtained from June to December, during which period *Notaden* was never once met with. In April,

however, the species made its appearance abundantly, and numbers might have been obtained. Thirteen specimens sent as a sample are all smaller than Mr. Deane's fine example from Narrabri; and some of them have their fingers and toes extraordinarily worn down as if they had had to burrow under difficulties. My correspondent has been unable to obtain any information as to the oviposition and breeding habits of this remarkable toad, which I suspect will prove to be interesting. He tells me, however, that *Notaden* avoids water, is useless for fish-bait, and he feels sure feeds largely upon ants. In an article in *Science Gossip* (Feb. 1890, p. 37), I found subsequently that an observer in Queensland also refers to the ant-eating propensity of *Notaden*.

(1) From Mulwala on the Murray (collected by Mr. T. G. Sloane).

Crinia signifera

Limnodynastes tasmaniensis

dorsalis

In addition to the above Mr. Sloane tells me that *Hyla aurea* is very common at Mulwala, but that he was unable to bring specimens. Mr. Sloane has also shown me two specimens of *Notaden bennettii*, which have been in his possession since 1880, and which were given to him as having been obtained at Lalaltee, 26 miles N.W. of Mulwala, but that of his own knowledge he is not certain that such was the case. If this habitat is correct, the occurrence of *Notaden* so far south is very interesting.

Mr. Krefft (Trans. Phil. Soc. N.S.W. 1862-1865 [1866] p. 32) records *Limnodynastes dorsalis*, *Hyla aurea*, *H. peronii*, *H. cærulea*, and *H. Adelaidensis*, as occurring on the Lower Murray.

At Hay and Wagga, both on the Murrumbidgee, in Sept. and Oct., 1889, I noticed that *Limnodynastes tasmaniensis*, *Hyla aurea*, *H. peronii*, and a fourth species whose croak I did not recognise and of which I was unable to obtain specimens, were common; in addition to which at Wagga I found one specimen of *Crinia signifera*. At both places the river being high, and the swamps from the backwater being full, it was difficult to procure specimens, sheltering logs or stones being conspicuously absent.

From the foregoing facts the following conclusions may be drawn :—

(1) Of about thirty-four species with which N.S.W. may at present be credited, all but five are to be found inhabiting the strip of coast east of the Dividing Range extending from the northern border to Jervis Bay (the district to the south of this being left out of consideration at present), the majority of which are more or less universally or widely distributed (Australian) species, several are species better represented in Queensland which appear to reach their southern limit in the northern part of the district in question (e.g. *Chiroleptes australis*, *Pseudophryne coriacea*, perhaps also *Phanerotis*) while at least four (*Hyla dentata*, *H. citropus*, *H. jervisiensis*, and *H. dimolops*) are not at present known to occur out of it.

(2) Of the thirty-four species above-mentioned eighteen (comprising representatives of the three dominant Australian families) are now recorded as occurring in the districts of the colony west of the Dividing Range, of which five (*Chiroleptes platycephalus*, *Limnodynastes fletcheri*, *Helioporus pictus*, *Notaden bennettii*, and *Hyla rubella*,) are not known to occur in the coast region of N.S.W.; the remainder being more or less widely distributed species. The common frogs of the interior of the colony thus include such species as *Limnodynastes tasmaniensis*, *L. dorsalis*, *Crinia signifera*, *Hyperolia marmorata*, *Notaden bennettii*, *Hyla cærulea*, *H. aurea*, and *H. peronii*. The rest, or some of them, may perhaps be widely distributed but appear to be rarer; or have not been collected from sufficiently numerous localities to furnish data for any very definite statements about them.

A few species occurring in the Richmond and Clarence district, or further to the north, shade off into the interior, though not known to occur much further to the south, or only sparingly; such are *Limnodynastes ornatus*, *L. salminii*, and *H. rubella*; a glance at the map is suggestive of a possible derivation arising out of the proximity of the sources of the eastern and western waters in this part of the colony.

As the collections herein recorded from the interior of the colony were, for the most part, obtained on the upper waters of tributaries of the River Darling, and as in a region with a comparatively small rainfall periodically subject to severe droughts it is not unreasonable to suppose that the distribution of the amphibia has been in some measure directed and regulated by the rivers, some of the species enumerated may be expected to occur further to the south in districts drained by the lower waters of the great river system of the colony.

Several observers have mentioned remarkable facts about burrowing frogs (*e.g.* Sanger, Atkin, Lumholtz, and recently several writers in the Melbourne *Australasian*) and their power of withstanding droughts; and though the identification of the species, and more detailed information are desirable, yet, in the absence of more definite knowledge, it would be rash to suppose that, though probably most flourishing and abundant in proximity to the rivers, frogs are unable to exist at any considerable distance from these even in the driest parts of the colony. Moreover, floods, particularly such a memorable flood as that of this year, during which in places the Darling is said to have been from twenty to forty miles wide, probably exercise a not inconsiderable distributing and replenishing influence, and do much to counteract the evil effects of a succession of prolonged dry seasons. Indeed it is much to be desired that naturalists who have the chance would give us some detailed information based on personal observations as to the more obvious general effects of a succession of dry seasons followed by a big flood on the fauna of particular districts.

In conclusion I have to thank very warmly the several gentlemen mentioned, who by much personal inconvenience in conveying jars of spirit long distances, and by taking so much trouble to preserve specimens, have enabled me to record so many interesting species from new habitats. The correct determination of the species may be relied on as Mr. G. A. Boulenger, of the British Museum, has most kindly given me the benefit of his knowledge and experience in all cases about which I had any doubt; and therefore to him also I beg to express my cordial thanks.



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