TASMANIAN AMPHIBIA IN THE MUSEUM OF COMPARATIVE ZOOLOGY, CAMBRIDGE, MASSACHUSETTS.

By

ARTHUR LOVERIDGE,

Associate Curator of Reptiles and Amphibians, Museum of Comparative Zoology, Cambridge, Mass., U.S.A.

(Read 25th September, 1933.)

INTRODUCTION.

Though there are represented in the collections of the Museum of Comparative Zoology all of the 19 genera and 75 of the 85 valid species, or races, of Australian amphibia, no Tasmanian material has been received until this year. Recently, through the generous co-operation of Mr. E. O. G. Scott and others, we have been able to complete our collection with all the nine species known to be found in Tasmania.

It will be recollected that on various occasions several species normally occurring on the Australian continent have been attributed to Tasmania. Prominent among these are:

Hyla peronii (Tschudi) and

Limnodynastes peronii peronii (Duméril and Bibron)

both of the records resting on a single individual of its species, presented to the British Museum by Sir A. Smith prior to 1858. In view of the fact that no others have been taken during the past three-quarters of a century, and taking into account the numerous instances of Sir A. Smith having inaccurate locality data on his specimens,* it seems reasonable to drop *Hyla peronii* and *Limnodynastes p. peronii* from the Tasmanian list until such time as they may be proved to actually occur upon the island.

Two others, viz., *Hyla krefftii* Günther and *Hyla calliscelis* Peters, have been correctly recorded from Tasmania, but for reasons explained elsewhere I consider both these species synonymous with *Hyla jervisiensis* Duméril and Bibron, a tree frog which is abundant at Launceston.

* Such as *Agama cælaticeps* Smith and *Pholeophilus capensis* Smith, described as from South Africa, though in reality from Australia, being synonyms of *Amphibolurus diemensis* (Gray) and *Riopa lineata* (Gray).

Of the nine species known to occur in Tasmania, only one—*Crinia tasmaniensis* (Günther)—is restricted to the island. It seems probable, however, that the typical forms of *Crinia lævis* (Günther) and *Hyla ewingii* Duméril and Bibron may be found to be similarly confined, their places being taken upon the continent by subspecies. Unfortunately much confusion exists as to the status of some of these mainland races.

I should like to take this opportunity of expressing my indebtedness to Dr. F. N. Blanchard, of the University of Michigan, for lending and donating specimens; to Mr. Clive E. Lord, for putting me in touch with the Queen Victoria Museum; and finally to Mr. E. O. G. Scott, for his exceeding kindness in procuring material through the co-operation of the schools. In the following pages I have given Mr. Scott's name as collector, and though all the material available to me is listed, some of it has been returned, named, to the Queen Victoria Museum. I am also under deep obligation to Mr. Scott for seeing these notes through the press, which was impossible for me to do at this distance.

A KEY TO AID IN THE IDENTIFICATION OF TASMANIAN AMPHIBIA.

	Toes not extensively webbed, their tips not dilated into small disks	1
	Toes extensively webbed, their tips dilated to form small disks	6
1.	Vomerine teeth in a strongly-developed, transverse series behind the choanæ; belly usually immaculate	2
	Vomerine teeth absent or indistinct; belly heavily marbled or mottled	3
2.	Inner metatarsal tubercle longer than the free portion of the adjacent inner toe....	*L. d. dorsalis*
	Inner metatarsal tubercle much shorter than the free portion of the adjacent inner toe	*L. tasmaniensis*
3.	Inner toe of the forward-pressed hind limb extends beyond the end of the snout	*C. s. signifera*
	Inner toe of the forward-pressed hind limb does not extend beyond the end of the snout	4

A KEY TO AID IN THE IDENTIFICATION OF TASMANIAN AMPHIBIA—*continued.*

4. An inner (sometimes indistinct) but no outer metatarsal tubercle; belly smooth	*C. l. lævis*
An inner and also an outer metatarsal tubercle	5
5. Back and belly smooth; hind aspects of thighs usually uniformly dark, sometimes mottled	*C. tasmaniensis*
Back slightly warty, belly areolate or granular; hinder aspect of thighs distally with a large orange patch	*P. bibronii*
6. Fingers free of web; digital disks extremely small	*H. aurea*
Fingers webbed; digital disks moderately dilated	7
7. Hinder side of thighs red; size smaller	*H. e. ewingii*
Hinder side of thighs yellow; size larger	*H. jervisiensis*

1. Tooth-like ridges on the anterior roof of the mouth.
2. Internal openings of the nostrils on the anterior roof of the mouth.
3. A nodular or ridge-like swelling on the sole close to the base of the inner toe.

CERATOPHRYIDÆ.

The South American genus *Ceratophrys* of Boie, 1825, must take precedence over *Leptodactylus* of Fitzinger, 1826, as the type genus for the family called Cystignathidæ by Boulenger in 1882, being based on *Cystignathus* of Wagler, 1830. The genus *Pseudophryne* of Fitzinger, 1843, placed by Boulenger in the Bufonidæ, is now considered one of the Ceratophryidæ.

Limnodynastes dorsalis dorsalis (Gray).

Cystignathus dorsalis Gray, 1841, in Grey's Journ. Exped. West. Australia, p. 446: Western Australia.

♀ (M.C.Z. 19258) Eaglehawk Neck, T. (F. N. Blanchard), 1928.
♂ (M.C.Z. 19330) Tasmania (T. M. S. English), 1901-1903.
♀ (M.C.Z. 19371) Stanley, T. (E. O. G. Scott), 1933.

Trinomials must be used for this species, since Fry (1913, p. 23) defined several "varieties" which are in reality good geographical races. Three of the four races are represented in the Museum of Comparative Zoology. The typical form is distinguished from all the others by its smooth back.

English (1910, p. 629) states that he caught only one of these frogs, but Mr. E. O. G. Scott assures me that there is a second specimen collected by English on exhibition in the Queen Victoria Museum. Our specimens measure: ♂ 58 mm., ♀ 60 mm.

Limnodynastes tasmaniensis Günther.

Limnodynastes tasmaniensis Günther, 1858, Cat. Batr. Sal. Brit. Mus., p. 33, Pl. ii., Fig. B: Tasmania.

1 (M.C.Z. 19333) Launceston, T. (E. O. G. Scott), 1933.

Both Fletcher (1897, p. 662) and English (1910, p. 628) record this species from Launceston, where it is common. I have compared it with examples from Victoria and from Eidsvold, Queensland. Our specimen is immature, measuring 31 mm. from snout to anus.

Crinia signifera signifera (Girard).

Ranidella signifera Girard, 1853, Proc. Acad. Nat. Sci. Philad., 6, pp. 421-422: Australia.

1 (M.C.Z. 19225) Near National Park, T. (F. N. Blanchard, 1928).
1 (M.C.Z. 19334) Launceston, T. (E. O. G. Scott), 1933.

Trinomials are employed, as the Western Australian race, *C. s. ignita* Cope, of which *C. stolata* Cope is a synonym, is distinguished by its larger size and the absence of dark blotches or marbling on the under-surface. *C. s. signifera* of the east and south is smaller, and has these dark marblings, except in *very* young individuals. Through the courtesy of the Director of the Philadelphia Academy and the co-operation of Dr. E. R. Dunn, I have been able to examine the types of *signifera*, *ignita*, and *stolata*. Our specimen from Launceston is somewhat dried; it measures 18 mm.

Crinia tasmaniensis (Günther).

Pterophrynus tasmaniensis Günther, 1864, Proc. Zool. Soc., London, p. 48, Pl. vii., Fig. 3: Tasmania.

10 (M.C.Z. 19240-9) Cradle Valley, T. (F. N. Blanchard), 1928.

This is the species over which so much printers' ink has needlessly been expended, when, as Blanchard (1929, p. 324) has pointed out, correctly identified specimens from Mt. Wellington and Hobart, collected by Professor E. J. Goddard so long ago as 1909, were in the Australian Museum. Dr. F. N. Blanchard secured good series at Lake Fenton and other localities, his being the first records in the literature since the species was described 64 years earlier. ♂, 17 mm., ♀, 30 mm.

Crinia lævis lævis (Günther).

Pterophrynus lævis Günther, 1864, Proc. Zool. Soc., London, p. 48, Pl. vii., Fig. 4: Tasmania.

6 (M.C.Z. 19226-31) Wilmot, T. (F. N. Blanchard), 1928.

1 (M.C.Z. 19331) Tasmania (T. M. S. English), 1901-1903.

1 (M.C.Z. 19335) Dunorlan, T. (E. O. G. Scott), 1933.

Fletcher (1898, p. 663) later came to regard his *Crinia froggati* as no more than a "variety" of *lævis;* they are undoubtedly very closely related, and it may be that *froggati*, which was described from Buninyong, near Ballarat, Victoria, is the mainland representative of *lævis*. Blanchard (1929, p. 328), however, may be correct in treating *froggati* as a full species. The Dunorlan specimen, taken between March 17 and April 11, is not breeding, whereas the Wilmot series, taken on March 7, are gravid; see also Blanchard (1929, p. 327), who figures the spawn.

Pseudophryne bibronii Steindachner.

Pseudophryne bibronii Steindachner, 1867, Reise Osterr. Freg. Novara. Amphib., p. 34, Pl. v., Figs. 1 and 2: Australia and Tasmania.

4 (M.C.Z. 19336-8) St. Patrick's River, T. (E. O. G. Scott), 1933.

These have been compared with specimens from Sydney, New South Wales, from which they do not appear to be separable. All the examples of both sexes have the ventral marbling extending on to the throat, though the tip of the chin may be free from marbling. In *P. semimarmorata* Lucas, on the other hand, the marbling does not extend on to the throat, which is white in females, dark or dusky in males. The Museum of Comparative Zoology possesses over a hundred examples of *P. semimarmorata* from localities on Mt. Kosciusko, quite close to the type locality in North Gippsland, Victoria. I cannot, therefore, agree with Fletcher (1897, p. 665) in considering these Tasmanian examples of *bibronii* as *semimarmorata*. Of course it is possible, though improbable, that his material from Ulverstone and Launceston does represent *semimarmorata*, for I have seen no examples from these localities. Unfortunately our Tasmanian specimens are somewhat shrivelled, through being placed in too strong alcohol; the largest measures 27 mm. from snout to anus.

HYLIDÆ.

Hyla ewingii ewingii Duméril and Bibron.

Hyla ewingii Duméril and Bibron, 1841, Erpét. Gén., 8, p. 597: Tasmania.

1 (M.C.Z. 19252) National Park, T. (F. N. Blanchard), 1928.

7 (M.C.Z. 19358-62) St. Patrick's River, T. (E. O. G. Scott), 1933.

14 (M.C.Z. 19363-9) Dunorlan, T. (E. O. G. Scott), 1933.

The outer finger usually with the merest rudiment of web, at most only a quarter webbed; outer toe webbed to base of disk or a little short of the disk; median digital disks as large as, or slightly smaller than, the tympanum; the tibio-tarsal articulation of the adpressed hind limb marks the orbit or (more usually) just beyond; skin of back smooth (in formalin) or with very small, pimple-like warts (in alcohol). Above, grey, forehead to interorbital region lighter, a more or less well-defined silvery streak from the upper lip to the base of the forearm; a broad brown dorsal streak from the interorbital region to above the anus; hinder side of thighs *uniformly red* (in fresh material), or with a few large spots and streaks on a red ground.

The largest ♂ measures 32 mm.; the largest ♀, 37 mm.

Hyla jervisiensis Duméril and Bibron.

Hyla jervisiensis Duméril and Bibron, 1841, Erpét. Gén., 8, p. 580: Jervis Bay, New South Wales.

Hyla krefftii Günther, 1863, Ann. Mag. Nat. Hist. (3), 11, p. 28, Pl. iv., Fig. C: Sydney, New South Wales.

Hyla calliscelis Peters, 1874, Monatsb. Akad. Wiss. Berlin, p. 620: Adelaide, South Australia.

1 (M.C.Z. 19054) Launceston, T. (Australian Mus.), 1933.

63 (M.C.Z. 19339-50) Launceston, T. (E. O. G. Scott), 1933.

3 (M.C.Z. 19351-2) Stanley, T. (E. O. G. Scott), 1933.

6 (M.C.Z. 19353-7) Franklin, T. (E. O. G. Scott), 1933.

Boulenger (1882, p. 383), lacking material of *jervisiensis* as he thought, believed it to be related to *cærulea*. I have good evidence for believing *krefftii* to be a synonym of *jervisiensis*; detailed reasons for this opinion will be given elsewhere (in MS.). On the other hand, Boulenger (1882, p. 407) made *calliscelis* a race of *ewingii*, though he lacked topotypic material of *calliscelis*; his two frogs from King George's Sound, South-Western Australia, may, or may not, have represented *calliscelis*. After comparing a South Australian *calliscelis* with New South Wales *jervisiensis*, I find that they differ in just those characters cited by Fry (1915, p. 84):

"Groin and hinder thigh with accentuated purple blotches ..... *calliscelis*.

Groin and thigh yellowish with faint brown speckles ..... *krefftii*."

The large series from Launceston and Franklin, however, show both types and every intergradation between them; on the supposition that large series of South Australian or New South Wales specimens would show similar variation, I relegate *calliscelis* to the synonymy of *jervisiensis*, not deeming it worthy of subspecific rank.

This explains why both *krefftii* and *calliscelis* have, in the past, been recorded from Tasmania by various workers.

Unfortunately Fletcher (1897, p. 665) confused several forms, including *calliscelis*, with *ewingii*. In the latter respect he was followed by English (1910, p. 632). Fry (1915, p. 79) cleared away some of the tangle by naming *H. ewingii alpina* from Mt. Kosciusko, New South Wales. Fletcher had called this mountain form *calliscelis*, for it shares with that form the distinction of possessing purple blotches (brown in *calliscelis*?) on a yellow hinder thigh.

Fry, however, thought that the best solution was to retain *calliscelis* as a race of *ewingii*, and make *krefftii* also a race of *ewingii*; actually he called them varieties. On grounds of geographical distribution they cannot be regarded as races, so I treat *jervisiensis* as a full species, while entirely agreeing that it is closely related to the members of the *ewingii* group.

After careful study of this Tasmanian material I have come to the conclusion that the only safe characters available to distinguish the two species occurring in Tasmania are those which I have employed in the preceding key. There are other average differences of webbing, limb-length, &c., which are of assistance when comparative material is available, but they do not serve to make a sharp and distinct separation between *jervisiensis* and *ewingii*.

The largest ♂ measures 38 mm.; the largest ♀, 45 mm.

Hyla aurea (Lesson).

Rana aurea Lesson, 1830, Voy. Coquille, 2, p. 60, Pl. vii., Fig. 2: Macquarie and Bathurst Rivers, New South Wales.

Hyla aurea var. *cyclorhynchus* Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., p. 411: West Australia.

♂ (M.C.Z. 19332) Tasmania (T. M. S. English), 1901-1903.

♀ (M.C.Z. 19370) Stanley, T. (E. O. G. Scott), 1933.

Binomials only are used, as our extensive Western Australian material of this species shows considerable variation and little grounds for supposing that *cyclorhynchus* should be recognised as a western race. Boulenger's types may represent extremes of variation or a full species.

Our Tasmanian representatives of the Golden Frog measure: ♂, 50 mm.; ♀, 73 mm.—but are surpassed by continental examples.

BIBLIOGRAPHY.

BLANCHARD, F. N., 1929: "Rediscovery of *Crinia tasmaniensis*." *Australian Zool.*, 5, pp. 324-328, Pl. xxxv.

BOULENGER, G. A., 1882: "Catalogue of the Batrachia Salientia s. Ecaudata in the Collection of the British Museum." London, pp. 1-502, Pls. i.-xxx.

ENGLISH, T. M. S., 1910: "Some Notes on Tasmanian Frogs." *Proc. Zool. Soc. London*, pp. 627-634, Pl. li.

FLETCHER, J. J., 1898: "Batrachia of Tasmania." *Proc. Linn. Soc. N.S.W.*, 1897, 22, pp. 660-673.

FRY, D. B., 1913: "On a Varanus and a Frog from Burnett River, Queensland, and a Revision of the Variations in *Limnodynastes dorsalis* Gray." *Rec. Austral. Mus.*, Sydney, 10, pp. 17-34, Pls. i.-iii.

FRY, D. B., 1915: "Herpetological Notes." *Proc. Roy. Soc. Queensl.*, 27, pp. 60-95, Pls. i.-iv.

LORD, C. E., and SCOTT, H. H., 1924: "A Synopsis of the Vertebrate Animals of Tasmania." Hobart. (Amphibia, pp. 97-102).

TASMANIAN CYCADOPHYTA.

[Part 2.]

By

H. H. SCOTT,

Curator of the Queen Victoria Museum, Launceston.

(Read 11th December, 1933.)

In a former paper, read before the Royal Society on 12th May, 1930, I gave some illustrated notes respecting certain cycad stems recovered from the Miocene strata at Evandale. The status of these specimens was called in question by certain palæobotanists, both in and outside the Australian Commonwealth. By a fortunate discovery a small piece of a trunk was afterwards found that proved beyond all question that they had an organic origin, and were not, as objected, inorganic concretions. This discovery, however, did not extend the microscopical evidence to the concentric woody layers, but related to the inthrusts of periderm into the central cavity of the stem, a state of things already found to obtain in cycad trunks from Dakota, U.S.A. In September last a splendid section of a trunk was found in the railway ballast-pit, and through the kindness of Mr. G. Curtis, of the Railway Department, and the keen interest manifested in it by the actual finder—Mr. L. V. Mason—we were enabled to secure this unique specimen. Some 2 feet of the trunk, in three fragments, eventually came to hand, and in many places the structure of the woody rings can be readily studied. As the diameter of the bole is 6 inches by 5 inches, we are evidently in possession of the remains of a fully-grown tree. The finding of this stem sets at rest for ever all objections raised against the organic origin of the specimens, and at the same time supplies us with several connecting links that serve to complete our chain of evidence, as will now be shown.

As the 50 lb. weight of fragments obtained at Evandale suggested both *Cycadites* and *Bennettites*, they were exhibited in the Museum cases as being such—all that manifested concentric layers of wood being relegated to the former taxonomy, and those that showed the entire centre to be