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A REVIEW OF THE *ELEOTRIDS* OF NEW SOUTH WALES.

By EDGAR R. WAITE, F.L.S., Zoologist, Australian Museum.

(Plates xxxiv.-xxxvi.)

In 1897 Mr. J. D. Ogilby published a paper "On some Australian Eleotrinæ"<sup>1</sup> and in the succeeding year made a further contribution to the same subject.<sup>2</sup> In the following pages these will be referred to as Nos. I. and II. respectively.

As the outcome of the first paper the author admits as members of the fauna of New South Wales, seven good and two doubtful species. In the second paper three other species are added so that the list stands as below:—

- Carassiops compressus*, Krefft.
- Carassiops longi*, Ogilby.
- Carassiops galii*, Ogilby.
- Krefftius australis*, Krefft.
- Krefftius adpersus*, Castelnau.
- Mulgoa coxii*, Krefft.
- Ophiorrhinus grandiceps*, Krefft.
- Ophiorrhinus angustifrons*, Ogilby.
- Gymnobotis gymnocephalus*, Steindachner.
- ? *striatus*, Steindachner.
- ? *Mogurnda mogurnda*, Richardson.
- ? *Gobiomorphus gobioides*, Cuvier and Valenciennes.

The author writes (I., p. 750):—"It is one of the most remarkable problems connected with Australian fish literature how the continental naturalists, receiving small collections from such well worked localities as Port Jackson and Hobson's Bay, invariably succeed in obtaining fishes, which we, despite our local knowledge, and despite that having once been recorded they are more carefully sought for, are unable to find."

It seems to me that as a first step instead of searching for forms new to us, which may be identified with species described by continental naturalists, we should rather seek to recognise in their description, some form with which we may be familiar under an earlier name.

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<sup>1</sup> Ogilby—Proc. Linn. Soc. N.S. Wales, xxi., 1897, pp. 725-757.

<sup>2</sup> Ogilby—*Loc. cit.*, xxii, 1898, pp. 783-793.

Dr. Günther has, I find, made a similar suggestion: "Dr. Steindachner describes as new from New South Wales, *E. striata*, *E. gymnocephalus* and *E. richardsonii*. The types of these species being from the same source as the species described by Mr. Krefft in 1864, a further comparison will be necessary."<sup>3</sup>

Mr. Ogilby states (L., p. 757) that he had so far failed in his special endeavours to obtain examples of *E. gymnocephalus* and *E. striatus*.

In attempting to identify the descriptions of these species with known forms I have been only partially successful, but certain comparisons made, led me to a more extended examination of the group; this results in the present contribution to the subject. I have confined my attention to the New South Wales representatives because Mr. Ogilby tentatively promises to deal with the hitherto unnoticed forms of the Australian fauna (II., p. 785).

My efforts therefore may be regarded as a review of Mr. Ogilby's two papers and will mark another step towards our better knowledge of the group. The figures, of most of our species, will be of distinct value, and are reproduced from the work of Mr. A. R. McCulloch.

Under the name of *Carassiops longi*, Mr. Ogilby distinguished our local race of *C. compressus*, Krefft: I am not disposed however to accord it more than varietal rank; the genus is well characterised and includes the small species *C. galii*, Ogilby, whose original habitat is still unknown.

In *Krefftius*, Ogilby, with two species, *K. adpersus*, Castelnau, and *K. australis*, Krefft, I have placed *Eleotris coxii*, Krefft, the type of *Mulgoa*, Ogilby. It seems to me that these two latter species are allied, while the former approaches *E. mogurnda*, Richardson,<sup>4</sup> the type of *Mogurnda*, Gill, the diagnosis of which I have so far been unable to consult. Smaller scales, though not described, may exclude the other three species.

For the flat-headed gudgeons I have reverted to the genus *Philypnodon*, Bleeker, and regarded as synonyms *Gymnobutis*, Bleeker, and *Ophiorrhinus*, Ogilby. I am brought to this conclusion by the identification of *E. gymnocephalus*, Steindachner, with *E. grandiceps*, Krefft, with which I also associate *O. angustifrons*, Ogilby.

Mr. Ogilby failed to obtain examples of *E. striatus*, Steindachner,<sup>5</sup> and I have been unsuccessful in satisfactorily identifying it with any described species. Some confusion in terms is

<sup>3</sup> Günther—Zool. Rec., xxiii., 1866, p. 146.

<sup>4</sup> Richardson—Voy. "Ereb. and Terr.," Ichth., 1844, p. 4, pl. ii., fig. 1-2.

<sup>5</sup> Steindachner—Sitzb. Akad. Wiss. Wein, liii., 1866, p. 452.

evident between the epitomised and extended descriptions; in the former, I read that the interorbital breadth equals half the length of the eye, in the latter, that the diameter of the eye equals half the interorbital breadth.

I have nothing to add to Mr. Ogilby's remarks respecting *Eleotris gobioides*, Cuvier and Valenciennes<sup>6</sup>—"This is a New Zealand species, and its occurrence here requires confirmation."

Dr. Steindachner's "Fischfauna von Port Jackson" was written nearly forty years ago, and he would materially assist us by re-examining his specimens and deciding such problems as are left in doubt by Mr. Ogilby and myself.

As Mr. Ogilby has given such lengthy descriptions, both generic and specific, I have done little more than make necessary additions or corrections: the broad features in which the species differ are noted, while some few observations made on the forms in my aquaria are added. It may be mentioned that Mr. Ogilby's enumeration of the vertebræ does not always agree with mine, probably explainable, in part, by a different method of computation. I have not included the hypural in counting the caudal vertebræ.

#### CARASSIOPS, *Ogilby*.

*Carassiops*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 732.

Under this genus the author includes *Eleotris cyanostigma*<sup>7</sup>, but Bleeker had, in 1874, made it the type of *Brachyeleotris*<sup>8</sup> which should apparently be used instead of *Carassiops*. An examination of specimens collected by Mr. W. T. Quaipe at Vila in the New Hebrides, however, and which I determine as *B. cyanostigma*, indicates that the genus *Carassiops* may be retained for our forms. The number of vertebræ in *C. compressus*, the type of the genus, is  $14+10=24$ . In *B. cyanostigma* the caudal vertebræ are more numerous than the abdominal, the formula being  $10+15=25$ .

Ogilby compares his genus with *Asterropteryx* (so spelled), Rüppell<sup>9</sup> and under *C. guentheri* writes<sup>10</sup> (II., p. 787): "Bleeker has placed this fish in the genus *Asterropteryx* from which I have found it necessary to remove it to my genus *Carassiops*, because in *Asterropteryx* . . . the teeth are in a single series and there is no genital papilla."

<sup>6</sup> Cuvier and Valenciennes—Hist. Nat. Poiss., xii., 1837, p. 247.

<sup>7</sup> Bleeker—Nat. Tijds. Ned. Ind., viii., 1855, p. 452.

<sup>8</sup> Bleeker—Arch. Neerl. Sci. Nat., ix., 1874, p. 306.

<sup>9</sup> Rüppell—Atlas Reise nord. Afrika, Fische, 1828, p. 138.

<sup>10</sup> Bleeker—Versl. Kon. Akad. Wet., xi., 1876.

The last character, if valid, renders the genus unique, but as Rüppell had but a single example too much stress must not be placed upon this statement. Jordan and Snyder evidently do not regard it seriously, for they describe and figure a species, *Asterropteryx abax*<sup>11</sup>, from Japan, in which the anal papilla is conspicuous.

Apart from the stated structural characters, which Bleeker regards as of considerable import, *Asterropteryx semipunctatus* and *Brachyleotris cyanostigma* are very similar.

CARASSIOPS COMPRESSUS, *Krefft*.

*Eleotris compressus*, Krefft, Proc. Zool. Soc., 1864, p. 184.

*Eleotris humilis*, De Vis, Proc. Linn. Soc. N. S. Wales, ix., 1884, p. 690.

*Eleotris cavifrons*, De Vis, *loc cit*, p. 693.

*Carassiops longi*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 733.

(Plate xxxiv., fig. 1.)

D. vi.-vii. i. 9-10; A. i. 9-10; P. 13-15; Sc. 27-29/8; Vert. 14+10=24.

The form under examination is that described by Ogilby as *C. longi*, which designates what I am disposed, at most, to regard as a varietal form. Stress is laid on the comparative height of the body and the depth of the head, also upon the colouration, especially of the males, as distinguishing features from *C. compressus*.

The comparative measurements depend greatly upon age and other conditions, and we possess examples from Cook River and water-holes adjacent, which exhibit a depth of body almost equal to any from the northern rivers.

I can fully support the encomia with regard to colouration, the males, in aquaria, during the breeding season, being most handsome little fishes. At the time of writing, Mr. Ogilby had not, I believe, seen living typical examples of *C. compressus*. His deductions were made from old preserved examples, from which all colour, even had they been taken in breeding garb, had vanished. In order to show the extreme form of this species a slender example, *i.e.*, a typical *C. longi*, has been selected for the purpose of the accompanying illustration. An examination of specimens received from Brisbane under the name *E. humilis*, De Vis, shows that they are absolutely identical with our form. I have not found specimens with so small a number of dorsal spines as five, but have on the other hand counted

<sup>11</sup> Jordan and Snyder—Proc. U.S. Nat. Mus., xxiv., 1901, p. 40, fig. 2.

seven in one individual. The extended distribution of this form supports my conclusions as to its identity with *C. compressus*. Those who still prefer to regard it as distinct, will note that the name *C. humilis* takes precedence of *C. longi*. Reading De Vis' description of *E. cavifrons* with the Brisbane and Sydney specimens in hand, it is not possible to find any character which warrants the recognition of the species.

CARASSIOPS GALII, *Ogilby*.

*Carassiops galii*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxii., 1898, p. 788.

(Plate xxxiv., fig. 2.)

D. vii.-viii. i. 10-12; A. i. 11-14; P. 15; Sc. 29-31/8; Vert. 16+14-15=30-31.

By the kindness of Mr. J. H. Maiden, Director of the Botanical Gardens, Sydney, I have kept examples of these little fishes for the past four years. They were taken from the same tank whence Mr. Albert Gale obtained his specimens, and have bred in my fish ponds, but not in the smaller aquaria where they are more readily observable. On the approach of cool weather they burrow in the mud and debris at the bottom of the water and so remain until spring, when breeding takes place. They become remarkably tame and jostle one another in their efforts to obtain a morsel of food held between the fingers.

The anal fin has a slightly more anterior insertion than in *C. compressus*, hence the generic description "anal fin originating behind the second dorsal" requires amending. Also in regard to the fin formula, number of vertebræ, etc. For this species Ogilby proposes the sub-genus *Austrogobio*, but of the features enumerated, the number of vertebræ is the only one at all distinctive.

KREFFTIUS, *Ogilby*.

*Krefftius*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 736. *Mulgoa*, Ogilby, *loc. cit.*, p. 740.

The characters of the genus were derived from its type *K. australis*, Krefft, but were not amended on the inclusion of *K. adspersus*, Castelnau. I cannot admit *Mulgoa* as a genus distinct from *Krefftius*. The author gives the following as distinguishing characters of the two:—

*Krefftius*.—First dorsal with seven rays (= spines); fourth ventral ray produced and filiform; pectoral with not more than sixteen rays; scales large, cheeks and interorbital space scaly.

*Mulgoa*.—First dorsal with six rays (= spines); fourth ventral ray not produced; pectoral with not less than eighteen rays; scales moderate; cheeks mostly, interorbital region entirely naked.

In *K. adpersus* the dorsal spines number eight and the fourth ventral ray is not filiform, in fact I should scarcely apply the term to *K. australis*; in this latter species the number of vertebræ agree with those of *M. coxi*, namely twenty-eight, whereas in *K. adpersus* there are thirty-one. Another feature noted is the size of the scales, large in *Krefftius*, moderate in *Mulgoa*; the size of the scales is surely determined by their relative depth and in the transverse series there are eleven rows in both *K. adpersus* and *Mulgoa*, whereas in *K. australis* they number eight to nine. A difference of two rays in the pectoral fin can scarcely be reckoned as of generic import, so that the only important character mentioned in the synopsis is in the degree of squamation of the head, possibly a less important factor than the number of vertebræ. In the diagnosis of *Krefftius* the ventral fins are stated to be inserted a little behind the root of the pectorals; in all the species the insertion is below the pectorals.

I have so far been unable to find Gill's diagnosis of *Mogurnda*, apparently founded on *Eleotris mogurnda*, Richardson. Judging however from the description of the species *Krefftius* must be very close to it and *K. adpersus* is scarcely dissimilar from the species, unless the scales are larger, as they would appear from comparison with Richardson's figure though they are not referred to by the author.

Ogilby includes *Mogurnda mogurnda* in his list as a doubtful record for New South Wales, remarking that its claim rests upon its inclusion by Steindachner<sup>12</sup> in his Fishes of Port Jackson and the authority of a single specimen now in the Australian Museum, and said to have come from the Clarence River. This latter example is nothing more than *K. adpersus*, and we may perhaps consider Steindachner's fish as of the same species also and so remove *Mogurnda* from the list. Further research will be needed to show the differences between *Krefftius* and *Mogurnda* unless such are expressed in Gill's diagnosis which, as above stated, I am at present unable to consult.

KREFFTIUS ADSPERSUS, *Castelnau*.

*Eleotris adpersa*, Castelnau, Proc. Linn. Soc. N. S. Wales, iii., 1878, p. 142.

*Eleotris mimus*, De Vis, Proc. Linn. Soc. N. S. Wales, ix., 1884, p. 690.

*Krefftius adpersus*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxii., 1898, p. 789.

(Plate xxxv., fig. 1.)

D. viii-ix. i. 10-12; A. i. 11-12; P. 15; Sc. 31-33/11.13;  
Vert. 15+16=31.

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<sup>12</sup> Steindachner—Sitzb. Akad. Wiss. Wien, lvi., i., 1867, p. 328.

This species may be distinguished by its low spinous dorsal fin, the longest spine, the sixth, being but one-third the length of the head; by its long second dorsal and anal in which the hinder rays form an acute angle, also by the short stout caudal peduncle and rounded tail. Interorbital space scaly, cheeks partly naked.

KREFFTIUS AUSTRALIS, *Kreff.*

*Eleotris australis*, Krefft, Proc. Zool. Soc., 1864, p. 183.

*Krefftius australis*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 737.

(Plate xxxv., fig. 2.)

D. vii. i.8; A. i.8; P. 15; Sc. 31-33/8-9; Vert. 13 + 15 = 28.

The distinguishing characters of this species are the rounded spinous dorsal, in which the third spine is longest, and nearly half the length of the head; the short and high second dorsal, and the long and comparatively slender caudal peduncle and rounded tail. Interorbital space scaly, cheeks partly naked.

This common gudgeon has spawned in my possession, but the ova were devoured by a rapacious *Galaxias* which was unfortunately in the same aquarium.

KREFFTIUS COXII, *Kreff.*

*Eleotris coxii*, Krefft, Proc. Zool. Soc., 1864, p. 183.

*Eleotris richardsonii*, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 455, pl. ii., fig. 4.

*Eleotris mastersii*, Macleay, Proc. Linn. Soc. N.S. Wales, v., 1881, p. 622.

*Mulgoa coxii*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 741.

(Plate xxxvi., fig. 1.)

D. vi. i. 8-9; A. i. 8-9; P. 18-19; Sc. 37-40/11; Vert. 12+16=28.

In some respects this species is intermediate between the last two, the spinous dorsal fin is similar to that of *K. adspersus* but higher, the iii.-v. spines sub-equal in length and a little shorter than half the length of the head. The second dorsal and anal are longer than in *K. australis*, shorter than in *K. adspersus* and the posterior angles are rounded, the caudal peduncle is likewise intermediate, but the tail is subtruncate. Interorbital space naked, cheeks mostly so. In referring to Steindachner's figure, Ogilby characterises it as unnamed and unnumbered. In my



copy it is numbered as above quoted though omitted from the "explanation of plates." For the purpose of direct comparison I also supply a figure of this species, it represents a female of natural size and the pectoral fin is fully expanded to draw attention to the increased number of its rays.

PHILYPNODON, *Bleeker*.

*Philypnodon*, Bleeker, Arch. Neerl. Sci. Nat., ix., 1874, p. 301.

*Gymnobotis*, Bleeker, *loc. cit.*, p. 304.

*Ophiorrhinus*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 745.

This genus was instituted to receive *Eleotris nudiceps*, Castelnau<sup>13</sup> in which the teeth are described as extending on to the vomer and palatines, the posterior part of the tongue being also covered with them. After an examination of sixteen specimens, identified with this species, Ogilby stated that there are no teeth on any part of the mouth except those on the jaws. (I., p. 757.)

He further writes: "I have been for some time past making special endeavours to obtain examples of *Gymnocephalus* . . . but have failed so far in doing so." There can be no doubt that *E. grandiceps*, Krefft, and *E. gymnocephalus*, Steindachner, are two names for the same fish: this had not occurred to Ogilby who makes the former name the type of his genus *Ophiorrhinus*, but Bleeker had in 1874, proposed the genus *Gymnobotis* for Steindachner's species. Now Ogilby admits the generic relation of *E. nudiceps* with *E. grandiceps* so that we have choice of three names for the genus. This author writes (I., p. 751): "The want of Bleeker's paper prevents me from ascertaining whether his genus *Philypnodon* is founded on Castelnau's description of *nudiceps*; if this be the case, Bleeker's genus, being specially formed on account of a character which it does not possess must if monotypic be suppressed. And this raises another question to which I am unable to find a satisfactory answer, namely—if a genus be founded on a character which is purely mythical, should the name so proposed stand in preference to another correctly characterised from the same species but at a later date?"

I am not in accord with Mr. Ogilby's sentiments and so use the name *Philypnodon*. If this be rejected on the grounds advanced, *Ophiorrhinus* can still have no standing, the genus *Gymnobotis* being of earlier date.

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<sup>13</sup> Castelnau—Proc. Zool. Soc. Viet., i., 1872, p. 126.

PHILYPNODON GRANDICEPS, *Kreffft.*

*Eleotris grandiceps*, Krefft, Proc. Zool. Soc., 1864, p. 183.

*Eleotris gymnocephalus*, Steindachner, Sitzb. Akad. Wiss. Wien, liii., 1866, p. 453, pl. ii., fig. 3.

*Gymnobutis gymnocephalus*, Bleeker, Arch. Neerl. Sci. Nat., ix., 1874, p. 304.

*Ophiorrhinus grandiceps*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxi., 1897, p. 746.

*Ophiorrhinus angustifrons*, Ogilby, Proc. Linn. Soc. N. S. Wales, xxii., 1898, p. 793.

(Plate xxxvi., fig. 2.)

D. vii. i. 9-10; A. i. 9-10; P. 19; Sc. 38-44/12-13; Vert. 13+16=29.

In comparing the description of *E. gymnocephalus* with our examples the only real difference I can find is contained in Steindachner's statement that the height of the anal is more than the length of the head: this is obviously an error, the phrase becomes applicable if "half the length of the head" is read, and this approximates the proportion shown in the author's figure.

Writing of *Ophiorrhinus angustifrons* Ogilby remarks (II., p. 793):—"Compared with an example of *Ophiorrhinus grandiceps* of the same size, the narrowness of the head and especially of the interorbital region is at once noticeable, as also is the greater concavity of the cephalic profile; also the ventral fins are elongate and filamentous even in the fry, while in the adult male of *O. grandiceps* they are short, even in the breeding season."

I am unable to discriminate between the two forms and find examples which exhibit characters quite intermediate between the extremes described, the greater interorbital width of the typical *P. grandiceps* is due to a greater fleshy development, the bony width being the same in both. Age seems to be a factor in the variation, and it may be noted that Ogilby had but three small specimens, one of which, at least, must have been very small as he describes the ventral fins as elongate and filamentous "even in the fry." The number of vertebræ is not given, it is the same in both extremes as is also the number of pectoral rays. I may mention that the Museum possesses, by donation from Mr. A. R. McCulloch, an example identified by Mr. Ogilby with *O. angustifrons*, but whether one of the ex-

amples originally taken or obtained by him subsequently I am unaware. It is in this example that the vertebræ were counted, and in this also, the dorsal and anal rays are each but nine in number.

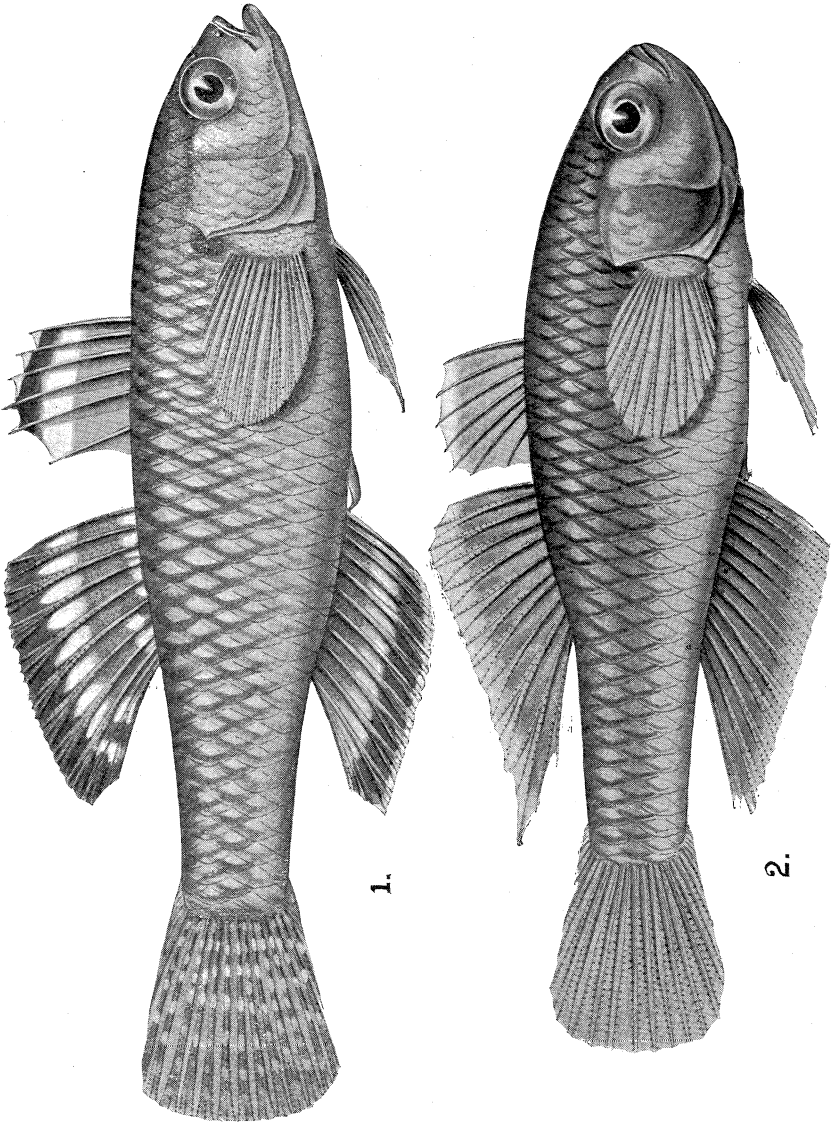
Though described from specimens taken in pure salt water it must not be inferred that it is a marine form. Towree or Towra Point is at the mouth of George River in which typical examples are common. Though half-grown specimens may be taken with either the broad or narrow head I have not seen adult examples with the latter character, and therefore presume it is an indication, to some extent, of immaturity.

EXPLANATION OF PLATE XXXIV.

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Fig. 1. *Carassiops compressus*, Krefft,  
(male, twice natural size).

Fig 2. *Carassiops galii*, Ogilby,  
(male, thrice natural size).



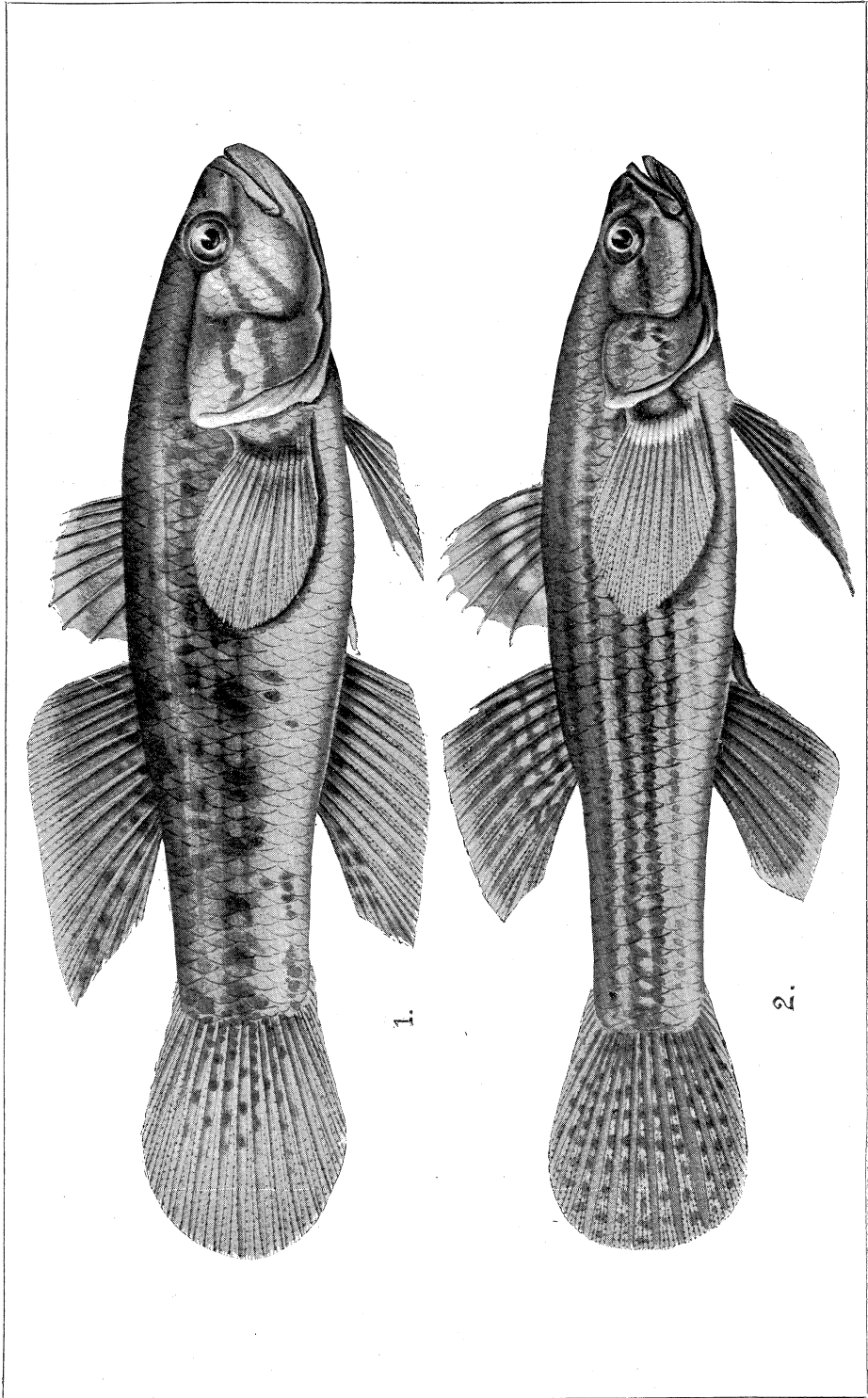
A. R. McCULLOCH, del.,  
Aust. Mus.

Electric Photo-Engr. Co., Ltd.,  
Sydney.

EXPLANATION OF PLATE XXXV.

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- Fig. 1. *Krefftius adpersus*, Castelnau,  
(male, one and a half times natural size).
- Fig. 2. *Krefftius australis*, Krefft,  
(male, one and a half times natural size).



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Aust. Mus.

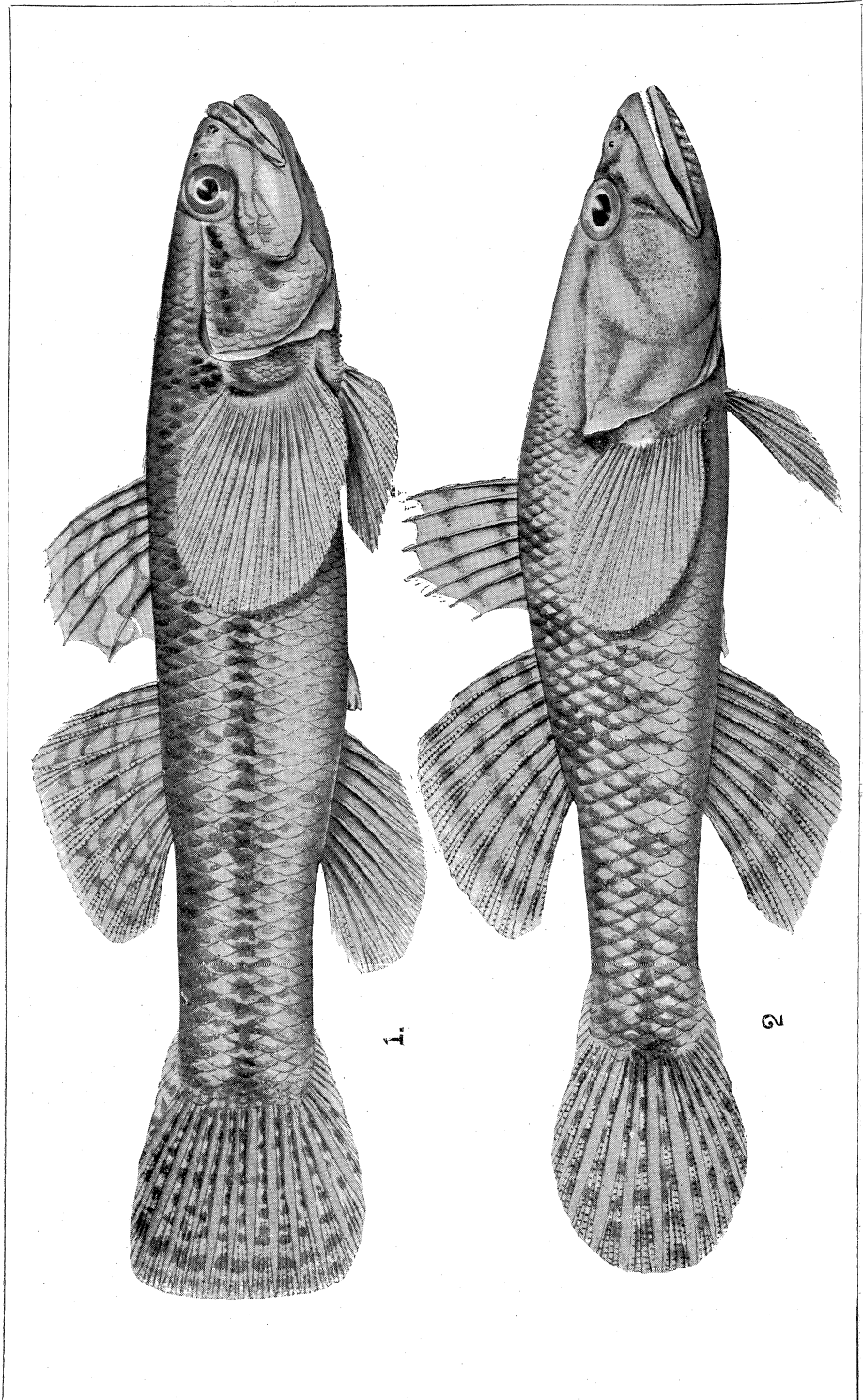
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Sydney.

EXPLANATION OF PLATE XXXVI.

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- Fig. 1. *Krefftius covii*, Krefft,  
(female, natural size).
- Fig. 2. *Philipnodon grandiceps*, Krefft,  
(male, twice natural size).





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