A Revision of the Genus *Gobiomorphus*.

By G. STOKELL.

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IN 1863 Gill pointed out the need for several new Eleotrid genera to accommodate certain species then included in the comprehensive genus *Eleotris*, and suggested *Gobiomorphus* for *Eleotris gobioides* Cuvier and Valenciennes (1837). The proposed genus was recognised by Bleeker, who published a definition of it in 1874. As this is the first published definition of *Gobiomorphus* (Gill's contribution to the establishment of the genus consisting merely of the suggestion of a name) and, moreover, as Bleeker's paper is not readily accessible, his definition is reprinted below.

GOBIOMORPHUS Gill.

> Dentes utraque maxilla multiseriati graciles subaequales, canini nulli. Caput nullibi spinigerum, vertice et operculis squamatum, fronte, rostro genisque alepidotum. Squame trunco ctenoidae 36 ad 43 in serie longitudinali. Isthmus latus. D. 6 vel 7–9 ad 11. A. 8 ad 12.
>
> Sp. typ. *Eleotris gobioides* Val.

In 1905 Jordan and Evermann united their genus *Quisquilius* with *Gobiomorphus*, and published a definition of the latter genus which appears to have been drawn up without reference to Australasian specimens, and to be based solely on the forms that were previously regarded as constituting the former. This definition includes the following particulars:—

> "Allied to *Asterropteryx*: with two series of sharp teeth in jaws, the inner depressible; ventral rays i 5; the fins joined by a narrow frenum."

The dental characters indicated differ greatly from those of *Gobiomorphus*, in which the teeth are disposed in bands about five wide, none being depressible. The union of the ventral fins forms a further disqualification for admission to *Gobiomorphus*, and indicates the true position of Jordan and Evermann's genus to be in the sub-family Gobiinae. McCulloch and Ogilby (1917–21) have already disallowed the union of *Quisquilius* and *Gobiomorphus* on the grounds of difference in dentition, their account of this character in the former genus, however, differing from that quoted above; and in their definition of the sub-family Eleotrinae (*loc. cit.*, p. 203) they express the view that *Quisquilius* is in some respects intermediate between Eleotrinae and Gobiinae. Jordan and Evermann's definition of *Gobiomorphus* must therefore be rejected as being based on a fish that is inadmissible to this genus.

McCulloch and Ogilby's (1917–21) definition of *Gobiomorphus* appears to be based on the original description of the genotype, modified in accordance with the specifications of an Australian form,

Eleotris coxii Krefft (1864), which they included. The most important diversion from Bleeker's definition is that the cheeks, which were stated by this author to be naked, are recorded by McCulloch and Ogilby as being partly scaled. Investigation of the genus in New Zealand has revealed forms agreeing with each specification. The form shown in fig. 3 has naked cheeks, while in that shown in fig. 2 they are usually naked but occasionally carry a few isolated scales below or to the rear of the eye, this arrangement sometimes existing on one cheek of an individual, the other of which is naked. In the form shown in fig. 1 the cheeks are invariably scaled to some extent, about half their area being covered in typical specimens, the lower and anterior portions being naked. It is therefore necessary to retain both Bleeker's definition and that published by McCulloch and Ogilby, and to regard the genus *Gobiomorphus* as having the cheeks naked or partly scaled.

A character upon which McCulloch and Ogilby agree with Bleeker, but in which the present writer has found a considerable degree of variation from their specification is the relative size of the outer row of teeth. McCulloch and Ogilby's definition of *Gobiomorphus* includes the statements " outer row of teeth not enlarged " and " teeth subequal." The present writer has been unable to find a New Zealand or Australian Eleotrid agreeing in other characters with *Gobiomorphus* in which there is not some degree of enlargement of the teeth in the outer row. In the only form to which the term " subequal " may be regarded as applicable there is usually a slight enlargement of both the outer and inner row in both jaws, this being most prominent anteriorly. A micrograph of the cross-section of the premaxillary of this fish is shown in fig. 4. Fig. 5 shows the same section of the species having the greatest degree of enlargement. In this fish the outer teeth in the upper jaw are much enlarged throughout, while those in the lower are conspicuously enlarged anteriorly and slightly at the rear, the change in the degree of enlargement usually being abrupt, with the enlarged anterior teeth set forward more or less out of line with the remainder of the row. Fig. 6 shows the same section of the premaxillary of an intermediate New Zealand form, and fig. 7 a section from a specimen of *G. coxii* which was kindly supplied by the Australian Museum. The latter shows definite enlargement throughout the outer row in the upper jaw, and in two or three teeth on each side of the symphysis in the lower, the few median teeth showing no enlargement. The genus must therefore be defined as having the teeth in the outer row more or less enlarged in both jaws.

The number of rays in the first dorsal fin is given by McCulloch and Ogilby as 6–7, but the present investigation has revealed the need for considerable extension of this specification, all New Zealand forms that have come under the writer's observation having a dominant number from which there is an occasional variation of one either way. In the forms shown in figures 1 and 2 the number is usually 6, but ranges occasionally to 5 and 7, while in that shown in fig. 3 it is usually 7, and ranges to 6 and 8. The observed generic range is therefore 5–8.

It is unfortunate that the number of vertebrae has been neglected by most workers on this genus, as it is one of the most constant characters, and forms one of the safest guides to the separation of certain species. So far as the dissection of 25 specimens has shown, the large form shown in fig. 1 is constant in the possession of 27 vertebrae (without hypural), while in that shown in fig. 3 the number is usually 29 and occasionally 30. There is thus a definite gap between the vertebral counts of these two species, neither of which has ever been found with 28. The form shown in fig. 2 has usually 27 and occasionally 28, but in no species that has been observed is 28 the dominant number.

Other characters to which little attention has hitherto been directed are the occurrence, disposition, and constancy of open pores on the head. In the forms shown in figures 1 and 2 pores are always present, but in that shown in fig. 3 they may be entirely absent, or present in two different arrangements. The only available specimen of the Australian form has no pores in the interorbital space, but the remainder of the head is not in sufficiently good condition for determining the presence or absence of pores thereon.

Other characters have been found to agree satisfactorily with McCulloch and Ogilby's definition, which may now be revised as follows.

Genus GOBIOMORPHUS Gill.

Vertebrae 27–30 (without hypural), those of the caudal section the more numerous. Teeth in premaxillaries and mandible in a band about 5 wide, those in the outer row more or less enlarged in both jaws. Opercles and occiput scaled, cheeks partly scaled or naked, snout and interorbital space or anterior two-thirds thereof naked. Breast and pectoral base scaled, scales ciliated on sides and tail, cycloid on head, abdomen, and anterior dorsal region; less than 50 from base of pectoral to base of caudal. Scales on occiput and nape reduced in size. Head with rows of minute mucigerous papillae, with or without open pores. Ventral fin rays i 5, first dorsal v–viii, second dorsal i 8–10. No bony crests on head, no spines on preoperculum, genital papilla large.

Adult total length 2½–9 inches.

Habitat: Fresh waters and estuaries of New Zealand and Australia.

Genotype: *Gobiomorphus gobioides* (Cuvier and Valenciennes).

In addition to the genotype of *Gobiomorphus* there have been described from New Zealand three Eleotrids that appear to be referable to this genus, so far as this point may be determined from the available descriptions. These species are *Eleotris radiata* Cuvier and Valenciennes (1837), *E. basalis* Gray (1842), and *E. huttoni* Ogilby (1894), which, together with *E. gobioides,* make four nominal species for the possible accommodation of the three distinct forms known to exist in New Zealand. In the original description *E. gobioides* is stated to have naked cheeks, head in length ratio of three and two-thirds, 6 rays in the first dorsal fin, i 10 in the second and vertical fins less than half the height of the body. This specification is not

typical of any of the three New Zealand species that have been observed during the present investigation, and notwithstanding the existence of a considerable degree of variation in all of them it has not been possible to find a single individual agreeing with it. The large form shown in fig. 1 appears to be disqualified by the possession of scales on the cheeks, and is also too high in the anal and second dorsal fins and rather long in the head; a head in length ratio of 3·5 is the highest that has been observed. This species agrees, however, in the number of rays in the first and second dorsal fins which, though moderately variable, is usually as specified for *gobioides.*

The small form shown in fig. 2 usually has naked cheeks and a six-rayed first dorsal, but the second is usually i 9, its height is always more than half the height of the body, and the head is shorter than is indicated in the specification of *gobioides;* a ratio of 3·8 is the lowest that has been observed.

The small form shown in fig. 3 has naked cheeks, agrees with *gobioides* in head in length ratio, and frequently has the vertical fins less than half the height of the body. It differs in usually having seven rays in the first dorsal fin, and i 9 in the second, and although occasional specimens are found with a six-rayed first dorsal or a second with i 10, the examination of over 100 specimens has failed to reveal a single individual in which these features are combined.

It is to be noted that Richardson (1839–43) identified with *gobioides* a scaled cheeked form which is recognisable as the fish shown in fig. 1 of the present paper, but made no attempt to explain the several points of difference between them except to state that the cheeks of his specimens appeared to be naked, but when scraped revealed minute scales over a considerable area. The acceptance of this identification involves the assumption that Cuvier and Valenciennes overlooked the scales on the cheeks of their specimens and also misrecorded the head in length ratio and the height of the vertical fins. It seems more probable that their description is a composite one based on specimens of two different species between which they failed to distinguish. Although none of the knowns forms agrees with the specification of *gobioides* this specification may be matched by a combination of two of them, the scaled cheeked form having the necessary dorsal rays, and the form shown in fig. 3 agreeing in the other characters. It must be admitted as a bare possibility that a form agreeing with Cuvier and Valenciennes' description may exist and have escaped present observation, but if, as their description implies, such a fish was plentiful in their time, it must have been a competitor for observation with the two forms mentioned above, which are of universal occurrence. As Cuvier and Valenciennes recorded only one species, while two are known to be abundant, it seems much more probable that they confused these two forms than that they happened on another which has not since been found. If

this explanation is accepted as the correct one, it raises the question of which of the two species involved is to carry the name *gobioides*. The present writer submits that the question of allocation to one or the other fish is capable of being decided on the principle established by Gill (1887)? when called upon to decide which of two names applied simultaneously to the same fish should be used. Gill held that where two names for the same species were first published on the same page, the name to be used was fixed by the action of the first subsequent user, and the principle seems equally valid when one name and two species are involved. It seems to the present writer that the application of the name *gobioides* to one or the other fish was open to the next zoologist who dealt with the subject, and that the first to use the name in conjunction with a recognisable description must be followed. Jenyns (1839–43) appears to have been the next to publish on this species, but his description, while including the fin ray formula, which agrees with that of *gobioides*, omits mention of the other characters involved in the present problem. Richardson's (1839–43) description must therefore be regarded as the first to indicate a recognisable form, and the present writer submits, on the grounds given above, that his fish, which is definitely identifiable with the scaled cheeked form shown in fig. 1, is entitled to the name of *gobioides*.

The description of *Eleotris radiata* is far from complete, the most important particulars being: cheeks naked, head in length 4, first dorsal rays 6, second i 9. This specification differs from the scaled-cheeked form in three particulars, the number of rays in the first dorsal fin being the only point of agreement. It agrees with the form shown in fig. 3 in the naked cheeks and the number of rays in the second dorsal fin, but differs in the first dorsal and the head in length ratio; a head in length ratio of 3·6 is the highest that has been observed in this latter species. The form shown in fig. 2 is the only one of the present group that has the head short enough to come within the specification of *radiata*, the observed limits of variation being 3·8–4·3. It also agrees in the first and second dorsals, while the cheeks are usually naked and never carry more than a few scattered scales. The moderate protrusion of the lower jaw also agrees with the description of *radiata*. This fish must therefore be regarded as satisfactorily identified with *radiata*, and, moreover, disagrees with all other recorded species. Hutton's (1872) description of a small specimen referred to *radiata* gives the head in length ratio as 3, which of itself amounts to a disqualification, but the description is not sufficiently detailed to reveal the true identity of the fish.

The original description of *Eleotris basalis* Gray (1842) is not available to the present writer, but it seems probable that the description of this species quoted by Richardson (1843) is a repetition of it. This is so scanty as to be almost useless, but the species is readily

definable, as Gray established two types in the British Museum, and these have been examined by Miss E. Trewavas, of that Institution, who very kindly forwarded the following particulars. Cheeks naked, head in length 3·3–3·4, first dorsal 7–8, second dorsal i 9. Not only do these specifications agree completely with the form shown in fig. 3, but the occurrence in one of the type specimens of an eight-rayed first dorsal places the identification beyond reasonable doubt, this form being the only one in which this number has been found. It is therefore necessary to reinstate Gray's species *basalis* which Gunther (1861) suppressed as a synonym of *gobioides*.

The description of *E. huttoni* Ogilby (1894) is fairly complete, the only important character not recorded being the number of vertebrae. This species is described as having the cheeks naked, the first dorsal fin six rayed, the second with i 8, the jaws equal, the outer row of teeth conspicuously enlarged, no open pores on the head, and a head in total length ratio of 4·24, which would approximate 3·4 in standard. The form shown in fig. 1 is disqualified on account of the scaled cheeks, the excessive number of rays in the second dorsal, the conspicuously protruding lower jaw, the presence of open pores on the head and the subequal teeth. It agrees in the number of rays in the first dorsal and approaches agreement in the head in length ratio. In the form shown in fig. 3 the cheeks are naked, the head is frequently without open pores and the head in length range includes the ratio given for *huttoni*. The enlargement of the outer row of teeth, however, could scarcely be regarded as conspicuous, and the protrusion of the lower jaw amounts to a disqualification as does the number of rays in the dorsal fins. The form shown in fig. 2 is the only New Zealand species in which a second dorsal of i 8 has been observed, three out of thirty-nine specimens examined having this number. It agrees with the specification of *huttoni* in the six rayed first dorsal, the considerable degree of enlargement of the outer row of teeth and the usual absence of scales from the cheeks. The lower jaw is shorter than in other New Zealand species, but in the specimens examined always shows some degree of protrusion. Other points of difference are that the head invariably has large open pores, and the head in length ratio is too high (3·8–4·3). The writer has been unable to obtain a fish agreeing with the description of *huttoni* from any New Zealand water, and in view of the fact that only one specimen of this alleged species is known the differences noted above do not seem sufficient to exclude the possibility that it is identical with *G. radiata*. Until the species is re-collected its validity must be regarded as open to question.

Descriptions of the three New Zealand species recognised as valid are given below, and also a description of a single specimen of the Australian form, *G. coxii*. The originals of figures 1, 2 and 3 have been deposited in the Canterbury Museum as reference specimens.

Gobiomorphus gobioides (Cuv. and Val.). Plate 35, fig. 1; plate 36, fig. 4.

Eleotris gobioides Cuvier and Valenciennes, *Hist. Nat. Poiss.*, 12, p. 247, 1837.

Eleotris gobioides Richardson, *Voy. Erebus and Terror*, p. 4, 1839–43.

Gobiomorphus gobioides Gill, *Proc. Acad. Nat. Sci., Philadelphia*, p. 270, 1863.

Gobiomorphus gobioides Bleeker, *Archives Néerlandaises Sci. Exac. Nat.*, p. 303, 1874.

B. 5–6. D. v–vii. i 9–11. A. i 9–10. V. i 5. P. 18–19. C. 15 (developed rays). Vertebrae 13 + 14 = 27.

Body section sub-circular anteriorly, somewhat compressed posterirly. Head 3·2–3·5 in standard length, depth 3·8–4·7 in same. Profile of snout usually very slightly convex, sometimes slightly concave, lower jaw much the longer, mouth steeply inclined. Usually 4 open pores in interorbital space, one about level with upper margin and perpendicular from posterior margin of eye, 1–4 behind cheek. Papillae on lower margin of cheek rather poorly developed, usually in a narrow band 2 or 3 wide tapering to a single row posteriorly; those immediately below cheek in single row, small, numerous and closely placed. Outer row and inner row of teeth slightly enlarged in both jaws. Cheeks more or less densely scaled for about half their area, the lower and anterior portions being naked. Scales on nape and occiput much reduced in size, extending forward between eyes to their posterior quarter; 33–35 scales from base of pectoral to base of caudal, 10–11 in series extending from anterior of anal fin upward and backward to second dorsal. First dorsal inserted at ·34–·39 of the standard length, sometimes with the top almost parallel with the base, in some specimens more or less rounded. First and second dorsals usually juxtaposed. Height of second dorsal usually about equal to its basal length, variable in either direction, posterior rays usually the longest, but occasionally the middle rays the longest, last ray sometimes double. Origin of anal about perpendicular from third to fourth ray of second dorsal, its height greater than its basal length, posterior rays usually the longest, last ray sometimes double. Ventrals inserted at ·283–·324 of the standard length. Caudal peduncle 1·4–1·6 times as long as its least depth. Colour greyish olive, in some specimens approaching black, in others light grey with ventral surface almost white.

Maximum total length observed, 217 mm.

Variation.—This species is remarkably constant in the number of vertebrae, an examination of 25 specimens failing to reveal any variation. Of 82 specimens examined, 1 has five rays in the first dorsal fin, 79 have six and 2 have seven. The second dorsal specifications of 25 specimens are 7 with i 9, 17 with i 10 and 1 with i 11. Variation has been observed in the number of branchiostegals (5–6).

Distribution and Habits.—*G. gobioides* appears to be generally distributed throughout New Zealand. It has not been taken far from the coast, and appears to be restricted to swampy creeks and the slacker waters at river mouths. The occurrence in this fish of the nematode *Hedruris spinigera* suggests that at least part of its feeding is done in salt or brackish water, as this parasite has never been found in strictly freshwater-dwelling fishes.

Gobiomorphus radiata (Cuv. and Val.). Plate 35, fig. 2; plate 36, fig. 5.

Eleotris radiata Cuvier and Valenciennes, *Hist. Nat. Poiss.*, 12, p. 250, 1837.

B. 6. D. v–vii i 8–10. A. i 8–10. P. 17–19. V. i 5. C. 13–15 (developed rays). Vertebrae 27–28.

Body section sub-circular anteriorly, much compressed posteriorly. Head 3·8–4·3 in standard length, depth 4·9–5·6 in same. Profile of snout convex, lower jaw the longer. A large open pore above each posterior nostril, one medially situated before anterior limit of dorsal scale covering, one behind each eye, two behind each cheek. Papillae fringing lower margin of cheek well developed, small, closely placed in single series, those below edge of cheek in single series, large and widely spaced. Outer row of teeth conspicuously enlarged throughout in upper jaw, a few of the anterior teeth in the lower jaw usually conspicuously enlarged and set forward out of line with the remainder of the row. Cheeks usually naked, but occasionally with a few isolated scales posteriorly. Scales on occiput and nape much reduced in size, those on dorsal surface extending forward about to perpendicular from posterior margin of eye; 34–36 scales from base of pectoral to base of caudal, 9–10 in series extending from anterior of anal upward and backward to second dorsal. First dorsal inserted at ·32–·35 of the standard length, its top usually almost parallel with its base but sometimes rounded, first and second dorsals usually separated by one scale, occasionally by three or four, sometimes juxtaposed. Height of second dorsal usually about equal to its basal length, variable in either direction, posterior rays usually the longest, but occasionally the top rounded and the middle rays the longest, last ray usually double. Origin of anal about perpendicular from second to fourth ray of second dorsal, its height greater than its basal length, posterior rays usually the longest, last ray usually double. Ventrals inserted at ·24–·27 of the standard length. Caudal peduncle 1·9–2·1 times as long as its least depth. Colour extremely variable, usually greyish with much red on second dorsal, anal and caudal fins, sometimes a series of vertical reddish brown marks on the sides resembling the parr marks of young salmonoids; red sometimes entirely absent.

Maximum total length observed, 102 mm.

It is not known if any type of this species exists.

Differs from *gobioides* in having the cheeks naked or sub-naked. a much greater degree of enlargement of the outer row of teeth, a shorter head, a smaller mouth, greater convexity of profile of snout. different arrangement of interorbital pores, less rays in the second dorsal fin, and in the much smaller total length attained.

Variation.—Of twenty-five specimens in which the vertebrae were counted, twenty-two have 27 and three have 28. The first dorsal specifications of thirty-nine specimens are: one with 5 rays, thirty-five with 6 and three with 7, the second dorsal specifications of the same group being three with i 8, thirty-three with i 9, one with 9

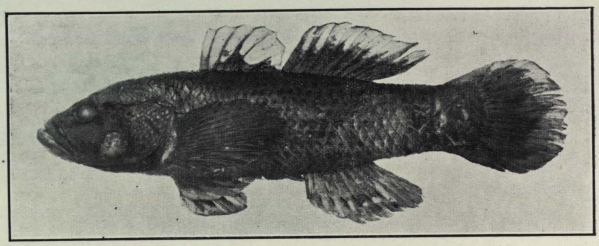

Fig. 1—*Gobiomorphus gobioides*. Total length 188 mm.
Locality: Mouth of Selwyn River.

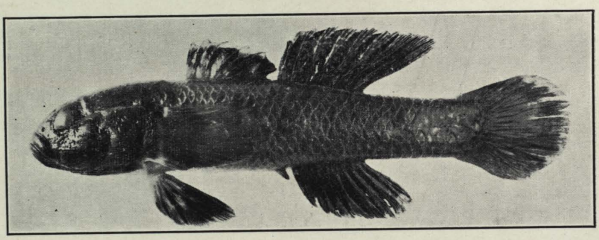

Fig. 2—*Gobiomorphus radiata*. Total length 96 mm.

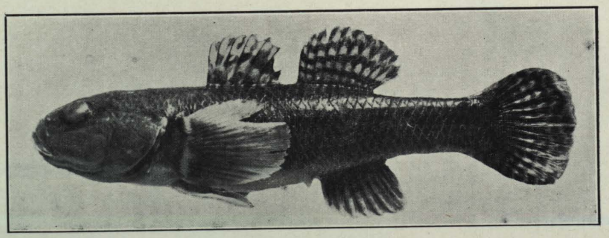

Fig. 3—*Gobiomorphus basalis*. Total length 106 mm.

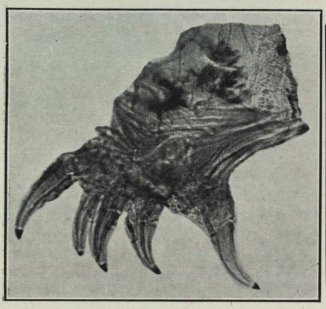

Fig. 4.

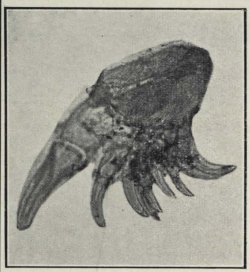

Fig. 5.

Fig. 6.

Fig. 7.

Micrographs of cross-section of premaxillary of four species of *Gobiomorphus*.

Fig. 4—*G. gobioides*. Slight enlargement of outer and inner teeth. × 22.

Fig. 5—*G. radiata*. Conspicuous enlargement of outer tooth, and progressive inward reduction in size. × 37.

Fig. 6—*G. basalis*. Moderate enlargement of outer and inner teeth. × 37.

Fig. 7—*G. coxii*. Moderate enlargement of outer tooth and progressive inward reduction in size. × 37.

and two with i 10. The degree of enlargement of the outer row of teeth is moderately variable as is the head in length ratio. The arrangement of papillae and open pores on the head is more constant than in other species.

Distribution and Habits.—This species has been collected from the mouth of the Rakaia in Canterbury and from various streams up to and including the Oaro Creek, Marlborough, but has been taken only from fresh water within a short distance of tidal influence. It is plentiful in a small stream near the mouth of the Rakaia, known locally as Boat Creek, which it appears to inhabit to the exclusion of other Eleotrids, although eels, flounders, Galaxiids, smelts and brown trout are present.

Gobiomorphus basalis (Gray). Plate 35, fig. 3; plate 36, fig. 6.

Eleotris basalis Gray, *Zool. Miscel.*, p. 73, 1842.

Eleotris gobioides Gunther, *Cat. Fishes Brit. Mus.*, vol. 3, p. 114, 1861.

B. 6. D. vi–viii i 9–10. A. i 8–10. V. i 5. P. 18–20. C. 13–15 (developed rays). Vertebrae 29–30.

Body section sub-circular anteriorly, slightly compressed posteriorly. Head 3·3–3·6 in standard length, depth 4·0–4·7 in same. Profile of snout moderately convex, lower jaw the longer. Head with or without open pores, which may be arranged 2–4 in interorbital space, 1–2 behind eye, 2–3 behind cheek. Papillae on lower edge of cheek usually in a band from two to four wide, sometimes irregularly uniserial, those below cheek in a single row, small, closely placed. Outer row of teeth moderately enlarged throughout in upper jaw, slightly to moderately, and mostly anteriorly, in lower. Cheeks naked. Scales on nape and occiput much reduced in size, extending forward between eyes to their posterior third; 34–38 scales from base of pectoral to base of caudal, 9–12 in a series extending from anterior of anal fin upward and backward to second dorsal. First dorsal inserted at ·36–·40 of the standard length, its form rounded, first and second dorsals separated by two or three scales, second dorsal usually longer than high, its form usually rounded with middle rays the longest, but sometimes with top almost parallel with base and posterior rays the longest, last ray double. Origin of anal about perpendicular from third to fifth ray of second dorsal, its height greater than its basal length, last ray double. Ventrals inserted at ·22–·29 of the standard length. Caudal peduncle 2·0–2·3 times as long as its least depth.

Colour variable, usually greyish speckled with darker, a more or less distinct yellow basal band on pectoral.

Maximum total length observed, 135 mm.

Gray's types are in the British Museum.

Differs from *gobioides* in having the cheeks naked, a greater degree of enlargement of the outer row of teeth, more vertebrae, more rays in first dorsal and less in second, the inconstant occurrence of open pores on the head and in the much smaller total length attained. Differs from *radiata* in having more vertebrae, a wider mouth, less enlargement of the outer row of teeth, the inconstant occurrence of open pores on the head and more rays in the first dorsal fin.

Variation.—The vertebrae were counted in twenty-five specimens. twenty-three of which have 29 and two 30. Of one hundred and sixteen specimens examined five have 6 rays in the first dorsal, ninety-three have 7 and eighteen have 8. The second dorsal specifications of a group of twenty-five are two with i 8, seventeen with i 9 and four with i 10. The occurrence and disposition of open pores on the head are subject to great variation in this species. Some specimens are entirely without pores, while others may have up to twelve, the more usual arrangements being two or four in the interorbital space, one behind each eye and three behind each cheek.

Distribution and Habits.—*G. basalis* occurs from Southland to Auckland, and is by far the most plentiful New Zealand species. It is the only Eleotrid known to exist in Lake Taupo, and is the species used by anglers at the mouth of the Selwyn, Canterbury, in the barbarous practice of live-bait fishing for trout. Although its altitudinal range is greater than that of other local species it is principally a lowland fish, existing about river mouths and creeks at no great height above sea level, and also occurring plentifully in tidal waters. It does exist at considerable altitudes in some localities such as Lake Taupo and Lake Georgina in Canterbury (altitude over 1,700 feet), but there is reason to believe that it is not native to either water, but has been introduced with the intention of providing food for trout. Statements to this effect are current regarding Lake Taupo, and at Lake Georgina there is evidence in the presence of the exotic gastropod, *Limnaea stagnalis,* that experiments of this nature have been made. About the upper limit of the lower permanent water of the Selwyn River, *G. basalis* is associated with another Eleotrid, *Philypnodon breviceps,* in about equal numbers, but in the upper permanent water it appears to give way entirely to the latter fish. *G. basalis* spawns about midsummer, the eggs being deposited on submerged wood and other material in fresh water near river mouths.

Gobiomorphus huttoni (Ogilby).

Eleotris huttoni Ogilby, *Pro. Linn. Soc. N.S.W.*, vol. 9, p. 369, 1894.
Gobiomorphus huttoni Whitley and Phillipps, *Trans. Roy. Soc. N.Z.*, vol. 69, p. 235, pl. 22, fig. 4.

A species of questionable validity known from a single specimen. Affinities with *G. radiata,* and possibly identical with that species.

Ogilby's type is in the Australian Museum.

Gobiomorphus coxii (Krefft). Plate 36, fig. 7.

Eleotris coxii Krefft, *Pro. Zool. Soc.*, p. 183, 1864.
Eleotris richardsonii Steindachner, *Sitzungsber. Akad. Wissenschaften,* liii, p. 32, pl. ii, fig. 4.
Eleotris mastersii Macleay, *Proc. Linn. Soc. N.S.W.*, v, p. 622, 1881.
Mulgoa coxii Ogilby, *Proc. Linn. Soc. N.S.W.*, xxi, p. 741, 1897.
Krefftius coxii Waite, *Rec. Aust. Mus.*, vol. 5, p. 283, pl. xxxvi, fig. 1, 1904.
Gobiomorphus coxii McCulloch and Ogilby, *Rec. Aust. Mus.*, xii, p. 284, 1917–21.

B. 6. D. vi i 8. A. i 9. P. 18. V. i 5. C. 15 (developed rays). Vertebrae 27.

Head 3·7 in standard length, lower jaw much the longer, no open pores in interorbital space. Outer row of teeth moderately enlarged throughout in upper jaw, a group of teeth on each side of the

symphysis enlarged in the lower, median and posterior teeth not enlarged. Cheeks with a patch of scales to rear of eye. Scales on nape and occiput moderately reduced in size, occipital scales extending forward between eyes to their posterior quarter; 38–39 scales from base of pectoral to base of caudal, 12 in a series extending from anterior of anal fin upward and backward to second dorsal. First dorsal inserted at ·37 of the standard length, two scales between dorsals, second dorsal about as high as long, the middle rays the longest, last ray double. Origin of anal about under third ray of second dorsal, its height greater than its basal length, last ray double. Ventrals inserted at ·26 of the standard length. Caudal peduncle twice as long as its least depth.

Described from an old specimen in spirits.

It is not known if any type of this species exists.

Differs from *gobioides* in having less scales on the cheeks, a greater degree of enlargement of the outer row of teeth, less reduction in the size of the scales on nape and occiput, and less rays in the second dorsal.

Differs from *radiata* in having more scales on the cheeks, less enlargement of the outer row of teeth, less reduction in the size of the scales on nape and occiput, a longer head and no pores in the interorbital space.

Differs from *basalis* in having scales on the cheeks, less vertebrae, less reduction in the size of the scales on nape and occiput, and less rays in the first dorsal.

Distribution and Habits.—This fish is recorded from New South Wales, where it appears to be freshwater-dwelling. It is unknown in New Zealand.

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