PAPERS AND PROCEEDINGS OF THE ROYAL SOCIETY OF TASMANIA, VOLUME 100

A PRELIMINARY INVESTIGATION OF THE SYSTEMATICS OF SOME TASMANIAN GALAXIIDAE

By

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(With four plates.)

ABSTRACT

The investigation has revealed no Tasmanian galaxiid identical with any New Zealand form. The fish known hitherto as *Galaxias attenuatus* in Tasmania is shown to be at least subspecifically different from the form bearing this name in New Zealand. The two forms are referred to the species *maculatus* Jenyns on the grounds of page precedence, and are regarded as different subspecies. No fish agreeing with *G. auratus* Johnson and *G. weedoni* Johnston have been found but *G. affinis* Regan appears to be a valid species represented by variants in different waters.

INTRODUCTION

The present investigation is an attempt to clear up some of the confusion that has surrounded the Tasmanian galaxiids for many years. Species that appear to be merely nominal have been listed on equal standing with others that are at least obtainable and recognisable. The confusion has been increased by the practice of proposing new species without putting the systematics of old ones in order. In the present work no new species are created, but efforts are directed towards defining the forms available and investigating their admissibility to recorded species.

MATERIAL

Most of the material used in this investigation was obtained from collectors engaged through newspaper advertisement. Ten specimens came from Lake Solitude, which is a very small lake at an altitude of about 3,100 feet draining into Lake St. Clair by a creek some 3½ miles in length. There were five specimens from Lake Myrtle in the Mersey River drainage basin and five specimens from Cephisus Creek which joins the Narcissus River near Lake St. Clair. Ten specimens of the fish known as *Galaxias truttaceus* were obtained from the mouth of the Tamar River a few feet above sea level, and nine specimens of the species called *Galaxias attenuatus* in Tasmania were obtained from the same locality. The Tasmanian Museum presented six specimens of the fish called *Galaxias attenuatus* which were combined with the nine from the Tamar River to form the group of fifteen recorded in the discussion. The names *truttaceus* and *attenuatus* used in preliminary discussion are queried to indicate their questionable validity.

TERMINOLOGY AND METHODS OF DESCRIPTION

The most important of the specific characters used is the number of vertebrae. In addition to being a basic osteological character it has a particular value in differentiating species on account of the general lack of correlation between it and certain proportional measurements such as the length of the head in relation to the standard length. Contrary to what might be expected the lower vertebral counts usually occur in the lower bodied species and the higher counts in the shorter-bodied ones, but these characters are not constantly associated, and the occasional exceptions increase their diagnostic value. In counting the vertebrae all bones having a socket at each end are counted, the terminal bone or urostyle, which has a socket at only one end, being omitted.

Another character that has proved of considerable value in separating New Zealand species but is unnoted in Tasmanian descriptions is the degree of development of the pyloric caeca. The number of these structures is usually two but in some species caeca are entirely lacking, in others they are short or rudimentary, and between these and species possessing maximum development there exists a full series of intermediates.

The head in standard length ratio is expressed by indicating the number of times the length of the head, measured to the posterior extremity of the opercular flap, is contained in the standard length.

Other proportional measurements, such as the point of insertion of the dorsal and ventral fins, are recorded by indicating the fraction of the standard length at which these structures originate. This permits precise definition and the convenient indication of variation. Most characters are very variable, and an indication of the range of variation in a substantial group is essential to specific definition. The practice of creating species on one or two specimens is to be deprecated, as is the basing of species on juvenile examples. Juveniles may give very different proportional measurements from adults, as most species are subject to differential growth.

The pectoral fin proportion represents the fraction the length of this fin forms of the distance from its base to the origin of the ventral, and the ventral proportion applies to the length of this

fin and the ventral-anal interspace. The length of the paired fins is the length of the longest ray and not the basal length as is used for the vertical fins.

The tail proportion is the fraction the least depth of the tail forms of the distance from the rear of the dorsal fin to the hypural joint, measured parallel with the axis of the fish.

STRUCTURE

Data on six numerical characters and six proportional measurements of the principal groups investigated are presented in the following tables.

TABLE 1

10 specimens of *Galaxias* from Lake Solitude

Character	*Minimum*	*Maximum*	*Average*
Branchiostegals	7	8	7.66
Dorsal rays (branched)	5	8	6.90
Anal rays (branched)	8	9	8.20
Ventral rays (all counted)	6	7	6.50
Pectoral rays (all counted)	13	15	14.22
Vertebrae	57	61	58
Head in standard length	4.08	4.52	4.23
Dorsal fin insertion	.73	.77	.74
Ventral fin insertion	.51	.55	.52
Pectoral fin proportion	.40	.57	.47
Ventral fin proportion	.44	.65	.52
Tail proportion	.44	.53	.51

TABLE 2

15 specimens of the fish called *Galaxias attenuatus* in Tasmania

Character	*Minimum*	*Maximum*	*Average*
Branchiostegals	6	7	6.57
Dorsal rays (branched)	6	8	7.46
Anal rays (branched)	11	13	12
Ventral rays (all counted)	7	8	....
Pectoral rays (all counted)	12	13	12.47
Vertebrae	58	61	59.66
Head in standard length	4.70	5.73	5.16
Dorsal fin insertion	.73	.79	.75
Ventral fin insertion	.46	.54	.48
Pectoral fin proportion	.32	.50	.42
Ventral fin proportion	.34	.44	.39
Tail proportion	.36	.50	.43

TABLE 3

5 specimens of *Galaxias* from Lake Myrtle

Character	*Minimum*	*Maximum*	*Average*
Branchiostegals	7	8	7.25
Dorsal rays (branched)	7	9	7.80
Anal rays (branched)	8	10	8.20
Ventral rays (all counted)	7	7	7
Pectoral rays (all counted)	15	15	15
Vertebrae	59	61	60
Head in standard length	4.45	4.73	4.66
Dorsal fin insertion	.69	.72	.71
Ventral fin insertion	.50	.51	.506
Pectoral fin proportion	.47	.57	.52
Ventral fin proportion	.61	.67	.64
Tail proportion	.38	.45	.42

TABLE 4

10 specimens of the fish called *Galaxias truttaceus*

Character	*Minimum*	*Maximum*	*Average*
Branchiostegals	7	9	7.63
Dorsal rays (branched)	8	10	8.30
Anal rays (branched)	10	11	10.66
Ventral rays (all counted)	6	7	6.95
Pectoral rays (all counted)	14	15	14.14
Vertebrae	60	62	60.60
Head in standard length	4.06	4.75	4.43
Dorsal fin insertion	.70	.74	.72
Ventral fin insertion	.50	.55	.52
Pectoral fin proportion	.40	.55	.51
Ventral fin proportion	.48	.61	.54
Tail proportion	.44	.57	.49

Frequency Tables in the more important meristic characters and a table of minimum, maximum and average values in the head in standard length ratio are given in the following discussion.

TABLE 5

Frequency of occurrence of vertebral counts

Designation	*Number of Specimens*	*Vertebrae* 57	58	59	60	61	62	*Average*
Lake Solitude	10	5	3	....	1	1	....	58
G. attenuatus?	15	....	1	5	7	2	....	59.6
Lake Myrtle	4	....	....	1	2	1	....	60
G. truttaceus?	10	....	....	....	5	4	1	60.2

The Lake Solitude group has a definitely lower number than any of the others and on this character must be regarded as distinct.

The character next in importance is the number of branched rays in the anal fin. Taking the groups in the same order the values are as follows.

TABLE 6

Branched rays in anal fin

Designation	*Number of Specimens*	*Branched anal rays* 7	8	9	10	11	12	13	*Average*
Lake Solitude	10	....	8	2	....	....	....	....	8.20
G. attenuatus?	15	....	....	....	....	5	4	6	12.06
Lake Myrtle	5	....	1	2	2	....	....	....	8.20
G. truttaceus?	12	....	....	....	4	8	....	....	10.66

The high counts in the *attenuatus?* group are sufficient to separate the fish composing it from all others recorded. The Solitude group has the lowest average, which appears to be sufficient to separate it from the two intermediate ones.

The number of dorsal rays does not appear to be a very important character but the number of ventral rays shows remarkable variation in one group. In most species of *Galaxias* the number is normally 7 but many show an occasional variation of 1 either way. There are usually 6 branched rays and 1 single one in each fin, which are totalled as 7 for convenience in tabulating. Rudimentary rays of less than half the height of the fin, which sometimes occur, are indicated in the following table by a plus sign after the number of developed rays.

TABLE 7

Number of ventral fin rays

Designation	*No. of fins*	6	6+	7	7+	8
Lake Solitude	20	7	3	9	1	....
G. attenuatus?	30	....	....	29	....	1
Lake Myrtle	10	....	....	10	....	....
G. truttaceus?	20	1	....	19	....	....

The only group free from variation is the one from Lake Myrtle, and this is too small to justify an assumption of constancy. The frequency of variation in the Solitude group is so high that only three of the ten specimens examined are typical in having 7 rays in each fin. Individual particulars of the ten are: 6-6, 6-6, 6-6 +, 6-7, 6 + -7, 6-7 +, 7-7, 7-7, 7-7. In species of *Galaxias* not normally 7 rayed there are other dominant numbers, 5 in *Galaxias burrowsius* Phillips, and 6 in *Galaxias divergens* Stokell, both of which vary occasionally, but the Solitude fish can be classed only as highly inconstant. Two specimens from a tributary of Lake Augusta, each of which has 58 vertebrae, show abnormal variation in the number of ventral rays, one having 7-7 and the other 6-6. While the character of high variation in the number of ventral rays requires taxonomic recognition it seems most appropriate as a subspecific distinction.

The number of branchiostegals appears to be of little importance except in separating *attenuatus?* which has a range of 6-7. In the others it is 7-8 or 7-9.

The most important of the proportional measurements in the head in standard length ratio, particulars of which are tabulated below.

TABLE 8

Head in standard length ratio

Designation	*Number of Specimens*	*Minimum*	*Maximum*	*Average*
Lake Solitude	10	4.08	4.52	4.23
G. attenuatus?	15	4.70	5.73	5.19
Lake Myrtle	5	4.45	4.73	4.66
G. truttaceus?	10	4.06	4.75	4.43

The only significant difference is shown by the *attenuatus?* group, which has a definitely higher ratio than any other in the table.

Of the characters that are not tabulated the form of the pyloric caeca carries the greatest interest. These structures differ considerably between some groups, and are much more variable within groups than is usual in New Zealand. Tasmanian caeca are usually more tapered than New Zealand ones. The Solitude group shows about normal development but the length varies considerably. In the *attenuatus?* group the caeca vary from short definite protuberances to mere wide bulges. The caeca are very variable in the *truttaceus?* group and sometimes absent. When present they are usually short and as wide at the base as high. Five large specimens from Cephisus Creek have rather unusual development. The caeca differ considerably in length and vary in shape from moderately tapered to almost cylindrical. They are not constant in number, three specimens having two caeca and two having three. These specimens are not tabulated as they show little difference in the characters listed from the the Solitude group. They have more finely subdivided rays in the anal fin and are the largest Tasmanian *Galaxias* observed, the largest specimen being 207 millimeters in total length.

The arrangement of large open pores on the head is a character of some value. It is usual for one pore to occur on each side of each anterior nostril, one well in from each posterior nostril with the posterior edge of the pore about level with the anterior edge of the nostril, a pair in the interorbital space in line with the second nostril pores and at .25-.50 of the eye diameter from the front of the eye, a pair in the interorbital space about level with the rear of the eyes, and one pore

behind the upper extremity of each eye. On the side of the head there are usually two pores about level with the centre of the eye, one of them slightly higher than the extremity of the maxillary and the other slightly lower, the lower one usually behind the other. There are also three or four on the posterior of the cheek and one or two on its lower edge. There are invariably two pores above each upper lip and two below each lower lip.

The Solitude group is variable in the position of the second nostril pore and usually has it much farther forward. The most usual arrangement is for the pore to be about one diameter forward of the nostril but it may extend forward as much as two diameters and in the posterior extreme is just forward of the nostril. The first interorbital pair is at about .2-.3 of the eye diameter from the anterior of the eye and the second interobrital pair is at about .7-.8. The postorbital pores are forward of the posterior extremity of the eyes and almost level with the posterior interorbital pair. The two pores behind the posterior extremity of the maxillary are behind the perpendicular from the rear of the eyes.

The lateral teeth in the mandible are more or less enlarged in the Lake Solitude, Lake Myrtle and *truttaceus?* groups, but are equal in the *attenuatus?* group.

Entopterygoidal teeth are about normal in all groups, and range from four to seven on each bone.

Minute pharyngeal teeth occur in all forms investigated. So far as the writer is aware pharyngeal teeth have not been recorded in *Galaxias*, but they are noted in a New Zealand paper which may not be published for a considerable time.

The gill rakers are short in the Solitude group and usually of moderate length in the others.

The origin of the anal fin is about perpendicular from the origin of the dorsal fin in the *attenuatus?* group and below the fifth-seventh ray (all counted) in the others.

NOMENCLATURE

The principal evidence on the identity of the upland species consists of a specimen of *G. auratus* Johnston and a specimen of *G. weedoni* Johnston, presented to the British Museum by Johnston himself, and three specimens of *G. affinis* Regan which were used by Regan in the Museum when describing the species. Through the kindness of Dr. P. H. Greenwood, head of the Department of Fishes in the institution, radiographs of all these specimens have been taken and presented to the writer. The two of Johnston's specimens and the best of Regan's are reproduced in Plate 1. The print of *G. auratus* shows 55 vertebrae definitely, but that of *G. weedoni* is less certain. At the posterior extremity several bones are disturbed and not clearly shown, but counting the neural spines in this short section and estimating the intervals the number appears to be 55 also. It seems questionable if these two nominal species are distinct. As 57 is the lowest count recorded in the tables none of the present forms can be referred to *auratus* or *weedoni*. The best specimen of *G. affinis* has 57 vertebrae and the other two appear to have 57 and 59, which come within the range of the Lake Solitude and Cephisus Creek forms. These two forms appear to be referable to *G. affinis*, and are left in the position of possible variants of this species. The present need is for a redefinition of *affinis* based on a workable group from Lake St. Clair.

The fish known as *Galaxias attenuatus* in Tasmania differs materially from the form bearing this name in New Zealand. The most important difference is in the number of vertebrae, which ranges from 58 to 61 in Tasmanian specimens and from 61 to 63 in New Zealand ones. In twenty New Zealand specimens dissected no individual with less than 61 was found, the frequency distribution being nine with 61, eight with 62 and three with 63. Fifteen Tasmanian specimens gave counts of one with 58, five with 59, seven with 60 and two with 61. The character next in importance is the number of branched rays in the anal fin, which does not range below 13 in the New Zealand fish or above 13 in the Tasmanian one. The frequencies of the group of twenty New Zealand specimens are eight with 13, four with 14, five with 15 and three with 16. Fifteen Tasmanian specimens have five with 11, five with 12 and five with 13. The branched rays in the dorsal fin number 8-10 in the New Zealand specimens and 6-8 in the Tasmanian ones. These differences might justify specific separation of the New Zealand and Tasmanian forms now referred to *attenuatus* if it were not for the existence of a somewhat intermediate form in South America. Three specimens from Chile, where the fish is known as *G. maculatus* have 61-62-62 vertebrae, 12-13-13 branched rays in the anal fin and 6-8-8 in the dorsal. The Chilean form therefore agrees best with the New Zealand one in the number of vertebrae and with the Tasmanian one in the number of anal and dorsal rays.

The first record of these fishes was made by Jenyns who, in 1842, described three species collected during the Voyage of the Beagle in 1832-36. He appears to have been unaware of the establishment of *Galaxias* Cuvier 1817 as he proposed for his new species the genus *Mesites* which he defined almost similarly. The first species *Mesites maculatus* was described on page 119 of the publication and was recorded from Hardy Peninsula Tierra del Fuego and Santa Cruz Patagonia. *Mesites alpinus* which was described on page 121, was recorded from fresh water lakes in Hardy Peninsula, Tierra del Fuego and *Mesites attenuatus* described on the same page from Bay of Islands New Zealand. Types of all species were established in the museum of the University of Cambridge and were handed over to the British Museum (Natural History) in 1917. Some years ago the types of *attenuatus* and *maculatus* were x-rayed for the writer in order to determine the number of vertebrae, the counts recorded being 64 for the type of *attenuatus*, 64 for the type of *maculatus* and 61 and 63 for co-types of *maculatus*. These counts would appear to have included the urostyle, as no record of 64 has ever been made from New Zealand specimens by the present writer's method of counting. If this is so one of the specimens of *maculatus* comes below the minimum in the New Zealand fish.

Frequency Table of Vertebral Counts

Locality	Number of Specimens	Number of Vertebrae 58	59	60	61	62	63
New Zealand	20	....	....	....	9	8	3
Tasmania	15	1	5	7	2	....	....
Chile	3	....	....	....	1	2	....

All Jenyns' descriptions were based on juvenile examples from two inches to about two and a half inches in total length. In view of the differential growth prevalent in these fishes during the transition from the juvenile stage to the adult stage the proportional measurements given have little definitive value. Colouration, to which much importance was attached, also shows a considerable change at this stage. When the New Zealand fish come in from the sea they are unpigmented except for the eyes and vertebral column, the normal colour pattern commencing to develop after a short residence in fresh water. The most important character recorded in the original descriptions is the number of anal fin rays which is given as 15-16 in *maculatus*, 16 in *alpinus* and 17 in *attenuatus*. The figures are not sufficiently different for specific separation, and the three forms as described cannot be regarded as distinct.

Cuvier and Valenciennes (1846) recognised these fishes as belonging to the genus *Galaxias* in which they placed them, thus reducing *Mesites* to a synonym. Günther (1866) who followed this classification recorded *attenuatus* from New Zealand, Tasmania, South America and Falkland Islands; and Regan (1905) added the mainland of Australia to the localities of occurrence. The Australian fish is not separable from the Tasmanian one. In a group of twenty specimens from the mouth of the Lang Lang Creek Victoria, the vertebral counts are—one specimen with 58, two with 59, thirteen with 60, three with 61 and one with 63. The individual with 63 appears to be an abnormal specimen, the more so on account of the absence of any with 62. The vertebrae of another group of Victorian specimens, most of them from the same Lang Lang Creek collection, were counted as a check. There was no specimen with more than 61 vertebrae in the group. The occurrences are ten specimens with 59, seven with 60 and three with 61. The average for this Victorian group is 59.65, that for the Tasmanian group is 59.60, and that for the first Victorian group is 60.1.

There is no difference of consequence in the number of branched rays in the anal fin, the range being 11-13 in each and the averages 12.18 in the Tasmanian group and 12.27 in the Australian one.

A consideration of the status of the three forms leads to the conclusion that the differences between them are not sufficient for specific separation. The Tasmanian and Australian form is the most distinct, and if it and the New Zealand one were all that existed two species would be justified, but the South American form agrees with the one in the anal and dorsal ray counts and with the other in the number of vertebrae. Specific union of the three seems called for, and the recognition of each as a subspecies would provide the distinction between them that is so necessary. Under this arrangement the specific name to be used would be *maculatus* on the grounds of page precedence. The South American form, to which this name was applied would repeat the specific name, becoming *Galaxias maculatus maculatus* Jenyns, the New Zealand one would be *Galaxias maculatus attenuatus* Jenyns, and the Tasmanian and Australian one, which was not dealt with by Jenyns, would take as a subsepecific name the earliest one applied specifically by another author if such should exist. Many nominal species have been proposed from Australia some of which have been regarded as synonyms of *attenuatus*, but even if they could be identified from the scanty data furnished most of them would not be available now. *G. kreffti* Günther (1866) has never been recognised and is now a *nomen oblitum*. *G. punctatus* Günther (1886), *G. waterhousii* Krefft (1867), *G. cylindricus* Castelnau (1872), *G. delicatulus* Castelnau (1872), *G. nebulosus* Macleay (1881) and *G. obtusus* Klunzinger (1872) appear to be in the same category. They were not included as valid species in the list of Regan (1905) and McCulloch (1929), in consequence of which they are judged to be lapsed names. *G. versicolor* Castelnau (1872) was included in both Regan's and McCulloch's lists and would still be available. It is described as having a total of 12 rays in the anal fin which disqualifies it as a species to which the Australian form known as *attenuatus* could be referred.

G. amaenus Castelnau (1872) which also has been kept alive by inclusion in Regan's and McCulloch's lists is described as having a head in total length of $4\frac{1}{3}$. This indicates a much longer head than ever occurs in the fish known as *attenuatus* in Australia. These species are very poorly described, and the account of *versicolor*, at least, is based on a single specimen. *G. scriba* Cuvier and Valenciennes (1846) may have been saved from lapsing by Whitley's (1933) use of the name in the trinominal *Austrocobitis attenuatus scriba* Cuvier and Valenciennes, but the matter is of little consequence, as the length of the head and the form of the caudal fin recorded in the description of *scriba* differ substantially from those of the Australian and Tasmanian fish commonly regarded as *attenuatus*.

There does not appear to be any name to which the present fish can be referred, and while it is desirable in the interests of general taxonomy that the standing of the few still remaining names should be investigated, if this is possible, it seems doubtful if any could be removed from the status of *species dubi*.

Under the circumstances it seems fitting to propose a new subspecific name indicative of the uncertainty that has existed, and to present a description sufficient to distinguish the fish from the New Zealand form for which it has been mistaken. A fuller investigation of South American specimens is desirable and if this should

show the necessity for full specific separation the present subspecific names would become specific ones.

GALAXIAS MACULATUS Subspecies *IGNOTUS*

Galaxias attenuatus Johnston. *Pap. and Pro. Roy. Soc. Tasmania* 1886 p. 130.

B. 5-7. D.III-V 6-8. A.III-IV 11-13. V. 7-8 (usually 7). P. 12-13. vertebrae 58-61 (average 59.66).

Jaws about equal, teeth in jaws about equal. Entopterygoidal teeth well developed, 4-7 on each bone. Gill rakers moderately developed, pyloric caeca varying from wide bulges to short definite protuberances, rather stout and round ended.

Head 4.70-5.73 in standard length, maxillary extending from scarcely to the perpendicular from the anterior of the eye to slightly past this point, diameter of eye 0.24-0.25 of the length of the head.

The dorsal surface of the head has one large open pore on each side of each anterior nostril, one well in from each posterior nostril, the longitudinal position varying from the posterior edge of the pore being level with the anterior edge of the nostril to the middle of the pore being level with the nostril edge. A pair in interorbital space at 0.25-0.30 of the eye diameter from the anterior of the eye, a pair in the interorbital space at about 0.75 of the eye diameter from the anterior of the eye, one pore above each eye slightly forward of the posterior interorbital pair. One pore on side of head behind extremity of maxillary and below about centre of eye, one lower, may be forward of or behind the suborbital pore, three on posterior edge of cheek, two on lower edge of cheek. Two above each upper jaw and two below each lower jaw.

Dorsal fin originating at 0.73-0.79 of the standard length, ventrals at 0.46-0.54 of same. Pectoral fins extending 0.32-0.50 of the distance from their origin to origin of ventrals, ventrals extending 0.34-0.43 of the distance from their origin to origin of anal, anal originating below origin of dorsal, branched rays of anal divided into two. Least depth of tail 0.36-0.50 of the distance from the rear of dorsal to hypural joint. Caudal fin concave with slightly rounded lobes.

Colour (in spirits) Ground colour and lower surface pale, sides with numerous narrow transverse bands of a greenish grey sometimes breaking up into a general mottling.

Maximum total length observed 108 mm.
Recorded locality lower Tamar River.

Differs from *Galaxias maculatus attenuatus* of New Zealand in having less vertebrae, less anal rays, less dorsal rays and a lower head in standard length ratio.

Tamania and mainland of Australia.

The fish from Lake Myrtle cannot be associated with any of the other groups recorded. It has 59-61 vertebrae, and in this comes very close to the species just described, but it differs from this species in having less branched rays in the anal fin and longer pectoral fins, ventral fins and head. The first and second of these differences are absolute but the third and fourth are subject to a small overlap in values. The Lake Myrtle fish differs from other Tasmanian forms discussed in the disposition of large open pores on the head. The second nostril pore is about two diameters ahead of the nostril and the first interorbital pair is not actually between the eyes but about level with their anterior edge. The second interorbital pair is nearly as far back as the rear of the eyes and the level with the postorbital pores. Other pores are about normal. The pyloric caeca are very variable. Some of them come nearer to the form occurring in New Zealand species than those of other Tasmanian species do, being long and cylindrical while others are slightly or definitely tapered.

The Lake Myrtle fish appears to be new, but it would be improper to name it on the small group available, and until something like order has been brought to the Tasmanian species. This water is in the Mersey drainage basin, the only species recorded from which is *G. weedoni*. The low number of vertebrae in *weedoni* excludes the present fish from this species.

The name *truttaceus*, which is universally applied to the common black-spotted species of Tasmania and Victoria, is of very doubtful validity. It was first used by Cuvier (1817) in a footnote to the definition of the genus *Galaxias*, but no description of *truttaceus* was given and no locality indicated. The definition is as follows:—

"Les *Galaxies* (*Galaxias* Cuv.)

Out le corps sans écailles apparentes, la bouche peu fendone, des dentes pointues et médiocres aux palatines et aux deaux machoires, enfin quelques fortes dentes crochues sour la langue.

Les cotes de leur tete offrent des pores, et leur dorsale répond a l'anale, comme des les brochets, dont ils ont aussi les intestines (1).".

The footnote at the bottom of the page is:—

"(1) *Esox truttaceus* Cuv. espec nouvelle, ou peut-etre L'es. *argenteus* Forst?"

In the later editions of Cuvier the definition is the same but the footnote is "*Esox truttaceus* Cuv. *Esox alepidotus* Forst."

The first mention of a fish that can be recognised as a galaxiid was made by G. Forster (1777) in his account of Captain Cook's stay at Dusky Bay, New Zealand in 1773. He records the discovery of a bushed lake, the only inhabitant of which appeared to be a small species of fish (Esox) without scales resembling a little trout, brown in colour mottled with yellowish spots in the shape of some ancient Asiatic characters. In 1789 Gmelin, the compiler of the 13th edition of Systema Naturae, gave a latinised description based on G. Forster's account of the Dusky Bay fish but transposed a name (*Esox argenteus*) proposed by G. Forster for a very different fish taken from the sea at Tanna Island, on the assumption that they were identical. Gmelin's account is given below.

p. 1393 (Esox).

argenteus. 12. Es. fuscus litteris flavicantibus pictus. G. Forster *it. circa orb. I. p.* 159. *Habitat in* novae Seelandiae, *aliarumque* oceani pacifici *insularum aquis dulcibus, exilis, truttae similis.*

In 1801 Bloch and Schneider published J. R. Forster's account of the fishes taken on Captain Cook's voyages, and recorded the yellow-spotted species from Dusky Bay as *Esox alepidotus*, which was J. R. Forster's manuscript name. These descriptions were published many years before Cuvier defined his genus, and no description of the Tasmanian fish appears to have been published in the interim. The yellow or golden markings recorded on the New Zealand fish constitute the principal evidence of the species on which the genus was founded. Their resemblance to a galaxy suggests the reason for the name *Galaxias*, which cannot be conceived to have been inspired by a contemplation of the black-spotted fish in Tasmania. Cuvier and Valenciennes (1846), actually Valenciennes who wrote of Cuvier in the third person, asserted that the genus was based on the Tasmanian fish, and applied the name *truttaceus* to this species, but made no attempt to explain the name *Galaxias* or Cuvier's alleged ignorance of the New Zealand fish until the Tasmanian one was obtained.

The application of the name *truttaceus* to the Tasmanian fish appears to be a misidentification of a type species, and a new name or the reinstatement of a synonym to be necessary. *Galaxias ocellatus* McCoy (1867) was recognised by Castelnau (1872) but does not appear to have been used since, and must be classed as a *nomen oblitum*. *Galaxias scopus* Scott (1935) appears to be the next possible synonym. It was proposed for a fish regarded as distinct from the black-spotted species commonly called *truttaceus*, but was based on only two specimens. The principal distinction recorded was the point of origin of the anal fin, which was described as below or slightly behind the origin of the dorsal fin. Tasmanian specimens of the black-spotted species in the present collection have the first anal ray below the 3rd-7th dorsal ray. In an x-ray of the holotype of *scopus*, kindly furnished by the Queen Victoria Museum, the first anal ray appears to the writer to be below the second or third ray of the dorsal. A specimen from Flinders Island which is close to Clark Island, the type locality of *scopus*, has the first anal ray below the third dorsal ray. This specimen has 60 vertebrae and comes well within the range of the black-spotted species of Tasmania in other important characters. The x-ray of the type of *scopus* is not clear enough for a definite count of vertebrae, but the number appears to be about 60. It would thus appear that the species *scopus* comprehends the common black-spoted fish of Tasmania and Victoria, and that this is the valid name for the species. A description based on the group of ten specimens from the lower Tamar River and its tributaries is given below.

GALAXIAS SCOPUS Scott

Galaxias truttaecus Valenciennes in Cuv. and Val. Hist. Nat. Poiss. 1846.

Galaxias truttaceus Johnston. Pap. and Pro. Roy. Soc. Tasmania. 1886.

Galaxias truttaceus Regan. Pro. Zool. Soc. London. 1905.

Galaxias truttaceus Scott. Pap. and Pro. Roy. Soc. Tasmania. 1935.

Galaxias scopus Scott. Pap. and Pro. Roy. Soc. Tasmania. 1935.

B. 7-9. D. iii-v 8-10. A. iii-v 10-11. P. 14-15. V. 6-7 (usually 7) vertebrae 60-62.

The lower jaw usually very slightly the longer. Lateral teeth in lower jaw usually slightly enlarged, entopterygoidal teeth strong, 5-7 on each bone. Gill rakers short to moderate in length and usually rather stout. Pyloric caeca very variable and sometimes absent. When present usually short and as wide at the base as high.

Head 4.06-4.75 in standard length, maxillary extending 0.2-0.4 of eye diameter past perpendicular from anterior of eye.

Pores on dorsal surface of head about normal, the posterior interorbital pair at about 0.7 of the eye diameter from anterior of eye, the post orbital pores slightly forward of these. Two behind extremity of the maxillary, the lower usually slightly forward of the upper.

Dorsal fin originating at 0.70-0.74 of the standard length, ventral at 0.50-0.55 of same. Pectoral fins extending 0.40-0.55 of the distance from their origin to origin of ventrals, ventrals extending 0.48-0.61 of the distance from their origin to origin of anal, anal originating below 3rd-7th dorsal ray, branched rays of anal divided into two. Least depth of tail 0.44-0.57 of the distance from the rear of dorsal fin to hypural joint. Caudal fin moderately concave with well rounded lobes.

Colour (in formalin) Ground colour and lower surface varying from pale to dusky. Sides with round distinct black spots over trunk and tail, ventral, dorsal and anal fins may have distinct black tips or may be pale throughout.

Maximum total length observed 142 mm.

Localities: Lower Tamar River and its tributaries, Flinders Island and Victoria.

ACKNOWLEDGMENTS

Thanks are expressed to the British Museum for radiographs of *G. auratus, G. weedoni* and *G. affinis*, to the Queen Victoria Museum for a radiograph of the type of *G. scopus* and to the Tasmanian Museum for seven specimens of the fish hitherto regarded as *G. attenuatus*.

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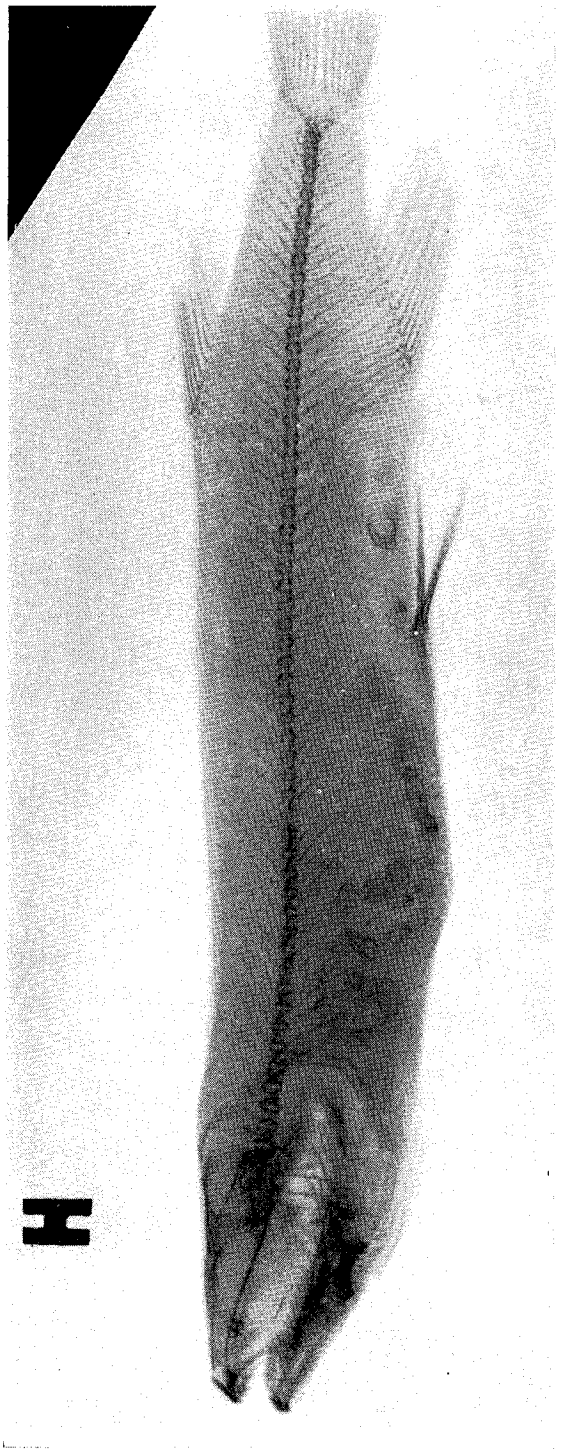

PLATE I.—Radiograph of *Galaxias auratus*. (Per British Museum.)

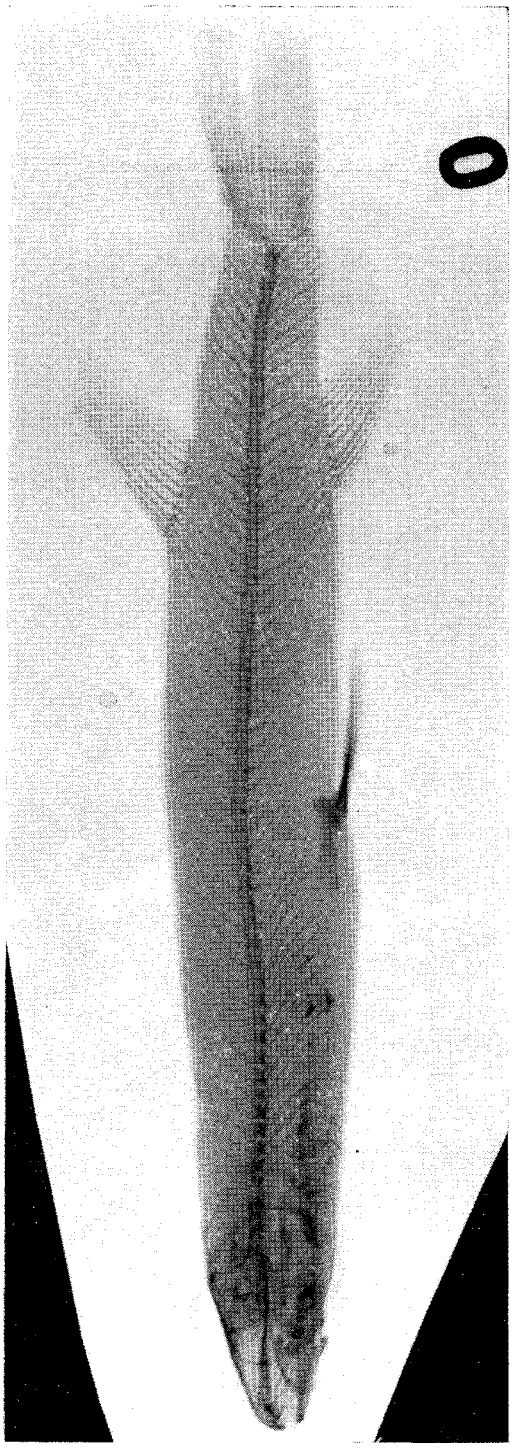

PLATE II.—Radiograph of *Galaxias weedoni*. (Per British Museum.)

PLATE III.—Radiograph of *Galaxias affinis*. (Per British Museum.)

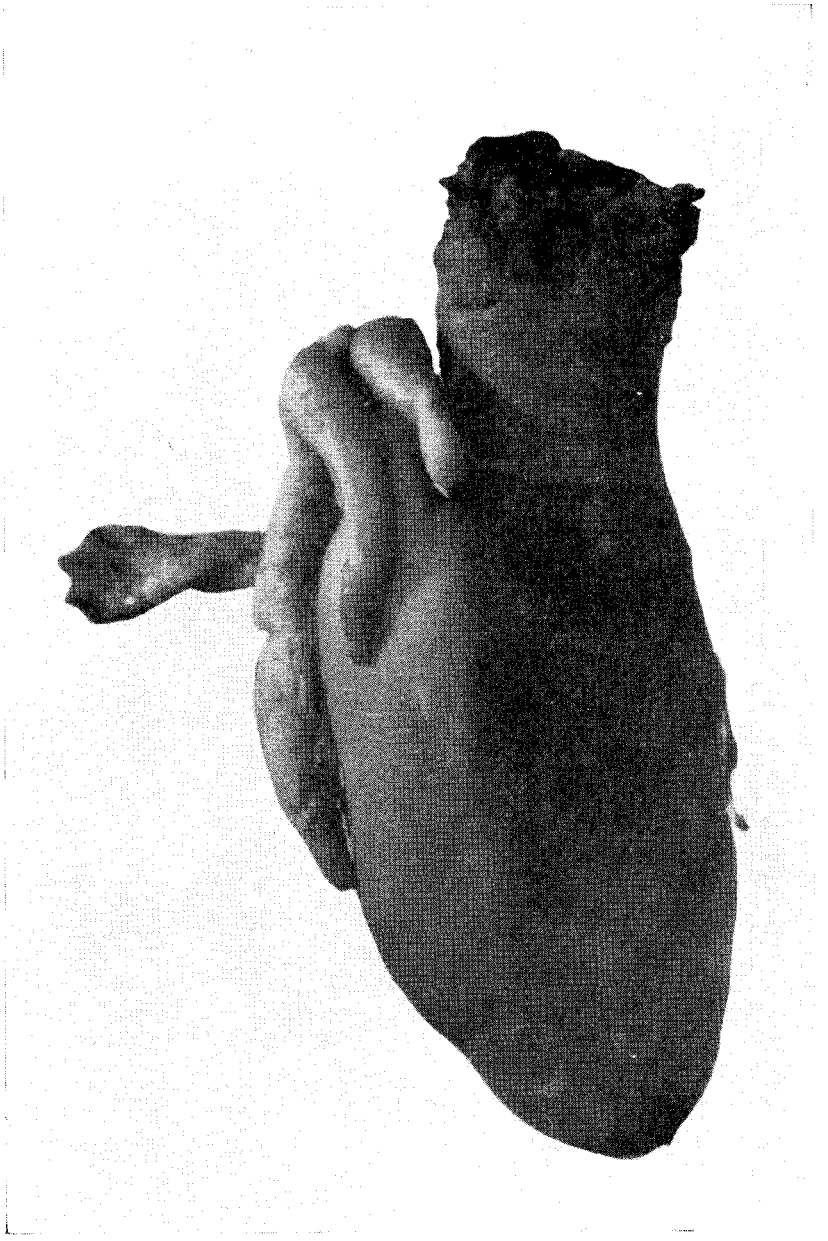

PLATE IV.—Stomach with three pyloric caeca.