Revision of the Clinid Fish Tribe Ophiclinini, Including Five New Species, and Definition of the Family Clinidae

ANITA GEORGE
and
VICTOR G. SPRINGER

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ABSTRACT

George, Anita, and Victor G. Springer. Revision of the Clinid Fish Tribe Ophiclinini, Including Five New Species, and Definition of the Family Clinidae. *Smithsonian Contributions to Zoology,* number 307, 31 pages, 14 figures, 6 tables, 1980.—The Clinidae contains only three tribes, Myxodini, Clinini, and Ophiclinini, the last of which includes the Ophiclinidae and Peronedysidae of various authors. The subfamily Labrisominae, which was previously included in the Clinidae, is raised to family rank.

The Ophiclinini comprises four genera: *Ophiclinops,* with three species (one new, *O. hutchinsi*); *Ophiclinus,* with six species (three new, *O. brevipinnis, O. ningulus,* and *O. pectoralis*); *Peronedys,* monotypic; and *Stichanium* (= *Breona*), with two species (one new, *S. clarkae*). The Ophiclinini are restricted to the southern, cooler waters of Australia. Keys to the genera and species, and illustrations of all species are provided. The following species are synonymized for the first time: *Ophioclinus devisi* Ogilby = *Peronedys anguillaris* Steindachner; *Breona greeni* E.O.G. Scott = *Stichanium dorsale* Günther; *Ophiclinus aethiops* McCulloch and Waite = *Ophiclinus antarcticus* Castelnau; *Ophiclinus greeni* E.O.G. Scott = *Ophiclinus gracilis* Waite.

Stenophus Castelnau and its two included species, *S. marmoratus* and *S. obscurus,* both Castelnau, formerly included in the Ophiclinidae, are synonymized under *Congrogadus* Günther and *C. subducens* (Richardson), family Congrogadidae.

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Contents

Revision of the Clinid Fish Tribe Ophiclinini, Including Five New Species, and Definition of the Family Clinidae

Anita George
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Introduction

This study is a much expanded version of the senior author's master's thesis, which was submitted to the University of Maryland; its purpose is to revise the blennioid fishes in the currently recognized families Ophiclinidae and Peronedysidae. It is our opinion that these two families should be combined into a single tribe, Ophiclinini, and included in the Family Clinidae, for which we will offer a new definition and composition.

The Ophiclinini consists of small (43–157 mm SL maximum adult size), ovoviviparous species that are restricted to the cooler, more southern coasts of Australia. They are often taken in rocky tide pools and bays. At least three species, *Ophiclinops pardalis, Peronedys anguillaris,* and *Sticharium dorsale,* burrow in mud (D.F. Hoese, in litt.). The ophiclinins feed on small annelids and crustaceans. One ophiclinin is reported as a common food fish for small sharks (Olsen, 1958).

METHODS AND MATERIALS.—Measurements were made with dividers and metric ruler using the methods of Hubbs and Lagler (1949), with the exception of the following: orbital diameter is the greatest horizontal diameter of the fleshy orbit; opercle length is the distance from the posteriormost point on the margin of the preopercle to the posteriormost point on the margin of the opercle; body length is the distance from the posteriormost point on the margin of the opercle to the midpoint of the caudal-fin base; distance between ventral insertions of pectoral fins (measured on ventral surface of fish) is the shortest horizontal distance between the ventroanteriormost insertions of the fins. Measurements and counts were made on the left side of specimens whenever possible.

The following abbreviations for measurements are used:

HL	head length
N	number of specimens
POL	postorbital length
SL	standard length
TL	total length

Counts of dorsal-, anal-, and caudal-fin elements, predorsal bones, and vertebrae were taken from raidographs. The anterior dorsal-fin spines are often greatly reduced and are not discernible except on radiographs or in skeletal preparations. We consider predorsal bones in ophiclinin fishes to be pterygiophores lacking a dorsal-fin element. Evidence favoring our belief can be found in the fact that an increase in the average number of predorsal bones in populations of *Sticharium dorsale* is accompanied by a decrease in the average number of dorsal-fin spines (Table 6). We do not believe that any of the ophiclinin predorsal bones are homologous with the anterior three predorsal bones characteristic of primitive perciform fishes.

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The anteriormost vertebra bearing a well-developed haemal spine is the anteriormost caudal vertebra. There is often difficulty in determining from a radiograph which vertebra bears the first haemal spine; an allowance of plus or minus one vertebra should be made on our precaudal or caudal, but not total, vertebral counts.

Counts of caudal-fin elements are reported as a formula: dorsal procurrent rays + segmented rays + ventral procurrent rays.

The distribution of cephalic sensory pores (Figure 1) is relatively consistent among the ophiclinins. The presence of a single pore or a pair of pores at the ventroanteriormost preopercular pore

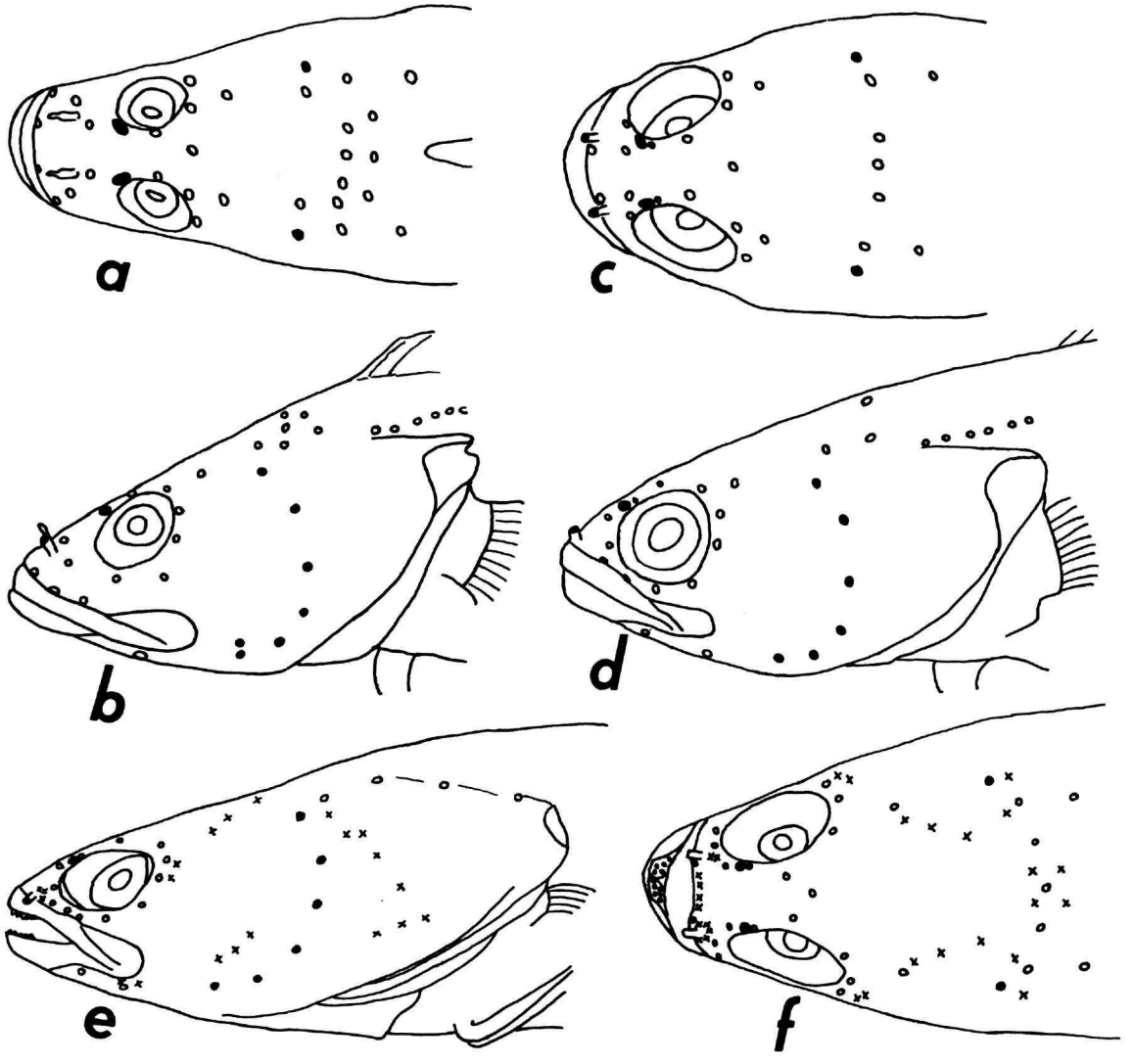

FIGURE 1.—Cephalic sensory pores: *a,b, Ophiclinus gracilis,* USNM 211267, male, dorsal and lateral views; *c,d, Ophiclinus antarcticus,* USNM 218781, male, dorsal and lateral views; *e,f, Ophiclinops pardalis,* SAMA F.656, female, lateral and dorsal views (pores enlarged; nasal openings and preopercular pores blackened; not all mandibular pores shown; x denotes position of pore-like pit).

position is, with few exceptions, constant within each species. For purposes of comparing numbers of preopercular pores in ophiclinins and other clinids, a pair of pores at the ventroanteriormost pore position is counted as a single pore (it is the number of pore positions that is important in these comparisons).

The ophiclinins often exhibit nonpatent, pore-like depressions (pits) on the head. These pits, especially when wet, can be confused with pores. The pits, when present, are consistent in position, and probably represent vestigial pores. They are particularly well developed on *Ophiclinops pardalis* (Figure 1*e,f*).

The lateral line degenerates from a dorsoanterior series of conspicuous pores to a posterior midlateral series of inconspicuous pits. Pores are defined here as openings leading into bones of the lateral-line system. Pits are shallow, nonpatent depressions. A diagonal series of pits usually connects the dorsoanterior series of pores to the posterior midlateral series of pits.

Color patterns are described from preserved specimens. Each description, unless indicated otherwise, is a composite derived from observations of several specimens. Bands refer to vertical markings, stripes to horizontal markings.

Statistical tests are taken from Sokal and Rohlf (1973). Statistical results are reported as follows: F_s refers to the calculated value for the test for significance using the F distribution; p indicates the level of significance for two-tailed tests; numbers in brackets refer to degrees of freedom for locality (or sex). Differences among means for counts are considered significant when $p \leq .01$.

Under "Material Examined" in the species accounts, data are given as follows: locality, institutional abbreviation, catalog number, and, in parentheses, the number of specimens (if more than one) and size range in mm SL.

The following abbreviations for institutions and collections are used:

AMS	Australian Museum, Sydney (catalog numbers begin with I or IA)
BMNH	British Museum (Natural History), London
CAS	California Academy of Sciences, San Francisco (catalog numbers may begin with SU)
NMNH	National Museum of Natural History, Smithsonian Institution, Washington
MNHN	Museum National d'Histoire Naturelle, Paris (catalog numbers begin with A)
QVML	Queen Victoria Museum, Launceston, Tasmania
SAMA	South Australian Museum, Adelaide (catalog numbers begin with F)
USNM	United States National Museum, the collections of which are now housed in the National Museum of Natural History, Smithsonian Institution, Washington (fish specimens in the Division of Fishes)
WAMP	Western Australian Museum, Perth (catalog numbers begin with P)
ZIL	Zoological Institute, Leningrad

The synonymies include only primary synonyms.

For comparative purposes, we examined a large number of non-ophiclinin clinid (strict sense) species, including cleared and stained specimens. In arriving at the family limits of the Clinidae, Springer has examined osteological and whole specimens of hundreds of species of blennioids and a large number of non-blennioid perciforms. It serves no purpose to list this material here; much of it has already appeared in the literature in various studies by Springer.

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Classification of the Family Clinidae

In June 1975 Springer gave a paper at the annual meeting of the American Society of Ichthyologists and Herpetologists on the composition and intrasubordinal classification of the suborder Blennioidei. That paper has not been published as the study is continuing. There have been no substantive changes (nor are any anticipated), however, in the main conclusions Springer reached. These conclusions included: (1) synonymization of the Ophiclinidae and Peronedysidae with the Clinidae (also proposed by Springer, 1970), and (2) restriction of the Clinidae to include only those fishes formerly placed in the Ophiclinidae and Peronedy-

sidae and those placed in the subfamily Clininae as conceived by Clark Hubbs (1952), Penrith (1969), and Springer (1970). The other fishes included in the Clinidae by these three authors were placed in the subfamily Labrisominae, which Springer (1975 oral paper) tentatively elevated to family rank, Labrisomidae. The Labrisomidae, which we also recognize, is much less specialized than the Clinidae, presently not definable monophyletically on the basis of shared specializations, and probably not particularly closely related to the Clinidae.

The families Ophioclinidae (based on an inadmissible emendation of the genus *Ophiclinus*) and Peronedyidae (based on an incorect stem for *Peronedys*) were first proposed by Jordan (1923, on the same page), who gave no basis for his actions. Whitley (1941) erroneously proposed the name Stichariidae to replace Ophiclinidae because *Sticharium* is an older generic name than *Ophiclinus*. Priority of family-group names is based on the oldest available family-group name, not on the oldest genus in the family. Peronedysidae has line priority over Ophiclinidae, but we, as first revisers, select Ophiclinidae as the senior synonym for the tribe (Ophiclinini) that includes *Peronedys*. Ophiclinidae has appeared more often in the literature than has Peronedysidae.

The Ophiclinidae has not been differentiated previously from the Clinidae as a whole, only from the Australian clinids. While the tribe Ophiclinini (including the Peronedysidae) as we will recognize it can be differentiated from all other clinids, we believe that the differences are of considerably less magnitude than those that separate some clinid genera. The Peronedysidae has most often been differentiated from other blennioid fishes by its supposed lack of pectoral fins. These fins are greatly reduced in *Peronedys*, more so than in any other clinid genus, but vestiges persist in all specimens (see Figure 13*c*). Considerable reduction in size (shorter than orbital diameter) of the pectoral fins also occurs in the three species of the ophiclinin genus *Ophiclinops*, but does not occur in any other clinid.

In order not to delay the present revision until completion of Springer's study, we herein propose formal definitions of the family Clinidae and tribe Ophiclinini.

Family CLINIDAE

DIAGNOSIS.—Blennioid fishes with the following unique specializations (within the Blennioidei): scales cycloid, with radii in all fields (1 of the approximately 75 included species, *Clinoporus biporosus*, lacks scales); a cordlike ligament extending from the dorsoposterior portion of each ceratohyal to the internal, anterior end of its respective dentary (1 species, *Cancelloxus burrelli*, lacks—has lost—the ligament). Among perciform fishes, a similar ligament is known to occur only in the Pseudochromidae, Congrogadidae, and some Serranidae (Springer, Smith, and Fraser, 1977).

In addition, the following, mostly unspecialized, characters serve to distinguish the Clinidae variously from the other families of fishes (Tripterygiidae, Dactyloscopidae, Labrisomidae, Chaenopsidae, Blenniidae) composing the Blennioidei: all fin rays simple; when both spines and segmented rays are present in dorsal fin, pterygiophore articulating with first ray also articulates with last spine; coracoid autogenous, not ankylosed to cleithrum; ectopterygoid and mesopterygoid autogenous, not fused into single bone; pterosphenoid present; ventral hypural plate (fused parhypural and hypurals 1 and 2) fused to urostyle; osseous, tubed portion of lateral line imbedded in skin, not occurring on scales with free posterior margins; infraorbital bones (including presumed dermosphenotic) 5.

Tribe OPHICLININI

DIAGNOSIS.—Clinid fishes with the following specializations that are unique (exception noted below) within the Clinidae: dorsal and anal fins joined to caudal fin by membrane; membranes between anal-fin elements usually not incised (9 of the 12 species). In addition, the following combination of specialized and unspecialized characters is unique to the Ophiclinini: reproduction by ovoviviparity; males with intromittent organ; dorsal fin continuous and joined by membrane to caudal fin; anteriormost 3 dorsal-fin spines not separated from remaining spines; predorsal bones usually present (absent in 3 of 6 species of *Ophiclinus*, possibly secondarily, as predorsal bones vary from 0–1 in the other 3 species, see Table 2); segmented pelvic-fin rays 2; lateral line reduced, con-

sisting of conspicuous dorsoanterior series of pores followed by posterior, mostly midlateral, series of inconspicuous pits; no orbital cirri; anterior nostril cirri usually absent (10 of 12 species); 7 unpaired infraorbital pores; 6 preopercular pores (see "Methods and Materials").

Most species of the Clinidae are characterized by having a hooklike process on the external dorsoanterior margin of the cleithrum. A hooklike process is present in only 6 of the 12 species of Ophiclinini, and in these species it may vary from absent to well developed.

In *Sticharium dorsale* the last dorsal- and anal-fin ray elements and the membranes attaching them to the caudal fin have become reduced secondarily. In many specimens there appears to be a complete separation of the dorsal and anal fins from the caudal fin; however, on close examination one can usually see a low, posterior continuation of the membrane from each of the terminal elements, attaching it to the caudal fin. The axis of each of these elements is almost parallel to the horizontal axis of the body, and each element is closely bound to, and almost touching the body contour for the element's entire length. The nature of the attachment of the anal fin (and usually that of the dorsal fin) differs from that of all but one of the non-ophiclinin clinids, in which there is a complete separation of the anal and caudal fins (discussion of exception follows) and the presence of a well-developed membrane that attaches the posterior margin of the last anal-fin element to the body contour (if the membrane is absent, the last anal-fin ray is free from the body).

The ophiclinin condition of attachment of the anal and caudal fins is duplicated among the Clinidae only by the South African clinin *Clinus anguillaris* (see Penrith, 1969, fig. 5). *Clinus anguillaris* is much less specialized than any ophiclinin in having: orbital cirri, more preopercular and infraorbital pores, 3 segmented pelvic-fin rays, scales on the cheek and vertical fin bases, vertically paired pores in the anterior portion of the lateral line, and horizontal, bipored tubes in the posterior lateral line. Additionally, *C. anguillaris* exhibits all the generalized characters we report for the most generalized ophiclinins. It is possible that *C. anguillaris* is the primitive sister taxon of the Ophiclinini, but more study is required before such a conclusion is justified.

Separation of the first 3 dorsal-fin spines from the other spines by a wide space is a common specialized condition in non-ophiclinin clinids. This condition does not occur in the Ophiclinini, but since the anterior dorsal-fin spines appear to have been lost (as evidenced by the presence of predorsal bones) in some, if not all, ophiclinins, it is not possible to decide if the specialized condition existed in the tribe. Based on serial reduction in size, progressing anteriorly, it appears that some predorsal bones, as well as their associated spines, may have been lost in *Sticharium*. The only non-ophiclinin clinid that has predorsal bones is the South African species *Cancelloxus burrelli*, which otherwise shows little resemblance to the ophiclinins.

The specialized condition of having only pits in the posterior portion of the lateral line occurs in only 2 other (Australian) clinids, *Heteroclinus puellarum* and *H. adelaidae*, in which the condition appears to have arisen convergently. We have also seen the pitted condition in 1 specimen, of several examined, of the Mediterranean species *Clinitrachus variabilis*. All the other specimens of *C. variabilis* have a series of bipored tubes in the posterior portion of the lateral line.

All ophiclinins lack orbital cirri. Orbital cirri are present in all other clinids except for 4 South African genera (*Pavoclinus, Blennioclinus, Clinoporus, Cancelloxus*) comprising 12 species, and 1 Australian species of *Heteroclinus*. Rudimentary orbital cirri are present in *Heteroclinus puellarum* and *H. mamoratus* (D. Hoese, pers. comm.)

There are cirri on the tube of the anterior nostril of all clinids, except for 10 of the 12 species of Ophiclinini, which lack the cirri.

In non-ophiclinin clinids the infraorbital and preopercular canal pores are often paired or in multiples at each position. In ophiclinins the infraorbital pores are always simple. The preopercular canal pores are also simple except that the ventroanteriormost pore of this series may be paired.

REMARKS.—Prior to our inclusion of the Ophiclinini, 2 tribes were recognized in the Clinidae (strict sense): Myxodini and Clinini. The Myxodini, restricted to the temperate waters of the Western Hemisphere and the Mediterranean Sea, are characterized by the primitive conditions of oviparity and the absence of an intromittent organ in males. Thus, no specializations have been used to characterize the Myxodini as a monophyletic group,

and we know of none. The Clinini, widespread in the temperate Indo–West Pacific, with 2 or 3 species in the tropics of that area, are characterized by the specialized conditions of ovoviviparity and the presence of an intromittent organ in males. Using only these criteria, the Ophiclinini would be included in the Clinini; now, however, as a result of our segregating the Ophiclinini as a monophyletic group (tribe) based on shared specializations, the Clinini, like the Myxodini, are lacking characterization as a monophyletic group. Although we recognize the problems of the Myxodini and the Clinini, we are presently unable to rectify them. In any event, the closest relatives of the Ophiclinini are among the Clinini, and we recommend that the tribes Myxodini and Clinini be retained as presently conceived until a complete phylogenetic analysis of the Clinidae has been performed. Further comparison of the Ophiclinini and Clinini is contained in Table 1.

We attempted a phylogenetic analysis of the 4 ophiclinin genera, but were unable to arrive at a scheme of relationships that was parsimoniously superior among several possibilities. In our analysis, *Ophiclinus* always ends as a primitive residue group without a specialization uniting its 6 species, and it is possible to relate the other genera variously to each other and to *Ophiclinus* based on a mosaic of

TABLE 1.—Comparison of the tribes Ophiclinini and Clinini

Character	Australian Clinini	Ophiclinini	South African Clinini
Origin of first dorsal-fin spine	At or anterior to vertical over middle of opercle	At vertical over posterior half of opercle to anus	At vertical over preopercle to midbelly
Length of first dorsal-fin spine (%SL)	8.3-17.0	0.9-4.0	2.1-10.0
Number of dorsal-fin spines	27-40	36-84	24-50
First 3 dorsal-fin spines separate from remainder of fin	Yes	No	Yes or No
Segmented dorsal-fin rays	2-8	1-4[b]	1-14
Segmented anal-fin rays	17-27	25-62	14-37
Anal fin attached to caudal fin	No	Yes	Rarely[c]
Interradial membranes of anal fin incised	Yes	Yes or No[d]	Yes
Precaudal + caudal vertebrae	13-16 + 28-32	18-35 + 30-63	13-19 + 21-40
Orbital cirri	Yes or No[e]	No	Yes or No
Nasal cirri	Yes	Yes or No[f]	Yes
Infraorbital pores	More than 7	7	7 or more
Preopercular pores[a]	6 or more[g]	6	7 or more
Posterior lateral line	Tubes, rarely pits	Pits	Tubes, rarely pores

[a]Ventroanteriormost preopercular pore, if paired, counted as single pore. [b]Peronedys has 2-4; others have only 1. [c]Only in Clinus anguillaris. [d]Present in only 3 of the 12 species. [e]Absent in one species, vestigial in two. [f]Present in only 2 of the 12 species. [g]Six in only one species.

TABLE 2.—Comparison of certain characters in ophiclinin fishes (Allp = pores in anterior lateral line; Dfs = dorsal-fin spines; Pb = predorsal bones; Pfr = pectoral-fin rays; Safr = segmented anal-fin rays; Scfr = segmented caudal-fin rays, modal count in parentheses; Vpp = ventroanteriormost preopercular pore)

Species	Dfs	Safr	Pfr	Vertebrae	Pb	Vpp	Allp	Scfr
Ophiclinops hutchinsi	56-59	43-45	6-7	22-23 + 46-47 = 68-70	2-3	single	2	14-15(14)
Ophiclinops pardalis	52-55	38-41	4-6	20-22 + 41-44 = 62-65	1-3	single	2-3	12-13(13)
Ophiclinops varius	40-45	27-29	6-10	19-22 + 31-33 = 51-55	1-3	single	2-3	12-14(13)
Ophiclinus antarcticus	52-61	34-42	9-11	21-23 + 38-47 = 59-68	0-1	single	9-15	13
Ophiclinus brevipinnis	63-67	42-46	8	25-27 + 45-49 = 72-74	0	single	10-19	13
Ophiclinus gabrieli	52-55	33-36	11-12	22-23 + 37-40 = 60-62	1	paired	12-16	13-15(13)
Ophiclinus gracilis	44-49	27-31	11-13	18-20 + 32-35 = 51-55	0	paired	15-20	13-14(13)
Ophiclinus ningulus	44-45	28-29	11-12	19-20 + 32-33 = 51-53	1	single	12-15	13
Ophiclinus pectoralis	42-44	25-28	11-12	18-19 + 30-33 = 48-52	0	paired	14-18	13
Peronedys anguillaris	76-84	55-62	3-4	31-35 + 57-63 = 89-96	2-4	single	9-15	13
Sticharium clarkae	38-41	35-37	8-11	20-22 + 38-39 = 58-60	12-13	single	36-42	13
Sticharium dorsale	36-43	33-39	8-11	18-22 + 37-42 = 56-62	8-17	single	32-42	13

shared specializations. Our only meaningful conclusions are that *Ophiclinus* appears to be the least specialized genus and that *O. gracilis or O. pectoralis* appears to be the least specialized species.

A comparison of some meristic characters in the species of Ophiclinini is given in Table 2.

Genera and Species Erroneously Assigned to the Ophiclinini

Castelnau (1875) described *Stenophus* and its two included species, *S. marmoratus* and *S. obscurus,* but did not assign them to a family. There are no literature records of anyone's having examined the holotypes of these two species subsequent to Castelnau. Jordan (1923) first assigned *Stenophus* to a family, Ophiclinidae, but gave no basis for his action. Later authors have retained *Stenophus* in the Ophiclinidae. Bauchot (1967) reported that the holotypes of both of Castelnau's species were received at MNHN but that she was unable to locate them. Bauchot recently located both holotypes, which she sent us for examination. The two specimens represent the young and adult of *Congrogadus subducens* (Richardson, 1843), family Congrogadidae. *Stenophus* is junior to *Congrogadus* Günther (1862), hence, none of Castelnau's three taxa are senior synonyms. The failure of previous workers to recognize the relationships of *Stenophus* is the result of Castelnau's having described the dorsal fin as being composed only of spines, whereas it is composed only of segmented rays, whose branches are not easily discerned. Castelnau also described the genus as having several lateral lines, but it has only one, which is limited to the anterior portion of the body. Otherwise Castelnau's description clearly applies to *Congrogadus.*

Jordan (1923) assigned *Neoblennius* Castelnau (1875) to the Ophiclinidae, but Hoese (1976) correctly includes *Neoblennius* among the non-ophiclinin clinids of Australia.

Hutton (1872) described *Sticharium rubrum* and *S. flavescens* from New Zealand, where ophiclinins do not occur. Hutton (1873) illustrated his two species and transferred them to *Clinus.* Both species are clearly clinin clinids. Gill (1893) proposed the genus *Ericentrus* for *S. rubrum,* and *Cologrammus* for *S. flavescens.*

Griffin (1927) described *Ophioclinus venusta* from New Zealand. Whitley (1968) synonymized Griffin's species with *Ericentrus ruber* [sic] based on information Whitley received from J. Moreland, National Museum of New Zealand. Griffin's illustration of *O. venusta* is clearly not of an ophiclinin.

Key to the Genera of the Tribe Ophiclinini

1. Dorsal fin LXXVI–LXXXIV,2–4; segmented anal-fin rays 55–62; pectoral and pelvic fins shorter than orbital diameter ..... ***Peronedys***
   Dorsal fin XXXVI–LXVII,1; segmented anal-fin rays 27–46; at least pelvic fin longer than orbital diameter 2
2. Dorsal-fin origin above vertical approximately at anus; dorsal-fin spines 36–43; 32–42 pores in lateral line; eyes dorsolateral; posteriormost point of opercle below level of horizonal septum of body (Figure 14) ..... ***Sticharium***
   Dorsal-fin origin well anterior to vertical at anus; dorsal-fin spines 40–67; 2-20 pores in lateral line; eyes lateral; posteriormost point of opercle at or above level of horizontal septum of body (Figure 3) 3
3. Pectoral fin longer than orbital diameter; pectoral-fin rays 8–13; dorsal fin originating anterior to vertical from posteriormost reach of appressed pectoral fin, origin varying from above vertical at posterior half of opercle to just posterior to opercle ..... ***Ophiclinus***
   Pectoral fin shorter than orbital diameter; pectoral-fin rays 4–10; dorsal fin originating much posterior to vertical from posteriormost reach of appressed pectoral fin or opercle ..... ***Ophiclinops***

Key to the Species of *Ophiclinops*

1. Dorsal-fin spines 40–45; segmented anal-fin rays 27–29; pectoral-fin rays 6–10; total vertebrae 51–55; SL to 43 mm ..... ***O. varius***
   Dorsal-fin spines 52–59; segmented anal-fin rays 38–45; pectoral-fin rays 4–7; total vertebrae 62–70; SL to 112 mm 2
2. Dorsal-fin spines 52–55; segmented anal-fin rays 38–41; pectoral-fin rays 4–6; segmented caudal-fin rays 12–13; usually 13; total vertebrae 62–65 ..... ***O. pardalis***
   Dorsal-fin spines 56–59; segmented anal-fin rays 43–45; pectoral-fin rays 6–7; segmented caudal-fin rays 14–15; total vertebrae 68–70 ..... ***O. hutchinsi,*** new species

Key to the Species of *Ophiclinus*

1. Dorsal-fin spines 42–48; interradial membranes of anal fin incised 2
   Dorsal-fin spines 52–67; interradial membranes of anal fin not incised 4
2. Cirrus present on tube of anterior nostril; some pore positions of supratemporal sensory canal usually with pairs of pores (rarely all positions simple); ventroanteriormost preopercular sensory canal pore position with pair of pores; lateral-line pores 14–20; dorsal-fin origin at vertical over posterior 1/3–1/4 of opercle length; predorsal bones absent 3
   Cirrus absent on tube of anterior nostril; all pore positions of supratemporal sensory canal with simple pores; ventroanteriormost preopercular sensory canal pore position with single pore; lateral-line pores 12–15; dorsal-fin origin at vertical over posterior 1/8 of opercle length or just posterior to opercle; predorsal bones 1 ..... ***O. ningulus,*** new species
3. Darkly colored proximal portion of pectoral fin not sharply demarcated from distal pale portion (Figures 8, 9); snout length equal to or greater than orbital diameter; dorsal-fin spines 44–49; segmented anal-fin rays 27–31; total vertebrae 51–55 ..... ***O. gracilis***
   Darkly colored proximal portion of pectoral fin sharply demarcated from distal pale portion (Figures 11, 12); snout length less than orbital diameter; dorsal-fin spines 42–44; segmented anal-fin rays 25–28; total vertebrae 48–52 ..... ***O. pectoralis,*** new species
4. Pectoral-fin length 4.4–4.7 percent SL; dorsal-fin spines 63–67; segmented anal-fin rays 42–46; vertebrae 25–27 + 45–49 = 72–74 ..... ***O. brevipinnis,*** new species
   Pectoral-fin length 7.5–8.7 percent SL; dorsal-fin spines 52–61; segmented anal-fin rays 33–42; vertebrae 21–23 + 34–47 = 59–68 5
5. Ventroanteriormost pore position of preopercular sensory canal with a single pore (Figure 1*d*); vomerine teeth in a roughly triangular patch (specimens 47 mm SL and longer); segmented anal-fin rays 35–42; caudal vertebrae 38–47; SL to 125 mm ..... ***O. antarcticus***
   Ventroanteriormost pore position of preopercular sensory canal with pair of pores (as in

Figure 1*b*); vomerine teeth usually uniserial, occasionally biserial, arranged in a V or U-shaped pattern; segmented anal-fin rays 33–36; caudal vertebrae 37–40; SL to 165 mm ..... ***O. gabrieli***

Key to the Species of *Sticharium*

Ventral insertions of pectoral fins above level of anal-fin base; last anal-fin ray extending to (specimens 55 mm SL and longer), or almost to (specimens less than 50 mm SL), caudal-fin base; distance between ventral insertions of pectoral fins 3.9–6.7 percent SL; upper-jaw length 5.1–5.9 percent SL; pectoral-fin length 4.7–6.5 percent SL ..... ***S. clarkae,*** new species

Ventral insertions of pectoral fins at, or below, level of anal-fin base; last anal-fin ray noticeably failing to reach caudal-fin base; distance between ventral insertions of pectoral fins 1.9–3.1 percent SL; upper-jaw length 4.0–5.1 percent SL; pectoral-fin length 6.3–7.9 percent SL ..... ***S. dorsale***

Ophiclinops Whitley

Ophiclinops Whitley, 1932:348 [type-species: *Ophiclinus pardalis* McCulloch and Waite, by subsequent designation].

DIAGNOSIS.—Dorsal fin XL–LIX,1; dorsal-fin origin at vertical just posterior to opercle, or posterior to opercle by approximately 1/4–1 orbital diameter; pectoral-fin shorter than orbital diameter; pelvic-fin longer than orbital diameter; 2 or 3 pores in dorsoanterior portion of lateral line; eyes lateral; posteriormost reach of opercle at or above level of horizontal septum of body; scales small, evenly distributed over body, or more numerous posteriorly; POL in HL 1.4–1.6; predorsal bones 1–3.

Ophiclinops hutchinsi, new species

FIGURE 2

DESCRIPTION.—Dorsal fin LVI–LIX,1; anal fin II,43–45; anal-fin origin at vertical from base of 13th or 14th dorsal-fin spine; pectoral-fin rays 6–7; caudal fin 2–3 + 14–15 + 2–3; vertebrae 22–23 + 46–47 = 68–70; vomerine teeth uniserial; cephalic sensory pores simple; depressed tube of anterior nostril extending ventrally beyond dorsal margin of upper lip; hooklike process on cleithrum present or absent.

Lateral Line: Dorsoanterior series of 2 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating approximately at point above posterior 1/2–1/3 of opercle length; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern: Head: sides brown mottled; ventral surface pale or brown mottled; orbital rim may be banded with brown; 2 or 3 short, dark postorbital stripes; wide, brown stripe on upper 1/4 of head; in 2 specimens (male and female), a conspicuous dark blotch is present on the upper 1/2 of the opercle (we did not observe this blotch in our specimens of the closely related *O. pardalis,* but the blotch occurs on the South Australian specimen of *O. pardalis* figured in McCulloch and Waite, 1918); dorsal surface pale with small, dark spots or speckling. Body: brown mottled with small, dark spots, which may form linear series on dorsal 1/4 of body, along horizontal septum, and above anal-fin base; immaculate pale area extending from dorsoposterior portion of head along dorsal body contour for most of length of dorsal fin; ventral to pale area, a diffuse, broad, brown area paralleled ventrally by diffuse paler stripes along horizontal septum and above anal-fin base. Dorsal and anal fins: pale with dark spots and speckling. Pectoral fin: pale with dark speckling. Pelvic fin pale or brown mottled. Caudal fin: pale with scattered fine dusky spots.

REMARKS.—The typical number of segmented caudal-fin rays in ophiclinins is 13 (7 on the upper half of the fin and 6 on the lower half), although the larger individuals of some species may have 14 or 15 segmented rays. Only *O. hutchinsi* appears to have 14 segmented caudal-fin rays as the normal number. In those specimens of *O. hutchinsi* with 14 segmented rays, the additional ray is present in the dorsal half of the fin. In the single specimen of *O. hutchinsi* with 15 segmented rays, an additional ray occurs in both the dorsal and ventral halves of the fin. In the smallest specimen of *O. hutchinsi,* the dorsalmost segmented ray bears only one segmental marking and might be mistaken for a pro-

current ray. The segmental markings of fin rays in fishes increase in number with increase in size of the fish.

RELATIONSHIPS.—*Ophiclinops hutchinsi* is distinguished from the other 2 species of *Ophiclinops* in having more dorsal-fin spines, segmented anal- and caudal-fin rays, and more vertebrae. It appears to be the sister species of *O. pardalis,* with which it shares generally high counts for meristic characters, a large maximum size, and similarity of color pattern. *Ophiclinops hutchinsi* is known only from Western Australia while *O. pardalis* is known only from eastern Australia. There is a large expanse of coastline between these 2 areas of Australia where no *Ophiclinops* (or other ophiclinin) specimens have been collected. It is possible, therefore, that populations of *Ophiclinops* exist that are intermediate in fin-ray and vertebral counts between *O. hutchinsi* and *O. pardalis.* If such populations do exist the 2 species should be synonymized. Our decision to describe *O. hutchinsi* was influenced greatly by the increased number of segmented caudal-fin rays in *O. hutchinsi.* Although 14 or 15 segmented caudal-fin rays are present occasionally in some large specimens of other ophiclinin species, *O. hutchinsi* is the only ophiclinin that normally has more than 13 segmented caudal-fin rays.

ETYMOLOGY.—Named for J. Barry Hutchins, who collected all the type specimens and allowed us to describe the species.

HOLOTYPE.—WAMP P.26004-008, female, 89.0 mm SL, unnamed island in eastern Lucky Bay, southern Western Australia, 34°01'S, 122°14'E, among reef and weed, 13 m, collected by J. B. Hutchins, 17 Mar 1978.

PARATYPES.—WAMP P.26454-001, two females, 49.5, 52.0 mm SL, and USNM 219564, male, 53.2 mm SL, collected with the holotype. WAMP P. 26003-016, female, 31.3 mm SL, Lucky Bay, southern Western Australia, 34°00'S, 122°14'E, over seagrass beds, 2-15 m, collected by J. B. Hutchins and R. Steene, 16 Mar 1978, boxtrawl.

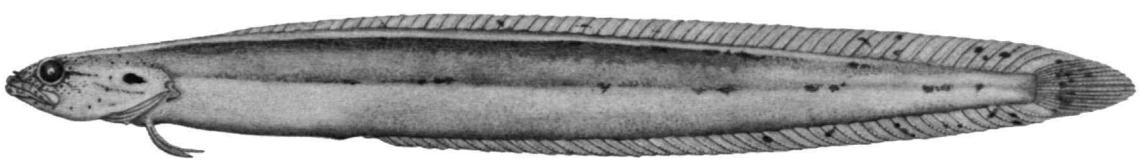

FIGURE 2.—*Ophiclinops hutchinsi,* new species WAMP P.26004-008, holotype, female, 89.0 mm SL, Lucky Bay, Western Australia. (Drawn by J. R. Schroeder.)

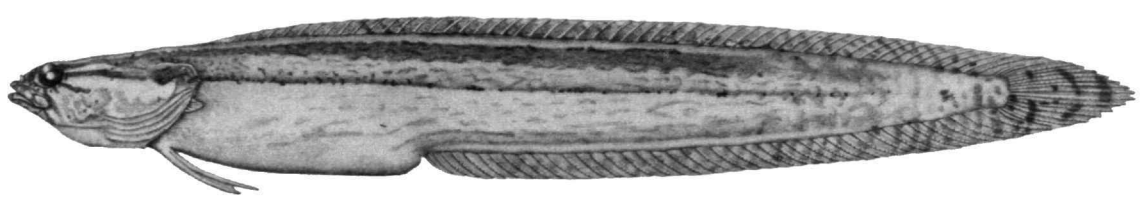

FIGURE 3.—*Ophiclinops pardalis,* SAMA F.4357, female, 57.0 mm SL, Kangaroo Island, South Australia. (Drawn by J. R. Schroeder.)

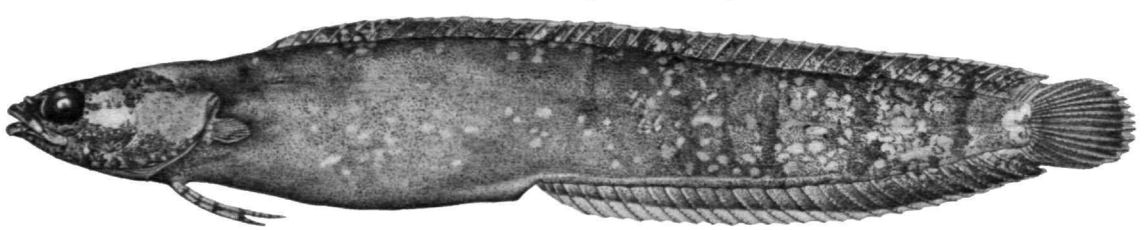

FIGURE 4.—*Ophiclinops varius,* USNM 218787, female, 43.0 mm SL, Moana, South Australia. (Drawn by J. R. Schroeder.)

Ophiclinops pardalis (McCulloch and Waite)

FIGURES 1*e,f*, 3

Ophiclinus pardalis McCulloch and Waite, 1918:58, pl. 4: fig. 2 [holotype: SAMA F600, South Australia, Streaky Bay].

DESCRIPTION.—Dorsal fin LII–LV,1; anal fin II, 38–41; anal-fin origin at vertical from base of 12th–15th dorsal-fin spine; pectoral-fin rays 4–6; caudal-fin 3 + 12–13 (usually 13) + 2–3; vertebrae 20–22 + 41–44 = 62–65; vomerine teeth uniserial (in specimens 36.3–71.3 mm SL) or biserial (in a specimen 112 mm SL); cephalic sensory pores simple; depressed tube of anterior nostril extending ventrally beyond dorsal margin of upper lip; hooklike process on cleithrum present or absent.

Lateral Line: Dorsonanterior series of 2 or 3 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating at point above posterior ½–⅓ opercle length; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern (based on 5 specimens 52.5–71.3 mm SL): Head: sides brown mottled; brown stripes on ventral surface; orbital rim may be banded with brown; 2 or 3 dark postorbital stripes, which may extend nearly length of opercle; pale, broad stripe, extending nearly length of opercle, between lower 2 dark postorbital stripes; dorsal surface of head dark brown or pale, if pale, with brown mottlings sometimes present; dark interorbital band or spot present. Body: sides light brown with darker brown mottlings; venter pale; wide, dark-brown stripe on upper ¼ of body, continuous with upper postorbital stripe, and extending nearly entire length; in 2 of 3 females, heavy concentration of brown mottlings on lower ¼ of body, forming stripe that extends entire body length; stripe not as dark as stripe on upper ¼ of body; in 4 specimens, dorsal surface of body pale, with brown mottlings present or absent; females usually more mottled than males. Dorsal, anal, pectoral, and caudal fins: pale, brown mottled. Pelvic fin: pale; faint brown bands may be present.

REMARKS.—In *O. pardalis,* the distribution of abdominal scales appears to vary with sex and SL. Males (58.0–63.5 mm SL) have numerous and uniformly distributed abdominal scales. Abdominal scales in 2 females (54.0, 58.5 mm SL) are few and concentrated in an area just posterior to the pelvic-fin insertions. Two females (71.3, 112 mm SL) have numerous, uniformly distributed abdominal scales.

McCulloch and Waite (1918) stated for *O. varius:* "abdomen naked, the scales otherwise distributed as in *O. pardalis.*" Three *O. pardalis* specimens (36.5–40.0 mm SL) lack abdominal scales; therefore, the presence or absence of abdominal scales cannot be used to distinguish the species of *Ophiclinops.*

Sexual dimorphism was not apparent in counts of dorsal-fin spines, segmented anal-fin rays, and total vertebrae.

MATERIAL EXAMINED.—N = 14, SL = 21.7–112 mm. SOUTH AUSTRALIA: FIDDLERS BAY, USNM 218774 (36.3); PORT VICTORIA, USNM 218782 (2: 21.7–23.0); KANGAROO ISLAND, SAMA F4357 (4: 52.5–63.0), AMS I.20179-020 (58.0), AMS I.20189-034 (33.5), AMS I.20193-004 (3: 36.5–71.3); ST. VINCENT GULF, SAMA F656 (112), ZIL 44077 (radiograph of syntype of *Neogunellus homacanthus,* which name we restrict under *Ophiclinus antarcticus*).

Ophiclinops varius (McCulloch and Waite)

FIGURE 4

Ophiclinus varius McCulloch and Waite, 1918:57, fig. 30 [holotype: SAMA F.503, South Australia, Kangaroo Island].

DESCRIPTION.—Dorsal fin XL–XLV,1; anal fin II, 27–29; anal-fin origin at vertical from base of 13th–15th dorsal-fin spine; pectoral-fin rays 6–10; caudal fin 2–4 + 12–14 (usually 13) + 3–4; vertebrae 19–22 (20–21 in 49 of 52 specimens) + 31–33 = 51–55; vomerine teeth uniserial; cephalic sensory canal pore positions with single pores; depressed tube of anterior nostril fails to reach ventrally beyond dorsal margin of upper lip; hooklike process on cleithrum absent.

Lateral Line: A dorsoanterior series of 2 or 3 pores and a posterior, midlateral series of pits; pored series originating above vertical over posterior ½–⅓ of opercle length; midlateral series of pits originating anterior to and below level of dorsal-fin origin and ending on caudal peduncle.

Color Pattern: Head: sides brown mottled; bands present on ventral surface; in 10 specimens, 32.0–43.0 mm SL, a wide, pale stripe extends from posterior margin of orbit to posterior margin of opercle; pale stripe not present in 9 specimens 14.0–28.0 mm SL; orbital rim banded with brown; 2 or 3 short, dark postorbital stripes; light-brown to black interorbital band usually present; dorsally, a wide,

pale stripe extends from premaxillary to dark interorbital band or to dorsal-fin origin; tubed anterior nostrils dark brown, but may be unpigmented. Body: light brown with black blotches and white mottlings; series of black markings below dorsal-fin base, along horizontal septum, and midway between horizontal septum and ventral profile; faint, brown stripes on body present in 3 of 10 specimens, ventral surface of body darkly pigmented. Dorsal fin: brown, heavily mottled and banded with dark brown, or brown with white mottlings; brown or white spots present below dorsal-fin base; white spots may occur along horizontal septum. Anal fin: anterior ½–¾ pale with brown bands or blotches; posterior portion dark brown with pale fin-ray tips. Pectoral fin: pale with brown mottlings. Pelvic fin: 5–10 brown bands. Caudal peduncle: typically pale. Caudal fin: dark brown with tips of fin rays pale. Life colors: refer to E.O.G. Scott (1966) and McCulloch and Waite (1918).

REMARKS.—*Ophiclinops varius* appears to mature at a small size. McCulloch and Waite (1918) described *O. varius* from 4 specimens 42–46 mm long (SL or TL not specified); 1 female had 23 young (the largest being 7.5 mm long) in each oviduct. The largest specimen that we examined is 47.8 mm TL; the largest reported in the literature is 50 mm (T. D. Scott et al., 1974). The male intromittent organ is recognizable in specimens as small as 14.0 mm SL.

Neither geographic variation nor sexual dimorphism was apparent in counts of dorsal-fin spines, segmented anal-fin rays, or total vertebrae.

E.O.G. Scott (1966) reported "a small lanceolate flap" on the rim of the tubed anterior nostril. We did not observe nasal cirri in any of our specimens.

MATERIAL EXAMINED.—N = 54; SL = 14.0–43.0 mm. SOUTH AUSTRALIA: KANGAROO ISLAND, AMS I.14616 (2 paratypes: 37.0), AMS IA.19 (28.5), AMS I.20171-008 (4: 14.0–25.6), AMS I.20162-025 (3: 32.0–43.0), AMS I.20180-047 (28.0), AMS I.20160–027 (18: 20.2–42.3); AMS I.20166-012 (9: 15.0–30.1); MOANA, USNM 218787 (43.0); SPENCER GULF, USNM 218778 (36.7). TASMANIA: DEVON: Greens Beach, USNM 201459 (2: 37.0, 1 cleared and stained), QVLM 1972/5/539 (24.8), QVML 1972/5/540 (36.5), QVML 1972/5/543 (25.7), USNM 218779 (35.0), USNM 218777 (6: 17.0–37.5). WESTERN AUSTRALIA: ROB ISLAND, AMS I.20216-002 (2: 23.0, 28.0).

Ophiclinus Castelnau

Ophiclinus Castelnau, 1872:246 [type-species: *Ophiclinus antarcticus* Castelnau, by monotypy].

Ophioclinus Castelnau, 1873:69 [unacceptable emendation of *Ophiclinus*].

Neogunellus Castelnau, 1875:27 [type-species: *Neogunellus sulcatus* Castelnau, by monotypy].

DIAGNOSIS.—Dorsal fin XLII–LXII,1; dorsal-fin origin at vertical varying from over posterior ½ of opercle length to over point just posterior to opercle; pectoral-fin longer than orbital diameter; pelvic-fin longer than orbital diameter; 9–20 pores in dorsoanterior portion of lateral line; eyes lateral; posteriormost point of opercle at or above level of horizontal septum of body; scales small, equally distributed anteriorly and posteriorly; POL in HL 1.4–1.8; predorsal bones 0 or 1.

REMARKS.—Castelnau compared his new genus *Neogunellus* only with *Ophiclinus* and some nonclinid genera. His comparison with *Ophiclinus* only indicated that *Neogunellus* "comes very near." Our examinations of the types of *N. sulcatus* and *O. antarcticus* (type-species of the genera *Neogunellus* and *Ophiclinus*) convinces us of their conspecificity. Fin-ray and vertebral counts are identical. The anal fin originates at a point below the base of the 18th dorsal-fin spine in both specimens. There are no differences in the number or positions of cephalic sensory pores. There is a hooklike process on the cleithrum of both specimens and the dentition is similar. Color pattern cannot be compared as both specimens are faded.

McCulloch and Waite (1918) first utilized *Ophiclinus* as the proper generic name for *Neogunellus sulcatus,* and Waite (1921) listed *O. sulcatus* as a synonym of *O. antarcticus.*

SPECIES GROUPS.—The six *Ophiclinus* species may be divided into 2 species groups. *Ophiclinus gracilis, O. ningulus,* and *O. pectoralis* form 1 group. This group is distinguished from the second group in having the following: base of the tube of the anterior nostril well removed posteriorly from the dorsal margin of the upper lip; interradial membranes of the anal fin incised; and low numbers of dorsal-fin, anal-fin, and vertebral elements (Tables 3–5). Although all these characters probably represent primitive states for *Ophiclinus* (and we know of no specialization that unites the group to the exclusion of the second group), we believe that the group is a natural unit. The second group of *Ophiclinus* species comprises *O. antarcticus, O. brevipinnis,* and *O. gabrieli,* which share the following specializations: base of the tube of the anterior nostril adja-

TABLE 3.—Frequency distributions for numbers of dorsal-fin spines in the species of *Ophiclinus*

Species	Dorsal-fin spines																									
	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	$\bar{x}$
Ophiclinus antarcticus																											
South Australia																											
Ceduna																1											
Moana													2	-	2												55.0
Spencer Gulf											1	8	5	5	2	-	3										54.4
Kangaroo Island																											
Stokes Bay															2	2	1	1	3	1							58.4
Kingscote												2	2	5	6	1	1										55.3
American River																	2										58.0
unspecified[a]														2	1	-	1										
St. Vincent Gulf																	1	3	4								59.4
Encounter Bay											1	-	-	-	-	1											54.5
Western Australia																											
Point Peron																	1	1									58.5
Ophiclinus brevipinnis																											
South Australia																											
Kangaroo Island																											
Knob Point																								1			
Penneshaw																						1					
Western Australia																											
Lucky Bay																										1	
Ophiclinus gabrieli																											
Victoria																											
Females												2	1														53.3
Tasmania (north coast)																											
Males												8	2	1													53.4
Females											1	6															52.9
South Australia																											
Males													1														
Females												3	1														53.2
Ophiclinus gracilis																											
New South Wales			1	2	8	3	1																				46.1
Victoria				1	-	1	2																				47.0
Tasmania				1	11	15	5	1																			46.8
South Australia					2	5																					46.7
Western Australia				3	2	4																					46.1
Ophiclinus ningulus																											
Western Australia			1	1																							44.5
Ophiclinus pectoralis																											
Western Australia	2	2	3																								43.1

[a]Data not used in F test

cent to the dorsal margin of the upper lip; interradial membranes of the anal fin not incised; and high numbers of dorsal-fin, anal-fin, and vertebral elements.

Ophiclinus antarcticus Castelnau

FIGURES 1*c,d*, 5

Ophiclinus antarcticus Castelnau, 1872:246 [holotype: MNHN A.1095, South Australia, St. Vincent Gulf].

Neogunellus sulcatus Castelnau, 1875:27 [syntypes: MNHN A. 1677 and ? AMS I.14216, South Australia, Adelaide].

Neogunellus homacanthus Herzenstein, 1896:5 [lectotype: ZIL 6639, South Australia, St. Vincent Gulf; designated below].

Ophiclinus aethiops McCulloch and Waite, 1918:57, fig. 29 [holotype: SAMA F.481, South Australia, Kangaroo Island].

DESCRIPTION.—Cirrus absent on tube of anterior nostril; dorsal fin LII–LXI,1; dorsal-fin origin at vertical varying from over posterior 1/8 of opercle length to just posterior to opercle; predorsal bones 0–1; anal fin II,34–42; anal-fin origin below vertical from base of 18th or 19th dorsal-fin spine; interradial membranes of anal fin not incised; pectoral-fin rays 9–11; pectoral-fin length 7.6–8.7 percent SL (in specimens 62.5–69.0 mm SL); caudal fin 2–4 + 13 + 2–4; vertebrae 21–23 + 38–47 = 59–68; teeth on vomer vary with SL, see "Remarks" below (vomerine teeth may be larger than jaw teeth); cephalic sensory canal pore positions with single pores; tube of anterior nostril proximal to dorsal margin of upper lip; hooklike process usually present on cleithrum.

TABLE 4.—Frequency distributions for numbers of segmented anal-fin rays in the species of *Ophiclinus*

Species	Segmented anal-fin rays																					
	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	$\bar{x}$
Ophiclinus antarcticus																							
South Australia																							
Ceduna															1								
Moana											1	1	1	-	1								36.8
Spencer Gulf											7	8	8	-	-	1							36.2
Kangaroo Island																							
Stokes Bay														2	3	2	3						39.6
Kingscote										1	2	4	6	3									36.5
American River																2							40.0
unspecified[a]													3	-	-	2							
St. Vincent Gulf															1	1	1	5					41.2
Encounter Bay												1	-	-	1								39.5
Western Australia																							
Point Peron														1	1								38.5
Ophiclinus brevipinnis																							
South Australia																							
Kangaroo Island																							
Knob Point																			1				
Penneshaw																		1					
Western Australia																							
Lucky Bay																						1	
Ophiclinus gabrieli																							
Victoria																							
Females									1	2													33.7
Tasmania (north coast)																							
Males										1	8	2											35.1
Females									2	5													33.7
South Australia																							
Males											1												
Females										2	2												34.5
Ophiclinus gracilis																							
New South Wales				5	7	3																	28.9
Victoria			1	-	1	1	1																29.2
Tasmania			1	2	13	11	6																29.6
South Australia					3	1	3																30.0
Western Australia				2	4	2	1																29.2
Ophiclinus ningulus																							
Western Australia				1	1																		28.5
Ophiclinus pectoralis																							
Western Australia	2	1	3	1																			26.4

[a]Data not used in F test

Lateral Line: Dorsoanterior series of 9–15 pores originating above vertical at posterior ½–⅛ of opercle length, extending to point below vertical from base of 3rd–7th dorsal-fin spine. Pored series connected by diagonal series of pits to posterior midlateral series of pits, which ends on posterior portion of caudal peduncle.

Color Pattern (specimens 24.5–108 mm SL): No sexual dichromatism observed. Head, body, and fins typically with heavy speckling of tiny, dark spots; other aspects of color pattern as follows. Head: brown, often paler than body; conspicuous pale area in preopercular region often present; 2–4 dark stripes radiate posteriorly from orbit; lips often banded; ventral surface usually spotted, occasionally uniformly pale; dorsal surface may also be pale (and unspeckled); posterior margin of opercular flap darkly pigmented. Body: brown with darker brown blotches or, if unspeckled, uniformly dark brown; a few white blotches often present near horizontal septum or above anal-fin base; series of 6–10 dark spots, interspersed with 3–8 (usually 6 or

TABLE 5.—Frequency distributions for numbers of total vertebrae in the species of *Ophiclinus*

Species	Total vertebrae																						$\bar{x}$
	48	49	50	51	52	53	54	55	59	60	61	62	63	64	65	66	67	68	72	73	74		
Ophiclinus antarcticus																							
South Australia																							
Ceduna														1									
Moana											2	1	1										61.8
Spencer Gulf										5	11	7	-	-	1								61.2
Kangaroo Island																							
Stokes Bay															4	3	2						65.8
Kingscote									1	-	5	4	4	2	1								62.2
American River															2								65.0
unspecified[a]											1	2	-	-	-	2							
St. Vincent Gulf															1	1	5	1					66.8
Encounter Bay										1	-	-	-	1									62.0
Western Australia																							
Point Peron															2								65.0
Ophiclinus brevipinnis																							
South Australia																							
Kangaroo Island																							
Knob Point																			1				
Penneshaw																			1				
Western Australia																							
Lucky Bay																					1		
Ophiclinus gabrieli																							
Victoria																							
Females											3												61.0
Tasmania (north coast)																							
Males											8	3											61.3
Females										2	4	1											60.8
South Australia																							
Males												1											
Females											3	1											61.2
Ophiclinus gracilis																							
New South Wales				2	5	7	1																52.5
Victoria					1	1	1	1															53.5
Tasmania					4	13	9	2															53.3
South Australia					2	4	1																52.8
Western Australia				2	2	5																	52.3
Ophiclinus ningulus																							
Western Australia				1	-	1																	52.0
Ophiclinus pectoralis																							
Western Australia	2	2	-	2	1																		49.7

[a]Data not used in F test

7) pale spots usually present near dorsal body contour; venter pale. Dorsal fin: typically brown with white blotches, or with darker brown bands and mottlings, and occasionally, when unspeckled, entirely pale or uniformly dark brown. Anal fin: pale, or brown with white or darker brown blotches. Pectoral fin: anterior ¼–½ dark brown, remainder pale; brown bands often present on pale portion of fin. Pelvic fins: pale, often with brown bands. Caudal fin: brown mottled; white spot with dark margin typically present just posterior to midpoint of caudal-fin base.

SYNONYMY.—The synonymy of *Neogunellus sulcatus* with *O. antarcticus* is discussed under the generic account of *Ophiclinus*.

Whitley (1940), based only on a study of the literature, stated that *Neogunellus homacanthus* was conspecific with *N. sulcatus* and that both were synonyms of *Ophiclinus antarcticus*. T. D. Scott et al. (1974) stated that *O. homacanthus* appears to be synonymous with *O. antarcticus* but did not give a basis for the synonymy.

One of Herzenstein's 4 syntypes of *N. homacanthus* (ZIL 6639) was made available to us, as well as a radiograph of all 4 syntypes. Data from this material, together with details in the original de-

scription, support previous opinions that *N. homacanthus* should be synonymized with *O. antarcticus*. Herzenstein's description of *N. homacanthus* contains mostly characters typical of *O. antarcticus;* however, he described the pectoral fin as being short compared with the snout length. The radiograph of the 4 syntypes indicates that 3 specimens have well-developed pectoral fins with lengths exceeding the snout lengths of the specimens. The presence of pectoral fins on the fourth specimen cannot be determined from the radiograph, and we suspect that Herzenstein based his description of the pectoral fins on this specimen.

Herzenstein's 4 specimens apparently comprise 2 species: 3 specimens of *N. homacanthus* (*O. antarcticus*) and 1 *Ophiclinops pardalis*. Although counts of vertebrae and dorsal-, anal-, and caudal-fin rays of the 4 specimens are included in the ranges for both *O. antarcticus* and *O. pardalis*, the anal-fin origin (below 12th dorsal-fin spine) and the presence of 2 predorsal bones (1 more than occurs in *Ophiclinus*) indicate that the fourth specimen is *Ophiclinops pardalis*. The specimen that we believe to be *O. pardalis* (ZIL 44077) was not available for examination. The reduced pectoral fins of *Ophiclinops* species usually cannot be detected on radiographs.

McCulloch and Waite (1918) remarked that *Ophiclinus aethiops* is very similar *to O. sulcatus* (= *O. antarcticus*), but has fewer dorsal-fin spines and anal-fin rays. We compared specimens (including the holotype of *O. antarcticus*) having high counts of dorsal-fin spines (58–61) and segmented anal-fin rays (40–42) with specimens (including the paratype of *O. aethiops*) having low counts of dorsal-fin spines (52–56) and segmented anal-fin rays (35–37), and tentatively conclude that the name *O. aethiops* applies to specimens of *O. antarcticus* at the low end of the ranges for these meristics. We were unable to correlate high or low meristic counts consistently with any other character, although specimens with high counts tend to be less spotted than specimens with low counts. In general, counts of dorsal- and anal-fin elements and vertebrae tend to be high or low at any locality, but at some localities both types of counts occur without intermediates (Tables 3–5). In the event that these groupings do represent 2 species, the name *O. aethiops* would apply to the form with low counts. The other nominal species included in the synonymy of *O. antarcticus* have high counts.

REMARKS.—Castelnau (1875) did not specify the number of type specimens in his description of *Neogunellus sulcatus*. More than 1 specimen is inferred from his statement that his "longest specimen is less than five inches long." We examined a specimen (MNHN A.1677) that Bauchot (1967) lists as a syntype of *N. sulcatus*. We also examined a specimen (AMS I.14216) that is labeled "syntype? *Neogunellus sulcatus*." McCulloch (1929) lists this specimen as a "co-type" of *N. sulcatus*.

One-way analyses of variance indicate that there are significant differences among the localities in the means for certain meristic charcters (Tables 3–5; unspecified frequencies under Kangaroo Island were not used in the analyses): dorsal-fin spines ($p < .001$, [7,61], $F_s = 14.43$, $N = 69$); segmented anal-fin rays ($p < .001$, [7,60], $F_s = 22.87$, $N = 68$); total vertebrae ($p < .001$, [7,60], $F_s = 31.10$, $N = 68$). No sexual dimorphism of these characters was noted within populations.

The number and arrangement of teeth on the vomer in *O. antarcticus* varies with SL but not with sex. Vomerine teeth are usually uniserial in specimens 31–42 mm, but often there are 1 or 2 additional teeth posterior to the row. In specimens 44–45 mm the vomerine teeth are biserial, and in specimens 47–125 mm the teeth are in a conspicuous, roughly triangular patch. The vomer also bears numerous fleshy papillae that superficially resemble teeth. In contrast to *O. antarcticus*, the vomerine teeth of the very similar appearing *O. gabrieli* are usually uniserial and always arranged in a V or U-shaped pattern. The vomerine teeth are occasionally irregularly biserial in large specimens of *O. gabrieli*.

Three of the 74 specimens examined have a pair of pores, instead of a single pore, at the ventro-anteriormost preopercular pore position. In all 3 specimens the upper pore of the pair is smaller than the lower pore. In 1 of the 3 specimens the pair of pores occurs only on the left side; the position bears a single pore on the right side. This may indicate, as we believe, that the paired-pore condition (found otherwise in *Ophiclinus* in *O. gabrieli*, *O. gracilis*, and *O. pectoralis*) is the primitive state for this character.

LECTOTYPE DESIGNATION.—We here designate as lectotype of *Neogunellus homacanthus* the syntypic specimen ZIL 6639, male 81.0 mm SL, St. Vincent Gulf, South Australia, collected by Schneider. The

paralectotypes are now cataloged as follows: ZIL 44076 (2 specimens conspecific with the lectotype) and ZIL 44077 (specimen of *Ophiclinops pardalis*). The lectotype is the largest of the four syntypes and the only one with a dorsal-fin spine count of 60 and a vertebral count of 21 + 46. It possesses an intromittent organ. The presence of this organ in the other specimens cannot be determined from the radiograph.

MATERIAL EXAMINED.—N = 75; SL = 24.5–125 mm. SOUTH AUSTRALIA: KANGAROO ISLAND: Kingscote, AMS I.20181-001 (51.0), AMS I.20189-024 (16: 34.3–66.0); Stokes Bay AMS I.20162-023 (10: 39.0–108), American River, AMS I.20193-005 (2: 55.6–95.0); unspecified localities, AMS I.14615 (paratype of *Ophiclinus aethiops*, 69.0), AMS IA.18 (37.8), AMS IA.20 (100), AMS I.20179-002 (86.0), USNM 87364 (45.4); SPENCER GULF, USNM 211881 (2: 63.2–64.8), USNM 218781 (22: 31.3–87.0); ST. VINCENT GULF, AMS I.14503 (79.5), MNHN A.1095 (holotype of *Ophiclinus antarcticus*, 116), ZIL 6639 (lectotype of *Neogunellus homacanthus*, 81.0), ZIL 44076 (radiograph of two paralectotypes of *N. homacanthus*); ADELAIDE, AMS I.14216 (questionable syntype of *Neogunellus sulcatus*, 107), MNHN A.1677 (syntype of *Neogunellus sulcatus*, 125); PORT WAKEFIELD, SAMA F. 1923 (76.0); ENCOUNTER BAY, SAMA F.935 (65.5), SAMA F.1418 (69.0); MOANA, USNM 218786 (4: 24.5–39.6); CEDUNA, AMS I.20215-002 (96.0). WESTERN AUSTRALIA: POINT PERON, USNM 211268 (2: 64.0–64.6).

Ophiclinus brevipinnis, new species

FIGURE 6

DESCRIPTION.—Cirrus absent on tube of anterior nostril; dorsal fin LXIII–LXVII,1; dorsal-fin origin at vertical varying from just anterior to just posterior to level of posteriormost reach of opercle; predorsal bones absent; anal fin II,42–46; anal-fin origin below vertical from base of 21st or 22nd dorsal-fin spine; interradial membranes of anal fin

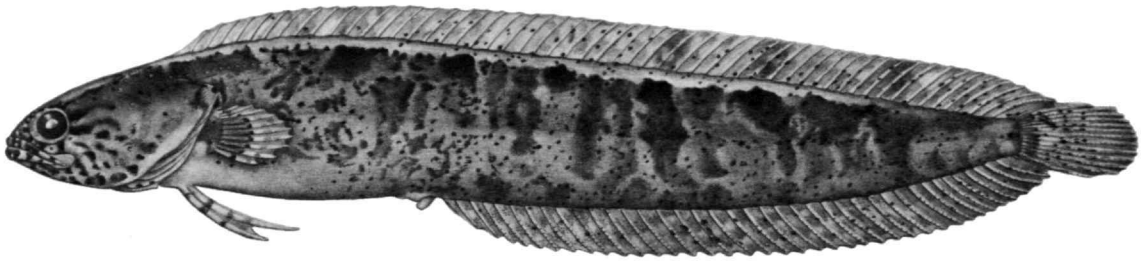

FIGURE 5.—*Ophiclinus antarcticus*, USNM 218781, male, 67.0 mm SL, Spencer Gulf, South Australia. (Drawn by J. R. Schroeder.)

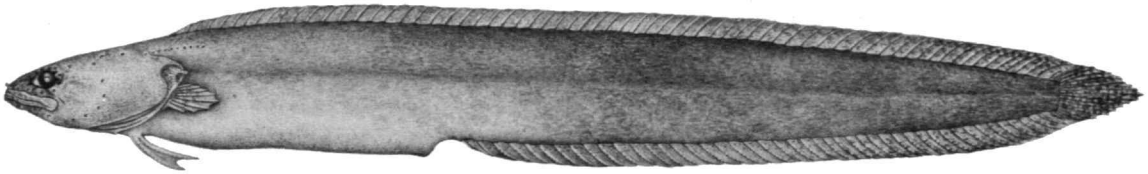

FIGURE 6.—*Ophiclinus brevipinnis*, new species, AMS I.20167-002, holotype; female 67.5 mm SL, Kangaroo Island, South Australia. (Drawn by J. R Schroeder.)

FIGURE 7.—*Ophiclinus gabrieli*, USNM 218789, male, 86.0 mm SL, Greens Beach, Tasmania. (Drawn by J. R. Schroeder.)

not incised; pectoral-fin rays 8; pectoral-fin length 3.9–5.1 percent SL; caudal fin 3–4 + 13 + 3–4; vertebrae 25–27 + 45–49 = 72 – 74; vomerine teeth uniserial; cephalic sensory canal pore positions with single pores; tube of anterior nostril poximal to dorsal margin of upper lip; hooklike process present on cleithrum.

Lateral Line: Dorsoanterior series of 10–19 pores originating above vertical at posterior ½ of opercle length, extending to point below vertical from base of 3rd to 7th dorsal-fin spine. Pored series connected by diagonal series of pits to posterior midlateral series of pits, which ends on posterior portion of caudal peduncle.

Color Pattern: Orbital rim with short, radiating, dark-brown bands, which may be restricted to posterior portion of rim; head and body variably or uniformly mottled with brown; dorsal, anal, and caudal fins brown mottled; pectoral fin with brown mottling, but distal ½ or only margin pale; pelvic fins pale or with faint brown bands.

REMARKS.—Only 5 preopercular canal pores are present on the right side of 2 of the 3 available specimens; 6 pores, the typical number for ophiclinins, are present on the left side of these 2 specimens and both sides of the third specimen.

Of the 3 known specimens, 2 are from South Australia and 1 is from southern Western Australia. The specimen from Western Australia has at least 2 more dorsal-fin spines, 3 more segmented anal-fin rays, 2 more vertebrae, and 4 more pores in the lateral line than the South Australian specimens. These differences may indicate that the 3 specimens represent 2 recognizable taxa. More material, including specimens from geographically intermediate areas, will be necessary to resolve the problem (see also "Relationships" under *Ophiclinops hutchinsi*).

RELATIONSHIPS.—*Ophiclinus brevipinnis* is differentiated from the other *Ophiclinus* species in having a much shorter pectoral fin, fewer pectoral-fin rays, and more dorsal-fin spines, segmented anal-fin rays, and vertebrae. It is most closely related to *O. antarcticus* and *O. gabrieli*, with which it shares the following two specializations: interradial membranes of anal fin not incised, and tube of anterior nostril proximal to upper lip.

ETYMOLOGY.—Named *brevipinnis* because this species has the shortest pectoral fin among the *Ophiclinus* species.

HOLOTYPE.—AMS I.20167-002, female, 67.5 mm SL, Knob Point, Kangaroo Island, South Australia 35°37'S, 137°15'E, rocky ledge, 15 m, collected by H. Larson, 5 Mar 1978.

PARATYPES.—AMS I.20188-007, female, 49.1 mm SL, Penneshaw, Kangaroo Island, South Australia, collected by D. and R. Blake, 12 Mar 1978; WAMP P-26000-022, male, 58.8 mm SL, small bay on west side of Lucky Bay, Western Australia, 34°S, 122° 14'E, among reef and weed, 10 m, collected by J. B. Hutchins, 12 Mar 1978.

Ophiclinus gabrieli Waite

FIGURE 7

Ophioclinus gabrieli Waite, 1906:208, pl. 36: fig. 7 [lectotype: AMS I.7612, Victoria, Western Port; designated below].

DESCRIPTION.—Cirrus absent on tube of anterior nostril; dorsal fin LII–LV,1; dorsal-fin origin at vertical varying from above posterior ½ of opercle length to just posterior to opercle; predorsal bones 0–1; anal fin II,33–36; anal-fin origin below vertical from base of 18th–20th dorsal-fin spine; interrradial membranes of anal fin not incised; pectoral-fin rays 11 or 12; pectoral-fin length 7.5–8.1 percent SL (in specimens 73.4–86.0 mm SL); caudal fin 2–5 + 13–15 (14 or 15 only rarely in some large specimens) + 2–5; vertebrae 22–23 + 37–40 = 60–62; teeth on vomer uniserial in specimens 72.0–144 mm SL; irregularly biserial in specimens 149–157 mm SL, arranged in a V or U-shaped pattern; cephalic sensory pore positions with single pores, except for ventroanteriormost preopercular canal pore position, which has a pair of pores (position has 1 pore unilaterally in 1 of 26 specimens examined); tube of anterior nostril proximal to dorsal margin of upper lip; hooklike process on cleithrum present or absent.

Lateral Line: Dorsoanterior series of 12–16 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating above vertical at posterior ½–⅓ of opercle length, extending to point below vertical from base of 4th–6th dorsal-fin spine; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern: Head: upper ½–¼ dark brown, nearly black; ventral portions light brown; 2 or 3 dark stripes posterior to orbit; lips and snout may have white mottlings; in one 86.0 mm SL male,

dorsal surface pale with darker brown mottlings. Body: upper ½–¼ dark brown, nearly black, lower ½–¾ lighter brown; pale brown area below dorsal-fin base present or absent; posterior portion of body may have white mottlings that extend onto dorsal, anal, and caudal fins (white mottlings conspicuous in specimens 72.0–86.0 mm SL). Dorsal fin: dark brown, or pale and brown mottled; in 86.0 mm male, distal ½ of dorsal fin pale, proximal ½ dark brown. Anal fin: brown, or pale and brown mottled. Pectoral fin: brown with white mottlings, tips of rays pale. Pelvic fin: brown, with darker brown or white mottlings. Caudal fin: brown, with white or darker brown mottlings; tips of rays may be pale.

Males often have darker fins than do females. The line of demarcation between the darker upper parts and the paler lower parts of the head and body is more noticeable in females.

REMARKS.—*Ophiclinus gabrieli* is the largest ophiclinin species, attaining an SL of up to 157 mm.

Waite (1906) reported that *O. gabrieli* lacked anal-fin spines. On radiographs of the *O. gabrieli* types, the first 2 anal-fin elements are spinous.

Counts of segmented anal-fin rays in Tasmanian *O. gabrieli* specimens are sexually dimorphic (Table 4). A one-way analysis of variance indicates a highly significant difference between the means for segmented anal-fin rays of males and females ($P=.001$, [1,15], $F_s = 29.9$, $N = 18$). Differences between the means for dorsal-fin spines ($.2 > p > .1$, [1,16], $F_s = 3.25$, $N = 18$) and total vertebrae ($.5 > p > .2$, [1,16], $F_s = 2.35$, $N = 18$) in males and females are not significant. An analysis of variance of numbers of anal-fin rays in females from different areas is not significant ($.20 > p > .10$, [2,11], $F_s = 3.26$, $N = 14$).

Because of the generally similar appearance of *O. antarcticus* and *O. gabrieli* the species may be difficult to distinguish, particularly small specimens. The 2 species overlap in the number of dorsal-, anal- and pectoral-fin rays, and vertebral counts; however, means of dorsal- and anal-fin ray and vertebral counts may differ greatly (Tables 3–5). Where *O. gabrieli* and *O. antarcticus* have been taken in the same collection (for example, Stokes Bay and Kingscote, Kangaroo Island, South Australia), the meristic values of the *O. gabrieli* specimens either do not overlap the meristic values of the *O. antarcticus* specimens, or they overlap only the low ends of the ranges for the *O. antarcticus* values. In *O. gabrieli* the dorsal-fin origin is somewhat more anterior than in *O. antarcticus*. The dorsal fin originates above the posterior ½ of the opercle or just posterior to the opercle in *O. gabrieli*. In *O. antarcticus* the dorsal fin originates above the posterior ⅛, or just posterior to the posterior margin, of the opercle. One character quickly separates most specimens of the 2 species: the ventroanteriormost preopercular canal pore position bears a pair of pores in *O. gabrieli*, a single pore in *O. antarcticus*. The vomerine dentition separates the 2 species at sizes over 47 mm SL (See "Remarks" under *O. antarcticus*).

The Tasmanian specimens (QVML 1972/5/399) that E.O.G. Scott (1967) reported as *O. aethiops* (= *O. antarcticus*), are *O. gabrieli*. Scott had difficulty in distinguishing *O. antarcticus* and *O. gabrieli* because of overlap in counts of dorsal-fin spines and segmented anal-fin rays, and a partial similarity in dentition and coloration. Only 8 of the 10 specimens described by Scott were available for examination. These specimens have 53–55 dorsal-fin spines, whereas Scott reported 51–57 spines. If Scott's counts are correct, they expand the range for number of dorsal-fin spines for the species over that which we found (Table 2). Scott may have had a mixture of *O. antarcticus* and *O. gabrieli* specimens, but as *O. antarcticus* has not been reported from Tasmania, this possibility seems unlikely.

LECTOTYPE DESIGNATION.—We here designate as lectotype of *O. gabrieli* the syntypic specimen AMS I.7612, female, 92.0 mm SL, Western Port, Victoria, collected by J. Gabriel.

MATERIAL EXAMINED.—N = 26, SL = 72.0-157 mm. SOUTH AUSTRALIA: KANGAROO ISLAND: Stokes Bay, AMS I.20162-026 (2: 123–150), USNM 201468 (2: 144–157); Kingscote, AMS I.20189-035 (149). VICTORIA: WESTERN PORT, AMS I.7611 (2 paralectotypes: 73.4–88.5), AMS I.7612 (lectotype: 92.0). TASMANIA: KELSO, QVML 1972/5/417 (5: 72.0–92.0); DEVON: Greens Beach, USNM 201465 (2: 103–122, including one cleared and stained), QVML 1972/5/399 (8: 97.0–118), USNM 218788 (2: 100), USNM 218789 (86.0).

Ophiclinus gracilis Waite

FIGURES 1*a,b*, 8, 9

Ophioclinus gracilis Waite, 1906:207, pl. 36: fig. 6 [lectotype: AMS I.7711, New South Wales, Long Bay; designated below].

Ophiclinus greeni E.O.G. Scott, 1936:114, fig. 1 [holotype: QVML HT 805, northern Tasmania, Lady Lucy Beach].

DESCRIPTION.—Cirrus present on tube of anterior

nostril; dorsal fin XLIV–XLIX,1 (XLIV and XLIX in only 1 each of 68 specimens); dorsal-fin origin at vertical over posterior ⅓ of opercle length; predorsal bones absent; anal fin II,27–31 (27 in only 2 of 68 specimens); anal-fin origin below vertical from base of 16th–19th dorsal-fin spine; interradial membranes of anal fin incised; pectoral-fin rays 11–13; pectoral-fin length 9.0–11.7 percent SL (in specimens 60.0–68.0 mm SL); caudal fin 3–5 + 13–14 (14 rarely in some large specimens) + 3–5; vertebrae 18–20 (18 in 3 of 69 specimens) + 32-35 = 51–55; vomerine teeth uniserial in specimens less than 85.0 mm SL and biserial in 2 specimens 85.0 and 101 mm SL; ventroanterior preopercular canal pore positions and all supratemporal canal pore positions usually with pared pores; tube of anterior nostril well removed posteriorly from dorsal margin of upper lip; hooklike process on cleithrum absent.

Lateral Line: Dorsoanterior series with 15–20 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating approximately above vertical at posterior ⅓ of opercle length, extending to point below vertical from base of 8th–10th dorsal-fin spine; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern: No sexual dichromatism observed. Head: wide, dark-brown stripe beginning on snout, interrupted at orbit, continuing to posterior margin of opercle; above dark stripe, dorsal surface of head dark brown or pale; lower ½ of head light brown or pale, with large pale spots occasionally present; brown or pale stripes radiate from orbit, 1 of which may extend to posteriormost point of maxillary or continue onto pale ventral surface of head. Body: color on side often sharply demarcated, upper ½ with wide, dark-brown stripe that widens posteriorly and encompasses caudal peduncle, lower ½ lighter brown or pale; venter pale; midlateral series of 6–18 (mean 10) large, pale spots beginning posterior to pectoral fin insertion; spots may be absent or appear as semicircles. Dorsal and anal fins: pale or brown, with dark-brown bands appearing on posterior ½–⅕ of fins. Pelvic fins: diffuse brown bands may be present. Pectoral fins: brown with distal pale margin. Caudal fin: brown with 1–4 (usually 2 or 3) pale spots dorsally and 2 or 3 spots ventrally.

SYNONYMY.—Although we were not able to examine the type specimens on which *O. greeni* (E.

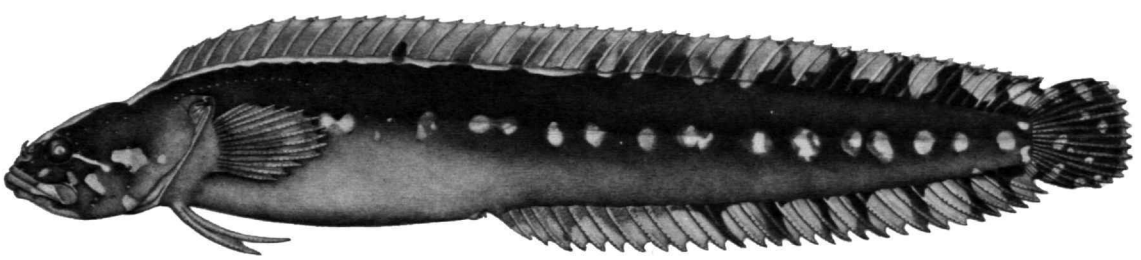

FIGURE 8.—*Ophiclinus gracilis*, AMS I.17556-001, female, 68.0 mm SL, Granville Harbour, Tasmania. (Drawn by J. R. Schroeder.)

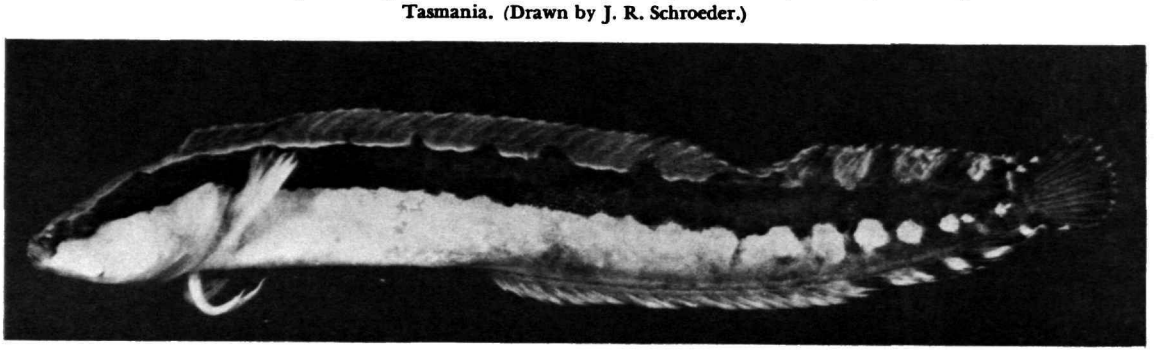

FIGURE 9.—*Ophiclinus gracilis*, USNM 21795, female, 71.7 mm SL, Bells Beach, Victoria (Photographed by J. F. McKinney.)

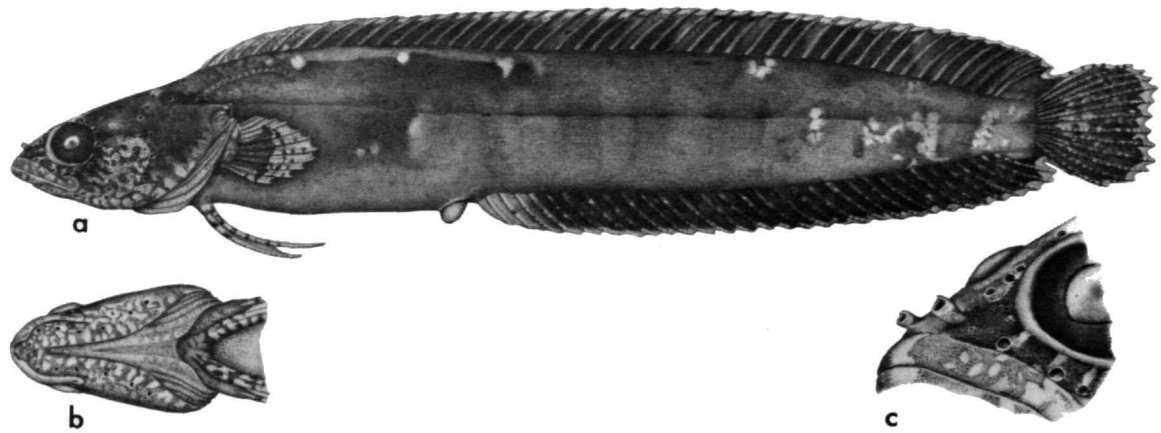

FIGURE 10.—*Ophiclinus ningulus*, new species, WAMP P.26009-015, holotype, male, 44.0 mm SL, Lucky Bay, Western Australia: *a*, lateral view; *b*, ventral view of head; *c*, enlarged view of snout region. (Drawn by J. R. Schroeder.)

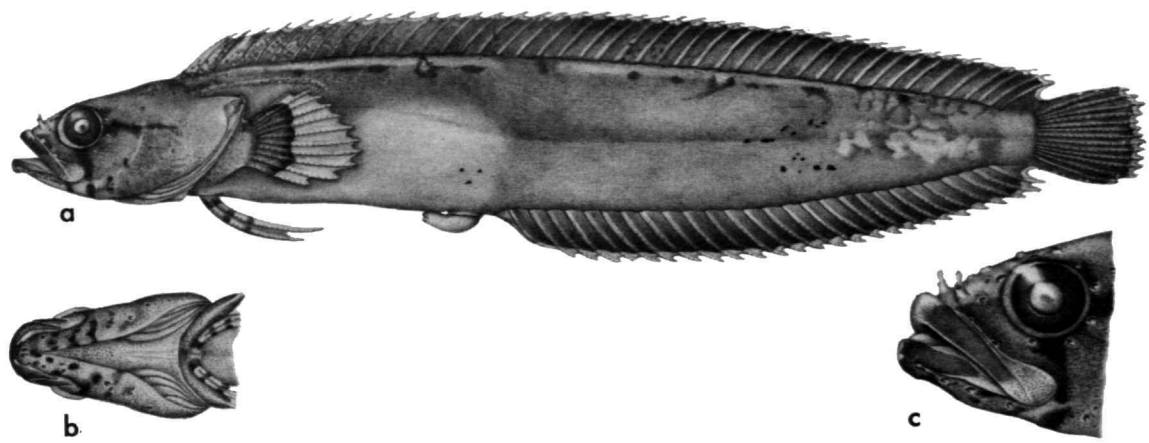

FIGURE 11.—*Ophiclinus pectoralis*, new species, WAMP P.25770-006, holotype, male, 52.0 mm SL, Sandy Hook Island, Recherche Archipelago, Western Australia: *a*, lateral view; *b*, ventral view of head; *c*, enlarged view of snout region. (Drawn by J. R Schroeder.)

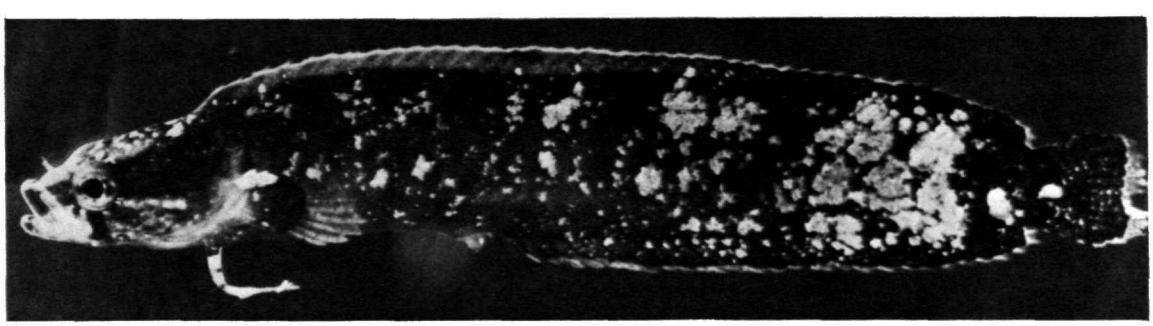

FIGURE 12.—*Ophiclinus pectoralis*, WAMP P.25758-015, female, 31.1 mm SL, Fish-Hook Bay, Rottnest Island, Western Australia. (From a color transparency; photographed by B. Hutchins.)

O.G. Scott, 1936) is based, information in the original description, including an illustration of the holotype, together with specimens sent us from northern Tasmania identified as *O. greeni*, convinces us that *O. greeni* and *O. gracilis* are synonymous. E.O.G. Scott (1965) remarked that *O. greeni* and *O. gracilis* are closely allied and may be identical.

In his key to Tasmanian ophiclinins, E.O.G. Scott (1967) reported that *O. gracilis* has less than 45 dorsal-fin spines and *O. greeni* has more than 45 dorsal-fin spines. Seven *O. gracilis* syntypes have 44–48 dorsal-fin spines; thus, the number of spines does not distinguish the two species. E.O.G. Scott (1967) used the shape of the dorsoanterior segment of the lateral line to separate *O. gracilis* and *O. greeni*: "strongly arched" in *O. greeni*, "nearly straight" in *O. gracilis*. The degree of arching of the lateral line is not a consistent character even among specimens in a single collection. In one *O. gracilis* syntype the anterior portion of the lateral line is arched on the right side and straight on the left side.

REMARKS.—Counts for dorsal-fin spines, segmented anal-fin rays, and total vertebrae do not exhibit sexual dimorphism. The first 2 of these characters also do not vary significantly with geographic locality, but total vertebrae do vary significantly (Tables 3–5). One-way analyses of variance for these characters for specimens from different localities are as follows: dorsal-fin spines, $.10 > p > .05$, [4,63], $F_s = 2.70$, $N = 68$; anal-fin rays, $.2 > p > .1$, [4,63], $F_s = 2.14$, $N = 68$; $.01 > p > .005$, [4,63], $F_s = 4.35$; vertebrae, $N = 68$.

Olsen (1958) reported that *O. gracilis* is a common food fish for small sharks in George Bay, Tasmania.

LECTOTYPE DESIGNATION.—We here designate as lectotype of *O. gracilis*, the syntype AMS I.7711, female, 40.5 mm SL, Long Bay, Sydney, New South Wales, collected by A. R. McCulloch.

MATERIAL EXAMINED.—N = 70, SL = 19.0–101 mm. SOUTH AUSTRALIA: YORKE PENINSULA, USNM 218783 (3: 56.0–74.0); KANGAROO ISLAND, AMS I.20167-022 (5: 16.7–19.8). NEW SOUTH WALES: SYDNEY: Long Bay, AMS I.7711 (lectotype of *O. gracilis*, 40.5), AMS I.7712 (3 paralectotypes: 42.0–50.0), AMS I.7713 (3 paralectotypes: 27.5–42.3), AMS I.9013 (3: 47.5–62.0), CAS SU20474 (5 paralectotypes: 22.3–44.6). VICTORIA: CAPE CONRAN, USNM 218794 (3: 67.0–101); BELLS BEACH, USNM 218795 (71.7). WESTERN AUSTRALIA: CAPE NATURALISTE, WAMP P.25195-012 (77.0); MURRAY BIGHT, WAMP P.5704 (65.0); POINT PERON, AMS I.15731-011 (71.7), USNM 211267 (2: 62.6–70.3); ROB ISLAND, AMS I.20216-001 (2:20.2–23.6); ROTTNEST ISLAND, AMS I.20245-024 (50.5); RECHERCHE ARCHIPELAGO: Mondrain Island, AMS I.20222-023 (21.8). TASMANIA: EAGLEHAWK NECK, AMS I.17545-002 (4: 60.0–70.0); GRANVILLE HARBOUR, AMS I.17556-001 (5: 68.0–85.0); THE GARDENS (north of Pinalong), AMS I.17555-001 (2: 60.5–68.0); COLES BAY, AMS I.17553-001 (8: 43.8–74.0); BOAT HARBOUR, AMS I.17586-001 (3:47.0–68.0), AMS I.17585-001 (57.0); BICHENO, AMS I.17554-001 (85.0), USNM 211879 (5: 49.0–86.1); DEVON: Greens Beach, USNM 201460 (2: 76.5–77.0, 1 cleared and stained), USNM 218772 (19.0), USNM 218773 (55.0), USNM 218780 (62.0).

Ophiclinus ningulus, new species

FIGURE 10

DESCRIPTION.—Cirrus absent on tube of anterior nostril; dorsal fin XLIV–XLV,1; dorsal-fin origin at vertical above posterior 1/8 of opercle length or at posterior margin of opercle; predorsal bones 1; base of 15th–16th dorsal-fin spine; interradial membranal fin II,28–29; anal-fin origin below vertical from branes of anal fin incised; pectoral-fin rays 11–12; pectoral-fin length 9.1–11.1 percent SL (in two specimens 36.0–44.0 mm SL); caudal fin 3 + 13 + 3; vertebrae 19–20 + 32–33 = 51–53; vomerine teeth uniserial; cephalic sensory canal pore positions with single pores; tube of anterior nostril removed posteriorly from dorsal margin of upper lip; hooklike process on cleithrum absent.

Lateral Line: Dorsoanterior series of 12–15 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating approximately at vertical above posterior 1/3 of opercle length, extending to point below vertical from 6th dorsal-fin spine; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern (based on holotype): Head: sides and ventral surface brown mottled; dorsal surface pale with brown mottling. Body: brown with pale blotches on posterior 1/4; a few pale spots present below dorsal-fin base; faintest suggestion of about 6 broad, dusky bands in region posterior to vertical from anus; bands extending well out onto dorsal fin. Dorsal fin: dark dusky with immaculate distal margin. Anal fin: pale dusky anteriorly, dark dusky posteriorly for most of length with pale distal margin; dark area mottled. Caudal fin: dark dusky with pale distal margin; dusky area with pale inclusions.

Pectoral fin: variably dusky and pale; dark and pale areas not sharply demarcated. Pelvic fin: pale with several dusky bands.

The paratype is faded and exhibits only some spotting on the head.

RELATIONSHIPS.—See "Relationships" under *Ophiclinus pectoralis.*

ETYMOLOGY.—The specific name, which is to be treated as a noun in apposition, is from the Latin *ningulus* (nobody) and derives from the lack of distinctive characteristics that might otherwise serve as a basis for a specific name.

HOLOTYPE.—WAMP P.26009-015, male, 44.0 mm SL, Lucky Bay, Western Australia, 34°00'S, 122°14' E, among coral (*Turbinaria*) and weed, 10 m, collected by J. B. Hutchins and R. H. Kuiter.

PARATYPE.—AMS I.20229-029, female, 35.4 mm SL, Cocburn Sound, Western Australia, collected by B. Russell, 26 Mar 1978.

ADDENDUM.—A female specimen, AMS I.20830-001, 64.1 mm SL, from Flinders Island, Tasmania, was received from the Tasmanian Fisheries Development Authority while this paper was in press. The following information was recorded from this specimen and is not included in Tables 2–5: dorsal fin XLVI,1; anal fin II,30; pectoral fins 11–11, 7.6 percent SL; caudal fin 5–13–4; vertebrae 20 + 34 = 54; lateral-line pores 14–15; head length 20.6 percent SL; orbital length 4.5 percent SL; snout length 3.1 percent SL.

Ophiclinus pectoralis, new species

FIGURES 11, 12

DESCRIPTION.—Cirrus present on tube of anterior nostril; dorsal fin XLII–XLIV,1; dorsal-fin origin at vertical above posterior 1/3–1/4 of opercle length; predorsal bones absent; anal fin II,25–28; anal-fin origin below vertical from base of 16th–17th dorsal-fin spine; interradial membranes of anal fin incised; pectoral-fin rays 11–12 (aberrantly 9 on one side of one specimen); pectoral-fin length 9.7–13.3 percent SL (in specimens 22.5–52.0 mm SL); caudal fin 4–5 + 13 + 4–5; vertebrae 18–19 +30–33 = 48–52; vomerine teeth uniserial; ventroanteriormost preopercular canal pore position and supratemporal canal pore positions usually with paired pores; tube of anterior nostril removed posteriorly from dorsal margin of upper lip; hooklike process on cleithrum present or absent.

Lateral Line: Dorsoanterior series of 14–18 pores, connected by diagonal series of pits to posterior midlateral series of pits; pored series originating approximately at vertical above posterior 1/3–1/4 of opercle length, extending to point below vertical from base of 7th–9th dorsal-fin spine; posterior midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern: Head: sides brown; 3 or 4 dark stripes radiate from orbit, of which 1 extends onto opercle and 1 extends ventrally below level of maxillary; ventral 1/4 of head may have some dark spots; dorsal surface of head entirely pale or pale from snout tip to interorbital region; ventral surface pale or with brown spots or bands; posterior margin of opercular flap may be darkly pigmented. Body: brown with white mottling, extent of mottling varying from occurring along entire body length to only on posterior 1/8 of body; mottling may extend onto dorsal and anal fins; pale area occasionally extending along dorsal body contour; series of small, dark spots and occasionally pale spots on dorsal body contour. Dorsal fin: dusky with pale distal margin and up to 5 faint, dusky bands on posterior half. Anal fin: dusky with pale distal margin and up to five faint dusky bands. Pectoral fin: dark brown on proximal half; brown area sharply demarcated from pale distal half. Pelvic fin: pale with up to 4 dark-brown bands. Caudal fin: dark brown with pale distal margin; small pale spots scattered over brown area.

RELATIONSHIPS.—*Ophiclinus pectoralis* is most closely related to *O. gracilis* and *O. ningulus.* Among these 3 species *O. pectoralis* and *O. ningulus* have the snout length equal to or shorter than the orbital diameter. In *O. gracilis* the snout length is equal to or longer than the orbital diameter. In *O. pectoralis* and *O. gracilis* there is a cirrus on the anterior nostril, paired pores at various cephalic sensory canal pore positions, no predorsal bones, and each, or many, of the interradial membranes of the dorsal fin bears a cirruslike projection. *Ophiclinus ningulus* lacks cirri, has only single pores at cephalic canal pore positions, and has a predorsal bone. (For distinguishing characters see also key to *Ophiclinus* and discussion of species groups under generic account.) The color pattern of the pectoral fin immediately distinguishes *O. pectoralis* from all other species of *Ophiclinus.*

ETYMOLOGY.—The specific name is derived from

the Latin *pectoralis* (of the breast) and refers to the distinctive coloration of the pectoral fins.

REMARKS.—In the holotype the ventroanteriormost preopercular pore position bears a pair of pores on the left side but only 1 pore on the right side of the head. A pair of pores occurs in this position on both sides of all the paratypes.

HOLOTYPE.—WAMP P.25770-006, male, 52.0 mm SL, bay on northeast side of Sandy Hook Island, Recherche Archipelago, Western Australia, 34°01'S, 122°00'E, among sand and weed, 13 m, collected by J. B. Hutchins and C. W. Bryce, 11 Apr 1977.

PARATYPES.—USNM 219565, male and ?male, 36.5 and 22.5 mm SL, collected with the holotype. WAMP P.26008-008, female and male, 31.0 and 40.0 mm SL, Mondrain Island, Recherche Archipelago, Western Australia, 34°08'S, 122°15'E 13 m, collected by J. B. Hutchins, 21 Mar 1978, rotenone. WAMP P.25758-015, female, 31.1 mm SL, Fish-Hook Bay, Rottnest Island, Western Australia, 32°01'S, 115° 27'E, among reef, sand, and weed, 8 m, collected by J. B. Hutchins, 8 Mar 1977. AMS I.20222-013, female, 38.2 mm SL, Mondrain Island, Recherche Archipelago, Western Australia, collected by B. Russell and A. Kuiter, 21 Mar 1978.

Peronedys Steindachner

Peronedys Steindachner, 1884:1083 [type-species: *Peronedys anguillaris* Steindachner by monotypy].

Eucentronotus Ogilby, 1898:294 [type-species: *Eucentronotus zietzi* Ogilby by monotypy].

Scleropteryx Waite, 1906:207 [first, and invalidly, proposed in synonymy by Ogilby, 1894, based on DeVis ms; validated by Waite; type-species *Ophioclinus devisi* Ogilby by original designation of Waite].

DIAGNOSIS.—Dorsal fin LXXVI–LXXXIV,2–4, dorsal-fin origin at vertical posterior to opercle by ½–1 opercle length; pectoral-fin shorter than orbital diameter; pelvic-fin shorter than orbital diameter; 9–15 (usually 10) pores in dorsoanterior portion of lateral line; eyes lateral; posteriormost point of opercle at or above level of horizontal septum of body; scales small, few present on anterior ⅓–⅔ of body, becoming more numerous posteriorly; POL in HL 1.3–1.4; predorsal bones 2–4.

COMPARISON.—The high counts for dorsal-fin spines and segmented anal-fin rays, the presence of more than 1 segmented dorsal-fin ray, and the vestigial pectoral and pelvic fins (lengths less than orbital diameter), separate *Peronedys* from the other ophiclinins. *Peronedys* is superficially similar to *Stichanium*. Both genera have slender, eel-like bodies and body scales more numerous posteriorly.

REMARKS.—In his original description, Steindachner (1884) reported that *Peronedys* lacked pectoral fins. Steindachner's type specimen was not available to us, but we surmise that he probably overlooked the pectoral fins, which are minute (Figure 13*c*). McCulloch and Waite (1918) more accurately described the pectoral fin of *Peronedys* as follows: "no true pectoral, but membrane enclosing rudimentary rays is present, and is connected with the opercular lobe." The supposed lack of pectoral fins was also reported in the original descriptions of *Eucentronotus zietzi* and *Ophioclinus devisi* (Ogilby, 1894, 1898), both synonyms of *P. anguillaris*. Steindachner (1884) also reported the absence of vomerine teeth, which we believe to have been an error, in *Peronedys*.

Peronedys has not been reported as reproducing by ovoviviparity. We examined a female (SAMA F.2390) that had 5 near-term embroyos, which completely filled the body cavity.

SYNONYMY.—Although we did not examine Ogilby's type specimen of *Eucentronotus zietzi*, we believe that the following combination of characters reported by Ogilby (1898) could only pertain to *Peronedys* among the ophiclinins: dorsal and anal fins connected to caudal fin; anal fin originating at a level below the base of the 23rd or 24th dorsal-fin spine; pelvic fin shorter than "eye"; a single series of stout conical teeth on the vomer. Ogilby reported only 1 anal-fin spine in *Eucentronotus*, but he may have overlooked the presence of a second spine. D. Hoese (AMS) has examined the holotype of *E. zietzi* and informs us that it is a specimen of *Peronedys*. The types of both *Eucentronotus zietzi* and *Peronedy anguillaris* were collected from St. Vincent Gulf. McCulloch and Waite (1918) first synonymized *Eucentronotus* with *Peronedys*.

Ogilby (1894) first published the name *Scleropteryx*, which he obtained from a label with some specimens identified by DeVis. The name was not available from Ogilby because he listed it only as a synonym of *Ophioclinus*, and even stated that he had no intention of proposing DeVis' label name. He described a new species, *Ophioclinus devisi*, which he stated applied to the DeVis specimens. Waite (1906) validated *Scleropteryx* and stated that *O. devisi* "may tentatively be regarded as the type

of *Scleropteryx*" and "Ogilby's definition of *Ophioclinus* will therefore apply to *Scleropteryx*, and not to Castelnau's genus [*Ophiclinus*]." *Ophiclinus devisi* is a synonym of *Peronedys anguillaris*, hence *Scleropteryx* is a synonym of *Peronedys*.

Peronedys anguillaris Steindachner

FIGURE 13

Peronedys anguillaris Steindachner, 1884:1083 [holotype: St. Vincent Gulf, South Australia; location of holotype unknown, possibly at the Naturhistorisches Museum in Vienna].

Ophioclinus devisi Ogilby, 1894:373 [2 syntypes: AMS I.362, Queensland, Moreton Bay].

Scleropteryx bicolor DeVis in Ogilby, 1894:374 [manuscript name for *Ophioclinus devisi;* not available by reason of appearance only in synonymy, where it has been placed by various authors].

Neogunellus microchirus Herzenstein, 1896:7 [3 syntypes: ZIL 6640, South Australia, St. Vincent Gulf].

Eucentronotus zietzi Ogilby, 1898:294 [syntype: SAMA F.1491, South Australia, St. Vincent Gulf].

DESCRIPTION (character given in "Diagnosis" under *Peronedys* not repeated here).—Anal fin II,55–62; anal-fin origin at vertical from base of 24th–27th dorsal-fin spine; pectoral-fin rays 3 or 4; caudal fin 0–2 + 13 + 0–1; vomerine teeth uniserial; vomer with numerous fleshy papillae posteriorly; vertebrae 31–35 + 57–63 = 89–96; cephalic sensory pores simple; tube of anterior nostril proximal to dorsal margin of upper lip; hooklike process on cleithrum absent.

Lateral Line: Dorsoanterior series of 9-15 pores connected by diagonal series of pits to posterior midlateral series of pits; pored series originating at vertical above posterior ½ of opercle length and extending posteriorly to points varying from just posterior to opercle to ¾ distance between posteriormost point of opercle and dorsal-fin origin; midlateral series of pits ending on posterior portion of caudal peduncle.

Color Pattern: Head: pale with brown stripes extending from snout tip to posterior margin of opercle; dorsal surface with dark-brown stripes from snout tip to point midway between orbits; posterior to orbits, 7 or 8 brown bands extending to and fusing at position varying from above anterior margin to above posterior ½ of opercle length, continuing as dark stripe occupying upper ¼ of body to caudal-fin base. Body: pale with brown stripes, which are confluent with head stripes; all stripes not discrete for entire lengths; most stripes fusing at point on posterior ¼–⅛ of body length; stripes on lower ¼ of body fuse and form wide, darker stripe near anal-fin base (stripe not as dark as stripe below dorsal-fin base). Dorsal fin dark brown; anal fin brown with distal ½–⅔ pale; pectoral and pelvic fins pale; dorsal and ventral caudal-fin rays brown, center rays pale.

REMARKS.—Two specimens of *P. anguillaris* (the syntypes of *Ophioclinus devisi*) are labelled as having come from Moreton Bay, Queensland. Ogilby (1894) remarked that the smaller of his 2 specimens

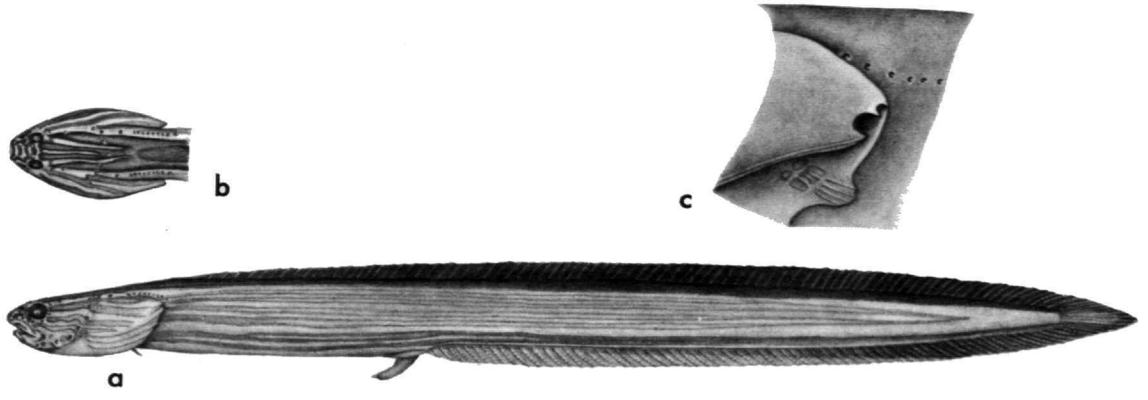

FIGURE 13.—*Peronedys anguillaris* (*a* and *b*, SAMA F.3594, male, 62.0 mm SL, lower jaw deformed, Kangaroo Island, South Australia): *a*, lateral view; *b*, dorsal view of head; *c*, SAMA F.2390, female, 77.5 mm SL, lateral view of pectoral fin. (Drawn by J. R. Schroeder.)

"is broken in two pieces." The head of this specimen now appears to be lost. The locality accorded the syntypes is much farther north than that known for any other specimen of ophiclinin and may be erroneous.

SYNONYMY.—Ogilby (1894) did not compare his *O. devisi* with *P. anguillaris*. We have examined the syntypes of *O. devisi* and find them to be normal specimens of *P. anguillaris*.

Herzenstein (1896) described *Neogunellus microchirus* and stated that the degeneration of the pectoral fins separated his species from other known species. Herzenstein's specimens are deposited in Leningrad and the lot (ZIL 6640) containing his *N. microchirus* material comprises 3 specimens, here considered to be syntypes. Herzenstein reported that his specimens have 90 dorsal-fin elements and 56 anal-fin elements. We were unable to examine these specimens but were able to obtain a radiograph of them. The specimens have 85-86 dorsal-fin elements (spines + rays) and 62-63 anal-fin elements, indicating that either Herzenstein was in error in his counts or that the specimen upon which the description is based is not among the lot of 3 specimens. We have not seen a specimen of *P. anguillaris* with more than 87 total dorsal-fin elements or less than 57 total anal-fin elements, and so we suspect Herzenstein's counts.

Herzenstein's description of *N. microchirus* generally agrees with *P. anguillaris*, especially the mention of rudimentary pectoral fins consisting of only 2 or 3 rays, the nature of the head pores, and the vomerine teeth. Herzenstein, however, reported that the pelvic fin had only 1 ray, which may be an error: the pelvic fin of all ophiclinins consists of an imbedded spine and 2 rays. Whitley (1940) first synonymized *N. microchirus* with *P. anguillaris*, but gave no basis for the synonymy.

The synonymy of *Eucentronotus zietzi* is discussed in "Synonymy" under the generic account of *Peronedys*.

MATERIAL EXAMINED.—N = 27; SL = 40.5–120 mm. SOUTH AUSTRALIA: USNM uncataloged (1 cleared and stained specimen); KANGAROO ISLAND, SAMA F.3594 (62.0), SAMA

TABLE 6.—Frequency distributions for certain meristic characters in the species of *Stichorium*

Species	Dorsal-fin spines									Segmented anal-fin rays							
	36	37	38	39	40	41	42	43	$\bar{x}$	33	34	35	36	37	38	39	$\bar{x}$
Stichorium dorsale																	
New South Wales						2	2	1	41.8				1	4			36.8
Victoria	1	-	3	4	1	2			38.9			2	1	6	1		36.6
Tasmania		2	5	8	10	10	7	2	40.1	1	1	5	12	18	7	1	36.6
South Australia	1	3	3	2	2				38.1			2	5	4			36.2
Western Australia				4	1				39.2		1	3	-	-	1		35.4
Stichorium clarkae																	
New South Wales			1	-	2				39.3			1	1	1			36.0
Victoria				1								1					
South Australia						1						1					
Western Australia			1	1					38.5			1	1				35.5

Species	Total vertebrae								Predorsal bones									
	56	57	58	59	60	61	62	$\bar{x}$	8	9	10	11	12	13	14	15	16	17	$\bar{x}$
Stichorium dorsale																			
New South Wales				2	2	1		59.8	1	2	-	1							9.2
Victoria			1	1	6	2		59.9				2	1	-	5	-	1		13.3
Tasmania			1	9	21	12	2	60.1		1	4	5	8	9	4				12.0
South Australia			3	3	4	1		59.3				1	2	2	2	1	-	1	13.4
Western Australia	1	1	2	-	1			57.8			2	3							10.6
Stichorium clarkae																			
New South Wales				1	2			59.7					1	2					12.7
Victoria				1										1					
South Australia					1								1						
Western Australia			1	1				58.5					1	1					12.5

F.2390 (12: 40.5–92.6), AMS I.20193-001 (6: 44.5-120), USNM 218785 (103), USNM 206172 (84.0); St. Vincent Gulf, ZIL 6640 (radiograph of 3 syntypes of *Neogunellus microchirus*, approximately 53–64 mm). QUEENSLAND: Moreton Bay, AMS I.362 (2 syntypes of *Ophioclinus devisi*, 74.8; smaller of the two is headless).

Sticharium Günther

Sticharium Günther, 1867:63 [type-species: *Sticharium dorsale* Günther, 1867, by monotypy].

Breona E.O.G. Scott, 1967:210 [type-species: *Breona greeni* E.O.G. Scott, 1967, by monotypy].

Diagnosis.—Dorsal fin XXXVI-XLIII,1; dorsal-fin origin at vertical approximately at anus; pectoral-fin longer than orbital diameter; pelvic-fin longer than orbital diameter; 32–42 pores (difficult to enumerate) in dorsoanterior portion of lateral line; eyes dorsolateral; posteriormost point of opercle below level of horizontal septum of body; scales inconspicuous, giving body a naked appearance, posteriorly more numerous and tending to follow lines of myomeres; POL in HL 1.2–1.4; predorsal bones 8–17.

Comparisons.—*Sticharium* is superficially similar to *Peronedys* in having an eel-like body and the scales more numerous posteriorly.

Synonymy.—Although we have not been able to examine the type specimen on which the genus *Breona* is based, information in the original description, which includes an illustration of the holotype of the type-species, *B. greeni*, together with data obtained from specimens in the Queen Victoria Museum identified as *Breona greeni* from the same locality as the type-species, convinces us that *Breona* is a synonym of *Sticharium*. Counts of fin elements, vertebrae, and predorsal bones for the *S. dorsale* syntypes agree with those for *B. greeni* specimens, and both groups of specimens have similar dorsal- and anal-fin origins.

E.O.G. Scott (1967) stated that *Breona* differed from *Sticharium* by having teeth on the vomer and by having 1 segmented dorsal-fin ray, and by not having the pelvic fins much longer than the pectoral fins. He reported vomerine teeth "disposed irregularly in a largish ovoid patch." In *B. greeni* specimens (including cleared and stained material), as in the *S. dorsale* syntypes, a single row of teeth is present on the vomer. Numerous papillae, which may be mistaken for teeth, are usually present behind the row of vomerine teeth. In the *B. greeni* specimens, the pelvic fins vary from shorter than, to longer than, the pectoral fins; therefore, the comparative lengths of these fins do not distinguish *Breona* from *Sticharium*.

Sticharium clarkae, new species

Figure 14*a*

Description.—Depressed tip of last segmented anal-fin ray extending to (specimens 55 mm SL and longer), or almost to (specimens less than 50 mm SL), level of caudal-fin base; upper jaw length 5.1–5.9 percent SL and pectoral-fin length 4.7–6.5 percent SL (specimens 45.0–71.5 mm SL); ventral insertions of pectoral fins above level of anal-fin base; distance between ventral insertions of pectoral fins 3.9–6.7 percent SL (specimens 45.0–71.5 mm SL). Dorsal fin XXXVIII-XLI,1; anal fin II, 35–37; anal-fin origin at a vertical from base of 3rd–6th dorsal-fin spine; pectoral-fin rays 8–11; caudal-fin 3–6 + 13 + 3–5; vertebrae 20–22 +38–39 = 58–60; cephalic sensory canal pore positions with single pores; depressed tube of anterior nostril reaches ventrally to or beyond dorsal margin of upper lip; no hooklike process on cleithrum.

Lateral Line: Dorsoanterior series of 36–42 pores originating above vertical at anterior ⅓–½ of opercle length, extending to point below vertical from base of 2nd–6th dorsal-fin spine; posterior midlateral series of pits originating above vertical from 3rd–5th anal-fin elements, ending on posterior portion of caudal peduncle; pits appear to correlate with myomeres.

Color Pattern: Head: sides brown mottled; ventral surface pale or brown mottled; upper ¼ pale; orbital rims with dark-brown bands. Body: sides brown mottled; upper ¼ and dorsal surface pale; horizontal septum with dark marks and small white spots. Dorsal fin: pale or with narrow, faint-brown bands. Anal, pectoral, and pelvic fins: pale or brown mottled. Caudal fin: dark brown.

Comparison.—The 2 *Sticharium* species are generally similar in appearance and close examination is necessary to distinguish them. In addition to the differentiating characters given in the key, the following characters may be useful in distinguishing the species: in *S. clarkae* the head tends to be pointed (bluntly rounded in *S. dorsale*); the lower lip tends to be fleshly with a protuberance extending

FIGURE 14.—*a*, *Stichariumclarkae*, new species, AMS I.16983-005, holotype, female, 55.0 mm SL, S. W. Anglesea, Victoria. *b* and *c*, head, tail of *Stichariumdorsale*, AMS I.17553-002, female, 55.0 mm SL, Coles Bay, Tasmania. (Drawn by J. R. Schroeder.)

anteriorly beyond the upper lip (not fleshly and without a protuberance in *S. dorsale*); the depressed tube of the anterior nostril usually extends ventrally well beyond the dorsal margin of the upper lip (usually does not extend ventrally beyond the dorsal margin of the upper lip in *S. dorsale*); and the pectoral-fin rays tend to be more slender than those of *S. dorsale*.

ETYMOLOGY.—Named for Dr. Eugenie Clark, University of Maryland, in recognition of her continued guidance and encouragement of the senior author.

HOLOTYPE.—AMS I.16983-005, female, 55.0 mm SL, SW of Anglesea, Victoria, Australia, collected by D. Hoese and party, 19 Mar 1972.

PARATYPES.—AMS I.18470-004, female, 71.5 mm SL, Robe, South Australia, shallow rock platform, collected by D. Hoese and party, 3 Oct 1975; AMS I.20217-001, 3 females, 55.2–69.0 mm SL, Montague Island (36°15′S, 150°14′E), New South Wales, collected by R. Kuiter, Dec 1977; AMS I. 20233-018, female, 49.1 mm SL, male, 45.0 mm SL, Canal Rocks, Cape Naturaliste, Western Australia, collected by B. Russell, 1 Apr 1978.

Stichariumdorsale Günther

FIGURE 14*b*,*c*

Stichariumdorsale Günther, 1867:63 [lectotype: BMNH 1863.10.14.36, New South Wales, Port Jackson; designated below].

Breona greeni Scott, 1967:210, fig. 3 [holotype: QVML 1966/5/10, Tasmania, Devon].

DESCRIPTION.—Depressed tip of last segmented anal-fin ray noticeably failing to reach level of caudal-fin base; upper-jaw length 4.1–5.1 percent SL (in specimens 54.2–72.0 mm SL); pectoral-fin length 6.3–7.9 percent SL (in specimens 54.5–71.8 mm SL); ventral insertions of pectoral fins below or at level of anal-fin base; distance between ventral insertions of pectoral fins 1.9–3.1 percent SL (in specimens 58.0–72.2 percent SL). Dorsal fin XXXVI-XLIII,1; anal fin II,33-39; anal-fin origin at vertical from base of 2nd–5th dorsal-fin spine; pectoral-fin rays 8–11; caudal fin 3–5 + 13 + 3–5; vertebrae 18–22 + 37–42 = 56–62; cephalic sensory canal pore positions with single pores; depressed tube of anterior nostril just reaches ventrally to dorsal margin of upper lip; no hooklike process on cleithrum.

Lateral Line: Dorsoanterior series of 32–42 pores originating above vertical over anterior ½ of opercle length, extending to point below vertical from base of 1st–6th dorsal-fin spine; posterior midlateral series of pits originating at point below last pore or at point above 1st–3rd anal-fin element, and ending on posterior portion of caudal peduncle; pits appear to correlate with myomeres.

Color Pattern: Three patterns occur: striped, melanistic, and marbled. The striped pattern is the most common, occurring in more than ½ of our specimens. The striped pattern is described as follows. Head: side and ventral surface brown mottled; lips banded with brown; 5–12 brown bands radiate from orbit; dorsal surface unpigmented. Body: sides yellowish or light brown, with darker brown stripes; stripes not discrete for entire lengths; most of dorsal surface unpigmented; median series of 10–26

hyphen-like marks extends onto posterior portion at caudal peduncle; occasionally a similar series of 13–18 marks occurs below dorsal-fin base; ventral surface pale. Dorsal fin: pale, speckled and banded with brown. Pectoral, pelvic, and anal fins: pale. Caudal fin: pale with brown spots. Males darker than females. Striped pattern occurs in specimens from New South Wales, Victoria, Tasmania, and South Australia. Refer to E.O.G. Scott (1967) for life-color descriptions.

The melanistic pattern occurs in only 5 specimens, all males (54.5–80.0 mm SL), from Victoria, Tasmania, and Western Australia. Head: sides and ventral surface dark brown to nearly black; dorsal surface dark or unpigmented. Body: sides dark brown to nearly black, occasionally with unpigmented area dorsally; venter darkly pigmented or pale. Dorsal fin: pale or dark brown with distal pale margin; 1 specimen with black blotches on dorsal fin and body. Pectoral, pelvic, and anal fins: pale. Caudal fin: brown with pale distal margin.

The marbled pattern occurs in only 1 specimen, a female from Western Australia. Head: anterior ⅕ pale, but tubed anterior nostrils dark brown; 3 brown stripes ventral and posterior to orbit; dorsal surface of head dark yellow and marbled with brown. Body: brown mottled; dorsal surface of anterior ⅕ of body dark yellow and marbled with brown. Dorsal fin: brown mottled. Pectoral, pelvic, and anal fins: pale. Caudal fin: black with pale distal margin.

LECTOTYPE DESIGNATION.—We here designate the specimen BMNH 1863.10.14.36, a 61.0 mm SL male, collected from Port Jackson, New South Wales, as lectotype of *Stichārium dorsale*. The paralectotype bears the catalog number BMNH 1863.10.14.37.

REMARKS.—E.O.G. Scott (1967) reported that in *Breona greeni* the teeth in both jaws become uniserial or biserial posteriorly. We have observed only the uniserial condition. Scott also reported the presence of 4 or 5 rows of teeth anteriorly in the lower jaw, where we observed only 2 or 3 rows.

The free edge of the branchiostegal membrane is often crenulated, the numerous crenulae appearing papillae-like. The crenulae are best observed on wet specimens.

One-way analyses of variance indicate that there are significant differences in the means for counts of dorsal-fin spines. ($p < .001$, [4,76], $F_s = 8.34$, $N = 71$), predorsal bones ($p < .001$ [4,53], $F_s = 9.04$, $N = 58$), and total vertebrae ($p < .001$, [4,71], $F_s = 7.99$, $N = 76$) in specimens from different localities. Differences in the means for counts of segmented anal-fin rays from different localities are not significant ($p > .50$, [4,71], $F_s = 1.63$, $N = 76$). (See Table 6.)

MATERIAL EXAMINED.—N = 76, 23.0–88.0 mm SL. WESTERN AUSTRALIA: CAPE NATURALISTE: Bunker Bay, WAMP P.25195–024 (4: 64.0–80.3); RECHERCHE ARCHIPELAGO: Mondrain Island, AMS I.20222-019 (71.7). SOUTH AUSTRALIA: SPENCER GULF, USNM 128796 (3: 74.0–88.0); LAKE WANGARY, SAMA F.1870 (76.0); KANGAROO ISLAND, AMS I.20162-017 (4: 43.4–84.0), AMS I.20171-077 (3: 23.0–70.1). NEW SOUTH WALES: USNM 218784 (45.5); PORT JACKSON, BMNH 1863.10.14.36 (lectotype of *Stichārium dorsale*, 61.0), BMNH 1863.10.14.37 (paralectotype of *Stichārium dorsale*, radiograph); LONG REEF, AMS I.16237-005 (43.0); BATEHAVEN, AMS DFH 76-2 (42.0). VICTORIA: SW of ANGLESEA, AMS I.16983-007 (9: 25.0–71.6); BELLS BEACH, AMS I.16980-008 (2: 63.0–67.5). TASMANIA: COLES BAY, USNM 211880 (4: 49.0–71.0), AMS I.17553-002 (17: 45.0–75.0); DEVON: Greens Beach, USNM 205386 (10: 57.0–71.0, 2 cleared and stained), USNM 218776 (74.0), USNM 218771 (6: 23.0–58.5), USNM 218775 (68.5); SISTERS BEACH, AMS I.17544-001 (2: 59.2–74.0); EAGLEHAWK NECK, AMS I.17545-001 (3: 54.0–61.0).

Literature Cited

Bauchot, M. L.

1967. Catalogue critique des types de poissons du Muséum National D'Histoire Naturelle. *Publications Diverses du Muséum National D'Histoire Naturelle,* 21:3–70.

Castelnau, F. de

1872. Contribution to the Ichthyology of Australia, II: Note on Some South Australian Fishes. *Proceedings of the Zoological and Acclimatisation Society of Victoria,* 1:29–247.

1873. Contribution to Ichthyology of Australia, IV: Fishes of South Australia. *Proceedings of the Zoological and Acclimatisation Society of Victoria,* 2:57–82.

1875. Researches on the Fishes of Australia. *Official Record, Philadelphia Centennial Exhibition of 1876, Intercolonial Exhibition Essays, 1875-1876,* 11:1–52.

Gill, T.

1893. A Comparison of Antipodal Faunas. *National Academy of Science Memoirs,* 6 (5) :91–124.

Griffin, L. T.

1927. Additions to the Fish Fauna of New Zealand. *Transactions and Proceedings of the New Zealand Institute,* 58 (1) :136–160, plates 9–17.

Günther, A.

1862. *Catalogue of the Fishes in the British Museum,* 4: xxii + 534 pages.

1867. Additions to the Knowledge of Australian Reptiles and Fishes. *The Annals and Magazine of Natural History,* series 3, 20 (8) :45–68.

Herzenstein, S.

1896. Ueber einige neue und seltene Fische des Zoologischen Museums der Kaiserlichen Akademie der Wissenshaften. *Annuaire du Musée Zoologique, St. Pétersbourg,* 1:1–14.

Hoese, D. F.

1976. A Redescription of *Heteroclinus adelaidae* Castelnau (Pisces: Clinidae), with Description of a Related New Species. *Australian Zoologist,* 19 (1) :51–67.

Hubbs, Carl L. and K. F. Lagler

1949. Fishes of the Great Lakes Region. *Cranbrook Institute of Science Bulletin,* 26:1–213.

Hubbs, Clark

1952. A Contribution to the Classification of the Blennioid Fishes of the Family Clinidae, with a Partial Revision of the Eastern Pacific Forms. *Stanford Ichthyological Bulletin,* 4 (2) :41–165.

Hutton, F.

1872. Catalogue with Diagnoses of the Species. *In* Colonial Museum and Geological Survey Department, *Fishes of New Zealand,* pages 1-93.

1873. Contributions to the Ichthyology of New Zealand. *Transactions and Proceedings of the New Zealand Institute, 1872,* 5:259–272, 4 plates.

Jordan, D. S.

1923. A Classification of Fishes Including Families and Genera as Far as Known. *Stanford University Publications, University Series, Biological Sciences,* 3 (2) : 77–243 + i–x.

McCulloch, A. R.

1929. A Check-List of the Fishes Recorded from Australia, Part 3. *Australian Museum, Memoir,* 5:329–436.

McCulloch, A. R., and E. R. Waite

1918. Some New and Little-known Fishes from South Australia. *Records of the South Australian Museum,* 1 (1) :39–78, figures 26-31, plates 2-7.

Ogilby, D. J.

1894. Description of Five New Fishes from the Australasian Region. *Proceedings of the Linnean Society of New South Wales,* series 2, 9:367–374.

1898. New Genera and Species of Fishes. *Proceedings of the Linnean Society of New South Wales,* 23:280–299.

Olsen, A. M.

1958. New Fish Records and Notes on Some Uncommon Tasmanian Species. *The Papers and Proceedings of the Royal Society of Tasmania,* 92:155–159.

Pennrith, M. L.

1969. The Systematics of the Fishes of the Family Clinidae in South Africa. *Annals of the South African Museum,* 55 (1) :1–121, figures 1-48.

Richardson, J.

1843. Description of the Lurking Machete *(Machaerium subducens)* from the Northern Coast of New Holland. *Annals and Magazine of Natural History,* 12: 175–178, plate 6.

Scott, E.O.G.

1936. Observations on Some Tasmanian Fishes, Part III. *The Papers and Proceedings of the Royal Society of Tasmania,* 1935:113–129.

1965. Observations on Some Tasmanian Fishes, Part XIII. *The Papers and Proceedings of the Royal Society of Tasmania,* 99:53–65.

1966. Observations on Some Tasmanian Fishes, Part XIV. *The Papers and Proceedings of the Royal Society of Tasmania,* 100:93–115.

1967. Observation on Some Tasmanian Fishes, Part XV. *The Papers and Proceedings of the Royal Society of Tasmania,* 101:189–220.

Scott, T. D., C.J.M. Glover, and R. V. Southcott.

1974. *The Marine and Freshwater Fishes of South Australia.* 329 pages. South Australia: A. B. James, Government Printer.

Sokal, R. R., and F. J. Rohlf

1973. *Introduction to Biostatistics.* 368 pages. San Francisco: W. H. Freeman and Co.

Springer, V. G.
1970. The Western South Atlantic Clinid Fish *Ribeiroclinus eigenmanni*, with Discussion of the Intrarelationships and Zoogeography of the Clinidae. *Copeia*, 1970 (3) :430-436.

Springer, V. G., C. L. Smith, and T. H. Fraser
1977. *Anisochromis straussi*, New Species of Protogynous Hermaphroditic Fish, and Synonymy of Anisochromidae, Pseudoplesiopidae, and Pseudochromidae. *Smithsonian Contributions to Zoology*, 252: 15 pages.

Steindachner, F.
1884. Ichthyologische Beiträge (XIII): I, Beiträge zur Kenntniss der Fische Australiens. *Sitzungsberichte der Akademie der Wissenschaften, Wien, Mathematische-Naturwissenschaftliche Classe, 1883*, 88 (1): 1065–1113.

Waite, E. R.
1906. Descriptions of and Notes on Some Australian and Tasmanian Fishes. *Records of the Australian Museum*, 6 (3) :194–210, plates 34-36.
1921. Catalogue of the Fishes of South Australia. *Records of the South Australian Museum*, 2 (1) :1–208.

Whitley, G. P.
1932. Studies on Ichthyology, No. 6. *Records of the Australian Museum*, 18 (6) :321–348.
1940. Illustrations of Some Australian Fishes. *Australian Zoologist*, 9 (4) :397–428.
1941. Ichthyological Notes and Descriptions. *Australian Zoologist*, 10 (1) :1–50.
1968. A Check-List of the Fishes Recorded from the New Zealand Region. *The Australian Zoologist*, 15 (1): 1–102.

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