PAPERS AND PROCEEDINGS OF THE ROYAL SOCIETY OF TASMANIA, VOLUME 101.

# OBSERVATIONS ON SOME TASMANIAN FISHES: PART XV

By

E. O. G. SCOTT

(With three text figures)

## ABSTRACT

A new Ophiclinid genus is established and its haplotype is described and figured. Two species are added to the Tasmanian list and the inclusion of one is confirmed. General observations, usually accompanied by a table of dimensions, are made on these and several other species (some points of special interest noticed below).

Secondary sexual dimorphism is found in several Ophiclinids, females having relatively longer trunk, with concomitantly greater value for the ratio of dorsal base to anal base. A second lateral line, hitherto unreported, has been observed in *Ophiclinus* Castlenau, 1872, *s. str.*, and a lateral line in *Ophiclinops* Whitley, 1932.

Rajidae.—*Raja whitleyi* Iredale, 1938: inclusion in Tasmanian list confirmed; several characters commonly relied on to separate this species from *Raja lemprièri* Richardson, 1845 found to be inconstant. Clinidae.—*Clinus perspicillatus* Cuvier & Valenciennes, 1836: frequency distribution of spines of second dorsal and frequency distribution of rays for each spine number both approximately symmetrical, suggesting separate genetic mediation of radial elements in two sections of fin (pigmentation also probably dual controlled); secondary sexual dimorphism parallels that of Ophiclinids. *Petraïtes phillipi* (Lucas, 1891): abnormal individual. *Petraites heptaeolus* Ogilby, 1885: parous at 44 mm; intromittent organ described. Ophiclinidae.—Key to Tasmanian species. *Ophiclinus aethiops* McCulloch & Waite, 1918: added to Tasmanian list; original account extended; present material (apparently the first reported since types) poses a question of the distinctness of this species from *O. gabrieli* Waite, 1906. *Ophiclinus greeni* Scott, 1936: anal spines 2, not 3 as originally reported; notes on a parous female. *Ophiclinus gabrieli* Waite, 1906: anal, reported as without spines, has 2; dentition; possible conspecificity with *O. aethiops* discussed; cephalic neuromast system described. *Ophiclinops varius* (McCulloch & Waite, 1918): metrical data. *Breona greeni gen. et sp. nov.*: described and figured. Tripterygiidae.—Key to Tasmanian species. *Brachynectes fasciatus* Scott, 1957: added to Tasmanian list; emendations to, and expansion of, original account.

Some notes are given on the catches at two surf angling contests.

## INTRODUCTION

This paper follows the general plan of others in the series. Certain conventions are regularly observed: (*a*) *unit of measurement.*—where the unit of a length measurement is not stated, millimetre(s) is to be understood: (*b*) *standard deviation.*—whether for direct citation or in the computation of derived quantities (standard errors, coefficient of variation), 'ordinary' or unadjusted standard deviation, with division by $n$, not $(n-1)$, has been calculated, regardless of size of sample: (*c*) *locality.*—the county name is included in Tasmanian localities: (*d*) *sequence of specification.*—where 2 or more specimens are noted in the one context, the sequence of citation of the relevant specification is, where the sexes are not distinguished, that of increasing size of fish, as measured by standard length (rarely, if standard length is for any reason inappropriate, by total length), or, where the sexes are distinguished, by a similar sequence within the sexes: (*e*) *abbreviations.*—*Ls, Lt* denote standard length, total length, respectively; *TLs, TLt,* signify thousandths of standard, of total, length.

## Family RAJIDAE

The Check-List carries only one Tasmanian entry, (*i*) *Raja lemprièri* Richardson, 1845 (type locality: Port Arthur [Pembroke], Tasmania), but admits two from Bass Strait (much of which is Tasmanian territorial water), (*ii*) *R. nasuta* Müller & Henle, 1841, (*iii*) *R. nitida* Günther, 1860. In the Handbook Munro (1956) admits as Tasmanian (*i*) and (*iii*), confining (*ii*) to Victoria: he adds (*iv*) *R. cerva* Whitley, 1939, (*v*) *R. whitleyi* Iredale, 1938. Earlier Whitley (1940) had listed for this State (*i*), (*iii*) (as *Pavoraja nita*) (*iv*), with (*ii*) (as *Zearaja nasuta*) from Bass Strait.

The only authority for the local occurrence of *R. whitleyi* appears to be Munro: Scott, writing later (1962) listed only New South Wales, Victoria, South Australia (the last an addition to the Check-List distribution). The appearance of this species on our list is confirmed by the specimens noted below.

In view of the fact that examination of this material shows that some characters commonly relied on—*e.g.*, in key by Scott (1962: 47)—to separate *R. whitleyi* (the nomenclature of which appears to have received more attention than have its external features) and *R. lemprièri* are not constant, it is perhaps inexpedient at this stage to key the Tasmanian forms. [Whitley (1940) has referred, further, to the occurrence of confusion between *R. whitleyi* and two other species, *R. dentata* Klunzinger, 1872 (for which he proposes the subgenus *Dentiraja*) and *R. ogilbyi* Whitley, 1939 (referred to the genus *Spiniraja* Whitley)].

## Genus **RAJA** Linné, 1758

### *Raja whitleyi* Iredale, 1938

*Raja oxyyrhynchus* Castelnau, 1872, *Proc. Zool. Acclim. Soc. Vict.*, 1: 244. *Non Raja oxyrhynchus* Linné, 1758.

*Raja rostrata* Castelnau, 1873, *Intercol. Exhib. Essays*, No. V (*Vict. Offic. Rec. Philad. Exhib.*): 17. Type locality: Melbourne, Victoria. Preoccupied *by R. rostrata* Lacépède.

*Raia scabra* Ogilby, 1888, Cat. Fish. Aust. Mus., 1: 17. Type localities: Manly, New South Wales, and Port Phillip, Victoria. Preoccupied by *R. scabra* Linné, 1764.

*Raja whitleyi* Iredale, 1938, *Aust. Zool.*, 9, 2: 169. Type locality: Port Phillip, Victoria.

*Distribution.*—Under the entry *R. scabra* Ogilby, the Check-List (McCulloch, 1929: 24) gives New South Wales, Victoria (type localities). Whitley (1940) admits only Victoria; while Scott (1962: 49) adds to the Check-List distribution South Australia; however, earlier, Munro (1956: 15) had listed Tasmania (along with New South Wales and Victoria). Specimens here noted serve to confirm the Tasmanian record.

*Material.*—The following observations are based on (*a*) a female, disc width 454; (*b*), (*c*), (*d*) 3 males, disc widths 455, 498, 603, caught at the Tasmanian Open Surf Angling Championships, Swimcart Beach, St Helens, Dorset, on 7th, 8th May, 1966 (see general notes on this meeting, below). Unfortunately, in accordance with the standard practice at such competitions, the tips of the tails were severed upon presentation of the fish at the check-point. At the conclusion of the contest the specimens were made available by the St Helens Surf Angling Club, and have since been handed over to the Queen Victoria Museum, Launceston (Reg. Nos. 1966/5/6-9).

*Spines.*—Throughout this section an entry consisting of three digits following a decimal point on the right of a zero denotes a linear measurement expressed as a decimal fraction of greatest disc width of the relevant specimen.

The number and arrangement of spines exhibit considerable variation, involving, in some cases, marked departure from standard accounts: attention is called to some of these divergences by quotation of the relevant passages in the treatment of the species in Scott's work on the fishes of South Australia (1962: 48-49, unnumbered fig. on p. 49). (*i*) 'Two sharp spines in the mid-line of the disc, behind the eyes': in (*a*) 1, stout, with broad buckler-like base 0.095 behind spiracles; in (*b*), (*c*), (*d*) 6, 3, 4, lying 0.070, 0.086, 0.099 behind spiracles, the series extending over 0.137, 0.035, 0.090. (*ii*) 'A row of six to seven spines on either side of the mid-line, at the posterior end of the disc': in (*a*), (*c*), (*d*) no spines here; in (*b*) on left 3 weak, 1st 0.700 from snout tip, series extending 0.077, on right none. (*iii*) 'The tail bears a median row of 11 to 12 spines between its base and the first dorsal fin': (*a*), (*b*), (*c*), (*d*) with 18, 23, 12, 10 spines (14, 15, 7, 10 of them fairly large), extending over 0.269, 0.396 (ending 0.048 in front of dorsal), 0.253, 0.367; this series beginning behind origin (on upper surface) of pelvic by 0.121, 0.044, 0.100, 0.075: in all our examples tips of tails are missing. (*iv*) 'The sides of the tail are armed with a single row of smaller spines' [the presence of this series is used in Scott's key (1962: 47) in distinguishing this species from *R. lemprièri* Richardson, 1845]: (*a*), (*b*), (*d*) have on left 10, 19, 13 spines, extending over 0.163, 0.305, 0.180, on right 11, 17, 11 spines, extending over 0.181, 0.297, 0.204; this series begins in (*a*) 0.011 behind, in (*b*), (*d*) 0.088, 0.041, respectively, in front of, level of freely lying pelvics; no spines on sides of tail in (*c*). (*v*) In (*b*) 1 spine barely in front of, just internad of, eye, 0.015 from orbit; in (*d*) on right, 2 spines, one on level with front of eye, 0.007 from orbit, the other 0.008 in front of this, on left 3 spines, hindmost on transverse level with orbit, 0.007 from it, next 0.005 in front of 1st, 3rd 0.005 in front of 2nd; in (*a*), (*c*) no spines near eyes [the absence of spines near the eyes in males is a feature used in Scott's key in separating this species from *R. lemprièri*; they are present in 2 of our 3 males]. (*vi*) 'The disc above and below is covered with small prickles, which are longer and sharper on the snout'; upper surface wholly covered, except (all specimens) outer part of small first lobe of pelvics, a marginal strip, 1-2 mm wide, on larger pelvic lobe, and in places along the margin of the pectoral; lower surface wholly covered back to, or somewhat beyond, level of maximum width of disc, behind which there is a bare subtriangular marginal strip, 0.055, 0.077, 0.060, 0.050 wide anteriorly, decreasing to, or almost to, zero at posterior end of disc, a marginal bare strip on pectoral, a bare area (reniform in (*a*), (*b*), (*c*), rectangular in (*d*)) at base of tail, its median anteroposterior extent 0.038, 0.066, 0.070, 0.056. (*vii*) In all specimens a median ridge, lying behind the region bearing the median spines noted for (*a*) in (*ii*), is rougher, and carries larger prickles, than the adjoining skin; best developed in (*c*), in which it begins 0.040 behind the 3rd median spine, and extends back through 0.351 to origin of supracaudal series.

*Caudal ridge.*—A pronounced white fleshy fringe runs along either side of the tail, extending the whole length of the appendage as preserved; in (*b*) it is less well developed posteriorly than anteriorly.

*Coloration.*—'Disc coloured slate grey above, white below, the upper surface and tail with irregular white spots and flecks.' The white spots are not recorded for *R. lemprièri*. In (*a*), (*b*), (*c*), (*d*) there are on each upper half of the disc upwards of 100, 30-40, about 30, 90-100 small spots or irregular splashes of white: on tail, in (*a*) 7-9 on each side, extending to present (mutilated) tip; (*b*) 2 on right, 1 on left lying 0.220 from dorsal origin of tail (tail is recognizable as an appendage more anteriorly above than below); (*c*) none; (*d*) 7-8 on right, 3 on left, extending back 0.003 from dorsal origin of tail.

*Buccal processes.*—The processes around the free posterior margin of the left nasal lobe of (*a*) number 15, well developed; in sequence from the inner side, 1 with 3 branches, 2 double, 1 single, 2 double, 1 single, 5 double, 1 single, 1 double, 1 single; followed by 6 barely developed, little more than a series of crenulations.

*Proportions.*—Some proportions, expressed as thousandths of the greatest width of the disc, are set out in Table I. As already mentioned, the tip

TABLE I

*Raja whitleyi* Iredale, 1938. Dimensions, expressed as thousandths of disc width, of 3 males and 1 female from Swimcart Beach, Dorset, Tasmania, 7th, 8th May, 1966

| *Dimension* | Specimen (Sex; disc width, mm) | | | |
|---|---|---|---|---|
| | (*a*) ♀ 454 | (*b*) ♂ 455 | (*c*) ♂ 498 | (*d*) ♂ 603 |
| Width at front of eyes | 520 | 495 | 494 | 484 |
| Width at front of vent (across pelvics only) | 233 | 308 | 247 | 282 |
| Width at front of vent (across pectorals) | 573 | 571 | 602 | 481 |
| Distance behind snout tip at which disc width is twice that distance | 26 | 30 | 24 | 111 |
| Length to junction of disc and pelvics (upper surface) | 729 | 765 | 755 | 748 |
| Length to hind border of pelvics, as they lie | 927 | 985 | 975 | 881 |
| Total length | .... | .... | 1400 | .... |
| Length to front of vent, length of vent | 745, 42 | 785, 46 | 757, 40 | 756, 30 |
| Length to front of eyes | 229 | 232 | 230 | 234 |
| Length of eye, width of eye | 43, 30 | 46, 38 | 42, 28 | 36, 27 |
| Interocular | 85 | 97 | 86 | 91 |
| Spiracle: length (anteroposterior), oblique width | 15, 26 | 22, 29 | 22, 27 | 23, 30 |
| Interspiracular distance (between inner borders) | 107 | 110 | 111 | 116 |
| Length to nostril | 170 | 174 | 171 | 178 |
| Nostril: oblique diameter of narial chamber, of external aperture | 42, 12 | 44, 11 | 48, 12 | 40, 10 |
| Internarial: between inner edges of narial basin, of external lobes | 96, 151 | 97, 149 | 82, 153 | 90, 142 |
| Length to free border of upper lip | 207 | 202 | 211 | 208 |
| Length to middle of anterior margin of upper tooth band | 214 | 214 | 221 | 212 |
| Exposed mesial anteroposterior extension of upper tooth band | 18 | 16 | 16 | 17 |
| Length to middle of posterior margin of lower tooth band | 233 | 233 | 241 | 250 |
| Exposed mesial anteroposterior extension of lower tooth band | 13 | 11 | 16 | 13 |
| Total width of tooth band: upper, lower | 148, 139 | 136, 125 | 135, 122 | 145, 124 |
| Width of mouth cleft | 151 | 151 | 159 | 157 |
| Distance between external borders of nasal lobes: maximum, minimum | 159, 152 | 166, 147 | 165, 146 | 163, 147 |
| Gill slits: lengths to slits | 344, 368, 388, 407, 418 | 360, 385, 409, 431, 451 | 361, 386, 408, 428, 446 | 355, 380, 403, 423, 441 |
| Gill silts: lengths of slits | 22, 22, 20, 20, 17 | 22, 20, 18, 18, 16 | 30, 27, 22, 20, 16 | 30, 30, 25, 20, 13 |
| Gill slits: distances between right and left slits | 273, 253, 227, 187, 156 | 262, 248, 226, 193, 171 | 251, 245, 223, 183, 147 | 255, 249, 216, 179, 154 |
| Length to origin of tail as free appendage on ventral surface | 848 | 895 | 859 | 846 |
| Tail: width at origin on ventral surface, depth here | 74, 37 | 82, 46 | 78, 36 | 79, 36 |
| Tail: width at origin on dorsal surface | 93 | 103 | 84 | 103 |
| First dorsal: length to origin, base, height | .... | .... | 1189, 80, 53 | .... |
| Interdorsal | .... | .... | 18 | .... |
| Second dorsal: base, height | .... | .... | 72, 40 | .... |
| Clasper: free inner length, outer length | .... | 78, 48 | 102, 50 | 100, 56 |
| Clasper: width at outer attachment, depth there | .... | 15, 9 | 16, 8 | 18, 9 |
| Distance between bases of claspers | .... | 57 | 52 | 51 |
| Outer pelvic lobe: length of external border, of internal border (chords) | 123, 57 | 110, 66 | 100, 50 | 113, 71 |
| Inner pelvic lobe: length of external border, of internal border (chords) | 141, 95 | 154, 90 | 163, 104 | 174, 80 |

of the tail was chopped off immediately the entry was handed in at the check-point: however, the severed section of (*b*) was recovered, making possible the measurement of total length in that individual.

## Family **CLINIDAE**

### Genus **CLINUS** Cuvier [1816]

### *Clinus perspicillatus* Cuvier & Valenciennes, 1836

*Clinus perspicillatus* Cuvier & Valenciennes, 1836, Hist. Nat. Poiss., xi: 372. Type locality: Westernport, Victoria (Quoy & Gaimard).

*Clinus despicillatus* Richardson, 1839, *Proc. Zool. Soc. Lond.*: 97. Type locality: Port Arthur, Tasmania.

*Dorsal radial pattern.*—Published counts of the spines of the first dorsal are invariable at three, and no other number has been observed in any specimen examined by the writer: this is the characteristic number among Australian Clinids, though counts of three and two have been noted for *Petraïtes johnstoni* (Saville-Kent, 1866).

The traditional ranges for the second dorsal of the present species of xxxii-xxxiv + 3-5, as reported by McCulloch (1908: 43) and still cited in Scott (1962: 253), were extended in the last contribution in this series to xxxi-xxxv + 2-5. While this range stands, and while no new southern material has been obtained to permit further investigation of a formally significant difference in mean number of dorsal radial elements reported in Part XIV (Table VI: 106) as characterizing samples from Taroona, Buckingham, and Green's Beach, Devon, examination of additional examples from the latter locality has made evident an interesting feature of the overall second dorsal pattern, the existence of which can now with hindsight be observed in the frequency distributions of these samples (1966, Table VII: 107), but which is perhaps there not immediately obvious.

Table II exhibits the frequency distribution of 203 northern fish from Green's Beach (comprising (*a*) three pooled sets of 29 specimens specified earlier (1966: 105) and newly examined sets of (*b*) 23, (*c*) 15, (*d*) 96, (*e*) 40 collected by Mr R. H. Green on 5th April, 11th September, 17th October, 19th December, 1965, respectively); together with (*f*) the 11 southern fish from Taroona, collected by Mr C. Scott, previously reported on (1965: 60; 1966: 105). It will be observed: (*i*) the pooled frequency distribution of number of spines, shown in the extreme right-hand column of the table, is tolerably symmetrical and approximates a binomial distribution with initial and terminal curtailment (*cf* $(0.5 + 0.5)^5$ which yields 7, 33, 67, 67, 33, 7); (*ii*) for a given spine number the modal ray count occurs centrally, and the distribution shows some approach towards symmetry (the pooled figures—2 rays, (1 fish), 3 (38), 4 (152), 5 (23)—exhibiting, like the spine totals, some degree of negative asymmetry); (*iii*) the patterns exhibited by the pooled values are more or less evident also in the sectional totals (thus, *e.g.*, for the 96 specimens of the largest sample the distribution of spine number found is (0), 21, 41, 31, 3, 0: the expansion of $(0.5 + 0.5)^5$ gives 3, 15, 30, 30, 15, 3). These results would suggest, first, that spine number and ray number in the second dorsal fin are controlled by separate genetic mechanisms; secondly, that the mechanism is in each case polygenic.

A further indication of the behavioral independence of the two sections of the second dorsal is afforded by the pigmentation, which differs notably in the spinous and rayed regions in respect both of its nature and its time of onset. The history of the large spinous portion is as follows. At standard lengths below about 20 (some variation is found both in individuals and in samples), this region is either (*a*) wholly clear, or (*b*) if not clear, it may be tinged yellow proximally, with or without some distal duskiness, or may exhibit about 6 yellowish areas at subequal intervals (the modal situation in non-clear fins), or, occasionally, may present some early indication of the replacement of the yellow areas by dusky bars. Subsequent development results in the strengthening of these bars, till each comes to involve about 3 spines, and often leads also to their more definite association with 6 dark spots in a line along the dorsal profile of the body, which themselves expand, reinforcing this association. The general gradients of this progressive pigmentation of the fin are from basal to proximal, and from anterior to posterior regions. Still later, pigmentation may be laid down between the bars, most commonly in the form of 2-3 subspherical clusters of melanophores on each spine, and, on the membrane, diffuse clouding, more or less intense and extensive according to the general degree of pigmentation of the individual. The short rayed portion of the dorsal may remain wholly clear of pigmentation in individuals of standard length of 60, and upwards: when pigmentation is present, which is seldom the case in fish of *Ls* less than 50, it first involves the rays, in sequence caudad, after which the punctulation may briefly invade the outer portion of the membrane between the 1st and 2nd rays, and, subsequently, usually to a lesser extent, that between the 2nd and 3rd rays, only exceptionally extending further caudad—at all stages the rayed portion almost invariably standing out as conspicuously lighter overall than the spinous portion.

*Frequency distribution of anal rays.*—For 136 specimens (29 from Green's Beach, 11 from Taroona, both specified in Part XIV, 96 from Green's Beach collected 18th, 19th December, 1965) the frequency distribution of the anal rays is 21 (1 fish; from Taroona), 22 (5), 23 (36), 24 (64), 25 (29), 26 (1, from Green's Beach); the good approach to symmetry probably being indicative of ray number being under allelic control. As is the case with the dorsal rays noted above (214 specimens), the arithmetic mean is less (though here less markedly so) than the unitary mode.

*Secondary sexual dimorphism.*—The finding, noticed under Ophiclinidae in this contribution, of the existence in members of that family there discussed of regular differences in overall size and in certain proportions characterizing the sexes has suggested the examination of data for a Clinid for which fairly extensive series are available to ascertain if they occur also in this group. Three samples have been examined, containing 67 (29 males), 17 (8 males), 14 (4 males), all from Green's Beach

TABLE II.

*Clinus perspicillatus* Cuvier & Valenciennes, 1836. Frequency distribution of spines and rays of second dorsal fin for 203 specimens from Northern Tasmania, 11 from Southern Tasmania (specifications of series *(a)*-*(f)* in text)

| Formula $S_i$ $R_i$ | Northern | | | | | | Southern | Pooled | |
|---|---|---|---|---|---|---|---|---|---|
| | *(a)* | *(b)* | *(c)* | *(d)* | *(e)* | Total | *(f)* | $\Sigma S_i R_i$ | $\Sigma S_i$ |
| xxxi, 2 | | | | | | | | 0 | |
| 3 | 1 | 1 | 1 | 2 | | 5 | | 5 | 36 |
| 4 | 1 | 4 | 5 | 18 | 2 | 30 | | 30 | |
| 5 | | | | 1 | | 1 | | 1 | |
| xxxii, 2 | | | | | | | | 0 | |
| 3 | 2 | 3 | 2 | 10 | | 17 | | 17 | 82 |
| 4 | 11 | 4 | 3 | 26 | 11 | 55 | | 55 | |
| 5 | 2 | 1 | | 5 | | 8 | 2 | 10 | |
| xxxiii, 2 | 1 | | | | | 1 | | 1 | |
| 3 | 1 | 3 | 1 | 6 | 2 | 13 | | 13 | 77 |
| 4 | 8 | 5 | 1 | 19 | 14 | 47 | 5 | 52 | |
| 5 | 1 | | | 6 | 4 | 11 | | 11 | |
| xxxiv, 2 | | | | | | | | 0 | |
| 3 | | | | | 3 | 3 | | 3 | 18 |
| 4 | 1 | 2 | 2 | 3 | 4 | 12 | 2 | 14 | |
| 5 | | | | | | | 1 | 1 | |
| xxxv, 2 | | | | | | | | 0 | |
| 3 | | | | | | | | 0 | 1 |
| 4 | | | | | | | 1 | 1 | |
| 5 | | | | | | | | 0 | |
| Total | 29 | 23 | 15 | 96 | 40 | 203 | 11 | 214 | 214 |

(17th October 1965, comprising the larger examples of the series used in Table II; 14th December 1964, portion of series quoted in Tables VI, VII, from Part XIV; part of a collection made on 18th, 19th December 1965, respectively) with the results here noted.

(*i*) *Absolute size.* Standard length ranges and means for the three series, in sequence as above, are: males 37.7-84.9, $\bar{x}$ 64.71 ± 1.57, females 46.8-84.3, $\bar{x}$ 61.59 ± 1.46; males 30.1-51.1, $\bar{x}$ 36.51 ± 2.32, females 24.4-43.8, $\bar{x}$ 33.03 ± 3.40; males 81.1-94.0, $\bar{x}$ 87.60 ± 2.29, females 69.1-86.0, $\bar{x}$ 79.49 ± 2.23. Female *Ls* is thus, in these samples, 95.2%, 86.2%, 91.0% of male *Ls*. It will be seen that, as might be expected with samples of this sort from general collections, the size ratio varies considerably. With variances high, there is in no instance a statistically significant difference in the sex means ($t$ = 1.20, 1.08, 2.0, respectively), but the occurrence in all samples of a male excess is probably indicative of the existence of an actual difference of overall size in the sexes in this species.

(*ii*) *Relative lengths of trunk.*—Ranges and means of trunk length, expressed as *TLs*, for the same samples are: males 123-190, $\bar{x}$ 148.6 ± 2.23, females 138-223, $\bar{x}$ 172.6 ± 3.74; males 130-159, $\bar{x}$ 144.5 ± 1.59 females 127-162, $\bar{x}$ 146.7 ± 3.18; males 146-173, $\bar{x}$ 156.8 ± 5.96, females 140-191, $\bar{x}$ 159.0 ± 5.17. The length, relative to standard length, of the trunk in males is thus, in these samples, 86.1%, 98.6%, 97.5% of that of the females; with the value for the largest sample possibly providing the best estimate of the ratio. With the 3 samples pooled, the difference of the male and female means yields $t$ = 4.42**.

(*iii*) *Relative lengths of vertical fins.*—Measurements needed for the calculation of the dorsal base/anal base ratio were not recorded for this material.

## Genus **PETRAITES** Ogilby, 1885

### *Petraïtes phillipi* (Lucas, 1891)

*Cristiceps phillipi* Lucas, 1891, *Proc. Roy. Soc. Vict.* (n.s.), iii; 11, pl. iii., fig. 2. Type locality: Port Phillip, Victoria.

*Petraïtes phillipi* (Lucas). McCulloch, 1908, *Rec. Aust. Mus.*, vii, 1: 43, pl. x, fig. 3.

*Occurrence.*—Three specimens, *Ls* 40.5 (parous female), 47.0 (male), 51.6 (parous female), obtained by Mr R. H. Green at Green's Beach, Devon, and noted in Part XIV (1966: 109) constitute the first record of the species for Tasmania. It is, however, apparently not uncommon here, other examples being present, in association with *Clinus perspicillatus* and other species, in intertidal rock-pool collections made at the same locality by Mr Green as follows: 2 specimens, probably females, *Ls* 34.7, 40.6, on 5th April 1965; 2, *Ls* 64.0 (female distended with young), 64.2 (female) on 11th September 1965; 16, *Ls* 46.0-81.1, $\bar{x}$ 64.2 ± 3.1, $\sigma$ 12.20 ± 2.16, *V* 19.0 ± 3.5 (8 females, 2 with young) on 18th, 19th December, 1965.

*Abnormal specimen.*—One fish of the December series, *Ls* 79.9, *Lt* 90.9, presents some unusual features. Both rostral and ocular tentacles are quite exceptional, exhibiting a complexity of ramification equalling, or exceeding, that characteristic of *P. johnstoni* (Saville-Kent, 1866), in which branching is more extensive than in any other common Australian Clinid (see Scott, 1966, fig. 1). The appendage surmounting the narial cylinder, normally a flattened ovate entire lobe, with major axis subequal to height of cylinder, is here a fairly stout rod terminating in 4 slender digitate processes, the longest reaching, with organ laid back, halfway to base of ocular tentacle. That tentacle, characteristically a rather broadly ovate or panduriform lamella, with distal margin entire, or at most but slightly crenulate, here presents a large flattened foursided flap, from the wide posterior border of which arise 6 long, very slender, tapering processes, several of which, when laid back, reach to base of 1st dorsal spine. Exceptional terminal processes (possibly resulting from the same physiological peculiarity as that which has produced excess development in the tentacles) characterize the dorsal spines. The 1st and 3rd spines of the first dorsal each bear a cluster of 4, the 2nd a group of 5, fingerlike appendages, the largest 3.5 long, equalling length of snout. A single filament occurs on each of the spines, though on none of the rays, of the second dorsal, ranging in length from rather less than one-third to more than half the length of the part of the spine (almost the whole extent) that is encased in membrane. Quite apart from its adventitious processes, the first dorsal is notably larger than customary, reaching, on being adpressed, to the base of the 7th, instead of the usual 2nd-4th, spine of second dorsal. On the other hand, the second dorsal and the anal, adpressed posteriorly, fail to achieve (commonly extending well beyond) the level of the hypural joint.

*Dorsal radial pattern.*—The range for dorsal spines and rays given by McCulloch (1908: 43), which incorporates that of the type material (Lucas, 1891: 11), and which is not transgressed by our earlier material (1966: 109), is iii, xxx-xxxii, 2-3. Three of the present series (one being the unusual individual just considered) have 4 rays. The frequency distribution for the second dorsal, with the 3 examples recorded in Part XIV included, is: xxx, 3 (8 fish), xxxi, 2 (3), xxxi, 3 (7), xxxi, 4 (1), xxxii, 3 (3), xxxii, 4 (1). The distribution (8, 11, 4) of the 3 spine classes and the distribution of rays (3, 7, 1) within the only one of these classes exhibiting more than one ray number follow, with reasonable fidelity for so small a sample, the general pattern already found in *Clinus perspicillatus;* and are probably indicative here also of separate genetic mechanisms for spine number and ray number, both involving alleles.

### *Petraïtes heptaeolus* Ogilby, 1885

*Petraïtes heptaeolus* Ogilby, 1885, *Proc. Linn. Soc. N.S.W.*, x: 225 [as *nom. nud.* on p. 10]. Type locality: Port Jackson [New South Wales].

*Cristiceps wilsoni* Lucas, 1891, *Proc. Roy. Soc. Vict.* (n.s.), iii: 10, pl. iii, fig. 1. Type locality: Port Phillip, Victoria.

*Corrections.*—In Part XIV (1966: 109) the trivial name is misspelt *heptaelus* in the first line of the synonymy; and in the two paragraphs under *Fin counts* xxx regularly appears in the second dorsal spine counts in error for xx.

*Remarks.*—This species was not reported from Tasmania for eighty years after its establishment, the first record for this State, based on 3 examples from Green's Beach, Devon, being made in Part XIII (1965: 59), 2 further specimens were later noted (1966: 109). Rock-pool collecting by Mr R. H. Green at Green's Beach on 18th, 19th December 1965 has yielded 2 females, (*a*) *Ls* 43.6, *Lt* 54.0, (*b*) *Ls* 52.4, *Lt* 64.0, the smaller containing a number of embryos, a record that reduces the already small size (*Ls* 55.5, *Lt* 65.0) reported for a parous female. Both fish have D. iii, xxvii, 1 + 2; A. ii, 20. Three examples, all from Green's Beach, have been noted in the collections of the Queen Victoria Museum, Launceston—(*c*) male, *Ls* 44.9, *Lt* 54.2, D. iii, xxviii, 1 + 2, A. ii, 21; (*d*) male, *Ls* 49.4, *Lt* 61.0, D. xxviii, 1 + 2, A. ii, 21; (*e*) female, *Ls* 54.9, *Lt* 64.5, D. iii, xxvii, 1 + 2, A. ii, 19. Specimens (*c*), (*d*) (labelled *Clinus perspicillatus*) were collected by Mr R. H. Green on 5th May, 1962, (*e*) is without date.

*Intromittent organ.*—The intromittent organ, which is pale yellow, without markings, shows a semicircular anterior basal fold, deepest mesially, from which projects a forwardly curved subconical process with, on its anterior surface, near its distal one-third, a large crescentic groove or slit, bounded below by a tumid lip and overhung by the distal portion of the main process, the tip of which is perforated. With minor variations, chiefly of proportions, this description is applicable to *Petraïtes phillipi* and to *Clinus perspicillatus*: the general formation differs considerably from that of the intromittent organ of one South African clinid, *Pavodinus litorafrontis* Penrith, 1965, figured by Penrith (1965, fig. 1), but agrees tolerably well in basic plan with that of *Gynutoclinus rotundifrons* (Barnard, 1937) shown (fig. 4) in the same paper. However, while specimen (*c*) was being examined, a slender tubular extension (not previously observed by the writer in any local species), about one-third as long as the rest of the organ, became extruded through the aperture hitherto terminal; shortly afterwards spontaneously retracting to become invisible. Partial redeployment was brought about by the application of pressure near the base of the penis.

*Disposition of dorsal rays.*—The general disposition of the dorsal rays as figured by McCulloch (1908, pl. xi, fig. 1)—the 2nd and 3rd rays close together, the 2nd separated from the 1st by an interval considerably exceeding that between 1st ray and last spine—characterizes all Tasmanian examples studied, but in our material the last 2 rays do not always run more or less parallel, as depicted, but commonly are bowed, coming to lie much closer together near the middle of their length than at their approximately equally disparted proximal and distal ends. In some individuals the 1st ray is much closer to the last spine than the latter is to the penultimate spine. The general pattern of the dorsal rays remains, however, highly characteristic, permitting the recognition of the species at a glance.

*Disposition of anal rays.*—The echoing of the dorsal rays by the posterior rays of the anal, as shown by McCulloch, but noted by him as not being invariable, is in our material a quite unusual arrangement.

## Family **OPHICLINIDAE**

The retention of the family name Ophiclinidae in preference to Stichariidae has been discussed earlier (1965: 61; 1966: 113).

Species known to occur in Tasmania—all the distribution entries postdating the Check-List—are: (*i*) *Ophiclinus greeni* Scott, 1936 (Tasmania only), (*ii*) *Ophiclinus gracilis* Waite, 1906 (also Victoria, New South Wales); (*iii*) *Ophiclinus gabrieli* Waite, 1906 (also Victoria); (*iv*) *Ophiclinops varius* (McCulloch & Waite, 1918). Of these (*i*) was described since the Check-List appeared, (*ii*) was reported by Olsen (1958: 57) from George Bay, Somerset/Cornwall; (*iii*) (*iv*) have been noted in these observations (1965, 1966). To this list may now be added (*v*) *Ophiclinus aethiops* McCulloch & Waite, hitherto known (Scott, 1962: 250) only from the original material taken at Kangaroo Island, South Australia, (*vi*) *Breona greeni gen. et sp. nov.*

A key to Tasmanian and ad-Tasmanian species is supplied, and some observations are made on all locally occurring forms, a good series of *Ophiclinus aethiops* providing material for an extended description of this little-known species, including the question of its status *vis-à-vis O. gabrieli.*

*Lateral line.*—The lateral line in the best-known genus of the Ophiclinidae, namely, *Ophiclinus sensu lato,* has hitherto been reported either (*a*) as being restricted to a rather short segment, made of contiguous tubules, running longitudinally a little below the dorsal profile, and not extending noticeably beyond level of end of adpressed pectoral (*Ophiclinus, sensu stricto*), or (*b*) as being obsolete (*Ophiclinops,* as that genus is understood in these Observations; see Part XIV, p. 113). In *Ophiclinus greeni* and in fish here determined as *O. aethiops* and *O. gabrieli* a second lateral line segment, in the form of a line of regularly spaced pores, originating behind and below the tubulous segment, and running (either from, or very shortly after, its anterior end) more or less horizontally, near the midlateral line, along the rest of the trunk and most, or all, of the tail has been observed. In *Ophiclinops varius,* stated to be without any lateral line, there has been detected a mediolateral series of pores, taking its origin a little behind the head, and extending to, or almost to, caudal base. In the newly described *Breona greeni,* which is without ordinary scales on the body, there occurs (in addition to a long anterior, superior line of tubules, reaching to, or beyond, level of vent) a median row of spaced scales on the tail. Details are noted under the several species, and the complete lateral line system is schematically depicted for *Ophiclinus aethiops* (Fig. 1) and for *Ophiclinops varius* (Fig. 2). With some indication, as in, *e.g., O. aethiops,* first, of some downturn of the upper segment, and, secondly, of the presence of one or two pores located on the downward and backward line drawn from the last tubule to the first pore of the midlateral series, the overall arrangement in *Ophiclinus, s.s.,* thus approaches the general plan found in the Clinidae: in *Ophiclinops,* however, we seem to be presented with the more common unspecialized single mediolateral pore-line. In the compilation of the subjoined key it has been assumed that the nature of the lateral line found in the species of

*Ophiclinus* and *Ophiclinops* it has been possible to examine characterizes also the remaining species.

*Secondary sexual dimorphism.*—It has been found that the relative length of the trunk, and, concomitantly, the magnitude of the ratio dorsal base/anal base are greater in females than in males.

## KEY TO TASMANIAN AND AD-TASMANIAN OPHICLINIDAE

The key includes [in square brackets] two species not hitherto reported from Tasmania, *Ophiclinus antarcticus* Castelnau, 1872, *Ophiclinops pardalis* (McCulloch & Waite, 1918). The unsatisfactory state of our present knowledge of the status of *Ophiclinus gabrieli* Waite, 1906 and *O. aethiops* McCulloch & Waite, 1918 is reflected in recourse being had in couplet 6 to quoted specifications.

1 { One lateral line. Pectoral shorter than eye. Dorsal originating behind head by about an eye diameter 2
1 { Two lateral lines. Pectoral longer than eye. Dorsal originating either above head or behind head by about a head length .... 3

2 { Dorsal spines > 48 (53). Anal rays > 33 (39). Trunk > $2\frac{1}{2}$ (about $2\frac{3}{4}$) in length behind vent without caudal fin .... [*Ophiclinops pardalis*]
2 { Dorsal spines < 48 (41-44). Anal rays < 33 (26-29). Trunk < $2\frac{1}{2}$ (about 2) in length behind vent without caudal fin .... *Ophiclinops varius*

3 { Dorsal originating above head. Dorsal base/anal base > 1.2 (1.3-1.7). Tubular anterior segment of lateral line < head .... 4
3 { Dorsal originating behind head (by about a head length). Dorsal base/anal base < 1.2 (10.-1.1). Tubular anterior segment of lateral line > head .... *Breona greeni*

4 { Total dorsal and anal radial elements > 98 (100-103). Anterior segment of lateral line 'a little longer than eye'; extending about to level of 3rd dorsal spine .... [*Ophiclinus antarcticus*]
4 { Total dorsal and anal radial elements < 98 (75-95). Anterior segment of lateral line at least twice eye; extending beyond level of 3rd dorsal spine (to about 5th—10th) .... 5

5 { Dorsal originating above opercular border (without lobe). Pectoral < postorbital head. Total dorsal and anal radial elements > 86 (87-95). Not conspicuously bicolor .... 6
5 { Dorsal originating in advance of opercular border (without lobe). Pectoral ≧ postorbital head. Total dorsal and anal radial elements < 86 (76-85). Conspicuously bicolor .... 7

6 { 'Vomerine teeth pointed, forming an angular row or series' .... *Ophiclinus gabrieli*
6 { 'Vomerine teeth' [mostly] 'tubercular, forming a triangular' [or other shaped] 'patch' .... *Ophiclinus aethiops*

7 { Dorsal spines < 45 (43). Anterior segment of lateral line strongly arched; markedly bent down posteriorly, its tip about on the horizontal line joining upper border of eye and upper angle of caudal peduncle .... *Ophiclinus gracilis*
7 { Dorsal spines > 45 (46-49). Anterior segment of lateral line nearly straight; not, or scarcely, continued obliquely downwards posteriorly, its tip equidistant from dorsal profile and the horizontal line joining upper border of eye and upper angle of caudal peduncle .... *Ophiclinus greeni*

## Genus **OPHICLINUS** Castelnau, 1872

### *Ophiclinus aethiops* McCulloch & Waite, 1918

(Figure 1)

*Ophiclinus aethiops* McCulloch & Waite, 1918, *Rec. S. Aust. Mus.*, I, 1: 57, fig. 29. Type locality: Kangaroo Island [South Australia].

*Ophiclinus aethiops* McCulloch & Waite. McCulloch, 1929, *Mem. Aust. Mus.*, V. iii: 352. *Id.* Scott, 1962, Marine and Fresh Water Fishes of S. Aust.: 249, unnumbered fig. on p. 250.

*Remarks.*—This species, based on a holotype 65 long and a second 'slightly smaller' example, was one of the three new species of *Ophiclinus, sensu lato,* described by McCulloch & Waite in their observations on the genus in 1918. As recently as 1962 Scott stated it had not been collected since.

*Tasmanian record.*—Ten specimens, (*a*)-(*j*), *Ls* 99.0-125.6, $\bar{x}$ 109.77 ± 2.79, $\sigma$ 8.81 ± 1.97, *V* 8.0 ± 1.8, *Lt* 110-138.2, $\bar{x}$ 121.59 ± 2.99, $\sigma$ 9.33 ± 2.08, *V* 7.7 ± 1.7, are included in a fine collection of rock-pool fishes obtained with the use of rotenone at Green's Beach, Devon, by Mr R. H. Green on 18th, 19th December 1965. One individual was secured on the 18th, the others, from the same pool, the next day.

*Status.*—The present material is referred to this species with some hesitation. If it is not *O. aethiops* it is *O. gabrieli* Waite, 1906; its examination raising some question as to the distinctness of these two forms. The key to 6 species of *Ophiclinus, s.l.*, given by McCulloch & Waite (1918: 55) makes a primary division into one group with pectoral longer than eye, lateral line present anteriorly, and another with pectoral shorter than eye, lateral line obsolete [dorsal commencing well behind head]; the second group constituting the genus *Ophiclinops* Whitley, 1932 [as understood by T. D. Scott (1962: 250, 251) and in these Observations (1966: 113)]. A subdivision of *Ophiclinus, s. str.,* sets in contrast a section (containing ? *O. sulcatus* (Castelnau, 1872) and *O. aethiops*) with vomerine teeth 'tubercular, forming a triangular patch', and a section (*O. gabrieli* and *O. gracilis*) with vomerine teeth 'pointed, forming an angular row or series'. In the Green's Beach material the vomerine teeth exhibit characters that, taken independently, could lead to their relegation to either one, or to both, of the categories of the key. They are mostly tubercular, but one or two, or several, may be pointed; they may be disposed chiefly in a patch, with or without some prolongation backward from the angles of the base, or the most prominent feature of the set may be an angular arrangement, with some additional teeth occurring near the apex of the inverted *V*: where this last-described arrangement obtains there is a tendency for at least some of the teeth on the limbs of the inverted *V* to be pointed. The differences are not strictly correlated with sex, though the diffuse tubercular patch is perhaps somewhat more noticeable in females.

Apart from dentition, the features in which *O. gabrieli* and *O. aethiops* are described as differing are (*i*) dorsal formula, (*ii*) anal formula, (*iii*) coloration: these may now be considered. (*i*) Only one dorsal count, Ii, 1, is reported for *O. gabrieli*

and only one, liv, 1, for *O. aethiops*. Our material embraces both these values, yielding li, 1 (*c*), lii, 1 (*a*), liii, 1 (*g*), liv, 1 (*b*), (*e*), (*f*), (*h*), (*i*), lv, 1 (*j*), lvii, 1 (*d*). (*ii*) *O. gabrieli* stands alone among the species of *Ophiclinus, s. l.*, described this century in having the anal formed wholly of soft rays; all other such species being reported as possessing 2 or (*O. gracilis* Waite, 1906) 3 spines [an original report of 3 spines for *O. greeni* Scott, 1936, has since been altered to 2 (see under that species in the present contribution)]. However, it is to be remarked that from an external examination the initial elements of the anal in the present material might well be taken to be soft rays, the more so as, in several specimens, these and/or more caudal elements present a curious (quite illusory) suggestion of being branched. Dissection of 3 examples reveals 2 non-septate elements, the first small, at the beginning of the anal. (*iii*) As regards color pattern all the females and the smallest male can be taken to be well represented by the illustration of the holotype of *O. gabrieli* (Waite, 1906, pl. xxvi, fig. 7; fig. 6 in legend): the other males tend to be more uniformly dark brown, and would seem visually to qualify quite well for a trivial name of *aethiops*. Unfortunately the only available illustration of *O. aethiops* is the original simple outline figure (washed in evenly in Scott's South Australian handbook). Black dots on the head body and fins reported for the type are noted as lacking in a 'slightly smaller example'; *O. gabrieli* is described as having fins other than anal and caudal without markings: no conspicuous system of black dots is present in the Green's Beach fish. 'Dorsal and anal fins with alternate light and dark bands, the former the narrower' (*O. aethiops*) would scarcely be a natural description of any of our specimens, though some of them exhibit darker and lighter regions; the relative disposition of which is, however, highly variable. Pectorals, ventrals and caudal appear to be in a few individuals all or severally immaculate: other examples exhibit irregular spotting, ranging from rather conspicuous to barely discernible.

With overlapping in dorsal count and with partial conformity in respect of specification of dentition and coloration exhibited by the present material when set against these features as reported for *O. gabrieli* and *O. aethiops*, the sole criterion left would seem to be the composition of the anal; here *O. aethiops* is unequivocally indicated. In view, however, of the uniqueness within *Ophiclinus, s.l.*, of the wholly articulated anal radial complement reported for *O. gabrieli*, the question as to whether *O. aethiops* is a synonym of Waite's species remains open.

If correctly attributed to *Ophiclinus aethiops* McCulloch & Waite, 1918, these specimens provide the first record of this species for Tasmania (and apparently the first report of the fish since the original account).

*Possible age groups.*—Individual standard lengths are recorded (along with some proportions) in Table III. It will be seen examples (*h*), (*i*), (*j*) are noticeably larger than the rest. With the sample divided into two groups of 7 and 3, *Ls* specifications of (*a*)-(*g*) are range 99.0-106.1, $\bar{x}$ 104.29 ± 0.93, $\sigma$ 2.45 ± 0.65, *V* 2.1 ± 0.6; and for (*h*)-(*j*) range 115.0-125.6, $\bar{x}$ 122.57 ± 1.58, $\sigma$ 2.73 ± 1.09, *V* 2.2 ± 0.9. The difference of means is highly significant ($t = 9.34^{**}$); the values of *V* are suggestive of homogeneous groups: two age populations are quite probably represented.

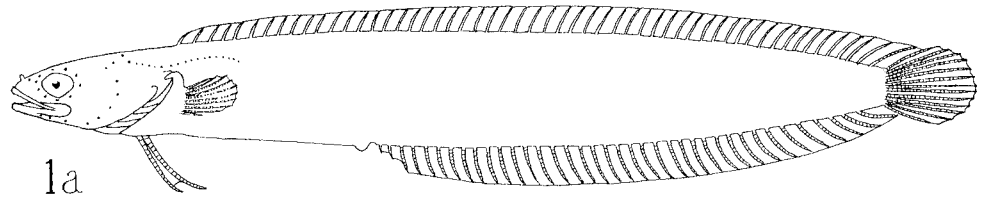
*Sex ratio.*—There are 6 males, 4 females.

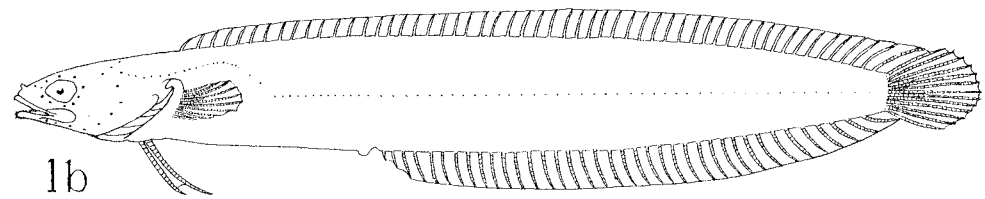
*External genitalia.*—The penis, which is regularly protruded, is strongly convex posteriorly and laterally, slightly convex, flat, or slightly concave anteriorly; anteroposterior basal diameter 0.5-0.7 transverse basal diameter, the latter subequal to the protruded length, which is subequal to vertical height of anal fin; the crescentic slit invisible from behind, more or less concentric with the whole half ellipse of the periphery of the anterior face, or approaching the margin more nearly at the tip than at the base of the organ, its front lip with a median sulcus, its hind lip entire. Females present an aperture of variable size, the margin more or less complexly lobed, situated at the posterior end of an ovate or pyriform bulbous region, widest anteriorly, with 10-12 longitudinal ridges or plicae running its whole length, which somewhat exceeds distance of opening from origin of anal fin.

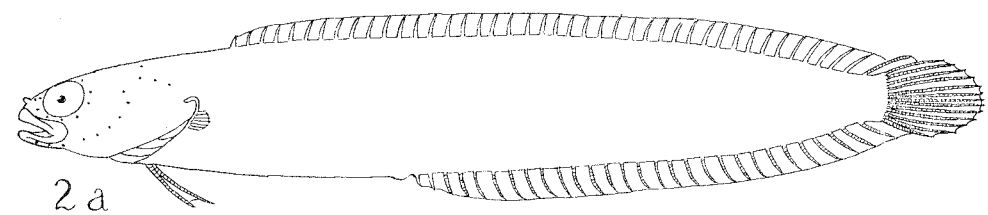
*Secondary Sexual dimorphism.*—(*i*) *Absolute size.*—If two age groups are represented, as *Ls* distribution suggests, females are consistently somewhat smaller than males, the *Ls* of females among specimens (*a*)-(*g*) being 99.0-105.0 $\bar{x}$ 102.17 ± 1.55, compared with the male 105.5-106.1, $\bar{x}$ 105.88 ± 0.11 (for difference of means $t = 3.05$); and among specimens (*h*)-(*j*) 118.0-124.1, $\bar{x}$ 121.05, against the single entry 124.8. On this assumption of ages, and with these extremely limited data, the mean increase in standard length on proceeding from the first to the second age group would be 15% for females, 18% for males.

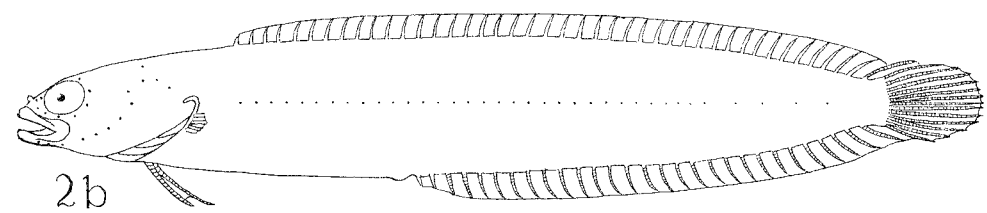
(*ii*) *Relative lengths of primary body regions.*—Sexual dimorphism obtains in the relative lengths of two, possibly all, of the primary body regions, head, trunk, tail. Length to vent, as *TLs*, is for females 430-453, $\bar{x}$ 442.0 ± 4.86, for males 398-415, $\bar{x}$ 404.3 ± 2.38: the means are significantly different ($t = 6.85^{**}$). The additional precaudal length is wholly, or almost wholly, accounted for by the trunk, the difference in head length (females 199-214, $\bar{x}$ 205.0 ± 2.81, males 195-208, $\bar{x}$ 202.6 ± 1.66), while possibly representing a small real variation, not being statistically significant ($t = 0.73$). For females *TLs* trunk lengths are 225-254, $\bar{x}$ 237.0 ± 5.3, for males 193-214, $\bar{x}$ 201.5 ± 2.1: *t* for difference of means is $5.72^{**}$. Some relative excess in coelomic volume in females of a viviparous fish is perhaps not unexpected. In the present sample, taken as a whole, the relative excess in trunk length in females is sufficiently pronounced to outbalance the deficit (mean 14.9%) in absolute length of female fish; the mean absolute trunk length in females being 25.2, in males 22.7.

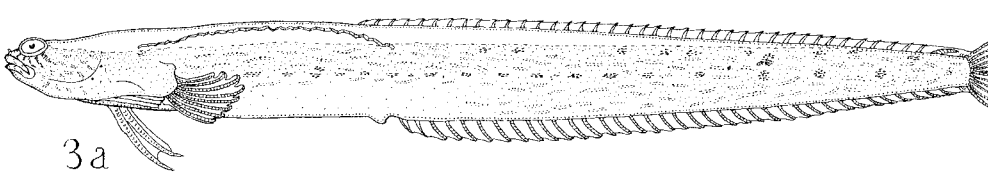
(*iii*) *Relative lengths of vertical fins.*—As a concomitant of shorter length behind vent, females have the anal base (extended along almost the whole caudal length) relatively shorter than males, the fin base (measured here between bases of first and last rays, omitting posterior membranous attachment) being, in terms of *TLs*, 509-526, $\bar{x}$ 515.3 ± 3.5 in the former, 539-553, $\bar{x}$ 543.7 ± 2.4 in the

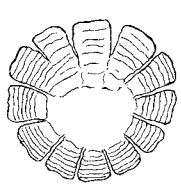


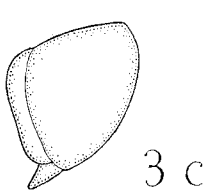




FIG. 1.—*Ophiclinus aethiops* McCulloch & Waite, 1918, to illustrate the lateral line: both figures semidiagrammatic, natural size. *a.*—Fish as conventionally depicted; lateral line consisting only of a short anterosuperior segment of tubules (redrawn from original figure of holotype). *b.*—Showing an additional lateral line segment (mediolateral series of pores), as observed in Tasmanian specimens.

FIG. 2.—*Ophiclinops varius* (McCulloch & Waite, 1918), to illustrate the lateral line: both figures semidiagrammatic, natural size. *a.*—Fish as conventionally depicted; without lateral line (redrawn from original figure of holotype). *b.*—Showing a lateral line (mediolateral series of pores), as observed in Tasmanian specimens.

FIG. 3.—*Breona greeni gen. et sp. nov. a.*—Holotype, female: x 2. *b.*—One of a line of spaced scales occurring along mediolateral line (fish otherwise scaleless): x *ca* 125. *c.*—Intromittent organ of a paratype, lateral aspect: x 20.

latter: for difference of means $t = 2.94^*$. On the other hand, the dorsal base, extending on to both precaudal and caudal regions, is found to be relatively longer in females (768-808 $\bar{x}$, 791.5 $\pm$ 14.3; against 769-805, $\bar{x}$ 786.0 $\pm$ 5.4), the difference being, as would be expected (tail length being much greater than—more than twice—trunk length) less than for anal base. The difference in relative lengths of the dorsal in the sexes thus disclosed is slight and is statistically non-significant. However, it quite probably represents a genuine distinction—in this connexion it will be convenient here to make reference to Table III.

Table III serves two purposes, the second being to present a summary of the position in respect to the lengths (as *TLs*) of the vertical fins in 7 Ophiclinids, 3 species being represented only by estimates based on the figures of the holotypes. It will be noticed that, except for dorsal base in *Breona greeni sp. nov.* (an exception discussed below), the following propositions regularly hold good where data for the sexes are available: female dorsal base exceeds male dorsal base; male anal base exceeds female anal base; the ratio dorsal base/anal base is greater in females than in males. Despite the lack, in the case of some individual species, of statistically significant difference between male and female variates, the overall regularity of the pattern disclosed in the table would seem to afford good ground for believing the results recorded are indicative of genuine sexual dimorphism. The one departure from the symmetrical disposition of the maximum means, the displacement, in *Breona greeni sp. nov.*, of that for dorsal length upwards from the female cell in the table to the male cell, actually affords, of course, additional support for the general propositions involved. The close approximation to unity of the ratio dorsal base/anal base in this species—the exhibition of which constitutes the first purpose of Table III—taken in conjunction with the usual male excess over female of anal base, necessarily leads to a relatively greater length in male of dorsal base, which in this species has become virtually equivalent to caudal length and anal base.

(*iii*) *Coloration.*—Females are consistently lighter than males in general ground color. A distinction on the flank between a darker region above, and a lighter region below, the midlateral line, barely developed in most males and conspicuous in none, is more pronounced, both in intensity and in sharpness of demarcation, in all females. All fins tend to be darker in males; the difference characterizing the whole length of the fin in dorsal, anal and caudal, but being more pronounced proximally in pectorals and ventrals.

*Fin counts.*—D. li, 1 (*c*); lii, 1 (*a*); liii, 1 (*g*); liv, 1 (*b*), (*e*), (*f*), (*h*), (*i*); lv, 1 (*j*); lvii, 1 (*d*). A. ii, 36 in 5 fish; with 35 rays in (*e*), (*g*), 34 in (*a*), (*c*), and 33 in (*b*). Different numbers of rays in the two pectorals occur in (*j*) with left 10, right 11; (*f*) l. 10, r. 12; (*c*), (*h*) l. 12, r. 11: while (*a*), (*b*), (*e*), (*g*) have 12, and (*d*) has 13 rays, in both fins. C. 13 (main rays), except (*e*), 14. Branchiostegals 4.

*Comparison of proportions.*—Direct comparisons of the 8 proportions recorded by McCulloch & Waite appear below, each entry comprising range, mean, standard deviation, coefficient of variation of our 10 examples, followed in parentheses by the single value of the original description.

Head in standard length 4.7-5.1, 4.91 $\pm$ 0.04, 0.12 $\pm$ 0.03, 2.4 $\pm$ 0.5 (5.5). Depth at origin of anal in head 1.4-1.6, 1.55 $\pm$ 0.02, 0.063 $\pm$ 0.01, 4.1 $\pm$ 0.9 (1.3). Eye in head 5.4-6.1, 5.73 $\pm$ 0.08, 0.25 $\pm$ 0.06, 4.4 $\pm$ 1.0 (4.2). Snout in eye 1.0-1.4, 1.20 $\pm$ 0.03, 0.10 $\pm$ 0.02, 8.2 $\pm$ 1.9 (1.6). Interorbital in eye 1.2-1.5, 1.34 $\pm$ 0.03, 0.10 $\pm$ 0.02, 7.4 $\pm$ 1.7 (2.5). Pectoral in head 2.2-2.7, 2.48 $\pm$ 0.05, 0.15 $\pm$ 0.04, 6.2 $\pm$ 1.4 (2.6). Inner ventral ray in head 1.9-2.4, 2.11 $\pm$ 0.04, 0.13 $\pm$ 0.03, 6.0 $\pm$ 1.4 (1.7). Last dorsal spine in head 3.6-4.4, 4.02 $\pm$ 0.03, 0.093 $\pm$ 0.02, 2.3 $\pm$ 0.5 (3.1). The most striking discrepancy between published and present values, which occurs in the ratio interorbital in eye (our range 1.2-1.5, holotype 2.5), is possibly attributable to different conventions for the measurement of interorbital (unless, indeed, 2.5 is a misprint for 1.5). Snout, taken in our measurements from most advanced point on fish, is perhaps taken by McCulloch & Waite from tip of upper jaw.

*Proportions as TLs.*—A more extensive series of proportions, calculated as thousandths of standard length, for each of the 10 individuals, is set out in Table IV. The measurement entered as 'depth at caudal peduncle (minimum)' is the depth at the level of the bases of the last ray elements of the vertical fins. Arithmetic mean, standard deviation and coefficient of variation, having been calculated as a matter of routine, are here recorded for ready reference. Over and above their value as formal specifications of the material, the first and second of these are most immediately useful in the direct comparison of other material, of the same or an allied species, with the present series; the chief interest in the third being somewhat more general, residing in the contribution it makes to the question of the magnitude of relative variation to be expected in data of this type—a matter touched upon on various occasions in these Observations (*e.g.* 1953: 143; 1965: 59, 60): for the 34 items in Table IV, *V* ranges from 0.8 to 9.4, with a mean of 4.93, and a mode, with unitary classes, of 6.

As might be expected in a sample covering so small a general size range, no clear correlation between any recorded dimension and *Ls* presents itself; though full head, the (*h*), (*i*), (*j*) entries for which are the lowest, may possibly become relatively shorter in larger fish.

*General description.*—McCulloch & Waite's account is brief, consisting of little more than a record of the 8 proportions noted above, 5 lines on color markings, and a statement that the species is similar in structure and dentition to *O. sulcatus* (as described by them), from which it is noted as differing, however, in having fewer radial elements in the dorsal and anal. A more extended description of this little-known species is here offered; complementing the fin counts and proportions recorded above.

Head 1.1-1.3, $\bar{x}$ 1.16 (females), 0.9-1.1, $\bar{x}$ 0.99 (males) in trunk, which is 2.2-2.5, $\bar{x}$ 2.36 (females), 2.8-3.1, $\bar{x}$ 2.97 (males) in tail without caudal fin.

TABLE III

Seven Ophiclinids. Dorsal and anal bases, both as thousandths of standard length (*TLs*), and dorsal base/anal base ratio: to illustrate (*a*) the distinctive low value of dorsal base/anal base, approximating unity, in *Breona greeni gen. et sp. nov.*; (*b*) sexual variation in relative lengths of vertical fins in all species considered

| Species | | Dorsal base, *TLs* | | Anal base, *TLs* | | Dorsal base/anal base | | Material |
|---|---|---|---|---|---|---|---|---|
| | | Range | Mean | Range | Mean | Range | Mean | |
| *Breona greeni* .. | ♂ | .. | 621.3 | .. | 605.6 | .. | 1.026 | 1 specimen |
| | ♀ | 591–595 | 593.0 ± 1.4 | 566–569 | 567.5 ± 1.1 | 1.04–1.05 | 1.045 ± 0.007 | 2 specimens |
| *Ophiclinops varius* | ♂ | 710–717 | 714.7 ± 1.9 | 478–503 | 488.3 ± 6.1 | 1.43–1.48 | 1.462 ± 0.012 | 3 specimens |
| | ♀ | 712–731 | 723.2 ± 4.7 | 451–495 | 483.7 ± 7.0 | 1.44–1.62 | 1.497 ± 0.027 | 5 specimens |
| *Ophiclinops pardalis* | | .. | *ca* 757 | .. | *ca* 589 | .. | *ca* 1.28 | Estimated from figure of holotype |
| *Ophiclinus greeni* .. | ♂ | 769–809 | 783.0 ± 5.6 | 494–524 | 512.3 ± 3.9 | 1.46–1.60 | 1.527 ± 0.018 | 6 specimens |
| | ♀ | 768–823 | 794.7 ± 5.7 | 485–521 | 495 ± 3.5 | 1.51–1.69 | 1.597 ± 0.022 | 9 specimens |
| *Ophiclinus gracilis* .. | | .. | *ca* 747 | .. | *ca* 472 | .. | *ca* 1.58 | Estimated from figure of holotype |
| *Ophiclinus aethiops* | ♂ | 769–805 | 786.0 ± 5.4 | 539–553 | 543.7 ± 2.4 | 1.52–1.70 | 1.570 ± 0.030 | 6 specimens |
| | ♀ | 768–807 | 791.5 ± 7.2 | 509–526 | 515.3 ± 3.5 | 1.62–1.67 | 1.647 ± 0.090 | 4 specimens |
| *Ophiclinus gabrieli* .. | | .. | *ca* 782 | .. | *ca* 505 | .. | *ca* 1.55 | Estimated from figure of holotype |

Elongate, maximum depth 7.1-7.9, $\bar{x}$ 7.37, depth at origin of anal 1.4-1.6, $\bar{x}$ 1.55, in *Ls;* the greatest depth occurring at about the middle of the trunk in 4 specimens, at two-thirds of trunk in 1, at about middle of trunk and vent jointly in 2, at two-thirds of trunk and vent in 1, at vent only in 2. Moderately compressed, maximum thickness 9.5-10.7, $\bar{x}$ 10.20, thickness at vent 10.8-15.4, $\bar{x}$ 12.43, thickness at middle of tail without caudal fin 15.1, 17.7, $\bar{x}$ 16.77, in *Ls:* or these 3 thickness in corresponding depths 1.3-1.5, $\bar{x}$ 1.39; 1.4-1.6, $\bar{x}$ 1.49; 1.8-2.2, $\bar{x}$ 1.96, respectively.

Head as deep as, or, usually, deeper than, wide at opercular border, tapering pretty evenly to tip of snout; in side view upper surface slightly to moderately convex in advance of eye, slightly convex, flat, or first barely convex then shallowly concave behind eye; the dorsum in general but little rounded transversely, the interorbital region nearly flat. Lips fairly large, the lower broader mesially, the upper broader laterally; lower projecting well behind upper. Maxillary evenly rounded, moderately expanded distally; failing to reach level of posterior border of eye by $\frac{1}{10}$ eye diameter (2 specimens), reaching border (3), extending beyond border by $\frac{1}{6}$ (1), $\frac{1}{5}$ (3), $\frac{1}{4}$ (1) of eye diameter. Eye in anterior one-third of head; just failing to cut dorsal profile; its general plane decidedly oblique; slightly exceeding snout (inclusive of lower lip); 1.2-1.5 times interorbital. Interior nostril tubular, tapering distally; its height about twice its basal diameter; inserted just behind upper lip, near horizontal level of lower border of eye; when directed forward, outward and upward, in what is probably its habitual posture, its tip extends to, or just beyond, vertical level of beginning of mouth cleft; internarial equal to direct distance from nostril to orbit. An aperture, somewhat more conspicuous than adjacent openings, lying just outside the orbit at approximately 10 o'clock (left side viewed), directly behind the anterior nostril by a distance subequal to interval between outer bases of anterior nostrils, is probably the posterior nostril; its distance from its fellow subequal to anterior internarial.

Pores on each half of the head include the following: more or less definitely on dorsal surface, (*a*) just internad of anterior nostril; (*b*) about collinear with (*a*) and presumed posterior nostril; (*c*) above orbit, in advance of anterior border of pupil; (*d*) near orbit at about 2 o'clock (left side viewed); (*e*), (*f*), (*g*) approximately collinear with (*d*) and origin of lateral line, (*f*) being closer to (*g*) than to (*e*); (*h*) internad of, and a little back from, (*g*): on lateral surface, (*i*) between anterior nostril and eye, near latter, at about 9 o'clock; (*j*), (*k*) along posterior border of upper half of upper lip; (*l*), (*m*), (*n*), (*o*) in an arc bordering orbit, between (*i*) in front and (*d*) behind; (*p*), (*q*), close together, behind end of maxilla, in general line of gape, by about half length of gape; (*r*), (*s*), (*t*), (*u*), (*v*) continuing back from (*p*) or (*q*) in an arc bordering preoperculum, (*v*) being below and in advance of (*f*), about as far from (*f*) as is (*g*): on ventral surface (*w*), (*x*), (*y*), (*z*) in a line between anterior termination of inner border of lower lip and a point on a level with, and slightly below, end of gape; (*zz*) internad of, and forming an equilateral triangle with, (*w*) and (*x*). On the dorsum there are two median pores, one forming with (*i*) and (*i*) a proconvex arc, one virtually collinear with the (*h*) and (*l*) arc. In some individuals additional smaller pores are detectable. Preopercular margin subcutaneous. Operculum without spines; its membrane attached to upper angle of pectoral base, and reflected to form a bursa; the outer wall with a pronounced subtriangular, pennon-shaped, or somewhat rounded notch, the posterior periphery of which is more or less made good by the inner wall. Gill membranes free from isthmus; joined across it in an evenly proconvex curve very shortly in advance of ventral fin bases.

Teeth in the premaxillaries rather small, subequal, bluntly conical, closely set; in a broad lunule with 4-6 rows anteriorly, the crescent either ending on each side rather bluntly in 1-2 rows at about the middle of the jaw, or extending back briefly as a single series of several teeth. Mandibular teeth in a short patch, 4-6 deep, in anterior one-third, or less, of jaw, being here small, bluntly conical; thence continuing back to end of jaw as a single series, and being decidedly larger, more pointed. Vomerine teeth tubercular, larger than teeth of upper jaw; varying in disposition from a uniserial arc of 8-12 to a crescentic patch 2-3 rows wide mesially. Palatines and tongue edentulous.

Head naked; whole body, including nape, abdomen, pectoral base squamous. Scales loosely embedded, in general not imbricate, the degree of separation showing regional differentiation that is, however, subject to some individual variation; in rather ill-defined subvertical rows, about 50-60 anterior to, about 160-180 behind, vent; at level of vent 40-50 in a vertical row; cycloid; on anterior flank subcircular, 300-400 $\mu$ in diameter; on hinder flank oval, about 600$\mu$ by 400$\mu$; on front of abdomen elliptical, about 250$\mu$ by 200$\mu$.

Anterior lateral line short, originating just above upper angle of preoperculum, the first of its 14-16 pores lying behind cephalic pore (*g*)—see above—by an interval equal to, or somewhat greater than, interval between pores (*g*) and (*f*); ending about below 4th-5th dorsal spine; its course, after a brief initial dip, involving 2 or 3 pores, gently convex upwards, subparallel with dorsal profile, except for the last 1-4 pores, which turn downwards, usually only slightly, but in several individuals quite markedly. As observed above, a second lateral line, hitherto unreported for the genus *Ophiclinus*, occurs in this species (and in others examined). Lying behind and below the first segment, this consists of a line of small simple pores; comprising, first, one or two well-separated pores lying on a line, steeply oblique downward and backward, drawn from the last tubule to almost the midlateral line (a little closer to superior than to inferior profile of fish), secondly, a longitudinal row of pores running from this point caudad, about along the midlateral line, this section containing some 10-12 pores to level of vent, with a further 20 or so to level of middle of anal base, behind which the series, becoming progressively less easy to trace, contains about another score: on trunk and anterior portion of tail pores maintain, with considerable fidelity, a one-to-one correspondence with myomeres. Fig. 1*a* gives a semidiagrammatic representation of the

lateral line as reported for *O. aethiops* by the authors of the species (McCulloch & Waite, 1918, fig. 29); fig. 1 *b* shows the complete system as present in our material.

Dorsal li, 1-lviii, 1 [spine frequency: li (1), lii (1), liii (1), liv (5), lv (1), lvii (1)]. The fin arises very gradually, making precise determination of its point of origin, lying about above posterior opercular border (without lobe), difficult of determination; profile rising rather sharply to about level of end of anterior lateral line; thereafter increasing slowly, evenly to within a dozen, or fewer, spines from end, behind which the lengths of the spines decrease slightly; longest spine 3.1-4.2 $\bar{x}$ 3.71 in head, the single ray as long as, generally longer than, last spine, about half its length lying caudad of end of tail its extreme tip free of the membrane, the latter wholly continuous with caudal membrane; maximum vertical height of fin subequal to eye; fin base (between bases of 1st spine, ray) as *TLs* 7.68-8.07, $\bar{x}$ 788.2, or 3.6-4.1, $\bar{x}$ 3.87, times head [for difference in males and females, see above under *Secondary sexual dimorphism*]. Anal ii, 33-36 [ray frequency: 33 (1), 34 (2), 35 (2), 36 (5)]. The fin originates below 18th-19th dorsal spine; origin behind head by 1.0-1.2, $\bar{x}$ 1.08 (females 1.1-1.2 $\bar{x}$ 1.11; males 1.0-1.1, $\bar{x}$ 1.05) times head, or nearer to tip of snout than to hypural joint by 0.3-0.8, $\bar{x}$ 0.61 (females 0.3-0.5, $\bar{x}$ 0.44; males 0.6-0.8, $\bar{x}$ 0.73) of head; behind the spines, the 2nd (longer) of which is half, or more, first ray, the fin profile tolerably even, the 1st ray being 0.7-0.9, modally 0.8, of the last (anal thus rising much more steeply than dorsal); last ray 3.0-3.9 $\bar{x}$ 3.40 in head, its tip free of membrane, the latter wholly continuous with caudal membrane; vertical height mostly less than, posteriorly subequal to, height of dorsal; base (to base of last ray) as *TLs* 509-551, $\bar{x}$ 532.3 [for sex differences, see above]. Ventral 2. Fin originating very shortly behind free common fold of branchiostegal membranes, about midway between levels of preoperculum and operculum; outer ray 1.1-1.3, $\bar{x}$ 1.23 in inner, the latter 1.9-2.4 $\bar{x}$ 2.11 in head; brought forward, reaching about to level of eye; external border of membrane a short transverse arc, very shortly below tip of outer ray; fin bases almost contiguous. Pectoral 10-13, modally 12. Fin rounded; the whole, or virtually the whole, border scalloped; longest (6th-9th, modally 8th) ray 2.5-3.4, $\bar{x}$ 2.94 in head; complete fin much longer than (2.0-2.6, $\bar{x}$ 2.33) eye, 2.2-2.8, $\bar{x}$ 2.49 in head; upper angle of base (see above) connected by membrane with opercular lobe. Caudal 13-14, modally 13, main rays. Fin bluntly rounded; when expanded nearly as deep as long; tips of middle 8 or so, occasionally all, rays projecting slightly beyond membrane; length exceeding length of pectoral, subequal to postorbital head with opercular flap; dorsal and anal membranes becoming confluent with it in its anterior one-fifth or one-fourth.

### *Ophiclinus greeni* Scott, 1936

*Ophiclinus greeni* Scott, 1936, *Pap. Proc. Roy. Soc. Tasm.* (1935): 114, fig. 1. Type locality: Lady Lucy Beach, Low Head [Dorset], Northern Tasmania.

*Material.*—A fine series of 15 examples is included in an extensive collection made at Green's Beach, Devon, by Mr R. H. Green on 18th, 19th December 1965. For the whole sample length specifications are: *Ls*, range 37.1-85.2, $\bar{x}$ 56.92 ± 3.43, $\sigma$ 13.30 ± 2.43, *V* 23.4 ± 4.5; *Lt*, range 41.0-93.4, $\bar{x}$ 62.19 ± 3.77, $\sigma$ 14.60 ± 2.67, *V* 23.5 ± 4.5. With length of the largest individual more than twice that of the smallest, the fish are clearly not coeval. A separation into two size groups originally made by the collector for convenience of storage in different sized containers probably segregates age classes, the *Ls* interval between the entries immediately on either side of the point of division being more than twice that between any two successive entries below it (except for that separating first and second individuals). *Ls* specifications for these two subsamples are: 11 specimens, range 37.1-60.8, $\bar{x}$ 49.78 ± 1.83, $\sigma$ 6.07 ± 1.29, *V* 12.2 ± 2.6, 4 specimens, range 68.9-85.2 $\bar{x}$ 76.55 ± 2.31 $\sigma$ 4.69 ± 1.66, *V* 6.1 ± 2.2—the first coefficient of variation being rather higher than one normally encountered in a group homogeneous for age and sex. There is evidence (see below) for variation of size in the sexes in this species.

*Anal spines.*—In the original description (1936: 114), followed in subsequent accounts (*e.g.*, 1939: 155; 1965: 62), 3 anal spines have been recorded: the same count is given by Waite (1906: 207) for his *O. gracilis*, to which our species is closely allied. The usual number of anal spines in the genus is 2; though an anal wholly composed of rays has been reported (Waite, 1906: 208) for one species, *O. gabrieli*—see under that species and under *O. aethiops* in the present contribution. In the holotypes of both *O. greeni* and *O. gracilis*, as figured, the first three anal radial elements are noticeably shorter than the fourth; and this arrangement characterizes some of the later specimens of the former species, while in others it is only the first two elements that are conspicuously shorter than those immediately following them. Dissection of some of the present, and some other, specimens shows the third radial element is articulated, while the first and second remain non-septate. In *O. greeni* the anal spine complement is thus the 2 modal for the genus; and this perhaps may be the case also in *O. gracilis*. The anal formulae of *O. greeni*, as reported prior to 1965, iii, 31-32, and as in 1965, iii, 29-32, are hence probably to be read as ii, 32-33, ii. 30-33, respectively—the known range, on this assumption of spine number, and with the inclusion of the present material, now becoming ii, 28-33; *cf. O. gracilis*, as reported, iii, 29, possibly representing ii, 30. Overlapping in respect of soft ray number in the anal between *O. gracilis* and *O. greeni*, not evident in the types or in the 1939 material of the latter species, is thus now well established. There continues to remain an absolute distinction in number of dorsal spines (*O. gracilis* xliii, both in original description and in figure (Waite, 1924, fig. 380) of a New South Wales specimen; *O. greeni*, all known examples, xlvi-xlix). All the present examples have the almost straight anterior tubular segment of the lateral line regarded (1965: 63) as characteristic of *O. greeni* (see further remarks on lateral line below).

*Fin counts, proportions as TLs.*—Dorsal, anal and pectoral fin counts and some proportions, recorded as *TLs*, are set out in Table V.

*Body ratios.*—Ranges and means of some diagnostic body ratios of the present material are here given, with previously recorded ranges in parentheses. Maximum depth 5.6-7.5, $\bar{x}$ 6.86 ± 0.13 (6.4-8.1); depth immediately behind vent 6.6-7.8, $\bar{x}$ 7.38 ± 0.07 (6.9-8.4); head 4.3-5.0, $\bar{x}$ 4.50 ± 0.05 (4.3-5.8): in *Ls*. Eye 5.3-6.7, $\bar{x}$ 5.97 ± 0.11 (5.3-7.2) in head; 1.1-1.5, $\bar{x}$ 1.32 ± 0.03 (1.2-1.5) in snout; 0.9-2.0, $\bar{x}$ 1.49 ± 0.08 (1.1-1.2) times interorbital. Head and trunk 1.1-1.3 $\bar{x}$ 1.21 ± 0.02 (1.1-1.4) in tail without caudal fin. Pectoral 1.5-2.2, $\bar{x}$ 1.79 ± 0.04 (1.7-2.1); ventral 1.5-2.1, $\bar{x}$ 1.83 ± 0.04 (1.4-1.9): in head. Caudal 2.0-2.7, $\bar{x}$ 2.41 ± 0.05 (1.9-3.0) in head; 9.5-12.3, $\bar{x}$ 10.70 ± 0.22 (8.8-13.8) in *Ls*. It will be seen that in 5 ratios (maximum depth, depth behind vent, eye in snout, eye times interorbital, pectoral in head) the known range is now extended numerically downward, while in 3 ratios (eye times interorbital, pectoral in head, ventral in head) it is extended numerically upward.

Examination of these ratios—all conventionally employed in specific diagnoses—brings to light some interesting features in some of them. Three ratios, all involving as one term the eye, and as the other terms the snout, the interorbital and the head as a whole, are found to be functions of length of fish. The correlation with *Ls* of the ratio eye in snout is $r = +0.759$, $z = 0.994$, $t = 4.20^{**}$; of eye times interorbital $r = -0.756$, $z = 0.987$, $t = 4.26^{**}$; of eye in head $r = +0.735$, $z = 0.940$, $t = 4.20^{**}$. Moreover, not only are these correlation coefficients large (emphasizing once again the importance attachable to absolute size of type specimens), but the data from which they are derived present the practising systematist with a pretty reliable pattern for estimation of the status of a given specimen selected at random—with 15 pairs of observations there are for the 3 ratios in the order cited above only 1, 2, 0 instances of *dXdy* values of the sign opposite to that of the correlation coefficient; indicative of a quite surprising degree of uniformity.

*Sex ratio*—There are 6 males, 9 females.

*Secondary sexual dimorphism.*—(*i*) *Absolute size.* The existence of differences of absolute size in the sexes found in *O. aethiops*, above, has prompted an investigation of male and female lengths in the present species. In the whole sample, females ($\bar{x}$ 56.63 ± 4.35) are slightly smaller than males ($\bar{x}$ 57.17 ± 5.52). The mean lengths are, however, much influenced by the presence of 3 females in the presumed older group of 4 fish; a better indication of relative size is probably obtained by considering the two groups separately: we then find, for 11 fish, female mean 48.15 ± 2.34, male mean 51.6 ± 2.47; for 4 fish, female mean 73.60 ± 1.49, single male 85.2—the excess of male on female in these two groups being 7%, 17%, respectively.

(*ii*) *Relative lengths of trunk.*—As in *O. aethiops* and *O. varius*, length of trunk, relative to *Ls*, is greater in females (221-258, $\bar{x}$ 235.6 ± 2.50) than in males (214-231, $\bar{x}$ 221.7 ± 2.23): the means differ significantly ($t = 4.16^{**}$).

(*iii*) *Relative lengths of vertical fins.*—Differences in relative lengths of trunk and tail entail differences in relative lengths of vertical fins, the anal base being shorter, the dorsal base longer, and hence the ratio dorsal base/anal base higher in females than in males. The differences in anal bases and in the dorsal base/anal base are statistically significant ($t = 2.81^{*}$, $3.15^{*}$); but for difference in dorsal base $t = 1.30$. Data on relative lengths of the vertical fins are recorded in Table III. Differences in body form in the sexes in this family such as those here found make apparent the need, not always met, for the sexing of type, or other, material for which metrical data are presented.

*Parous females.*—All 3 females of the 4 individuals constituting the presumed older group carry eyed ova, the presence of which is rendered evident both by the general distention of the abdomen (more pronounced laterally than vertically: in the present material not nearly as marked as that observed in some Clinids, though this may well be merely a question of the state of development of the embryos) and by indications, rather indistinct, of the presence of eyes observable through the body-wall (much more conspicuous on external examination is the yellow mass of the large sharply pointed somewhat tongue-shaped liver, extending from about the level of the ventral base more than halfway towards the vent). In the largest female, *Ls* 77.8, each fusiform ovarian mass measures 16 long by 5.5 wide by 7 deep. As preserved, both the enveloping membrane and the embryos (apart from the black eyes) are whitish, as also is most of the stroma, the remainder being yellowish. The right ovary contains 117 ova, ranging from 80 by 65$\mu$ to 250 by 200$\mu$, the modal dimensions being round about 200 by 160$\mu$. Embryos, still in the egg membrane, have developed to a stage at which the tip of the wrapped-round tail just reaches beyond the beginning of its broad base on the adjacent side. The diameter of the white lens is about 0.2 of that of the whole eye, which is 0.3-0.4 length of head: the choroid fissure is still open, though in some instances barely so. In some individuals pigmentation has begun; in these 17-24 small rounded clusters of melanophores in a median dorsal series are probably segmental. Scattered among the embryos are a few unfertilized ova 75-100$\mu$ in diameter, and a small amount of fine fibrous tissue.

*Lateral line.*—As mentioned above, in a general note on its nature in the best known members of the Ophiclinidae, the lateral line is now found to be composed of two parts.

The conspicuous anterior portion is adequately described and figured in the original account of the species: its general horizontal sense, without posterior downcurve, one of the few points of distinction between *O. greeni* and *O. gracilis*, is there discussed, and has since been commented on in these Observations (*e.g.*, 1965: 63). Its 12-17 perforate tubercles, contiguous or barely separate, extend over a distance somewhat less than a head length.

The newly observed segment consists of a line of small circular pores, of which 5-7 run more or less horizontally along the trunk, the first, which carries the line a little upward, lying shortly behind the level of the last tubule of the upper segment; while on the tail the same line, continued about midway between superior and inferior

profiles, is traceable for at least half the distance from level of vent to hypural joint, with approximately 20 pores.

*Ophiclinus gabrieli* Waite, 1906

*Ophiclinus gabrieli* Waite, 1906, *Rec. Aust. Mus.*, vi, 3: 208, pl. xxxvi, fig. 7 (in legend of plate appears as fig. 6). Type locality: Victoria.

*Status of Tasmanian record.*—In an earlier contribution (1965: 62) two small Ophiclinids, (*a*) *Ls* 45.5, *Lt* 51.2, (*b*) *Ls* 54.1 *Lt* 61.1 (Queen Victoria Museum Reg. No. 1964: 5: 6) obtained at Green's Beach, Devon, by Mr R. H. Green on 13th September 1964 were referred to this species, this being the first notice of it from Tasmania. In the light of the problem as to the relationship of *O. gabrieli* and *O. aethiops* discussed above in observations on the latter species, these two specimens have been re-examined with the results noted below.

(*i*) *Anal formula.*—As the outcome of dissection it has been found that the articulated rays are preceded by 2 unarticulated elements, or spines; these are little, if at all, less flexible than the soft rays succeeding them. Hence, if the specification in the account of the holotype of *O. gabrieli*, 'anal is formed wholly of soft rays' is correct, the present specimens cannot be referred to this species. On the other hand, in respect of their total number of anal radial elements, reported as 36, 35, or as now counted ii, 34 ii, 33, they agree with *O. gabrieli* (holotype 36), and not with *O. aethiops* as described (ii, 36), though in material referred earlier in this contribution to the latter species anal counts range from ii, 36 downwards to ii, 33, thus rendering possible the identification, on the basis of anal formula, with this material of the 2 fish reported as *O. gabrieli*. Points to be considered in evaluating the original report of the absence of anal spines in *O. gabrieli* include (*a*) the presence in all other adequately known species of *Ophiclinus, s.l.*, of 2 (?3) anal spines (in most groups of fishes anal spine number is constant at generic, or higher, level); (*b*) the absence of any emendation by Waite when, in association with McCulloch, he returned to the group in 1918; (*c*) the general superficial resemblance of the 2 spines to soft rays, particularly in regard to flexibility—the weight attachable to these items remains largely a matter of personal judgement.

(*ii*) *Dorsal formula.*—The only formula given by Waite for *O. gabrieli* was li + 1, with which the counts of the 1964 fish, both liii, 1 were considered compatible: but while they fall below the single value for the types of *O. aethiops*, liv, 1, they lie within the range, li, 1—lvii, 1, here reported for the 10 specimens referred to that species.

(*iii*) *Dentition.*—While the original description of *O. gabrieli* merely noted the presence of teeth on the vomer, the species (along with *O. gracilis*) is made to enter, in McCulloch & Waite's 1918 key a section 'Vomerine teeth pointed, forming an angular row or series', the correlate of a section 'Vomerine teeth tubercular, forming a triangular patch', comprising ? *O. sulcatus* (Castelnau, 1875) and *O. aethiops*. The vomerine teeth of our 2 fish are mostly pointed, and are disposed in a lunule or wide somewhat blunted inverted *V*.

(*iv*) *Coloration.*—The coloration is not positively incompatible with either *O. gabrieli* or *O. aethiops*. In lacking the alternate light and dark vertical bands on the anal and dorsal described for *O. aethiops* (but not noticeably developed in the Tasmanian specimens ascribed to that species) the present 2 specimens formally approach *O. gabrieli*; and they certainly exhibit, as described for this species, a decidedly greater degree of uniformity of coloration in the dorsal than in the anal. However, it is difficult to point to any significant difference in coloration between these 2 fish and the smaller females among the 10 fish here identified as *O. aethiops*.

Chiefly on the positive evidence afforded by the general character of the dentition, the earlier ascription (1965: 62) of these 2 specimens to *O. gabrieli* Waite, 1906 may perhaps be allowed to stand. However, pending satisfactory clarification of the relationship of *O. gabrieli* and *O. aethiops*, their definite status remains in doubt.

*Lateral line.*—In a general note on the family mention has been made of the discovery in *O. aethiops* and some other species of an element of the lateral line hitherto undescribed. In these specimens, from slightly above, and slightly in advance of, the point at which the upper margin of the sleeve-like opercular membrane becomes attached there runs backwards and slightly upwards (in its course either rising continuously to, or flattening out shortly before, its termination) a raised line of 13-17 contiguous perforate tubules; its total length about half head length. This is the lateral line shown in the illustration of the holotype of *O. gabrieli* (though in Waite's figure the general direction more nearly approaches the horizontal than it does in our examples), and is, in essence, that conventionally depicted for the genus *Ophiclinus, s. str.*

The portion of the lateral line now first reported here consists, on the trunk, of a series of 11-12 apertures running more or less horizontally, somewhat nearer to the dorsal than to the ventral profile, the anterior pore being slightly caudad of the last tubercle of the upper segment; with, beyond the vent, a continuation caudad, along about the middle of the tail, almost to caudal base, the total number of pores in this section being difficult of determination but approximating 40. One small pore has been detected near the middle of the downwardly and backwardly oblique line joining the last tubule of the short upper segment and the first pore of the long lower segment.

*Cephalic neuromast system.*—The locations of the main pores regularly found on the head of *O. greeni* have been specified in observations above on that species. Pores of this kind are a generic feature (though no detailed investigation has so far been made of their exact disposition in the various species). They are commonly apparent simply as discrete subcircular apertures, with no obvious external indication of any connexion with one another. In the present specimens, however, they occur along from tolerably well developed to very clearly defined ridges, arranged on each side of the head in a continuous system, the posterior branch of which comes into direct relation with the

anterior end of the upper segment of the lateral line. The ridges and their pores thus apparently represent a cephalic neuromast system. The actual arrangement is as follows. Anteriorly the lateral line on each side continues forward as a short spur of 2-4 perforations, reaching to the level of the hind border of the preoperculum. From just behind the front perforation a ridge, carrying in all 2 lateral pores and 1 median pore, passes across the dorsum to join the spur from the lateral line of the other side. From the anterior pore of the spur the ridge continues, very briefly, obliquely forward and downward to another pore (from just above which a branch ridge, with 1 pore in its anterior half, runs forward to become continuous with a pore-bearing ridge clearly encircling at least the lower two-thirds of the orbit, and extending, in a less distinct form, round most of the rest of the orbit), from which it swings down in an arc very slightly in advance of, and concentric with, the margin of the operculum, and including 5-6 pores. This cephalic system of ridges is perhaps not so conspicuously elevated in life.

## Genus **OPHICLINOPS** Whitley, 1932

### *Ophiclinops varius* (McCulloch & Waite, 1918) (Figure 2)

*Ophiclinus varius* McCulloch & Waite, 1918, *Rec. S. Aust. Mus.*, I. 1: 57, fig. 30. Type locality: Kangaroo Island [South Australia].

*Ophiclinops varius* (McCulloch & Waite). Scott, 1962, The Marine and Fresh Water Fishes of South Aust.: 250.

*Status of genus.*—The scope of *Ophiclinops* as accepted in these Observations has been discussed earlier (1966: 113).

*Correction.*—In an account (1966: 113) of the first specimen of this species reported from Tasmania there appeared the following passage ' Scott (1962: 250)—who, unaccountably, notes " length 3½ in." . . .' the reference being to T. D. Scott's work on South Australian fishes. However, the really unaccountable circumstance was the careless picking up by the present writer of the size mentioned from the account on the same page of another species: for *O. varius* Scott gives a reasonable ' 2 in.'.

*Material.*—Since the collection of the first Tasmanian individual, a female, *Ls* 37.8, *Lt* 42.0, 7 other examples have been taken by Mr. R. H. Green in rock pools at Green's Beach, Devon. In ascending order of *Ls* the 8 are: (*a*) 26.1, female; (*b*) 27.6, male; (*c*) 31.1, female; (*d*) 31.2, male; (*e*) 37.8, female; (*f*) 38.2, male; (*g*) 38.3, female; (*h*) 40.1, female. Specimen (*a*) was collected on 11th September 1965; (*b*), (*c*), (*d*), (*f*), (*h*) on 18th, 19th December 1965; (*e*)—the example reported earlier—on 27th September 1964; (*g*) on 4th-5th September 1965. As would seem likely for the pooled sample with subsamples collected at different dates, the *Ls* coefficient of variation is high, being 15.1 ± 3.8.

*Fin counts.*—For the dorsal the authors of the species gave xli-xliv, 1 (4 specimens); and all our counts fall within this range (individual counts for dorsal, and other, fins in Table VI): original anal range, ii, 26-28, now becomes ii, 26-29. McCulloch & Waite's entry for pectoral was 8: here, with fins on both sides counted, we have 8 (9 cases), 9 (4), 10 (2)—left fin of (*d*) missing.

*Proportions as TLs.*—The opportunity is here taken to provide for the first time a tolerably detailed metrical specification of a series of specimens, 34 dimensions expressed as *TLs* being recorded in Table VI.

*Body ratios.*—For the ratios recorded for the holotype, 45.2 long, the present values are as follows (McCulloch & Waite's figures in parentheses). Head 4.4-5.2, $\bar{x}$ 4.76 ± 0.081 (5.1) in *Ls*. Depth at origin of anal 6.9-7.9, $\bar{x}$ 7.66 ± 0.071 (6.8) in *Ls*. Eye 3.8-4.6, $\bar{x}$ 4.21 ± 0.85 (4.0) in head. Snout 1.4-1.8, $\bar{x}$ 1.61 ± 0.046 (1.6) in eye. Snout 0.7-1.0, $\bar{x}$ 0.77 ± 0.044 in (greater than) interorbital, which is 1.6-2.6, $\bar{x}$ 2.15 ± 0.12 (2.6) in eye. Pectoral 1.1-1.4, $\bar{x}$ 1.25 ± 0.038 (1.3) in eye. Inner ventral ray 1.9-2.4, $\bar{x}$ 2.07 ± 0.10 (2.0) in head. Last dorsal spine 3.6-4.9, $\bar{x}$ 4.26 ± 0.17 (4.0) in head. It will be seen the range is in no instance very narrow, and in some cases is so wide as to make the ratio of little diagnostic significance. For the 9 ratios in the order in which they appear above the coefficients of variation are 4.8, 4.0, 5.7, 8.1, 16.4, 15.2, 8.7, 14.3, 11.1—broadly speaking, $V \leqq 10$ should be expectable, with lower values looked for in the case of the major and more basic elements of body form.

*Sex ratio.*—There are in the pooled material 3 males, 5 females: of the 5 specimens taken at the same time 3 are males.

*Secondary sexual dimorphism.*—(*i*) *Absolute size.* The mean standard length for females (34.68 ± 2.44) exceeds that for males (32.33 ± 2.54), and within the single sample the excess is maintained. In other Ophiclinids here dealt with females are regularly shorter: differences of means here are nonsignificant, and may well simply represent sampling fluctuations.

(*ii*) *Relative lengths of trunk.*—As in other species examined, the trunk is relatively longer in females (*TLs*, 266.6 ± 6.3) than in males (255.0 ± 6.6): $t = 1.05$.

(*iii*) *Relative lengths of vertical fins.*—The pattern for the sexes encountered in other species holds good for the present form, females having relatively shorter anal base, relatively longer dorsal base, with consequent higher value for the ratio dorsal base/anal base. Statistics are exhibited in Table III.

*Lateral line.*—The tubular anterior lateral line found in *Ophiclinus s. str.* is lacking in this genus, and the two known species, the present form and *Ophiclinops pardalis* (McCulloch & Waite, 1918), have been described as being without a lateral line of any kind. Examination of our material discloses the presence of a line of simple pores, regularly spaced (on trunk and on at least the anterior two thirds of the tail there is one on each myomere), beginning just behind the posterosuperior region of the opercular border, a trifle nearer to dorsal than to ventral profile of fish, and running back in a virtually rectilinear series to, or near to, caudal base. Anterior to the level of the vent there are about 16 pores; behind this 20 can be counted with certainty, and there may well be a further half dozen. See fig. 2.

TABLE VI

*Ophiclinops varius* (McCulloch & Waite, 1918). Meristic data, and dimensions, expressed in thousandths of standard length (*TLs*), of 3 males and 5 females from Green's Beach, Devon, Tasmania, collected by Mr R. H. Green

| Count or Dimension | Specimen (Sex; standard length, mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (*a*) ♀ 26.1 | (*b*) ♂ 27.6 | (*c*) ♀ 31.1 | (*d*) ♂ 31.2 | (*e*) ♀ 37.8 | (*f*) ♂ 38.2 | (*g*) ♀ 38.3 | (*h*) ♀ 40.1 |
| Dorsal | xlii, 1 | xli, 1 | xli, 1 | xli, 1 | xliii, 1 | xliv, 1 | xliii, 1 | xliii, 1 |
| Anal | ii, 28 | ii, 27 | ii, 27 | ii, 29 | ii, 28 | ii, 28 | ii, 28 | ii, 27 |
| Pectoral (left/right) | 8/9 | 8/9 | 8/8 | –/8 | 10/10 | 8/9 | 9/8 | 8/8 |
| Caudal | 3/13/4 | 4/13/4 | 3/13/4 | 4/13/4 | 3/13/3 | 4/13/4 | 3/13/4 | 4/13/4 |
| Total length | 1,129 | 1,118 | 1,109 | 1,106 | 1,111 | 1,115 | 1,112 | 1,107 |
| Length to— | | | | | | | | |
| Origin of dorsal | 267 | 246 | 248 | 248 | 265 | 251 | 235 | 239 |
| Termination of dorsal (ray) | 979 | 957 | 966 | 962 | 978 | 969 | 977 | 970 |
| Termination of dorsal (membrane) | 1,006 | 1,007 | 1,003 | 1,003 | 1,021 | 1,005 | 1,017 | 1,015 |
| Origin of anal | 484 | 482 | 482 | 481 | 484 | 471 | 471 | 511 |
| Termination of anal (ray) | 960 | 960 | 965 | 965 | 979 | 974 | 966 | 962 |
| Termination of anal (membrane) | 1,000 | 1,013 | 1,013 | 1,010 | 1,021 | 1,021 | 1,010 | 1,015 |
| Origin of pectoral | 192 | 188 | 167 | 175 | 180 | 181 | 184 | 175 |
| Origin of ventral | 173 | 170 | 161 | 159 | 146 | 149 | 157 | 147 |
| Vent (middle) | 457 | 471 | 466 | 468 | 466 | 448 | 457 | 499 |
| Length of— | | | | | | | | |
| Longest dorsal spine | 46 | 53 | 48 | 58 | 53 | 54 | 51 | 49 |
| Last dorsal spine | 46 | 45 | 47 | 56 | 53 | 52 | 51 | 49 |
| Dorsal ray | 54 | 54 | 59 | 63 | 54 | 55 | 54 | 52 |
| Longest anal ray | 46 | 49 | 50 | 58 | 52 | 50 | 52 | 50 |
| First anal ray | 36 | 38 | 34 | 34 | 38 | 34 | 39 | 40 |
| Last anal ray | 44 | 47 | 48 | 56 | 52 | 48 | 50 | 49 |
| Pectoral (whole fin) | 46 | 43 | 39 | 38 | 42 | 37 | 41 | 37 |
| Longest (*nth*) pectoral ray | 27(6th) | 25(6th) | 29(6th) | 22(5th, 6th) | 24*(8th) | 24(6th) | 23(6th, 7th) | 20(6th) |
| Inner ventral ray | 115 | 105 | 111 | 98 | 99 | 99 | 104 | 98 |
| Outer ventral ray | 88 | 91 | 95 | 80 | 85 | 84 | 86 | 82 |
| Head with opercular lobe | 226 | 214 | 215 | 200 | 193 | 208 | 208 | 219 |
| Head without opercular lobe | 192 | 178 | 180 | 160 | 185 | 178 | 167 | 182 |
| Snout | 35 | 34 | 31 | 32 | 28 | 37 | 29 | 26 |
| Eye | 54 | 56 | 55 | 48 | 45 | 50 | 47 | 47 |
| Interorbital | 23 | 24 | 21 | 22 | 28 | 25 | 27 | 20 |
| Depth— | | | | | | | | |
| Maximum | 154 | 149 | 154 | 147 | 138 | 134 | 131 | 151 |
| At opercular border | 121 | 112 | 127 | 120 | 122 | 110 | 104 | 125 |
| Before anal origin | 127 | 145 | 129 | 128 | 132 | 131 | 128 | 127 |
| At middle of tail | 107 | 127 | 116 | 112 | 122 | 118 | 110 | 115 |
| Of caudal peduncle | 46 | 54 | 48 | 52 | 48 | 47 | 51 | 45 |
| Thickness— | | | | | | | | |
| Maximum | 81 | 72 | 93 | 77 | 101 | 102 | 78 | 100 |
| Behind pectoral base | 73 | 71 | 90 | 64 | 87 | 81 | 63 | 82 |
| Before anal origin | 54 | 54 | 58 | 63 | 56 | 55 | 54 | 70 |
| At middle of tail | 42 | 36 | 28 | 32 | 28 | 29 | 29 | 49 |

* In Part XIV (1966:113) the absolute length (0.9 mm) is correctly recorded but the *TLs* value is incorrectly given as 54. Some additional measurements of specimen (*e*) have been made expressly for this Table.

Genus **BREONA** *gen. nov.*

*Diagnosis.*—Body elongate, moderately compressed; no developed scales outside lateral line; but skin beset, particularly posteriorly, with very numerous, well separated, minute (several microns in diameter) apparently discoidal elements which may be squamous vestiges or rudiments. Lateral line present, comprising an anterior portion, composed of contiguous tubules, rising shortly behind head almost to dorsal profile, and running back near, and subparallel to, profile to, or a little beyond, level of vent, and a posterior portion, consisting of

a row of upwards of a score of spaced scales, originating about vertically below end of tubular portion, and extending back along midlateral line to at least middle of tail. Head moderate, subconical; operculum unarmed, its membrane united with upper part of pectoral and/or body immediately adjacent to fin, the lobe not, or negligibly, notched; preoperculum subcutaneous; anterior nostril tubular; posterior nostril a simple opening, well within the interorbital area; some open pores on dorsal and lateral surfaces; eye in anterior half of head, superolateral or superior; interorbital much less than eye diameter; gill membranes united, forming a free fold across isthmus; teeth in jaws stout, conical, in a band anteriorly, narrowing to become biserial or uniserial behind; teeth on vomer stout, conical, in a patch. Dorsal composed of numerous spines and one posterior ray, commencing shortly in advance of level of vent, united with caudal; anal with two spines and numerous rays, united with caudal; pectoral moderate, longer than eye, with stout unbranched rays, base of fin covered by branchiostegal membrane and operculum; ventral of three rays, the anterior small, wholly embedded in thick integument, fins inserted in median notch of ventral fold of common gill membrane; caudal with about a dozen rays, most, or all, unbranched. Male with intromittent organ; fish presumably viviparous.

*Haplotype.—Breona greeni sp. nov.*

*Range.*—At establishment of the genus its known provenance is northern Tasmania.

*Affinities.*—Discussion of the affinities of the new genus calls for some preliminary consideration of the standing and relationships of existing genera. Four genera with Australian representives are mentioned in the Check-List (McCulloch, 1929) in the Ophiclinidae: (*i*) *Ophiclinus* Castlenau, 1872 (emended in 1873 by Castelnau to *Ophioclinus*), (*ii*) *Neogunellus* Castelnau, 1875, (*iii*) *Scleropteryx* Ogilby, 1894, (iv) *Stenophus* Castelnau, 1875: of these, (*ii*) is treated by McCulloch as synonymous with (*i*). Whitley (1941: 39) has identified *Ophiclinus gracilis* Waite, 1906 with *Sticharium dorsale* Günther, 1867, the Ophiclinidae thus becoming the Stichariidae; hence it is needful here to take account also of *v Sticharium* Günther, 1867, (*vi*) the closely allied *Notograptus* Günther, described in the same paper, (*vii*) *Blanchardia* Castelnau, 1875, synonymized in the Check-List with *Notograptus* (in the Check-List the genera (*v*)-(*vii*) are treated as the Notograptidae, emended by Whitley to Stichariidae, *Stichārium* having line priority over *Notograptus*). From *Ophiclinus* as understood in the Check-List Whitley (1932) has separated off (viii) *Ophiclinops*, with *Ophiclinus pardalis* (McCulloch & Waite, 1918 as haplotype: however, as suggested previously in these Observations (1966: 113) *Ophiclinus varius* McCulloch & Waite, 1918 would seem to be a congeneric form—a view arrived at independently, and earlier, by T. D. Scott (1962: 250). The status of *Ophiclinus vis-à-vis Stichārium* has already received some notice. The identification of the two genera would certainly solve some problems. However, there would appear to be some difficulty (Scott, 1965: 61) in synonymizing *S. dorsale* with *O. gracilis*, as proposed by Whitley; possibly Günther's species is to be identified with some other Ophiclinid given in the Check-List, or it may of course simply be a species of *Ophiclinus* not since encountered (*O. aethiops* McCulloch & Waite, 1918, Tasmanian examples of which are reported in the present paper, has apparently remained uncollected for nearly half a century). One feature noted for *S. dorsale*, 'ventrals much larger than the pectorals', would be well met by either species of *Ophiclinops*, in which genus ventral is much more noticeably larger than (2-3 times as long as) in any recognized species of *Ophiclinus, s. str.*: however, ascription to *Ophiclinops* is clearly negated by Günther's generic 'anterior part of lateral line distinct . . .'.

Of the 8 genera above, 4 only appear to be represented by species currently recognizable—*Ophiclinus, Ophiclinops, Scleropteryx, Stenophus*. *Breona* stands well clear of each of these. From *Ophiclinus, s. str.*, it differs in, among other features, (*a*) more dorsal location and greater extent of tubular portion of lateral line; (*b*) much more caudad origin of dorsal (near vent instead of above head); (*c*) absence of developed scales except as elements of the second lateral line; (*d*) the superolateral eyes: from *Ophiclinops* in possessing an anterior tubular portion of lateral line, in more caudad origin of dorsal (in *Ophiclinops* behind head by less than half postorbital head) and in characters (*c*) and (*d*): from *Scleropteryx* by presence of pectorals, later origin of dorsal ('commences a short distance behind the opercular flap'), presence of a single dorsal ray (in *S. devisi* 3 rays), nature of lateral line ('a single lateral line along the middle of the body, straight'), in (*d*) and probably in (*c*): from *Stenophus* by presence of ventrals, nature of lateral line system ('several lateral lines, emitting no lateral branches'). [It may be remarked that in describing his *Ophioclinus devisi*, and in hesitating about—and finally deciding against—De Vis' manuscript name *Scleropteryx*, since generally accepted, Ogilby (1894: 374) observed, 'The neglect of Castelnau to even mention the pectorals is negative evidence as to their existence in his genus', *i.e., Ophioclinus*, the emended version of the 1872 *Ophiclinus*. However, in the description of the genotype, immediately following the account of *Ophioclinus*, it is noted (1873: 70) 'pectorals much shorter than the ventrals'.] *Neogunellus* (the original diagnosis of which contains some inconsistencies, *e.g.*, 'the ventrals jugular, composed of five rays', 'these' [the ventrals] 'are long, filamentary, and formed of two articulated rays') was identified with *Ophiclinus* by McCulloch & Waite (1918: 54), who further suggested the probable synonymy of its type species, *N. sulcatus*, with *O. antarcticus* Castelnau, 1872, and described, and figured the anterior portion of, a specimen labelled *Neogunellus sulcatus* (possibly in Castelnau's handwriting) from the old collection of the Australian Museum. This identification of *Neogunellus* with *Ophiclinus*, adopted in the Check-List, has received general acceptation. From the *Neogunellus* of Castelnau's original account *Breona* is distinguished by the more posterior dorsal insertion (fin 'beginning on the line of the end of the opercule'), by absence of small scales covering body; and probably by character of the lateral line, absence of canines in lower jaw, position of eyes, and other characters. From *Stichārium*, as far as

can be determined from the short accounts of the genus and the haplotype, our genus can be differentiated by having teeth on the palate, by not having 'ventrals much longer than pectorals', by (if original diagnosis can be relied on) possessing one dorsal ray. From *Notograptus* (with which the Check-List synonymizes *Blanchardia*) the Tasmanian fish differs trenchantly in not having lateral line 'complete, running along the base of the dorsal fin', in lacking a barbel at the symphysis of the jaw.

The more caudad origin, compared with that in the well known Ophiclinids, of the dorsal—the fin beginning just anterior to the vent, instead of over, or quite shortly behind, the head—is a striking feature. The character is formulated quantitatively in Table III, which gives, for *Breona greeni* and for several species of *Ophiclinus* and *Ophiclinops*, the lengths, as *TLs*, of the dorsal and anal bases, and the value of the ratio of the length of the dorsal base to that of the anal base.

*Generic name.*—*Breona* is one of the four words for fish (in a general sense) found among the scanty records of the several dialects of the extinct Tasmanian aboriginals, being given in a vocabulary by Roberts that appears, pooled with other small words lists by Gaimard, La Billardière, Péron and others, in Ling Roth (1899, app. B: vii). No indications of pronunciation are supplied; but the placename Breona, used for a small settlement at the northern end of the Great Lake, is customarily pronounced as a trisyllable, with the *o* accented, long.

*Breona greeni sp. nov.*
(Figure 3)

*Diagnosis.*—The general characters those of the genus. D. xxxviii, 1-xli, 1. A. ii. 35-36. V. 3. P. 8-9. C. 12 (main rays). Br. 5. Dorsal originating behind head by a distance exceeding postorbital head, length to origin from two and a half to three times in standard length. Anal originating in advance of level of fifth dorsal ray. Posterior (formally inner) ventral ray with an external membranous fringe. Pectoral rays resembling ventral rays, the septa appearing as conspicuous annuli. Head subequal to trunk. Snout less than eye. Eye about six to seven in head; twice, or more than twice, interorbital; cutting dorsal profile; looking outward and upward. Lower jaw slightly longer than upper. Maxillary to below hind half of eye. Anterior lateral line with about 40 tubules, superior, extending about to level of vent; posterior a mediolateral line of spaced scales.

*Types.*—Holotype: a female, 63.4 in standard length, 68.2 in total length, from Green's Beach, Devon, Tasmania; collected by Mr R. H. Green, 4th May, 1965; Queen Victoria Museum Launceston Reg. No. 1966/5/10. Paratypes: female, *Ls* 65.2 *Lt* 70.1; male, *Ls* 57.3, *Lt* 62.0; locality and collector as for holotype, 18th, 19th December 1965; Queen Victoria Museum Reg. Nos.: 1966/5/11, 1966/5/12, respectively.

*General description.*—The description below is based on the holotype, variations exhibited by the paratypes being regularly noted in parentheses, the paratype cited first being the female.

Head 1.04 (0.98, 0.87) in trunk, which is 3.15 (3.08, 4.08) in tail without caudal.

Elongate, maximum depth 9.2 (10.8, 9.9), depth at origin of anal 12.0 (11.2, 11.5), depth, without caudal ridges, at hypural joint 32.5 (32.6, 30.2), in *Ls*. Moderately compressed anteriorly, greatly posteriorly; maximum thickness 14.1 (15.5, 17.4), thickness at origin of anal 21.5 (21.7, 19.1), thickness at hypural joint 317 (338, 287), in *Ls*. Thickness in depth: maximums 1.53 (1.44, 1.76), at anal origin 1.80 (1.93, 1.67), at hypural 9.75 (10.4, 9.50).

Head deeper than wide at opercular border, tapering tolerably evenly to tip of snout; in lateral view upper surface almost straight to level of middle of eye, somewhat convex between eyes, then descending rather steeply, but briefly, to upper lip, which is set high; the dorsum as a whole almost flat transversely, gently rounded laterally. Eye in anterior part of head, combined eye and snout 3.1 (3.0, 2.9) in postorbital head; set superolaterally, almost superiorly, constituting part of the dorsal profile; 1.4 (1.3, 1.8) times snout; 2.4 (2.6, 2.1) times interorbital; orbital rim somewhat elevated. Lower jaw slightly longer than upper. Mouth cleft oblique. Maxillary moderately expanded, evenly rounded distally; extending to level of 0.6 (0.7, 0.9) of eye. Anterior nostril tubular, tapering somewhat distally, its height twice, or more, its basal diameter; inserted on dorsal surface behind posterior border of upper lip by a distance subequal to its height; at, or a trifle above, horizontal level of middle of eye; internarial exceeding direct distance from nostril to orbit. Posterior nostril an opening rather larger than paired pores nearby; its margin slightly (or not observably) elevated; set hard against the eyeball, about halfway between anterior nostril and level of posterior border of eye. Pores on dorsum of head include a pair about midway between the anterior and posterior nostrils; an azygous pore at level of posterior orbital border; directly behind the last-named a pair, each approximately on the anteroposterior line passing through the middle of the pupil; behind these, by a distance subequal to their distance from snout tip, a proconcave arc of 5, the outer pair lying at (in paratypes close to) the external border of the conspicuous, sharply delimited light-colored middorsal stripe: on each side of the head at least 2 pores lie behind the posterior border of the preoperculum: pores are made out with difficulty in our material, and it is not unlikely others occur. Preopercular margin subcutaneous. Operculum unarmed; its membrane attached to upper part of pectoral (and/or body immediately adjacent), the membrane margin broadly rounded, not, or negligibly, notched superiorly. Branchiostegals 5. Gill membranes free of isthmus, joining broadly across it, about at level of preopercular border. Teeth in lower jaw stout, conical, some slightly recurved; in a broad lunule, mesially with 4-5 rows, narrowing to biserial or uniserial laterally. Teeth in upper jaw stout, conical, some slightly recurved, rather larger than mandibular teeth; in two bands, not, or barely, contiguous mesially; each band 3-4 wide anteriorly, narrowing posteriorly to a biserial, or shortly uniserial, termination at about the hinder two-thirds of the jaw. Teeth on vomer stout, conical; disposed irregularly in a largish ovoid patch.

Lateral line comprising a conspicuous anterior and a rather obscure posterior section. Anterior section a series of about 40 contiguous tubules, originating in last one-third of head, a little in advance of level of pectoral insertion, at about one-third (half, two-fifths) of an eye diameter below dorsal profile; rising in first 10 or so tubules almost to dorsal profile, and extending back—in a line grossly very slightly convex upwards, with contiguous tubules in some cases collinear, in other cases set at a variable small angle to each other, giving rise to a series of small-scale waves or zigzags—to level of vent, beyond which 2 or 3 tubules, curving downward somewhat, continue it to horizontal level, on left side, of 1st, on right side, of 2nd anal spine (left and right, 2nd anal ray; left 3rd, right 2nd anal ray); its length (left side) 1.58 (1.46, 1.42) times head. Posterior section apparent to naked eye as a line of small inconspicuous regularly spaced lightish spots on midlateral surface of tail, originating below, and shortly behind, last tubule of anterior segment and extending back almost horizontally towards the caudal; pores in anterior two-thirds, or more, of tail occurring at about 1 per myomere, behind which they may be more widely set (total number of caudal myomeres *ca* 40). Examination of a strip of skin dissected off from the right flank of the larger paratype, at 0.5-0.7 of the length behind the vent (without caudal) shows the apparent spots, here 800-850$\mu$ apart, are well developed cycloid scales about 180$\mu$ in diameter (Fig. 3*b*): these are similar in general shape and size to ordinary body scales on the hind flank of a specimen of *Ophiclinops varius* about half the overall size of the paratype.

No scales other than the series along the lateral line have been detected. However, under a Zeiss F objective, with a medium ocular, the whole surface of the skin is seen to be crisscrossed regularly with minute, fairly closely set longitudinal and transverse striae, at most of the intersections of which occur more or less discoidal structures that may possibly represent squamous rudiments or vestiges.

Dorsal xxxix, 1 (xxxviii, 1; xli, 1); arising rather gradually, the early spines being more or less markedly decumbent, making somewhat difficult the determination of the exact point of origin; behind the first few spines, the profile rising almost rectilinearly to near the middle of the length, then falling in a very gentle, upwardly convex curve; some spines projecting beyond membrane; middle spine about 12 in head; maximum vertical height of fin about one-third eye diameter; ray noticeably longer than last spine, about 7 (7, 8) in head, less erect than neighboring spines, approaching horizontal, its tip, contained within membrane, in advance of level of hypural joint by about half depth of body (without fin) vertically below it; fin originating a little in advance of level of vent, length to origin contained 2.72 (2.65, 3.01) in remainder of standard length; base (measured to base of ray) 1.68 (1.69, 1.61) in *Ls*, or 3.17 (2.97, 3.37) times head; membrane wholly continuous with caudal, the fin profile dipping slightly at the point of junction. Anal ii, 35 (ii, 35, ii, 36); originating below 3rd (2nd, 3rd) dorsal spine, behind head by 1.14 (1.04, 0.92) times head; base (measured to base of last ray) 1.77 (1.76, 1.65) in *Ls*, or 3.02 (2.85, 3.27) times head, or 1.06 (1.01, 1.03) times dorsal base; 1st spine rather more than half 2nd, the latter nearly two-thirds 1st ray; border of fin more or less parallel with ventral body profile; middle ray a trifle less than twice length of middle dorsal spine, but, as preserved, anal rays are set more obliquely than dorsal spines, the vertical heights of the two fins being subequal; last ray inserted behind dorsal ray, the latter almost opposite penultimate anal ray; fin continuous with caudal, the junction indicated by a slight notch; rays with strong and conspicuous septa, modally about 10. Ventral 3; short, carried forward, reaching to below eye, carried back, extending 0.29 (0.28, 0.28) of distance to vent; originating just posterior to free border of common fold of gill membranes, between levels of borders of preoperculum and operculum, length to its origin 1.7 (1.6, 1.7) in head; anterior ray wholly enclosed in membrane, hidden, its length about two-fifths length of middle ray; middle ray a little shorter than, rather stouter than, the posterior (formally inner), their lengths 2.5 (2.7, 2.3), 2.4 (2.6, 2.1) in head; free rays projecting for about a quarter of their length beyond the middle of the bight of the membrane joining them; posterior ray with, throughout its proximal four-fifths, a fairly wide external slip of membrane (not developed in species of *Ophiclinus* and *Ophiclinops* examined). Pectoral 8 (left), 9 (right) (8, 8; 8, 8); broad, short, auriform, 1.8 (1.9, 1.7) in head, or 3.8 (3.5, 3.5) times eye; upper part of base hidden by opercular flap, with which it is more or less definitely conjoined; lower part of base overlapped by branchiostegal membrane; originating behind ventral origin by little more than basal diameter of ventral; length to origin 1.2 (1.2, 1.2) in head; rays simple, as preserved characteristically curved forward and upward, tips rounded, free of membrane, which is deeply scalloped; septae numerous (in a median ray 30, or upwards), in the form of closely set rings, giving the ray an annulated appearance similar to that of the ventral rays. Caudal 12 main rays, all unbranched (some indication of possible terminal fission in a couple of median rays in a paratype), and 5 + 5 (4 or 5 above and below) procurrent rays; short, its length 2.5 (2.7, 2.3) in head; as preserved, narrow, its margins continuing those of the dorsal and anal to end in a point, but opening out to give rounded posterior border.

*Color pattern.*—(*i*) *Holotype.* Body: whole of dorsal surface covered by a conspicuous stripe of light fawn, this uniform band, the borders of which are sharply delimited, invading the side, occupying the upper one-sixth of the flank anteriorly, but decreasing regularly in depth posteriorly to become a thin line at caudal origin; flank between stripe and vicinity of midlateral line dusky olivaceous, darker than lower half; the distinction less marked on the trunk, which further differs from the tail in having the dusky area decreased in depth by the continuation upward, immediately behind the head, to level of upper part of pectoral base, of the immaculate, somewhat yellowish flesh of the belly; the duskiness noted is due to brownish longitudinal somewhat wavy streaks, formed of closely set punctulations, mostly running somewhat obliquely, down and back on upper part of flank, up and back on lower part, the punctulation becoming more general and more confused in last one-third of tail; beginning at level of lower border of eye

and ending equidistant from dorsal and ventral profiles, a conspicuous line of about a score (number and disposition somewhat different on the two sides) of black markings, mostly in the form of short lines, the last 4-5 rounded; about a dozen similar but smaller markings between the main series and the dorsal profile, mostly nearer the latter. Head: behind eyes, dorsum and side down almost to level of inferior border of orbit occupied by the forward continuation of the conspicuous dorsal body stripe; except for upper lip and lower part of operculum, which are largely whitish, immaculate, the whole of rest of head olivaceous, heavily marked with brownish, the punctulation mainly diffuse on upper part of operculum, forming small patches and vermiculations elsewhere, with more or less clear indications of 5 short radial spokes from eye. Dorsal fin: membrane in anterior half largely concolorous with the fawn dorsal stripe, this invasion of pigmentation from the body gradually decreasing to extinction caudad, the rest of the membrane greyish; spines glassy, their exposed tips clear. Anal, pectoral, ventral whitish, immaculate. Caudal chiefly olivaceous, a trifle darker near ends of middle rays; confusedly punctulated with dark grey and brownish, the pigmentation stopping short of tip and sides, the latter being chromatically continuous with the ends of the dorsal and anal.

(ii) *Paratypes.* The chief variations exhibited by the larger paratype (another female) are: dorsal stripe somewhat greenish yellow; ground color of side darker, the upper and lower regions less clearly differentiated than in holotype; brownish longitudinal streaks darker and in general rather wider; vermiculations on head less conspicuous; no spokes from eye; dorsal with some small, irregular, rather faint groups of brownish punctulations on anterior half of membrane, and 3 brownish spots in posterior half; caudal tip white, preceded by a very narrow black bar. The smaller paratype (male) has the ground color much the darkest; no brownish longitudinal streaks, which have perhaps become indistinguishable by mere extension; on flank, particularly in lower half, a number of small light areas, often rounded, which may represent positive elements of pattern, or may simply be uninvaded regions of ground color; some brownish clouding proximally on membrane of last 6-7 dorsal spines; 3 short dark spokes and 4 lighter, longer less sharply defined streaks from orbit; most of caudal dark brownish, centrally approaching blackish, but a very narrow whitish border at tip, along whole of upper, and part of lower, margin.

*Life colors.*—(i) *Holotype.* The fairly fresh holotype had the ground color light, somewhat greenish yellow, deeper on upper part of flank, approaching white on lower side of trunk and on ventral surface; longitudinal streaks pinkish red; markings along midlateral line green; dorsal stripe off-white, contrasting boldly (as in preserved specimen) with rest of fish; eye with much gold, ocular spokes reddish; dorsal pinkish, largely fringed lighter; anal pale, approaching white; pectoral and ventral whitish; caudal with some reddish.

(ii) *Paratypes.* The following notes summarize extensive observations made on the coloration of the 2 paratypes. Female: dorsal stripe uniform pale orange; general color of sides olivaceous, tending to become more greyish in upper portion and posteriorly; longitudinal streaks brownish olivaceous; markings in a line along side dark brown; belly whitish with bluish tinge; side of head below the dorsal stripe mostly orange, deepest just below and behind eye; lips whitish, the lower with 4 or 5 small greyish patches on each side, an extension of this series involving the chin; operculum silvery, with half a dozen subhorizontal wavy lines, a little narrower and lighter than those on front of trunk; tubes of anterior nostrils medium brown; a narrow light interorbital cross bar about at level of front of pupil, rest of interorbital dark, almost black, sharply delimited both in front and behind; ventral surface of head pale orange anteriorly, silvery posteriorly; chin whitish, with a touch of bluish, and some greyish patches noted above; dorsal fin orange proximally (the color continues with that of the dorsal stripe), whitish distally, the orange forming a subtriangular area, deepest anteriorly, in each interradial, small blackish smudges on membrane at spines 22/23, 34/35 and (less pronounced) 38/39; anal wholly white; pectoral pale flesh, immaculate; ventral pale yellow, immaculate; caudal centrally yellowish, orange, blackish, in succession caudad; a patch of blackish in upper part of base; elsewhere, except for colorless borders, yellow. The male differed, when fresh, from the female chiefly as follows: dorsal stripe rather paler; ground color more greyish; longitudinal streaks much less obvious, their interspaces being largely filled with fine crowded punctulations; on trunk streaks lost, the whole region, down almost to ventral profile being pale yellowish, being finely punctulated with brown; markings along midlateral line in the form of shorter, somewhat thicker dashes, with the last 4-5 rounded; behind vent on flank some obscure small whitish spots; sinuous lines on operculum replaced by a few brownish blotches; brown markings on side of head and greyish patches on chin larger, more discrete, darker; anterior nostrils very pale brownish; light and dark cross bars between eyes less distinct; posterior part of dorsal fin more whitish; caudal mostly blackish, darkest posteriorly, rather narrowly margined behind and at sides with white.

*Intromittent organ.*—The intromittent organ of the male paratype (Fig. 3*c*) is extruded. Its total height is rather less than its transverse basal diameter; about half length of a modal anal ray. Viewed from below, it presents a close approximation to a short ellipse, the anterior half of the periphery being a little more strongly curved than the posterior half; major axis transverse. In front elevation the main mass is made up of a basal portion in the form of the frustrum of a cone (widest distally) and on outer portion resembling the pileus of a mushroom. In lateral view, the anterior profile first rises steeply, barely convex, and then curves back to join the boldly curved posterior profile, the point of junction occurring at the level of the anterior one-third of the anteroposterior extension of the base. At the point of junction the pale yellow main mass, which alone has been considered so far, is surmounted by a small colorless conical process directed downward and forward, its tip extending almost to level of anterior face of the supporting structure. The organ, which is marked by some subvertical plicae, emerges from an aperture fringed, for rather more

than its anterior half, by a strongly plicate fold, highest mesially.

*Proportions as TLs.*—Some dimensions of the holotype and the 2 paratypes, given as thousandths of standard length, are set out in Table VII.

*Secondary sexual dimorphism.*—In an investigation of *Ophiclinus aethiops* McCulloch & Waite, 1918, discussed elsewhere in this paper, the relative precaudal length of females was found to be significantly greater than that of males. In the types of *Breona greeni* the precaudal length of the females is 38.3% (holotype), 39.6%, that of the male 34.6%, of *Ls;* the male value being less than the female mean by 11.3% of the latter (in *O. aethiops* 8.5%); while for trunk the corresponding entries are 19.6%, 19.5% 16.1%, male deficit as before 17.8% (*O. aethiops* 15.0%). Variations, concomitant with those of trunk and tail, of the vertical fin bases in the sexes are exhibited in Table III, and receive some notice in the observations on *O. aethiops*.

*Distribution.*—The species is at present known only from the type locality.

*Trivial name.*—The trivial name is in honor of Mr R. H. Green, Zoologist, Queen Victoria Museum, Launceston, whose enthusiastic collecting of rock-pool fishes at Green's Beach, Devon has led to the addition to the Tasmanian list of a number of species, and has provided much other valuable material, the examination of which is serving to extend considerably our knowledge of the local fish fauna.

TABLE VII

*Breona greeni gen. et sp. nov.* Meristic data, and dimensions, expressed as thousandths of standard length (*TLs*), of holotype and 2 paratypes from Green's Beach, Devon, Tasmania, collected by Mr R. H. Green

| *Count or Dimension* | *Specimen (sex; standard length, mm.)* | | |
|---|---|---|---|
| | *Holotype* ♀ 63.4 | *Paratype* ♀ 65.2 | *Paratype* ♂ 57.3 |
| Dorsal | xxxix, 1 | xxxviii, 1 | xli, 1 |
| Anal | ii, 35 | ii, 35 | ii, 36 |
| Pectoral (left/right) | 8/9 | 8/8 | 8/8 |
| Ventral | 3 | 3 | 3 |
| Caudal | 12 + ½ | 12 + ½ | 12 + ¾ |
| Total length | 1076 | 1075 | 1082 |
| Length to dorsal origin | 368 | 377 | 332 |
| Length to dorsal termination (base of ray) | 963 | 968 | 953 |
| Length to anal origin | 402 | 406 | 356 |
| Length to anal termination (base of ray) | 968 | 975 | 962 |
| Length to pectoral origin | 156 | 172 | 150 |
| Length to ventral origin | 110 | 124 | 106 |
| Length to vent (middle) | 383 | 396 | 346 |
| Length of longest dorsal spine | 16 | 16 | 16 |
| Length of dorsal ray | 28 | 29 | 24 |
| Length of longest anal ray | 28 | 31 | 30 |
| Length of pectoral (whole fin) | 102 | 104 | 108 |
| Length of longest (*n*th) pectoral ray | 73 (3rd) | 74 (3rd) | 70 (4th) |
| Length of anterior (hidden) ventral ray | 32 | 31 | 35 |
| Length of middle ventral ray | 76 | 74 | 80 |
| Length of posterior (formally inner) ventral ray | 80 | 77 | 84 |
| Length of tubular section of lateral line | 297 | 291 | 262 |
| Head | 188 | 199 | 185 |
| Snout | 19 | 20 | 17 |
| Eye | 27 | 30 | 31 |
| Interorbital | 11 | 8 | 8 |
| Depth, maximum | 109 | 93 | 101 |
| Depth, at vent | 84 | 89 | 87 |
| Depth, at hypural joint | 31 | 31 | 33 |
| Thickness, maximum | 71 | 66 | 58 |
| Thickness, at vent | 47 | 46 | 52 |
| Thickness, at hypural joint | 3 | 4 | 4 |

## Family **TRIPTERYGIIDAE**

Prior to the appearance of the Check-List there were reported from Tasmania (*i*) *Tripterygion clarkei* Morton, 1888 (Morton consistently spelt the generic name *Triptergium*: Fowler (1953: 264) gives the trivial name, from Clarke Island, as *clarkii*), referred in the Check-List (McCulloch, 1929: 348) to *Gillias* Evermann & Marsh, 1900, and now placed by Whitley (1964) in *Norfolkia* Fowler, 1953, a step contemplated, but not taken, by Fowler; the species being known, outside the two original notices of it (Morton, 1888: xlvii, 78), only from a

paper by Hall (1913) who gave an account of some twenty specimens from Hobart that he ascribed to this form: (*ii*) a Tripterygiid in the possession of R. M. Johnston that was mentioned at the Royal Society's meeting at which Morton's specimen was exhibited, and that is perhaps the subject of a short entry in R. M. Johnston's Memoranda, redacted by Whitley (1929: 165), by whom it is referred to Morton's species, from which, however, it has a decidedly different dorsal formula, D. 21/8 (presumably iii, xviii, 8; contrast iii, xvi, 11): for further details see Scott (1939 159). In 1939 the writer reported from the mouth of the Currie River, Dorset, a single individual of *Tripterygium macleayanus* Lucas, 1891, since referred by McCulloch to *Gillias* and by Whitley to *Norfolkia*. *Brachynectes fasciatus* Scott, 1957, hitherto known only from South Australia, is added here to the local list, and some descriptive observations on it are given: several points in the original account require emendation.

## KEY TO TRIPTERYGIIDAE RECORDED FROM TASMANIA

In the compilation of a key to the Tasmanian members of the family the best that can be done with R. M. Johnston's unidentified specimen is to segregate it from the rest on number of dorsal rays: it is doubtful whether its generic status can now be satisfactorily established, The possibility that *Norfolkia clarkei* is conspecific with *N. macleayanus* cannot be wholly ruled out.

1 Second dorsal with 18 spines. Third dorsal with 8 rays .... R. M. Johnston's specimen
1 Second dorsal with $<$ 18 (10-16) spines. Third dorsal with $>$ 8 rays (10-19) .... 2

2 Number of spines of second dorsal $<$ number of rays of third dorsal. Superior lateral line ending below second dorsal. Inferior lateral line a series of incised scales behind upper .... *Brachynectes fasciatus*
2 Number of spines of second dorsal $>$ number of rays of third dorsal. Superior lateral line ending below third dorsal. Inferior lateral line ? .... 3

3 D. iii, xiv-xvi, 10. Lat. l. 34. Maxillary teeth subequal .... *Norfolkia macleayanus*
3 D. iii, xvi, 11. Lat. l. 26. Some maxillary teeth enlarged .... *Norfolkia clarkei*

## Genus **BRACHYNECTES** Scott, 1957

### *Brachynectes fasciatus* Scott, 1957

*Brachynectes fasciatus* Scott, 1957, *Trans. Roy. Soc. S. Aust.*, **80**: 180, fig. 1. Type locality: Pelican Lagoon, Kangaroo Island, South Australia.

*Verconectes fasciatus* (Scott), Scott, 1962, Marine and Fresh Water Fishes of South Aust.: 255; unnumbered fig. on p. 256.

*Material.*—Tasmanian material examined comprises 1 specimen (*g*), *Ls* 36.1, *Lt* 44.6 from a large collection of intertidal rock-pool fishes made at Green's Beach, Devon by Mr R. H. Green on 4th, 5th September; 6 specimens (*a*)-(*f*), *Ls* 24.9, 31.1, 33.2, 34.0, 34.8, 35.3, *Lt* 31.0, 38.5, 41.6, 41.5, 43.1, 43.7, same locality and collector, 18th, 19th December 1965. Through the courtesy of the authorities of the South Australian Museum, Adelaide the following specimens from South Australia have been examined: 1 specimen (*h*), *Ls* 31.1, *Lt* 38.6, collected at Cape Jervis by T. D. Scott on 6th November 1956 (printed entry on label 'Id by T. D. Scott'; metal tag in phial F 2933); 5 specimens, *Ls* 28.7, 32.3, 33.1, 39.9, 42.0 (in poor condition, very rigid, most with caudal imperfect), collected in Port River, Adelaide by A. Zeitz on 12th February 1931 (F 1488).

*Tasmanian record.*—Specimen (*g*) provides the first record of this species in Tasmania.

*Distribution.*—Scott (1962: 256) observed 'To date, this species has been taken only in shallow weedy areas in Pelican Lagoon, Kangaroo Island, and on the coasts of that island'. However, the localities recorded for the South Australian examples we have received on loan, specified above, would indicate a wider South Australian distribution than thus allowed for.

*Generic status.*—*Brachynectes* was stated in the original diagnosis to be 'Separated from other Australian genera in having the second dorsal fin shorter than the third'. However, its author later (1962: 255) referred its type species to *Verconectes* Whitley, 1931, proposed as a substitute name for *Trianectes* McCulloch & Waite, 1918, considered to be preoccupied by *Trinectes* Rafinesque, 1832. In his recent list of Australian fishes Whitley (1964) continues to recognize *Brachynectes* (with sole species *B. fasciatus*). The retention of the genus seems advisable. *Verconectes* is noted by its author as differing from his *Vauclusella* (orthotype *Tripterygium annulatum* Ramsay & Ogilby, 1888), described earlier in the same paper, by, among other features 'the very long anterior portion of the lateral line'; which in *Verconectes bucephalus* reaches to, or a trifle beyond, level of middle of third dorsal. In *B. fasciatus* this section of the lateral line does not extend beyond level of end of second dorsal. Other differences between the two species that may be of generic value include the excess in *Brachynectes* of length of the third over the second dorsal on which original emphasis was placed (in *V. bucephalus* the excess of the second over the third is of comparable magnitude); the character of the pectoral rays (all simple in *Brachynectes*, upper divided in *Verconectes*); possibly the structure of the ventral (see below), and perhaps the gross form of the mouth. With his account of *Brachynectes* Scott gave a key to the genera of Tripterygiidae of Australia, covering, in addition to the new genus, *Lepidoblennius* Steindachner, 1867, *Helcogramma* McCulloch & Waite, 1918, *Gillias* Evermann & Marsh, 1899, *Notoclinops* Whitley, 1930, *Verconectes* Whitley, 1931, *Vauclusella* Whitley, 1931, *Tripterygion* Risso, 1826. Fowler (1953) has discussed relationships of some Australian forms, in particular those placed by McCulloch in the Check-List in *Gillias;* with his *Norfolkia*, to which genus Whitley (1964) refers all 3 species referred in the Check-List to *Gillias*, together with *N. squamiceps* (McCulloch & Waite, 1916), *N. thomasi* Whitley, 1964.

*Remarks on original account.*—The first Tasmanian specimen obtained (*g*) fails to conform with the original description and figure in having (*i*) greater number of ventral rays, (*ii*) anal with two spines, (*iii*) second dorsal base shorter relative to third dorsal base, (*iv*) different course of superior lateral line, (*v*) both ctenoid and cycloid scales: it

was thought possibly to represent a new species. However, examination of further Tasmanian specimens and the South Australian material specified above—particularly the best-preserved example, (*h*)—has shown (*i*) though the original description gives V.2, there are regularly 3 rays in the ventral, the posterior being small, and usually being wholly enclosed in membrane; (*ii*) the original entry is A.20-21, but the first two anal radial elements are not articulated; (*iii*) from the figure, the ratio of the base of the third dorsal (between bases of rays) to that of the second dorsal (between bases of spines) is about 1.44; in our original local example it is 1.07, in the specimen (*h*) identified by T. D. Scott 1.15, in the 6 Tasmanian specimens (*a*)-(*f*) 1.07, 1.03, 1.12, 1.01, 1.21, 1.15, respectively—all examples thus having the discrepancy between the sizes of the fin bases less than depicted for the type; (*iv*) the tubular superior section of the lateral line runs almost exactly parallel with the dorsal profile (dropping in some individuals to become a trifle further from the profile posteriorly), and not, as in the figure of the holotype, rising rather sharply backward to have its termination about half as far from the profile as its origin [the figure correctly indicates that the origin of the line is about 2 scales ($\frac{1}{2}$ + 1 + $\frac{1}{2}$) from the profile, but shows only $\frac{1}{2}$ + $\frac{1}{2}$, instead of 1 + $\frac{1}{2}$ or $\frac{1}{2}$ + 1 + $\frac{1}{2}$, at its termination; the slope thus arrived at being rendered steeper by failure to take into account differences of size among the scales]; (*v*) scales are reported simply as ctenoid; this is the character of most scales, but those on the anterior breast are cycloid.

*General description.*—The following account is based primarily on the largest Tasmanian specimen, (*g*). Entries in square brackets relate to the 6 other Tasmanian examples, (*a*)-(*f*), and the South Australian (*h*). Entries in parentheses relate to all 8 lettered specimens.

D. iii, X, 13 [iii, X; third dorsal with 13 (4 specimens), 12 (3)]. A. ii, 19 [ii; rays 17 (1), 18 (5), 19 (1)]. P. (left/right) 13/13 [11 (1), 13 (6)/12 (2), 13 (4), 14 (1)]. C. 13 main rays [12 (2)]. V. 3. Br. 6. L. lat. (left/right) 11 + 19/12 + 19 [11-14 + 19-21, with some variation on right and left sides]. L. tr. 2 + 1 + 7 [scales below tubules 7 (3), 8 (4)].

Head large, 3.3 (2.6-3.4, $\bar{x}$ 3.09 ± 0.082), in *Ls*; subconical, its greatest width 1.1 in its greatest depth; naked, the body scales terminating along a sharply defined oblique line from base of 1st dorsal spine to upper angle of operculum, there being about 5 scales in advance of the latter. Eye in anterior half of head, not cutting dorsal profile; 3.6 (3.4-4.0, $\bar{x}$ 3.63 ± 0.077) in head; 1.1 (0.9-1.2, $\bar{x}$ 1.05 ± 0.035) times snout; 1.3 (1.3-2.0 $\bar{x}$ 1.58 ± 0.072) times interorbital, which is gently convex in front, almost flat behind. Jaws equal anteriorly (equal, or lower very slightly projecting); lips thick anteriorly, protuberant, the upper partly overlapped by free border of preorbital; mouth oblique, anterior end of cleft about on horizontal level of inferior border of pupil; maxillary much expanded posteriorly, its greatest width exceeding distance of its posterosuperior angle from orbit, extending to below posterior border (0.4-0.8, modally 0.8) of eye. Preoperculum with subvertical free posterior border, slightly behind level of 1st dorsal spine. Upper angle of operculum incised. Gill membranes united, free of isthmus. Anterior nostril tubular, a little higher than wide; equidistant from hind border of lip and orbit; surmounted by a subtriangular flap, longer than the cylinder, its gently convex terminal border very minutely crenulate. Posterior nostril a simple opening, with a low rim, almost directly behind anterior nostril, just posterior to level of front of eye. Supraorbital tentacle with its inner insertion partly on eye; basally a broad flap, compressed anteroposteriorly, a little wider than high, giving rise along its distal border to half a dozen subtriangular processes; total length subequal to diameter of pupil. Two minute rigid digitiform processes on either side of, and immediately in advance of, 1st dorsal spine; distance between them equal to anterior internarial. Numerous cephalic pores: these are of more than one size, and their systematic location presents some difficulty. The main concentrations of the larger pores are disposed as follows: (*a*) along border of preoperculum, where about a score lie mainly in 2 irregular rows; (*b*) a patch just behind eye; (*c*) an oblique band, 1-2 wide, from lower angle of (*b*) back towards upper end of preopercular border; (*d*) a cluster between (*c*) and front of first dorsal base; (*e*) 6-8 below eye; (*f*) about 8 on preoperculum; (*g*) a dozen on dorsal surface between tip of snout and origin of dorsal. Teeth in lower jaw villiform; in anterior half of jaw in a broad band, narrowing behind, at first rapidly, then more gradually. Teeth in upper jaw similar to those of lower jaw, and more or less similarly disposed, but the band initially not so wide, and decreasing in width more evenly. Three contiguous patches of villiform teeth on vomer. Palatines toothless. Gill membranes broadly united, free of isthmus.

Body stout; moderately compressed anteriorly, greatly posteriorly; its width behind pectoral base, at level of its maximum, at vent, at hypural joint 0.7, 0.9, 0.4, 0.2, respectively, of its depth there; maximum depth 4.0 (3.7-4.4, $\bar{x}$ 4.26 ± 0.058), depth at vent 4.1 (4.0-4.4, $\bar{x}$ 4.22 ± 0.019), in *Ls*. Except for pectoral base, body wholly covered with scales; in general rather large, smaller on belly and breast; anterior breast scales cycloid, others ctenoid; 32 [29 (2), 30 (2), 31 (1), 32 (2)] scales between axilla and caudal base, the latter overlapped on each side by 3 enlarged specialized scales—this is the regular pattern; exceptionally one scale is replaced by 2 or more smaller scales. Counted obliquely backwards from origin of first dorsal scales are 2 + 1 + 7 [for variants, see above], or from origin of third dorsal 2 + 1 + 4—for latter convention see Scott (1939: 153, footnote). Tubular superior segment of lateral line parallel with dorsal profile; left/right 11/12 contiguous tubules [variants above], the last beneath 8th [7th (2), 8th (4), 9th (1)] spine of second dorsal: lower segment consisting of 19 [variants above] scales, each with a deep *U*-shaped median incision in its posterior border, the depth of the incision in anterior scales being about equal to distance between front of one groove and back of next, and in posterior scales to half this distance, or less; first incised scale below [or just caudad of] end of last tubule; lines of tubules and incisions separated by $\frac{1}{2}$ + 1 + $\frac{1}{2}$ scales.

Dorsals just connected by membranes basally; third attached by membrane to caudal peduncle. First dorsal originating slightly in advance of hind margin of operculum; length to origin 4.6 (3.9-4.9, $\bar{x}$ 4.39 ± 0.13) in *Ls;* base to back of 3rd spine) 4.1 (3.1-5.8, $\bar{x}$ 4.85 ± 0.27) in head; 1st, 2nd, 3rd spines 2.8, 2.7, 3.3 [1st spine 2.1-2.8 $\bar{x}$ 2.54 ± 0.091] in head; First pseudo-interdorsal (spine to spine) half eye. Second dorsal originating above hind face of pectoral base; length to origin 3.0 (2.7-3.0, $\bar{x}$ 2.84 ± 0.030) in *Ls;* base (spine to spine) 1.2 (1.2-1.4, $\bar{x}$ 1.25 ± 0.027) in head, or 1.08 [1.07, 1.03, 1.12, 1.01, 1.21, 1.15, 1.15) times base of third dorsal; 1st, 5th, 9th, 10th spines 2.8, 2.2, 2.5, 2.8 (1st spine 2.8-3.9, $\bar{x}$ 3.06 ± 0.16) in head. Second pseudo-interdorsal (spine to spine) two-thirds eye. Third dorsal with all rays simple; originating a little nearer end of head than base of caudal; length to origin 1.6 (1.5-1.6, $\bar{x}$ 1.53 ± 0.011) in *Ls*; base (ray to ray) 1.1 (0.8-1.2, $\bar{x}$ 1.09 ± 0.033) in head; 1st, 7th, 11th, 12th, 13th rays 2.5, 2.0, 2.5, 3.4 5.0 (1st ray, 2.5-2.8 $\bar{x}$ 2.63 ± 0.046) in head; last ray above penultimate anal ray; briefly attached by membrane to caudal peduncle at a point in advance of end of specialized caudal scales by a distance of little less than depth of body at that point; laid back, fin reaches beyond origin of specialized scales. Anal originating below 6th spine of second dorsal; length to origin 2.2 (2.0-2.2, $\bar{x}$ 2.04 ± 0.084) in *Ls;* base 1.4 (1.3-1.5, $\bar{x}$ 1.41 ± 0.025) times head; 1st spine, 2nd spine, 1st, 9th, 17th, 18th 19th rays 4.6, 3.8, 2.8, 2.3, 2.2. 3.4, 3.7 (1st spine 4.5-6.9, $\bar{x}$ 5.43 ± 0.091; 2nd spine 3.3-4.9, $\bar{x}$ 3.86 ± 0.050; 1st ray 2.5-3.1, $\bar{x}$ 2.83 ± 0.074) in head; last ray followed by mere slip of membrane; laid back, fin extends slightly beyond laid-back dorsal, almost to tip of specialized scales. Pectoral more or less pointed; all rays simple; originating behind level of ventral origin by a trifle less than snout length; length to origin 3.6 (3.6-4.1, $\bar{x}$ 3.76 ± 0.020) in *Ls;* base partly overlapped by transparent operculum; length of whole fin 0.9-1.2, $\bar{x}$ 1.01 ± 0.028 in head; longest, 8th [7th (3), 8th (3), 9th (1)] ray 4.1 times shortest, 1st, or 1.1 (0.9-1.2, $\bar{x}$ 1.01 ± 0.028) in head; adpressed, fin reaches beyond vent, to below last [last (2), penultimate (3), antepenultimate (2)] spine of second dorsal. Ventrals originating below angle of preoperculum, immediately behind free border of common gill membrane; length to origin 5.0 (4.4-5.2, $\bar{x}$ 4.90 ± 0.082) in *Ls*; 1st ray small, slender, wholly bound to 2nd [in specimen (*d*), right fin, free for most of length; in (*d*), left fin, and in some other cases, the needle-like tip free]; 1st ray 4.6 (2.9-5.6, $\bar{x}$ 4.18 ± 0.28), 2nd 1.6 (1.4-1.6, $\bar{x}$ 1.53 ± 0.070), 3rd 2.2 (2.0-2.2, $\bar{x}$ 2.11 ± 0.027) in head, the longest exceeding twice eye. Caudal rounded: all rays simple ['none of the rays bifurcate' (Scott, 1957: 181), but his fig. 1 shows 9 rays fairly deeply divided]; length 1.3 (1.2-1.5 $\bar{x}$ 1.33 ± 0.025) in head: base overlapped by a set of 3 subequal enlarged scales, their exposed length about one-fifth total length of fin; medial scale overlying the others [1 of the lateral scales sometimes replaced by 2, or more, smaller scales].

*Coloration.*—The colors in life have not been reported. The following notes summarize some observations made on specimens (*a*)-(*f*) on receipt, when some loss of color had clearly taken place, the extent of decolorization varying in individuals and at times in different parts of the one individual.

Upper half of operculum bright reddish or orange; lower half translucent, revealing pectoral base with conspicuous red area, peppered with black spots and having a black border. Rest of head a complex assemblage of lighter and darker areas, reddish, brownish, whitish, pinkish. yellowish, orange. Below eye some white, punctulated with brown, diffuse or forming lines. Alternate darker (reddish, bearing black spots) and lighter (pearly, immaculate) areas fringing operculum and preoperculum; the lighter often in the form of complete bays invading from the margin; upper 2 dark areas on operculum commonly sharply defined redbrown spots; markings on preoperculum extend downwards to border ventral surface, the region between them (isthmus and part of branchiostegal membrane) being off-white, without markings. Lower lip with about 10 such color bands, others of which occur also laterally on upper lip. Dorsum mostly orange or yellowish, fairly heavily punctulated with darker, but lacking discrete pattern. Anterior nostril white or pinkish, peppered minutely with red or brown. Superocular tentacle bright red or reddish brown, either without other color or somewhat splashed with brown.

Ground color of body probably originally orange, now best preserved and brightest in a band along dorsal profile; the conspicuous character of this region enhanced by absence, or virtual absence, of punctulation on the scales, which nearly everywhere else carry a dark brown arc concentric with border of preceding scale: in specimen (*e*), which is in general much darker than the others, almost all scales are so patterned. Along midlateral line 5-7 fairly evenly spaced dark spots (as preserved, the hinder the darker, more sharply delimited), within which may be small orange or bright red dots; last 2 may trespass upward somewhat on to the otherwise unmarked superior band, and may be clearly duplicated below midlateral line (either as separate spots or as part of a dumbbell); but others are not so repeated below, or are at most vaguely echoed by irregular areas, a little darker than ground color, that may occur vertically below them, or may be out of phase with them, coming to lie beneath their intervals. Belly whitish and/or bluish; some scales with some brownish blotching.

First dorsal overall reddish orange; 1st spine (which may be lighter than the rest) crossed by 3 red (immaculate or with minute black dots) bars sharply bordered with black, the interspaces whitish punctulated with blackish. Second dorsal crossed by 3-4 red bars, vertical or running upward and forward, subequal in width to their whitish interspaces; may also carry several small red spots partly bordered with black. Third dorsal much lighter in general appearance than second; mostly white, with delicate lines, running downward and backward, of orange, each line a series of small contiguous rectangles, occurring on both membrane and spines, many rectangles partly outlined by minute black splashes or dots. In the dark specimen (*e*) first dorsal is black with some red; second dorsal largely black with some proximal red; third dorsal proximally ashen, and, especially behind first 2-3 rays, distally blackish. Anal white; crossed by a dozen orange or yellowish bars, running down-

ward and forward, darkest proximally, wider than bars of third dorsal, much narrower than those of second dorsal; composed of contiguous rectangles, the basal units invariably heavily bordered with black, the more distal ones with less pronounced, or without, dark margins: in (*e*) fin ashen with a good deal of black, when laid back appearing wholly black. Caudal with membrane almost colorless, rays a little dusky; crossed by a dozen subvertical bars of deep orange, clear or tinged with brown; the proximal bar easily the best defined and most conspicuous, in the from of 2 proconcave arcs bordering the 2 lateral specialized scales on fin base; other bars less readily traceable as complete (increasingly so distally), becoming lost on membrane: in (*e*) whole fin is, additionally, heavily punctulated with black. The specialized caudal scales conspicuous, pale pinkish or yellowish, with a fan of diverging lines each bordered on either side at base with a streak of orange; hinder part of scale translucent. Pectoral chiefly whitish; about 10 cross bars formed by orange spots (often partly bordered and/or sprinkled with black) on the rays. Ventral whitish; with 6-8 orange or reddish annuli (sometimes, especially in the case of the proximal 3-4, margined with black) on each of the 2 main rays, often somewhat more intense on shorter ray.

TABLE VIII

*Brachynectes fasciatus* Scott, 1957. Meristic data, and dimensions, expressed as thousandths of standard length (*TLs*), of 7 specimens, (*a*)-(*g*), from Green's Beach, Devon, Tasmania, and 1 specimen, (*h*), from Cape Jervis, South Australia

| Count or Dimension | Specimen (standard length, mm) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | (*a*) 24.9 | (*b*) 31.1 | (*c*) 33.2 | (*d*) 34.0 | (*e*) 34.8 | (*f*) 35.3 | (*g*) 36.1 | (*h*) 31.1 |
| Dorsal | iii, x, 13 | iii, x, 12 | iii, x, 12 | iii, x, 13 | iii, x, 13 | iii, x, 13 | iii, x, 13 | iii, x, 12 |
| Anal | ii, 18 | ii, 18 | ii, 18 | ii, 18 | ii, 17 | ii, 19 | ii, 19 | ii, 18 |
| Pectoral (left/right) | 13/13 | 11/13 | 13/14 | 13/12 | 13/13 | 13/12 | 13/13 | 13/13 |
| Caudal (main rays) | 12 | 13 | 13 | 13 | 12 | 13 | 13 | 13 |
| L. lat. (anterior section, left/right; posterior section) | 10/11; 20 | 11/12; 21 | 12/11; 19 | 11/11; 21 | 12/12; 20 | 12/14; 19 | 11/12; 19 | 13/12; 19 |
| L. tr. | 2/1/7 | 2/1/7 | 2/1/8 | 2/1/8 | 2/1/8 | 2/1/8 | 2/1/7 | 2/1/7 |
| Scales between shoulder and caudal base | 29 | 32 | 31 | 30 | 30 | 32 | 32 | 29 |
| Total length | 1,245 | 1,238 | 1,253 | 1,221 | 1,239 | 1,238 | 1,235 | 1,241 |
| Length to— | | | | | | | | |
| Origin of first dorsal | 243 | 257 | 223 | 253 | 204 | 213 | 216 | 225 |
| Termination of first dorsal (spine) | 283 | 289 | 280 | 290 | 305 | 272 | 291 | 289 |
| Origin of second dorsal | 365 | 354 | 355 | 347 | 365 | 343 | 332 | 355 |
| Termination of second dorsal (spine) | 606 | 610 | 605 | 618 | 605 | 595 | 583 | 611 |
| Origin of third dorsal | 655 | 650 | 639 | 653 | 632 | 626 | 639 | 669 |
| Termination of third dorsal (ray) | 912 | 910 | 919 | 926 | 927 | 915 | 909 | 963 |
| Origin of anal | 490 | 505 | 506 | 475 | 486 | 514 | 454 | 502 |
| Termination of anal (ray) | 924 | 952 | 940 | 950 | 950 | 958 | 920 | 934 |
| Origin of pectoral | 247 | 277 | 271 | 262 | 256 | 256 | 277 | 286 |
| Origin of ventral | 205 | 228 | 209 | 206 | 200 | 197 | 198 | 193 |
| Vent (middle) | 474 | 482 | 476 | 449 | 457 | 493 | 415 | 482 |
| Length of— | | | | | | | | |
| First spino of first dorsal | 120 | 96 | 151 | 129 | 125 | 136 | 111 | 116 |
| First spine of second dorsal | 116 | 95 | 108 | 97 | 116 | 119 | 111 | 82 |
| First ray of third dorsal | 123 | 127 | 120 | 119 | 112 | 112 | 125 | 130 |
| Last ray of third dorsal | 116 | 80 | 90 | 116 | 86 | 113 | 55 | 76 |
| First spine of anal | 64 | 63 | 66 | 59 | 52 | 65 | 66 | 47 |
| Second spine of anal | 88 | 90 | 92 | 88 | 75 | 79 | 80 | 66 |
| First ray of anal | 118 | 103 | 117 | 111 | 109 | 116 | 111 | 114 |
| Last ray of anal | 74 | 64 | 92 | 59 | 89 | 85 | 83 | 80 |
| Pectoral (whole fin) | 333 | 352 | 361 | 318 | 293 | 290 | 263 | 334 |
| Longest (*nth*) ray of pectoral | 313(7th) | 296(7th) | 283(8th) | 276(8th) | 273(8th) | 280(8th) | 249(8th) | 315(7th) |
| First ventral ray | 72 | 74 | 90 | 88 | 108 | 88 | 66 | 95 |
| Second ventral ray | 201 | 196 | 211 | 215 | 216 | 204 | 188 | 235 |
| Third ventral ray | 159 | 158 | 157 | 147 | 145 | 193 | 140 | 161 |
| Head | 325 | 322 | 332 | 335 | 316 | 290 | 306 | 322 |
| Snout | 88 | 80 | 89 | 88 | 78 | 85 | 76 | 77 |
| Eye | 82 | 95 | 87 | 90 | 83 | 79 | 84 | 93 |
| Interorbital | 52 | 48 | 57 | 53 | 57 | 57 | 66 | 63 |
| Depth— | | | | | | | | |
| Maximum | 243 | 251 | 265 | 250 | 259 | 229 | 252 | 251 |
| At opercular border | 241 | 232 | 240 | 237 | 241 | 224 | 269 | 225 |
| Before anal origin | 239 | 248 | 244 | 224 | 247 | 227 | 247 | 225 |
| Of caudal peduncle | 100 | 96 | 116 | 103 | 103 | 99 | 108 | 96 |

*Proportions as TLs.*—Table VIII records, together with some fin and scale counts, a number of dimensions, expressed as thousandths of standard length, of all the 7 known Tasmanian specimens, arranged in ascending order of standard length, and, in the extreme right column, of the South Australian example from Cape Jervis noted as having been identified by T. D. Scott.

## NOTES ON SURF FISHING CONTESTS HELD AT SWIMCART BEACH, DORSET IN APRIL 1965 AND MAY 1966.

In line with the recording of results of Californian Shark Derbies— see, *e.g.*, Herald, Schneebelli, Green & Innes (1960)—some data were given in an earlier contribution (1965: 64) on the catch at a fishing contest held at George Town, Dorset in January 1963. Some general observations on the Tasmanian Open Surf Angling Championship, sponsored by the St Helens Surf Angling Club, held at Swimcart Beach, near St Helens, Dorset, on 3rd, 4th April, 1965 and on 7th, 8th May 1966 are here given; the data being based on information kindly supplied by the Club's Secretary, Mr T. M. Brimfield (1965), Mr M. Franks (1966).

In the 1965 competition there were 259 entrants, and 159 fish were caught. The catch was noted as including about 30 flathead (probably *Platycephalus bassensis* Cuvier & Valenciennes, 1829); 75 salmon (*Arripis trutta esper* Whitley, 1950), heaviest 1 lb. 4 oz, 22 mullet (probably *Mugil cephalus* Linné, 1758); 1 gurnet (? *Trigla sp.*; ? *Ruboralga ergastulorum*), 2 lb 6 oz; 14 kelpies (*Pseudolabrus sp.*; the commonest form is *P. fucicola* (Richardson, 1840)); 16 skate, small, 1 shark (probably *Galeorhinus australis* (Macleay, 1881) or *Mustelus antarcticus* Günther, 1870), 19½ lb. In a letter dated 11th April 1965 Mr Brimfield observed, 'You would find that catches would vary considerably from year to year. Conditions were too calm for a good run of salmon. The Saturday after the contest two of our members caught almost as many cocky and blackback' [*i.e.*, young and adult of *Arripis trutta esper;* which many fishermen regard as distinct species] 'at Swimcart as the entire 259 anglers the week before.'

Fish caught in the 1966 contest numbered 224, as follows: 16 mullet, 8 oz-16 oz; 97 salmon, heaviest 4 lb 4 oz, 17 others over 2 lb (3 lb 1½ oz;3, 1; 2, 13½; 2, 13; 2, 13; 2, 11½; 2, 10; 2, 9½; 2, 9¼; 2, 9; 2, 8¼; 2, 8; 2, 7; 2, 6; 2, 5; 2, 4½; 2, 1½) 1 barracouta (*Leionura atun* (Euphrasen, 1791): the Commonwealth/State Fisheries has recently given official approval—reported in *Australian Fisheries Newsletter* (1966)—to a newly introduced vernacular name, snoek) 4 lb 13 oz; 10 rock cod (*Physiculus barbatus* (Günther, 1863)), 1 lb-2 lb; 88 kelp fish; 11 skate (including 4 specimens of *Raja whitleyi* Iredale, 1938 on which some observations are given earlier in this paper) 6 lb-11 lb; 1 shark (*Galeorhinus australis* (Macleay, 1881)).

### References


AUSTRALIAN FISHERIES NEWSLETTER (formerly *Fisheries Newsletter*), 1966.—Announcement of official adoption of vernacular name snoek to replace barracouta for *Leionura atun* (Euphrasen, 1791). Vol. 25, No. 9 (September): 31.

CASTLENAU, F., 1872.—Contribution to the Ichthyology of Australia. II.—Note on some South Australian Fishes. *Proc. Zool. Acclim. Soc. Vict.*, 1: 243-247.

————————, 1873.—Contribution to the Ichthyology of Australia. No. III.—Supplement to the Fishes of Victoria; and No. IV.—Fishes of South Australia. *Proc. Zool. Acclim. Soc. Vict.*, II: 37-58 (No. III); 59-82 (No. IV).

————————, 1875.—Researches on the Fishes of Australia. Intercolonial Exhibition Essay No. II in *Official Record . . . of the Colony of Victoria: Philadelphia Centennial Exhibition of* 1876 (*Melbourne* 1875).

FOWLER, H. W., 1953.—On a collection of Fishes made by Dr Marshall Laird at Norfolk Island. *Trans. Roy. Soc. N.Z.*, 81, 2: 257-267, 5 figs.

GUNTHER, A., 1867.—Additions to the knowledge of Australian Reptiles and Fishes. *Ann. Mag. Nat. Hist.* (3), XX: 45-68.

HALL, R., 1913.—Notes on Derwent Estuary Fishes. *Pap. Proc. Roy. Soc. Tasm.* (1912): 79-84.

HERALD, E. S., SCHNEEBELLI, W., GREEN, H., and INNES, K., 1960.—Catch Records for Seventeen Shark Derbies held at Elkhorn Slough, Monterey Bay, California. *Calif. Fish and Game*, 46, 1: 59-67.

LING ROTH, H., 1899.—*The Aborigines of Tasmania*: 2nd ed. Halifax (England).

LUCAS, A. H. S., 1891.—On the Occurrence of Certain Fish in Victorian Seas, with Descriptions of some New Species. *Proc. Roy. Soc. Vict.*, III (n.s.): 8-14, pl. iii.

MCCULLOCH, A. R., 1908.—Studies in Australian Fishes: No. 1. *Rec. Aust. Mus.*, VII, 1: 36-43, pl. x-xi.

————————, 1929.—A Check-List of the Fishes recorded from Australia. *Mem. Aust. Mus.*, V, I-III (IV, Index, 1930).

MCCULLOCH, A. R. & WAITE, E. R., 1918.—Some New and Little-known Fishes from South Australia. *Rec. S. Aust. Mus.*, I, 1: 39-78, pl. ii-vii, text-figs 26-31.

MORTON, A., 1888.—Description of Two New Fishes. *Pap. Proc. Roy. Soc. Tasm.* (1887): 77-78, also xlvii.

MUNRO, I. S. R., 1956 +.—*Handbook of Australian Fishes,* currently appearing serially in *Fisheries Newsletter* (now *Australian Fisheries Newsletter*), issued monthly, Fisheries Branch, Department of Primary Industry, Canberra. Here cited: No. 3: 13-16 (*F.N.*, 15, 9, September, 1956).

OLSEN, A. M., 1958.—New Fish Records and Notes on Some Uncommon Tasmanian Species. *Pap. Proc. Roy. Soc. Tasm.*, 92: 155-159.

PENRITH, M. L., 1965.—Studies on the South African Clinidae, I. Description of a new species of *Pavoclinus,* and redescription of *Gynutoclinus rotundifrons* (Barnard). *Ann. S. Afr. Mus.*, 48, 10.

SAVILLE, KENT, W., 1886.—*Rept. Fish. Dept. Tasmania.*

SCOTT, E. O. G., 1934-66.—Observations on Some Tasmanian Fishes: Parts I-XIV in this journal. Contributions here cited: Part III, 1936, *Pap. Proc. Roy. Soc. Tasm.* (1935): 113-129, text-figs 1-13; Part IV, 1939: 139-159, text-figs 1-2; Part XIII, 1965: 53-65, text-fig. 1; Part XIV, 1966: 93-115, text-fig. 1.

SCOTT, T. D., 1957.—A New Blenny (Tripterygiidae) and pipefish (Syngnathidae) from Kangaroo Island, South Australia. *Trans. Roy. Soc. S. Aust.*, 80: 180-183, text-figs 1-2.

————————, 1962.—*The Marine and Fresh Water Fishes of South Australia.* Adelaide (Government Printer).

WAITE, E. R., 1906.—Descriptions of and Notes on some Australian and Tasmanian Fishes. *Rec. Aust. Mus.*, VI, 3: 194-210, pl. xxxiv-xxxvi.

WHITLEY, G. P., 1931.—New Names for Australian Fishes. *Aust. Zool.*, 6, 4: 310-334, pl. xxv-xxvii.

————————, 1932.—Studies in Ichthyology. No. 6. *Rec. Aust. Mus.*, XVIII, 5: 321-348, 36-39, figs 1-3.

————————, 1940.—*The Fishes of Australia. Part I. The Sharks . . .* Sydney (Royal Zoological Society of New South Wales).

————————, 1964.—Presidential Address. A Survey of Australian Ichthyology. *Proc. Linn. Soc. N.S.W.*, lxxxix, 1: 11-127.