FISHES OF THE FAMILY
PENTACEROTIDAE

By

J. L. B. SMITH
Research Professor and South African Council for Scientific and Industrial Research Fellow in Ichthyology.

Illustrations by Margaret M. Smith.

(Published by the Department of Ichthyology, Rhodes University, Grahamstown, South Africa.)
ACKNOWLEDGMENTS.

The main funds covering the costs of the work on which this Bulletin is based were provided by the South African Council for Scientific and Industrial Research, who also made a special grant for its publication.

We are indebted to the following for the loan or donation of valuable specimens or for information, or both: Dr. T. Abe, Tokyo; Mr. B. van D. de Jager, Director, Division of Fisheries, Cape Town; Dr. W. I. Follett, California Academy of Sciences; Dr. K. Matsubara, Maizuru, Japan; Prof. J. Moreland, Wellington University, New Zealand; Mr. G. Palmer and Mr. P. J. P. Whitehead, British Museum; Mr. T. D. Scott, South Australian Museum; Dr. A. D. Welander, University of Washington; Mr. G. P. Whitley, Sydney; Dr. F. H. Talbot, Cape Town

To my wife, Margaret Mary Smith, I am indebted for numerous illustrations.
FISHES OF THE FAMILY PENTACEROTIDAE
(With Plates 87-91)
by J. L. B. SMITH

Research Professor and South African Council for Scientific and Industrial Research Fellow in Ichthyology, Rhodes University, Grahamstown, South Africa.

Family Pentacerotidae

Formerly known as the Histiopteridae, Follett and Dempster 1963 have shed new light on the nomenclature of the categories in this family. The earliest genus is Pentaceros C & V, 1829. This has long been held in abeyance on the grounds that it was preoccupied by Pentaceros Schulze, 1760 as well as by Pentaceros Schroeter, 1782 (both for Starfishes). Follett and Dempster have however shown that neither Pentaceros Schulze nor Pentaceros Schroeter is valid, and that Pentaceros C & V is therefore not invalidated. Further, Pentaceros C & V, 1829 was used in primary zoological literature by Gilchrist in 1902, and by Thompson in 1916, and hence cannot be relegated as a nomen oblitum. The oldest available family category name is the PENTACERATINA of Gunther, 1859 (which was corrected by Gill, 1893 to PENTACERATOINA). Bleeker, 1861 used the family name Pentacerotoidei, and as these antedate the name Histiopteridae of Jordan 1905, the family name becomes PENTACEROTIDAE.

The outstanding character of this family is the unusual armature of the head, which is almost completely encased in exposed, rough striated bones. A single dorsal fin, with 4-14 strong spines and 9-29 soft rays, total 23-34. Anal spines 2-5, strong, 8-13 rays, total 11-18. Pelvic I 5, spine stout. Small teeth in bands in jaws, vomer sometimes dentate, none on palatines. Scales small, rough, in some forms ventrally united to a cuirass. Recorded from cooler rather deep water of all the oceans, are primarily Indo-Pacific. The chief centres are Australasia, Japan and South Africa. There appear to be only eleven species, of which six occur about Australasia, four apparently endemic there, one being shared with Japan and one more or less cosmopolitan. Japan has four, sharing one with Australia and another with Australia and South Africa, where three occur. One is known only as a pelagic juvenile, so far found in the Pacific and the Atlantic. The young in at least two cases appear to be pelagic, widely distributed in curious fashion. Thus while adults of Pentaceros richardsoni Smith are known from an enormous stretch within all three major oceans, juveniles have been found only in the rather deep south, off Cape Horn and about Australasia, but the adults are unknown there. Histiopterus Temminck & Schlegel, ranges from S. Africa to the mid-Pacific, but while juveniles of the S. African species are not uncommon, those of the two Pacific species have not been described.

With validation of Pentaceros C & V, 1829 the substitute name Pseudopentaceros Blkr, 1876 becomes a synonym. For some time Quinquarius Jordan, 1907 has been regarded as distinct from Pentaceros but now that I have been able to compare specimens of the type species of each, I agree with Follett that Quinquarius falls into synonymy (first suggested by Smith 1951, Ann. Mag. Nat. Hist. (12), IV, 874). Of Gilchristia Jordan, 1907; Quadrarius Jordan, 1907; Undecimus Whitley, 1934 and Griffinetta & Phillipps, 1939, none seems to merit recognition.

Although Japanese species are among the oldest known, there is a serious lack of adequate descriptions of their species, hence critical data of Japanese species have never been published. The same applies to early Australian forms, there has been a similar curious reluctance to redescribe their species. Numerous genera have been proposed but only five appear to merit recognition, as outlined below. They fall into two sub-families, each represented in South Africa.

Key to Genera. Those asterisked occur in S. Africa.

A. Dorsal with fewer than 9 spines, soft rays 17-29. Soft dorsal much longer than spinous, 2-3 anal spines.

(Histiopterinae).

I. 4 dorsal spines. Lateral teeth pointed (Hawaii, Japan, N. Indian Ocean, S. Africa) Histiopterus*
II. 6-8 dorsal spines, 2-3 anal spines. Lateral teeth granular or molariform.

a. Dorsal with 6 spines, none as long as front soft rays: soft rays 25-28. 3 anal spines (Australasia) Zanclistius

b. Dorsal with 7-8 spines, some longer than longest soft rays, 17-18 soft rays. 2-3 anal spines (Australasia) Paristiopterus

567
Key to Genera—continued.

B. Dorsal with 10-14 spines and 8-15 soft rays. Spinous dorsal much longer than soft, 3-5 anal spines  
(Pentacerotinae).

I. 3 anal spines, palate edentate (Australasia)  
Pentaceropsis

II. 4-5 anal spines. Teeth on vomer (S. Africa, Japan, Australasia, Pacific, S.W. Atlantic)  
Pentaceros*

The distribution of the genera is variable, some are relatively localised, others widespread. As far as at present known Histiopterus occurs about South Africa, northern Indian Ocean, Philippines, Japan, Hawaii, Polynesia, but not in Australasia (Fig 1). Zanclistius, Parisiotopserus and Pentaceropsis are known only from Australasia, while Pentaceros has been found in all the major oceans as shown in Fig 2. Because some are so widespread there has been confusion (see the case of Histiopterus acutirostris and H.typus below). For that reason while genera with species that occur in South Africa have been treated in full, a brief review of all species, with illustrations, is included here to facilitate identifications in case of their, or of hitherto unknown forms, being found elsewhere.

Sub-family Histiopterinae.

Soft dorsal much longer than spinous, no groove for this latter.

Histiopterus Temminck & Schlegel, 1844.

Temminck & Schlegel 1844, in Siebold, Fauna Jap. (Pisc) 86. Type H.typus T & S, 1844. (Evistias Jordan, 1907. Type H.acutirostris Temm. & Schl. 1844, Japan. Evistius Whitley, 1932, for Evistias Jordan preocc.). An elevated sail-like dorsal fin, higher and more acute in young, 4 dorsal spines, either the first two short, the third abruptly longer, stoutest, fourth, subequal to third, slender, almost as long as front soft rays; or, the spines graded longer to the fourth: 25-29 soft rays, high in front, lower behind. Anal with 3 spines and 9-13 soft rays. Moderate stout scales, about 60 series. Feeble teeth in bands, none on palate. Deepish water, Indo-Pacific, Japan, Philippines, Hawaii, Duke of York Island (Pacific), Muscat, Aden, South Africa. Evistius Whitley, 1932, for Evistias Jordan, 1907, based chiefly on the difference in height of the spinous dorsal fin, scarcely merits subgeneric rank. Three species are recorded here, characterised and distinguished as shown below.

Key to the species of Histiopterus T & S.

A. A III 8-10. Third dorsal spine strongest, 1-1.3 in front soft rays.

I. Gillrakers 5-7+1+13-16 (Av 6+1+14). A III 8-10 (Av 9). 25-27 (Av 25.4) soft rays in dorsal fin (S. Africa, Western Indian Ocean, Aden, Muscat) spinifer


B. A III 12-14. Fourth dorsal spine strongest, 1.7-2 in front soft rays. Gillrakers 4-7+1+15-17 (Japan, Hawaii) acutirostris

For many years Histiopterus spinifer Gilchrist, 1904 from South Africa has been retained as distinct from the Japanese H.typus T & S, 1844. The original description of spinifer, the type a juvenile, is brief and mentions neither its close relationship to typus nor justifies distinction from that species. Regan 1921, 412 described a 350mm adult of spinifer from Natal, and justified its distinction from typus on the grounds that it has “anterior profile less irregular than in H.typus, the snout less concave, the interorbital region less prominent.” On that same page Regan later mentions “A smaller specimen (150mm) has a considerable general resemblance to the young H.typus figured by Kner (?) and Steindachner”. This is altogether scarcely a basis for specific distinction! Subsequent published work on spinifer Gilchrist has ignored its close relationship to typus nor has there been any justification of its distinction from that species.

The vague differentiation advanced by Regan 1921 is scarcely tenable as specimens from Japan and South Africa are clearly variable. In pursuit of this matter it has proved exceedingly difficult to find critical data of Japanese specimens of typus, for no adequate description of a Japanese or any Pacific specimen has been published since the originals of 1844 and 1884. H.typus appears in the literature mainly as bare records, the only gillraker count that can be traced is the 4+14 given by Jordan 1907, 237, whose account is plainly hasty and suspect as it is otherwise not original but stated as condensed from Temminck & Schlegel’s 1844 description. From available data however it is plain that typus and spinifer
Histiopterus spinifer Gilchrist. A. 77mm. B. 85mm. C. 103mm. D. 310mm (All South Africa).
are so closely related that the matter of their identity or otherwise should have received attention earlier. Fortunately by kindness of Dr. K. Matsubara I have been able to examine two specimens of typus from Japan, and Dr. T. Abe has kindly sent me gillraker counts from five juveniles. Table I shows not only the variations which occur with growth in S. African specimens, but gives critical data of both S. African and Japanese fishes. While the Japanese and S. African forms show narrow divergence in the characters outlined in the key, in most characters there is only minor divergence, but the dorsal and pelvic fin rays in juveniles of typus are strikingly shorter than those of spinifer of equivalent size. It is debatable whether full specific rank for spinifer is justified, but divergence to that degree is plainly in progress and because of the wide separation of the relative areas specific rank is conceded here.


**Fig 1. To show the distribution of Histiopterus T & S.**
### TABLE I

**Histiopterus spinifer** (above) and **H. typus** (below the heavy line).

<table>
<thead>
<tr>
<th>Locality</th>
<th>Std. length mm.</th>
<th>Depth in Std. L.</th>
<th>Head in Std. L.</th>
<th>Longest D ray in Std. L.</th>
<th>Pelvic in Std. L.</th>
<th>Eye in head</th>
<th>Rays in dorsal</th>
<th>Lat. L.</th>
<th>Gillrakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. Africa</td>
<td>42</td>
<td>1.3</td>
<td>2.1</td>
<td>1.1</td>
<td>1.2</td>
<td>3.3</td>
<td>25</td>
<td>—</td>
<td>5+1+13</td>
</tr>
<tr>
<td>S. Africa</td>
<td>54</td>
<td>1.5</td>
<td>2.2</td>
<td>1.2</td>
<td>1.4</td>
<td>3.5</td>
<td>25</td>
<td>—</td>
<td>6+1+14</td>
</tr>
<tr>
<td>S. Africa</td>
<td>60</td>
<td>1.6</td>
<td>2.4</td>
<td>1.3</td>
<td>1.5</td>
<td>3.5</td>
<td>25</td>
<td>—</td>
<td>6+1+15</td>
</tr>
<tr>
<td>S. Africa</td>
<td>67</td>
<td>1.5</td>
<td>2.4</td>
<td>1.3</td>
<td>1.5</td>
<td>3.4</td>
<td>25</td>
<td>—</td>
<td>6+1+15</td>
</tr>
<tr>
<td>S. Africa (Type)</td>
<td>72</td>
<td>1.5</td>
<td>2.4</td>
<td>1.3</td>
<td>1.6</td>
<td>3.7</td>
<td>26</td>
<td>64</td>
<td>?</td>
</tr>
<tr>
<td>S. Africa</td>
<td>85</td>
<td>1.5</td>
<td>2.5</td>
<td>1.4</td>
<td>1.8</td>
<td>3.4</td>
<td>25</td>
<td>63</td>
<td>7+1+15</td>
</tr>
<tr>
<td>S. Africa (Fwlr)</td>
<td>275</td>
<td>1.7</td>
<td>2.5</td>
<td>2</td>
<td>3</td>
<td>?</td>
<td>27</td>
<td>60(65?)</td>
<td>6+1+13</td>
</tr>
<tr>
<td>S. Africa</td>
<td>300</td>
<td>1.6</td>
<td>2.8</td>
<td>2.4</td>
<td>3</td>
<td>3.6</td>
<td>26</td>
<td>64</td>
<td>6+1+16</td>
</tr>
<tr>
<td>Gulf of Aden* N.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>—</td>
<td>6+1+14</td>
</tr>
<tr>
<td>Muscat Blgr.*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>—</td>
<td>6+1+14</td>
</tr>
<tr>
<td>Japan (T &amp; S)</td>
<td>? Ad</td>
<td>1.6</td>
<td>2.8</td>
<td>2.4</td>
<td>3.0</td>
<td>3.5</td>
<td>26</td>
<td>+65?</td>
<td>?</td>
</tr>
<tr>
<td>Japan (S &amp; D)</td>
<td>155</td>
<td>1.4</td>
<td>2.7</td>
<td>2.0</td>
<td>2.0</td>
<td>3.6</td>
<td>27</td>
<td>+60</td>
<td>?</td>
</tr>
<tr>
<td>Philippines (H &amp; H)</td>
<td>220?</td>
<td>1.7</td>
<td>2.7</td>
<td>2.0</td>
<td>3.4</td>
<td>3.7</td>
<td>26</td>
<td>+60-65</td>
<td>?</td>
</tr>
<tr>
<td>Japan (A &amp; T)</td>
<td>? Ad</td>
<td>1.6</td>
<td>2.7</td>
<td>2.5</td>
<td>3.4</td>
<td>3.5</td>
<td>26 or 28</td>
<td>+60</td>
<td>?</td>
</tr>
<tr>
<td>Japan (Abe)</td>
<td>65-105</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29</td>
<td>—</td>
<td>5-6+1+14</td>
</tr>
<tr>
<td>Japan</td>
<td>75</td>
<td>1.6</td>
<td>2.5</td>
<td>1.5</td>
<td>2.4</td>
<td>3.4</td>
<td>28</td>
<td>65</td>
<td>4+1+15</td>
</tr>
<tr>
<td>Japan</td>
<td>145</td>
<td>1.6</td>
<td>2.7</td>
<td>2.0</td>
<td>2.9</td>
<td>3.8</td>
<td>28</td>
<td>66</td>
<td>5+1+14</td>
</tr>
</tbody>
</table>


The 75mm specimen has 4 + 1 + 15 rather short stout gillrakers, depth 1.6, head 2.5 in standard length. Eye 3.4 in head, slightly exceeds interorbital, 1.4 in snout and 1.1 in preorbital depth. In standard length the third dorsal spine is 1.5, the longest dorsal ray 1.5, the pectoral 3, the pelvic 2.4, the peduncle depth 8.5. There is no sign of spines or bony crests anywhere on the head, only a low knob above each eye and on the nape more or less in the positions where crests are found in juvenile spinifer Glch. There is no sign of the variegated blotched pattern seen on equivalent juveniles of spinifer Glch.

The 145mm specimen has 5 + 1 + 14 short stout spiny gillrakers, depth 1.6, head 2.7 in standard length. Eye 3.8 in head, equals interorbital, 1.8 in snout and 1.4 in preorbital depth. In standard length the third dorsal spine is about 2.0, the longest dorsal ray 2.0, the pectoral 2.1, the pelvic 2.9, the peduncle depth 8.5. There is no sign of spines or bony crests anywhere on the head, only a low knob above each eye and on the nape more or less in the positions where crests are found in juvenile spinifer Glch.

The spinous dorsal longer than the soft and depressible into a groove.

Subfamily Pentacerotinae

The spinous dorsal longer than the soft and depressible into a groove.
With the characters of the family and sub-family as defined above: D XI-XIV 8-15; A IV-V 7-11. A trigger mechanism locking front spines in at least some species. Body rather deep, compressed. Five species usually accepted, partly for geographical reasons, three seem more likely, but from lack of data, four are maintained here, all more or less uniformlybrownishwhen preserved. South Africa, Japan, Australia, N.E. Pacific, W. coast of America to Patagonia, S.W. Atlantic, mostly deepish cool water, the young apparently pelagic.

**KEY TO SPECIES**

A. More than 60 scales in L.I. Dorsal with 8-9 soft rays
   - richardsoni
B. Less than 60 scales in L.I.
   I. 12 soft rays in dorsal. Depth in adult 2.2-2.3
      - capensis
   II. 13-15 soft rays in dorsal. Depth about 1.8-2.
      a. 5-6+1+12 gillrakers
      - decacanthus
      b. 6-7+1+14-17 gillrakers
      - japonicus


Until recently regarded as one of the rarest of fishes this was first described in 1844 from a 21 inch (530mm) specimen taken on a long line in deep water off Cape Point (South Africa). It remained unique in the type area until recently. Despite their different appearance a few small juveniles taken about New Zealand from about 1885 onwards have been generally accepted as this species. No further adult specimens were recorded until 1956, when Dr. T. Abe found four together in the Tokyo Fishmarket, at that time from an unknown source (but later tracked to a special fishery at Hachijo Island and off Amatsu, Japan). Also in 1956 American scientists working on the migration of Pacific salmon in the Gulf of Alaska (about 50°N x 155°E) took four specimens of *richardsoni* in surface gill nets. All these Pacific specimens were smaller than the type, ranging from about 300-390mm in length. In February 1963 a Rock Lobster fisherman in Table Bay, Cape, saw floating in the sea about 1½ miles off shore a fish he did not recognise. It was quite fresh and in good condition except that sea birds had pecked out the eyes (and part of the gills!). He wisely captured the fish and took it to the Division of Fisheries Laboratories at Cape Town. Here it was provisionally identified as the rare *Pseudopentaceros richardsoni* and sent to me. The specimen, agreeing in almost every detail with the type, and found only a few miles from the type locality northwards across the Peninsula (but in cooler sea), is 555mm total length, hence the largest yet reported. This is an interesting rediscovery of this rare fish in the type area after an interval of just on 120 years. A recent paper by Follett & Dempster (May, 1963) provides interesting information and further records of this fish, throwing an entirely new light on its chief centre of abundance and distribution. They show that it must occur along most of the Western seaboard of North America from Alaska to California and that the focus of this species is Japan rather than South Africa or Australia. A number of fishes are common to Japan and South Africa, though they are mostly species known from the tropical Pacific and from the Western Indian Ocean, many curiously not as yet found at any intermediate locality. There is less difficulty in understanding the radiation of species in deeper water. Accepting Japan as the focus, a small fish, described by Steindachner 1866 as *Pentaceros kneri*, from Cape Horn, long overlooked, may shed new light on the possible route followed by *P.richardsoni* from Japan to the Atlantic for *P.kneri* is certainly identical with the juveniles found about New Zealand.
Pentaceros richardsoni Smith. A. About 35mm. Type of *kneri* Steind. After Steindachner (Cape Horn). B. 70mm. Type of *Griffinetta nelsonensis* Whitley & Phillipps. After McCulloch & Phillipps (New Zealand). C. 128mm (New Zealand). D. 290mm (N. Pacific). E. 555mm (Table Bay, Cape).
As indicated by Follett & Dempster this species could have been transported from Japan to Alaska and western North America by the north Pacific current system, but this does not explain its presence at Cape Horn. Cape Horn, the tip of Southern Africa and New Zealand are linked by the great westerly drift, but as adults of the species clearly live in deepish water, distribution may not be dependent only on surface currents.

The recently discovered 555mm specimen from Table Bay is described below:


Body ovate, compressed, dorsal and anal profiles about evenly curved. Predorsal profile undulate with marked concavity above eye. Nape trenchant. The left branchiostegal membrane overlaps the right in front. Most of the head encased in finely radiately striate surface bones, some sutured marginally, others separated by narrow naked grooves, a triangular naked area median on snout tip. Both sides of chin similarly armoured below. The preopercle is striate to the margin, the hind edge gently concave, the angle produced into an acutely rounded lobe. Three postorbital scutes. A wide irregular area of the cheek covered with small scute-like scales, smaller areas above opercle and preopercle with similar scutes, connected by a single line of them along the front margin of the preopercle running into those of the cheek. Nostrils close together, slightly nearer eye than snout tip, the hinder larger, subcircular, the anterior smaller, with tubular rim, situated in a naked area between preorbital and prefrontal scutes. No obvious sensory pores in exposed bones of the head.

Mouth moderate, lower jaw projects, maxilla extends to below slightly behind nostrils, not to below eye, the end of the maxilla runs on a striated scute. Cleft of mouth slightly oblique, its front on a level with lower orbital margin. Lips finely villose. Fine sharp slender slightly curved teeth in bands in each jaw, a small cluster at the head of the vomer, rest of palate and tongue edentate. Pseudobranchiae well developed. The gills on the right hand side had been removed by seabirds, those on the left were slightly damaged. Gillrakers short and stout, longest at angle of arch slightly shorter than gill filaments, about 2.5 in eye.

Dorsal origin over hind margin of opercle, the spines stout, strongly heteracanth, the odd numbers to the right, the whole fin folds down into a groove. As illustrated by Follett and Dempster the 3-5th spines have a basal anterior median lobe indicating a locking mechanism, but not as efficient as in P. capensis C & V. The first spine shortest, the 4th longest, the 5th about subequal, those behind progressively shorter. 1st spine 5.5, the second (broken) about 3.3, the third 2, fourth 1.8, fifth 1.9, ninth 2.2, thirteenth 3.3, all in head, fourteenth shorter but broken. The first soft ray simple, 3 in head, the remainder branched, the second longest, 2.6 in head, the hinder graduated shorter, the hindmost about 5 in head. Base of spinous dorsal about equals body depth, base of soft dorsal about 4 as long as that of spinous. Anal origin below hind end of spinous dorsal, the spines stout, striated. First spine about 6 in head, second 3.3, third and fourth subequal, about 4 in head. First soft ray simple, about 4 in head, remainder branched, the second ray subequal with first, the hinder shorter, last about 5.5 in head. Base of spinous anal about equals that of soft fin, the total base about 1.7 in head. A stout deep basal scale sheath to soft dorsal and anal. Pectoral subvertical. Pelvic origin well behind pectoral base, apex of fin reaches not to anus, spines stout, striated, both broken but intact, probably about 1.9 in head. Caudal feebly emarginate, the peduncle short and stout.

Scales small, stout, imbricate on most of flanks, deeply embedded, feebly ctenoid. The nape scaly, the scales there progressively smaller anteriorly, those in front not imbricate, separated by narrow naked grooves. Predorsal scales end above hind third of eye. On the chest and belly the scales become marginally sutured, forming a rigid casing, almost Balistoid, and there is a rigid median ridge of them along the belly. The abdominal organs are heavily encased in thick layers of fat. The fish is a female, the ovaries immature, more or less "cookie" shaped, much like those shown for Quinquarius capensis (C & V, 1829) in Smith, Ann. Mag. Nat. Hist. 1951, (12), 4, Plate XVIII. There are 6 pyloric caeca, about eye length.

With the indicated centre of abundance in the northwestern Pacific it is certainly curious that early juveniles have been found only in the deep south at Cape Horn and New Zealand while by far the largest fishes have come from South Africa. The known Japanese and Eastern Pacific specimens are intermediate in size.

The adult clearly lives in fairly deep (cool) water and probably rises to the surface at nights. The recent specimen from Table Bay was possibly attacked by sea birds at that time. The more undulate predorsal profile in my specimen is probably due to age. Gunther (1859, 1, 212) who examined
the type remarks that the pelvics in the original illustration of the type are too short. The type description (Smith, 1844) lacked scale counts, but Mr. P. J. P. Whitehead has kindly examined the type in the British Museum and sent further data. I am obliged to Mr. G. P. Whitley for counts of scales and gillrakers of a 94mm standard length specimen of *Griffinetta nelsonensis* from Cook Strait. By kindness of Prof. J. Moreland of Wellington University, New Zealand, I have been able to examine a 128mm specimen of *Griffinetta nelsonensis* Whiteley & Phillips (Plate 88C), but cannot find any reason for regarding it as even specifically distinct from *P. richardsoni* of which it is apparently the juvenile stage. In any case *kneri* Stntr, 1866 has priority over *nelsonensis*. I am greatly obliged to Dr. A. D. Welander who has kindly sent me a 290mm specimen from the Gulf of Alaska whose data are shown below. I cannot find any reason to regard it as other than conspecific.

Follett & Dempster (1963, 326) state that their specimen of *P. richardsoni* has large sensory pores in the exposed bones of the head, but those are not apparent in their photograph, 1963, Fig 1, of the fish, and I cannot find them in my specimen, or in the one from Alaska. Especially in the preorbital of the adult *P. capensis* C & V, they are quite distinct, certainly there are none comparable in the two specimens of *P. richardsoni* available.

A colour slide of a fresh 330mm specimen kindly sent by Dr. Welander shows head and body mainly silvery, dorsally blue, dorsal and caudal bluish, soft dorsal and caudal with hind edge pinkish. Pelvic and anal spines white, pectorals pinkish above, hyaline below, soft anal like soft dorsal, pelvic rays blue.

The following table summarises the data of specimens from various localities.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total length mm.</td>
<td>About 35</td>
<td><em>80-128</em>*</td>
<td><em>290</em></td>
<td>305</td>
<td>340-390</td>
<td>533</td>
<td>555</td>
</tr>
<tr>
<td>Dorsal</td>
<td>XIV 9(8?)</td>
<td>XIV 9(10)</td>
<td>XIV 9</td>
<td>XIV 9</td>
<td>XIV 8</td>
<td>XIV 9</td>
<td>XIV 9</td>
</tr>
<tr>
<td>Anal</td>
<td>IV 8</td>
<td>IV 8(9?)</td>
<td>IV 7</td>
<td>IV 8</td>
<td>IV 7</td>
<td>IV 8</td>
<td>IV 8</td>
</tr>
<tr>
<td>Pectoral</td>
<td>?</td>
<td>18</td>
<td>17</td>
<td>19</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>L.1. tubes</td>
<td>75</td>
<td><em>70</em></td>
<td>71-76</td>
<td>69</td>
<td>69?</td>
<td>78-85</td>
<td>74</td>
</tr>
<tr>
<td>Scale rows above L.1.</td>
<td></td>
<td>90-95</td>
<td>90</td>
<td><em>11</em></td>
<td><em>14</em></td>
<td><em>?</em></td>
<td>90-95</td>
</tr>
<tr>
<td>Tr above L.1.</td>
<td>—</td>
<td>—</td>
<td><em>11</em></td>
<td><em>14</em></td>
<td><em>?</em></td>
<td>—</td>
<td>12</td>
</tr>
<tr>
<td>Gillrakers</td>
<td>—</td>
<td><em>3+1+14-17</em>*</td>
<td><em>6-8+16-17</em></td>
<td><em>7+1+16</em></td>
<td><em>6-8+1+16-17</em></td>
<td>—</td>
<td><em>6+1+15</em></td>
</tr>
<tr>
<td>Eye in head</td>
<td>2.6</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3.7</td>
<td>4.2</td>
<td>4.1</td>
</tr>
<tr>
<td>Head in body</td>
<td>2.6</td>
<td>2.8</td>
<td>3.2</td>
<td>3.3</td>
<td>3.1</td>
<td>3.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Depth in body</td>
<td>2.5</td>
<td>2.4</td>
<td>2.3</td>
<td>2.5</td>
<td>2.4</td>
<td>2.6</td>
<td>2.3</td>
</tr>
<tr>
<td>Longest D. spine in head</td>
<td><em>1.2</em></td>
<td><em>4th 1.1</em></td>
<td><em>3rd 2.2</em></td>
<td><em>2.0</em></td>
<td><em>3rd 2.0</em></td>
<td><em>5th 2.2</em></td>
<td><em>4th 1.8</em></td>
</tr>
<tr>
<td>Pelvic Spine in head</td>
<td>Equals</td>
<td>1.4</td>
<td><em>?</em></td>
<td>1.7</td>
<td>1.9</td>
<td>1.9</td>
<td>1.9</td>
</tr>
<tr>
<td>Pectoral in head</td>
<td>1.7</td>
<td>1.7</td>
<td>1.15</td>
<td>1.2</td>
<td>1.15</td>
<td>1.25</td>
<td>1.25</td>
</tr>
</tbody>
</table>

*Includes information kindly sent by Prof. J. Moreland*
**PENTACEROS CAPENSIS** C & V, 1829. PI 89, C & D. Pentaceros capensis C & V 1829, Hist. Nat. Poiss. 3, 30, Pl XLIII (C.G.H.). Gunther 1859, Cat. Fish. Brit. Mus. 1, 212; Gilchrist 1902, Mar. Inv. S.A. 1, 108; Thompson 1916, Mar. Biol. Rep. 3, 134 (All S. Afr.). **Quinquarius (Pentaceros) capensis** Gilchrist 1922, Fish. Mar. Surv. Spec. Rep. 3, 70 (rec. S. Afr. 164 fms.). **Quinquarius capensis** Barnard 1927, Ann. S.A. Mus. 21, 623 (S.A.) and 1937 *ibid.*, 32, 55, Juv. (Pt. Nolloth) Pl 8. Fowler 1935, Proc. Ac. Nat Sci. Phil. 87, 393, fig 26 Juv (Natal). Smith 1949, Sea Fish. S.A. 242, Pl 35, fig 621 (S. Afr.); and 1951, Ann. Mag. Nat. Hist. (12), 4, 873, Pls 17, 18 (Mozambique). The adult is described in great detail in Smith 1951 above. The following brief description embraces South African specimens from 63-320mm length. D XII 12. A IV-V 7-8. Front spines with locking mechanism. L.l. about 50. Gillrakers 5-6 + 15-16. Depth 1.7-2.3 with age, head 2.7-3 in body. Eye 3 in head. Horns above eyes in juveniles, obsolete with age. Attains at least 350mm. S. Africa, South Mozambique, 40-150 fathoms. **P. capensis** appears to be well differentiated from all other species by scale count and in having invariably 12 soft dorsal rays, 7-8 anal rays, and by the more elongate body, which from about 180mm upwards is 2.0-2.3 in standard length, other comparable species have more rays in dorsal and anal and bodies constantly more orbicular. **NOTE:** on **P. decacanthus** Gnthr, 1859 (Pelagic, Atlantic and Pacific); **P. japonicus** Doederlein, 1884 (Japan); and **P. hendecacanthus** McCulloch, 1915 (Australia). Despite or perhaps because of the rarity of these fishes, there has been a regrettable tendency on the part of both Australian and Japanese ichthyologists merely to be content with early data and illustrations of species in this family and neither adequately to describe nor to illustrate them anew, there is an almost complete absence of published photographs. The issue is further confused by the fact that despite the considerable changes that take place with growth in this family, in only few cases are lengths of illustrated specimens recorded. In one case authors state they have two specimens, one 93mm, the other 240mm, but record that the illustration is of a fish 120mm length.

With regard to the above three supposed species, **P. decacanthus** is known only from two small juveniles, while not many different specimens of the other two have been described or illustrated. The present available data of the three supposed species summarised below are from few specimens only.
<table>
<thead>
<tr>
<th></th>
<th>decacanthus (Pelagic, Atl. &amp; Pac.)</th>
<th>japonicus (Japan)</th>
<th>hendecacanthus (Australia)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. length mm.</td>
<td>40-60</td>
<td>190-210</td>
<td>246</td>
</tr>
<tr>
<td>Anal</td>
<td>IV 9 (2 Juv)</td>
<td>IV-V 9-10</td>
<td>IV 9-10</td>
</tr>
<tr>
<td>L.I.</td>
<td>50-52</td>
<td>46-50</td>
<td>45-47</td>
</tr>
<tr>
<td>Gillrakers</td>
<td>5-6+1+12</td>
<td>7+1+17</td>
<td>6-7+1+14-17</td>
</tr>
<tr>
<td>Depth in Std. L.</td>
<td>+1.7</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Head in S. L.</td>
<td>3</td>
<td>2.6 or 2.7?</td>
<td>2.8</td>
</tr>
<tr>
<td>Eye in head</td>
<td>3</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Base of soft dorsal in spinous</td>
<td>&lt; 2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Longest D. spine</td>
<td>3 &amp; 4</td>
<td>3 &amp; 4</td>
<td>4</td>
</tr>
<tr>
<td>This in head</td>
<td>1.2</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Interpelvic space in juveniles</td>
<td>Broad</td>
<td>Broad?</td>
<td>Broad</td>
</tr>
<tr>
<td>Teeth on vomer</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

From this and other data it would appear that there is little of significance other than locality to distinguish between these three forms, excepting only the low gillraker count of decacanthus, i.e. 5-6+1+12 in the two small specimens known, the variation between the lowest count, i.e. 19 total in decacanthus against a total of 21-24 in adult japonicus (& hendecacanthus). It may be noted that gillraker counts can apparently vary (with age) relatively widely, ranging from 3+1+14, i.e. 18, in juveniles to 7+1+16, i.e. 24, in adults of P.richardsoni. However, until such time as a reasonable series of stadia may show that decacanthus is truly the juvenile of japonicus, it is here maintained separately on the basis of the gillraker count.

PENTACEROS DECACANTHUS Gunther, 1859. Gunther 1859, Cat. Fish. B.M. 1, 213, (Voyage Herald, Pacific?); and 1873, Journ. Mus. Godeff. 1, Heft 4, 265 (S.W. Atlantic). Not seen. Known only from two juveniles, the type, 34mm, and a 59mm (standard lengths) specimen from 12°25'S, 30°W (S.W. Atlantic). Gunther 1859, 213 stated D X 13, A IV 8 for the type; for the second specimen, 1873, 265 he stated D XI. Mr. G. Palmer has kindly examined both specimens and finds:

<table>
<thead>
<tr>
<th>Type 1859</th>
<th>S.W. Atlantic 1873</th>
</tr>
</thead>
<tbody>
<tr>
<td>Std. Length mm.</td>
<td>34</td>
</tr>
<tr>
<td>Dorsal</td>
<td>XI 13</td>
</tr>
<tr>
<td>Anal</td>
<td>IV 9</td>
</tr>
<tr>
<td>L.l.</td>
<td>50</td>
</tr>
<tr>
<td>Gillrakers</td>
<td>5+1+12</td>
</tr>
</tbody>
</table>

No specimen available. Gunther 1859, 213 states “depth half of total length, head not quite one third, eye one third of head, equals interorbital. Snout shorter than eye. The triangular space between the ventrals and the throat as broad as long. Villiform teeth in bands in jaws, a small patch on vomer. Pectorals reach vent. Pelvic spine strong and long, two thirds of head. Third and fourth dorsal spines longest, 3½ in body depth. Base of soft dorsal more than half of that of spinous. Lateral line very curved. Yellow, marbled brown.” There are several inaccuracies in both of Gunther’s descriptions. In 1859, 213 he states: D X 13 and “second” anal spine “shortest”. In 1873, “the scales are much smaller than shown by Cuvier for P.capensis.” Gunther states the dorsal spines to be longitudinally striated and that there is a spiny process on the forehead. There can be little doubt that this misnamed decacanthus is the juvenile of an as yet unknown adult, probably japonicus Doederlein.
A. Paristiopterus gallipavo Whitley. About 380mm. After Scott(?) (Austr).
B. Histiopterus acutirostris T & S. 400mm. After Steindachner & Doederlein (Japan).
C. Zanclistius elevatus (Ramsay & Ogilby). After Waite(?) (Austr).
D & E. Paristiopterus labiosus (Gnthr). D. Juvenile after Waite(?). E. Adult 560mm, after Gunther (Austr).
F. Pentaceropsis recurvirostris (Richdsn), 380mm, after Steindachner & Doederlein (Austr).

Review of genera and species not in S. Africa

Sub-family Histiopterinae

Zanclistius Jordan, 1907 (Monotypic)

Type Histiopterus elevatus Ramsay & Ogilby, 1888 (Australia).

ZANCLISTIUS ELEVATUS (R & O, 1888). PI 90, C.


Paristiopterus Bleeker, 1876


Sub-family Pentacerotinae

Pentaceropsis Steindachner & Doederlein, 1884 (Monotypic).

Type Histiopterus recurvirostris Richardson, 1845 (Australia). (Prosoplismus Waite, 1903).

PENTACEROPSIS RECURVIROSTRIS (Richardson, 1845). PI 90, F. D X-XI 14. A III 11. L.l. 95. Gillrakers 5+1+17. Pink. 500mm. Australasia. Waite 1903, Rec. Austr. Mus. 5, 57, Pl VI gives an illustration of this species which accords with his description (Prosoplismus r.), but in an illustrated catalogue of the fishes of S. Australia, 1921, Waite gives another illustration, which does not, showing Ia. only 10 dorsal spines. This is copied from Steindachner & Doederlein 1884, Pl VI, without acknowledgment of the source. The latter is copied by Scott, Fishes of S. Australia 1962, 218, who states D XI 14, though the illustration shows only D X. The size of the specimen illustrated is not stated by either Waite or Scott.
INDEX

Valid names are in capitals

FAMILIES AND SUBFAMILIES

Histiopteridae ........................................... 567
HISTIOPTERINAE ........................................... 567, 568, 577
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
Pentaceratina ........................................... 567
PENTACEROTIDAE ........................................... 567
PENTACEROTINAЕ ........................................... 568, 571, 577

GENERA

Evistias ............................................... 568
Evistiopterus ........................................... 568
Gilchristia ............................................... 567, 571
Glaeertichthys ........................................... 577
Griffinetta ............................................... 567, 571
HISTIOPTERUS ........................................... 567, 568-9
McCullochia ............................................... 577
PARISTIOPTERUS ........................................... 567, 568-8, 577
PENTACEROPSIS ........................................... 568, 577
PENTACEROS ........................................... 567, 568, 571
PENTACEROS ........................................... 567, 568, 571
Prosoplismus ............................................ 577
Pseudopentaceros ........................................... 567, 571
Quadrarius ............................................... 567, 571
Quinquarius ............................................... 567, 571
Richardsonia ............................................. 577
Undecimus ............................................... 567, 571
ZANCLISTIUS ........................................... 567-8, 577

SPECIES

ACUTIROSTRIS ........................................... 568, 571
kneri ...................................................... 572, 574
CAPENSIS ............................................... 571-4, 575
LABIOSUS .................................................. 577
DECACANTHUS ........................................... 571-2, 575, 576
nelsonensis .............................................. 571-2, 574
ELEVATUS ............................................... 577
RECURVIROSTRIS ........................................... 577
farnelli .................................................... 577
RICHARDSONI ............................................ 567, 571, 572-6
GALLIPAVO ............................................... 577
SPINIFER ............................................... 568, 569-71
hendecacanthus ......................................... 571, 575-7
TYMPUS ................................................. 568-9, 570-1
insignis .................................................... 577
typus ..................................................... 569, 571
JAPONICUS ........................................... 571-2, 575-6, 577
PLATE 91

A. Histiopterus acutirostris T & S. 265mm (Japan).
B & C. Histiopterus typus T & S. B. 94mm
C. 182mm (Both Japan).