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# Removal of the Family Hypoptychidae from the Suborder Ammodytoidei, Order Perciformes, to the Suborder Gasterosteoidei, Order Syngnathiformes

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**Abstract** The osteology, mode of life, and reproduction of *Hypoptychus dybowskii* were compared with a species of the family Ammodytidae, two species of the family Aulorhynchidae, and a species of the family Gasterosteidae. *Hypoptychus* resembles gasterosteids and aulorhynchids in osteological features, mode of life, and reproduction. Although *Hypoptychus* resembles ammodytids in higher number of vertebrae, the family Hypoptychidae should be transfered from the suborder Ammodytoidei of the order Perciformes to the suborder Gasterosteoidei of the order Syngnathiformes.

## Introduction

*Hypoptychus dybowskii* Steindachner is a small fish (less than 9 cm in standard length) and inhabits in shallow sea waters. Its distribution is restricted to the sub-boreal western North Pacific, i. e., Sakhalin, Hokkaido (Jordan et Tanaka, 1927; Schmidt, 1904; Ishigaki, 1957), and Korea (Mori, 1952). The species is locally called in Hokkaido, Japan, as "aka-uo" or "aka-moguri" (red fish or red burrower) and sometimes "mo-uo" (seaweed fish). The species, though not rare, has been received little attention due to its small size and no value for food. The biological data, such as sexual dimorphism, size frequency, growth, and mode of reproduction of the species were reported by Ishigaki (1957).

At the end of the brief original description, Steindachner (1880) discussed that the species belongs to distinct group "Hypoptychina", which should be placed between "Ammodytina" and "Congrogadina", all of them are included in "Ophidiidae". Since then, most of authors recognized the monotypic family Hypoptychidae (Jordan, 1923; Duncker and Mohr, 1939; Greenwood et al., 1966), but others included the genus in the family Ammodytidae (Schmidt, 1904; Jordan, 1906; Regan, 1913; Berg, 1940; Fowler, 1959; Robins and Böhlke, 1970). Gosline (1963) and Matsubara (1963) emphasized the difference of two families, Hypoptychidae and Ammodytidae, but they included them in the suborder Ammodytoidei.

In the cource of revisional study of the family Ammodytidae I found a number of prepercomorphic features in *Hypoptychus*. The present study was made to clarify the systematic position of the species based on the osteological feature, behavior, and mode of reproduction comparing with the fishes of the family Aulorhynchidae and Gasterosteidae and *Embolichthys mitsukurii* which has been regarded as the most generalized form among the suborder Ammodytoidei (Matsubara, 1963).

## Methods and materials

Specimens examined in the present study are:

*Hypoptychus dybowskii* Steindachner. 68 specimens (65.0～78.0 mm in S. L.); June 12, 1971, Hakodate Harbor, by set net; collected by Dr. Kazuhiro Nakaya. ZUMT-53973, an alizarin stained sample; other uncatalogued.

*Aulorhynchus flavidus* Gill. 4 specimens (106～138 mm); Aug. 22, 1962, Sooke British Columbia, Collected by Mr. D. Wilkie and sent by Dr. N. J. Wilimovsky. BC: 62-881.

*Aulichthys japonicus* Gill. 29 specimens (106～132 mm); April 4, 1975, Sakihama Harbor, Sanriku, Iwate, by seine net, collected by the author. ZUMT-52974, an alizarin stained sample; others uncatalogued.

*Embolichthys mitsukurii* (Jordan et Evermann). 15 specimens (65～121 mm); Pescadore fish market, collected by Dr. Yoshiaki Tominaga. ZUMT-52975, an alizarin stained sample; others uncatalogued.

*Gasterosteus aculeatus aculeatus* Linnaeus. 1 specimen (42.0 mm); Japan. ZUMT-52976.

The osteological analysis was based on the specimens stained with alizarin red S and cleared by KOH solution. The vertebral counts were made on the radiographs, the caudal vertebrae defined as those having haemal spine. The terminology of bone structure of the jaws followed Gosline (1963) and those of pectoral region Mural (1973), and caudal region Rosen and Patterson (1969).

## Observation

1. General features (Fig. 1.)

Ishigaki reported, reffering to the sexual dimorphism of *Hypoptychus dybowskii*, that females are larger than males, dorsal and anal fins and gill membranes of males are blackish in color while those of females light. The shape and color of mid-ventral skin fold of male are wider and orange in color whereas that of female narrower and whitish.

2. Jaws (Figs. 2 and 3.)

For dentition Gosline (1963) described that "there are about 14 conical teeth in a single row on each side of the premaxillary". The present study on the 68 specimens, however, necessiate to add further comments. Premaxillary dentition is present in males but absent in females (Fig. 2.). Similar sexual dimorphism in the premaxillary dentition is found also in *Aulichthys japonicus* as shown in Fig. 2.

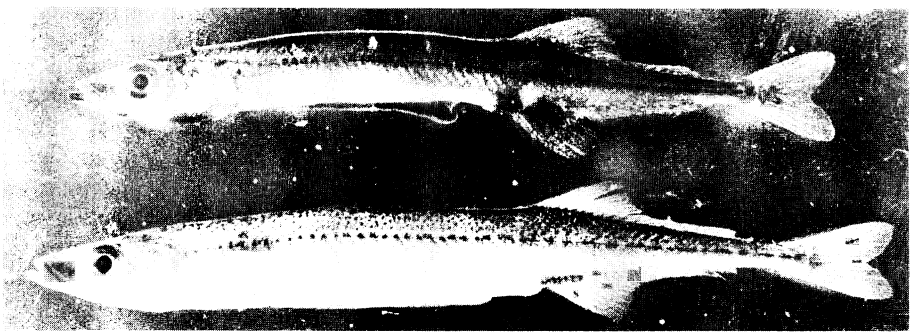

Fig. 1. General appearance of adult *Hypoptychus dybowskii*. upper: male, 67.2 mm S. L., lower: 77.0 mm. In male, size is smaller, branchial membrane, dorsal, and anal fins are darker, and midventral skinfold is larger.

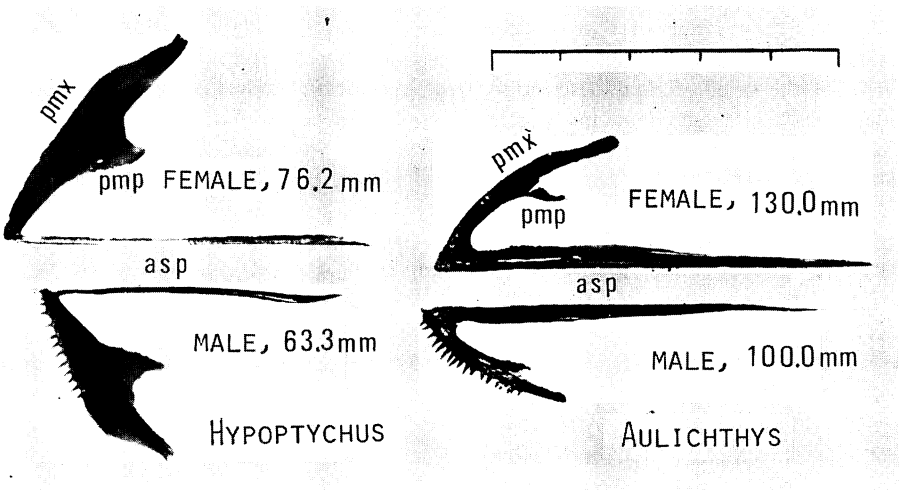


Fig. 2. Premaxillaries of *Hypoptychus dybowskii* and of *Aulichthys japonicus* showing the resemblance in shape and dentition. asp: ascending process, pmp: postmaxillary process, pmx: premaxillary. Size of the materials are shown in the figure. Conical teeth are absent in females in both species.

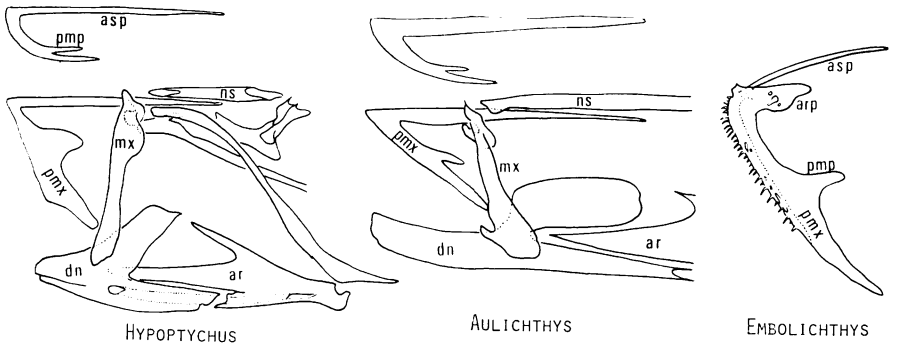


Fig. 3. Jaw structure in *Hypoptychus dybowskii*, female, 67.8 mm; *Aulichthys japonicus*, female. 128 mm; and premaxillary of *Embolichthys mitsukurii*, 115 mm. Articular process is absent in *Hypoptychus* and *Aulichthys*, but present in *Embolichthys*. ar: articular, arp: articular process, asp: ascending process, dn: dentary, mx: maxillary, ns: nasal, pmp: postmaxillary process, pmx: premaxillary.

Jaw structure of *Hypoptychus* and *Aulichthys* are shown in Fig. 3, and the same of other species in the family Ammodytidae were reported by Kayser (1962) and Ida (1973). The most striking difference between *Hypoptychus* and *Embolichthys* is in the shape of the premaxillary, i. e., the articular process on the premaxillary is absent in *Hypoptychus* but well developed in *Embolichthys*, further, the ascending process is as stout as the premaxillary proper in *Hypoptychus*, but that of *Embolichthys* is much thinner and more flexible than the premaxillary proper. The ascending process of *Ammodytes* (Gosline, 1963) and *Gymnammodytes* (unpublished) are basically similar to that of *Embolichthys* but differing in the movable articulation with the premaxillary proper, i. e., autogeneous. The shape of the premaxillary of *Hypoptychus* is very similar to that of *Aulichthys* as shown in Fig. 2.

3. Hyoid arch and branchiostegals (Fig. 4.)

The number of the branchiostegals are three in *Gasterosteus* and four in *Hypoptychus*. In both species all attach to the outer surface of the epihyal and ceratohyal. Branchiostegals of *Embolichthys* are seven in number, of which the anterior three attch to the ventral edge of the ceratohyal. The four branchiostegals of *Hypoptychus* are separate from each other and not covered at all by the opercular bones but exposed ventrolaterally as in the fishes of Gasterosteoidei; those of *Embolichthys* are not separate from each other but tightly folded together and completely covered by the sub- and interopercles, thus all the branchiostegals are not visible from lateral view.

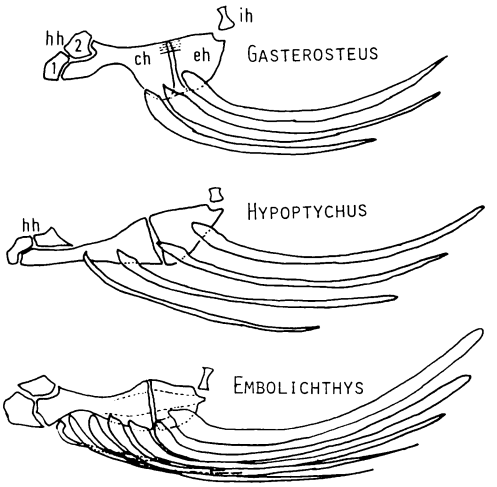


Fig. 4. Branchiostegals and hyoid arches of *Gasterosteus aculeatus aculeatus*, female, 42.0 mm, *Hypoptychus dybowskii*, female, 67.8 mm, and *Embolichthys mitsukurii*, 115 mm (sex not determined). All branchiostegals attach to the outer surface of epihyal and ceratohyal in the upper two forms, while in *Embolichthys* the anterior three stegals attach to the ventral edge of ceratohyal. From the third to 7th stegals of *Embolichthys* are folded together but are expanded vertically in the illustration.

4. Pectoral girdle (Fig. 5.)

Significant differences between *Hypoptychus* and *Embolichthys* are as follows: The scapular and coracoid are very large in *Hypoptychus*, but small in *Embolichthys*. There are two post-

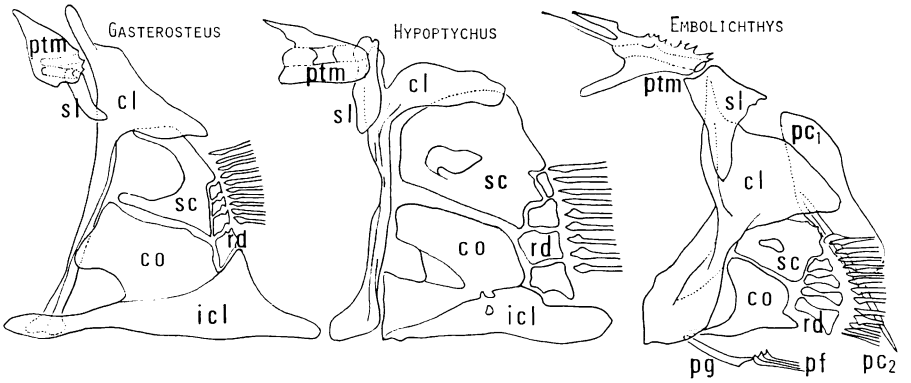


Fig. 5. Pectoral girdle of *Gasterosteus aculeatus aculeatus*, female, 42.0 mm; *Hypoptychus dybowskii*, female, 67.8 mm; and *Embolichthys mitsukurii*, 115 mm. The two postcleithra are absent in *Hypoptychus* and *Gasterosteus*. Note the size difference of the coracoid between the former two and *Embolichthys*. Infraclavicle fused with the coracoid is present in *Hypoptychus* as in *Gasterosteus*. cl: cleithrum, co: coracoid, icl: infraclavicle, pc: postcleithrum, pf: pelvic fin ray, pg: pelvic girdle, ptm: posttemporal, rd: radial, sc: scapula, sl: supracleithrum.

cleithra in *Embolichthys* but absent in *Hypoptychus*.

The equivalent part of the infraclavicle (Mural, 1973) or ectoclavicle (Nelson, 1971 a) of some fishes of the family Gasterosteidae is clearly distinguishable in *Hypoptychus* by the demarcation of ridge on the lower one third of the whole plate (Fig. 5.).

The general shape of the girdle in *Hypoptychus* is similar to those of fishes in the family Gasterosteidae (Mural, 1973) and in Aulorhynchidae (Nelson, 1971a) in the larger size extending far beyond the pectoral radials, in contrast, *Embolichthys* has little difference from typical percomorph illustrated by Gosline (1971) in their smaller size, not reaching to the pectoral radials, and presence of the two postcleithra.

5. Caudal skeleton (Fig. 6.)

The number of the principal caudal rays in these three forms are 6+6, 7+6, and 8+7

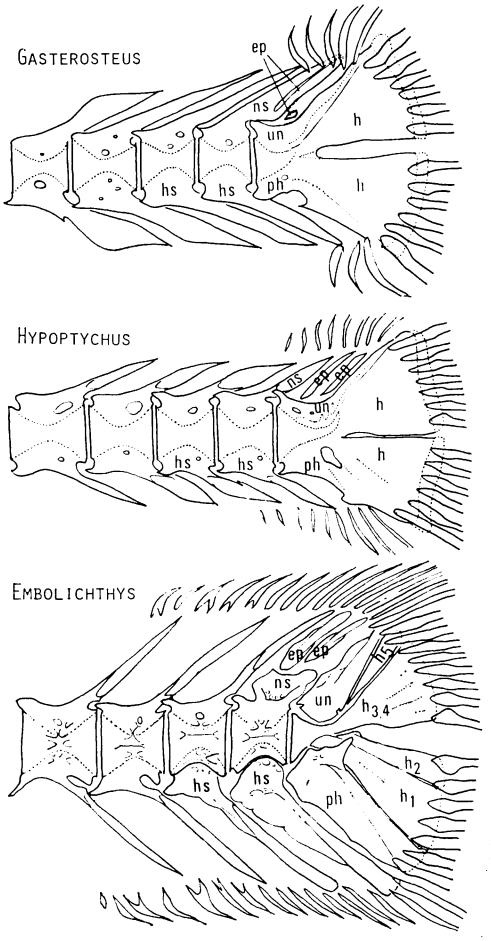


Fig. 6. Caudal skeletons of *Gasterosteus aculeatus aculeatus*, female, 42.0 mm; *Hypoptychus dybowskii*, female, 67.8 mm; and *Embolichthys mitsukurii*, 115 mm. Note the fusion of parhypural and the last two haemal spines with the centra in *Gasterosteus* and *Hypoptychus*, while, those are autogenous in *Embolichthys*. The last neural spine is long in the upper two forms, while, in *Embolichthys* it is short crest and leading to difference in position of epeurals.

respectively. In this regard, *Hypoptychus* appears closer to *Gasterosteus* than to *Embolichthys*.

The number of epurals are two in *Gasterosteus* and *Hypoptychus* but the size of posterior epural of the latter form is somewhat variable by the individuals, but being much smaller usually than the anterior. In *Gasterosteus* the anterior epural is fused basally with the precedent neural spine, and the epural to follow is small. The variability of the size of the two epurals and of the state of fusion of the two with the preceding neural spine among the fishes of the family Gasterosteidae are well illustrated by Mural (1973).

In *Gasterosteus* and *Hypoptychus* the shape of the last four vertebrae anterior to the urostyle are almost identical in structure, i. e., the haemal spines of the penultimate and antepenultimate centra are fused with the centra itself, and the neural spine of the penultimate vertebra is not shortened but equal in its size to that of the antepenultimate. In *Embolichthys* the last two haemal spines are not fused with their centra, i. e., autogenous.

6. Vertebrae (Figs. 7 and 8.)

The difference of the vertebrae between *Hypoptychus* and *Embolichthys* can be seen in the position of neural spines and in the developement of the parapophyses on the anterior abdominal vertebrae. In both fishes the neural and haemal spines of posterior caudal vertebrae are extended from posterodorsal and posteroventral corners of neural and haemal arches respectively. But in *Hypoptychus* neural spines of anterior abdominal vertebrae extend from midpart of the neural arches, while, in *Embolichthys* those are extend from the posterodorsal corners of the neural arches irrespective of the position of the vertebrae.

The parapophyses of *Hypoptychus* are well developed in all abdominal vertebrae, but, in *Embolichthys* those of anterior six abdominal

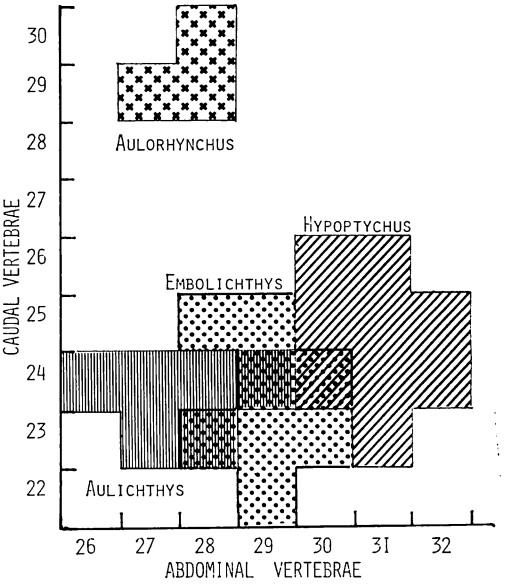


Fig. 8. Vertebral composition of *Hypoptychus dybowskii*, *Aulichthys japonicus*, *Aulorhynchus flavidus*, and *Embolichthys mitsukurii*.

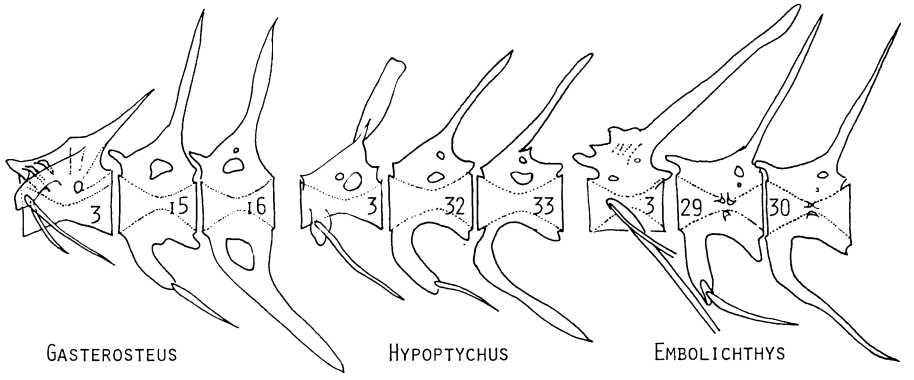


Fig. 7. The third and last abdominal vertebrae and the first caudal vertebra of *Gasterosteus aculeatus aculeatus*, female, 42.0 mm, *Hypoptychus dybowskii*, female, 67.8 mm, and *Embolichthys mitsukurii*, 115 mm. Note the presence of parapophysis on the third abdominal vertebra in the former two but absent in *Embolichthys*. Numbers on centra show ordinal numbers of centra.

vertebrae are scarcely developed and the ribs attach to the slight concavity of the centra themselves (Fig. 7.).

The structure of the vertebrae of *Gasterosteus* is almost identical with *Hypoptychus* in the presence of the parapophyses in all vertebrae and the extention of the neural spine from midpart of the neural arches.

The vertebral composition of *Hypoptychus*, *Aulichthys*, *Aulorhynchus*, and *Embolichthys* are listed in the following figure (Fig. 8.). As it can be seen in the figure, both *Hypoptychus* and *Aulichthys* resemble to *Embolichthys* in higher count of the abdominal vertbrae than those of the caudal. On the contrary the vertebral composition of *Aulorhynchus* differs from other three species in higher count of caudal vertebrae than those of the abdominal but the difference does not exceed more than two in number.

7. Mode of life

I observed *Hypoptychus* in the field and *Ammodytes personatus* kept in aquarium. In *Hypoptychus* the main propulsion of the darts is gained by the beat of the tail as done by many other fishes, but, usally, *Hypoptychus* stand still by the movement of his pectoral fin in same way in *Aulichthys* and *Gasterosteus*. The presence of swim-bladder in *Hypoptychus*, *Aulichthys*, and *Gasterosteus* is leading the similar mode of swimming motion. While *Ammodytes* swims continuously by undulation of the body just like as usual elongate fishes.

The mode of reproduction in *Hypoptychus* were reported by Ishigaki (1957). He states that in Hokkaido *Hypoptychus* spawn their adhesive egg clumps on the stems of *Sargassum* or other seaweed from April to June. The ovarian eggs are composed of trimodal groups in the size, and, ova in the largest group measuring 2.14～2.22 mm in diameter, counting 60 pieces in number. The diameter of the ova in the second and third groups are measuring 1.93～1.98 and 1.13～1.29 mm respectively, both counting about 60 in number. The number of each egg clumps attached to seaweed was counted 35 to 55 suggesting that the eggs in the largest group are deposited at one time.

The present author also observed the ovarian eggs of female *Hypoptychus* collected inside of the harbor on Hakodate in June finding that almost the same size frequency in ovarian size as reported by Ishigaki (1957). The ovarian eggs of the largest group have one large oil globule, about 0.4 mm in diameter, surrounded by eight to ten smaller ones, about 0.1～0.25 mm in diameter. Limbaugh (1962) reported the spawning behavior of *Aulichthys* from western Pacific coast and, though not stated, his photograph clearly show the presence of one large and few smaller oil globules in the egg. It is comtemplated that there exist similarity between *Hypoptychus* and *Aulorhynchus* in size and character of eggs as well as the mode of attachment to the seaweeds. It must be noted here that the eggs of perciformes have usually only one oil globule (Mito, 1960).

## Discussion

Among a number of osteological features, the structures of upper jaw, hyoid arch, pectoral girdle, and caudal skeleton were taken into consideration.

Though there are some exceptions in the fishes refered to perciformes as to lacking of the articular process in the premaxillary, e. g., *Callionymus* (Kayser, 1962) labrids (Gregory, 1933), its presence is one of the prevalent and salient features among the higher teleost (Greenwood et al., 1966: 369). In this respect *Hypoptychus*, lacking the process and with the general shape of the premaxillary, resembles *Aulichthys* and *Gasterosteus* (Figs. 2 and 3).

McAllister (1968) reported the number of branchiostegals in Gasterosteoidei counting less than four in number and all of them attached to the outer surface of the epihyal and ceratohyal. In this respect *Hypoptychus* shows similar formation of branchiostegals in Gasterosteoidei excepting that the two branchiostegals attached to the epihyal instead of one as usual case in Gasterosteoidei. In *Embolichthys* there are as many as 7, of which the anterior three are attached to the ventral edge of the ceratohyal as observed in the most of perciform fishes.

For the functional aspects of the branchiostegals, Gosline (1971: 74) stated that the main suction is caused by expansion of the branchiostegal membranes in higher teleosteans while in lower teleosteans it is brought about by the lowering of hyoid bars and thus the branchiostegal pump is effective in higher teleost but is less effective in the lower teleosteans. Alexander

(1967) also illustrated the protrusible mechanisms of the jaws in relation to gillcover on *Pterophyllum* and *Gasterosteus*. The arrangement and function of *Hypoptychus* seems to belong to those of the lower teleosteans.

According to Gosline (1971: 145), the diagnostic features of Syngnathiformes are (i) vertically inserted pectoral, (ii) no interspaces between pectoral radials, (iii) large scapular and coracoid foramina, (iv) small supracleithrum, (v) one or no postcleithrum, (vi) posttemporal not bifurcated.

But the last character seems not consistent, for instance, Mural (1973) illustrates the slight bifurcation of the bone in some species of the family Gasterosteidae, and similar condition is found in *Hypoptychus* treated here (Fig. 5).

Because of the presence of clear demarcation on the lower part of the coracoid plate and also of the extreme prolongation towards posteroventral of the plate, the present author regards this particular part as the infraclavicle. The fusion of infraclavicle with the coracoid has been illustrated for some species in the family Gasterosteidae (Nelson, 1971 b; Mural, 1973). In this respect also *Hypoptychus* coincides with the gasterosteid. In contrast the coracoid of *Embolichthys* is small and shows typical perciform pattern. *Hypoptychus* lacks pelvic fin, in this respect the species is unlike usual gasterosteids. But Nelson (1971 b) reported absence of pelvic fin and its girdle in some populations of *Pungitius pungitius*.

According to Gosline (1971: 146): the caudal skeleton in Gasterosteoidei is characterized by the fusion of the parhypural and hypurals to the urostyle; in this respect *Hypoptychus* undoubtedly carries the same pattern as the Gasterosteoidei. He also defined the characters of perciform caudal skeletons in his work (1961) stating that the haemal spines of the penultimate and antepenultimate vertebrae are autogenous, i. e., spines are articulated with cartilage to the centra. In this respect the caudal structure of *Embolichthys* is surely of a perciform formation but the structure of *Hypoptychus* not falling on the category.

Jordan and Tanaka (1927), Ishigaki (1957), and Gosline (1961) described general feature and some sexual dimorphism for *Hypoptychus*, and the sexual dimorphism in dentition seems to need some comments. According to Breder and Rosen (1966: 614) "difference in size between sexes appear to be related to nest guarding and the subsequent care of young" and also "in species with large egg production, the female is generally the larger". Their acounts well fitted to *Hypoptychus, Aulorhynchus*, and *Aulichthys*. It is interesting that the conical dentition of *Hypoptychus* and *Aulichthys* is restricted to the male only (Fig. 2.) and it may be suggested that the male dentition plays a certain function in the nest building and egg clumping to the stems of seaweeds though such behavior have not been observed, whereas no such sexual dimorphism is reported nor observed for *Embolichthys*.

All the known Pacific ammodytids show higher count for abdominal vertebrae than those for caudal (unpublished), in contrast to most teleostean fishes. In this respect *Hypoptychus* and *Aulichthys* resemble to the Ammodytidae. There are, though not common, some taxonomical groups among teleosteans which have higher count of abdominal vertebrae than those of the caudal, e. g., Sillaginidae, Embiotocidae, Beloniformes (Hotta, 1961). Thus the vertebral count itself does not seem sufficient to locate a species to a systematic taxon. The structure of the vertebrae of *Hypoptychus* resembles that of *Gasterosteus* and unlike that of *Embolichthys* as mentioned before.

Adding to these points of morphological significance the mode of reproduction as well as distributional pattern should be taken into consideration. As mentioned before *Hypoptychus* lays eggs rather few in number but large in size carrying several oil globules and adhesive to each other, the features shared by *Aulorhynchus* (Limbaugh, 1962) and fishes in the family Gasterosteidae (Breder and Rosen, 1966: 279). The eggs of *Ammodytes* measuring less than 1mm in diameter are less adhesive and deposited on bottom sand, and more than 1000 eggs are spawned at one time (Senta, 1965). Only very few exceptional groups exemplified by *Arctoscopus japonicus* (Trichonotidae; Kitami et al 1974), Uranoscopidae (Breder and Rosen, 1966: 557) and some species of Pleuronectidae (Mito, 1960), among higher teleosts reproduce eggs exceeding 2 mm in diameter. Mito (1963) notes that none of the perciform species has been reported to reproduce eggs having more than two oil globules. Though his works are focused especially on the pelagic forms, the quality of

size and number of oil globules is believed playing an important role.

Thus eggs of *Hypoptychus* deviates from those of a perciform fishes in quantity of oil globules and the larger size exceeding 2 mm in diameter but resemble a lower teleosteans especially the family Aulorhynchidae. The eggs of *Ammodytes* (Senta, 1965) show undoubtedly the perciform characters.

After the osteological study of *Hypoptychus*, Gosline (1963) concluded that *Hypoptychus* has evolved in quite different direction from *Ammodytes* and *Bleekeria* among the fishes of Ammodytoids. He also states that none of the percoid families would seem to provide a suitable ancestor of the family Ammodytidae. But the

Table 1. Comparison between *Hypoptychus dybowskii*, *Gasterosteus aculeatus aculeatus*, and *Bleekeria mitsukurii*.

| | *Hypoptychus dybowskii* | *Gasterosteus aculeatus* | *Bleekeria mitsukurii* |
|---|---|---|---|
| 1. Premaxillary | | | |
| ascending process | part of pmx proper | part of pmx proper | autogenous to pmx proper |
| articular process | absent | absent | present |
| conical teeth | present only in male | present in both sexes | present in both sexes |
| 2. Pelvic girdle | | | |
| supracleithrum | small | small | large |
| postcleithra | absent | absent | present, two |
| perforation of scapula | large | large | small |
| coracoid | large | large | small |
| infracleithrum | present, fused with coracoid | present, large | absent |
| 3. Caudal skeleton | | | |
| no. of branched caudal rays | 6+5=11 | 6+6=12 | 7+6=13 |
| parhypural | fused with urostyle | fused with urostyle | not fused with urostyle |
| hypurals | fused with urostyle | fused with urostyle | not fused |
| last neural spine | as long as precedents | as long as precedents | short crest |
| position of epurals | above uroneural | above uroneural | above neural arch of penultimate vertebra |
| last two haemal spines | fused with centra | fused with centra | autogenous |
| 4. Circumorbitals | 2 | 2 | 7 |
| 5. Perforation of dentary | absent | absent | present |
| 6. Gill membranes | united | united | not united |
| 7. Branchiostegals | 2+2=4, all attached outer surface | 2+1=3, all attached outer surface | 2+5=7, anterior three attached ventral edge |
| 8. Predorsals | absent | absent | present (two) |
| 9. Parapophysis of centra | developed in all vertebrae | developed in all vertebrae | developed in anteiror poorly 10 to 12 vertebrae |
| 10. Air bladder | present | present | absent |
| 11. Lateral line systems | consisted of canal free neuromasts | consisted of canal free neuromasts | canal present |
| 12. Mode of life | | | |
| habitat | rocky shore with vegetation | stream with vegetation | sandy bottom* |
| grooping | aggregation | solitary | forming school* |
| swimming | sporadical hovering with pectoral | sporadical hovering with pectoral | continuous tail beating |
| 13. Mode of reproduction | | | |
| parental care | male guards egg clumps | male guards eggs | (not reported) |
| quality of egg | >2 mm in diameter, several oil globules, adhesive | 1.4~1.7 mm (ovarian ova) | <1 mm; one oil globule, nonadhesive |

* Mr. Hajime Masuda's information and underwater photographs.

differences of many characters above mentioned strongly suggest that the genus *Hypoptychus* is not a member of Perciformes but that of Syngathiformes. It is impossible to seek the ancestor of the family Ammodytidae with inclusion of the genus *Hypoptychus*.

*Hypoptychus* is limited to shallow (less than 20 m in depth) waters in temperate and subboreal seas of the western North Pacific. In this respect the species resembles to some members of Gasterosteoidei especially to the family Aulorhynchidae, which is restricted to both sides of the northern Pacific. Fishes of the family Ammodytidae range rather widely both vertically and horizontally; *Embolichthys sarisa* was collected from the depths of more than 180 m (Robins and Böhlke, 1970) and *Bleekeria renniei* was reported to have derived from a beach of South Africa (Smith, 1957). Thus the restricted distribution of *Hypoptychus* may be contrasted with that of the Ammodytidae originated in warm water and spreading on both hemispheres (unpublished).

*Hypoptychus* resembles to Gobioidei in fusion of caudal supporting elements with the centra, to *Callionymus* in the absence of the articular process of the premaxillary, and to Ammodytoidei in the composition of the vertebrae and the absence of pelvic fin. But the combination of a number of characters together will justify the phyletic position of *Hypoptychus* (Hypoptychidae) placed in the Gasterosteoidei (Table 1). Therefore the present author propose to remove the family Hypoptychidae from the suborder Ammodytoidei of the order Perciformes, and to transfer it to the suborder Gasterosteoidei of the order Syngnathiformes. Proposed system is:

Order Syngnathiformes (Gasterosteiformes)
  Suborder Syngnathoidei
  Suborder Gasterosteoidei
    Family Aulorhynchidae
    Family **Hypoptychidae**
    Family Gasterosteidae
  (Suborder Indostomoidei*)
Order Perciformes
  Suborder Ammodytoidei
    Family Ammodytidae (including Bleekeriidae)

* Bannister (1970) removed the Suborder Indostomoidei from the order Syngnathiformes and assigned it to its own order Indostomiformes.

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## シワイカナゴ科のスズキ目からヨウジウオ目への分類学的位置変更

井田　斉

シワイカナゴ *Hypoptychus dybowskii* は Steindachner の原記載によるイカナゴ亜目とアシロ亜目との間の位置づけ以後その妥当性の検討は極めて少なく，イカナゴ亜目における退化的特化種との見解 (Gosline, 1963) が受けいれられている．本種の骨格，繁殖生態等を詳細にわたり検討した結果本種は多くの点でスズキ目より下等な形質を具える事が判明した．真骨魚類の中ではトゲウオ亜目，特に繁殖生態ではクダヤガラ科 Aulorhynchidae に，骨格的にはトゲウオ科 Gasterosteidae に類似点がある．イカナゴ亜目との類似点は脊椎骨数の多さおよび尾鰭分枝軟条の少なさなどであるがそれらの構造に類似点はない．従ってシワイカナゴ科 Hypoptychidae をトゲウオ亜目 Gasterosteoidei (ヨウジウオ目，Syngnathiformes) に位置づける事が妥当と判断される．

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