

## New Records of Three Fish Species from Hawaii

Ofer Gon

(Received July 14, 1986)

The first significant report on the meso- and bathypelagic fishes of Hawaii was based on material collected by the 'Albatross' in December, 1891. Eight beam trawl hauls were made in Kaiwi Channel at depths of 295–375 fm. Of the 26 species collected, all but 5 were described by Gilbert and Cramer (1897) as new species. In 1902, the 'Albatross' was sent to carry out a survey of the deep water fauna of the Hawaiian Islands, supervised by David S. Jordan and Barton W. Evermann. The area surveyed included the major islands and the leeward islands up to Laysan Island. The 344 hauls, mostly at depths not more than 400 fm, yielded 111 species from depths of 100 fm or more and of which 70 were described as new species (Gilbert, 1905). Since Gilbert's reports (1905) on the fishes collected by the 'Albatross', practically no work had been done on deep-sea fishes in Hawaii for over 45 years. In the late 1940's the National Marine Fisheries Service in Honolulu became interested in tuna fishing in the central Pacific Ocean. Ships such as H. M. 'Smith' and others, while being employed mainly in tuna surveys, collected a fair amount of pelagic and deep-sea fishes by trawling as well as long lines. In 1967, after the arrival of the 'Townsend Cromwell' in the islands, the National Marine Fisheries Service (NMFS) in Honolulu launched a five-year survey of the deep water around the Hawaiian Islands which was led by Dr. Paul Struhsaker. The first four cruises yielded 182 species of which 29 were new to Hawaii (Struhsaker, 1973). Two years later, Dr. T. A. Clarke of the University of Hawaii started collecting meso- and bathypelagic fishes, concentrating mainly on myctophid and stomiatoid fishes. A more or less regular sampling is still being carried out by NMFS as well as the University of Hawaii.

Although the benthic fish fauna of Hawaii below 100 fm is one of the best known in the world (Randall, 1976), the accidental catching of the unique megamouth shark, *Megachasma*

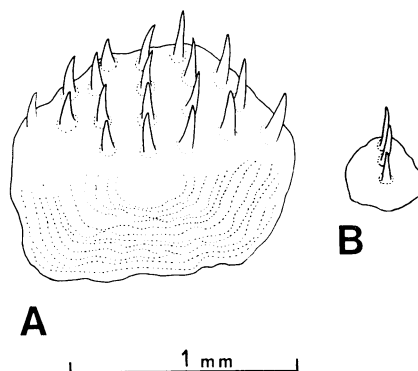


Fig. 1. Scales of *Paratrachichthys prosthemi*. A, adult (BPBM 29262, 60.8 mm SL); B, juvenile (BPBM 28125, 19.0 mm SL).

*pelagios* Taylor, Compagno et Struhsaker, 1983 and the new species and records resulting from recent deep dives of the submersible 'Makalii' (Gon, 1985; Suzumoto, personal communic.) indicate that there is more to be discovered in the deeper water around the islands.

Counts and measurements follow Hubbs and Lagler (1958) and photophore terminology follows Grey (1964). The depth of the suborbital bone in *Paratrachichthys* is the greatest distance between the ventral margin of the orbit and the ventral edge of the bone. The specimens examined for this study are deposited in the Bernice P. Bishop Museum, Honolulu (BPBM).

### Family Trachichthyidae

#### *Paratrachichthys prosthemi*

Jordan et Fowler, 1902

(Fig. 1)

*Paratrachichthys prosthemi* Jordan and Fowler, 1902: 9, fig. 1 (Suruga Bay).

Three adult females of *P. prosthemi*, a new record to Hawaii, were found in a collection recently donated to the Bishop Museum by Dr. Paul J. Struhsaker. These were mixed with 52 specimens of *P. heptalepis* recently described from Hawaii (Gon, 1983). The specimens (BPBM 29261, 60.0 and 61.4 mm SL; BPBM 29262, 60.8 mm SL) were trawled by the NMFS vessel 'Townsend Cromwell' off Haleiwa, Oahu, in the depth range of 90–110 m.

Dorsal rays V, 13; anal rays III, 8; pectoral rays 12/12; transverse rows of scales 59–62; pored

lateral-line scales 29–30; ventral scutes 9–10; gill-rakers 7+(15–16); 5 or 6 spiny procurrent rays on each side of the caudal fin. Depth of body 2.7–2.8, length of head 2.8–2.9 in SL, caudal peduncle depth 6.8–7.2 and its length 5.5–5.6 in SL; snout 5.1–5.8, eye 2.8–3.0, interorbital 3.7–3.9 in head length; depth of the suborbital bone 2.4 in orbit diameter.

Dorsal ridges on head serrated posteriorly, curving outward behind the eyes. Anteriorly these ridges end on the snout with short, blunt spines. Posttemporal spine long and strong. Opercular spine extending beyond the opercular membrane, but preopercular spine shorter, not reaching beyond the membrane. Anus between pelvic bases. Striated areas on isthmus, under pectoral base along ventral side of body to about caudal base. Teeth in both jaws small, conical, arranged in a wide patch near symphysis, tapering posteriorly to a narrow band; vomer with 4–6 minute teeth and a narrow band on palatines. Posterior projection of cleithrum with a prominent, diagonal, dorsally pointing ridge and few smaller ridges under it. Its edge smooth.

A juvenile specimen (BPBM 28125, 19 mm SL) was collected by the use of rotenone, on Penguin Bank, E of Molokai, at a depth of 650 ft, by Dr. Edith H. Chave during a deep dive in the submersible 'Makalii'. The juvenile (Fig. 1) resembles the adult fish in its general morphology but differs in proportions. Distinguishing features such as the spine and form of the posttemporal bone, the opercular and preopercular spines, the head ridges, and the extension of the striated area on the caudal peduncle are already distinct. Scala-tion of the juvenile is markedly different from the adult. Each scale has 2–3 long spines on its midline, erected in an angle of about 70 degrees to the body surface. In alcohol, the colour of the juvenile is brown on most of the body and head. The head is slightly darker. Ventral area from isthmus to caudal base and under and above anterior half of pectoral fin black. Pelvic fins pale, with scattered melanophores. Other fins pale. Bases of ventral scutes dark but ridges pale.

*Paratrachichthys prosthemi*, previously known only from Japan (Jordan and Starks, 1904; Jordan et al., 1913; Kamohara, 1950; Abe 1963; Matsubara, 1971; Masuda et al., 1975), differs from *P. heptalepis* in having a more pointed

posttemporal bone with a longer and sharper spine, longer opercular spine and shorter preopercular spine (Gon, 1983). The suborbital bone is smaller, at most 0.5 of orbit compared to about 0.7 of orbit in *P. heptalepis*. The occipital pit of *P. prosthemi* has no mesially curved ridges and the posterior projection of the cleithrum is somewhat thicker and more pointed. The striated area along the side of the body of *P. prosthemi* reaches further on the caudal peduncle, almost to caudal fin base (Gon, 1983). Kuwabara (1955) and Haneda (1957) described the luminous organ of *P. prosthemi*.

Kreffit (1976) found juveniles of *P. argyrophanus* as far as 1,000 miles off shore in the south Atlantic. It is very likely that *P. prosthemi* also has a long pelagic stage and that its pelagic juveniles were carried by the Kuroshio current from Japan to the northwestern end of the Hawaiian Ridge and from there migrated to the major islands.

#### Key to the Trachichthyidae of the Hawaiian Islands

- 1a. Anus between pelvic fin bases; large scutes between anus and origin of anal fin; anal rays 8 (*Paratrachichthys*) . . . . . 2
- 1b. Anus in front of anal origin; scutes between anus and anal fin origin absent, but present anterior to anus; anal fin rays 10. . . . .  
. . . . . *Hoplostethus mediterraneus*
- 2a. Posttemporal spine weak, in the form of a low ridge of the posttemporal bone; striated area along the ventral side of the body reaching just past anal fin base. . . *P. heptalepis*
- 2b. Posttemporal spine long and pointed; striated area along ventral side of the body reaching almost to caudal fin base. . . . .  
. . . . . *P. prosthemi*

#### Family Photichthyidae

*Ichthyococcus intermedius* Mukhacheva, 1980

*Ichthyococcus intermedius* Mukhacheva, 1980: 7 (north of New Guinea, 1°45'S, 143°49'E).

A specimen of *I. intermedius* (BPBM 17863, 53 mm SL) was collected by Dr. T. A. Clarke of the Hawaii Institute of Marine Biology on June 10, 1971 (21°25'N, 158°21'W, 540–590 m, 10-ft 1K trawl). Dorsal fin rays 13; anal fin rays 14;

pectoral fin rays 8; gill-rakers 5+16; lateral-line scales 37-38; depth of body 3.2, length of head 3.5 in SL; eye diameter 3.0, interorbital width 15.0 in head length. Photophores: SO 1, BR 12, OA 27, IV 26, VAV 11, AC 12-13, IC 49-50. *I. intermedius* is closely related to *I. ovatus*, from which it differs in having SO photophores, and to *I. polli*, from which it can be distinguished by its fewer gill-rakers and lateral-line scales as well as fewer AC and VAV photophores (Mukhacheva, 1980). No illustration of *I. intermedius* is given in the original description.

*Ichthyococcus intermedius* is known from waters around New Guinea and the Caroline Islands (Mukhacheva, 1980). Its discovery in Hawaiian waters is significantly increasing its range.

In addition, five specimens of *I. elongatus* (BPBM 26015, 48 mm SL, 44°37'N, 172°27'W; BPBM 26087, 29.5 mm SL, 39°N, 179°54'W; BPBM 26091, one of two specimens, 41 mm SL, 42°21'N, 179°52'W; BPBM 26129, 32 mm SL, 39°08'N, 164°55'W; BPBM 26132, 54 mm SL, 42°22'N, 164°55'W) were found in a large collection of fishes recently donated to the Bishop Museum by the National Marine Fisheries Service, Honolulu Laboratory. They were collected by the H. M. 'Smith' with a midwater trawl, at the depth range of 0-200 m, during Cruise 30, north of the Hawaiian Islands, summer 1955. This species differs from *I. ovatus*, already known from Hawaii, and *I. intermedius* in having more photophores in the lateral (OA) and ventral (IC) series, higher number of dorsal fin rays, shorter head, shallower body and the absence of ventral adipose fin (for other differences, see key blow).

Mukhacheva (1980) associated the pattern of distribution of *I. elongatus* with the Kuroshio current, the North Pacific Drift, and the Alaska and the California currents. The specimens reported here considerably extend the range of *I. elongatus* in the central north Pacific Ocean. As in the case of *Paratrachichthys prosthemi* above, *I. elongatus* is very likely to appear in the north-western islands of the Hawaiian chain.

**Key to the species of *Ichthyococcus* of the Hawaiian Islands and adjacent waters**

- 1a. SO photophores present; interorbital width 9-15 in head length . . . . . 2
- 1b. SO photophores absent; interorbital width

- 17-20 in head length. . . . . *I. ovatus*
- 2a. OA photophores 30-32; IC photophores 54-56; gill-rakers 31-37; lateral-line scales 40-44. . . . . *I. elongatus*
- 2b. OA photophores 27; IC photophores 49-50; gill-rakers 21; lateral-line scales 37-38. . . . . *I. intermedius*

**Family Gempylidae**

*Thyrsitoides marleyi* Fowler, 1929

*Thyrsitoides marleyi* Fowler, 1929: 256, fig. 2.

In November 1982, a record size female of *T. marleyi* was caught by hook and line off the island of Niihau, west of Kauai, in the Hawaiian Islands. The specimen (BPBM 28203) was 1483 mm SL, 1573 mm FL, 1700 mm TL and weighed 15.42 kg. Dorsal rays XVIII, i, 12+6; anal rays II, 12+5; pectoral rays 14-15. Body long and compressed, covered with small cycloid scales. Head large, about 4.0 in SL. Snout long, conical. Mouth large, the lower jaw projecting in front of upper jaw. Tip of each jaw with a small cartilaginous process. Both jaws with a single series of small, laterally compressed triangular teeth, increasing in size posteriorly. Lower jaw with a large canine tooth on each side of symphysis. Palate with three large fangs, two on the right side and one on the left. A smaller, depressible tooth behind the left fang. Dorsal fin originates above angle of opercle, first spine longest, others gradually decreasing in size posteriorly. Soft dorsal and anal opposite each other, both ending with 5-6 finlet-like rays connected to each other by membrane. Pelvic insertion behind pectoral base. A keel-like process at base of upper and lower caudal fin lobes. Lateral keel on side of caudal peduncle absent. Caudal fin deeply forked. Lateral-line originates above angle of opercle and bifurcates under 4th dorsal spine. Upper section runs along dorsal profile of body to a point between 12th and 13th dorsal spines. Lower section runs along middle of body to caudal base.

Subsequent to Fowler's (1929) description of *T. marleyi*, Kamohara (1936) described a similar species, *Mimasea taeniosoma*, from Kochi Reef, Japan, now recognized as a junior synonym of *T. marleyi* (Forster et al., 1970; Nakamura, 1980). Previously known from various Indian Ocean localities (Smith, 1937, 1961; Forster et al., 1970; Jones and Kumaran, 1980; Wongratana,

1980) and Japanese waters (Kamohara, 1936, 1938; Matsubara and Iwai, 1952; Gushiken, 1972; Nakamura, 1980), the distribution of *Thyrstitoides marleyi* is now extended to the Hawaiian Islands.

#### Acknowledgments

I wish to thank Arnold Y. Suzumoto and Marjorie L. Awai of the Bishop Museum, Honolulu, for their help with various aspects of this study.

#### Literature cited

- Abe, T. 1963. Keys to the Japanese fishes. Hoku-ryukan, Tokyo, vi+36+358 pp.
- Forster, G. R., J. R. Badcock, M. R. Longbottom, N. R. Merret and K. S. Thomson. 1970. Results of the Royal Society Indian Ocean deep slope fishing expedition, 1969. Proc. Roy. Soc. Lond., B, 175: 367-404.
- Fowler, H. W. 1929. New and little-known fishes from the Natal coast. Ann. Natal Mus., 6(2): 245-264.
- Gilbert, C. H. 1905. The aquatic resources of the Hawaiian Islands. Part II. The deep-sea fishes. Bull. U. S. Fish. Comm., 23(2): 575-713.
- Gilbert, C. H. and F. Cramer. 1897. Report on the fishes dredged in deep water near the Hawaiian Islands, with descriptions and figures of twenty-three new species. Proc. U. S. Natn. Mus., 19: 403-435.
- Gon, O. 1983. *Paratrachichthys heptalepis*, a new roughie (Pisces, Trachichthyidae) from the Hawaiian Islands. Pacif. Sci., 37(3): 293-299.
- Gon, O. 1985. Two new species of the deep-sea cardinalfish genus *Epigonus* (Perciformes, Aponogonidae) from the Hawaiian Islands, with a key to the Hawaiian species. Pacif. Sci., 39(2): 221-229.
- Grey, M. 1964. Family Gonostomatidae. Pages 78-240 in Fishes of the western North Atlantic. Part 4. Sears Found. Mar. Res. Mem., (1).
- Gushiken, S. 1972. Fishes of the Okinawa Islands with 330 species colored. Ryukyu Fisheries Office, Naha, 247 pp.
- Haneda, Y. 1957. Observations on luminescence in the deep-sea fish *Paratrachichthys prosthemius*. Sci. Rep. Yokosuka City Mus., 2: 15-23.
- Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Cranbrook Inst. Sci. Bull., (26): i-lxi+1-213, 44 pls.
- Jones, S. and M. Kumaran. 1980. Fishes of the Laccadive Archipelago. The Nature Conservation and Aquatic Sciences Service, Kerala, India, 760 pp.
- Jordan, D. S. and H. W. Fowler. 1902. A review of the berycoid fishes of Japan. Proc. U. S. Natn. Mus., 26: 1-21.
- Jordan, D. S. and E. C. Starks. 1904. List of fishes dredged by the steamer Albatross off the coast of Japan in the summer of 1900, with descriptions of new species and a review of the Japanese Macrouridae. Bull. U. S. Fish. Comm., (1902): 577-630.
- Jordan, D. S., S. Tanaka and J. O. Snyder. 1913. Catalogue of fishes of Japan. J. Coll. Sci., Tokyo Imp. Univ., 33(1): 1-497.
- Kamohara, T. 1936. Supplementary notes on the fishes collected in the vicinity of Kochi City, Shikoku. Zool. Mag., Tokyo, 48(11): 929-935.
- Kamohara, T. 1938. Gempylidae of Japan. Annot. Zool. Japon., 17: 45-51.
- Kamohara, T. 1950. Descriptions of the fishes from the provinces of Tosa and Kishu, Japan. Kochi-ken Bunkyo Kyokai, 368 pp. (In Japanese.)
- Kreff, G. 1976. Ergebnisse der Forschungsreisen des FFS "Walther Herwig" nach Südamerika. XLI. Fische der Ordnung Beryciformes aus dem Südwestatlantik. Arch. Fischwiss., 26(2/3): 65-86.
- Kuwabara, S. 1955. Some observations on the luminous organ of the fish *Paratrachichthys prosthemius* Jordan and Fowler. J. Shimonoseki Coll. Fish., 4(2): 197-202.
- Masuda, H., C. Araga and T. Yoshino. 1975. Coastal fishes of southern Japan. Tokai Univ. Press, Tokyo, 379 pp.
- Matsubara, K. 1971. Fish morphology and hierarchy, vol. 1. Ishizaki Shoten, Tokyo, xi+789 pp.
- Matsubara, K. and T. Iwai. 1952. Studies on some Japanese fishes of the family Gempylidae. Pacif. Sci., 6: 193-212.
- Mukhacheva, V. A. 1980. A review of the genus *Ichthyococcus* Bonaparte (Photichthyidae). J. Ichthyol., 20(6): 1-14.
- Nakamura, I. 1980. New record of a rare gempylid, *Thyrstitoides marleyi*, from the Sea of Japan. Japan. J. Ichthyol., 26(4): 357-360.
- Randall, J. E. 1976. The endemic shore fishes of the Hawaiian Islands, Lord Howe Island and Easter Island. Colloque Commerson 1973. ORSTOM Trav. Doc., 47: 49-73.
- Smith, J. L. B. 1937. New records of South African fishes. Ann. Natal Mus., 8(2): 167-197.
- Smith, J. L. B. 1961. The sea fishes of southern Africa. Central News Agency, Cape Town, 580 pp., 111 pls.
- Struhsaker, P. 1973. A contribution to the systematics and ecology of Hawaiian bathyal fishes. Ph. D Thesis, University of Hawaii, Honolulu.
- Taylor, L. R., L. J. V. Compagno and P. J. Struhsaker. 1983. Megamouth—a new species, genus and family of Lamnoid shark (*Megachasma pelagios*,

family Megachasmidae) from the Hawaiian Islands.  
Proc. Calif. Acad. Sci., 43(8): 87-110.

Wongratana, T. 1980. An occurrence of *Thyrsitoides marleyi* Fowler in the Andaman Sea (Pisces: Gempylidae). Nat. Hist. Bull. Siam Soc., 28: 137-146.

(JLB Smith Institute of Ichthyology, Private Bag 1015,  
Grahamstown, South Africa)

### ハワイから新記録の3魚種

Ofer Gon

近年ホノルルのビショップ博物館に寄せられた魚類標本の中から、ハワイ新記録の3魚種—ヒウチダイ科ハリダシエビス (*Paratrachichtys prosthemi*), ヨコエソ科シンジュエソ属の一種 (*Ichthyococcus intermedius*), クロタチカマス科ナガタチカマス (*Thyrsitoides marleyi*)—を報告し、前2種については地域的な検索表を示した。