# First occurrence of two Blennidae fishes from Vellar Estuary, Southeast coast of India

**Iyyappan S.[1]; Subramaniyan M.[1]; Ragul S.[1]; Thangaraj M.[1]***

Received: August 2022 Accepted: October 2022

**Abstract**

Two *Omobranchus punctatus* (Valenciennes,1836) and one *Omobranchus ferox* (Herre, 1927) were collected for the first time from the oyster bed ecosystem of Vellar estuary, Tamilnadu. *Omobranchus ferox* is well distinguished by the presence of a vertical crest posterior of the eye, also *Omobranchus punctatus* is easily recognized by the presence of horizontal stripes from the posterior operculum to the caudal peduncle; the head region has no cirri or spikes and dorsal fins base with yellow spots. The two species were confirmed at a molecular level by the DNA barcoding technique.

**Keywords:** Blennidae, *Omobranchus* sp., Morphometric, Vellar estuary, DNA barcoding

1-Centre of Advanced Study in Marine Biology, Faculty of Marine Sciences, Annamalai University, Parangipettai 608 502, Tamil Nadu, India
*Corresponding author's Email: coralholder@yahoo.com

## Introduction

The combtooth blennidae consists of small fishes occurring in shallow coastal marine waters, in rocky intertidal areas, coral reefs, mangroves, oyster beds and in the lower reaches of most rivers (Hastings and Springer, 2009). Blennies are found throughout the world; however, they are numerous in the tropics, and some species are found in temperate regions. The species diversity decreases when latitude increases (Kuiter, 1993). They may be found in a range of settings, including coral reefs, mangroves, oyster beds, and stony reefs (Hastings and Springer, 2009). They lay their egg in rock fissures, abandoned bivalve shells, marine weeds, and mangrove stem holes (Thomson and Bennet, 1953; Munro, 1955; Dutt and VisweswaraRao, 1961), also eggs are demersal and adhesive (Breder and Rosen, 1966) and are attached to the substrate via a filamentous, adhesive pad or pedestal (Watson, 2009). The genera and species of Blenniidae family (subfamily: Blenniinae, Salariinae) is reported 59 (16,43) and 405 (96,309) respectively (Eschmeyer *et al*., 2022). *Omobranchus* sp. is the only genus found in the Indo-West Pacific, and west of the Andesite Line, a key continental divide (Springer, 1972). Earlier, *O. punctatus*has been documented in the coastal waters of Venezuela, Panama, Colombia, Trinidad, and Makransea (Lasso-Alcalá *et al*., 2008; Mehraban and Esmaeili,2018). Several *Omobranchus* species have been brought to new locations and mostly through maritime vessel transportation. *Omobranchus punctatus* was reported as an invaded species through ballast water in the southwestern Atlantic Sea (Gerhardinger *et al*., 2006). Likewise, this species might be introduced into Mediterranean region through ship hull (Golani, 2004). In Hawaii islands, *O. ferox* was reported by Yamamoto and Tagawa (2000). In India, a high-level representation of 65 species and 26 genera of blennidae were documented (Gopi and Mishra, 2015). *Omobranchus elongatus, O. fasciolatus, O. ferox*, *O. obliquus, O. punctatus, O. smithi*, and *O. zebra* have been reported from Indian marine and estuary environments (Froese and Pauly, 2019). The variable sabretooth blenny, *Petroscirtes variabilis* was reported for the first time in the Digha coast of West Bengal (Mitra *et al*., 1997). Two combtooth blennies such as *O. zebra* and *O. smithi* were reported in the Sundarbans estuary of West Bengal recently (Chakraborty *et al*., 2020). Earlier, in the Chilika lagoon of Odisha, *O. zebra* was recorded as an estuarine species (Gopi and Mishra, 2015). In the Gulf of Manner waters, six species such as *E. frontalis, O. elongatus, P. breviceps, P. variabilis, E. striatus* and *S. fasciatus* were recognized by Gopalakrishanan *et al*. (2012). About 22 species of blennies were reported from Tamilnadu in recent times (Mogalekar *et al*., 2018). While there is no report about the occurrence of *O. punctatus* and *O. ferox* in Tamilnadu coast as of date. We have found these two species from the Vellar estuary as the first occurrence and the

morphometric, molecular data were analyzed (Fig. 1).

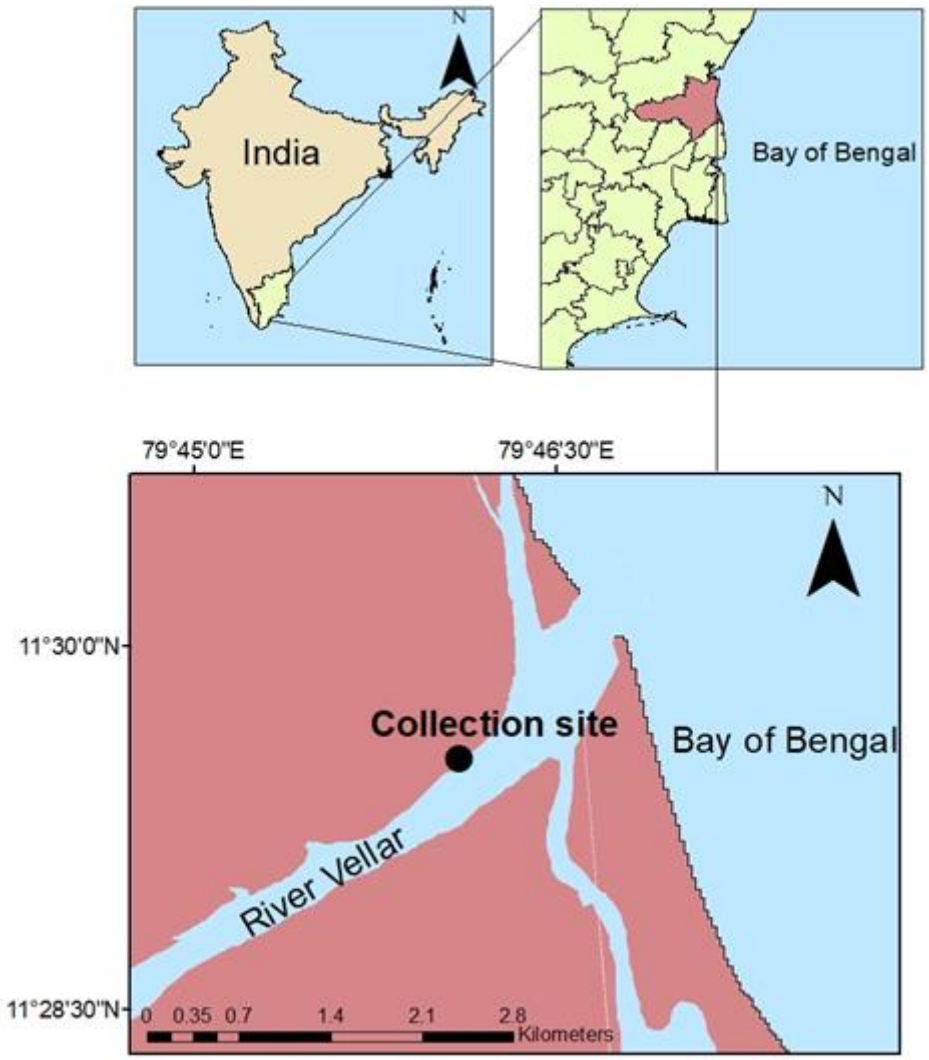


**Figure1: Showing the collection sit.**

## Material and methods

Specimen Collection and Morphological Characterization

Three specimens were collected by hand picking from the edible oyster bed in the Vellar estuary (11° 29'N, 79° 46'E) during October 2021. The collected live specimens were brought to the laboratory and took photographed. The specimens were sacrificed in ice and subsequently morphometric, meristic characters were documented. Measurements were made using Mitutoyo CD-6″ASX digital caliper to the nearest 0.1 mm. For morphometric measurement, we have followed the standard protocol (Springer and Gomon,1975). For DNA isolation, small fin clips were dissected and kept in 95% ethanol.

*DNA isolation and PCR*

DNA was isolated from the preserved fin clips by the standard phenol-chloroform ethanol method (Sambrook *et al*., 1989). The absorbance ratio of

DNA was taken at 260nm and 280nm (260/280), to estimate the quality. The DNA was diluted with TAE buffer to a concentration of 100ng/ml. PCR amplification of the COI gene was done in a 50µL volume PCR mix with 5µL of 10X Taq polymerase $MgCl_2$ (25mM) buffer, 1µL of each dNTP (0.05mM), 1µL of each primer (0.01mM), 0.6U of Taq polymerase, 2µL of template DNA and 36µL of double-distilled water. *Fish F1*-5'TCAACCAACCACAAAGACATTGGCAC3' and *FishR1*-5'TAGACTTCTGGGTGGCCAAAGAATCA3' (Ward *et al*., 2005) were the universal primers used in the amplification of COI gene. The thermal cycle regime of PCR consisted of an initiation stage of 4 min at 95°C and subsequent variation of thermal exposure of 40 sec at 94°C, 45 sec at 54°C, and 50 sec at 72°C for 30 cycles and a final extension for 10 min at 72°C. The PCR product was then run on 1.5% agarose gel to assessthe size of the amplicon. The purified PCR product was sequenced by Sanger's sequencing method in a commercial sequencing center.

*Sequence analysis*

The resulting, sequences were edited with BioEdit v 7.2.6.1 and searched for sequence similarity through NCBI BLAST. All the sequences were submitted to NCBI through BankIt submission portal and got the accession numbers.

**Results**

Through PCR amplification, 650 bp partial CO1 gene sequence was obtained for two specimens. The BLAST analysis showed that the two specimens were resolved as *O. ferox* and *O. punctatus* with higher similarity with respective species in the database. The Genbank accession number for *O. ferox* is OM780313 and *O. punctatus* is OM763670.

Systematics of *Omobranchus ferox* (Herre, 1927)

| | |
|---|---|
| Phylum | Chordata |
| Class | Actinopterygii |
| Order | Blenniiformes Bleeker, 1860 |
| Family | Blenniidae Rafinesque, 1810 |
| Genus | *Omobranchus* Valenciennes, 1836 |
| Species | *Omobranchus ferox* (Herre, 1927) |

Synonyms

*Petroscirtes ferox* (Herre, 1927)
*Petroscirtes kranjiensis* (Herre, 1940)
*Omobranchus kranjiensis* (Herre, 1940)
*Petroscirtes feliciana* (Herre, 1942)
*Petroscirtes waterousi* (Herre, 1942)
*Omobranchus dealmeida* (Smith, 1949)
*Cruantus dealmeida* (Smith, 1949)

*Description*

Apart from the presence of the generic characters mentioned above, the specimens are diagnosed by the following characters: XII, 22 dorsal-fin rays; II, 24 anal-fin rays; 12/12 pectoral-fin rays; I, 2 pelvic-fin rays; 12 principle, 7+6 procurrent caudal fin-

rays, and 4 lateral line tubes. The details are given in Table 1.

The head and body are laterally compressed and elongated; the anterior profile of the head is almost vertical, clearly convex. The mouth is sub-terminal(inferior) and withlower-lip flap; teeth incisor-like, in a row in both jaws and just above the mouth, pairs of nasal pores present, gill openings continuous across the lower surface of the head. Preorbital and preopercular spines are short and blunt, with no fleshy crest on top of the head. The lateral line is continuous on the body, extending from the preopercular to the caudal-fin base. Dorsal and anal fin spines are flexible; pectoral, pelvic and anal-fin are having rays. Caudal fin segmented and truncate.

**Table 1: Morphometric and meristic data of the *O. ferox* and *O. punctatus* specimens**

| **Morphometric characters** | ***O. ferox* (n=2)** | ***O. punctatus*(n=1)** |
|---|---|---|
| **Standard length(mm)** | **27.73 - 40.16** | **48.4** |
| **%Standard Length** | | |
| Head length | 22.39 - 24.61 | 19.93 |
| Pre- dorsal length | 21.67 - 22.92 | 23.19 |
| Pre-pectoral length | 23.29 - 23.97 | 25.21 |
| Pre-pelvic length | 23.33 - 24.1 | 25.05 |
| Pre-anal length | 45.04 - 46.01 | 48.01 |
| Body depth at pelvic fin origin | 13.19 - 13.31 | 14.50 |
| Body depth at anal fin origin | 10.16 - 10.19 | 15.20 |
| Body width at anal fin origin | 3.31 - 3.38 | 7.32 |
| Length of caudal peduncle | 2.92 - 3.01 | 6.52 |
| Depth of caudal peduncle | 8.11 - 8.31 | 7.84 |
| Width of caudal peduncle | 1.62 -1.69 | 4.09 |
| Length of dorsal-fin base | 72.66 - 73.5 | 76.50 |
| Length of Anal fin Base | 51.85 - 52.6 | 50.35 |
| Pectoral-fin length | 20.08 - 20.25 | 15.33 |
| Pelvic-fin length | 20.95 - 21.20 | 10.20 |
| Caudal-fin length | 17.34 - 18.24 | 15.76 |
| **% Head length** | | |
| Eye diameter | 28.50 - 28.70 | 20.00 |
| Snout length | 23.99 - 24.01 | 18.20 |
| Head depth | 60.54 - 60.58 | 44.87 |
| Head width | 39.13 - 39.19 | 30.61 |
| **Meristic characters** | | |
| Dorsal fin rays | XII, 22 | XI,22 |
| Anal fin rays | II, 24 | II,23 |
| Pectoral fin rays | 12/12 | 14/14 |
| Pelvic fin rays | 2 | 2 |
| Caudal fin rays | 12 | 15 |
| Lateral line tubes | 4 | - |

*Colour pattern*

The good diagnostic characteristic is a short almost vertical narrow line found just behind the eye. Paired and unpaired fins are pale with very fine, threadlike fin elements. Dorsal fin with a prominent orange longitudinal stripe at

the middle and tip of dorsal spines (D XII) (Fig. 2).

Systematics of *Omobranchus punctatus* (Valenciennes,1836)

Phylum Chordata
Class Actinopterygii
Order Blenniiformes Bleeker, 1860
Family Blenniidae Rafinesque, 1810
Genus *Omobranchus* Valenciennes, 1836
Species *Omobranchus punctatus* (Valenciennes,1836)

**Figure 2: *Omobranchus ferox*.**

*Synonyms*

*Blennechis punctatus* (*Valenciennes*, 1836)
*Petroscirtes lineolatus* (Kner, 1868)
*Omobranchus lineolatus* (Kner, 1868)

*Omobranchus japonicus* (Bleeker, 1869)
*Petroscirtes japonicus* (Bleeker, 1869)
*Petroscirtes kochi (*Weber, 1907)

*Description*

XI, 22 dorsal fin rays; II, 23 anal fin rays; 14/14 pectoral fin rays; 2 pelvicfin rays; 12 + 3 upper and 2 procurrent caudal fin rays (Table 1). Body elongated, compressed and scaleless; standard length six times of body depth. Small gill holes limited to the sides of the head above the pectoral-fin base; uphill head profile no cirri or spikes; body slender and flattened with horizontal stripes.

*Colour pattern*

Vertical bars emerging from the base of head on the lateral side several white spots present on the head posterior to the eye, darker dots around operculum. Continuous bands from dorsal fin to caudal fin, colour yellowish with brown. Horizontal stripes start from the posterior operculum to caudal peduncle (Fig. 3).

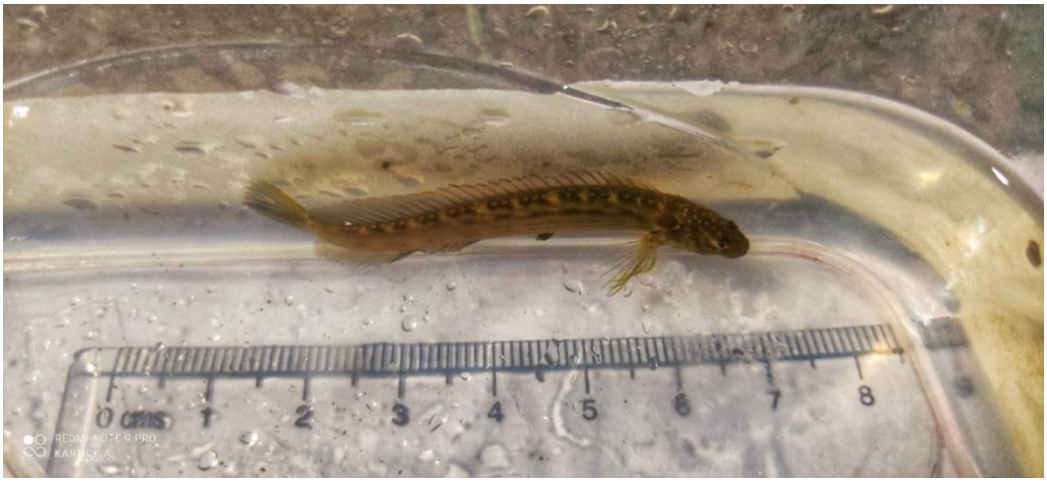


**Figure 3:** ***Omobranchus punctatus*****.**

## Discussion

The collected specimens were identified to species level by following the diagnostic features given by Springer and Gomon (1975). The body is elongated with long dorsal fins and anal fins, eyes often positioned high on the head and is usually with super orbital cirri. Cirri is often present near the nape. Comb-like teeth in jaws, fixed or moveable (canine teeth occasionally present).Typically, bottom-dwelling species that eat a combination of algae and benthic invertebrates; some are planktivorous, while others specialize in eating the skin or fins of large fishes, with imitation acting as a cleaner.

The distribution pattern of this family in various region of Indian water is well studied and more reports are readily available (Mitra *et al*., 1997; Gopalakrishanan *et al*., 2012; Gopi and Mishra, 2015; Joshi *et al*., 2016; Mogalekar *et al*., 2018; Froese and Pauly, 2019; Chakraborty *et al.,* 2020). The colour pattern and distinguish character descriptions of various species were elaborately discussed elsewhere (Chakraborty *et al.,* 2020). *Omobranchus ferox* is closely related with *O. zebra* but slightly differs based on the position and shape of the crest (Fig. 1). It is near to the eyes and a vertical line in *O. ferox*, while *O. zebra* has curved crest. *Omobranchus ferox* has several bands in the head region while *O. zebra* is devoid of the same. In *O. ferox,* the gill opening is opposite to the 3$^{rd}$ or 6$^{th}$ pectoral fin ray whereas it is different in *O. zebra*. Multiple yellow dots are present below the mouth region of *O. ferox* whereas in *O. zebra*, devoid of dots but the extension of the bands from the head cover the region.

The colour pattern of *O. punctatus* is resembles with *O. elongatus*. But, *O. punctatus* has dark bands extending from the mouth and ending before the pectoral fin origin (Fig. 3). *Omobranchus elongatus* does not have these bands. In addition to this, *O. punctatus* is devoid of crest, while it is fleshy and blade like and present in top of the head in *O. elongatus*. Both the species have equal number of dorsal spines (D XII).

Moreover, these species were confirmed by evaluating their DNA Sequence. The blast analysis disclosed that these two specimens were *O. punctatus* and *O. ferox* by showing high similarity with NCBI database. Thus, the current study is the first report to document the existence of *O. punctatus* and *O. ferox* in Vellar Estuary. Further research is warranted to bring more new fish fauna in this estuarine system.

**Conflict of interest**

All the authors declare that, there is no conflict of interest.

**Acknowledgements**

The authors are grateful to the Dean and the Director, Faculty of Marine Sciences for constant encouragement and the authorities of Annamalai University for the facilities. M. T. is acknowledging the Ministry of Environment, Forests and Climate Change, New Delhi for financial support in the form of research project (F. No. 22018-30/2019-CS (Tax).

**References**

**Breder, C.M. and Rosen, D.E., 1966.** Modes of reproduction in fishes. T.F.H. Publications, Neptune City, New Jersey. 941P.

**Chakraborty, P., K. Yardi, and Sindha, P., 2020.** New record of two Combtooth blennies, *Omobranchus zebra* (Bleeker 1868) and *Omobranchus smithi* (Rao 1974) (Blenniiformes: Blenniidae) from West Bengal, India with a key to species of Omobranchus from India. *Fish Taxa* 18, 22-29.

**Dutt, S. and Visweswara Rao, V., 1961.** On the breeding habits and early developmental stages of *Petroscirtes bipunctatus* (Day). *Journal of Zoological Society of India* 12, 158-161.

**Eschmeyer, W.N., Fricke, R. and Laan, R. Van der., 2022.** Catalog of Fishes: Genera, Species,References. http://researcharchive.calacademyorg /research.ichthyology/catalog/fishcat main.asp.

**Froese, R. and Pauly, D., 2019.** FishBase. World Wide Web electronic publication. www.fishbase.org.(Accessed on 8 December 2021).

**Gerhardinger, L.C., M.O. Freitas, A.B. Andrade, and Rangel, C.A., 2006.** *Omobranchuspunctatus* (Teleostei: Blenniidae), an exotic blenny in the Southwestern Atlantic. *Biological Invasions*, 8, 941–946.

**Golani, D., 2004.** First record of the Muzzled Blenny (Osteichthyes: Blenniidae: *Omobranchus punctatus*) from the Mediterranean, with remarks on ship-mediated fish introduction. *Journal of the Marine Biological Association of the UK*, 84, 851–852.

**Gopalakrishnan, A., P.R. Divya, V.S. Basheer, T.R. Swaminathan, A. Kathirvelpandian, K.K. Bineesh, R. G. Kumar, and Jena, J.K., 2012.** Macro Flora and Fauna of the Gulf of Mannar- a checklist.National Bureau of Fish Genetic Resources, Lucknow, U.P., India. 127 P.

**Gopi K.C. and Mishra, S.S., 2015.** Diversity of marine fish of India. *In*: K. Venkataraman, C. Sivaperuman (Eds.). Marine Faunal Diversity in India. Taxonomy, Ecology and Conservation. *Elsevier Publ., Amsterdam*, pp171-193.

**Hastings, P.A. and Springer, V.G., 2009.** Systematics of the Blenniidae (Combtooth Blennies). pp. 69-91. In Patzner, R.A., E.J. Gonçalves, P.A. Hastings and B.G. Kapoor (eds.) The biology of blennies. Enfield, NH: Science Publishers, 482P.

**Joshi, K. K., Sreeram, Miriam Paul, P.U. Zacharia, E. Abdussamad, M. Varghese, O. Habeeb, K. Jayabalan, P. Kanthan, K. Kannan, K. Sreekumar, G. George, and Shaji, V., 2016.** Check list of fishes of the Gulf of Mannar Ecosystem, Tamil Nadu, India. *Journal of the Marine Biological Association of India*, 58, 34-54. http://doi.10.6024/jmbai.2016.58.1.1895-05

**Kuiter, R.H., 1993.** Coastal fishes of south-eastern Australia. University of Hawaii Press. Honolulu, Hawaii. 437 P.

**Lasso-Alcalá, O.M., C.A. Lasso, and Posada, J., 2008.** Especiesexóticasenel Mar Caribe: Introducción de *Omobranchus punctatus* (Valenciennes, 1836) (Perciformes, Blennidae) enlas Costasde Venezuela. *In*: Proceedings of the Sixty First Annual Gulf and Caribbean Fisheries Institute. Gulf and Caribbean Fisheries Institute, Guadaloupe, pp. 391–395.

**Mehraban and Esmeili, 2018.** Comb-tooth blennies of the intertidal zones of Persian Gulf and Makran Sea: Morphology, taxonomy, distribution and conservation status (Blenniiformes: Blenniidae). *Iranian Society of Ichthyology*, 5(**3**), 192-211. https://doi.org/10.22034/iji.v5i3.295.

**Mitra, S., A.K. Mukherjee, T.K. Chatterjee, and Ramakrishna, 1997.** Note on an intertidal fish, *Petroscirtes variabilis* Cantor (Pisces: Blenniidae) from Digha coast of West Bengal. *Proceedings of the 84th Indian Science Congress, Delhi*. 100P.

**Mogalekar, H.S., C. Johnson, D. S. Patadiya, and Chandran, S., 2018.** Marine and estuarine fish fauna of Tamil Nadu, India. *Proceedings of the International Academy of Ecology and Environmental Sciences*, 8(**4**), 231-271.

**Munro, I.S.R., 1955.** Eggs and larvae of the sabretoothed oyster blenny, *Dassonsteadi* (Whitley) (Blenniidae). *Australian Journal of Marine and Freshwater Research*, 6(**1**), 30-34.

**Sambrook, J., Fritsch, E.R. and Maniatis, T., 1989.** Molecular Cloning: A Laboratory Manual (2nded.). Cold Spring Harbor, NY: Cold Spring Harbor Laboratory Press.

**Springer, V.G. and Gomon, M.F., 1975.** Revision of the blenniid fish genus *Omobranchus*with descriptions of three new species and notes on other species of the tribe Omobranchini. *Smithsonian Contributions to Zoology* 177, 1-135.

**Springer, V.G., 1972.** Synopsis of the Tribe Omobranchini with descriptions of three new genera and two new species (Pisces: Blenniidae). *Smithsonian Contributions to Zoology*, 130, 1–31.

**Thomson, J.M. and Bennett, A.E., 1953.** Parental care of the eggs and the early larvae of the oyster blenny, *Omobranchus anolius* (Valenciennes) (Blenniidae). *Marine and Freshwater Research*, 4, 227–233.

**Ward, R.D., T.C. Zemlac, B.H. Innes, P.R. Last, and Hebert, P.D.N., 2005.** DNA barcoding Australia's fish species. *Philosophical Transactions of Royal Society B*, 360, 1847–1857.

**Watson, W., 2009.** Larval development in blennies. pp. 309-350. In: Patzner, R.A., E.J. Gonçalves, P.A. Hastings and B.G. Kapoor (eds.). The biology of blennies. Science Publishers, Enfield, NH, USA. 482P.

**Yamamoto, M.N. and Tagawa, A.W., 2000.** Hawaii's Native and Exotic Freshwater Animals. Yang, Z. (ed), Mutual Publishing, Honolulu, 200P.