



Gymnothorax zonipectis Seale, 1906 (Anguilliformes: Muraenidae) - an addition to the Eel Fauna of Andaman and Nicobar Islands and India

P. T. Rajan¹, Johann Bharucha², K. K. Bineesh¹ and S. S. Mishra^{3*}

¹Zoological Survey of India, Andaman and Nicobar Regional Centre, Port Blair - 744102, Andaman and Nicobar, India

²SCUBA explorer, Neil Island, Andaman and Nicobar Islands, India

³Marine Fish Section, Zoological Survey of India, Kolkata, 700016, West Bengal, India; subhrendumishra@gmail.com

Abstract

A moray eel species, *Gymnothorax zonipectis* Seale, 1906, is reported for the first time from India based on photographic evidence from Neil Island, Andaman and Nicobar Islands, and expands its geographical distribution further westward. The description, habitat ecology and distributional range of the eel also provided establishing its first record from India. An annotated checklist of moray eels from these islands is also appended.

Keywords: Andaman Islands, *Gymnothorax zonipectis*, Muraenidae, New record

Introduction

Andaman and Nicobar Islands situated in the Bay of Bengal between 6° 45' -13° 45' N and 92° 10' -94° 15' E consists of 572 islands, islets and rocks and covers a distance of almost 750 km North-South with a coastline of 1962 km, and bring in for India, an Exclusive Economic Zone (EEZ) of 600 thousand km. Moray eels are common inhabitants of coral reefs, but most species are cryptic. The family Muraenidae contains about 16 genera and 200 species worldwide and represented by 10 genera and 38 species in India (Gopi and Mishra, 2015). During last three years, two species, i.e., *Gymnothorax prolatus* and *Strophidon dorsalis*, have been recorded from north-east coast of India (Mohapatra *et al.*, 2015; Ray and Mohapatra, 2015) and six new species, namely *Gymnothorax mishrai* by Ray *et al.* (2015), *Gymnothorax indicus* by Mahapatra *et al.*, (2016), *Gymnothorax pseudotile* by Mohapatra *et al.*, (2017a), *Gymnothorax visakhaensis* by Mohapatra *et al.*, (2017b), *Gymnothorax odishi* by Mohapatra *et al.*, 2018 and *Enchelycore propinqua* by Mohapatra *et al.*, (2017c), have been described from the east coast of India raising the number of moray eels of India to 45 species.

Blyth (1846) pioneered in reporting 3 moray eels from the Nicobars. However, following several records during last 150 years, Rajan *et al.*, (2013) listed only 18 species under 8 genera from Andaman and Nicobar Islands, missing out *Uropterygius macrocephalus* reported by Menon and Talwar (1973) from Great Nicobar and *Uropterygius micropterus* recorded by Allen and Erdmann (2012). The fish fauna of Andaman and Nicobar Islands is one of the most diverse, since it is zoogeographically isolated from mainland and close to south Asian countries (western Pacific) from where the most numbers of coral reef fishes are derived. The present record of another moray eel, *Gymnothorax zonipectis* Seale, 1906, is an addition to the moray eel constituents of Andaman and Nicobar Islands and forms its first record from India.

Material and Methods

The new record of barred fin moray eel, *Gymnothorax zonipectis* Seale, was observed during field survey, underwater observations and photography in the coral reef ecosystem in Neil Island (11° 50.606' N 93° 00.493' E), Andaman Islands using SCUBA gears. The reefs

* Author for correspondence

are named as Busstop at the observation site, which is of fringing coral reef type, depth ranges to 17m, with sand on both sides with predominately barrel sponges, sea whips and few table coral *Acropora* sp dominate the underwater topography. Identification was mostly comparing photographs of the species at various sources including Allan and Erdmann (2012).

Results and Discussion

The aim of this paper is to list the muraenid eels from Andaman and Nicobar Islands and to describe one newly recorded moray species.

Systematic Account

Phylum CHORDATA
Subphylum VERTEBRATA
Class ACTINOPTERYGII
Order ANGUILLIFORMES
Family MURAENIDAE
Genus: *Gymnothorax* Bloch 1795

Gymnothorax zonipectis Seale, 1906 (Bartail Moray)

Gymnothorax zonipectis Seale, 1906, *Occ. Pap. Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History*, 4(1): 7, Fig. 1 (Tahiti, Society Islands South Pacific).

Gymnothorax zonipectis: Allen and Erdmann, 2012, *Reef fishes of the East Indies*: 95.

Diagnostic characters: Body elongate, devoid of pectoral fin; body depth at gill opening 15 to 20 times in total length; dorsal fin origin on head, nearer to gill opening than rictus of mouth; tail longer than rest of body, preanal length 2.2-2.3 in total length; jaws with a single row of canine teeth anteriorly and small sharp teeth on sides, upper jaw with an inner row of few small canines; roof of mouth with two elongate median canine teeth; vertebrae 122 to 130. Colour usually pinkish-brown with yellow hue ventrally; white bands and blotches on jaws, dark brown band on jaws, dark brown band at rear edge of eye, 2-4 longitudinal rows of dendritic brown blotches on body, and diagonal bands on posterior dorsal and anal fins.

Habitat: Mainly outer slopes in 4-40 m in coral reef areas.

Distribution: East Africa to Micronesia and Marquesas Islands, and Australia to Taiwan; ranges throughout East India region.



Barredtail Moray *Gymnothorax zonipectis* Seale at Neil Island.

Muraenid species reported from Andaman and Nicobar Islands

Blyth (1846) has pioneered the study of fishes from Nicobar Islands with record of three moray eel, viz., *Thaerodontis reticulata*, *Dalophis geometrica* and *Thaerodontis maculata*, which are first ever report of any fish from these group of Islands. Day (1871) listed only 7 species of moray eels. Further, beginning with, many other workers contributed (Day, 1878; Herre, 1940; Herre, 1941; Menon and Talwar, 1973; Talwar, 1990; Devi and Rao, 2003; Rajaram and Nedumaran, 2009; Allen & Erdmann, 2012) to record of ten more species, while recently Rajan *et al.*, (2013) added *Echidna rhodochilus* to the list of muraenids from Andaman and Nicobar Islands. The present record of *Gymnothorax zonipectis* forms the 21st species from these Islands belonging to the family Muraenidae. An annotated list of muraenids so far reported from Andaman and Nicobar Islands is appended herewith.

Family MURAENIDAE

1. *Echidna nebulosa* Ahl, 1789

Muraena nebulosa: Day 1871: 702 (Andaman Islands).

Gymnothorax boschi (Bleeker): Menon & Talwar 1973: 37 (Campbell Bay, Great Nicobar); Talwar 1990: 72 (checklist).

Echidna nebulosa: Herre 1940: 2 (Ross Island, Port Blair); Herre 1941: 338 (checklist); Menon & Talwar 1973: 37 (Galathea Bay, Great Nicobar); Talwar, 1990: 72 (checklist); Rao *et al.*, 2000: 59 (Little Andaman, Havlock Is., Chidiyatapu, Rutland Is., South Andaman; Narcondam Is., North Andaman); Devi & Rao 2003: 6 (Andaman Islands); Rao, 2003: 79 (A & N Islands); Rajaram & Nedumaran 2009: 168 (Great Nicobar); Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

2. *Echidna rhodochilus* Bleeker, 1863

Echidna rhodochilus: Rajan *et al.*, 2013: 51 (checklist).

3. *Gymnomuraena zebra* Shaw, 1797

Echidna zebra: Herre 1940: 2 (Ross Island, South Point, Port Blair); Herre 1941: 338 (checklist); Talwar 1990: 72 (checklist); Rao *et al.*, 2000: 59 (Port Blair, South Andaman).

Gymnomuraena zebra: Rao, 2003: 80 (A & N Islands); Rao, 2009: 336 (checklist); Ramakrishna *et al.* 2010: 49 (checklist); Rajan *et al.* 2013: 51 (checklist).

4. *Gymnothorax favagineus* Bloch & Schneider, 1801

Thaerodontis reticulata McClelland: Blyth 1846: 378 (Nicobars).

Muraena tessellate, Day 1871: 702 (Andaman Islands).

Gymnothorax favagineus: Herre 1941: 338 (checklist); Talwar 1990: 72 (checklist); Rao 2003: 80 (A & N Islands); Rao 2009: 336 (checklist); Ramakrishna *et al.* 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

5. *Gymnothorax fimbriatus* Bennett, 1831

Muraena fimbriata: Day 1878: 670, 674 (Andamans); Day 1889(I): 79 (Andamans).

Gymnothorax fimbriatus: Rao *et al.* 2000: 60 (Port Blair, Rutland Is., South Andaman; Outram Is., Narcondam Is., North Andaman; Harmander Bay, Little Andaman); Rao, 2003: 81 (A & N Islands); Rajan & Dam Roy, 2004: 124 (A & N Islands); Devi & Rao, 2007: 16 (A & N Islands);

Rajaram & Nedumaran 2009: 168 (Great Nicobar); Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist); Ray *et al.*, 2013: 23 (North Bay Reef).

6. *Gymnothorax flavimarginatus* Ruppell, 1830

Muraena flavomarginata: Day 1871: 702 (Andaman Islands).

Gymnothorax flavimarginatus: Herre 1941: 338 (checklist); Rao *et al.*, 2000: 61 (Rutland Is., South Andaman; Harmander bay, Little Andaman); Talwar 1990: 72 (checklist); Devi & Rao, 2003: 7 (Andaman Islands); Rao 2003: 81 (A & N Islands); Rajaram & Nedumaran 2009: 168 (Great Nicobar); Rao 2009: 336 (checklist); Ramakrishna *et al.* 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist); Ray *et al.* 2013: 23 (North Bay Reef).

7. *Gymnothorax javanicus* Bleeker, 1859

Gymnothorax javanicus: Devi & Rao 2003: 7 (Andaman Islands); Rao, 2003: 82 (A & N Islands); Rao 2009: 336 (checklist); Ramakrishna *et al.* 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

8. *Gymnothorax pictus* Ahl, 1789

Muraena picta: Day 1871: 702 (Andaman Islands).

Siderea picta (Ahl): Talwar 1990: 72 (checklist); Rao *et al.*, 2000: 63 (Rutland Is., South Andaman; Outram Is, Narcondam Is., North Andaman; South Bay, Little Andaman); Rajaram & Nedumaran 2009: 168 (Great Nicobar); Rajan *et al.*, 2013: 51 (checklist).

Gymnothorax pictus: Herre 1941: 339 (checklist); Rao, 2003: 82 (A & N Islands); Rajaram & Nedumaran, 2009: 168 (Great Nicobar); Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist).

9. *Gymnothorax richardsonii* Bleeker, 1852

Gymnothorax richardsonii: Herre 1941: 339 (checklist); Talwar 1990: 72 (checklist); Rao *et al.*, 2000: 61 (Rutland Is., South Andaman; Narcondam Is., North Andaman); Rajaram & Nedumaran, 2009: 168 (Great Nicobar);

Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

10. *Gymnothorax rueppelliae* McClelland, 1845

Muraena ruppellii: Day 1871: 702 (Andaman Islands).

Muraena ruppelli: Day 1878: 667 (Andamans).

Muraena rueppellii: Day 1889(I): 77, 78 (Andamans).

Gymnothorax ruppelli: Herre 1941: 339 (checklist).

Gymnothorax rueppelliae: Talwar 1990: 72 (checklist); Rao *et al.* 2000: 62 (Rutland Is., South Andaman; Outram Is.); Rao, 2003: 83 (A & N Islands); Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

11. *Gymnothorax thyrsoideus* Richardson, 1845

Dalophis geometrica (non Ruppell): Blyth 1846: 378 (Nicobars).

Muraena thyrsoidea: Day 1878: 667, 672 (Andamans); Day, 1889(I): 81, 82 (Andamans).

Gymnothorax thyrsoidea: Herre 1941: 339 (checklist); Talwar, 1990: 72 (checklist).

Gymnothorax thyrsoideus: Rao 2003: 83 (A & N Islands); Rao, 2009: 336 (checklist); Ramakrishna *et al.* 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

12. *Gymnothorax tile* Hamilton, 1822

Thaerodontis maculata (McClelland): Blyth 1846: 378 (Nicobars).

Lycodontis tile: Kamla Devi 1991: 101 (checklist).

Gymnothorax tile: Devi & Rao, 2007: 16 (A & N Islands); Rao, 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Allen & Erdmann, 2012: 94 (Andaman Islands); Rajan *et al.*, 2013: 51 (checklist).

13. *Gymnothorax undulatus* Lacepede, 1803

Muraena undulate Lacepede: Day 1871: 702 (Andaman Islands).

Gymnothorax undulatus: Herre 1940: 2 (Chatham, Port Blair); Herre 1941: 339 (checklist); Rao *et al.*, 2000: 62 (Chidiyatapu, South Andaman); Talwar, 1990: 72 (checklist); Devi and Rao, 2003: 7 (Andaman Islands); Rao 2003: 84 (A & N Islands); Rajan and Dam Roy, 2004: 124 (A & N Islands); Devi and Rao, 2007: 17 (A & N Islands); Rao, 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

14. *Rhinomuraena quaesita* Garman, 1888

Rhinomuraena quaesita: Rajaram & Nedumaran 2009: 168 (Great Nicobar); Rao, 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

15. *Scuticaria tigrina* Lesson, 1828

Scuticaria tigrina: Herre 1941: 339 (checklist); Rao 2003: 84 (A & N Islands); Rao 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

Uropterygius tigrinus: Talwar, 1990: 72 (checklist); Rao *et al.*, 2000: 64 (Port Blair, Ross Island, South Andaman).

16. *Strophidon sathete* Bleeker, 1854

Muraena macrurus Bleeker: Day 1871: 702 (Andaman Islands).

Evenchelys macrurus: Herre 1941: 338 (checklist).

Thyrsoidea macrura: Talwar 1990: 72 (checklist); Devi and Rao, 2007: 17 (A & N Islands).

Strophidon sathete: Rao, 2009: 336 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

17. *Uropterygius concolor* Ruppell, 1838

Uropterygius concolor: Talwar 1990: 72 (checklist); Rao *et al.*, 2000: 63 (Hut Bay, Little Andaman); Rao 2003: 85 (A & N Islands); Rajan and Dam Roy, 2004: 124 (A & N Islands); Devi & Rao, 2007: 18 (A & N Islands); Rao, 2009: 337 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

18. *Uropterygius marmoratus* Lacepede, 1803

Gymnomurana marmorata: Day 1878: 674 (Andamans); Day 1889(I): 85 (Andamans).

Uropterygius marmoratus: Herre 1939: 328, 330 (South Corbyn Cove, Port Blair); Herre, 1940: 2 (South Point, Port Blair); Herre, 1941: 339 (checklist); Menon and Talwar, 1973: 38 (Campbell Bay, Great Nicobar); Talwar, 1990: 72 (checklist); Rao *et al.*, 2000: 64 (Chidiyatapu, South Andaman); Rao 2003: 85 (A & N Islands); Rajaram and Nedumaran, 2009: 168 (Great Nicobar); Rao, 2009: 337 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist); Rajan *et al.*, 2013: 51 (checklist).

19. *Uropterygius macrocephalus* Bleeker, 1864

Uropterygius macrocephalus: Menon and Talwar 1973: 37 (Campbell Bay, Great Nicobar); Talwar, 1990: 72

(checklist); Rao, 2009: 337 (checklist); Ramakrishna *et al.*, 2010: 49 (checklist).

20. *Uropterygius micropterus* Bleeker, 1852

Uropterygius micropterus: Allen and Erdmann, 2012: 99 (Andaman Islands).

Acknowledgements

Thanks to Dr Kailash Chandra, Director, Zoological Survey of India, Kolkata and Dr C. Sivaperuman, Officer-in-Charge, Zoological Survey of India, Port Blair for facilities and encouragement to undertake this study. Thanks to Dr. J. E. Randall Bishop Museum, Hawaii, USA, for the preparation of the manuscript by sharing his knowledge.

References

- Allen, G.R. and Erdmann, M.V. 2012. *Reef fishes of the East Indies*. Tropical Reef Research, Perth, Australia, Volume I: 1-424.
- Blyth, E. 1846. Notes on the fauna of Nicobar Islands. *J. Asiat. Soc. Bengal*, 15: 367-379.
- Day, F. 1871. On the fishes of the Andaman and Nicobar Islands. *Proc. Zool. Soc. London*, 1870: 677-705.
- Day F., 1878. *The fishes of India, being a Natural History of the fishes known to inhabit the seas and freshwater of India, Burma and Ceylon*. William Dawson, London. Part 4: i-xx + 553-778, 139-195 pls.
- Devi, Kamla and Rao, D.V. 2003b. Poisonous and venomous fishes of Andaman Islands, Bay of Bengal. *Rec. zool. Surv. India, Occ. Paper*, 211: 1-71.
- Herre, A.W.C.T. 1940. On a collection of littoral and freshwater fishes from the Andaman Islands, Supplement. *Rec. Indian Mus.*, 41: 1-8.
- Herre, A.W.C.T. 1941. List of the fishes known from the Andaman Islands. *Mem. Indian Mus.*, 13(3): 331-403.
- Menon, A.G.K. and Talwar, P.K. 1973. Fishes of the Great Nicobar Expedition, 1966, with a description of a new gobioid fish of the family Kraemeriidae. *Rec. zool. Surv. India*, 66(1-4): 35-61.
- Rajan, P.T., Sreeraj, C.R. and Immanuel, T. 2013. Fishes of Andaman and Nicobar Islands: A Checklist. *J. Andaman Sci. Assoc.*, 18(1): 47-87.
- Gopi, K.C. and Mishra, S.S. 2015. Diversity of marine fish of India. In, Venkataraman, K. and Sivaperuman, C. (eds.), *Marine Faunal Diversity in India: Taxonomy Ecology and Conservation*. Academic Press, Elsevier Inc., USA: 171-193.
- Menon, A.G.K. and Talwar, P.K. 1973. Fishes of the Great Nicobar Expedition, 1966, with a description of a new gobioid fish of the family Kraemeriidae. *Rec. zool. Surv. India*, 66(1-4): 35-61.
- Mohapatra, A., Ray, D., & Smith, D. 2015. First occurrence of the moray eel *Gymnothorax prolatius* Sasaki & Amaoka, 1991 (Teleostei: Anguilliformes: Muraenidae) from the northern Indian Ocean. *Marine Biodiversity Records*, 8: e106 (1-3 pp) doi: 10.1017/S1755267215000834
- Mohapatra, A., Ray, D., Smith, D.G. and Mishra, S.S. 2016. A new species of elongate unpatterned moray eel of the genus *Gymnothorax* (Muraenidae: Muraeninae) from the Bay of Bengal. *Zootaxa*, 4150(5): 591-598. <https://doi.org/10.11646/zootaxa.4150.5.6>.
- Mohapatra, A., Smith, D.G., Ray, D., Mishra, S.S. and Mohanty, S.R. 2017a. *Gymnothorax pseudotile* sp. nov. (Muraenidae: Muraeninae) from Bay of Bengal, India. *Zootaxa*, 4286(4): 586-592. <https://doi.org/10.11646/zootaxa.4286.4.11>.
- Mohapatra, A., Smith, D.G., Mohanty, S.R., Mishra, S.S. and Tudu, P.C. 2017b. *Gymnothorax visakhaensis* sp. nov., a new species of elongate unpatterned moray eel (Muraenidae: Muraeninae) from the Indian Coast. *Zootaxa*, 4300(2): 279-286. <https://doi.org/10.11646/zootaxa.4300.2.9>

- Mohapatra, A., Smith, D.G., Mohanty, S.R., Mishra, S.S. and Tudu, P.C. 2017c. *Enchelycore propinqua* sp. nov., a new moray eel (Anguilliformes: Muraenidae: Muraeninae) from the Indian Coast. *Zootaxa*, **4319**(3): 595-599. <https://doi.org/10.11646/zootaxa.4319.3.11>.
- Mohapatra, A., Mohanty, S.R., Smith, D.G., Mishra, S.S. and Roy, S. 2018. *Gymnothorax odishi* sp. nov. (Muraenidae: Muraeninae), a short brown unpatterned moray eel from Bay of Bengal, India. *Zootaxa* **4420**(1): 123-130. <https://doi.org/10.11646/zootaxa.4420.1.7>
- Rajaram, R. and Nedumaran, T. 2009. Ichthyofaunal diversity in Great Nicobar Biosphere Reserve, Bay of Bengal. *Journal of Threatened Taxa*, **1**(3): 166-169.
- Ray, D. and Mohapatra, A. 2015. First record of the moray eel *Gymnothorax dorsalis* Seale, 1917 (Anguilliformes: Muraenidae) from Indian waters. *Indian J. Fish.*, **62**(4): 132-134.
- Ray, D., Mohapatra, A. and Smith, D.G. 2015. A new species of short brown unpatterned moray eel of the genus *Gymnothorax* (Anguilliformes: Muraenidae) from the Bay of Bengal. *Zootaxa*, **4027**(1): 140-144. <http://dx.doi.org/10.11646/zootaxa.4027.1.8>
- Talwar, P.K. 1990. Fishes of the Andaman and Nicobar Islands: A Synoptic analysis. *J. Andaman Sci. Assoc.*, **6**(2): 71-102.