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ORGINAL ARTICLE

Occurrence of two vulnerable butterfly rays *Gymnura micrura* (Bloch & Schneider, 1801) and *Gymnura poecilura* (Shaw, 1804) (Myliobatiformes: Gymnuridae) in the northern Arabian Sea, Pakistan, Indian Ocean region

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Abstract
Batoid fishes, an ionic group commonly known as rays are universally vulnerable and some of them critically endangered owing to fisheries related activities. This study validates presence of two vulnerable butterfly rays, *Gymnura micrura* and *Gymnura poecilura* captured in the northern Arabian Sea coast of Pakistan, Indian Ocean for the first time. The IUCN listed both of the species as vulnerable whereas FishBase recorded Atlantic and Pacific Ocean as their native habitats. These rare species of the family Gymnuridae are now added in the ichthyofaunal diversity of Pakistan. The detailed taxonomic description and an image of each species are provided.

Keywords: New record, Vulnerable fishes, Taxonomy, IUCN red list, Pakistan waters.

INTRODUCTION

Smooth butterfly ray, *Gymnura micrura* (Bloch & Schneider, 1801) is well distributed in Western Atlantic; (northern USA to Brazil) and possibly Eastern Atlantic (Senegal to Angola) now in Indian ocean from Arabian Sea Coast Pakistan, and the long tail butterfly rays, *Gymnura poecilura* (Shaw, 1804) has been being reported from Indo-West Pacific; Red Sea to Shanghai, China (including Indonesia and Malaysia) (Yokota et al. 2017); Fishbase (2021). Both are benthic inshore, primarily on sandy and muddy substrates to a depth of at least 30 m. Diet consists mainly of bony fishes with evidence of feeding specialization; may ingest proportionally very large fishes (Yokota et al. 2017). This is up to date valid report on the occurrence of *G. micrura* is limited to Western Atlantic. A recent plight taxonomic revival on batoids fishes all around the world has risen in the description of numerous new species and has amplified to determine the species complexes (Last et al. 2016). Several new batoids species, distributional range extensions, rare species have been continuously reported (Kizhakudan et al. 2018). Order Myliobatiformes contain 12 families of cartilaginous fishes, in this paper we were discus only one family Gymnuridae, which consist of 12 species Fricke et al. (2022).

Smooth butterfly ray (*G. micrura)* and long-tailed butterfly ray (*G. poecilura)* are shallow Sea, sub tidal aquatic beds; estuarine water and coastal saline lagoons are the habitat of these fishes. These sanctuary fishes are basically benthic and are distributed across continental platforms in the Atlantic, Pacific, and some of species from Indian Oceans. These may differ from remaining rays fishes which exhibit a wide disc more than 1.5 times wider than longer, a short tail (Nelson et al. 2016), and a flat butterfly body. Mostly of these species may swim with wave motion, as observed in dasyatids, urotrygonids, and potamotrygonids, but oscillatory movements predominate, as observed in myliobatoids (Schaefer & Summers 2005).

In Pakistan merely one species has been reported belongs to genus *Gymnura* family which is lacking detailed taxonomic description (Fatima et al. 2016; FAO 2015) another batoids species *Narcine oculifera* has recently added in ichyofaunal diversity for the first time in Pakistan, Shaikh & Panhwar (2021). Recently Moazzam & Osmany (2021) gathered information on Myliobatiformes but did not provide detailed

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information. This study aims to provide detailed taxonomic description and validate presence of two vulnerable ray species sampled from commercial catches at Gwadar and Pasni, Balochistan.

Species descriptions

Gymnura micrura (Bloch & Schneider, 1801)

Smooth butterfly ray belongs to family Gymnuridae inhabitation marine, brackish and demersal waters at the depth of 55m. This species is distributed from Southwestern Atlantic: Venezuela, including Trinidad and Tobago, to Brazil (Fishbase 2021). It is now reported for the first time from Indian Ocean, Arabian Sea coast of Pakistan. Body shape broad, diamond-shaped with a very short tail lacking a dorsal spine (Smith, 1997). Tail with five irregular black and white pairs of clear dots (Personal Investigation) showing clear distinguished from *Gymnura poecilura* and others species of this genus, which was reported from Indian Ocean, but *Gymnura micrura* reported from first time in this area. Snout protruding with mouth about 1.3cm, front edges of disk concave, tail with low dorsal and ventral fin folds and 3-4 dark crossbars (Robins & Ray 1985), Upper surface gray, brown, light green or purple with round spots, lower surface white and light brown. The mature male *G. micrura* are known to develop longer, more acutely pointed snouts than their female counterparts. Prefers neritic waters of the continental shelf and usually found on soft bottoms. May enter brackish estuaries or hyper-saline lagoons, feeds on small fishes and shrimps, other crustaceans and clams, generally marketed salted. Ovoviviparous, exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialised structures (Dulvy & Reynolds 1997). *Gymnura micrura* species is near to threatened the IUCN Red list (IUCN 2021; Dulvy et al. 2021).

Gymnura poecilura (Shaw, 1804)

Commonly called as Long-tailed butterfly ray inhabiting marine, demersal, found from Indo-Pacific: Persian Gulf (Carpenter et al. 1997), Red Sea to French Polynesia, and north to Japan. Found on sandy bottoms of shallow inshore waters and offshore banks (Sommer et al. 1996). Ovoviviparous, Feeds mainly on crustaceans and clams (Carpenter et al. 1997). Basically catch through demersal trawls and occasionally by trammel nets. Catch to utilized for its meat, but of limited value due to its typically small size (White et al. 2006). Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialised structures (Dulvy & Reynolds 1997). Distinct pairing with embrace, Gives birth to litters of up to 7 pups; born at 24-26 cm WD (White et al. 2006). *Gymnura poecilura* species is listed in IUCN Red List Status for Vulnerable (IUCN 2021; Sherman, et al. 2021).

Remarks: This species is reported earlier from Indian Ocean (Fatima et al. 2016) but its current status appeared to be vulnerable listed by IUCN (2021). Therefore, it is necessary to update its current status globally.

MATERIAL AND METHODS

A specimen of *G. micrura* (Fig. 1 A~B) was collected from commercial catches at Gwadar fish harbour (Balochistan) on 24 November 2021 whereas *G. poecilura* (Fig. 1 C~D) was collected from Pasni Balochistan (N 25^0 07.610'- E 063^0 51.282') coast which is considered as home of the rays fishes (Fig. 2). Specimens were brought to the Fishery Biology Laboratory, Centre of Excellence in Marine Biology, University of Karachi, where identification and measurements were taken. Identification of each specimen was made using FAO field guide of fish species (Psomadakis et al. 2015), Fishbase and WoRMS (Froese & Pauly 2021; Fricke et al. 2021).

RESULTS

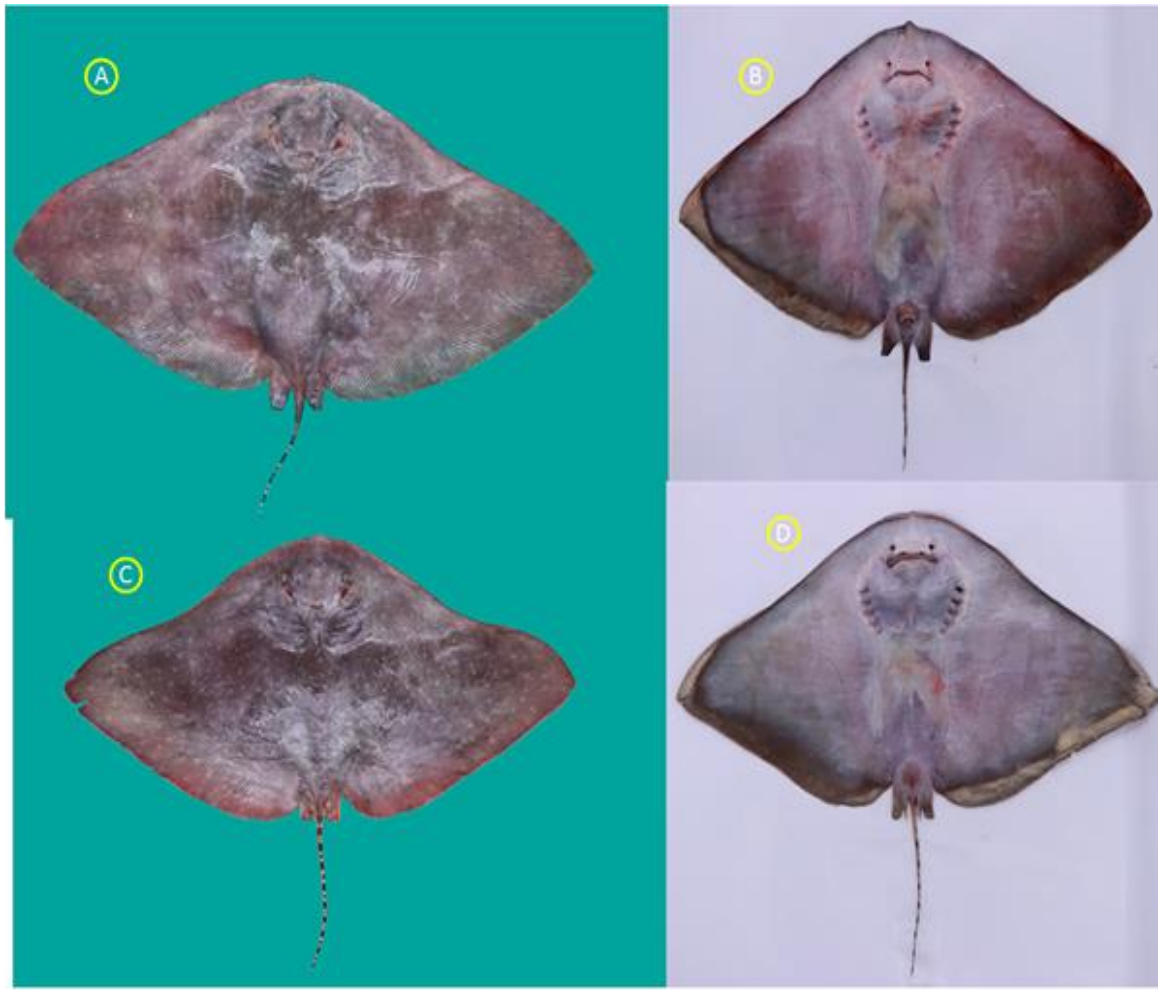

Fig.1. A~B dorsal and ventral view of *Gymnura micrura* and C~D *Gymnura poecilura* sampled from Gwadar and Pasni respectively.

In November 2021 major fish landing facilities of the Balochistan coast including Jiwani, Gwadar and Pasni were surveyed. During the survey two vulnerable butterfly rays, *Gymnura micrura* and *Gymnura poecilura* was opportunistically collected from commercial catches at Jiwani and Pasni respectively. All taxonomic characters, morphometric and meristic measurements were recorded using information available in Fishbase, FAO field identification guide and WoRMS (Table 1).

Gymnura micrura species has the typical combination of diagnostic features of *G. poecilura* but having disc and tail are differentiating, including a broad diagonal band of large black and white dots from the upper and lower edge of tail. Fishes identification is the main toll in fisheries science, there are bunch of methods to identified fishes like morphometric measurements, meristic counts, through otoliths shapes variation, swim bladder position and shape, through gill rakers and arches, molecular bar coding so on. Lack of otoliths in Batoids fishes made them intricate to identification.

DISCUSSION

Unusual appearance of aquatic organism is common and assumed to be affected by the ecological stresses or fluctuation of water parameters like water temperature, low or high salinity and currents made by large cargo ships wandering globally. In this study we assumed that presences of *G. micrura* in Pakistan could possibly transported into Indian Ocean region by the transportation of large cargo ships. Limited research has been documented on Batoid fishes in Pakistan with exception of (Fatima et al. 2016) recorded merely one species of the family Gymnuridae. However, population of ray fishes is

Table 1. Summary of morphometric measurements (in cm) recorded for *Gymnura micrura* and *Gymnura poecilura* sampled along the Balochistan coast.

Measurements	***G. micrura***	***G. poecilura***
Total length	24.6	25
Standard length	17	15.2
Disk length	33.5	31
Total width	65	60
Eye diameter	0.8	0.7
Gap between eyes	2.9	2.3
Snout length	1.1	1
Spiracle length	1.3	1.1
Mouth length	4	3.8
Mouth width	1.6	1.6
Tail length	7	9.4
Tail bands	5+5	10+12
Gill opening roundness	0.9	0.6

Fig.2. Bulk of rays being landed at Jiwani fish landing facility along Balochistan coast being considered as the home of rays in Pakistan.

drastically declining due to over fishing and pollution. The rays have been sold at low price is due to meager consumption and religious limitation in Pakistan (Fatima et al. 2016).

Identification of elasmobranches (Batoids) is often as difficult, as there are moderately few external features on which dissimilarity may be based. The colour is limited supporting and being often drab or else variable within one species. Most characters change significantly during growth (Vossoughi &

Vossoughi, 1999). *G. micrura* is distributed from Southwestern Atlantic: Venezuela, including Trinidad and Tobago, to Brazil Fishbase (2021). Due to heavy Cargo ships' transportation which made high levels of currents in water is possibly cause of migration to this species in Indian Sea at the region of Arabian Sea Coast of Pakistan. In addition to, *G. micrura* was not reported previously from these regions. *G. micrura* are red-listed as 'data deficient' in remaining of the regions including Gulf of Mexico (Grubbs & Ha 2006).

Present study document presence of two butterfly rays inhabiting coastal areas within the geographical region of Pakistan. It is noted that Elasmobranchs a group of untargeted fishes that usually caught as bycatch whereas their derivatives often used in different products to be used in medicinal purpose. According to Seret (2006) their trade becomes attractive globally. Nevertheless, it is primary obligation of every country to protect biodiversity to avoid overharvest of the species for the sake of sustainability. In this regards, it is necessary to update species status and the composition with reliable scientific data. This has profound implications for implementing appropriate conservation strategies. Generally, migratory patterns of fishes are related to oceanographic factors and the currents where their eggs, larvae, and young drift passively with the current, although migration of adult fish toward breeding grounds is usually against the current. Study population biology, ecology and environmental impacts on aquatic organisms particularly bycatch species such as rays should be prioritizing to mitigate extinct challenges particularly in the developing countries.

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REFERENCES

Carpenter, K.E.; Krupp, D.A.; & Zajonz, U. 1997. Living marine resources of Kuwait, eastern Saudi Arabia, Bahrain, Qatar, and the United Arab Emirates. FAO species identification field guide for fishery purposes. Col. Plates. Rome, FAO. 293 p +17

Dulvy, N.K. & Reynolds, J.D. 1997. Evolutionary transitions among egg-laying, live-bearing and maternal inputs in sharks and rays. Proceeding of Royal Society, Biological Sciences 264: 1309-1315.

Dulvy, N.K..; Charvet, P. & Derrick, D. 2021. Gymnura micrura. The IUCN Red List of Threatened Species, (Accession date 14 May 2022).

Fatima, A.; Panhwar, S.K.; Shaikh, W.; Mairaj, M.; Farooq, N. & Jahangir, S. 2016. Preliminary Observations on Elasmobranchs Captured in Pakistan. Journal of Aquaculture and Marine Biology 4(4): 00092.

Fricke, R.; Eschmeyer W.N. & Laan, R. 2022. Catalog of Fishes: Genera, Species, References. http:// researcharchive.calacademyorg/research/ichthyology/catalog/fishcatmain.asp.

Froese, R. & Pauly, D. 2021. FishBase. World Wide Web electronic publication. Available from: www.fishbase.org. (Accessed 09.2021).

Grubbs, R.D. & Ha, D.S. 2006. *Gymnura micrura*. The IUCN Red List of ThreatenedSpecies. Version 2014.3. www.iucnredlist.org (Accessed 31.12.2021.).

IUCN. 2021. The IUCN Red list of threatened Species. (Accessed 3.2021) http://www.iucnredlist.org.

Kizhakudan, S.J.; Akhilesh, K.V.; Thomas, S.; Yousuf, K.S.S.M.; Sobhana, K.S.; Purushottama, G.B.; Menon, M.; Dash, S.S.; Manojkumar, P.P.; Nair, R.J.; Najmudeen, T.M. & Zacharia, P.U. 2018. Field identification of batoids-a guide to Indian species, CMFRI special publication no. 132. ICAR-Central Marine Fisheries Research Institute, Kochi, 104 p.

Last, P.R.; White, W.T.; de Carvalho, M.R.; Séret, B.; Stehmann, F.W. & Naylor, G.J.P. 2016. Rays of the world. Cornell University Press, Ithaca. 790 p.

Moazzam, M. & Osmany, H.B. 2021. Species composition, commercial landings, distribution and conservation of fishes belonging to order Myliobatiformes from Pakistan. Karachi University Journal of Science 49(1): 01-26.

Nelson, J.S.; Grande, T.C. & Wilson, M.V.H. 2016. Fishes of the world. USA: John Wiley and Sons. (5th ed., 92 p).

Psomadakis, P.N.; Osmany, H. B. & Moazzam, M. 2015. *Field Identification Guide to the Living Marine Resources of Pakistan*. FAO Press, Rome.

Robins, C.R. & Ray, G.C. 1986. *A Field Guide to Atlantic*

Coast Fishes of North America. Houghton Mifflin Company, Boston, U.S.A. 354 p.

Schaefer, J.T. & Summers, A.P. 2005. Batoid wing skeletal structure: Novel morphologies, mechanical implications, and phylogenetic patterns. Journal of Morphology 264(3): 298-313.

Seret, B. 2006. Guia de identificacao das principais especies de raias e tubaroes do Atlantico oriental tropical, *para observadores de pesca e biologos*.

Shaikh, W. & Panhwar, S.K. 2021. First record of six marine fish species caught occasionally in the northern Arabian Sea in Pakistan. Journal of Fisheries and Aquatic Life 29: 158-163.

Sherman, C.S.; Akhilesh, K.V.; Bin Ali, A.; Bineesh, K.K.; Derrick, D.; Dharmadi Ebert, D.A.; Fahmi Fernando, D.; Haque, A.B.; Maung, A.; Seyha, L.; Tanay, D.; Tesfamichael, D.; Utzurrum, J.A.T.; Valinassab, T.; Vo, V.Q. & Yuneni, R.R. 2021. Gymnura poecilura. The IUCN Red List of Threatened Species. (Accession date 14 May 2022).

Smith, C.L. 1997. National Audubon Society field guide to tropical marine fishes of the Caribbean, the Gulf of Mexico, Florida, the Bahamas, and Bermuda. Alfred A. Knopf, Inc., New York. 720 p.

Sommer, C.; Schneider, W. & Poutiers, J.M. 1996. FAO species identification field guide for fishery purposes. The living marine resources of Somalia. FAO, Rome. 376 p.

Vossoughi G.H. & Vossoughi, A.R. 1999. Study of batoid fishes in northern part of Hormoz Strait, with emphasis on some species new to the Persian Gulf and Sea of Oman. Indian Journal of Fisheries 46(3): 301-306.

White, W.T.; Last, P.R.; Stevens, J.D.; Yearsley, G.K. & Fahmi, D. 2006. Economically important sharks and rays of Indonesia. [Hiu dan pari yang bernilai ekonomis penting di Indonesia]. Australian Centre for International Agricultural Research, Canberra, Australia.

WoRMS (Ed.). 2021. World Register of Marine Species. Available from http://www.marinespecies.org at VLIZ. (Accessed 07.10.2021).

Yokota, L.; White, W.T. & Carvalho, M.R.de. 2017. Butterfly rays. Family Gymnuridae. 011601 Rays Ch 23-24,27-29,31-32.

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مقاله کامل

حضور دو گونه آسیب‌پذیر پروانه ماهی دم دراز *Gymnura micrura* (Bloch & Schneider, 1801) و *Gymnura poecilura* (Shaw, 1804) (لقمه ماهی سانان: پرتوماهیان پروانه‌ای) در شمال دریای عربی، پاکستان، منطقه اقیانوس هند

کشور کومار کاچی، شیر خان پانوار*، امتیاز کاشانی

مرکز عالی زیست شناسی دریایی، دانشگاه کراچی- ۷۵۲۷۰، سند.

چکیده: سپرماهیان که به‌طور معمول به عنوان سفره ماهیان شناخته می شوند، یک گروه شناخته شده از ماهیان غضروفی هستند که به‌طور جهانی در لیست گونه‌های آسیب‌پذیر قرار گرفته و برخی از آن‌ها به دلیل فعالیت‌های شیلاتی به شدت در معرض خطر هستند. این مطالعه حضور دو گونه پروانه ماهی دم دراز آسیب‌پذیر به نام‌های *Gymnura micrura* و *Gymnura poecilura* را که برای اولین بار در سواحل شمالی دریای عربی پاکستان، اقیانوس هند ثبت شده‌اند، را تایید می‌کند. اتحادیه بین‌المللی حفاظت از طبیعت (IUCN) هر دو گونه را به عنوان آسیب‌پذیر فهرست می‌کند در حالی که FishBase اقیانوس اطلس و اقیانوس آرام را به عنوان زیستگاه بومی آن‌ها ثبت کرد. این گونه‌های نادر از خانواده Gymnuridae اکنون به فون ماهیان پاکستان اضافه شده‌اند. شرح دقیق آرایه‌شناسی و تصویری از هر گونه ارائه شده است.

کلمات‌کلیدی: اولین گزارش، ماهیان آسیب‌پذیر، آرایه‌شناسی، لیست قرمز اتحادیه بین‌المللی حفاظت از طبیعت (IUCN)، آب‌های پاکستان.