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An overview on the Lethrinid species inhabiting the Egyptian Red Sea with the first record of three *Gymnocranius* species (*G. satoi, G. elongatus* and *G. oblongus*)

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ABSTRACT

This paper revised the presence of lethrinid fishes in the Egyptian Red Sea waters and discussed the first record of the black nape wide-eye bream, *Gymnocranius satoi*, forktail large-eye bream *G. elongatus* and *G. oblongus***.** Family Lethrinidae is presented in the Egyptian Red Sea by 14 species and the three *Gymnocranius* species never recorded before in the area. In January 2022, 5 specimens of *G. satoi*, 2 specimens of *G. elongatus* and 7 ones of *G. oblongus* were recorded in the miscellaneous catch at Shalatein landing site on the Red Sea (23°09'08.10"N, 35°36'50.75"E), Egypt. The collected specimens represent the first record of the three species in the Egyptian Red sea waters. The specimens of *G. satoi* have a total length ranging from 24.3 and 29.4 cm and weighed 202 to 350 g total weight. The two specimens of *G. elongatus* have 28.8 and 38.5 cm TL and weighed 370 and 750 g. While the *G. oblongus* total length varied between 24.3 and 27.7 cm and weighed 202 to 290 g. The specimens' morphometric measurements and meristic counts were described. These new findings increased the number of Lethrinid species in the Egyptian Red Sea waters to 17 species.

INTRODUCTION

Studies on biodiversity, community ecology and management of natural resources require precise species level analysis for the accurate assessment of community structure (**Bhadury *et al.*, 2006; Pfenninger *et al.*, 2007 and Valentini *et al.*, 2008**). In addition, fisheries are unsustainable if catch records are based on erroneous or inaccurate species identifications (**Watson & Pauly, 2001; Marko *et al.*, 2004 and Crego *et al.*, 2012**). Accurate species population structure is important for assessing the conservation status of threatened or overexploited species, as well as for developing effective recovery strategy for its management. The emperors or scavengers (family: Lethrinidae) is a commercially important demersal species composed of 5 genera and 42 species (**Fishbase, 2021**). Lethrinids are bottom-feeding, carnivorous, coastal fishes, ranging primarily on or near reefs. They typically feed primarily at night on benthic invertebrates or fishes, those with

molariform teeth mainly on hard-shelled invertebrates. Lethrinids can be solitary or schooling and do not appear to be territorial. They often form large aggregations for pelagic spawning (**Fishbase, 2021**). Lethrinids have a great commercial importance as delicious edible fishes with reasonable prices. In reef areas along the Red Sea coast of Egypt, multi-species artisanal fisheries have been the traditional way to exploit resources. They have focused on fishes of families Lethrinidae, Serranidae, Lutjanidae, Carangidae, Sparidae, Haemulidae, Scaridae and Mullidae (**Mehanna, 1997&2011; Osman, 2015 & 2018; Mohammad, 2016; Mehanna *et al*., 2017; El-Mahdy, 2018 and Mehanna, 2021**). Unfortunately, no published data exist on the exact species composition of these families in the area. The present work was undertaken to follow up the catch composition of family Lethrinidae in the area from Hurghada to Shalatein. This is useful information for biodiversity estimates, conservation issues and sustainable management. Also, the taxonomic studies play an important role in prospecting for new resources especially with the overexploitation situation of the common commercial species.

MATERIALS AND METHODS

Study area

The Egyptian Red Sea coast is about 1080 km extending from Suez in the North to Mersa Halayeb in the South (**Fig. 1**). The mean annual fish production from this vast area did not exceed 40 thousand tons (**GAFRD, 2019**). The main fishing gears operated in this region are trawling, purse-seining and small-scale fishery especially long and hand lining, trammel and gillnets. The fishing grounds along Egyptian Red Sea coast are divided into three main regions namely; Gulf of Suez region (Suez, El-Tor and Hurghada), proper Red Sea (Safaga, Quseir, Baranis, Shalatein and Abo Ramad) and Gulf of Aqaba (**GAFRD, 2019 and Mehanna, 2021**). In between there are many small landing sites like Mersa Alam, Hemaira, Ras Banas and Halayeb.

During routine visits to the different landing sites along the Egyptian Red Sea coast on the period from 2018 to 2022 to follow the catch composition by species and to collect routine samples for different marine species, we recorded 14 lethrinid species inhabiting the area from Hurghada to Shalatein. In January 2022 we observed a strange species (14 specimens) in the commercial catch at Shalatein fishing ground (23°09'08.10"N, 35°36'50.75"E). It was captured among the other unsorted species using trammel nets and lines. The specimens were identified at first for its specific characters to the genus Gymnocranius. The specimens were preserved frozen and transferred to the laboratory for further investigation. According to FAO identification sheets and fishbase web site the specimens were identified as *Gymnocranius satoi* (5 specimens), *G. elongatus* (2 specimens) and *G. oblongus* (7 specimens). Morphometric and meristic characteristics as well as most diagnostic features were recorded and counted with a digital caliper. The following measurements were taken (**Fig. 2**):

1. Total length (TL)
2. Fork length (FL)
3. Standard length (SL)
4. Head length (HL)
5. Head depth (HD)
6. Body depth (BD)
7. Eye diameter (EyD)

8. Snout length (SnL)
9. Dorsal fin base length (DFL)
10. Pectoral fin length (PFL)
11. Anal fin base length (AFL)
12. Distance between the first dorsal fin base and the end anal fin base length (DAFL)
13. Distance between the end dorsal fin base and the first pectoral fin base length (DPFL)
14. Distance between the end dorsal fin base and the first caudal fin base length (DECL)
15. Distance between the end anal fin base and the first caudal fin base length (AECL)
16. Caudal depth (CD)
17. Pre-dorsal fin length (PDFL)
18. Pre-pelvic fin length (PPFL)
19. Pre-anal fin length (PAFL)

Fig. 1. Egyptian coast of Red Sea showing the main fishing grounds

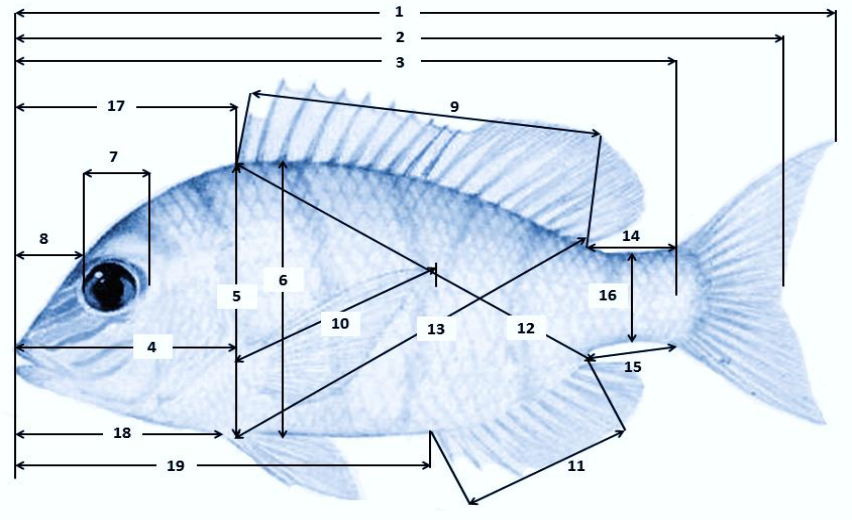


Fig. 2. Different measurements of *Gymnocranius* sp. from Shalatein, Red Sea, Egypt

RESULTS AND DISCUSSION

In many regions of the world, fish stocks are being exploited without much taxonomic assistance. However, it is impossible to develop conservation plans and long-term management without knowing what species are involved, and how to identify them. Lethrinids (emperors) are demersal coastal fishes, ranging primarily on or near reefs to depths of 100-220 m (**Carpenter & Allen, 1989**). In the Egyptian Red Sea, emperors contribute about 24% of the total landings of the artisanal fishery (2000 - 2019) earning about 250 million LE annually. Knowledge of fisheries' resources, their availability, and distribution, is necessary for proper fisheries management.

The current study's findings confirmed that there are 17 lethrinid species (**Table 1 and PLATE I**) belonging to three genera (*Lethrinus*, *Monotaxis* and *Gymnocranius*). In Egyptian Red Sea, seven species are common and abundant, *Lethrinus nebulosus, L. borbonicus, L. mahsena, L. lentjan, L. microdon, L. variegatus* and *Monotaxis grandoculis*. While six species are moderately numerous (*L. xanthochilus, L. harak, L. olivaceus, L. obsoletus, L. conchyliatus* and *Gymnocranius grandoculis*) and four species are uncommon (*L. miniatus, Gymnocranius satoi, G. oblongus* and *G. elongates*). The three *Gymnocranius* species (*Gymnocranius satoi, G. oblongus* and *G. elongates*) are recorded for the first time in the Egyptian Red Sea in this year by the authors. All these species are food fish species and varied from moderate to very high prices.

Table 1. Lethrinid species that recorded in the area from Hurghada to Shalatein, during the period from 2018 to 2022

Fish species			Length range (cm)	Weight range (g)
Latin name	**English name**	**Local name**		
Lethrinus nebulosus	Spangled emperor	Shoor hor	22 – 80	190 - 9250
L. mahsena	Sky emperor	Mahseni	18 – 55	115 - 3800
L. borbonicus	Snubnose emperor	Bungoz	11 – 32	15 - 500
L. lentjan	Pink ear emperor	Sharkas	11 – 51	15 – 1890
L. microdon	Smalltooth emperor	Khomkhom	15 - 63	50 – 2700
L. variegatus	Slender emperor	Derini	11 – 30	15 – 215
L. xanthochilus	Yellowlip emperor	Khomkhom	20 - 70	120– 5745
L. harak	Thumbprint emperor	Harak	12 - 35	25- 630
L. olivaceus	Longface emperor	Khermi	25 - 75	250– 6000
L. obsoletus	Orange-striped emperor	Khermi	25– 90	290 - 14000
L. conchyliatus	Redaxil emperor	Khermi	20 - 60	110 - 2900
L. miniatus	Trumpet emperor	Khermi	14 - 70	30 - 5150
****Gymnocranius satoi***	Blacknape large-eye bream	Kamar	24.3 – 29.4	202 – 350
****G. oblongus***	Redaxil emperor	Kamar	24.3 – 27.7	202– 290
****G. elongatus***	Forktail large-eye bream	Kamar	28.8 – 38.5	370– 750
G. grandoculis	Blue-lined large-eye bream	Kamar	28 - 54	350 - 2000
Monotaxis grandoculis	Humpnose big-eye bream	Shoor Abo Ain	19 - 49	110- 2200

*The new recorded species

Gymnocranius satoi

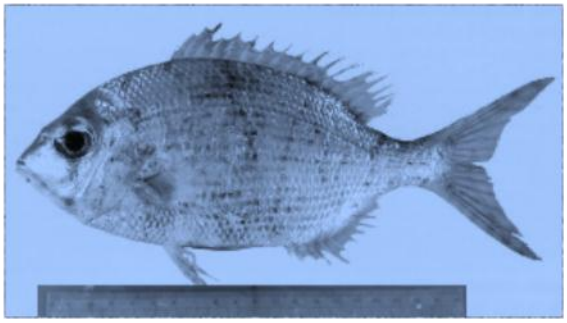
Gymnocranius satoi

Gymnocranius oblongus

Gymnocranius oblongus

Gymnocranius grandoculis

Gymnocranius grandoculis



Gymnocranius elongatus

Gymnocranius elongatus

***Lethrinus borbonicus* (*bungus*)**

Lethrinus lentjan

Lethrinus conchyliatus

Lethrinus xanthochilus

Lethrinus microdon

Lethrinus harak

Lethrinus nebulosus

Lethrinus mahsena

Lethrinus variegatus

Monotaxis grandoculis

Lethrinus olivaceus

Lethrinus obsoletus

Lethrinus miniatus

PLATE 1. Photos of the recorded Lethrinid species from Egyptian Red Sea

Description of the first recorded species

During the monitoring and recording fish landings in the fishing harbors along the Egyptian Red Sea, 17 specimens of *Gymnocranius* spp. were observed among the other mixed species in Shalatein fishing ground. They were identified as *Gymnocranius satoi, G. elongatus* and *G. oblongus* based on the combination of main morphological characters. The detailed description of morphometric and meristic characters of the *Gymnocranius satoi, G. elongatus* and *G. oblongus* was given in **Table (2)**, while some characters of the other recorded species were presented in **Table (3)**.

The taxonomy of large-eye breams of the genus *Gymnocranius* (Lethrinidae: Monotaxinae) is notoriously difficult **(Borsa *et al*., 2009 & 2010)**. **Sato (1986)** recognized six species in this genus, whereas **Carpenter & Allen (1989)** recognized eight species. **Borsa *et al*. (2013)** added new two species and the number of *Gymnocranius* species became ten.

Up to now, 42 species of lethrinid belonging to five genera have been recorded all over the world of which 11 inhabited the Red Sea **(Froese & Pauly, 2022)**. Our findings confirmed the presence of 14 lethrinid species in the Egyptian Red Sea and by January 2022, three new species of the genus *Gymnocranius* were recorded: *G. satoi, G. oblongus* and *G. elongatus.* To our knowledge, these species are firstly documented records in the Egyptian Red Sea. Despite the long research tradition of monitoring the marine fauna in Egypt **(Mehanna, 1997, 1999; Osman, 2015&2018; El-Mahdy, 2018; Mehanna *et al*., 2019** and **Mohammed *et al*., 2022)**, which has provided important biological material for taxonomical studies on fishes, further recent research should be performed. However the present record is a new addition to the family Lethrinidae as well as to the ichthyofaunal diversity of Egypt. Further, it showed significant range expansion of its previously known distribution in the Egyptian Red Sea waters.

Table 2. Morphometric, meristic counts and relative characters of the first recorded species from Shalatein fishing area, Egypt

Parameters*	Measurements (cm)		
	G. satoi	***G. elongatus***	***G. oblongus***
Total length (TL)	24.3 – 29.4	24.3 – 27.7	28.8 – 34.4
Forked length (FL)	21.5 – 26.8	21.5 – 24.6	25.4 – 31
Standard length (SL)	18.5 – 23.7	18.5 – 21.8	21.7 – 26.5
Pre-dorsal fin length (PDL)	7.8 – 9.4	7.8 – 9.1	9.63 – 12.5
Pre-pelvic fin length (PPL)	7 – 8.8	7 – 8.2	8.68 – 11.4
Pre-anal fin length (PAL)	12 – 14.6	12 – 13.8	14.11 – 18.8
Head depth (HD)	7.2 – 9.2	7.2 – 8.2	9.94 – 11.88
Head length (HL)	6.2 – 7	6.2 - 7	7.72 – 9.22

Dorsal fin counts	X+10	X+10	X+10
Anal fin count	III+10	III+10	III+10
Pelvic fin count	I+5	I+5	I+5
Pectoral fin count	12	12 - 13	13-14
Body depth (BD)	8.7 – 10.7	8.7 – 9.7	10.66 – 12.73
Eye diameter (ED)	1.9 – 2.4	1.9 – 2.2	2.8 – 3
Caudal peduncle depth (CPD)	2.5 – 3.1	2.5 – 3.0	3.02 – 3.61
Snout length (SnL)	2.4 – 2.8	2.4 – 2.8	3.01 – 3.60
DAFL	11.5 – 14.3	11.5 – 13.2	13.68 – 17.5
DPFL	10.3 – 12.5	10.3 – 11.7	12.57 – 16.3
DECL	2.8 – 4.5	2.8 – 4.0	3.34 – 5.4
AECL	3.0 – 4.2	3.0 – 3.8	3.58 – 5.2
SL/TL	76 - 81%	76 – 79%	75 – 79%
SL/BD	2.07 – 2.25	2.13 – 2.25	2.03 – 2.22
SL/HL	2.98 – 3.39	2.98 – 3.11	2.81 – 2.97
SL/ED	9.74 – 11.4	9.74 – 9.91	7.75 – 9.86
HL/ED	2.92 – 3.5	3.73 – 3.79	2.76 – 3.34
SL/PDFL	2.37 – 2.52	2.37 – 2.40	2.25 – 2.40
SL/PPFL	2.59 – 2.69	2.64 – 2.66	2.49 – 2.63
SL/PAFL	1.54 – 1.63	1.54 – 1.58	1.53 – 1.60

*****Abbreviations as recorded in materials and methods

Table 3. Some morphometric and meristic characters of lethrinid species inhabiting the Egyptian Red Sea

Species name	Morphometrics			Merestic counts		
	SL/BD	SL/HL	HL/BD	Dorsal fin	Anal fin	Pelvic fin
Lethrinus nebulosus	2.45 - 2.89	2.6 – 3.1	0.9 – 1	X+9	III+8	I+5
L. mahsena	2.11 – 2.47	2.8 – 3.3	1.2 – 1.3	X+9	III+8	I+5
L. borbonicus	2.43 – 2.76	2.65-3.07	1.0 – 1.11	X+9	III+8	I+5
L. lentjan	2.48 – 2.81	2.61 – 3.01	0.9 – 1.1	X+9	III+8	I+5
L. microdon	3.02 – 3.54	2.58 – 2.94	1 – 1.21	X+9	III+8	I+5
L. variegatus	3.44 – 3.68	2.96 – 3.18	0.9 – 1.11	X+9	III+8	I+5
L. xanthochilus	2.81 – 3.49	2.61 – 3.02	1 – 1.21	X+9	III+8	I+5
L. harak	2.59 – 2.8	2.69 – 3.11	0.9 – 1	X+9	III+8	I+5
L. olivaceus	2.91- 3.38	2.42 – 2.87	1.11 – 1.29	X+9	III+8	I+5
L. obsoletus	2.81	3.39	1.21	X+9	III+8	I+5
L. conchyliatus	3.31	3.08	1.08	X+9	III+8	I+5
L. miniatus	2.42 – 2.81	2.51 – 2.92	0.9 – 1	X+9	III+8	I+5
****Gymnocranius satoi***	2.07 – 2.25	2.98 – 3.39	0.63 – 0.72	X+10	III+10	I+5
****G. oblongus***	2.03 – 2.22	2.81 – 2.97	0.65 – 0.73	X+10	III+10	I+5
****G. elongatus***	2.13 – 2.25	2.98 – 3.11	0.71 – 0.73	X+10	III+10	I+5
G. grandoculis	2.04 – 2.22	2.81 – 2.97	0.68 – 0.75	X+10	III+10	I+5
Monotaxis grandoculis	2.03 – 2.31	2.81 – 3.38	0.71 – 0.81	X+10	III+10	I+5

CONCLUSION

In Egypt, the identification of marine species is still done individually and the exact number of these species is under-estimate. Thus, more research and a monitoring program are urgent to deepen our knowledge about the diversity of marine species in the area. Also, detailed studies on the ecology and life history strategies of marine species should be done to detect the ecological changes that lead to the appearance of new species in the area.

REFERENCES

Bhadury, P.; Austen, M.C.; Bilton, D.T.; Lambshead, P.J.D.; Rogers, A.D. and **Smerdon, G.R. (2006).** Development and evaluation of a DNA barcoding approach for the rapid identification of nematodes. Mar. Ecol. Prog. Ser., **320**: 1-9.

Borsa, P.; Lemer, S.; Chen, W.J.; Collet, A.; Carassou, L. and **Ponton, D. (2009).** Identification par barcode (sequences nucleotidiques d'un fragment du gene du cytochrome b) des larves de Lethrinidae capturees en baies de Dumbea et Ouano (Nouvelle-Caledonie), rapport pour Zoneco, IRD, Noumea: 60 p.

Borsa, P.; Collet, A.; Carassou, L.; Ponton, D. and **Chen, W.J. (2010).** Multiple nuclear and mitochondrial genotyping identifies emperors and large-eye breams (Teleostei: Lethrinidae) from New Caledonia and reveals new large-eye bream species, Biochem. Syst. Ecol., **38**: 370–389

Borsa, P.; Hsiao, D.R.; Carpenter, K.E. and Chen, W.J. (2013). Cranial morphometrics and mitochondrial DNA sequences distinguish cryptic species of the longface emperor (*Lethrinus olivaceus*), an emblematic fish of Indo- West Pacific

coral reefs. Comptes Rendus Biologies, **336:** 505–514. https://doi.org/10.1016/j.crvi. 2013.09.004

Carpenter, K.E. and **Allen, G.R. (1989).** FAO Species Catalogue. Vol. 9. Emperor fishes and large-eye breams of the world (family Lethrinidae). An annotated and illustrated catalogue of lethrinid species known to date. FAO Fish. Synop., **125**(9):118 p. Rome: FAO.

Crego-Prieto, V.; Campo, D.; Perez, J.; Martinez, J.L.; Garcia-Vazquez, E. and **Roca, A. (2012).** Inaccurate labelling detected at landings and markets: The case of European megrims. Fisheries Research, 129-130. 106-109. doi: 10.1016/j.fishres. 2012.06.017.

El-Mahdy, S.M. (2018). Biological studies, stock assessment and fisheries management of *Acanthopagrus bifasciatus* (Forsskål, 1775) from the Red Sea, Egypt. Ph.D. Thesis, Zoology Department, Faculty of Science, Assiut University, Egypt.

Fish Base (2021). World Wide Web electronic publication (Eds. Froese, R. and Pauly, D.), version (12/2021).

Froese, R. and Pauly, D. (2022). Fish Base. World Wide Web electronic publication, version (12/2022).

GAFRD General Authority for Fish Resources Development (2019). Annual Statistical Year Book.

Marko, P.B.; Lee, S.C.; Rice, A.M.; Gramling, J.M.; Fitzhenry, T.M.; McAlister, J.S.; Harper, G.R. and **Moran, A. (2004).** Mislabeling of a depleted reef fish. Nature, **430**: 309-310. doi: 10.1038/430309b.

Mehanna, S.F. (1997). The study of biology and population dynamics of *Lethrinus mahsena* in the Gulf of Suez. PhD Thesis, Faculty of Science, Zoology Department, Zagazig University.

Mehanna, S.F. (1999). An assessment and management of the coral reef fish stocks in the Gulf of Suez. Egyp. J. Aquat. Biol. & Fish., **3**(2): 103-114.

Mehanna, S.F. (2011). Population dynamics and management of snubnose emperor *Lethrinus bungus* (*L. borbonicus*) from the Foul Bay, Red Sea. INOC-XI International Symposium 2011, Bogor, Indonesia: 121-129.

Mehanna, S.F. (2021). Egyptian Marine Fisheries and its Sustainability, pp. 111-140. In: Sustainable Fish Production and Processing (Ed. Galanakis, Ch. M.). Academic Press, Elsevier, 325 p.

Mehanna, S.F.; El-Gammal, F.I.; Zaahkouk, S.A.; Khalaf-Allah H.M. and **Makkey, A. (2017).** Population dynamics of the small tooth emperor, *Lethrinus microdon* (Valenciennes, 1830) from the Egyptian Red Sea. International Journal of Fisheries and Aquatic Studies, **5**(2): 158-163.

Mehanna, S.F.; Osman, Y.A.A.; Khalil, M.T. and **Hassan, A. (2019).** Age and growth, mortality and exploitation ratio of *Epinephelus summana* (Forsskål, 1775) and *Cephalopholis argus* (Schneider, 1801) from the Egyptian Red Sea coast, Hurghada fishing area. Egyptian Journal of Aquatic Biology & Fisheries, **23**(4): 65-75. 115.

Mohammad, A.S. (2016). Biological studies, stock assessment and fisheries management of *Carangoides bajad* (Forsskål, 1775) and *Caranx melampygus* (Cuvier, 1833) from the Red Sea, Egypt. Ph.D. Thesis, Zoology Department, Faculty of Science, Assiut University, Egypt.

Mohammad, A.S.; Mehanna, S.F. and **Mahmoud, U.M. (2022).** Age and growth based on the scale readings of the two carangid species *Carangoides bajad* and *Caranx melampygus* from Shalateen fishing area, Red Sea, Egypt. Egyptian Journal of Aquatic Biology & Fisheries, **26**(2): 399 – 411.

Osman, Y. A. (2015). Population dynamics and stock assessment of the most important species of family Scaridae (parrot) in Hurghada, Red Sea. M. Sc. Thesis, Marine science Department, Faculty of Science, Port Said University, Egypt.

Osman, Y. A. (2018). Fisheries management and dynamics of the common species of family Mullidae in Hurghada, Red Sea, Egypt. Ph.D. Thesis, Marine Biology and Fishes Department, Faculty of Science, Al-Azhar University, Egypt.

Pfenninger, M.; Nowak, C.; Kley, C.; Steinke, D. and **Streit, B. (2007).** Utility of DNA taxonomy and barcoding for the inference of larval community structure in morphologically cryptic *Chironomus* (Diptera) species. Mol. Ecol., **16**: 1957- 1968.

Sato, T. (1986). A systematic review of the sparoid fishes of the subfamily Monotaxinae, in: T. Uyeno, R. Arai, T. Taniuchi, K. Matsuura (Eds.), IndoPacific Fish Biology: proceedings of the second international conference on Indo-Pacific fishes. Ichthyological Society of Japan, Tokyo: 602–612.

Valentini, A.; Pompanon, F. and **Taberlet, P. (2008).** DNA barcoding for ecologists.Trends Ecol. Evol., **24**: 110-117.

Watson, R. and **Pauly, D. (2001).** Systematic distortions in world fisheries catch trends. Nature, **414**: 534-536. doi: 10.1038/35107050.