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Quantitative attributes of family Sisoridae (Siluriformes) with a new record of *Glyptothorax kashmirensis* from River Panjkora, District Lower Dir, Khyber Pakhtunkhwa, Pakistan

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Abstract

Present study was conducted to assess the family Sisoridae diversity in River Panjkora, Pakistan during 2012-2015. A total of 115 specimens representing 2 genera and 5 species, *Glyptothorax cavia*, *Glyptothorax kashmirensis*, *Glyptothorax naziri*, *Glyptothorax punjabensis* and *Glyptosternon reticulatum*, of the family were recorded. The most abundant species was *Glyptothorax naziri* with a relative density of 43.46 and relative frequency of 35.29. The second abundant species in the area was *Glyptothorax punjabensis* with relative density (RD) of 35.60 and relative frequency (RF) value of 35.29. The least found species in the area is *Glyptothorax kashmirensis* with a RD of 1.72 and RF 5.88. *Glyptothorax kashmirensis* was reported for the first time from River Panjkora and even from Khyber Pakhtunkhwa, Pakistan.

Keywords: Sisoridae, Glyptothorax, River Panjkora, relative density, relative frequency

1. Introduction

Pisces make one of the important groups of vertebrates inhabiting almost all types of water bodies from freshwaters to brackish and up to marine ecosystems. Man is consuming fish as food since the pre-historic ages [1]. Ichthyofauna plays a vital role in aquatic habitats as it mostly dominates the biotic components in terms of number [2].

According to an extensive review 28900 fish species are listed in *Fish Base*, and fresh water fish species are represented by approximately 13000 species belonging to 2513 genera across the globe [3]. From perennial and temporary water sources of District Jammu, 20 fish species including two exotic species (*Cyprinus carpio* and *Ctenopharyngodon idella*) were reported [4]. In a study on conservation status of ichthyofauna in Sagar lake Madhya Pradesh, India, 21 fresh water fish species were reported, represented by 17 genera and 11 families [5]. From Vattakkayal Kolloam District, Kerala, India, 22 fish species were documented and ranked as critically endangered, vulnerable and as lower risk level [6]. From River Charju Arunachal Pradesh, India, 37 fresh water fish species were reported which included *Labeo dyocheilus*, *Glyptothorax striatus*, *Amblyceps apangi*, *Psilorhynchus homaloptera*, *Lepidocephalichthys berdmorei* and *Aborichthys elongates* as threatened species [7]. In a study carried in Iberia it was reported that invasive fish species had high predation rates among fresh water ichthyofauna. Extinction of some native species was attributed to this factor [8]. From River Padma, Rajshahi Bangladesh, 73 species of fish were reported, along with their seasonal distribution [9]. In some localities of Australia increased ichthyofaunal similarities was found to be the result of anthropogenic influences. Major invaders in such aquatic ecosystems were *Carassius auratus*, *Gambusia holbrooki*, *Oncorhynchus mykiss* and *Poecilia reticulata* [10]. From Rajshahi District, Bangladesh, 133 fresh water species were collected [11]. In an extensive study on distribution of fresh water fish in Pakistan 86 species were documented. Habitat destruction and over exploitation were two main causes of decline in population density of some important fish species [12]. From River Kabul at District Nowshera checklist of 24 fish species was prepared [13]. From Hub reservoir Sindh 21 fresh water fish species belonging to 9 families and 7 orders were recorded [14]. From River Indus and its tributaries 180 fish species were documented along with their longitudinal zonation [15]. From River Jhelum 51 fish species were collected and exotic species i.e. *Oreochromis aureus* was found to be responsible for the low population density of endemic species i.e. *Tor macrolepis* [16].

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From River Swat at Charsadda, 38 fish species were documented. Family *Cyprinidae* was found to be the dominant one in the study area [17]. From River Swat a total of 18 fresh water fish species were collected. Use of electricity and explosives for fish hunting were found to be major threats to ichthyofauna [18]. In another study *Nangra robusta* was first time reported from River Panjkora at Sheringal, District Dir Upper [19]. In a study 11 edible fresh water fish species were reported from Konhay stream, District Lower Dir including *Channa gachua*, *Cyprinus carpio*, *Garra gotyla*, *Channa punctatus* and *Racoma labiate* [20]. From River Panjkora, District Dir Upper, 11 fish species were collected which belonged to 5 orders and 5 families. *Cyprinidae* was dominant family in the study area [21]. Previously a total of 25 fish species were reported from River Panjkora, *Crossocheilus diplocheilus* was found to be the dominant species in the study area [22]. The study area is mostly unexplored for the ichthyofaunal diversity and present study will provide a baseline of information in this regard.

2. Materials and Methods

2.1 Study Area

District Dir Lower is situated in the Northern part of Khyber Pakhtunkhwa. It has District Dir Upper in North, District Swat in East, District Malakand in South and Bajaur in West.

The name of River Panjkora refers to its origin from five streams i.e. Kumrat-Kohistan, Lawari, Barawal, Ushera and Guladai. River Panjkora begins from Hindukash range at latitude, $35^{\circ} 45'$ and passes through North and south faces making it through several tributaries i.e. Dir, Barawal, Usheri, Nihagadara, Konai, Roade, Guladai, Rabat, Toormang, Narhan and Karo. River Panjkora join River Swat at Busak near Qulangi (Fig. 1). The study area of the river is about 180 kilometers from its origin. The area is about 70 kilometers from Rabat to Busak. It lies between latitude of $34^{\circ} 38'$ and $34^{\circ} 84'$ towards north having average altitude of 725 to 850 meters on the bank of River Panjkora. According to 1998 census population of Dir Lower are about 717650.

2.2 Collection and Identification

A total of six monitoring sites i.e. Timergara, Rabat, Odigram, Khazana, Shagu Kas and Busak were established for sampling. Fish samples were collected by cast net, hand net, fishing rods and by hands in shallow water. Samples were taken to laboratory and shifted to plastic jars. Large sized samples were incised and 10% formalin was used as a preservative [23]. Morphometric attributes of each sample were recorded and tabulated [23, 24]. Identification was done following standard keys [23-26].

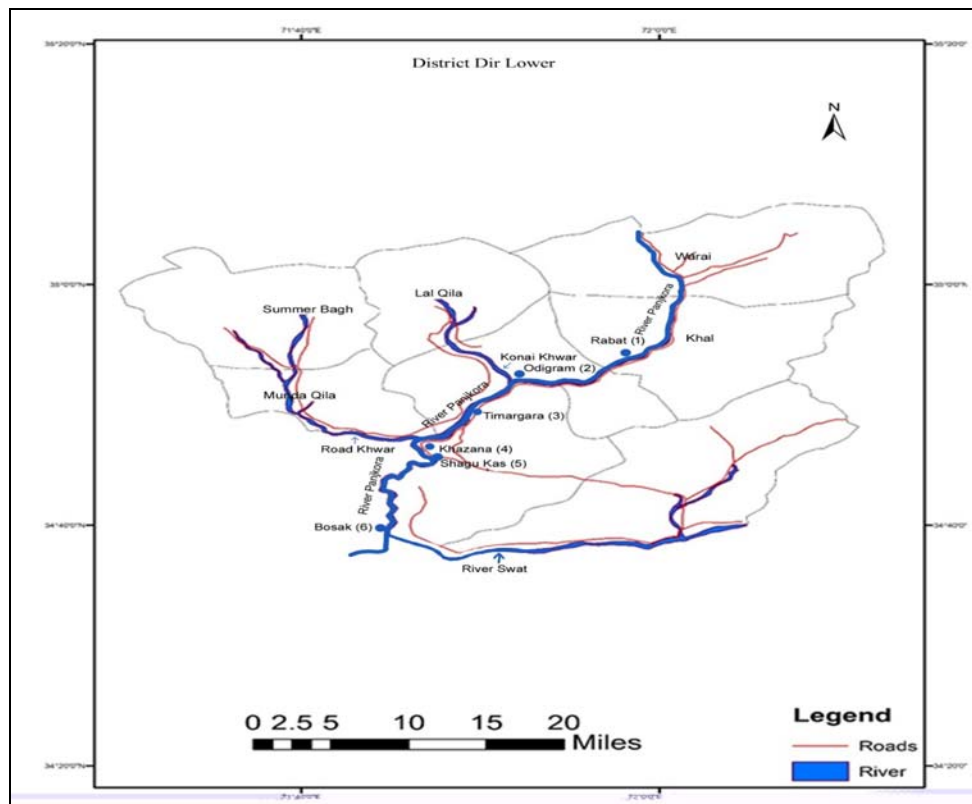


Fig 1: Map of the study area.

3. Results and Discussion

A total of 115 specimens representing five species under two genera of the family *Sisoridae* were recorded in the present study. Taxonomic and morphometric details of fish species collected are as follows:

3.1 *Glyptothorax cavia* (Hamilton, 1822)

Upper surface of the fish was brown and lower surface was silvery. Transverse bars were found on tail and tail fin. It is

found in rapids of stream and river. Its total, fork and standard lengths were recorded as 27.5 cm, 25 cm and 24.5 cm respectively. Diameter of eye was 0.4 cm and snout length was of 3.6 cm. Measurements of body depth was 4.4 cm and inter orbital width was 1.6 cm (Table. 1, Plate. A). Only three specimens of the species were collected from one monitoring site i.e. Rabat. Its population density was 0.5 while its frequency was 16.67, which clearly shows that it has a very limited ecological range of tolerance. Its relative density was

2.62 while relative frequency was 5.88 (Table. 2). *Glyptothorax cavia* was reported from Pakistan [27], from River Aronai, Swat [28], from River Swat at Charsada [17], from River Jhelum [16] and from Dera Ghazi Khan [29]. This species was also documented from abroad i.e. from Tirpura, India [30] and from Garo Hills, India [31]. It is enumerated as endangered species from Northeast India [32].

3.2 *Glyptothorax kashmirensis* Hora, 1923

Body colour was dark brown with black dots all over the body including fins except ventral surface. It is found in stream and river with rocky bottom. Its total, fork and standard length were recorded as 11.2, 9.8 and 9.2 cm respectively. It had eye diameter of 0.3 cm and snout length of 1.2 cm. Body depth was measured as 2.1 cm and inter orbital width as 0.6 cm (Table. 1, Plate. 1. B). Only 2 specimens were collected from Busak. Its population density was 0.33 while frequency was 16.67, which clearly reflects that it is very rare in the study area (Table. 2).

The species was for the first time reported from Pakistan and was collected from River Jhelum in Kashmir valley [33] but it was also recorded previously from India [34]. Later on the presence of this species in the River Jhelum was confirmed [35]. Now it is a new record for the study area and Khyber Pakhtunkhwa. The species is already red listed [36].

3.3 *Glyptothorax naziri* Mirza & Naik, 1969

Body was brown in colour with yellow marks along the back. Black stains were found on yellowish fins. It is found in mountain rapids of streams and rivers. Measurements of total, fork and standard lengths were 13, 11.5 and 10.1 cm respectively. It had eye diameter of 0.3 cm and snout length of 1.4 cm. Body depth was recorded as 2 cm and inter orbital width as 0.7 cm (Table. 1, Plate. 1. D). It was collected from all monitoring sites. Its population density was 8.33 while frequency was 100 which clearly reflect that it is common in the study area. Its relative density was 43.46 while relative frequency was 35.29 (Table. 2). *Glyptothorax naziri* was reported from River Kabul at Machini [37], from River Swat at Charsada [17], from Attock [38], from Pakistan [27], from River

Panjkora Dir Lower [22], from Azad Jammu Kashmir, Balochistan, Punjab and Khyber Pakhtunkhwa [12] and from Kalpani stream, Mardan [39].

3.4 *Glyptothorax punjabensis* Mirza & Kashmiri, 1971

Upper surface of the fish was greyish and lower surface was white. Yellow blotches were found on cheeks. Tips of the pectoral and caudal fins were dark brown. Other fins were yellowish. It is found in mountain rapids. Total, fork and standard lengths were recorded as 12.2 cm, 11 cm and 10.5 cm respectively. It had eye diameter of 0.3 cm and snout length of 1.5 cm. Body depths was measured as 2.1 cm and inter orbital width as 0.8 cm (Table. 1, Plate. 1. C). It was collected from all monitoring sites. Its density was 6.83 while frequency was 100 which clearly reflect that it is common in the study area. Its relative density was 35.60 while relative frequency was 35.29 (Table. 2). *Glyptothorax punjabensis* was reported from River Darmai, Swat [40], from River Kabul at Nowshehra [13], from River Kabul at Machini [37], from River Aronai, Swat [28], from River Swat [18], from River Swat at Charsada [17], from Attock [38], from Pakistan [27], from River Barandu, Buner [41], from River Panjkora Dir Lower [21] and from Balochistan, Khyber Pakhtunkhwa, Punjab and AJK [12].

3.5 *Glyptosternon reticulatum* McClelland, 1842

Fish was dorsally yellowish green and light ventrally. Fins were yellowish with dark edges. It is found in mountain rapids. Its total length was recorded as 13 cm and standard length as 11 cm. The diameter of the eye was 0.3 and snout length of 1.3 cm. Its body depth was measured as 1.9 cm and inter orbital width was 0.8 cm (Table. 1, Plate. 1. E). It was collected from 3 monitoring sites. Its population density was 3.17 while its frequency was 50. Its relative density was 16.60 and relative frequency was 17.64 (Table. 2). *Glyptosternon reticulatum* was documented from Allai Khoar, Batagram [42]. This species was also reported from abroad i.e. from Afghanistan [43] and from Lidder River Kashmir, India [44].

Table 1: Morphometric details of Sisoridae species of River Panjkora, Pakistan.

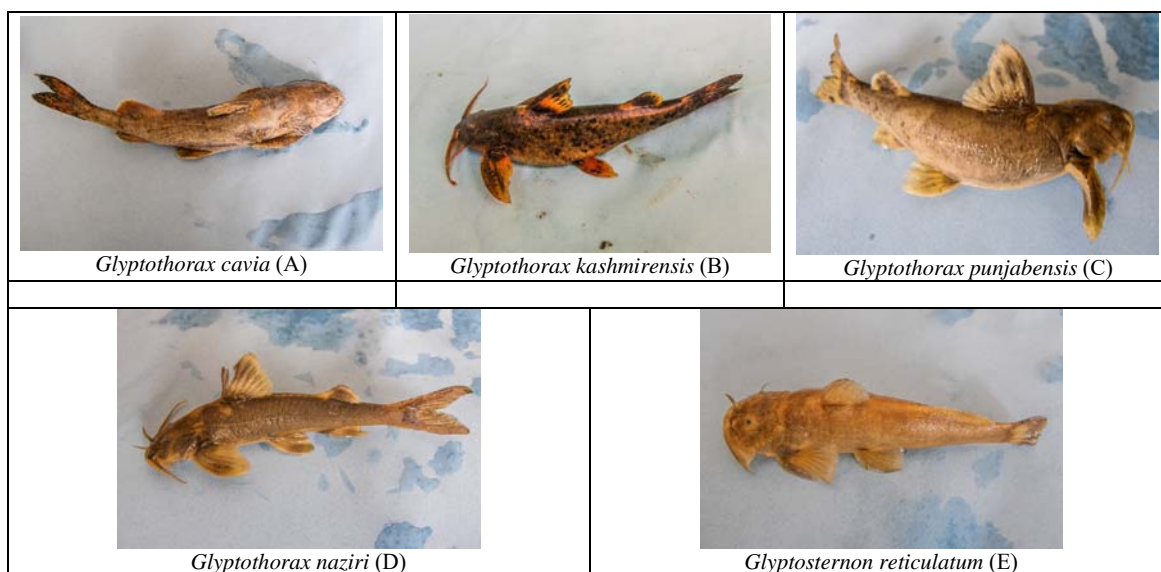
S. No		Wt-gm	TL-cm	FL-cm	SL-cm	BD-cm	ED-cm	PcFL-cm	PIFL-cm	DFL-cm	AF-cm	CFL-cm	HL-cm	LJL-cm	UJL-cm	SnL-cm	Mga-cm
1	<i>Glyptothorax cavia</i> (Hamilton, 1822)	211	27.5	25	24.5	4.4	0.4	5	3.1	3.5	3.6	4.7	6.5	2.5	3	3.6	3.6
2	<i>Glyptothorax kashmiriansis</i> Hora, 1923	17	11.2	9.8	9.2	2.1	0.3	2.3	1.6	1.8	1.8	2	2.5	1	1.2	1	1
3	<i>Glyptothorax naziri</i> Mirza & Naik, 1969	28	13	11.5	10.1	2	0.3	2.9	1.9	2.3	2.3	2.8	2.9	1	1.4	1.4	1.3
4	<i>Glyptothorax punjabensis</i> Mirza & Kashmiri, 1971	34	12.2	11	10.5	2.1	0.3	2.5	1.7	1.95	2	2.3	2.8	1.2	1.5	1.5	1.3
5	<i>Glyptosternon reticulatum</i> McClelland, 1842	25	13	0	11	1.9	0.3	2.3	1.7	1.5	1.3	1.5	2.15	0.6	0.7	1.3	1

Abbreviations

Wt-Weight in grams, TL-Total length, FL-Fork length, SL-Standard length, BD-Body depth, ED-Eye diameter, PcFL-Pectoral fin length, PIFL-Pelvic fin length, DFL-Dorsal fin length, AF-Anal fin length, CFL-Caudal fin length, HL-Head length, LJL-Lower jaw length, UJL-Upper jaw length, SnL-Snout length, Mga-Mouth gap

Table 2: Presence-Absence data of Ichthyofauna of River Panjkora, District Lower Dir, Pakistan

S. No	Taxon	Rabat	Odigram	Timergara	Khazana	Shagukas	Busak	Density	Frequency	Relative Density	Relative Frequency
1	<i>Glyptothorax cavia</i> Hamilton, 1822	-	3	-	-	-	-	0.5	16.67	2.62	5.88
2	<i>Glyptothorax kashmirensis</i> Hora, 1923	-	-	-	-	-	2	0.33	16.67	1.72	5.88
3	<i>Glyptothorax naziri</i> Mirza & Naik, 1969	7	6	12	10	9	6	8.33	100	43.46	35.29
4	<i>Glyptothorax punjabensis</i> Mirza & Kashmiri, 1971	8	3	5	13	4	8	6.83	100	35.60	35.29
5	<i>Glyptosternon reticulatum</i> McClelland, 1842	10	7	2	-	-	-	3.17	50	16.60	17.64
	Total	25	19	19	23	13	16				

**Plate I:** Five Sisoridae species (A-E) collected from River Panjkora, District Lower Dir, Khyber Pakhtunkhwa, Pakistan.

4. Conclusion

During the present study a total of 115 specimens belonging to 2 genera and 5 species of the family Sisoridae were recorded. One out of five species, *Glyptothorax kashmirensis* is reported for the first time from the study area. The species is previously reported from Kashmir only. One out of five new species from the area suggests that the area has a great potential in biodiversity and needs to be properly explored.

5. Acknowledgment

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