

The New Record of Nangra Fish, *Nangra robusta* Mirza and Awan (Siluriformes: Sisoridae: Sisorinae) from River Panjkora, Sheringal, Khyber Pakhtunkhwa, Pakistan

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Abstract: The fish live underwater, therefore, they are more difficult to study than terrestrial animals and plants, therefore, the information about fish populations is often lacking. However, freshwater fish seem particularly threatened, because they often live in relatively small water bodies. The present research was the first and new record of Nangra fish, *Nangra robusta* Mirza and Awan, (n=5) from River Panjkora, near Shaheed Benazir Bhutto University, Sheringal, Khyber Pakhtunkhwa, Pakistan during June 2013-July 2014. It was found through the literature that it was not collected before the present report throughout the river Panjkora. However, during the present research, it was first time collected by different fish-nets like cast-net, hook-net, hand-net and locally adopted devices. Moreover, it belongs to order Siluriformes, family Sisoridae and subfamily Sisorinae. Further, it is dark brown in color, body is short and compressed, abdomen is rounded but almost spindle-shaped with dorsal profile is slightly arched and ventral is almost straight. Additionally, its total length was 12 ± 1 cm, however, standard length was 10 ± 1 cm, furthermore, the diameter was 3 ± 0.3 cm. Consequently, at the present, it was the newly recorded species from River Panjkora. Accordingly, a detail study is required for further exploration of *N. robusta* of river Panjkora, Sheringal, KP, Pakistan with special reference to the taxonomy, physiology and ecology.

Keywords: Dir Upper (DU), edible, freshwater fish, Shaheed Benazir Bhutto University (SBBU), taxonomy.

1. INTRODUCTION

The Sheringal valley is located between the 72° - 20° east longitudes and 35° - 28° north latitudes in Pakistan, however, altitude is approximately 2000 m above the sea level. Moreover, this is a small valley situated northern site of district Dir Upper (DU), KP, Pakistan. Bajaur Agency and Jandool is located toward the west, while it is surrounded by district Swat and Malakand Agency from the East and South, respectively. Further, a total area covered by this hilly valley is 7992.7 hec. Furthermore, the northern part is generally covered with forests. The River Panjkora flows towards the north-south. Consequently, the climate is extremely cold in winter and warm in summer. Accordingly, the minimum and maximum temperature in January has been recorded as -2.3 and 11.2 °C, respectively (Figure 1) (Hazrat *et al.* 2011).

The fishes are diverse group of aquatic and cold blooded vertebrates, having fins for swimming and gills for breathing. However, most fishes have scales for protection, and a streamlined body for moving easily in water (Premium 2009). Further, they are one of the prime important organisms, which play a key role in economy of many nations, as they have been stable item in the diet of many people (Essetchi *et al.* 2003; Perveen and Ullah 2015). Furthermore, in the world, their statistic are 28,900 species (fresh and salt-waters) present, out of these 13,000 freshwater species (2,513 genera and 170 families) live in lakes and rivers that cover only 1%, while the remaining 16,000 species live in salt water that covers 70% of the earth surface (Leveque *et al.* 2008). Pakistan as the most distinguished in river Jhelum up to Head Mangla and in river Indus upstream from Kalabagh up to Besham including Tarbela Dam, in river Kabul up to Bagram near Charikar in Afghanistan, in river Swat up to Bagh Dheri (Perveen and Shah, 2012).

Fishes are classified differently by various ichthyologists. However, the majority of the classifications are very complex and divide fishes into more than 100 orders and suborders. Recently, in the most generally used system, the subphylum Vertebrata is divided into 2 super classes: Agnatha, which includes the lamprey, *Petromyzon marinus* (L.) and other fishes without jaws; and Gnathostomata,

which includes fishes with hinged jaws. The latter are further divided into the class Chondrichthyes, the cartilaginous fishes such as the sharks, rays, and chimaeras. Moreover, the class Osteichthyes, the bony fishes, are made up of the subclass Sarcopterygii, lobe-finned fishes, and the subclass Actinopterygii, ray-finned (or spiny-finned) fishes. Furthermore, the recent ray fins consist of 2 groups, the Chondrostei and the Neopterygii, which includes the large division Teleostei or modern bony fishes (Bihar *et al.* 2012).

The freshwater fish fauna of Pakistan is represented by a minimum of 193 fish species. However, these species belong to class Actinopterygii, sub-class Teleostei, 3 cohorts, 6 super-orders, 13 orders, 30 families and 86 genera (Rafique 2007; Rafique and Mian 2012). Moreover, this diversity also includes the exotic species introduced in wild or fish farming system of Pakistan during the recent past. Furthermore, among total fish fauna of Pakistan, 86 fishes (8 exotic and 78 indigenous) have been identified as species of special importance on the basis of endemism, IUCN status, economic importance and rarity (Rafique and Khan 2012). The normal growth of fish is affected by parasite that lives on the body if highly infested. The ectoparasites not only harm the fish directly but also render the fish for grown, reduce host population and induce mortalities (Perveen and Ullah 2013).

The Nangra, *Nangra robusta* Mirza and Awan is an edible fish, which is distinguished from all Sisorids by having palatal teeth, maxillary barbells that extend till the base of pectoral fin and very long nasal barbells, in which the barbell length is much greater than the eye diameter and often as long as the head. The objective of the present research is to explore the new record of Nangra, *Nangra robusta* from River Panjkora near Shaheed Benazir Bhutto University (SBBU) at Sheringal and to educate the people of Sheringal about the significance of this fish.

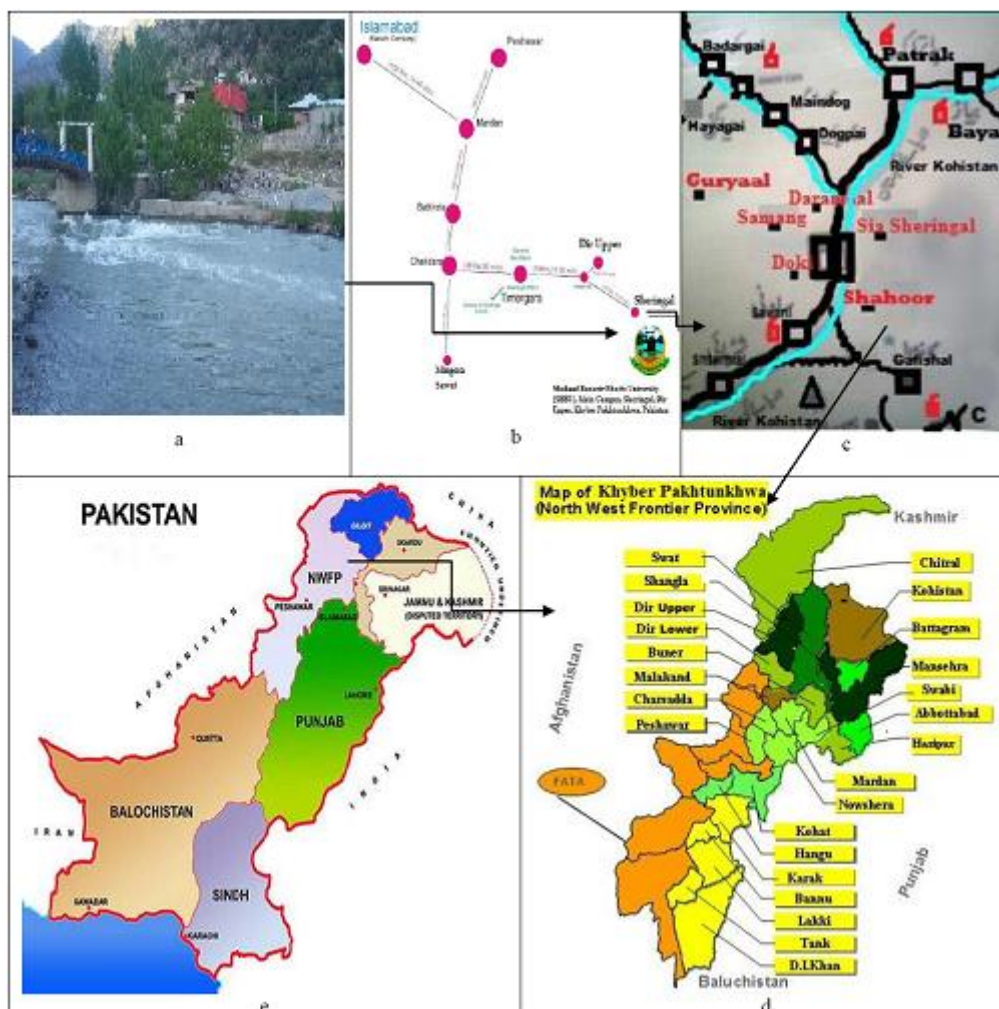


Figure 1. Maps of River Panjkora, Shaheed Benazir Bhutto University (SBBU), Main Campus, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan, where the new record of Nangra fish, *Nangra robusta* Mirza and Awan was established during June 2013-July 2014; arrows show map of the study area: a) river Panjkora; b) SBBU, Main Campus; c) Sheringal, where the present research was conducted; d) map of Khyber Pakhtunkhwa, which is one of the provinces of Pakistan and; e) map of Pakistan (Online, 2013).

2. MATERIALS AND METHODS

The people of Sheringal, Dir Upper (DU), Khyber Pakhtunkhwa (KP), Pakistan usually concern with agriculture. However, total area covered by this hilly valley is 7992.7 acres. Moreover, the population is about 20,000 and literacy rate is 51%. Further, River Panjkora flows, meanderingly, through this lush green valley with average depth is about 3 feet, while width is 15-25 feet. Furthermore, it is northern in KP and north-western in Pakistan. Although, it rises high in the Hindu Kush and flows south through DU and Lower Dir (LD) districts and joins the Swat river near Chakdara, Malakand, KP. Therefore, the present research was conducted during June 2013-August 2014 in study area, River Panjkora located in Sheringal, DU, KP, Pakistan (Figure 1) (Hazrat *et al.* 2011).

Fish was collected from different sites of River Panjkora at Sheringal near Shaheed Benazir Bhutto University (SBBU). The collection was made on daily basis for 3 months during October-December 2013. During collection, different types of instruments were used like hand net, cast net, hooks, and other locally adopted methods were also used. The collected fish (n=5) was brought into the laboratory, Department of Zoology (DOZ), SBBU, Sheringal, DU, KP, Pakistan, faint by mortin[®] (CIC enterpriser, Lahore, Pakistan) in a bottle. Then pictures of the fish (dorsal, ventral and lateral sites) were taken with the camera[®] (Nikon, Tokyo, Japan: 12 mega pixel lense). Collected fish was identified with the help of keys (Jayaram, 1999; Sandhu 2000), literature available, experts, pictures, already identified specimens and internet. They were studied under magnifying glass (Nikon, Tokyo, Japan) and stage microscope (BH₂; Olympus Co. Ltd., Tokyo, Japan) for their characteristics. The morphometric measurements of total length, standard length, fork length and diameter (in cm) of fishes were calculated with the help of graduated scales. These specimens were labeled and preserved in 10% formalin solution. The specimens were deposited in Natural History Museum (NHM), DOZ, SBBU, Sheringal.

3. RESULTS

During the present research, the Nangra fish, *Nangra robusta* Mirza and Awan, 1973 (n=5) was reported first time in the Panjkora River, Sheringal, DU, KP, Pakistan during June 2013-August 2014. It was identified by expert, Prof Dr Abdurab (Rtd), National Institute of Scientific Research (NIRC), Islamabad, Pakistan. The characteristics of newly reported *N. robusta* were stated as following:

3.1. Newly Record of Nangra fish, *Nangra robusta* from River Panjkora

The newly recorded Nangra, *Nangra robusta* from River Panjkora is an edible fish with dark brown dorsally and light yellow ventrally, however, its fins are yellowish (Figure 2; Tables 1 and 2). Moreover, it was usually found in mountain streams and rivers. Further, its morphometric measurements were found such as total length: 12±1 cm; fork length: 11±1 cm; standard length: 10±1 cm and diameter: 3±0.3 cm (Table 2). Furthermore, its fin formula was dorsal 2/7, pectoral 9-11, ventral 6, anal 3/8, caudal 19 and lateral line 184 in numbers. Although, body is short with slime and dorso-ventrally compressed, though, abdomen is rounded but almost spindle-shaped, with dorsal profile is slightly arched and ventral is almost straight. Additionally, Body is the deepest just before the base of dorsal. However, the head is short depressed with ventrally flattened and bluntly pointed having 2 parallel median dorsal ridges extending from almost tip of snout up to base of dorsal, although, united into one at the base of occipital process. Moreover, small white papillae are present all over the head. Further, they are extended behind over the dorsal and lateral side of the body. Furthermore, transverse groove is present between anterior narial openings. Snout is projecting beyond the mouth and bluntly pointed. In addition, eyes are small dorso-lateral in position, though, they are not visible from below and ventral surface of the head. Consequently, they are situated in the anterior half of the head, but their diameter about 12% of length of the head. Accordingly, mouth is narrow and crescent but ventral, moreover, it is situated behind the level of posterior narial opening. Although, lips are thick fimbriated, but upper lip is indistinct, however, lower and upper lips continuous at the angle of mouth with a groove around the corners. Moreover, the jaws are sub-equal, though, upper jaw is considerably longer and overhangs the mouth. Further, an inverted v-shaped packet is present behind the mouth, but gape of the mouth is about 3 times in length of head. Furthermore, nostrils are situated nearer tip of snout than to the eye. Additionally, minute villi-form teeth are present on both jaws, but they are situated outside the mouth on the upper jaw. Similarly, palates are edentate, however, barbless are 4 pair. Moreover, the axillary pair is arising from a groove on the either side of the mouth and extending up to the origin of anal or even beyond its posterior

ends. The 2 pairs of mandibular barbless are arising just behind the mouth not in a straight transverse line. The outer pair is extending to the base of pectoral fin, however, it is almost below the level of origin of dorsal and inner pair of barbless extending up to posterior end of the base of pectoral. A pair of small nasal barbless is arising between 2 narial openings on either side, extending up to the middle of the eye. Origin of dorsal fin is before pelvic and nearer to the tip of snout than to the base of caudal. Its last simple ray is the longest and extended behind the last fin, when it is depressed and modified in to a spine. Dorsal fin is consists a spine end of branched rays. Adipose dorsal fin is small, distinct in origin, found just above the anal fin. Pectoral fin is longer than head, however, its first pair of rays is spiny with 12-16 serrations on its inner surface, moreover, the longest rays are extending behind the base of pelvic fin. Pectoral fin is with 9-10 rays, however, pelvic fin extending behind the anal aperture which is well developed before the anal fin. Its free edge is almost straight, moreover, pelvic fins have 6 rays, further, anal fin slightly concave at its free edge but it is not reached the base of caudal. Anal fin consists with 10 rays, however, caudal fin is deeply forked, moreover, its lobes are almost of equal length. Furthermore, caudal fin have 17-18 rays, its length is slightly less than the head length. In addition, gill openings are wide extended on the ventral side up to the mid-ventral line. Although, operculum of either side is continuous on ventral side in the middle. Lateral lines are present, which are simple and complete. Swim bladders are very small hard-walled and bi-lobed, however, both lobes are equal in dimension, moreover, it is pointed out at free ends. Further, it is expended in the middle and united to each other through a hard isthmus. It is distributed in Punjab of Pakistan and Rajasthan of India (Figure 2; Tables 1 and 2).

Table 1. Classification of the first time reported Nangra, *Nangra robusta* from Panjkora River, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan during June 2013-August 2014

Phylum	:	Chordata
Sub-Phylum	:	Vertebrata
Class	:	Actinopterygii
Subclass	:	Neopterygii
Super order	:	Ostariophysii
Order	:	Siluriformes
Family	:	Sisoridae
Subfamily	:	Sisorinae
Common name	:	Nangra
Local name	:	Chukaysary
Genus	:	<i>Nangra</i>
Species	:	<i>robusta</i>
Authority	:	Mirza and Awan
Year	:	1973



a



b

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c



Figure 2. The first time reported *Nangra*, *Nangra robusta* Mirza and Awan from Panjkora River, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan during June 2013-August 2014; a: dorsal; b: ventral and c: lateral sides; bars on photographs indicate 10 cm; d: the local and worldwide distribution; the red color star representing the countries where such fish found (Online 2015)

Table 2. The *Nangra* fish, *Nangra robusta* Mirza and Awan new record from Panjkora River, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan during June 2013-August 2014 is at a glance

SNo	Scientific name	n*	Total	Fork	Standard	Dm* M±SD	Date of collection	Status
			length M±SD* (cm)*			(cm)*		
1.	<i>Nangra robusta</i>	5	12±1*	11±1*	10±1*	3±0.3*	16/12/2013	R*
			Lateral line No	Dorsal fin formula	Anal fin formula	Pectoral	Ventral	Caudal
			184	2/7	3/8	9-11	6	19
			Dorsal spines	Dorsal soft rays	Environment	Ecology	Range	IUCN status
			1	7	freshwater	benthopelagic	tropical	not evaluated
								Native
								Pakistan, Asia
								Thread to human
								harmless

*n: number of specimen collected; Dm: diameter; M: mean; SD: standard deviation; cm: length and Dm measured in centimeter; data were analyzed by MS Excel at $P < 0.01$; R: Rare

3.2. Distribution

3.2.1. Local

The newly recorded *N. robusta* from Panjkora River, Sheringal, Dir Upper, Khyber Pakhtunkhwa, Pakistan was also reported from Behrain, Madyan, Fateh Pur, Khwaza Khela, Fizagat, Kanju and Barikot, Swat, Khyber Pakhtunkhwa, Pakistan by Ahmad *et al.* (2014) (Figure 2; Tables 1 and 2). However, it is native from Pakistan, Asia.

3.2.2. Worldwide

This species was also reported from Mizoram, Tripura and Barak drainage of Northeastern India by Kar and Sen (2006); from West Bengal by Mahapatra *et al.* (2015); from North East India, inclusive of the Biodiversity Hotspots Zones, Himalayan and Indo Burma by Goswami *et al.* (2012) (Figure 2; Tables 1 and 2). It is also reported from Bangladesh and Nepal (Online, 2015).

4. DISCUSSION

When collection and identification of the fishes of river Panjkora, Sheringal, DU, KP, Pakistan were made during June 2013-August 2014, Nangra, *Nangra robusta* Mirza and Awan was first time recorded in Panjkora River at Sheringal and its 5 specimens were collected near SBBU. It was identified by experts and keys (Jayaram, 1999; Mirza and Sandhu, 2007;) and preserved in NHM, DOZ, SBBU.

Muhammad et al. (2014) reported a total of 11 fish species belonging to 4 orders and 4 families were recorded from river Panjkora at DU. The richest family represented by 7 species were Cyprinidae (trout, *Barilius pakistanicus* Mirza and Sadiq, 1978; ray-finned fish, *Carassius auratus* Temminck and Schlegel, 1846; ray-finned fish, *Crossocheilus diplocheilus* (Heckel, 1838); sucker head, *Gara gotyla*, (Gray, 1830); kunar snowtrout, *Racoma labieta* McClelland and Griffith, 1842; *S. esocinus*, and ray-finned fish, *S. plagiostomus* Heckel., 1838) followed by Sisoridae (*Gagata cenia* and *Glyptothorax punjabensis*). The family Channidae and Salmonidae were comprised of one species each, spotted snakehead, *Channa punctata* Bloch, 1793; and rainbow trout, *Oncorhynchus mykiss* Walbium, 1792, respectively. In the present Ichthyofauna study, the richest family was Cyprinidae represented with 2 species (*S. esocinus* and *S. plagiostomus*) followed by family Sisoridae was represented by only 1 species *N. robusta* (the new species reported from river Panjkora first time at Sheringal near SBBU, DU, KP, Pakistan). There was no data observed about *N. robusta* fish by Muhammad et al. (2014) results, as well as it was not collected before the present report throughout the river Panjkora. However, during the present research, it was first time collected, it may be migrated from other rivers, however, its abundance is still critical because only 5 specimens were collected at the present.

Ahmad et al. (2014) reported the family Sisoridae species like *N. robusta* in Behrain, Madyan, Fateh Pur, Khwaza Khela, Fizagat, Kanju and Barikot, Swat, KP, Pakistan. Moreover, it was reported by Kar and Sen (2006) in Mizoram, tripura and barak drainage of Northeastern India. Furthermore, it was reported by Goswami et al. (2012) in the north-east India, inclusive of the Himalayan and Indo Burma biodiversity hotspots zones. In the present Ichthyofauna study, family Sisoridae species such as *N. robusta* collected from river Panjkora near SBBU, Sheringal, DU, KP, Pakistan, which shows closed similarity in both of the results. Similarity in the results may be due to same habitat, i.e., fresh water.

Bhat et al. (2005) carried a study on the biology of fishes of river Lidder (Jammu and Kashmir) during 2003-2005. Seven species of fishes were collected from the river, out of which, 3 was commercially important species, i.e., *S. esocinus* (n=70), *S. labiatus* (n=40) and *S. plagiostomus* (n=133). In the present Ichthyofaunal study, it was observed commercially important species collected belong to family Cyprinidae, i.e., *S. plagiostomus* (n=13), *S. esocinus* (n=43) and family Sisoridae, i.e., *N. robusta* (n=5), which shows somewhat similarity in both of the results. Similarity in the results, may be due to the same habitat, i.e., fresh water.

Hasan et al. (2013) worked on river Swat and reported fish (n=50) consisting of 16 edible fish species including: goldfish, *Carassius auratus* L., 1758; dogra, *Crossocheilus diplocheils* (Heckel 1838); dwarf snakehead, *C. gachua* (Hamilton, 1822), Bilardo and Rocchi, 1995 and daula, *C. punctatus* (Bloch, 1793), Bilardo and Rocchi, 1995; gulform, *Cyprinus carpio* L., 1758; gamefish, *Clupisoma garua* (Hamilton, 1822); naziri bachcha, *Clupisoma naziri* (Mirza and Awan, 1973) and freshwater catfish, *Eutropiichthys vacha* (Hamilton, 1822); mountain rahu, *Labeo diplostomus* (Heckel, 1838); zig-zag eel or bam, *Mastacembulus armatus* (Lecepede, 1800); bleekri-tingara, *Mystus bleekeri* (Day, 1877); rainbow trout, *O. mykiss* (Walbaum, 1729); kunar snow trout or chun, *Racoma labieta* (Thorell, 1887), McClelland and Griffith; brown trout, *Salmo trutta fario* L., 1758, ray-finned fish, *S. plagiostomus* Heckel, 1838 and Indus golden mahseer, *Tor macrolepis* (Heckel, 1838) after their survey during 2004-2010. In the present study, the total numbers of species collected were 3. All of them were edible, i.e., *N. robusta*, *S. esocinus* and *S. plagiostomus*. It shows that the numbers of edible fish diversity are less as compared to non-edible in Hasan et al. results. The difference in the results may be either due to variation in the environment or natural disaster such as flood, which was occurred in 2010 at river Panjkora Sheringal, DU and a lot of numbers of fishes were lost during that time.

Ishaq et al. (2014) worked on fish biodiversity of river Swat and reported that fishes were facing adverse factors due to human activities like using illegal fishing techniques in the form of electric current and dynamites etc, therefore, some important fishes like chirruh snow trout, *Shizothorax*

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esocinus Heckle, 1838; *T. macrolepis* and *C. carpio* became endangered in the same river. In the present Ichthyofaunal study, the important fish species collected were less according to expectation of the present study, which shows somewhat similarity in both studies. Similarity, during the present research, the overfishing, un-proper methods of collection, addition of garbage, sewage and waste products etc to river by local people, which change the quality of water, may lead to decrease the numbers of such fish species. Therefore, necessary measures for conservation of fishes in Panjkora River should be adapted.

The present study announcing the discovery of a population of *N. robusta* at River Panjkora, Sheringal, Pakistan. However, it is known that the type locality of this species is the Jinnah Barrage near Kalabagh, and that both the Jinnah Barrage and Sheringal lie within the Indus drainage (email correspondence to Prof Dr Rohan Pethiyagoda, Australian Museum, Sydney, Australia). Moreover, before the present study, it was not collecting from this river. Accordingly, it is unsurprising that this species occurs at Sheringal, on the other hand, it is surprising why *N. robusta* was not collected before. At any event, the discovery of this species at Sheringal is sufficient significance as to warrant the presence of it in River Panjkora, Sheringal, DU, Pakistan.

The limitations encountered during the present research were the climatic condition of the study area, shortage of time period for the collection, unawareness of the people about the importance of fish and initially inexperience of proper catching practices by authors. In addition, no proper conservation of the Panjkora River, no proper methods of collection and overfishing. In 2010, the flood destructed the habitat of the fish species in the river Panjkora, therefore, a lot of fishes were lost or may be migrated. Moreover, this led lesser number of specimens of *N. robusta* collected according to the requirement at the present.

4.1. Conclusion

During the present research, the fish *N. robusta* was first time reported from the River Panjkora, Sheringal from June 2013-August 2014. Its biology has been described.

4.2. Recommendations

The conservation of the *N. robusta* and related aquatic fauna is required in river Panjkora, Sheringal, Pakistan. The seminars, symposiums and workshops etc should be conducted for awareness and education of community of Sheringal.

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