BOTTOM FAUNA OF CERTAIN FRESHWATER BODIES OF PESHAWAR DURING SPRING SEASON

by

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Abstract. *The productivity of the bottom fauna of the water tanks of Punj-tirat, a stream of Palosee Village and the canals in Islamia Collage Campus, Forest Institute and Lakerhay Village has been determined by number and weight per unit area in Spring Season. The gut contents of the fishes of these water bodies were also studied and it was found that* 80 *percent fishes live on bottom fauna.*

Introduction. The purpose of the present investigation is to find out the productivity of the bottom fauna of three different habitats, i.e., water tanks, a pond, a slow running stream and fast running canals of Peshawar by number and weight per unit area and finally correlate bottom organisms with the food of fishes.

Physical features and Climate. Peshawar lies between longitudes 71.25′ and 71.15′ East and 30.40′ and 34.35′ North. It is bounded on North by ranges which link the Sufaid Koh to the Hindu Kush, on the West and South by the continuation of the same mountains, on the South-east by the Indus river and on the North-east by the hills of the Swat. Tribal territory forms the boundary elsewhere. The height of Peshawar above the sea level is about 1000′. The district is well watered.

Its geological origin explains that the existing physical features are due to the valley formed from the abandoned bed of a great post tertiary lake, whose outlet has slowly worn a way for itself through the barrier of hills which once shut it off from the Indus. Peshawar valley consists of a central hollow, filled by alluvial deposits of silt and gravel, interspersed water worn boulders. The rocky outcrops exposed represent three types of rocks namely igneous, sedimentary and metamorphic, igenous rocks are most extensively developed near Harichand. The sediments derived from these rocks are assemblage of various, minerals like falspar, quartz, magnatite, pyroxene, olivine etc. A few pockets of chromites are located in these rocks. Sedimentary rocks are exposed in Darra Adam Khel. Metamorphic rocks are met with near the confluence of the Kabul and Indus rivers. The rocks termed as Attock slates which are not of homogenous formation.

Winters are very cold and summers are very hot. In winter minimum termperature is below 30° F. and in summer maximum temperature goes beyond 120° F. In early spring occassional hail storms and rainfall extends 3 to 4 inches; dust storms in Summer; rainy season is from August to September. After rains it becomes humid and oppressive. In winter sky is generally cloudy. Average annual rainfall is 14 inches.

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Methods. Bottom samples were collected with the help of Ekman Dredge in tanks, canals and soft bottom of the stream while a Surber one sq. ft. sampler was used only in riffle area of the stream. Samples were washed through sieves to seperate silt, sand, gravel and debris. The samples were placed in wide mouth bottles and preserved in 10% formaldehyde. The samples were placed in petri dishes and animals were picked up under a dissecting binocular microscope. The animals were identified, counted and recorded for each sample. After drying on a blotting paper for one minute, animals of each samples were weighed with the help of a chemical balance. These samples were preserved for further study of taxonomy of the distribution of species.

Fishes were caught from the pond of Punj-tirat with the help of dipnet and in the stream of Palose with the help of a drag net. The gut contents of the fishes were studied under the binocular microscope.

Sampling Stations. Punj-tirat. Near the Government Transport Bus Service, Peshawar, there are pukka water tanks and a large pond. Four tanks and a pond are within a boundary wall while two tanks are outside. These tanks and pond are managed by the Fisheries Department. The tanks and pond are fed by spring water. These tanks are very old and build by Hindus and were treated by them as holy place and used for bathing. The tanks outside the boundary wall were heavily polluted due to decaying leaves and other wastes. The water was also sprayed against mosquito larvae and pupae. The colour of the water was black with bad smell. The bottom consisted of sand, silt and decaying leaves. There was *Lemna minor* growing in these tanks. Tanks within boundary wall have clean water and *Lemna minor* and *Hydrilla* sp. were growing in them. The pond water was also polluted and was brown in colour and there was luxuriant growth of *Hydrilla* sp. in it. The collection was done from the following places:—

1. One tank outside boundary wall.
2. Two tanks within boundary wall.
3. At two places in the pond.

Stream near Palosee. Village Palosee is about 2-1/2 miles from Forest Institute. There is a stream near this village. This is formed by a few springs. At a few yards from the springs, water is deep and bottom consists of sand. At one bank there are willow trees. At a distance of about 100 feet from the springs, stream becomes shallow and bottom consists of thones, gravel and sand. The submerged stones were covered with algae. Along the riffle area there were no trees, but after 300 feet again there was a deeper area where trees were present along one bank. The depth of the stream was from 6 inch to 4 or 5 feet and was wide from 10 feet to 15 feet. The water was slow running and clean water plants were *Spirogyra*, *Ulothrix*, *Microspora*, *Cladophora* and *Hydrilla*.

The collection of the botton fauna was done at 4 different places:—

Canals. A small canal runs through Islamia College Campus and passes near Forest Institute. It is 5 feet to 6 feet wide and 3 feet to 4 feet deep, the bottom consists of silt, the water is fast running and muddy. The collection of bottom organisms was done in

Islamia College Campus and near Forest Institute. A canal feeds Lakerhay village. The water of this canal is also fast running and muddy and bottom consists fo silt. The collection was done from this canal also.

Fishes were caught from the pond of Punj-tirat and the stream. They are small in size and are identified as *Puntius ticto*, *Chela baciala*, *Danio devario*, *Barilius vagra*, *Puntius sophore*, *Nemacheilus botia*, *Hoteropneustes fossilis*, *Glyptothorax cavia*, *Channa gachua* and *Channa punctatus*.

pH of the water was tested and it was 7.5 at all place of collection.

Standing Crops of Bottom Organisms (Tables 1, 2 and 3). The bottom of the areas under investigation consisted of nearly all typical aquatic organisms. The stream was richest in quality as there were varied genera of organisms.

Productivity of bottom fauna was used by Hazzard (1938) to classify streams. His standards are grade I (rich) more than 22 gms of bottom organisms by weight or more than 2152 by number per sq. metre, grade II (average) 11-22 gms. or 1072 to 2152 organisms per sq. metre, grade III (poor) less than 11 gms. or less than 1072 organisms per sq. metre.

In the tanks and the pond of Punj-tirat, oligochaetes (*Limnodrilus sp.*) leeches, Chironomid larvae and pupae, other dipteran larvae, anails (*Limnaea sp.*) fish embryoes and fishes were found. In the stream of Palosee Oligochaetes (*Limnodrilus sp.*) leeches, Cyproidea, ephemeropteran nymphs (*Baetis* and *Caenis* sp.) trichopteran larvae and pupae, larvae of tabanid and other diptera, mites, snails (*Limnaea* sp. and *Planorbis* sp.) egg masses of snails and fishes were found. In canals Oligochaetes (*Limnodrilus* sp.) nymphs of *Baetis* sp. larvae and pupae of *Chironomus* sp. and other diptera, and larvae of *Simulium* sp. and *Culicoides* sp. were found.

Productivity of Bottom Fauna by number (Tables 1, 2 and 3). In the tanks outside the boundary wall, only oligochaetes were found which were 19440/Ft. Due to the water pollution which consists of oil with D.D.T. and decaying organic matter other animals could not survive. In other tanks and the pond the number of oligochaetes was lesser than the outer tanks. With the exception of third tank, the productivity was high in other tanks and pond according to the standard of Hazzard.

In the stream oligochaetes (*Limnodrilus* sp.) were few in number and were not found at 2nd station only. Ephemeropteran nymphs with the exception of the 1st station were present at all stations. Bugs (*Corixa* sp.) were found in sufficient number at all stations. Trichopteran larvae were present at all stations with the exception of 2nd station and pupae at 3rd station only. Adult beetles, tabanid larvae and mosquito pupae were very few in number. Chironomid larvae were in large number as compared to other habitats. *Limnaea* sp. were found at all stations and *Planorbis* sp. at three stations. Productivity of bottom organisms was rich at 1st and 3rd stations, average at 4th and poor at 2nd station.

In canals oligochaetes were heighest at Lakerhay village, *Chironomus* larvae were

present at all stations. Productivity was poor at Islamia College Campus and Forest Institue No. 2 and rich at Forest Institute No. 1 and Lakerhay village.

Productivity of Bottom Fauna by Weight (Tables 1, 2 and 3). The productivity of bottom fauna by weight was determined per sq. metre. At Punj-tirat it was very rich, i.e., 269.28 gms./M^2 in tank No. 1, poor in tanks No. 2 and 3 and average in the pond. The average weight of this area was 70.144 gms./M^2. In the stream it was poor at 1st and 2nd stations and was average at 3rd and 4th stations. The average productivity of the stream was 10.406 gms./M^2. The productivity was poor in the canals and average weight was 4.996 gms/M^2.

Bottom fauna used as Food by Fishes (Table 4.) *Barilius vagra, Puntius tico, Nemacheilus botia, Heteropneustes fossilis* and *Glyptothorax cavia* live on aquatic animals, *Danio devario, Channa gachua* and *Channa punctatus* live on both algae and animals and *Chela baciala* and *Puntius sophore* lives only on algae.

Discussion. Planarians are commonly found in streams, but they were totally absent in the stream of Palosee or elsewhere. Nematodes are also found in muddy bottom and polluted waters but they were not found either in the tanks of Punj-tirat or canals. Oligochaetes were found in all habitats, numerous in the tanks of Punj-tirat which indicate organic pollution in water. Leeches were found in tanks. Only two genera of may flies, i.e., *Baetis* sp. and *Caenis* sp. were found. Larvae of aquatic lepidoptera were not found which, are usually present on angiospermic plants. As compared to the bottom fauna with that of Rawalpindi, Dera Ismail Khan, Kohat and Azad Kashmir, numerous genera of diptera were found. Among gastropods only *Limnaea* sp. and *Planarbis* sp. were found. Productivity by number was rich in tanks of Punj-tirat and the streams and average in canals and by weight it was rich in tanks, nearly average in stream and poor in canals.

Fifty percent of the fish were entirely carnivorous, twenty percent were herbivorous and thirty percent were found to be omnivorous. Eighty percent of fish live on bottom fauna.

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TABLE I

Number of Organisms per square foot in the tanks and a pond of Punj-tirat.

Organisms	Tank No. 1	Tank No. 2	Tank No. 3	Pond Station No. I	Pond Station No. II	Avg.
Oligochaetes.	19440	200	72	1144	984	4368
(*Tubifex* sp.)	—	—	—	—	—	2
Leeches.	—	4	4	—	—	2
Chironomus larvae.	—	32	4	244	132	82
Chironomus pupae.	—	—	—	4	—	1
Other dipteran larvae.	—	—	—	—	4	1
Gastropods:-						
(*Limnaea* sp.	—	4	—	4	—	2
Fish.	—	—	—	—	4	1
Fish embryoes.	—	8	—	—	—	2
Total organisms Ft^2*	19440	248	80	1396	1124	4459
Total organisms M^2*	206064	2629	1848	14798	11914	47265
Weight of organisms in gms. M.	259.38	.2444	.0424	10.6	4.452	51.185

*Ft^2. Square foot.
*M^2. Square metre.

TABLE II

Number of Organisms per Square Foot in a Stream near Palosee village.

Organisms	Station No. I	Station No. II	Station No. III	Station No. IV	Avg.
Oligochaetes (*Limnodrilus* sp.)	20	—	16	18	14
Leeches	4	—	—	—	1
Cyproidea	2	—	—	—	
Ephemeropteran nymphs:-					
(*i*) *Baetis* sp.	—	2	37	10	12
(*ii*) *Caenis* sp.	—	5	12	12	7
Heteroptera:-					
Corixa sp.	96	31	102	17	81
Trichopteran larvae	4	—	10	8	7
Trichopteran pupae.	—	—	8	—	2
Coleoptera adults (Elmidae)	4	—	—	1	1
Chironomus larvae.	16	13	138	41	52
Chironomus pupae.	8		4	1	3
Chironomus adult.	—	1		—	—
Tabanid larvae.	—	—	1	—	—
Mosquito pupae.	—	2	3	2	2
Other dipteran larvae.	4	—	5	13	5
Other dipteran pupae.	—	—	—	5	1
Hydracarina (Mites.)	—	1	—	—	—
Gastropods:-					
(*i*) *Limnaea* sp.	12	3	225	42	70
(*ii*) *Planorbis* sp.	16	—	33	6	14
Egg mass of snails.	—	—	21	1	5
Fish.	—	—	3	3	1
Total organisms Ft^2	186	58	618	181	258
Total organisms M^2	1972	614	6550	1919	2733
Weight of organisms in gms. M.	1.187	3.07	15.90	18.83	9.784

TABLE III

Number of Organisms per Square Foot in Canals

Organisms	Islamia College Campus	Forest Institute Station No. 1	Forest Institute Station No. 2	Lakerhay Village	Average
Oligochaetes (*Tubifex* sp.)	60	276	204	2083	832
Protura.	4	—	—	—	1
Ephemeropteran nymphs.	—	—	—	—	—
(Baetis sp.)	—	4	—	—	—
Culicoides sp.	—	—	—	4	2
Chironomus larvae.	4	16	72	4	96
Chironomus pupae.	—	—	8	—	2
Simulium sp. larvae.	—	—	4	—	—
Other dipteran larvae.	28	—	8	—	2
Other dipteran pupae.	—	—	3	—	—
Total organisms Ft.	96	396	904	2096	837
Total organisms M.	1018	4198	9582	22217	99328
Weight of organisms in gms. M^2.	.042	.084	8.844	14.416	5.832

TABLE IV

Food of Fish

S. No.	Scientific Names	Vernacular Names	Locality	Size in cm.	Number of Fish dissected for gut Contents	Gut Contents*
1.	*Chela baciala* (Ham).	Chal	Lakerhay	7.3—8.3	5	Navicula. Cocconeis.
2.	*Danio devario* (Ham).	Purrandah	Lakerhay	3.4—5.5	5	Chironomus larvae. Dixa larvae. Corixa. Anoneis. Cocconeis. Tabellaria. Cymbella. Gyrisigma.
3.	*Barilius vagra* (Ham.)	Lohari, (Chal)	Lakerhay	7.3—8.3	5	Diptrous adults
4.	*Puntius Sophore* (Ham.)	Chiddu	Lakerhay	4.7—5.9	5	Pleurosigma. Mastogolia. Navicula. Tabellaria. Diatoma. Gyrosigma. Gomphonema.

Table IV *contd.*

5. *Puntius ticto* (Ham.)	Chiddu	Panj-tirat	5.5—7.5	5	*Chironomus* larvae. *Chironomus* pupae Dragon fly nymphs. Larvae of Coleoptera.
6. *Nemacheilus botia* (Ham.)	Chitala	Lakerhay	6—8	5	*Chironomus* larvae.
7. *Heteropneustes fossilis* (Bloch)	Singhi	Lakerhay	3—4.5		Corixa. Chironomus larvae. Trichoptera larvae.
8. *Glypothorax cavia* (Ham.)	Kani-tengara	Lakerhay	2—3	5	Chironomus larvae. Mayfly nymphs.
9. *Channa gachua* (Ham).	Daula	Panj-tirat	8—9.5	5	Pinnularia. Chironomus larvae. Chironomus pupae. Snail.
10. *Channa punctatus* (Ham.)	Daula	Lakerhay	9—10.7	5	Navicula. Gomphonema. Chironomus larvae. Corixa. Trichoptera. Planorbis. Cymbella.

*Various gut contents in a species are arranged in order of their predominance.

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