

Comparative study of gill rakers morphology and capacity of filtration area of some local fishes

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Abstract: The present study deals with a comparative study of some Teleosts which belonging to the family Cypriniformes a fish, *Aspius vorax* (Heckel, 1843) and fish, *Barbus sharpeyi* (Cunther, 1874) and fish *Barbus xanthopterus* (Heckel, 1843), to estimate filtration area of gill rakers, collected (278 fish) Swaib area of West Qurna district / province of Basra during the period between October / 2014 a month until the month of March / 2015 by using gill nets. The results showed that the studied fish vary in the forms and prepare of gill rakers it was noted that the *A. vorax* have small , acute and fewer number of gill rakers ranged between (12 -19), while fish *B. sharpeyi* and *B. xanthopterus* was of gill rakers elongated and skinny and with many numbers ranged numbers between (17-24 and 20-30) in *B. sharpeyi* fish and *B. xanthopterus* respectively.

The present results showed the difference of fish studied in values of filtration area (mm^2) of gill rakers , *A. vorax* have filtration area larger than of *B. sharpeyi* and *B. xanthopterus*, The filtration area in *A. vorax* was ranged between (64 – 151 mm^2) while were ranged between (14 – 69 mm^2) in *B. sharpeyi* and ranged between (31 – 70 mm^2) in *B. xanthopterus* , and this difference lead to incorporate differences ($P < 0.05$) between studied species, and this study first locally on these species .

Keywords: gills , food filtration area , fish feeding.

1. Introduction

1.1- superficial gill rakers and food filtration efficiency

The gill fish from Members Home and serves as a multi-functional members because they are sensitive to a number of changes in environmental factors such as: changes in salinity, temperature and pH as well as all types of pollutants which directly affect the natural function of the gill [1].

Most fish contain adult and young at gill rakers that vary in numbers and installed in the fish, as it plays an active role in determining the volume of food Minutes eaten and that cross into the gut when it passed with the water that enters the interior of the oral cavity, since the preparation of such gill rakers linked and forms closely linked to the behavior and habits of fish food, and the number of teeth and the installation of those changes with the growth and development of gill rakers [2],[3],[4]. gill rakers working in gill fish work sieve to sift or water filtration It serves as combs resembling cartilage intertwine and overlap with each other when the cavity pharyngeal is dilated, and is working on a book food minutes of microbiology and others in addition to protecting gill filaments of solid particles and other [4],[5],[6] .division [2] fish populations depending on the superficial gill rakers and forms to the following- :

*Filters - Feeders: is the fish that feed by filtering food from the water minutes, and fish characterized this group as

having many gill rakers and with great rates and length of almost shapes elongated and skinny.

*Omnivores, Carnivores, Herbivores: fish characterized these groups that gill rakers the brim with small numbers and rates of short-length and short-pointed shapes.

Cover gill rakers external layer epithelial container on the buds or papillae taste cells and secretory mucosa, where you play a key role in the chemical nature of the water discovery when flowing through the cracks gill, and gill rakers different types depending on the food and the behavior and feeding habits may be soft, thin, paint brushes, solid , flat, triangular or tooth-like [5]. Local studies on the morphology of the gill rakers and efficiency of food filtration for gill fish in southern Iraq, very few, such as the study [2] on the four fish from family Cyprinidae in southern marshes of Iraq, and the study [6] on the fish *Barbus esocinus*, in the Tigris / saffron River and a study [4] on the four types of fish Cyprinidae family.

1.2- objective of the study

The present study aims to determine the food filtration area of the gill rakers fish species studied after knowing phenotypic differences in the shapes and numbers and lengths gill arches and numbers gill rakers and lengths in gill arches, each fish type thoughtful, and the longer the current study is the first of its kind in the current study fish.

2. Materials and methods

2.1- Fish collection

The choice of three types of fish, which date back to the same family, Cyprinidae of local samples collected from rivers in the district of Qurna - Basrah province and of Swaib west of Qurna - area and in cooperation with fishermen during the period from October 2014 until March 2015 using gill nets (Gill nets) with different measurements, where the samples were transferred to the laboratory in cork containers filled with ice to keep the freshness of the fish while access to the laboratory, it was fish laundering and classified according to sources classification was taking phenotypic measurements of measuring the total length and the record for the lowest one (mm) and a weight of 0.1 g minimum preparation for the tests given in the current study.

2.2- Location of the fish studied taxonomic

The current study were classified fish depending on the [7] , [8].

Phylum: Chordata

Subphylum: Vertebrate

Superclass: Pisces (Fishes)

Class: Osteichthyes

Subclass: Actinopterygii

Order: Cypriniformes

Family: Cyprinidae

1- Genus: *Aspius vorax* (Heckel, 1843)

2- Genus: *Barbus sharpeyi* (Cunther, 1874)

3- Genus: *Barbus xanthopterus* (Heckel, 1843)

2.3 - calculate filtration area of the gill rakers

For the purpose of calculate filtration area of the gill rakers, it was taken (278) fish of fish current study within the totals for different length, which was extracted gill arches and separated and washed with tap water and placed in petri dishes, and took measurements referred to [4] for [9] It is.

1. The length of each gill arch using a flexible wire to take the form of a bow and then extends listed on the ruler, and represents the length of the gill arch the distance between the first gill raker to last gill raker and each gill arch, has the symbol (L).

2. The number of gill rakers each gill arch using anatomical dissecting microscope, and has the symbol (N).

3. lengths five gill rakers rate representing all regions of the gill arch and each gill arch.

4. The thickness of the rate estimated three gill rakers base on different locations of all gill arch using the lens-kind listed Ocular micrometer with balancing the zoom is set to power (10x), and symbolizes the age thickness measurements base gill raker symbol (T).

5. The rate of capacity leeway account (G) Gap, which represent the spaces between the gill rakers using gill equation [9], it is :-

$$G = L - ((N - 1) \times T) / (N - 1)$$

6. account Filtration area (F), which represents the open space between gill rakers by applying equation [9], it is :-

$$F = (\Sigma I - I_{max}) \times G$$

Where: - F: filtration area.

ΣI : - represents the total length of the gill rakers each gill arch .

= Number of gill rakers x rakers longer and each gill arch .

I_{max} : - represents the longest gill raker and each gill arch .

2.4 - Statistical Analysis

The differences between the rates of the total length of the fish and components filtration area of the gill rakers test and test value less teams moral (LSD) using a statistical program (Genstat 3), when the moral level of 5%, also examined the relationships between variables to calculate the correlation Coefficient, and the equations of regression each relationship as stated in [10].

3. Results

The results of the current study Showed, three different species in the area of food filtration components of the gill rakers for each type of fish in addition to the difference in rates between the groups studied fish length for each type of fish and as shown in the tables (1,2,3), the current study showed, different lengths rates gill arches between the three types, which ranged rates between (33.55 - 48.52 mm) in fish *A. vorax* as shown in Table (1), while the rates ranged between (18.86 - 31.19 mm and between 22.88 - 35.62 mm) in fish *B. sharpeyi* and *B. xanthopterus* as shown in Tables (2,3), and notes that the lengths of the gill arches in fish *A. vorax* greater rates compared to the other two species, and this is illustrated by the results of the statistical analysis of the differences recorded in the study of this trait between the three types existence of significant differences ($P < 0.05$) between fish *A. vorax* and the other two while there have

been no significant differences between *B. sharpeyi* and fish *B. xanthopterus* as shown in the table (4).

Also showed the results of statistical analysis of the differences recorded for the study of prescription numbers of gill rakers between the three types existence of significant differences between the three types rate ($P < 0.05$) as shown in the table (4), and these differences dating primarily to the difference in the three types in numbers rates of gill rakers between species three, which ranged rates between (12.78 - 19.20) in fish *A. vorax*, while the range rates between (17.05 - 24.45) in fish *B. sharpeyi* and ranged numbers of gill rakers between (20.97 - 30.49) in fish *B. xanthopterus*, notes from these values that the fish *B. xanthopterus* It was once the largest rakers compared to rates set up in fishes *B. sharpeyi* and *A. vorax* and the latter owned by a few rakers preparation rates compared three types as shown in the tables (1,2,3).

When examining the correlation relation (r) between the average total length of the fish and the rates of lengths gill arches (mm) and rates numbers of gill rakers in three types, showed the results of the statistical analysis a strong positive relationship between the traits were correlation coefficient values (0.984 and 0.990 and 0.999) as in the table (5), when studying the recipe average total length of the fish with the length of the gill arch in fishes *A. vorax* and *B. sharpeyi* and *B. xanthopterus* respectively as shown in the form of (1) while the correlation coefficient values (0.994 and 0.990 and 0.978) in fish *A. vorax* and *B. sharpeyi* and *B. xanthopterus* respectively when studying the relationship between the rate of the total length of the fish and the rate of the number of gill rakers in three types, respectively, as shown in Figure 2.

The current study showed, three types different in rates lengths of gill rakers ranged from (2.32 - 3.91 mm) in *A. vorax* fish as shown in Table (1) while the rates ranged between (1.30 - 3.62 mm) in *B. sharpeyi* fish as shown in the table (2) while the rates ranging between (1.87 - 3.26) in fish *B. xanthopterus* as shown in Table (3) which shows the variation of the three species in the lengths rates of gill rakers which indicates the presence of significant differences ($P < 0.05$) among the three species and this is what illustrated by the results of the differences recorded statistical analysis between the rate of the total length recipe rate gill rakers length between the three types as shown in the table (4), while the differences were not significant ($P > 0.05$) between fishes *B. sharpeyi* and *B. xanthopterus* as in the table (4), and notes from tables (1,2,3) The rates of

length gill rakers values increase with the length of the fish and that's what made clear correlation coefficient, which proved the existence of a strong positive relationship between the rate of moral total length of the fish and the rate of length gill rakers where the values (r) values (0.984 and 0.979 and 0.957) in *A. vorax* fish and *B. sharpeyi* and *B. xanthopterus* respectively as shown in Figure (3) and Table (5).

The results of the current study, the fish *A. vorax* possessed greater length rates gill raker compared to other types, the longer rates ranged from gill raker in fish *A. vorax* between (3.09 - 4.49 mm) as shown in Table (1) while the rates ranged between (1.39 – 3.44 and 2.28 - 3.32 mm) in fishes *B. sharpeyi* and *B. xanthopterus* respectively as shown in the tables (2,3), which indicates the existence of differences between the three types have the results of the statistical analysis showed the existence of significant differences ($P < 0.05$) between the three types as shown in the table (4) while were not any significant differences ($P > 0.05$) between fishes *B. sharpeyi* and *B. xanthopterus* as shown in the table (4), not the results of statistical analysis to study the correlation between the rate of the total length of the fish and the rate of the longest gill raker proved the existence of a positive relationship moral and this is shown by the correlation coefficient values (r), which was (0.992 and 0.963 and 0.977) in fish *A. vorax* and *B. sharpeyi* and *B. xanthopterus* respectively as shown in Figure (4) and Table (5), as well as is the case when studying the correlation relation (r) between the gill raker base thickness and rate total length of the fishes, which showed the results of statistical analysis of the existence of a link between the qualities in three types relationship and that was (0.702 and 0.943 and 0.998) in fish *A. vorax* and *B. sharpeyi* and *B. xanthopterus* respectively as shown in the form of (5) and table (5) which indicates the increasing values of base thickness gill raker when increasing fish length this is illustrated in rates in the tables (1,2,3) for the three types, it

Table (1): rates lengths and weights and components of an area of space for filtration and an area of filtration in fish *A. vorax*

Rate area of filtration (mm ²)(F)	Rate space of filtration (mm)(G)	Rate thickness (base) of gill raker (mm)	Rate longer of gill raker (mm)	Rate length of gill rakers (mm)	Rate numbers of gill rakers	Rate length of gill arch (mm)	Rate of weight (g)	Rate the total length (mm)	Number Of fish	a Total length(mm)
18.64 ± 32.11	53.2 ± 07.0	32.0 ± 011.	09.3 ± 26.0	32.2 ± 130.	78.12 ± 42.0	55.33 ± 70.1	238.66 ± 27.22	318.10 ± 12.73	16	300-324
85.84 ± 15.8	79.2 ± 08.0	41.0 ± 02.0	50.3 ± 23.0	93.2 ± 330.	59.13 ± 410.	12.37 ± 62.0	321.55 ± 12.23	341.66 ± 14.36	18	325-349
07.107 ± 71.5	49.2 ± 01.0	48.0 ± 01.0	57.3 ± 21.0	13.3 ± 010.	72.14 ± 470.	42.40 ± 47.1	369.44 ± 15.93	367.50 ± 9.48	14	350-374
74.119 ± 85.4	60.2 ± 060.	56.0 ± 030.	85.3 ± 07.0	23.3 ± 040.	74.15 ± 550.	42.43 ± 70.0	442.50 ± 21.62	382.77 ± 5.95	16	375-399
82.136 ± 92.5	56.2 ± 05.0	45.0 ± 05.0	28.4 ± 23.0	52.3 ± 140.	31.17 ± 620.	14.46 ± 80.0	480.18 ± 16.22	412.55 ± 8.51	14	400-424
76.151 ± 24.8	33.2 ± 06.0	66.0 ± 06.0	49.4 ± 16.0	91.3 ± 120.	20.19 ± 0.83	52.48 ± 65.0	573.80 ± 12.06	430.50 ± 10.65	14	425-450

±..... Standard error

Table (2): rates lengths and weights and components of an area of space for filtration and an area of filtration in fish *B. sharpeyi*

Rate area of filtration (mm ²)(F)	Rate space of filtration (mm)(G)	Rate thickness (base) of gill raker (mm)	Rate longer of gill raker (mm)	Rate length of gill rakers (mm)	Rate numbers of gill rakers	Rate length of gill arch (mm)	Rate of weight (g)	Rate the total length (mm)	Number Of fish	a Total length(mm)
07.14 ± 50.0	95.0 ± 03.0	32.0 ± 01.0	39.1 ± 23.0	30.1 ± 330.	05.17 ± 67.0	68.18 ± 66.0	200.33 ± 50.8	212.60 ± 7.53	16	200-224
12.21 ± 96.4	82.0 ± 04.0	35.0 ± 01.0	75.1 ± 16.0	44.1 ± 18.0	56.18 ± 360.	14.20 ± 81.0	239.77 ± 6.86	234.0 ± 7.28	18	225-249
44.31 ± 54.2	94.0 ± 03.0	33.0 ± 01.0	32.2 ± 26.0	12.2 ± 390.	58.19 ± 360.	26.22 ± 60.0	291.22 ± 25.81	260.44 ± 7.17	18	250-274
92.35 ± 71.0	91.0 ± 030.	40.0 ± 020.	39.2 ± 07.0	22.2 ± 600.	50.20 ± 340.	33.24 ± 50.0	387.62 ± 31.39	283.37 ± 6.41	16	275-299
85.49 ± 38.7	85.0 ± 04.0	47.0 ± 01.0	76.2 ± 17.0	81.2 ± 400.	47.22 ± 580.	46.28 ± 72.0	457.85 ± 17.96	313.14 ± 7.73	14	300-324
70.69 ± 39.12	78.0 ± 03.0	56.0 ± 03.0	44.3 ± 24.0	62.3 ± 050.	45.24 ± 590.	19.31 ± 79.0	504.66 ± 11.30	337.83 ± 7.13	12	325-350

±.....Standard error

Table (3): rates lengths and weights and components of an area of space for filtration and an area of filtration in fish *B. xanthopterus*

Rate area of filtration (mm ²)(F)	Rate space of filtration (mm)(G)	Rate thickness (base) of gill raker (mm)	Rate longer of gill raker (mm)	Rate length of gill rakers (mm)	Rate numbers of gill rakers	Rate length of gill arch (mm)	Rate of weight (g)	Rate the total length (mm)	Number Of fish	a Total length(mm)
31.03 ± 2.24	.900 ± .050	13.0 ± .0080	2.28 ± .240	.871 ± 0.09	20.97 ± .640	22.88 ± .570	224.5 ± 8.89	236.25 ± 6.31	16	249-225
38.06 ± 3.07	.830 ± .020	.340 ± .0080	2.32 ± .050	2.34 ± .240	22.87 ± 0.65	24.86 ± .640	259.11 ± 10.09	262.55 ± 7.31	18	274-250
46.57 ± 3.50	.890 ± 03.0	.370 ± 01.0	.572 ± .090	.452 ± 0.09	23.02 ± 0.64	27.46 ± 1.18	312.62 ± 27.28	287.0 ± 7.13	16	275-299
54.89 ± 2.02	.880 ± 030.	40.0 ± 0.005	.792 ± 40.0	.702 ± 0.05	24.94 ± 0.58	29.97 ± .730	390.50 ± 32.83	313.12 ± 7.56	16	300-324
62.79 ± 3.02	85.0 ± .030	.430 ± .010	.253 ± .370	3.42 ± 0.43	27.65 ± 0.90	32.64 ± .880	523.14 ± 59.31	338.28 ± 7.73	14	325-349
70.97 ± 3.92	.790 ± 03.0	.470 ± .010	.323 ± .080	.263 ± 0.09	30.49 ± 0.84	35.62 ± 1.01	663.50 ± 45.84	364.83 ± 7.62	12	350-375

±.....Standard error

also results of the statistical analysis of the differences recorded between the average total length of the fish and the rate of base thickness gill raker between the three types, did not record any significant differences ($P > 0.05$) as shown in the table (4) which shows the approximate thickness of the rates base gill raker each type separately, which ranged rates between (0.32 - 0.66) in *A. vorax* fish as in Table (1) while ranged between (0.32 - 0.56) in *B. sharpeyi* fish, as in the table (2) while the rates ranged between (0.31 - 0.47) in fish *B. xanthopterus* as shown in the table (3) .

The results of the current study showed, three different species in the expanse filtration rates ranged from (2.33 - 2.53) in fish *A. vorax* as in Table (1) while values ranged between (0.78 - 0.95) in *B. sharpeyi* fish as in the table (2), while rates ranged between (0.79 - 0.90) in fish *B. xanthopterus* as shown in the table (3), as the results of statistical analysis showed that there is an inverse relationship between the rate of the total length of the fish and the rate of leeway filtration and this is what made clear correlation coefficient values, which recorded (- 0.546 and - 0.658 and - 0.641) in *A. vorax* fish and *B. sharpeyi* and *B. xanthopterus* respectively as shown in Figure (6) and table (5).

Proven results of the statistical analysis of the differences recorded between the rate of the total length of the fish and the rate of leeway filtration existence of significant differences ($P < 0.05$) between the *A. vorax* fish and *B. sharpeyi* and *B. xanthopterus* while there have been no significant differences ($P > 0.05$) between *B. sharpeyi* and *B. xanthopterus* as in the table (4) .

Results of statistical analysis also showed when studying the correlation between the rate of the total length of the fish and the rate of filtration area of gill rakers a strong correlation moral and this is shown by the results of the correlation coefficient values (r) which recorded values (0.966 and 0.978 and 0.993) in fish *A. vorax* and *B. sharpeyi* and *B. xanthopterus* on respectively as shown in the form of (7) and

table (5) which indicates the increase filtration area when increasing fish length, due to differences in the gill rakers filtration area rates among the three types, the results of statistical analysis of the existence of significant differences were recorded ($P < 0.05$) between the three types As shown in the table (4) This is due to the differences in the three types of filtration area rates have rates recorded ranged from (64.18 - 151.76 mm) in fish *A. vorax* as in Table (1) while the rates ranged between (14.07 - 69.70 mm) in fish *B. sharpeyi* as shown in the table (2), while ranged filtration between space rates values (31.03 - 70.97) in fish *B. xanthopterus* as in the table (3), and notes from the above values that fish *A. vorax* possessed higher filtration area compared rates in fishes *B. sharpeyi* and *B. xanthopterus* respectively.

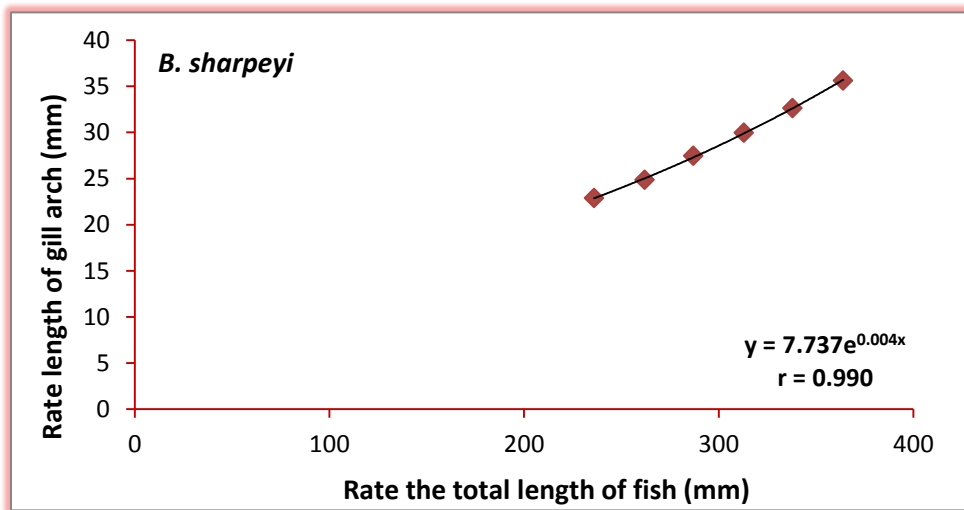
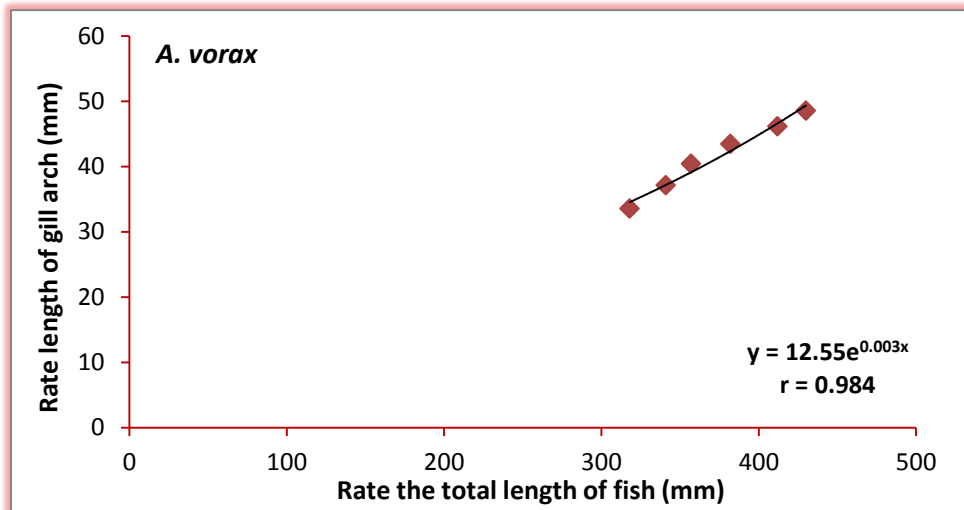
Table (4) : Variance analysis differences recorded the components of space of filtration (mm) and an area of filtration (mm²) in the species the three .

L.S.D	Compared three types			Character of the studied
	<i>B. xanthopterus</i>	<i>B. sharpeyi</i>	<i>A. vorax</i>	
6.28	9.28 ^b	2.24 ^b	5.41 ^a	Rate length of gill arch (mm)
3.574	24.99 ^c	20.43 ^b	15.56 ^a	Rate numbers of gill rakers
0.836	2.67 ^b	2.25 ^b	3.17 ^a	Rate length of gill rakers (mm)
0.711	2.75 ^b	2.34 ^b	3.8 ^a	Rate longer of gill raker (mm)
0.1153	0.387 ^a	0.405 ^a	0.480 ^a	Rate thickness (base) of gill raker (mm)
0.1210	0.857 ^b	0.875 ^b	2.550 ^a	Rate space of filtration (mm)(G)
29.26	50.7 ^c	37.0 ^b	110.7 ^a	Rate area of filtration (mm ²)(F)

*average that carry characters are similar are no different among themselves morally and each status of a deliberate .

Table (5) : Values of the correlation coefficient between the coefficient of the total length of fish and attributes studied fish study .

<i>B. xanthopterus</i>	<i>B. sharpeyi</i>	<i>A. vorax</i>	Character of the studied
0.999	0.990	0.984	Rate length of gill arch (mm)
0.978	0.990	0.994	Rate numbers of gill rakers
0.957	0.979	0.948	Rate length of gill rakers (mm)
0.977	0.963	0.992	Rate longer of gill raker (mm)
0.998	0.943	0.702	Rate thickness (base) of gill raker (mm)
-0.641	-0.658	-0.546	Rate space of filtration (mm)(G)
0.993	0.978	0.966	Rate area of filtration (mm ²)(F)



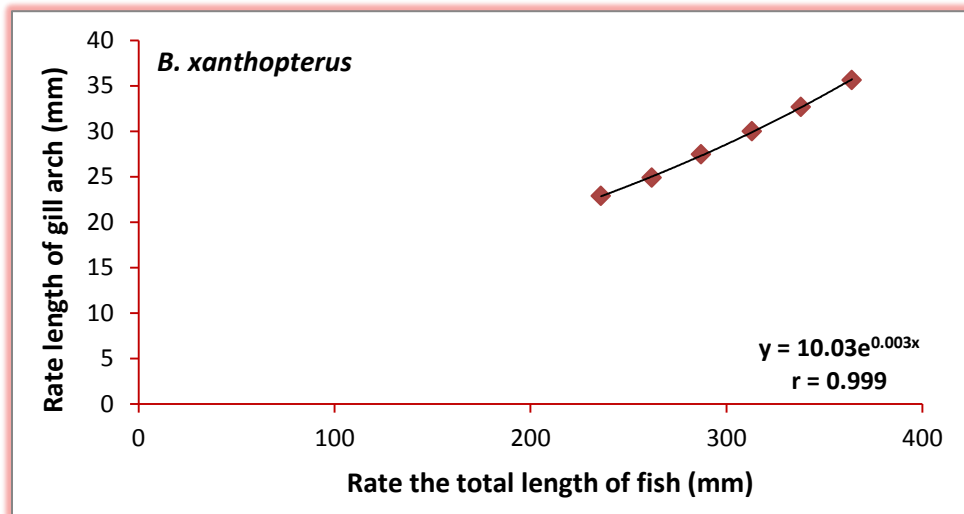
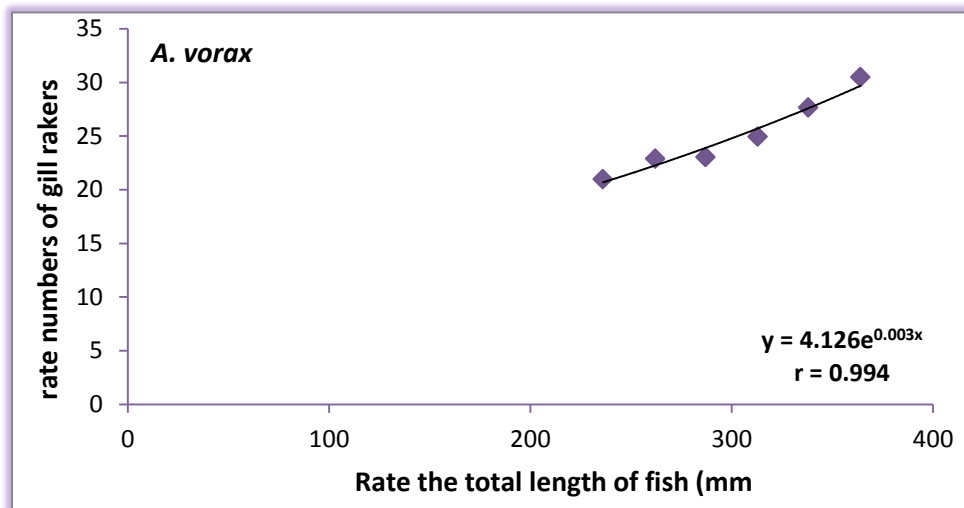


Figure (1):The relationship exponential between rate the total length (mm) and rate along gill arches in the fish studied



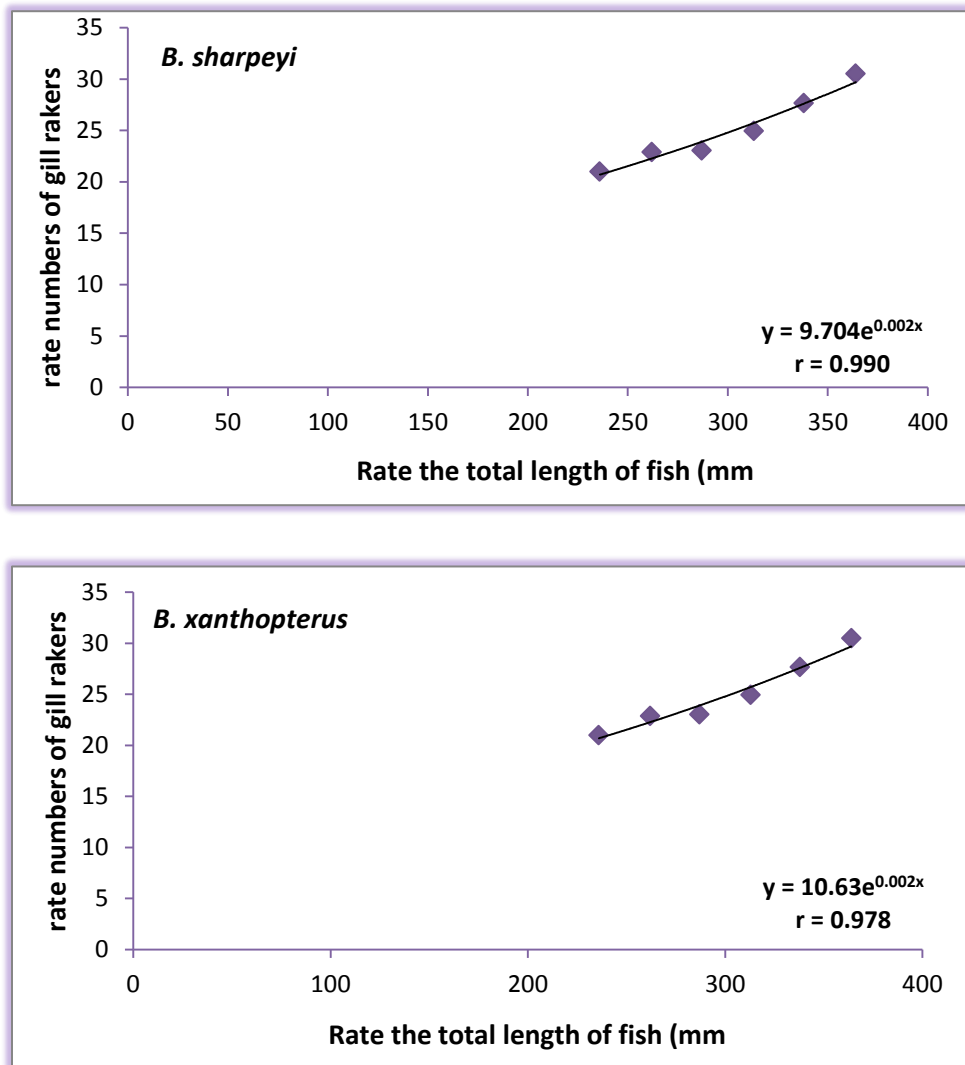


Figure (2):The relationship exponential between rate the total length (mm) and rate numbers gill rakers in the fish studied

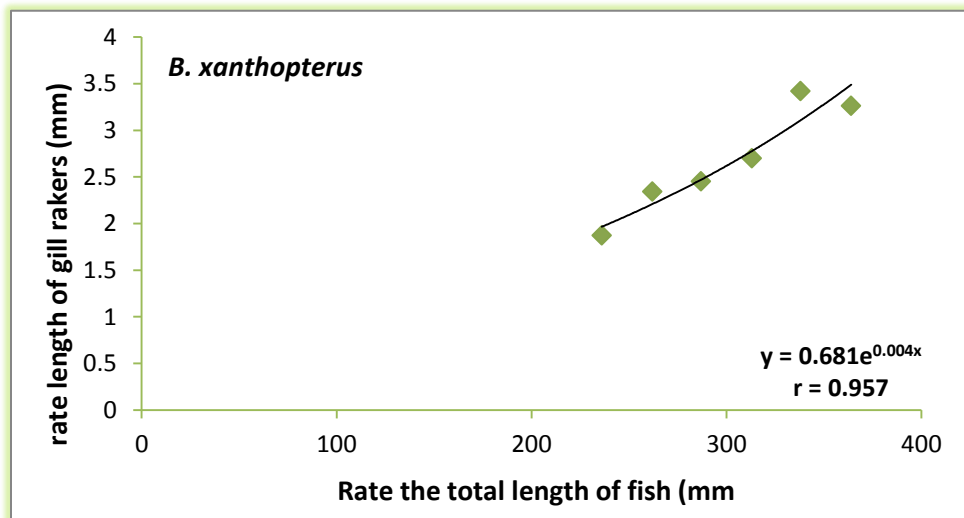
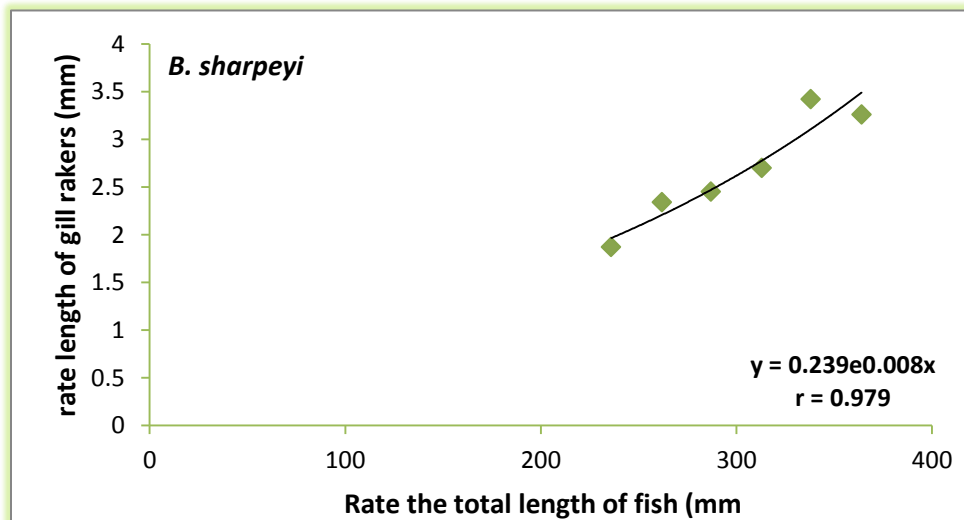
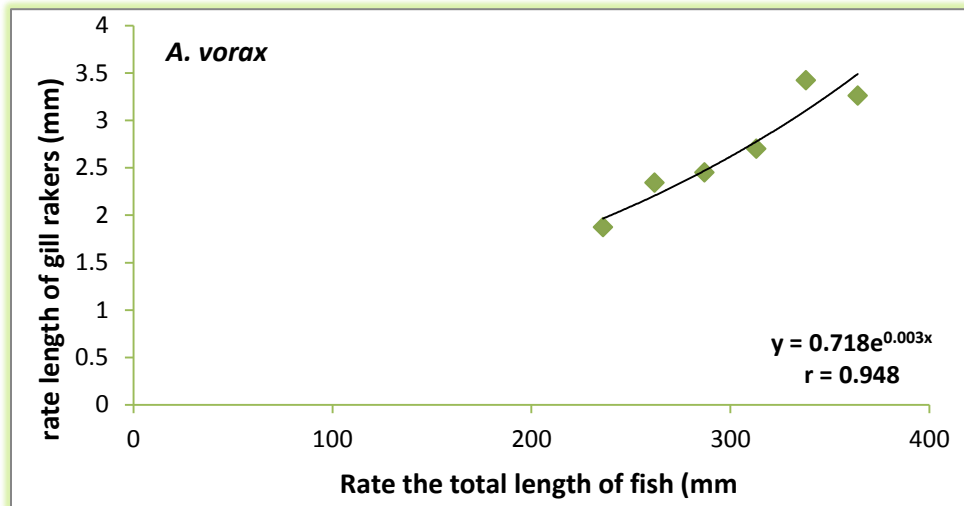
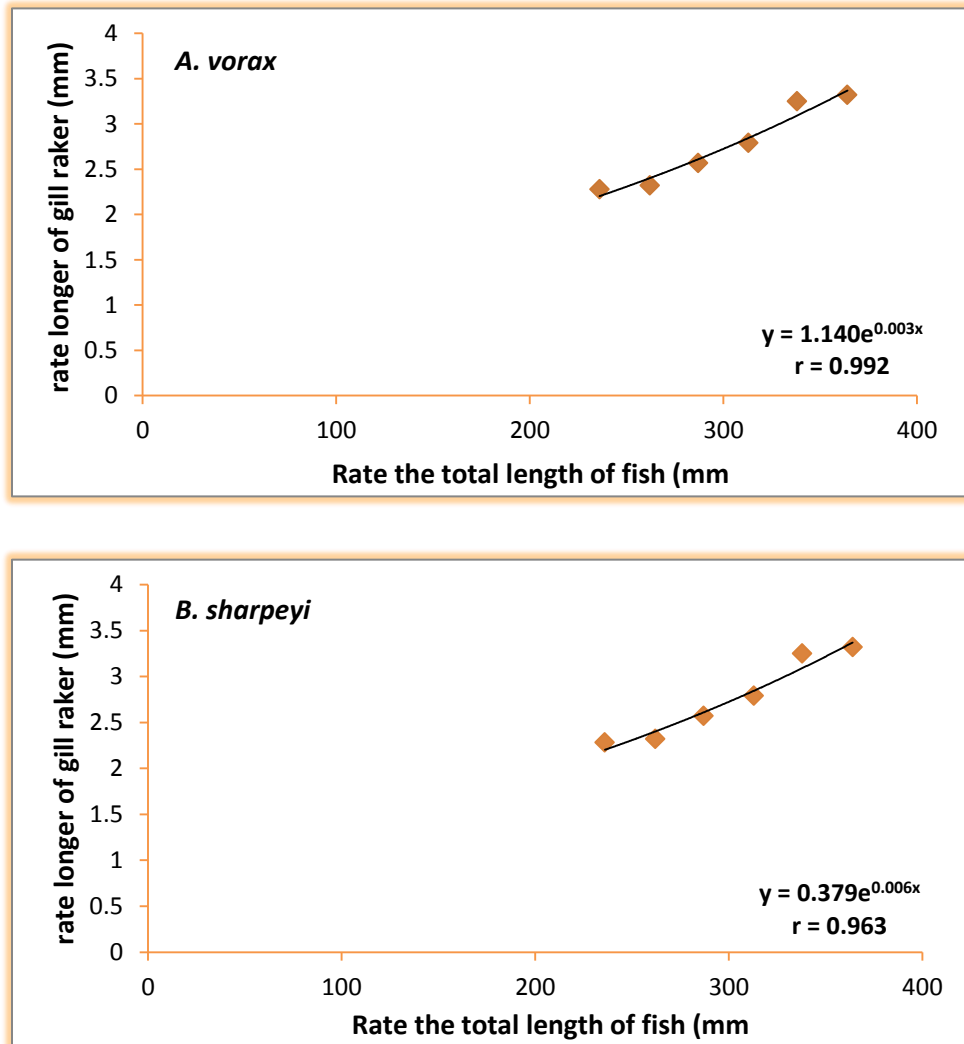


Figure (3):The relationship exponential between rate the total length (mm) and rate length gill rakers (mm) in the fish studied



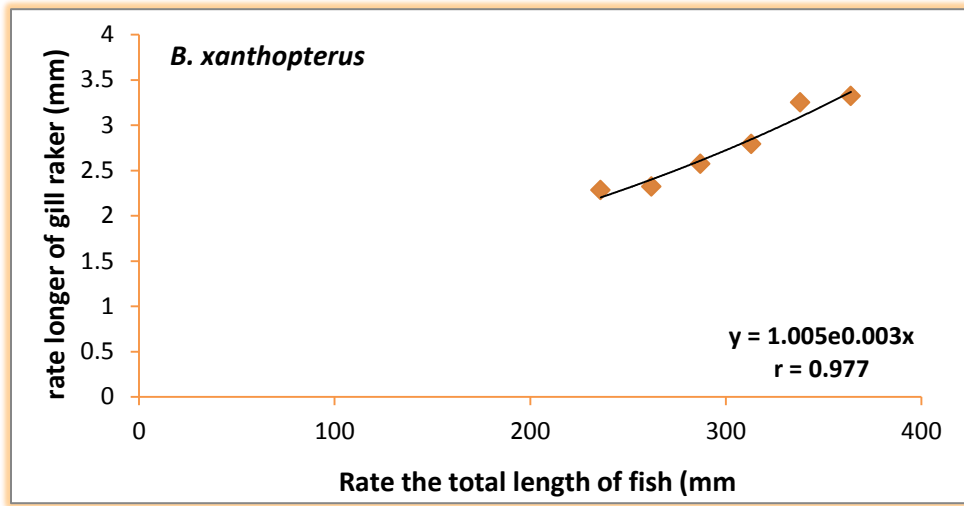
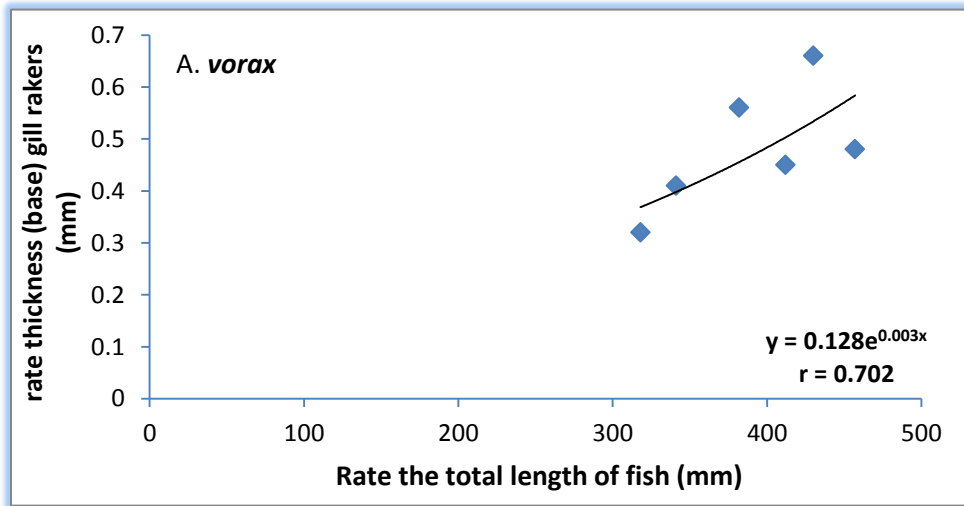


Figure (4):The relationship exponential between rate the total length (mm) and rate longer gill raker (mm) in the fish studied



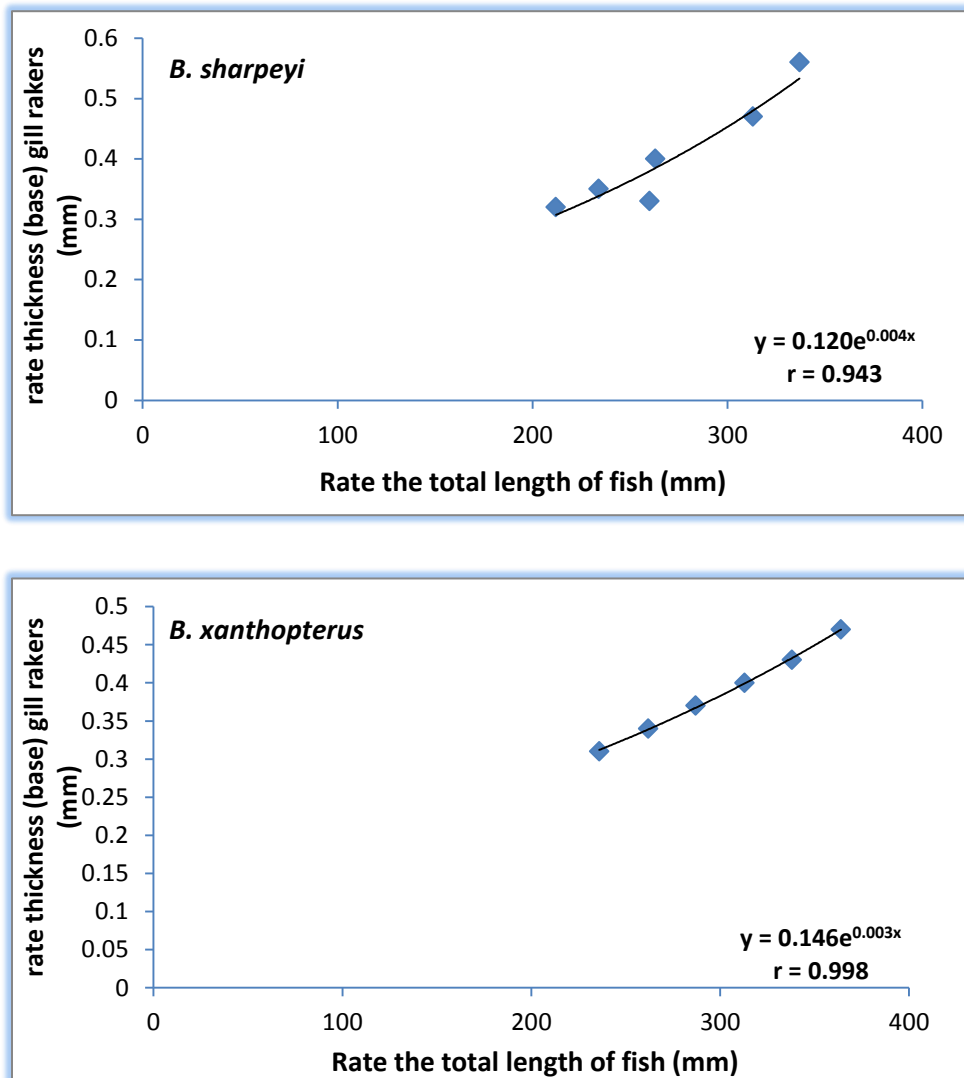


Figure (5):The relationship exponential between rate the total length(mm) and rate thickness (base) gill rakers (mm) in the fish studied

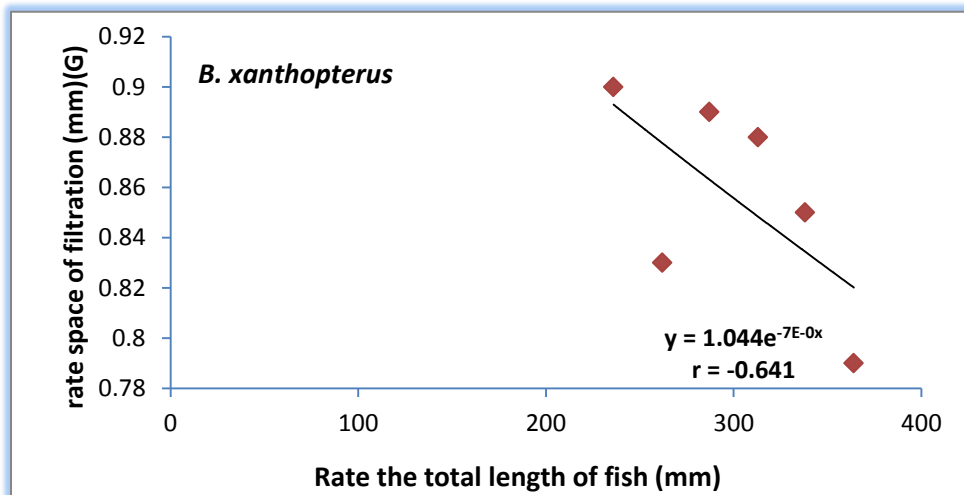
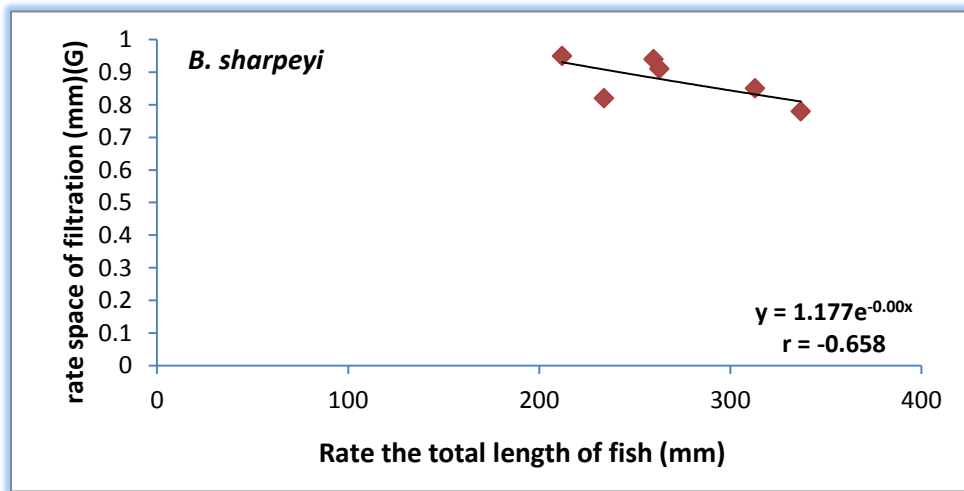
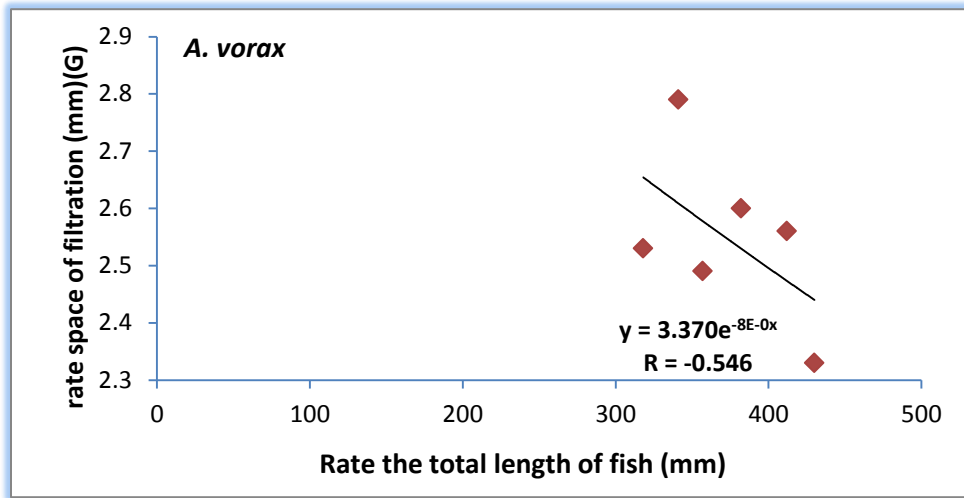
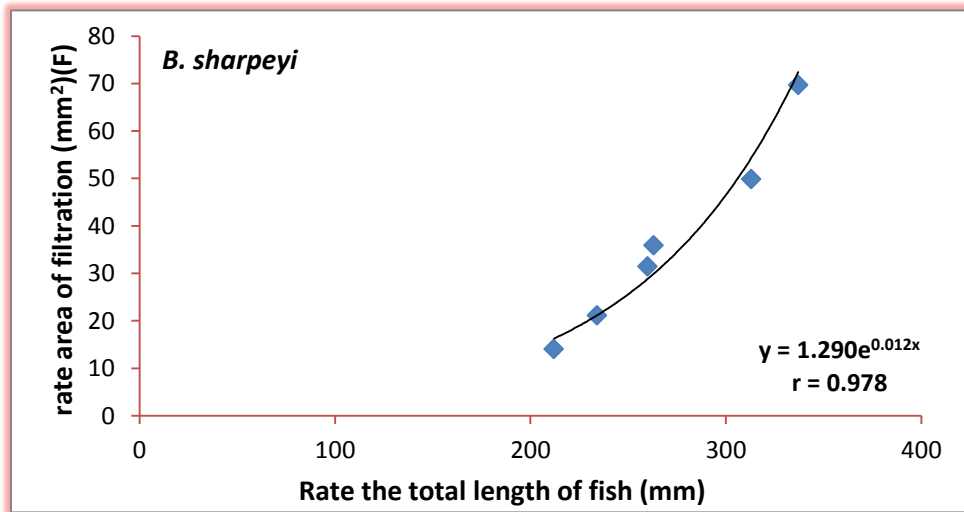
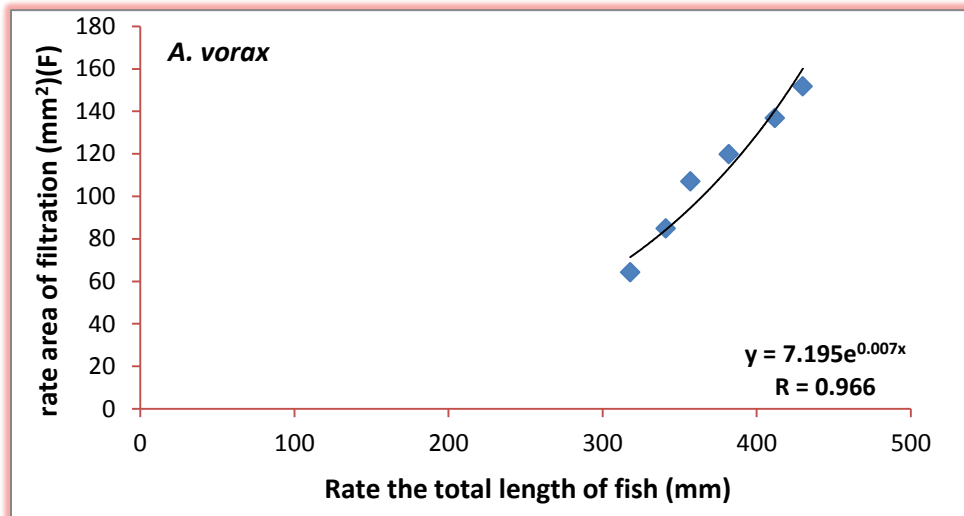


Figure (6):The relationship exponential between rate the total length(mm) and rate space of filtration (mm)(G) in the fish studied



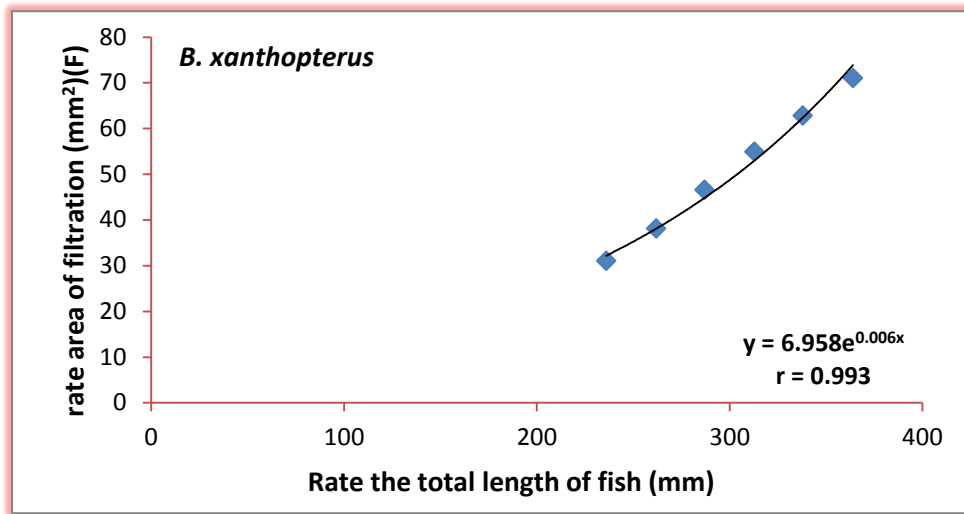


Figure (7):The relationship exponential between rate the total length(mm) and rate area of filtration (mm²)(F) in the fish studied

4. Discussion

Fish generally vary in shapes and numbers and installation gill rakers carried by gill arches in gills, and these differences go back mainly to fish a difference in style and habits of food and feed the fish, and as a result of the different fish in their eating habits, which are divided into different food groups, namely: Carnivores, Herbivores, Omnivores , Detritivores a result of this diversity in the feeding method and the type of food you eat fish to the presence of superficial and synthetic differences in gill rakers, with each of the [4],[6] pointed out that the forms and numbers gill rakers used as a means taxonomic fish, while the gill rakers are characterized lack edition and the short length at the same feeding fish animal while characterized by abundant numbers and increase the length of the fish that are vegetarian feed or mixed [2], and that forms the gill rakers and numbers in the current study fish consistent with phenotypic specifications for both types of different food Nature which showed that fish *A. vorax* were has gill rakers short and pointed and with a few numbers, while the *B. sharpeyi* and *B. xanthopterus* fishes with gill rakers elongated and skinny and with many numbers, and this difference in shapes and lengths and numbers gill rakers primarily due to the difference in the studied species in the nature of the food and feeding habits [4],[11],[12],[13],[14].

noted the current study, the studied fish difference in the values contained filtration space components rates lengths gill arches and rates of numbers and lengths gill rakers rates as possessed *A. vorax* fish lengths gill arches rates and gill rakers lengths greater compared to rates lengths gill arches and rates of gill rakers lengths in *B. sharpeyi* and *B. xanthopterus* fish, In addition to owning the *A. vorax* fish numbers rates gill rakers less compared numbers in other species, and the gill rakers lengths in Fish *A. vorax* was the biggest compared lengths in other species, and this difference is due primarily to the difference in the totals length of fish used in the current study, which is due mainly to the the difference in the growth and development of gill rakers [15], according to the studied groups of fish, which reflects the extent of the activity and vitality of the fish according to their lengths and sizes [9],[11],[15].

The results of the present study showed, non-studied species difference in the expanse filtration, which represent the spaces between gill rakers, as it showed an inverse relationship between space filtration with different groups length of fish present to fish study and the reason is due to the small space filtration between the gill rakers values and showed the results of the current study also it said that the special area of filtration rates was characterized by the existence of differences in values in the studied species, as it acquired the *A. vorax* fish larger filtration area ranging from (64-151 Mlm²) while possessed *B. sharpeyi* fish and *B.*

xanthopterus values close to the area of filtration ranged between (14-70 Mlm²) and this difference is due to the difference between the species in the lengths gill arches and rates the number of rates and lengths gill rakers between fishes the current study and this difference is due primarily to the difference in the nature of the food and feeding habits of the current fish and referred to previous studies that *A. vorax* fish with Carnivores and fish animal feed *B. sharpeyi* with Herbivores Vegetarian Nutrition while fish *B. xanthopterus* of feed mixed Omnivores This difference in feeding result in differences in the shapes and lengths and the number of gill rakers which in turn affect food stand for filtration space of gill rakers and therefore, the current findings are consistent with most of the studies on superficial and efficiency of the food stand for gill rakers such study [2], and a study [4], and a study [6] on a different fish with different eating habits.

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