STUDIES ON THE SCALES OF THE IMPORTANT FRESH WATER FISHES IN MANCHURIA*

(PL. I ~ II)

ISAO MATSUI

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1. INTRODUCTION

The fresh water fishes collected in the rivers, lakes, swamps or the markets in Manchuria are generally the large types, and this may be the result from quickness of their growth or may only be the result of their old age and then such a question may be resolved by explaining of the organization of fishes age. From this point of view, this paper was written on morphological studies of the scales of the important fresh water fishes in Manchuria for the purpose of comparing the growth-degree of the Manchuria fresh water fishes with the Japanese ones. The fauna and the distribution of the fresh water fishes in Manchuria were studied by Berg (*1932-33*),[1] Mori (*1934*) (*1936*),[2)3)] Sho (*1940*),[4] D. Miyaji (*1940*)[5] and also by Nishio (*1946*)[6] on the ecological studies of salmon and trout. But from the above mentioned points of view as I have observed, there is not this kind on the fishes in Manchuria. There is a comparative study of Chu, Yuan, Ting (*1935*)[8] on the scales of cyprinidae in China and H. Kobayashi (*1937*)[7] studied on Japanese Cyprinid. I express here my cordial thanks dedicating this paper to the memory of Mr. Hidebumi Kuwano who had cooperated in collecting the scales of fishes.

2. MATERIALS

Materials on studies have been collected in the rivers, lakes, swawps and at the market of Harbin, and there are 23 species of scales, namelly containing 15

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* Contributions, No. 5, the Shimonoseki Fisheries College. Concerning the growth-degree of fresh water fishes in Manchuria, please take reference to stuies on the growth of the aquatic animals (IX) on the comparative studies on the growth of fishes in Manchuria and the latter is to be reported in the Journal of the Shimonoseki Fisheries College (next volume).

species of Cyprinidae, 3 sp. of Coregonidae, I sp. of Salmonidae, or of Epinephelidae, or of Eleitrudae. These scales were collected at the part of the 2nd or third line right below the fore fundamental part of dorsal fin. Name of species, collected date, locality, length of body, weight of body are shown in Table 1.

Table 1

Name of species	Date of collection	Collected locality	Number	Body length (cm)	Body weight (gr)
CYPRINIDAE					
Cyprinus carpio Linne	Sep. 10, *1941* Feb. 23, *1941*	Harbin, Datsurei Lake	13	15.0~76.0	100~9500
Carassius auratus (Linne)	Jan. 19, *1941*	Harbin, Datsurei, Nonkou	20	9.7~31.8	36~1160
Ctenopharyngodon idella (C. et V.)	Jan. 6~24, *1941*	Harbin, Dairai, Nonkou	17	8.4~76.5	12~8050
Mylopharyngodon aethiops (B.)	Feb. 12, *1941*	Harbin	3	10.3~86.0	25~9550
Hypophthalmichthys molitrix	Dec. 27, *1941* Jan. 16, *1941*	Harbin, Dairai	16	10.5~67.0	20~5000
Squaliobarbus curriculus (R.)	Jan. 16~19, *1941*	Harbin	9	10.1~30.5	17~720
Parabramis pekinensis (B.)	Jan. 19, *1941*	Harbin, Dairai	11	12.0~40.0	40~1350
Erythroculter erythropterus (B.)	Jan. 6, *1941*	Nonkou	8	30.0~64.0	250~2500
Culter mongobicus Basilewsky	Feb. 12, *1941*	Harbin	11	11.0~44.0	19.1~1910
C. brevicauda Günther	Feb. 19, *1941*	Harbin	5	9.7~24.0	17~200
Xenocypris macrolepis Bleeker	Feb. 19, *1941*	Harbin	4	6.2~13 5	5~450
Hemiculter leucisculus (B.)	Feb. 12, *1941*	Harbin, Dairai	9	4.1~15.5	4~45
Hemibarbus labeo maculatus (B.)	Sep. 10, *1941*	Harbin	3	22.0~28.0	192~227
H. labeo (Pallas)	Jan. 6, *1941*	Harbin	2		
Elopichthys bambusa (Richardson)	Dec. 26~29, *1941*	Harbin	10	14.0~100.0	30~10800
SALMONIDAE					
Hucho taimen (Pallas)	Sep. 10, *1941*	Harbin, Nonkou.	4	47.0~95.0	1950~9900
COREGONIDAE					
Branchymystax lenok (Pallas)	Sep, 10, *1941*	Nonkou.	3	23.2~47 0	320~1600
Coregonus ussuriensis Berg	Dec. 25~26, *1940*	Harbin	5	21.5~42.5	180~1400
C. chadaryi Dybowsky	Dec. 25~26, *1940*	Harbin	3	27.0~30.0	360~450
ESOCIDAE					
Esox reichertii Dybowsky	Jan. 6, *1941*	Harbin	8	17.2~87.5	50~6650
OPHICEPHALIDAE					
Ophiocephalus argus (Cantor)	Sep. 10, *1940* Feb. 19, *1941*	Harbin, Nonkou.	8	12.5~80.0	36~7000
EPINEPHELIDAE					
Siniperca chuatsi (Basilewsky)	Jan. 24, Feb. 21, *1941*	Harbin, Dairai	9	23.0~39.0	400~1550
ELEOTRIDAE					
Percottus glehni Dybowsky	Jan. 9, *1941*	Harbin,	2	6.8~7.0	10~16

3. COMPARATIVE STUDIES ON SCALES

1) CYPRINUS CARPIO (Linne) Fig. 3

The numbers of scales in the lateral line are 31~36 and these scales which are larger in comparison with its form is somewhat round and especially the fore-margin of the basal field is round and side-margin of the apical field does not so much curve and the focus lies in the middle part or lies in the front a litte. The radii grow on both sides of the basal and the apical field and it does not exist on the side. The radii in the apical field especially develop well and it radiates around the focus and although its numbers are inconstant according to the size, these are 11~141. The space between radii is narrow and irregular. The numbers of radii in the basal field are generally fewer than those in the apical field but some exceptions are seen in the case of the small body of fish. Its numbers are 13~57 and the space between radii is wide. The relation between the size of fish and radii is shown in Table 2.

Table 2

Length of Body (cm.)	15.0	17.3	18.0	25.0	35.1	36.0	41.0	51.0	51.7	69.0	76.0
Apical Radii	11	54	35	30	89	41	49	42	128	141	57
Basal Radii	13	17	20	23	31	26	24	32	57	38	55

Namely as the body of fish grows, there can be seen the tendency of radii increasing but it is not necessarily the rule. Some of radii radiated from the focus continue to the last, or discontinue on the half-way or some radii newly grow on the way. The annular ring is the boundary of the radii which discontinue or grow, and some of them seldm decrease suddenly and such a growth seems to follow the change of their surroundings.

2) CARASSIUS AURATUS (Linne) Fig. 19

The numbers of scale in the lateral line are 26~30. The size of its scale is larger in comparison with carp. The type of its scale is somewhat round and

there is uneveness about the margin of the apical field. The focus lies not in the middle but lies ahead a little. The circuli doesn't grow in the basal field. The radii are extremely few in comparison with carp and they exist in both the apical and basal field. The radii in apical field are 2~6 but generally 3~4. The radii in the basal field 1~4 but generally 2~3. The character of the scales consists in growing the thick X-formed radii around the focus. And one or two of them are on one side of the scale or are on both sides. Accordingly the carp and *Carassius auratus* can be easily discriminated by the difference of their radii and mode, or of their appearance and the shape of the margin of the body and the radii is shown in Table 3.

Table 3

Length of Body (cm.)	9.7	9.7	10.5	11.5	12.5	12.7	13.0	15.6	16.7	17.0
Apical Radii	3	2	3	5	4	4	2	2	3	3
Basal Radii	2	2	3	4	2	3	1	2	3	3
Lateral Radii	1	1	0	0	1	0	0	0	2	1

Length of Body (cm.)	17.8	18.9	19.0	20.9	21.6	22.5	23.3	23.7	29.8	31.8
Apical Radii	3	4	4	4	3	5	5	5	6	3
Basal Radii	4	3	3	2	3	3	3	2	4	4
Lateral Radii	1	0	0	2	0	0	2	1	1	1

Namely there is no relation between the growth and the radii.

3) CTENOPHARYNGODON IDELLA (Cuvier et Valeucieunes) Fig. 12

The numbers of the scale in the lateral line are 40~45. The form of the scale is big in comparison with the body. The scale's form is round-oval and thick. The focus lies in the middle or some what in front. The radii radiates from the focus and the radii from the apical field are only 1~2 and have a irregular width. The radii's numbers from the basal field are 14~63 and there are more than the numbers from the apical field. The relation between the length of the body and the radii's number is shown in Table 4.

Table 4

Length of Body (cm.)	31.0	40.0	42.0	42.0	44.0	60.0	64.5	71.0	72.0
Apical Radii	8	12	3	4	1	1	1	3	6
Basal Radii	16	14	31	33	29	38	48	63	51

It seems to be no relation between the radii's number and the growth of fish. The circuli is hemmed in between the radii's form, the basal field standing side by side, like a wave and the circuli of the apical field have a different form and space is larger. The margin of the basal field has a corresponding and has many irregularities like a wave.

4) MYLOPHARYNGODON AETHIOPS (Basilewsky) Fig. 13

The scales in the lateral line are 40~45 and the shape of scale resembles to that of *Ctenopharyngodon idella* but it is different in the following several points, namely its thickness is thin, the proportion of length to the width of the scale is large and the forcus lies in the backward from the middle, and space of the circuli which exist between the radii in the basal field are narrow and make form and accordingly the margin of the basal field presents zigzag forms. The radii's numbers in the apical field are 3~4 and the radii's numbers in the basal field show 36~54. The relation between the length of the body and the radii's number is shown in Table 5.

Table 5

Length of Body (cm.)	67.0	86.0
Apical Radii	4	3
Basal Radii	36	54

5) HYPOPHTHALIMICHTHYS MOLITRIX (Cuvier et Valencieunes) Fig. 18

The scale's number in the lateral line are 112~114, the form of the scale is somewhat round and the margin of apical field look round and the basal field

is comparatively flat. The focus lies in the front. Both the radii from the apical and basal field doesn't utterly develop. Those which resemble to the radii in the basal field exist 0~2 irregularly. There is no relation with the size of body. Both the circuli and the growth line grow concentric-circularily around the focus and the circuli in the basal field has a wide width in comparison with that of the apical field and consequently the numbers are few. From the point of the shape of the scale, it is very curious as the Cyprinidae and has nature resembling Salmonidae.

6) SQUALIOBARBUS CURRICULUS (Richardson) Fig. 1

The numbers of the scales in the lateral line are 43~49. The form of the scale is somewhat round oval. The margin part of apical field looks round and the middle part projects. The focus lies in the backward. The radii in the basal field doesn't wholly develop. The radii in the basal field are 6~26. The circuli in the basal field has changed and exists among the radii like a wave, and its width is wide and the numbers are few. The relation between the length of the body and the radii is shown in Table 6.

Table 6

Length of Body (cm.)	11.0	12.5	10.7	11.5	12.5	20.7
Basal Radii	6	7	10	11	14	26

7) PARABRAMIS PEKINENSIS (Basilewsky) Fig. 4

The scale's numbers in the lateral line are 53~59. The form of the scale is somewhat round and the fore-margin is round and projects. The width of the apical field is large. The focus lies in the middle or somewhat in the backward. The radii from the apical field doesn't develop. The middle radii in the basal field radiates from it's focus but the side part runs parallel to it and accordingly it is the feature that the radii of the side doesn't radiate directly from the focus. The relation between the length of the body and the radii's number is

shown in Table 7.

Table 7

Length of Body (cm.)	14.2	16.2	20.0	27.0	24.4	32.5	40.0	30.0
Basal Radii	10	12	14	17	15	30	36	25

There seems to be some relation between the length of the body and the radii. The circuli and the growth line grows, also in the basal field but the form is not like that in the apical field and then the circuli in the basal field grow in succession with the apical field. The direction of the circuli runs from right and left with V-form for the right middle line and this doesn't be controlled by the radii and also the space of the circuli is narrow and is like that of the apical field.

8) ERYTHROCULTER ERYTHROPTERUS Basilewsky Fig. 23

The numbers of the scale in the lateral line are 90~99. The form of it bear a close resemblance to *Hypophalimichthys molitrix* but the fore and backward middle part projects a little. The focus lies somewhat foreward. The radii in the apical field doesn't develop. The radii in the basal field radiate from the focus but the line is curve and feeble. The relation between the length of the body and the radii's number is shown in Table 8.

Table 8

Length of Body (cm.)	33.0	41.0	46.0	51.9	53.0	53.7	64.0
Basal Radii	26	23	32	18	26	26	25

The circuli in the basal field and the growth line grow nearly as the same form in the apical field and show the concentric-circle around the focus but the number of the circuli are few.

9) CULTER MONGOBICUS (Basilewsky) Fig. 15

The scale's number in the lateral line are 73~78 and the form is round oval

and the forward middle part projects somewhat. The focus inclines toward ahead. The radii in the apical field doesn't develop. The radii in the basal field grows radiatedly from the focus. The relation with the length of the body is shown in Table 9.

Table 9

Length of Body (cm.)	11.0	24.3	32.5	34.0	35.0	36.5	37.0	39.0	44.0	47.0	48.2
Basal Radii	5	11	19	29	29	28	28	24	32	35	34

The circuli in the basal field develops but its form is somewhat like that of the apical field. Namely the circuli grow concentric-circularily around the focus and it succeeds to the circuli in the apical field but doesn't upheave and it shows only a wave by dint of the radii.

10) CULTER BREVICAUDA Günther Fig. 8

The scale's number in the lateral line are 61~67. The scale's form is round. The focus lies in the middle. The radii in the apical field doesn't develop and the radii in the basal field are 0~20 and the apical is broad. The relation with the length of the body and the radii is shown in Table 10.

Table 10

Length of Body (cm.)	9.7 — 19.0	21.0	24.0
Basal Radii	0	13	20

The circuli in the basal field grow concentric-circularily and the form resembles closely to that in the apical field but the numbers are few.

11) HEMICULTER LEUCISCULUS (Basilewsky) Fig. 17

The scale's numbers in the lateral line are 45~52 and the form is rhombic and the foreward and backward middle part of margin projects exceedingly, especially the foreward margin is distinct and the tickness is thin. The focus lies in the rear. The radii in the apical field doesn't develop and the radii in the

basal field are 12~25 and the space is wide. The relation with the length of the body is shown in Table 11.

Table 11

Length of Body (cm.)	7.1	9.3	11.3	15.5
Basal Radii	12	16	19	25

Generally the length of the body and the number of the radii seem to be proportioned. The circuli and the growth line grow in the basal field and these forms nearly resemble to those in the apical field. The numbers are few.

12) XENOCYPRIS MACROLEPIS Bleeker Fig. 2

The scale's number in the lateral line are 57~62. The scale's form resembles to the shape of the petal of tulip. The margin of the basal field is round but the middle part of the margin of the apical field rise and the angle made by the side is nearly a right angle. The focus lies exceedingly in the backward. The radii in the apical field doesn't develop. The radii in the basal field grows as a thin like and the numbers are few. The space between the radii is wide. The relation with the length of the body is shown in Table 12.

Table 12

Length of Body (cm.)	6.2	10.3	10.8	13.5
Basal Radii	6	4	7	10

The circuli in the basal field is nearly the same form with the apical field and it grows concentric-circularily around the focus but the numbers of the circuli are fewer than those in the basal field.

13) ELOPICHTHYS BAMBUSA Richardson Fig. 21

The scale's numbers are 110~115 and the form is somewhat round and the forward and backward margin in the middle part of the scale projects a little. The focus lies in the middle or in the front. The radii in the apical field doesn't

develop and the comparatively many radii in the basal field radiates around the focus. The relation with the length of the body is shown in Table 13.

Table 13

Length of Body (cm.)	39.0	52.0	71.0	75.0	86.0	100.0
Basal Radii	28	27	34	41	49	53

The circuli in the basal field exists among the radii and its form shows a wave with big width differing from that of the apical field.

14) HEMIBARBUS LABEO MACLATUS Bleeker Fig. 6

The scale's numbers are 49~50 and the form at the margin in the apical field is flat and make nearly and right angle by the side. The middle part of the margin in the basal field projects. The form resembles to *Hemibarbus labeo* but generally is a large type. The focus lies in the backward. The radii in the apical field doesn't develop. The radii in the basal field radiates from the focus. The relation with the length of the body is shown in Table 14.

Table 14

Length of Body (cm.)	22.0	23.5	28.0
Basal Radii	22	37	26

The circuli in apical field doesn't develop.

15) HEMIBARBUS LABEO (Pallas) Fig. 7

The numbers of the scale in the lateral line are 49~51. The form resembles to *H. labeo maclatus* but somewhat a small type. The focus lies stripingly in the backward. The radii in the apical field doesn't develop and the radii in the basal field radiates from the focus and the space between the radii are wide. The relation with the length of the body is shown in Table 15.

Table 15

Length of Body (cm.)	10.2
Basal Radii	2

The circuli doesn't exist in the basal field.

16) HUCHO TAIMEN (Pallas) Fig. 11

The numbers of scale in the lateral line are 198~220. The form of the scale is long-oval like a foreign pear. The width of the basal field is wider than the apical field and the middle part of the margin in the basal field projects. The focus lies in the middle. The circuli and the growth line are the same form both in the apical and basal field. The radii doesn't develop.

17) BRANCHYMYSTAX LENOK (Pallas) Fig. 22

The numbers of scale in the lateral line are 132~175. The form of the scale is nearly same with that of *Hucho taimen* but the type is big and the numbers among the growth line seem to be rather many.

18) COREGONUS USSURIENSIS Berg. Fig. 16

The numbers of scale in the lateral line are 84~85. The scale is comparatively large comparison with the body. The form is long and rather round. The focus lies in the front. The radii doesn't develop. The space of the circuli in the basal field is rather wide in comparison with that in the apical field. The growth line develops clearly.

19) C. CHADARYI Dybowsky Fig. 10

The numbers of scale in the lateral line are 87. The form of the scale is a like egg or round. The focus lies almost in the middle and the circuli grows concentric-circularily around the focus and the circuli in the basal field does not almost differ from that in the apical field. The growth line is not tinct than

that of *C. ussurienses*.

20) ESOX REICHERTII Dybowsky Fig. 20

The form of the scale is long-oval. The width of apical field is smaller than the basal field. There are 1~3 constricted parts and these form glens and as such glens project to make mountains, there are 1~2 unevenessis. The focus lies in shining toward the front. The radii in the basal field doesn't develop. The radii in the apical field grow 1~3 from the focus towards the creases at the margin of the apical field. In the older scales I can see the radii running out and both sides doubled. The circuli and the growth line grow concentric-circularly around the focus and both the shapes in the apical and basal field are same.

21) OPHIOCEPHALUS ARGUS Cantor Fig. 9

The scale's numbers in the lateral line are 65~67. The form of the scale is like a fan. The middle part of the margin side of the basal field projects. The focus lies nearly in the middle of somewhat in the front. The radii in the basal field doesn't develop. The radii in the apical field develops strikingly with the radiating form around the focus. The relation with the length of the body is shown in Table 16.

Table 16

Length of Body (cm.)	12.5	13.0	16.0	44.5	46.0	49.0	52.0	80.0
Apical Radii	10	14	14	14	17	25	22	45

The circuli also exists in the basal field and the form wholly differs from that in the apical field and the circuli concentrates to the right-middle line forming shape and its space is wide.

22) PERCOTTUS GLEHNI (Dybowsky) Fig. 14

The scale is small in comparison with the body. Its form is oval on the side.

The margin side of the basal field is forming a upright line and it has the feature of projecting many small prickles. The focus is nearly near the margin side of the basal field. As the circuli lies in the front, it doesn't make concentric circles and rather make generally a semicircle. The radii in the basal field doesn't develop. The radii in the apical field develop and its space is wide. The relation with the length of the body is shown in Table 17.

Table 17

Length of Body (cm.)	6.8	7.0
Apical Radii	12	16

23) SINIPERCA CHUATSI (Basilewsky). Fig. 5

The scale is small in comparison with the body and the form is long-oval, and is rather proper to say oblong with roundness. The focus lies in the front. The radii in the basal field does not develop wholly and the radii in the apical field grow well from the focus radiatingly. The relation with the length of the body is shown in Table 18.

Table 18

Length of Body (cm.)	23.0	26.0	27.5	29.0	31.0	32.5	34.0	36.0	39.0	40.0
Apical Radii	7	8	11	8	10	11	11	12	14	12

The circuli also develop in the basal field and exist concentric-circularily as in the apical field but the space in the basal field between the circuli is wide. I shall sum up here the main points of the features of various scales above-described, and show the following inspecting table.

A.) Both the radii in the apical and basal field exists.

a. Many radii in the apical field exists.

..... *Cyprinus carpio*

b. A few radii in the apical field exists.

i. X form big radii, radii in the apical field 2~6, radii in the basal field 1~4, 1~2 radii on the side.

..... *Carassius auratus*

ii. Radii in the apical field 1~12, radii in the basal field 14~63, circuli in the basal field show big broad wave.

..... *Ctenopharyngodon idella*

iii. Radii in the apical field 3~4, radii in the basal field 36~54, the space of circuli is narrow and shows V form.

..... *Mylopharyngodon aethiops*

B.) Lack of radii in the apical field, have only radii in the basal field.

a. Circuli develop in the basal field and the form resembles to that in the apical field and makes concentric circle.

i. Scales form is oval, radii a few.

..... *Erythroculter erythropterus*

ii. Scale's form is like tulip flower.

! Radii 4~10 ..... *Xenocypris macrolepis*

!! Radii 12~25 ..... *Hemiculter leucisculus*

b. Circuli in the basal field develop but differ from the form in the apical field.

i. Circuli in the basal field resemble a little to that in the apical field and the concentric-circular circuli get out of shape a little by dint of radii.

! Scale's form is oval, the scale is large in comparison with the body, the focus inclines to the front, radii 5~35.

..... *Culter mongobicus*

!! Scale's form is round, small in comparison with the body, focus lies in the middle and radii 13~20.

..... *Culter brevicauda*

!!! Scale's form round, the focus lies in the middle, radii 10~36, circuli in the basal field against the right middle line with V

form from right and left.

..... *Parabramis pekinensis*

ii. Circuli in the basal field lie among radii and show a wave.

! Middle part of margin of the basal field project strikingly, the length of scale is large.

..... *Squaliobarbus curriculus*

!! Middle part of margin of the basal field projects not so, the width of scale is large.

..... *Elopichthys bambusa*

c. Circuli in the basal field doesn't develop wholly.

i. Scale is comparatively large, the focus inclines to the backward a little.

..... *Hemibarbus labeo maculatus*

ii. Scale comparatively small, the focus inclines exceedingly to the backward.

..... *Hemibarbus labeo*

C.) Radii lies in the apical field, lack of radii in the basal field.

a. Scale is long-oval, the scale is large in comparison with the body, the focus lies in the front, a few circuli in the basal field.

..... *Siniperca chuatsi*

b. Scale is oval on the side, there project many prickles on the margin of the basal field.

..... *Percottus glehni*

c. Scale is a fan form, large and thick in comparison with the body, radii develop well.

..... *Ophiocephalus argus*

d. Scale is long-oval, there exists 1~3 creases, concentric-circular circuli on the margin of the basal field.

..... *Esox reichertii*

D.) Lack of both radii in the apical field and basal field.

a. Scale is round or somewhat round.

i. Scale is round, growth line is somewhate distinct.

..... *Coregonus chadaryi*

ii. Scale is somewhat round, growth line is distinct.

..... *Coregonus ussuriensis*

b. Scale is oval or long-oval.

i. Scale is oval, scale is comparatively small, circuli a few.

..... *Branchymystax lenok*

ii. Scale is long-oval like a foreign pear, large, circuli are many.

..... *Hucho taimen*

iii. Scale is long-oval, scale is somewhat large, circuli are many.

..... *Hypophthalmichthys molitrix*

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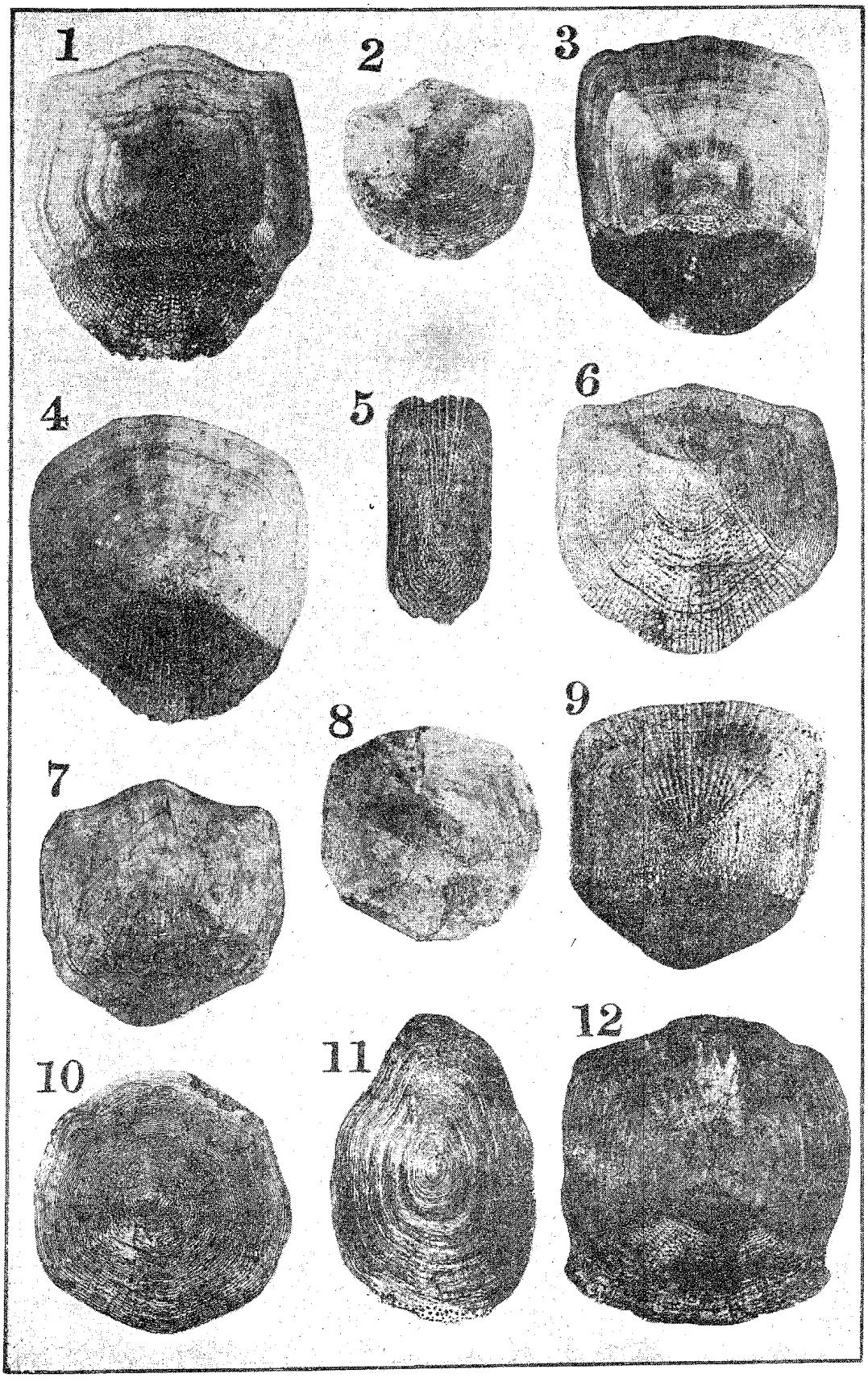
EXPLANATION OF THE FIGURES

Fig. 1.	*Squaliobarbus carriculus* (Richardson)	× *5.0*
Fig. 2.	*Xenocypris macrolepis* Bleecker	× *10.0*
Fig. 3.	*Cyprinus carpio* Linne	× *4.5*
Fig. 4.	*Parabramis pekinensis* (Basilewsky)	× *6.4*
Fig. 5.	*Siniperca chuatsi* (Basilewsky)	× *9.7*
Fig. 6.	*Hemibarbus labes maculatus* Bleeker	× *6.8*
Fig. 7.	*Hemibarbus labeo* (Pallas)	× *15.0*
Fig. 8.	*Culter brevicauda* Günther	× *8.0*
Fig. 9.	*Ophiocephalus argus* Cantor	× *4.5*
Fig. 10.	*Coregonus chadaryi* Dybowsky	× *10.0*
Fig. 11.	*Hucho taimen* (Pallas)	× *0.8*
Fig. 12.	*Ctenopharyngodon idella* (Cuvier et Valencieunes)	× *12.5*
Fig. 13.	*Mylopharyngodon aethiops* (Basilewsky)	× *2.5*
Fig. 14.	*Percottus glehni* Dybowsky	× *15.0*
Fig. 15.	*Culter mongobicus* (Basilewsky)	× *7.0*
Fig. 16.	*Coregonus ussuriensis* Berg	× *6.5*
Fig. 17.	*Hemiculter leucisculus* (Basilewsky)	× *15.0*
Fig. 18.	*Hypophthalmichthys molitrix* (Cuvier et Valencieunes)	× *2.0*
Fig. 19.	*Carassius auratus* (Linne)	× *4.5*
Fig. 20.	*Esox reichertii* Dybowsky	× *10.4*
Fig. 21.	*Elopichthys bambusa* (Richardson)	× *6.0*
Fig. 22.	*Branchymystax lenok* (Pallas)	× *9.3*
Fig. 23.	*Erythroculter erythropterus* (Basilewsky)	× *7.7*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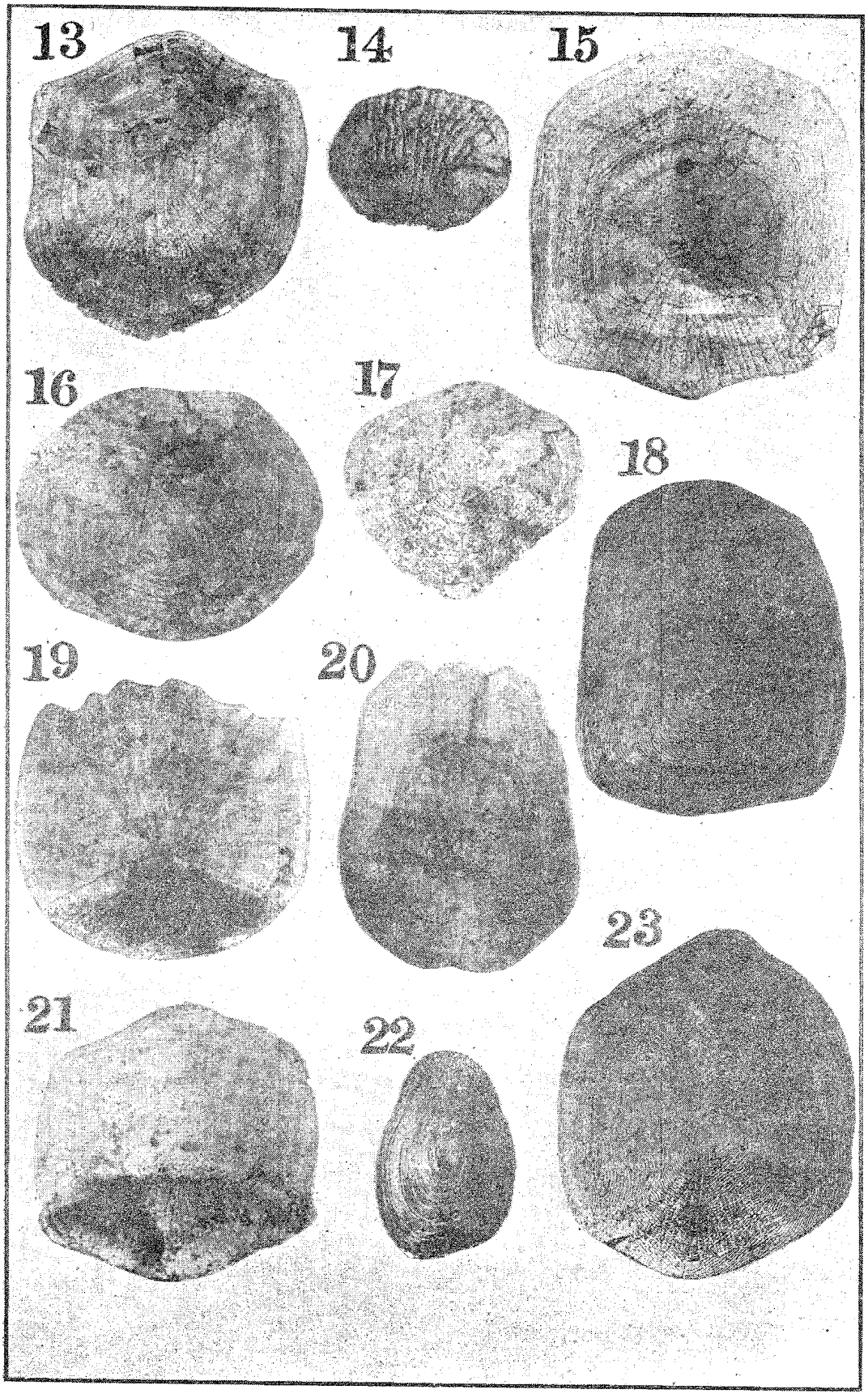
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