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GOLDFISH AND THEIR CULTURE IN JAPAN



By Shinnosuke Matsubara

*Director of the Imperial Fisheries Institute, Tokyo*



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# GOLDFISH AND THEIR CULTURE IN JAPAN.

By SHINNOSUKE MATSUBARA,  
*Director of the Imperial Fisheries Institute, Tokyo.*

## JAPANESE VARIETIES OF GOLDFISH.<sup>a</sup>

That the goldfish of Japan was originally introduced from China there is no doubt, but a long domestication of the fish has resulted in producing several Japanese varieties. The four known from remote times are as follows:

"*Wakin*" (Japanese goldfish).—This variety bears a close resemblance to the original *Carassius auratus* from which it came. Its body is slender and long, and the black pigment gives it when very young a color like that of steel, which gradually changes into vermilion red, often variegated with white. The caudal fin is either simply forked or split into three or four lobes. (Pl. xviii.)

"*Ryukin*" (Loochoo goldfish).—This variety has a short rounded body with a protuberant or swelled-out abdomen. The caudal fin, pendulous when at rest and flowing when in motion, is as long as the body or sometimes still longer, all the other fins being also long. (Pl. xix.)

"*Ranchu*," otherwise called "*Maruko*" (round fish).—The body of this variety is short and rounded, its tail and broad head being also short. It has no dorsal fin. The head, which is free from any abnormal features when the fish is quite young, in two or three years develops all over it a number of protuberances, like the achenia of a strawberry. In this state it is called "*shishigashira* (lion-headed) ranchu." Owing to the fact that this variety has a globular body, a short protuberant abdomen, and a short caudal fin, it can hardly swim, and is usually seen in an erect position with the head downward, which may be accounted for by the absence of the dorsal fin. (Pl. xx.)

"*Oranda shishigashira*" (rare lion-headed).—This resembles the ranchu in its bodily form with strawberry-like protuberances on the head. The body is big and longer than that of the ryukin and furnished with the dorsal fin; the caudal fin is long. (Pl. xxi.)

Among the older varieties are also the following:

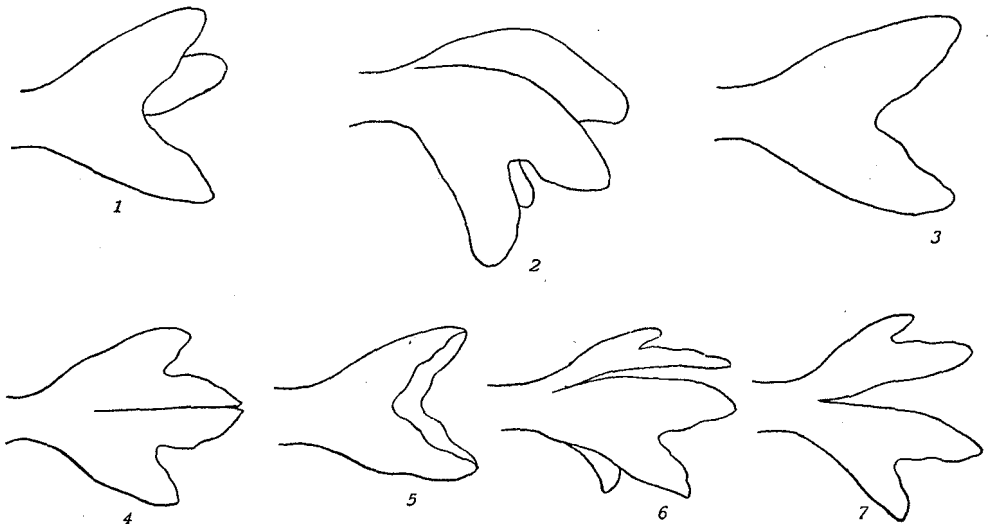
"*Demekin*" (goldfish with protruding eyes) and "*deme ranchu*" (ranchu

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<sup>a</sup> The ten colored plates accompanying this paper have been made from water-color drawings from life by J. Urata, and have been copyrighted by the author.

with protruding eyes). The former was first introduced from China toward the close of the Japan-China war (1894-95). It has protruding eyeballs, and the body and the caudal fin are short. It is not usually bright colored, being black all over the body or yellowish red variegated with black spots or irregular patches. The deme ranchu, first brought from China six or seven years ago, has a globular body and, like the ranchu, no dorsal fin. The eyes not only protrude, but also are turned upward 90 degrees. (Pl. XXII and XXIII.)

The foregoing are varieties for some time cultivated in Japan or recently introduced from China. New varieties, however, different from these, have lately come into existence, and I shall now describe how and in what order these have been produced.



TYPICAL FORMS OF GOLDFISH TAILS.

- |                                   |                                  |
|-----------------------------------|----------------------------------|
| 1. Arrow tail, lateral view.      | 5. Bag tail, lateral view.       |
| 2. Tassel tail, lateral view.     | 6. Rudder tail, lateral view.    |
| 3. Forked tail, lateral view.     | 7. Four-lobed tail, dorsal view. |
| 4. Three-lobed tail, dorsal view. |                                  |

“*Watonai*.”—When the Fisheries Exhibition was held in Tokyo in 1883, I saw there exhibited a highly interesting variety of goldfish, which was a wakin with a flowing caudal fin. Being struck with its extreme peculiarities, and inquiring how this variety came to be produced, I found that the exhibitor, who lived at Imaidani, Akasaka, Tokyo, had only one pond for breeding goldfish, and that there the said variety was produced. As in that pond all the different varieties just stated above were reared together, the strange new variety appeared to be a cross between the ryukin and the wakin; but I did not make at that time further investigation into the cause. That breed was called “*watonai*,” which means “a variety hitherto found neither in Japan nor in China.” (Pl. XXIV.)

As to the order in which the different varieties of goldfish have been produced in Japan, it is probable that the wakin stands first in priority, but in what order the others have come can not be definitely stated. The oranda shishigashira, however, is generally known to have been produced by crossing the ryukin with the ranchu at Koriyama, Yamato, in 1840. All the new varieties of recent times except the watonai, which comes first in order, were produced by Mr. Akiyama Kichigoro, a goldfish breeder in Tokyo. The latest produced varieties are the following three:

"*Shukin*."—In 1897 a new variety, having its own peculiarities, was produced by the following means: Oranda shishigashira, ten in number and 3 years old, were crossed with ranchu equal in number and also of the same age. The cross thus made produced about 300 young fish, of which some were like the oranda shishigashira in form. There were 20 entirely without the dorsal fin; but in a large majority of the young there were some traces of the dorsal fin, one to three spines or something like knobs being discernible in its place. Those without any dorsal fin were then selected for breeding purposes, and in their offspring were still found some with traces of dorsal fin such as the spines and knobs mentioned above. This variety without the dorsal fin has been kept breeding up to the present; and being requested by the breeder to give it an appropriate name, I called it "shukin" (literally "autumn brocade"). The adjective "shu" takes its rise in the breeder's name, Akiyama (Chinese, Shu-zan, i. e., "autumn hill"), and the "kin" signifies "brocade," the epithet being given on account of the beautiful bright color. (Pl. xxv.)

"*Shubunkin*."—The year 1900 first saw this new variety. The goldfish hitherto known in Japan having no such dapples as are found in the Chinese demekin, which is dappled in three or four colors, the breeder had wished to have a variety produced having the same dapples as the Chinese. Thus the males and females, each ten in number, of the demekin having the most attractive dapples were crossed with an equal number of the males and females of the wakin. The breeding fish selected were the demekin having black dapples on a vermilion red or purple ground and those speckled with red, white, black, and blue. Some of the offspring resembled the original *Carassius auratus* in form and had dapples like the demekin, while in some others the scales were not so conspicuous as is the case with the demekin. On the whole, however, those resembling the wakin were most numerous, while those similar to the demekin in form were very few; and the number of the cross the breeder had in view was only 100 out of a total of 500. This new variety, to which I gave the name of "shubunkin" ("vermilion red dappled with different hues"), has since been kept breeding. Among its descendants some were of a vermilion color, dappled with black, some of a purple color all over the body

without any dapples, and the others speckled with three or four colors. The entirely purple color above referred to was quite an unknown thing in the parent fish. (Pl. xxvi.)

"*Kinranshi*."—With a view to obtaining a new variety without the dorsal fin, the ryukin was crossed with the ranchu. The number of parent fish, as well as the numerical ratio of the males to the females, was the same as in the preceding case. The offspring thus produced were of a bright attractive color. Some were provided with the dorsal fin or spines, others partially provided with the former, while in some others there were protuberances in place of the dorsal fin. Those entirely destitute of any dorsal fin numbered only one-third of the whole. This last-mentioned variety, which I called "*kinranshi*" (brocade-figures), has been kept breeding up to date. (Pl. xxvii.)

Of these three new varieties, the shukin is the most popular, but the shubunkin the most profitable one, only a few of the latter being eliminated on account of the caudal fin being crooked or irregular.

The goldfish is cultivated almost all over the Empire, but most extensively in Tokyo and Koriyama, Yamato, Nara Prefecture. Broadly speaking, the most popular varieties are those cultivated in these two localities, and the methods of rearing goldfish most in vogue are also those followed there. The northeastern half of the Empire follows Tokyo in things relative to the goldfish breeding, while Koriyama leads the southwestern half.

#### GOLDFISH CULTURE IN TOKYO.

The varieties of goldfish cultivated in Tokyo are the ranchu, the ryukin, the demekin, and the wakin. Attempt was once made in Tokyo to cultivate the oranda shishigashira by introducing the fish from Koriyama. This variety was not regarded with much favor, however, and has come to be scarcely ever cultivated in the capital. The most popular breed is the ranchu, which is highly prized by goldfish lovers and engrosses a great deal of the attention of breeders, who take pride in producing the best of this variety.

#### RANCHU.

This fish is chiefly cultivated in concrete ponds. When the culture is carried on upon a small scale, the usual number of parent fish is five, two of which are females and the others males, but when it is carried on upon a large scale, the number of parent fish is over fifty, one half of these being male and the other half female. The eggs are laid during the period between the beginning of April and the middle of May, and the utmost attention should be paid to the fish during the three months of September, October, and November of the preceding year, when the food should be given them in sufficient

quantity, without their being overfed. The males of the parent fish are separated from the spawners some time before the latter deposit their eggs. When the spawning season approaches, the water of the pond is not renewed, but the fish are kept amply fed with the larvæ of mosquitoes (*Culex pipiens*) or earthworms (*Limnodrilus* or *Tubifex*) for about ten days, at the end of which time the eggs are laid when the temperature of water in the pond rises or when it rains. As, by experience, this can be known beforehand, the water of the spawning pond is changed the day before and the parent fish are removed thither. The spawning bed is then made with "kingyomo" (*Myriophyllum verticellatum*), on which the eggs are deposited on the following morning.

When the number of parent fish is 5, the proper size of the pond is 4 by 3 shaku (1.2 meters by 91.0 centimeters) with a depth of 5 sun (15 centimeters). With 50 parent fish, the area of the pond should be 7 by 6 shaku (2.1 by 1.80 meters), the depth remaining the same as before. In a pond of the latter size, a circular concavity with a diameter of 8 sun (24 centimeters) to 1 shaku (30 centimeters) and with a depth of 1 sun 5 bu (4.5 centimeters) from the bottom of the pond, is made around the outlet for the water. This concavity is intended to prevent the fish from being driven, when the water is drained off, against the walls of the pond. When the spawning is over, either the parent fish or the eggs are removed to another pond to prevent the eggs from being devoured.

For a few days after the eggs are hatched, the fry do not move about, but stick to their bed or the bottom of the pond. During this time no food need be given, as every individual of the fry is provided with a yolk sac in its abdomen; if forcibly fed, their health would be impaired. In three days or so, they begin to swim about in the pond, and are then fed once every day in the morning with the yolk of hen's eggs boiled. This food is administered by straining the yolk, mixed with water in the proportion of 2 eggs to 5 sho (9.1 cubic centimeters) of water, through cotton or silk gauze, this mixture being then completely stirred up until it is yellow, when it is put into a watering pot and poured all over the pond as food. The belly of the fry becomes yellow by taking this food, and the shade of the abdominal yellowish color shows whether or not the fry have got sufficient food. After being thus fed for seven days, they are given the small crustacea, "mijinko" (*Daphnia*, *Moina* or *Cyclops*), which have been cultivated and kept in a separate pond, the crustacea being caught with a gauze bag and then sifted, in order that any injurious insect, etc., may not remain mixed in them. After fifteen days thus nourished with mijinko, the tender fish are fed with the larvæ of mosquitoes or earthworms cut in small pieces.

About twenty days after the fish are hatched, the first selection is made, for which purpose the fish are put into a white earthenware plate. As they are

still very small at this stage of development, it is difficult to select those which are satisfactory in every respect, and only those furnished with the better caudal fins, such as they are, are picked out. Ten days later the second selection takes place, when those having any irregularities on the back are thrown into a mud pond and put aside. Again, ten days later, the third selection is made and the fish are grouped together according to their size. And yet, about ten days after this, the fourth and last selection comes, when particular attention is paid to the form of the caudal fin. The fish are for the first time put up for sale when the third selection is over.

After the first selection the young are put into two concrete ponds, each of which is of the same size as the former one, and in the second selection they are distributed into three ponds of this same size. The area of these ponds would not be large enough for the original number of fish, but the number has been reduced as the inferior breeds were eliminated. To every twenty of the fish hatched in the beginning of May is given a space of one tsubo (3.3058 square meters), and when the cold weather comes they are removed either to a mud pond or to a hibernacle (i. e., wintering pond). The latter, which is made entirely of concrete and has a depth of 6 to 8 sun (18.2 to 24.2 centimeters), is provided with a lid, and the whole is again covered with an inclined roof opening toward the south, with one end coming down to the north edge of the pond. When the weather is warm, the lid is partially lifted up so as to admit the sun's rays into the pond from the south. The water sometimes becomes foul through the putrefaction of fish food and from other causes, in which case a basket having its lower part covered with gauze is immersed into the concavity of the pond and by means of a rubber siphon put into the basket the foul water is drawn out, to be replaced by fresh water. The fish in the second and third years should have a space of one tsubo at least for every twenty of them.

In the first year the fish attain in eight or nine months the size of 2 sun 5 bu (7.5 centimeters) from the snout to the extremity of the tail; in the second year they attain in the same length of time the size of 4 sun (14 centimeters); in the third year, 5 sun (15 centimeters); in the fourth year, 5 sun 5 bu (16.5 centimeters), and in the fifth year, 6 sun (18.2 centimeters). The fish that are kept four or five years are the only ones fetching a very high price in the market.

#### RYUKIN.

Being naturally very strong and healthy, the ryukin is much in demand abroad and is exported in large numbers. At home, also, this variety is a great favorite, and as such is kept in the ponds. Those having the longest caudal fin and called "ohiki," viz, "tail trailers," require at least four years for their full development. The superior kind has a head broad in front but not angu-



lar, and a short body. For instance, to be perfect in form, the body should be about 1 sun (3 centimeters) in length when it is 1 sun 5 bu (4.5 centimeters) in breadth. The body as long as broad comes next. As to the form of the caudal fin, it should be long and thin, at the same time the rays being fine and slender and the peduncle of the tail thick. To have the best coloration, it is essential that both the belly and the back should be well dappled and the tail vermilion colored. In former times when goldfish were kept in a china basin to be looked at from above only, those having the finest dapples on the back were most highly appreciated. Nowadays, however, the fish are kept in a glass tank to be viewed from the sides, hence the necessity of having fine dapples on the sides and downwards. The greatest desideratum for the ryukin is that it should have nothing abnormal in the caudal fin.

When the fish having a two-rudder tail are selected for breeding purposes, the tail becomes long in the offspring, but when the fish having a one-rudder tail are used for the same purposes, the tail becomes short in the offspring. Those having a long body and a short tail are regarded with the least favor. The second requisite for the ryukin is that the form of the body should be satisfactory, the shape of the head coming last.

A mud pond is used not only for rearing the ryukin but also for its spawning. Equal numbers of males and females of this variety are used as breeding fish, and 800 fish 3 years old are placed in a pond having an area of forty tsubo (132.2 square meters) with a depth of 2 shaku 5 sun (76 centimeters). An ample supply of food is given them in the preceding year. In order that sufficiently developed offspring may be put up for sale at the earliest possible date, the breeders vie with one another in causing the parent fish to deposit their eggs with little delay. Many of the offspring become striped like a tiger before their original steel color fades into white, and it is at this intermediate stage of their coloring that those inferior breeds destined to become white can be sold with the greatest profit. A full supply of fertilizer is required in the mud pond in which the breeding fish are kept, as it produces more plankton for them. About the end of March, when its temperature rises to 15° C., the water of the pond is renewed. In this season of the year, when the weather is very changeable, the fish require the utmost care. It is good for them if the temperature of water in the pond is higher than 15° C., but a lower temperature has a bad effect. A rising temperature accelerates the hatching of eggs, but a falling one retards it from two to three days, thereby producing a diversity of size in the offspring, an effect that should be avoided. When the eggs are deposited thereon, the bundles already referred to are removed to one or two ponds. In the case of its size being 4 tsubo (13.2 square meters), one pond may suffice to receive the eggs, but in the case of its being only 2 tsubo (6.6 square meters) the eggs are

distributed into two ponds. The more spacious the pond is, the better it is for breeding purposes.

The best food for the young is natural food, viz, plankton, which is on that account cultivated beforehand. About as much as one koku (5.2 bushels) of rice bran, soy lees or the excrement of man or horse is put into the pond, if it is 50 tsubo (165.3 square meters) in size and over 10 years old. But if the pond is only about 2 years old, a double quantity of the fertilizer is used. In each case, the pond is drained previous to putting in the fertilizer, after which its bottom is exposed to the sun's rays for about a week, and then the pond is filled with water. Another pond of 40 to 50 tsubo (132.2 or 165.3 square meters) in size is provided for receiving the fry just hatched. This pond already contains the plankton which was produced by feeding the pond with about 3 to 4 to (1.5 to 2.1 bushels) of the aforesaid fertilizer. Besides, if 1 go (0.005 bushel) of mijinko is put into the pond three days prior to removing the fry there, they increase to an immense number in that short interval.

When the young fish begin to swim about in the pond, the bundles on which the eggs were deposited are removed, and they are fed from the following morning with boiled eggs (5 in number), prepared as in the case of the ranchu. Three or four days later, when it is warm, the water in the pond is drained off by means of a rubber siphon, as stated before, and the young are put into a mud pond and fed with mijinko. Ten or fifteen days after, the fish, having outgrown the size of the pond, have to be removed to another pond. When a supply of mijinko falls short in that pond, the fish are again put into a new pond where plenty of such food can be had.

In order that the ryukin may be reared with any success, at least four ponds are required, two of which are intended for keeping the young and the other two for cultivating mijinko. In the middle of May the fish are grown so large that the larvæ of mosquitoes can be given them as food on earthenware plates slung by three strings from a bamboo pole. Given 800 parent fish, 200,000 offspring are produced, which is a proper number for the capacity (200 tsubo) of the four ponds just mentioned.

No selection of the fish is yet made at this stage of their development (the middle of May). After feeding them for about fifteen days from earthenware plates, the selection is first made in the following way: Food being put into a basket or a scoop net, the young are thereby enticed and caught, and are distributed into two ponds. The first pond is at the same time completely cleaned from everything pernicious and replenished with water. The selection is sometimes made while catching the fish with a basket or a scoop net from the new pond, when an earthenware plate is put for this purpose into the basket (or the scoop net), the inside of which is covered with gauze. The caudal fin is

the criterion by which selection or rejection is made. If there is any marked diversity in the size of the fish, the large ones are separated from the small. Those selected are put into the pond lately cleaned, when their number is roughly estimated by measuring them with a teacup or a lacquered bowl. Twenty or thirty days later another selection takes place, in which the fish are chiefly classified according to size. As at this stage those destined to be white can be distinguished from those to be dappled, the former are caught and sold off. Between this time and the following August all the fish are cleared off by selling, except 300 per tsubo of the ponds, it being possible to find buyers for the fish grown to one sun (3 centimeters) or over.

Toward the end of March the next year, 4,000 of the fish deemed best are retained and the rest sold off. From that time forward selection is made once a month during the following April, May, and June, and every time 1,000 fish are eliminated, commencing with the most inferior, until 1,000 are left at last for breeding purposes. Making allowance for loss from various causes and deducting 2 per cent from the above number, 800 fish may remain.

#### WAKIN, DEMEKIN, AND DEME RANCHU.

The wakin is never so much prized as the ryukin, but on account of its large size, besides being healthy and strong, it is kept in a garden pond. In this variety, the tail should be thick and widely spread, the rays invisible and the dapples not merged into one another, while the contrary is the case with the ryukin in this last respect. The method of its culture is the same as that of the ryukin.

Of the demekin those dappled with three of four colors are highly prized. Either the vermilion dapples or the black patches should be pronounced. In some the black pigment gives the color of ink, while others have the color of steel, like that of the crucian carp. In the former the color is permanent, but in the latter it fades into yellowish red in a year or two, and such a color as this last is worse than a uniform red. The caudal fin should be long and widely spread. The eyes, right and left, should protrude symmetrically. Those which protrude but little are not regarded with favor. Goldfish of this variety swim about, not in groups, but singly, which is not the case with the goldfish long known in Japan.

The deme ranchu is colored all over the body either with yellowish red or black pigment, or yet dappled with black and red. This variety remains most of the time at the bottom of the pond resting on the belly, and scarcely ever swims. It does not live in groups; even less so than the demekin, and it very seldom spawns. In cultivating this variety, the breeders follow the same method as with the ryukin.

Thus far as regards the culture of goldfish in Tokyo. I shall now describe the method of culture pursued at Koriyama.

#### METHODS OF CULTURE IN KORIYAMA.

There are but few trustworthy records giving information on goldfish breeding in remote times in Japan. Tradition has it that during the Hoyei era (1704-1710), a certain Sato Sanzaemon set up as a goldfish breeder at Koriyama and commenced to cultivate the fish in a mud pond. It is said that he pioneered the industry in that locality.

The principal varieties of goldfish cultivated at Koriyama are the oranda shishigashira, the wakin, and the ranchu. The ryukin was most extensively cultivated there until fifty years ago, but it has since been replaced by the oranda shishigashira and is not much reared at present. The demekin is not wholly uncultivated at Koriyama but no great attention is paid to it.

The dimensions of a pond at Koriyama do not vary with the different varieties of goldfish. It is usually oblong in form and measures 10 ken by 3 ken, i. e., 30 tsubo (99.2 square meters). This is a size most convenient for the purpose of efficient fertilization. Formerly a depth of 1 shaku 5 sun (45 centimeters) was given to the pond, but it is now increased to 2 shaku (60.5 centimeters) in order to protect the fish from the sun's heat or atmospheric changes. The only drawback in this increased depth is that injurious gases are thereby generated from the bottom, especially when a large quantity of fertilizer is put into the pond.

#### COLLECTION AND CULTIVATION OF FISH FOOD.

The most noteworthy thing in connection with goldfish breeding here is the attention paid to rearing as well as collecting mijinko. These small crustacea are caught in a bag 20 to 25 shaku (6.0 to 7.5 meters) long, with a diameter of 2 shaku (60.5 centimeters) and made of "tenjiku kanakin" (a kind of calico) with fine meshes, varnished with the astringent obtained from unripe persimmons, or with the extract of oak-tree bark. For two weeks after hatching the fish are fed with the smallest of mijinko, which have been sifted. For another fortnight a larger kind of the crustacea is also given. When mijinko can not be obtained recourse is had to the yolk of boiled eggs, well pulverized. But the latter compares unfavorably as a substitute.

Usually 40 days, but when it is warm, 30 days, prior to removing the newly hatched fish to another pond, soy lees packed in a straw bag are immersed in the bottom of the second pond with a view to producing mijinko. To determine properly what quantity of fertilizer is to be placed in the pond is very difficult. In the case of a newly made pond, 50 kamme (187 kilograms) of soy lees mixed with 4 or 5 ka (59.8 kilograms) of human excrement in liquid state

are poured over the bottom when it is not yet filled with water. When the bottom is sufficiently exposed to the sun, the pond is replenished with water, which in a few days presents a green color on account of the algæ produced there. Even after the young fish are put into the aforesaid pond it must be fertilized every other day. When they are fed with mijinko obtained elsewhere, one sho (0.4 gallon) of the crustacea is given every day in the case of a pond of 30 tsubo (99.2 square meters).

This is what should be done with the fish when removed to a new pond after forty days from the time of their hatching. During these forty days they are kept in a concrete pond and are given mijinko in such quantity as may be deemed proper. Afterwards the number of mijinko in that pond is ascertained by immersing something like a white earthenware plate in a corner of it, and a supply of food to the fish is kept daily increasing. Feeding the pond with fertilizer is intended for no other purpose than producing mijinko, with which the fish are to be provided without interruption.

The longer the fish are fed with mijinko the better it is for them. As there is, however, a limit to the supply of mijinko, that wholesome food when the young are grown to 4 or 5 bu (1.2 to 1.5 centimeters) gives way to the *Viviparus* (a kind of mollusk found generally in the rice fields) pulverized, or the dried chrysalides of silkworms pounded and mixed with starch. As it is during the three months of June, July, and August that the fish increase in size with great rapidity, the most abundant supply of food is given in this season of the year. The extent to which the fish are to be fed, indeed, is judged by the color of water in the pond. When the water is green and turbid, it shows that the supply of food is plentiful; when it is green and transparent, the supply is insufficient. The same is the case with all other colors.

#### ORANDA SHISHIGASHIRA.

A concrete pond is used for hatching the oranda shishigashira. It is 12 shaku (6.1 meters) long by 5 shaku (1.5 meters) broad with a depth of 7 to 8 sun (21.2 to 24.2 centimeters). The eggs having been deposited on bundles of willow-tree roots placed in a mud pond, about 50,000 or 60,000 are put into the above-mentioned concrete pond to be hatched. The water is removed without fail every four or five days, and is even changed every other day when the weather is warm. The first selection of the fish takes place after twenty-five days from the time of their hatching, when they are about 2 bu (0.6 centimeter) in length. About 20,000 of the then superior breeds are retained, the rest being eliminated, i. e., sold off. If the number of those first hatched suffices, it is most satisfactory, but if it does not, those hatched later are added. If sickness or other cause reduces this number, those hatched still later are used also. In that last case the fish are made to spawn even in midsummer. Forty days from the time of

their hatching they are put into a mud pond in the proportion of 300 fish per tsubo. The next selection is not made until the fish put on new colors at the end of July or the beginning of August, when those which are uniformly white or unsatisfactory in the form of the tail are sold at a nominal price. That the best kind of the variety may be obtained, however, two more selections are to be made, the character most highly prized being the form of the caudal fin. In Tokyo and Nagoya the four-lobed tail is regarded with preference, while Koriyama is content with the three-lobed tail, the four-lobed tail, or the bag tail, if only it is symmetrical in form. The head should be broad in front. The protuberances which are in three years developed on the head should be like a large well-proportioned flower of the tree peony and should not be small. In some localities, such as Kii, Hiroshima, Awa, and Sanuki, there is a variety called simply "shishi" (lion), which is brass colored and has a short tail. Not a few of this variety are found to be uniformly colored. Generally speaking, those which are satisfactory in the form of the head have the tail abbreviated; seldom are the fish perfect in both respects.

There was formerly neither oranda shishigashira nor ranchu having variegated figures on the back. Such varieties, however, have been occasionally produced since the twenty-second year of Meiji (1889), and their descendants have been studiously used for breeding purposes. Both varieties are now extensively produced and highly admired.

The young oranda shishigashira are first put into a mud pond in the proportion of 300 fish per tsubo, but those white in color and abnormal in form are eliminated, and from this and other causes the numbers are by autumn reduced to one-half of the number originally put into the present pond. These are left alone till the following spring, when they are put up for sale. They attain by that time the size of 1 sun 5 or 6 bu (4 to 5 centimeters) in length. When it is desired to produce fish of a greater size, the number of young first to be removed to a new pond after hatching is reduced from 300 to 100, and these attain the size of about 2 sun (6 centimeters) in the same length of time as before. In the third year they grow to 3 or 4 sun (9 to 12 centimeters), in the fourth year, to 6 sun (18 centimeters), in the fifth, to 8 sun (30 centimeters), and in the sixth, to 1 shaku (33.3 centimeters). In fact, it is known that in the last-mentioned year they sometimes attain to the minimum size of 1 shaku 2 sun (36.5 centimeters). Furthermore, for the purpose of producing breeds of a great size, the fish having a good natural constitution and a well-formed head are selected from the six year old stock as parent fish, and breeds are put into a pond in the proportion of 6 or 7 per tsubo. Selection is again made in the following year and the rate is further lessened to 2 per tsubo. The fish are fed with 2 kamme (7.5 kilograms) of *Viviparus* and 500 or 600 momme (1,875 to 2,250 grams) of the chrysalides of silkworms pounded and mixed with starch (of

wheat). All ponds are so made that they can be drained at any time to prevent the generation of poisonous gases. Usually twice a year, viz, in March or the beginning of April, when the young are about to be removed to another pond, and at the end of autumn when the fish are going to be put into a hibernacle, both these ponds, prior to receiving them, are drained and dredged and then exposed to the sun's rays for four or five days. Any place where the water gushes forth in the ponds should be exposed longer. It is usual for these steps to be taken twice a year as stated above, but the more this is done the better it is for the health of the fish; it would be best to do it even once a month. When the fish come up to the surface of the pond to breathe in warm weather before sunrise and go down afterwards into the water it shows that they are in good health.

#### RANCHU.

The ranchu is chiefly cultivated in a concrete pond, though in small numbers. The number of ranchu to be put into a pond after hatching is one-half the number of oranda shishigashira, and the amount of fertilizer used is also half the amount of that used in the case of the latter variety. When put into a mud pond, the method of culture of the ranchu does not differ from that for the oranda shishigashira, but when reared in a concrete pond it is essential that the fish should be constantly supplied with fresh water. Hence the necessity of entirely renewing the water once every day. An amateur breeder would be likely to partially change the water to prevent a sudden change of temperature in the pond; but nothing is better than entirely replenishing the pond with fresh water of the same temperature as before. The fish are fed only with the larvæ of mosquitoes.

In a concrete pond of the aforesaid size are generally placed 100 fish under 1 year, 30 under 2 years, 10 under 3 years, 4 under 4 years, or again 4 under 5 years, but if these numbers were reduced better results would be obtained. It is good for the fish to be constantly supplied with food. Earthenware plates are not used for this purpose as in Tokyo, except for the time being after the fish are first put into a mud pond. There is one advantage in this method of feeding them without earthenware plates: they are naturally made to thrust their snouts in quest of food into the bottom of the pond, with the result that the bottom remains free from gases. If the number of fish under 1 year to be put into a rearing pond is reduced below the normal quantity above referred to (i. e., 100), they can be made to attain the size of 2 sun 5 bu (7.5 centimeters) at the end of the year, while keeping to that quantity they attain in length only 1 sun 5 bu (4.6 centimeters) in the same length of time, 2 sun (6 centimeters) at the end of the second year, 3 sun (9 centimeters) at the end of the third year, 4 sun (12 centimeters) at the end of the fourth year, and 5 sun at the end of the fifth year.

## WAKIN.

In the case of the wakin, twice as many as of the preceding variety are cultivated in a pond. When put into a miniature pond they are most lively, but do not live long.

## ARTIFICIAL COLORATION.

Various designs are artificially produced on the back of goldfish at Koriyama. Dilute hydrochloric acid is applied to the part where certain figures are desired to be produced. But the scales along the margin of the intended figures (such as badges or flowery patterns) being but partially colored, the results are not very satisfactory. This artificial coloration is best attempted in August or September, in the early morning. When the fish are purely red, the discoloration makes them very unsightly; besides, the color of the head can not be changed. For the purpose of artificial coloring, the water of the pond in which the fish are kept should in the first place be completely renewed and then they should be abundantly supplied with food. When they grow plump and fleshy the figures are put on. This practice has been known from remote times.

## INTEREST AND VALUE OF GOLDFISH TO THE JAPANESE.

On account of its beautiful form, its fine bright color, and graceful attractive motion when swimming, the goldfish has been for hundreds of years a great favorite with the people of Japan, and now different varieties are cultivated almost all over the Empire. In Hokkaido it is very difficult for the fish to survive the winter, owing to the intensely cold climate, and they are hardly ever hatched and cultivated there. Yet the favor with which they are regarded is extremely great and they are yearly brought there from Tokyo without number in the beginning of summer.

Such is the interest with which goldfish are regarded in Japan, and they are, moreover, admired by every class of the Japanese people. Some are kept in an artificial lake in a garden, some in tanks of various forms, others suspended in a glass globe from a ceiling, still others put into the pond of a miniature garden, and so forth. The kind and quality of the fish naturally vary with the class of people by whom they are kept. Those kept by persons of wealth and position are superior breeds specially selected, while people of limited means, holding in regard healthy and strong ones, prefer the wakin and the ryukin to others. Those enjoyed by children are mostly what are called "dregs" and often sold on fête days, which are many in Tokyo and other towns.

Although the goldfish is so extensively cultivated in Japan, as has been stated above, yet its value from a commercial standpoint can not be said to be



very great. The inferior breeds are sold at 1 sen (half a cent) a piece, while the superior ones fetch a price of only 50 yen (\$25) a pair. On rare occasions, however, 200 or 300 yen are paid for a single pair. In costliness the ranchu ranks first, the superior breeds of the oranda shishigashira are also of great value, and the ryukin comes next. The number of the last variety yearly exported from Yokohama and Kobe is great.

As already mentioned, the ranchu is regarded with special favor in Tokyo. An exhibition of this variety is held there every year in autumn by lovers of the fish, for the purpose of having the merits of their exhibits determined, and a successful breeder to whom an award of merit is made prides himself upon it. The exhibition lasts two days, on the first of which are examined the grown-up breeds and on the second the young in the first year. Being developed in color and form, the former naturally attest the extent of skill in the breeders and their value can be known at a glance. The latter are those hatched only in the preceding spring and as yet little developed in every respect; but these, after all the care lavished upon them by breeders, are to appear again fully grown up for contest at a future show, and on that account are full of interest and promise. The examination of fish in an exhibition is made in a shallow tub containing a white earthenware plate in the center. Two ranchu being placed in the plate are examined by connoisseurs as to their shade, dapples, and the form of the tail and body. Those perfect in every respect are awarded the "first best," and a list of the exhibits made in the order of their merits is given to the public. Every time the classification is made amid a stormy debate by the examiners. No positive criteria exist to guide one in the examination of the ranchu. Nevertheless, those uniformly bright red are considered the best, so far as coloration is concerned. Those perfect in form, however uniformly white they may be, are counted tolerably good. The variegated ones are generally unpopular; but in Osaka and its vicinity, those having fine dapples are greatly appreciated, especially if the head is of a bright red color. A ranchu having either a white body and bright red fins and mouth, or a bright red in color in both cheeks, is also admired. Every one of the breeds exhibited has its own name, which is given in the aforesaid list with that of the owner. Those who participate in the show are mostly nobles, wealthy merchants, and others in comfortable circumstances. On such occasions the very best breed fetches a price of 200 or 300 yen, but not one in ten thousand commands such a high price. The exhibition takes place chiefly in Tokyo but it has recently come to be held in Osaka also. Not a few goldfish breeders with fish of their own culture now come from localities lying far beyond Hakone to take part in a Tokyo exhibition. The reason why the exhibition is held in autumn is that the goldfish puts on the most brilliant colors in that season.



Plate XVIII.—WAKIN



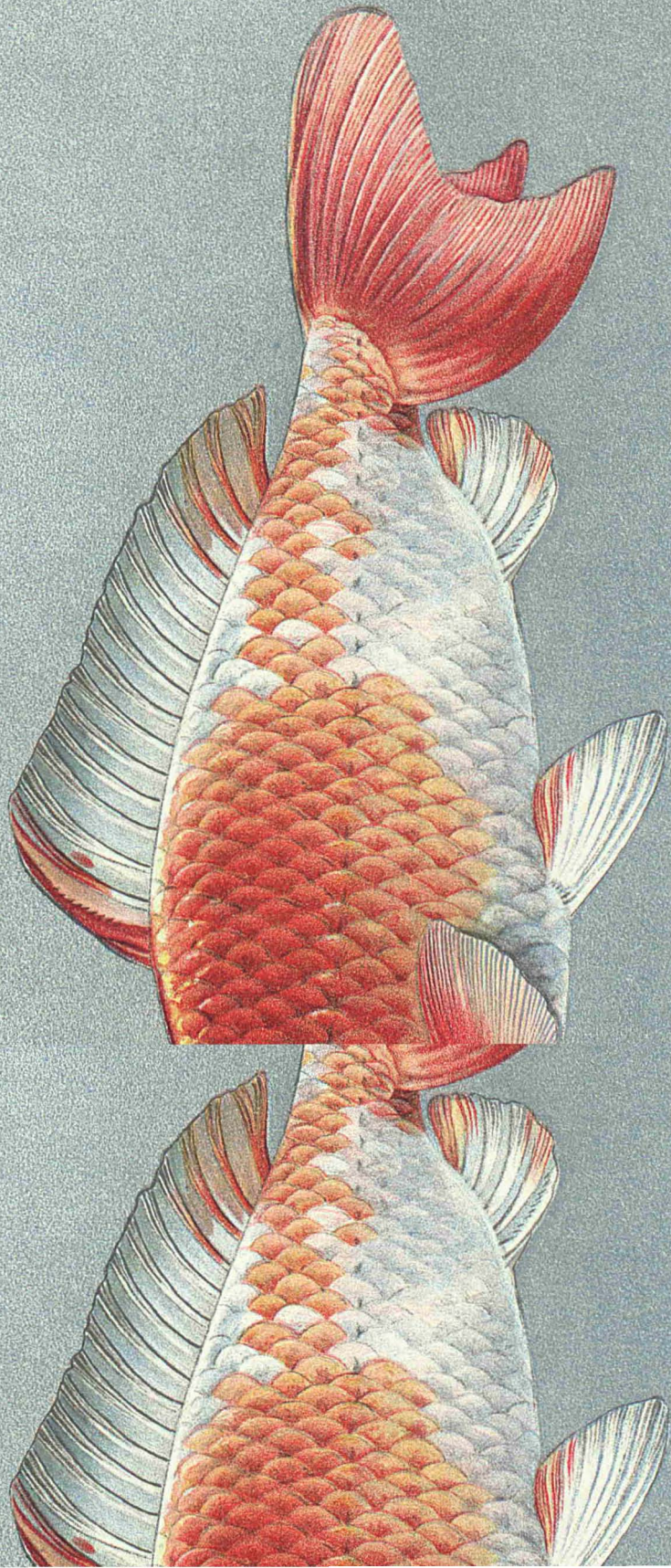




Plate XIX.—RYUKIN



Plate XX.—RANCHU



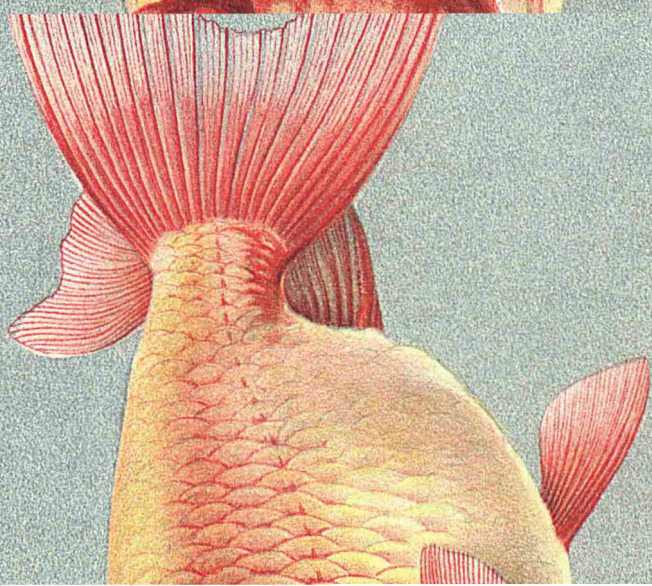
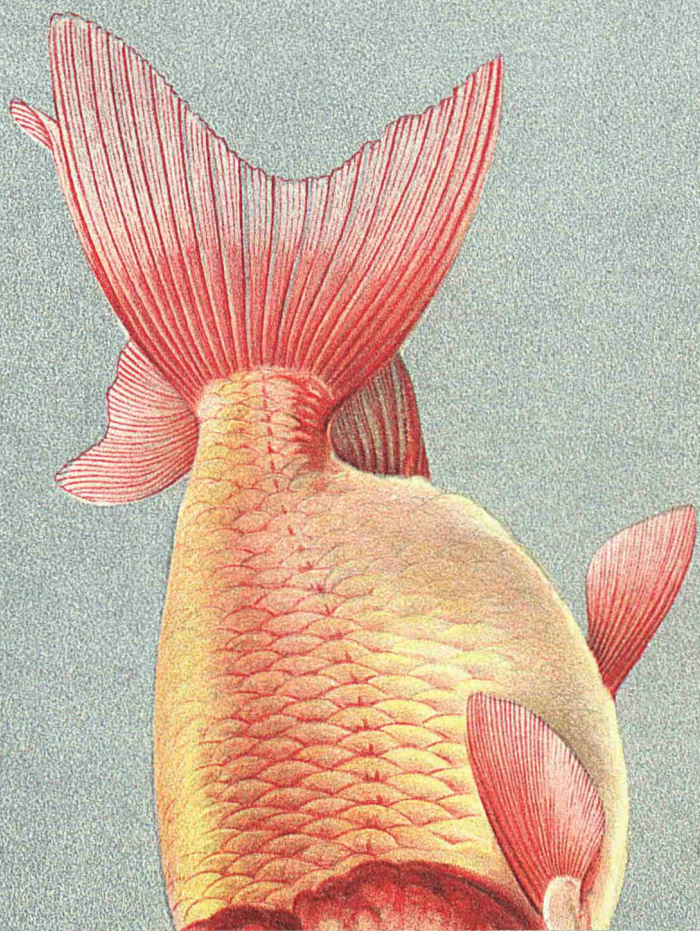




Plate XXI.—ORANDA SHISHIGASHIRA

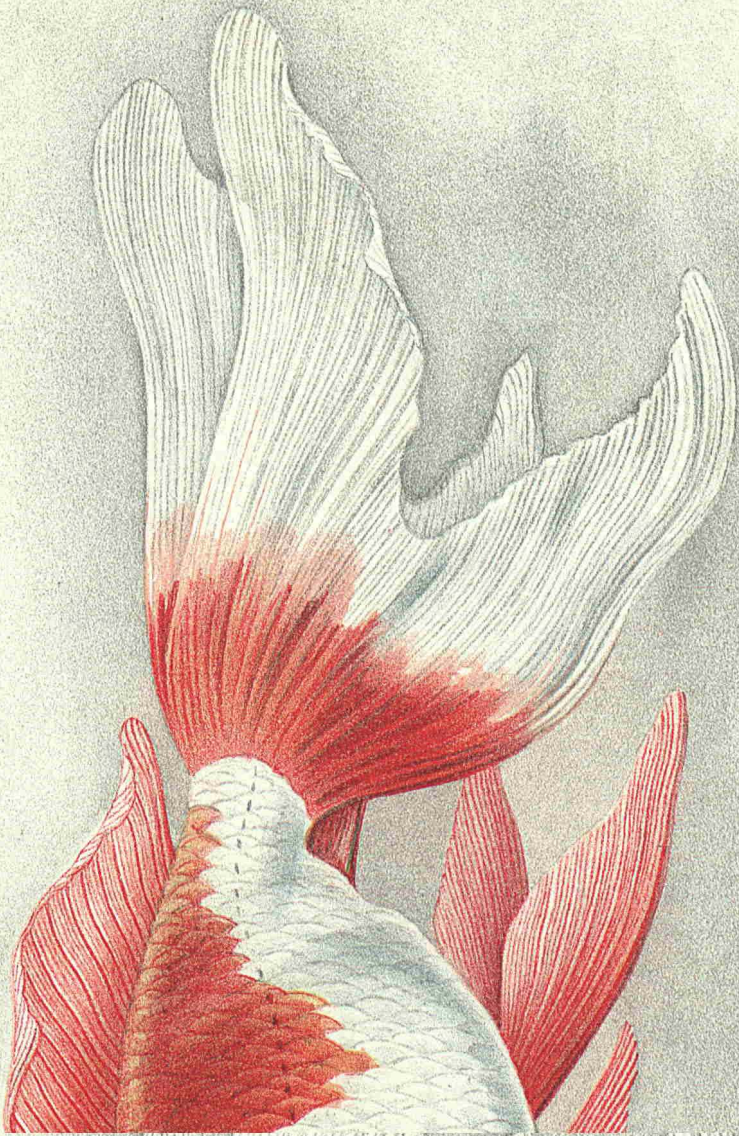


Plate XXII.—DEMEKIN



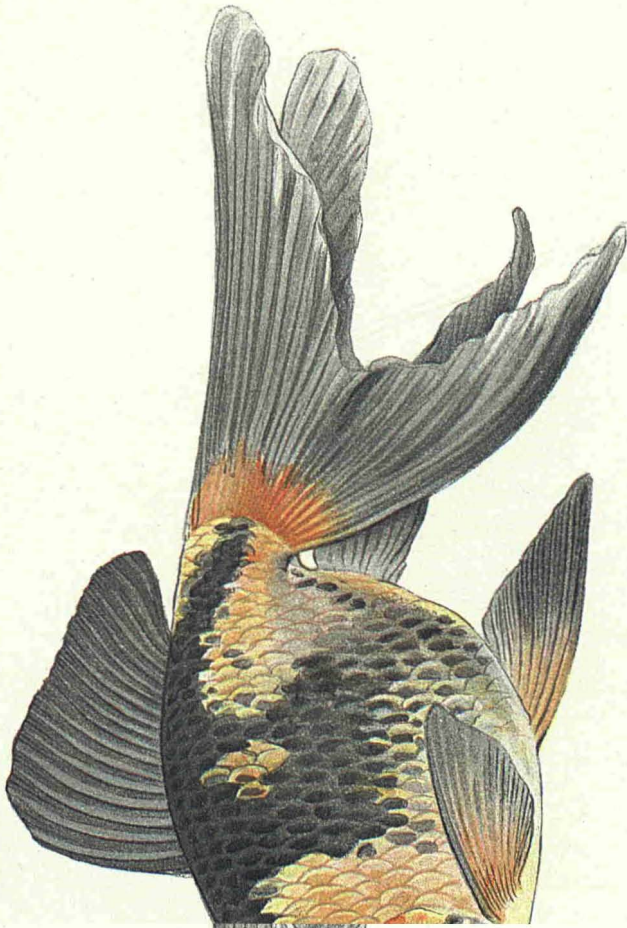


Plate XXIII.—DEME RANCU





Plate XXIV.—WATONAI







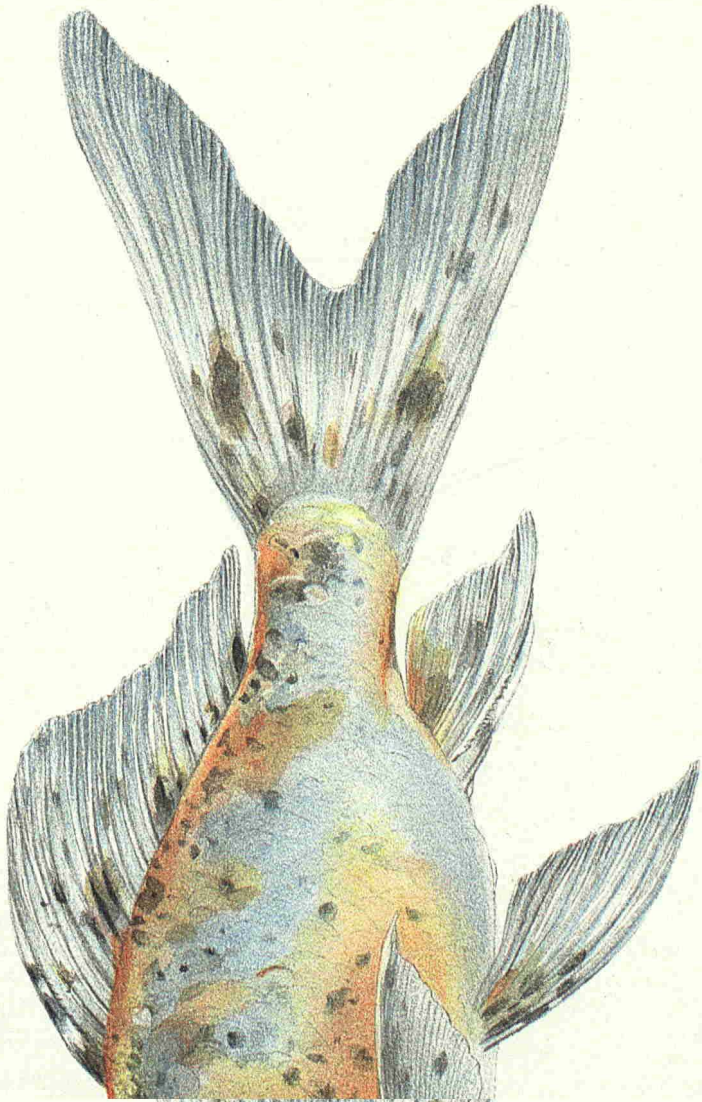
Plate XXV.—SHUKIN







Plate XXVI.—SHUBUNKIN



**Plate XXVII.—KINRANSHI**



