

CHAPTER II.

**The Freshwater Aquarium and
its Maintenance.**

THE AQUARIUM

A well-kept aquarium is unquestionably one of the most beautiful ornaments in the household, as it is both decorative and instructive, and a constant source of interest and entertainment to young and old. To the lover of the beautiful in Nature, the plant and animal life, thus brought under ready observation, affords opportunity for study and investigation that must lead to broader views and a higher appreciation of the beauties of nature.

DEVELOPMENT OF THE AQUARIUM. Of the early history of the aquarium Henry D. Butler states that "the great principle of the Aquarium was faintly indicated by Priestley, as long ago as the close of the 18th Century; Ingelhauss approached it more closely in 1778-9; Daubeny touched its verge in 1833; Dr. W. B. Ward, in 1837, suggested it with some distinction; Dr. Johnson partially demonstrated it in 1842; Dr. Lankester, in 1849, and Warrington, in 1850, rendered it conclusive; but Dr. Philip H. Gosse, in 1852, perfected all the labors of his predecessors in a series of decisive experiments that left no room for doubt or contradiction."

"An aquarium had also, about this time, established itself, by accident, at Hampton Court, England, and was described by M. Jesse. In a water tank in the open air, plants and snails made themselves unbidden confrères with the fishes. Nature did the rest, as she does in those more gigantic Aquaria, the placid lake and the majestic river."

"Next followed the grand Aquaria of London and Dublin under regal auspices. These were sumptuous exhibitions; and in a short time created such a popular interest in Great Britain that all the other curiosities of nature sank at once, into comparative insignificance."

Other authorities mention that Priestley, in 1833, discovered that growing plants, submerged in water, gave off oxygen when exposed to sunlight. In 1844, Ward succeeded in keeping fishes together with plants, but did not know the law of balance between plant and animal life. In 1849, Wm. Stimson had several aquaria at the Smithsonian Institute, but did not give publicity to the fact. But in 1850, Robert Warrington, of Manchester, England, read a monograph before the London Chemical Society on "The Relation between the Animal and Vegetable Kingdom," in which he explained the principle for the arrangement and maintenance of the aquarium. Later, he in conjunction with Dr. Gosse, continued their experiments and learned of the necessity of snails, and this finally solved the entire problem of the balanced freshwater aquarium. Dr. Gosse

also first applied the term "aquarium" to fish tanks, it having previously been used by the botanists to designate aquatic plant receptacles.

THE PROPERLY CONDITIONED OR BALANCED AQUARIUM. When properly arranged, its maintenance is very simple, but the governing principles of a balanced aquarium are not always understood. It is not realized that when the relations of plant to animal life are correctly proportioned, the aquarium is virtually self-sustaining or balanced, and the water need only be changed at long intervals, often of a year or more.

Plants in their growth liberate oxygen and take up the carbon-oxide and dioxide given off by the living creatures; the latter, in their turn require the liberated oxygen, which is either in suspension or dissolved in the water, to maintain their existence. Hence, if the plants and animals are properly balanced, the quality of the water remains fixed, and only becomes vitiated after a long period through the presence of other gases generated by the excrement of the animals and the decomposition produced by the general decay of the plants, of food, and other organic substances. Oxygen is absorbed in considerable quantity by the breathing organs of the living inmates, for the oxidation of waste carbonaceous matter, thereby producing carbonic acid gas. This, during the daytime, is absorbed by the plants, the contained carbon being required to add to the solid structure of the plants, and the oxygen is set free in the water. Thus the double action of animals and plants maintains an almost perfect balance, as the animals diminish the proportion of oxygen and add to the quantity of carbonic acid gas, and the plants increase the oxygen and diminish the carbonic acid gas.

The fishes, however, consume more oxygen than still water takes up from the air, and if oxygen-liberating plants are not introduced into the aquarium, they suffer from the lack thereof, become restless, come to the surface to breathe the air, and may finally die of asphyxiation.

It must not, however, be taken that an exact balance is ever attained, and it is better to have a preponderance of the oxygenating element, restricting the animal life to that which will live comfortably in the existing environment, and that the nearer these conditions are approached the better the inhabitants will thrive and the less often the water need be changed.

AQUARIUM PLANTS. Not all aquatic plants are equally good generators of oxygen and some information is requisite to make a selection of those which best fulfil this necessary purpose. There are quite a number of readily obtainable plants which perform this function, many of them native and others to be had of dealers. These are, in the order of their

utility, *Sagittaria* (floating arrowhead), *Cabomba* (fanwort), *Vallisneria* (eel or tape grass), *Anacharis* (water weed), *Myriophyllum* (water milfoil), *Ludwigia* (loose strife), *Fontinalis* (willow moss), *Ceratophyllum* (hornwort), *Potamogeton* (pond or stink weed), and others, of which more will be stated hereafter.

SCAVENGERS. To get rid of offal and waste matter generally, scavengers must be introduced, the best of these being frog tadpoles and those species of snails that do not attack the plants. When not overfed, they also clean the glass of the green coating of *Algæ*, the minute water plants, though these are far from objectionable, as they are one of the natural foods of the fishes.

KINDS OF AQUARIA. Any vessel will serve as an aquarium if it is clean and impervious to water, but glass better permits of observation of the contents. The cylindrical and bell forms distort the appearance of the fishes, and the ordinary globes furnish, in proportion to their capacity, too limited surface for the absorption of air. All-glass vessels are liable to fracture by uneven expansion and contraction, due to rapid changes in temperature or the effect of the sun rays, and if not soft and well-annealed, by the pressure and weight of the water. Globes and cylinders may also be so placed as to condense the sun rays, and as focusing lenses set fire to inflammable materials. Of the all-glass vessels the rectangular battery jars, though usually more expensive, give the best results. They may be obtained in two sizes made of white flint glass; having a capacity of $2\frac{1}{2}$ and 5 gallons, and are sold with or without brass or iron bases and stands. Thick pieces of felt under them are safeguards against breakage from uneven pressure on the bottoms, when set on flat surfaces, or by scratches. The brass or iron-framed aquaria are by far the best, and when properly constructed the glass sides and the bottom are so neatly joined that little or no cement is required on the inside. They are the strongest and handsomest, and can be made in any desired size. The foregoing refers to small aquaria, and it is a mooted question whether a number of these, each of distinct character, may not have more charm than one larger aquarium, if space will permit of their proper display, though the larger the aquarium the more likely is the success with fishes.

Large aquaria are usually made with heavy iron stiffening frames, slate bases and thick plate or crystal glass, the size limited only by the available space. When the tanks are of too great width they may become obscure and their contents not so easily seen. When they are of too great depth the aerating surface may not be sufficient and the water pressure too great. Consequently a tank of greater width than 24 inches and greater

height than 22 inches is objectionable. For out-of-door tanks and cisterns, any size and a variety of materials may be used; but when built of wood, they should be seasoned by a frequent change of water. Slate, soapstone and cement basins are used, of which more will be stated hereafter.

ARRANGING THE AQUARIUM. The aquarium should be set on a stable support, a stand, table or shelf, preferably facing a northern or north-eastern exposure in the summer, while in the winter it should be placed to get the sunlight two or three hours daily, preferably the morning sun; as it is essential that the aquarium should get a good light or failure will be the inevitable result. If indoors it should be placed at a window or under a skylight admitting the daylight and sunlight but without too much exposure to the direct rays of the sun during the hot summer months. The best success will be had when the light is such as to stimulate the growth of the plants without producing material changes in the temperature of the water. The position at a window also permits of the necessary ventilation and aeration; the slight draught, even when the window is closed, is a protection from excess of coal or illuminating gases and tobacco smoke; and in warm weather, it will moderate the temperature of the water if the direct rays of the sun are excluded.

COVERS FOR AQUARIA. Experts advocate glass covers for the aquarium having sufficient plant life. The plants will grow more luxuriantly, dust will be kept out, froth and bubbles will not form on the surface, and the evaporation will be less rapid. The cover need not fit tightly, but raised about $\frac{1}{4}$ inch by rubber or cork discs on the upper frame of the aquarium or it may have the corners cut away. The cover will also prevent the single-tailed goldfishes, the ide, tench and other freshwater fishes, from leaping out of the aquarium, a habit which they have inherited from their wild congeners who do this at twilight, when the day enemies have retired and those of the night not yet appeared. The double-tailed goldfish cannot leap from the water. Wire gauze or cotton netting over the top of the aquarium will also serve to prevent the leaping out of the fishes.

AQUARIUM EQUIPMENT. In the equipment and maintenance of an aquarium cleanliness is the all-abiding law. The interior should be cleaned with water, the glass rubbed with table salt, either on the finger tips or on a soft rag, and then carefully rinsed; no soap or alkaline substances are to be used nor any greasy or soiled vessel employed. When placed in position, the bottom should be covered with two inches of well washed sand, or grit, (small pebbles) and covered with small or larger pebbles; this depth being requisite for the proper rooting of the plants.

Next the plants should be arranged, and for the indoor aquarium *Sagittaria*, *Cabamba*, *Vallisneria*, *Nitella*, *Potamogeton* and *Ludwigia*, the best generators of oxygen, are to be recommended and should be planted in natural groups, interspersed with a few slips of *Anacharis* and *Fontinalis*, to enhance the effect; considerable opportunity being afforded for the display of individual taste either by arrangement with mathematical precision or by mingling in the graceful abandon of nature. These will grow all the year and thrive indoors; and, to permit of shelter to the fishes from too strong light, they should be arranged towards the window, leaving an open space on the inner side in which the fishes may disport themselves. If closely grouped, each kind somewhat by itself, most picturesque water gardens can be produced.

The planting is usually done directly in the sand or grit, the lower ends of the plants covered and weighted with pebbles, but it is preferable to plant in low flower pots or dishes, into which a little clean earth or pond mud has been placed, covered with pebbles, so that the plants will not be uprooted when the sand and grit are taken out and cleaned. *Sagittaria* and *Vallisneria* should be planted deeply so that the runners will be covered; the others may be set into the sand or grit without roots, as with some of the plants these will develop, or they will grow without roots. Bunches of *Cabamba* and other aquatics bound with strips of block tin, as sold by the dealers, should be separated; when planted in that way they will not thrive and soon rot at the lower ends. *Cabamba* and *Ceratophyllum* rarely root in the aquarium but grow quite as well with the ends buried in the pebbles.

A few larger pebbles scattered over the top and brook-worn stones between the plants, a pile of rockwork or a piece of turfstone make a pleasing effect, but it is surely questionable taste to introduce the grotesque submerged castles and figurettes so often seen in aquaria.

The pebbles permit the humus and precipitations to sift to the bottom, add to the cleanly appearance, permit of the growth of tiny aquatic plants, and are of benefit in many other ways.

When the plants have been put in position, the aquarium should be filled with clean water nearly or quite to the top, by pouring it on wrapping paper laid over the plants, that the contents may not be disturbed; and then the plants raised to proper positions.

The outside having been cleaned, the aquarium should be permitted to stand a few days before introducing the fishes, though it is advisable to introduce tadpoles and snails at once, so that the water may clear and the plants begin to take root and accumulate oxygen.

The use of feeding dishes is an unsettled question. Some expert fanciers claim that it is best to have the fishes hunt their food among the pebbles; but for the novice they have the advantage of showing whether the quantity given is correct and all the food consumed after each feeding, an important observation, as all excess should be removed.

STOCKING THE AQUARIUM. The number of fishes and scavengers which may be safely introduced depends upon the size of the fishes, the conditions under which they have been reared, the quantity of light, the temperature of water, the plant growth, and other circumstances; but overstocking should be avoided. A generally accepted rule for the permanent aquarium, under the most favorable conditions, is not more than one 2 or 3 inch fish per $2\frac{1}{2}$ to 3 gallons of water, with a tadpole and two snails to each three fishes. Care should also be exercised that the water is of like temperature to that to which the fishes have been accustomed, as any sudden excessive changes are injurious. If they have been kept in cold water, that of the aquarium should be of the same temperature, and assume that of the room after the fishes have been put into it. This is usually between 50° and 80° F. In the aquarium, indoors, in the winter, it is easily maintained between 50° and 60° F., and in summer between 65° and 80° F. In the open air the fishes survive almost every temperature, even freezing cold, if the ice is broken to prevent suffocation; while 100° F. is not injurious if sufficient oxygen is contained in the water and no sudden changes in temperature take place. A moderate equable temperature, between 50° and 70° F., is best for the household aquarium, and is easily attained.

It has been ascertained that for each 16 degrees of lower temperature water will absorb or hold in suspension double the volume of oxygen liberated by plants; and, inversely, a corresponding diminution will take place for each 16 degrees of rise in temperature; or that water at say 44° F. will sustain nearly twice as many fishes in comfort as will the same volume at 60° F., or three times as many as at the summer heat of 76° to 80° F.; and their number should therefore be diminished as soon as they persist in remaining on the surface sucking in the air and taking the required oxygen directly from the air itself.

In changing the fishes to the aquarium they should be gently handled, floated from one vessel to the other, if possible, avoiding violence or needless fright, as considerate treatment soon makes them less timid and more fully domesticated.

Success with goldfishes depends upon cleanliness, a vigorous plant growth to furnish abundant oxygen, intelligent treatment and proper food, sparingly fed.

FOOD. The natural food of the goldfish consists of the minute protozoans and crustaceans, algæ, insects, larvæ and worms contained in all freshwater. In the artificial conditions of domestication and in the aquarium, however, an insufficient amount of this food is obtainable, making feeding necessary; the best results being obtained when this natural food can be given to them; but in lieu thereof, artificial food may be fed, care being taken to feed in moderation, excess being more dangerous than a slight insufficiency. Not more should be given than will be immediately consumed, and if any remains uneaten, it should either be removed with the lifting-tube or no more given until it has been consumed. Animals under domestication thrive best when sparingly fed, and this also applies to goldfishes and other aquarium pets. The appetite of fishes is greatest in warm weather, as they become sluggish when the water is cold, and in their natural state take little or no food; which should be considered, and their diet regulated in keeping with their natural requirements.

During warm weather they should be fed once each day, but when the water has become cold, only on alternate days, or a smaller quantity given daily with occasional days of abstinence, that they may seek the discarded particles of previous feedings and prevent its becoming sour, with the attendant objectionable results.

For the novice, the most readily obtainable and least harmful fish food is the generally used rice wafer. Of this a piece about $\frac{3}{4}$ inch square should be fed to each 3 inch fish in summer and a smaller quantity in winter, varied at intervals of a week with other approved prepared goldfish foods or small particles of cleansed earthworms or ant larvæ, and when these can not be obtained with very small pellets of raw scraped beef, each fish receiving but one piece and care taken that none remains uneaten. Bread, cake and similar substances are not proper food for aquarium fishes.

SALTS. In an aquarium holding say five gallons of water, a half teaspoonful of table salt or a smaller quantity of epsom or glauber salts should be put about once a fortnight. It is beneficial to the fishes, who take it ravenously, as they have the same craving for saline substances as other animals. The table salt is both a mild antiseptic and a cathartic, and the other salts, cathartics, which are necessary to the fishes in their artificial surroundings, confinement, and the concentrated and highly nutritious forms of their food. Some of the prepared foods contain these salts, but their addition to the water in moderate quantity is always beneficial.

Sea shells, corals and other marine objects should not be put into the freshwater aquarium, though experts favor the introduction of a small quantity of lime in some slowly soluble form as necessary to the existence of the fish and molluscs. This will be treated of hereafter.

ADVICE TO BEGINNERS. The novice would do well to first obtain a few of the inexpensive common goldfishes, which are hardy and easily domesticated, and study their habits and requirements, before procuring the finely bred Japanese and Chinese varieties. Among the common American and European goldfishes there are many of beautiful forms and markings, ranging over almost the entire gamut of colors; from pure iridescent pearly white, lustrous silvery and golden hues, to all the shades and combinations of yellow, red, blue, brown and black. The prevailing colors of all the breeds of the goldfish are bright or dull white and yellowish tints on the abdomen, which change to a lustrous metallic yellow on the sides, and then almost imperceptibly shade into golden yellow, red, vermillion, carmine or the deepest and richest oxblood red.

When he has familiarized himself with their care, the novice could select for a five-gallon aquarium, say one Japanese Fringetail, a Fantail, a Comet and a Nymph, none over three inches; but these should not be at once put into a newly established aquarium, and only after he is assured that it will support that number in comfort. These are more easily kept than the more delicate fishes of Chinese and Korean origin.

CLEANING THE AQUARIUM. When and how often it is advisable to clean the aquarium is a matter of individual judgment. Green water, even to the extent of obscuring the contents, is not injurious; the fishes thrive better in it than in limpid water; nor is the residuum on the pebbles harmful, if objectionable substances are removed either with the dip—or lifting tube or the lower depths of water siphoned with a small rubber hose, which may be guided to all parts of the tank, removing the heavy vitiated water and most of the sediment. If the fishes continue excessively restless, persist in coming to the surface for air, and still avoid the bottom of the tank, possibly due to overfeeding, the introduction of more tadpoles and snails may be required, but should these measures not affect a remedy, thorough siphoning or cleaning is necessary and must be done at once.

DISEASED FISHES. When a fish becomes diseased, it should be immediately removed and isolated, and, dependent on the nature of the ailment; either the others quarantined, or the tank and contents cleaned and the healthy fishes returned; the latter course especially if the disease can be traced to unsanitary conditions. A clean surface on the pebbles adds to the beauty of the aquarium and also indicates healthful conditions.

It is a grave mistake to immediately introduce recently acquired fishes into an established aquarium. They should be kept for some time under observation and only introduced when full assurance has been reached that they are free of contamination. Aquatic plants should also be placed in water containing a tablespoonful of Phenol Sodique to the quart of water several hours before being placed into an aquarium; then rinsed in clean water, carefully examined, all decayed parts removed and the leaves cleared of dirt, algæ and confervæ, as serious ailments to the fishes are often produced by inattention to these particulars.

RESTLESSNESS. When the supply of oxygen is insufficient, the fishes come to the surface gasping for air. Relief may be given them by dipping and pouring back some of the water and by increasing the number of plants, selecting the best oxygenators; but if these measures do not improve their comfort some of the water should be siphoned from the bottom, refilling with fresh aerated water, poured a number of times from one vessel to another, or introduced into the aquarium in a fine spray. While the aquarium should be cleaned when the fishes persist in coming to the surface, this should not always be taken as an indication of unsanitary conditions, as they have the habit of doing this at daybreak and in the evening. The gasping of the fishes on the surface is to take in air with the water, to cause its partial absorption in the mouth before passing the water into the gills.

Excessive restlessness may also be due to a variety of causes; insufficient oxygen, the accumulation of objectionable gases in the water, impurity of the water itself, and the presence of parasites and fungi, too small to be seen. These will be treated of under ailments and remedies.

Changes from colder to warmer weather also unfavorably affect the fishes as a portion of the suspended air is thereby expelled from the water; and cloudy weather has some effect, as the plants will not liberate as much oxygen when they lack the stimulus of strong sunlight.

It is not advisable to put ice into the aquarium to furnish oxygen or to cool the water; fishes are just as liable to pneumonia as other animals; this being the ailment that kills many of them when transferred from aquaria to tanks in the open air too early in the Spring.

EFFECT OF GASES, FUMES AND ODORS. Authorities on the subject of goldfish culture disagree as to the injurious effects of illuminating and coal gases, tobacco smoke, and the dust borne by the wind or raised by sweeping. Water readily absorbs fumes and odors, and if these are excessive, they cannot be otherwise than injurious, though with care and forethought no further precautions need be taken. The hands should not

be put in the water, least of all after smoking; the aquarium should be covered when sweeping, and the room frequently aired or ventilated in mild weather. The dust may be removed from the surface of the water with a piece of clean blotting paper, but it soon settles to the bottom and serves as food for the scavengers and forms a part of the humus or residuum on the sand or pebbles. When the humus layer becomes thick, it may be injurious, and should be removed with the dipping-tube, the water siphoned, or the aquarium cleaned. In an experimental aquarium containing twenty gallons of water, this humus had formed fully half an inch thick, the water not having been changed for eighteen months, yet the fishes were perfectly healthy and contented. It is best to remove it, however, as it is the culture medium of parasites and fungi, and it is not advisable to leave it so long in the aquarium.

A piece of charcoal floating on the water or weighted and hidden among the plants serves as a deodorizer and mild antiseptic, and can be introduced to advantage.

ALGÆ. Algæ on the glass may be removed with a brush or a piece of felt on a stick or rod. It is advisable, however, to leave it on the sides which do not obstruct the view, as it aids in screening the fishes from excessive light and in keeping the water in good condition. A fish showing signs of illness, will often speedily recover when removed to a tank filled with green water, as it contains not only desirable food, but also beneficial medicinal properties. A very little permanganate of potassium will check the growth of Algæ, if this is found to be objectionable.

DESTRUCTION OF PLANTS. Even when sufficiently fed, the fishes will sometimes tear and destroy some of the aquatic plants, feeding on the younger shoots; but this is often done in sheer mischief and wantonness and the remedy is to introduce more of those plants which are unmolested. It may also be noticed that the fishes take the sand and smaller pebbles into their mouths; they do this to feed on the tiny water plants growing upon them, and it is not always an indication of insufficient feeding.

In conclusion it would be well to recapitulate the principles leading to success with the properly conditioned aquarium, any mistakes of which will surely lead to failure:—absolute cleanliness with everything pertaining to the aquarium; proper and abundant light; a vigorous growth of desirable aquatic plants; absence of decaying vegetation, a proper balance of plant and animal life, with preferably a preponderance of the former, absence of parasites and diseases, sufficient scavengers; and care in feeding the proper food.

CRUELTY TO FISHES. All admirers of the aquarium should consider it a duty to direct attention to the pernicious practise of keeping fishes in small fish globes. Millions of goldfishes have been killed by slow torture in this regrettable precursor of the modern aquarium, and by other unintentional cruelties. Many instances can be recalled of globes containing too many fishes, without a plant, hung in the glaring sun; to improper feeding and other practises which a little knowledge of the subject would prevent.

That the common goldfish is tenacious of life and will often survive abuses for a long time is no excuse for violating the laws of its nature. Other animals are protected by laws and philanthropic societies, but these seem to interest themselves but little in the fauna of the aquarium.

It is the dealer in fishes who is responsible for the survival of fish globes. They are the cheapest vessels that can be offered to purchasers, and he still has them for sale, rather than explain that the globe is an objectionable form of fish receptacle, superseded by better ones, and that success with its use is hardly possible. He would find that his sales would not diminish from candor and expressions of the truth. If he would explain the laws of balance in the aquarium, it is certain that the success which his customers will have would result in further exciting interest, while an unsuccessful attempt will discourage and may lead to the abandonment of all hope of success.

Means should be devised for placing simple correct information within the reach of everyone; then the aquarium would be much more popular than it now is, and this esthetic pleasure in the household would be within the reach of almost every one.

Experts in the keeping of the aquarium should interest themselves in this subject for the benefit of the general public. The fish globe should be used only as a temporary receptacle or hospital, but it were best if this torture chamber came entirely out of use.

CHAPTER III.



Goldfish Breeds

THE COMMON GOLDFISH

Both the American and European common goldfishes have elongated bodies slightly flattened on the sides, the latter being the slightly longer

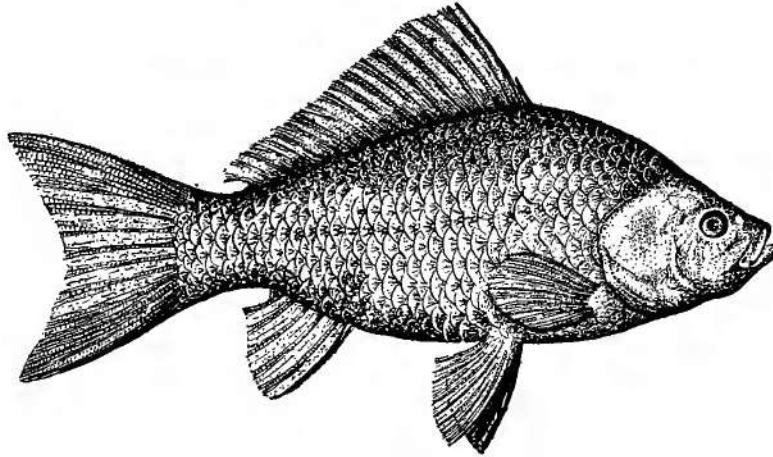


FIG. 6.—The Common American Goldfish
Carassius auratus, var. americanus

and more slender fish. Figs. 6 and 7. The scaleless head is usually short with broad forehead and wide interorbital space, blunt snout, full and well-defined lips, erect nostrils, clear eyes and the operculæ or gill covers of a burnished metallic lustre. The body has an even covering of uniformly

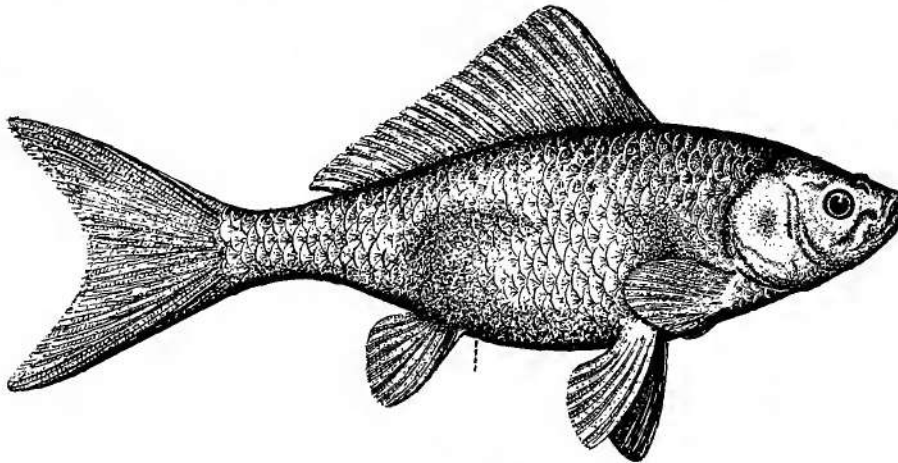


FIG. 7.—The European Goldfish
Carassius auratus, var. europensis; as known in the eastern United States markets.

sized scales having a bright, enameled surface. There are two sets of paired and three single fins including the tail. The color varies in different fishes and may be white, silvery-grey, olivate, golden or orange-yellow,

GOLDFISH BREEDS

red and brown or a combination of these colors, sometimes associated with black. It is hardy and tenacious of life, grows to large size, often attaining a length of 16 inches and reaching an age of 12 to 16 years, with reported instances of even greater size and longevity. It is prolific and will thrive under trying and adverse circumstances in any stillwater pool, cistern, tank or aquarium. It will withstand almost any temperature unless deprived of sufficient oxygen or subjected to sudden changes and may be transported over long distances. It is easily domesticated, and like its progenitor, the Crucian carp, will survive considerable periods out of the water in wet waterplants, to keep the gills moist.

When the fish has a grey or olivate hue, it is known as a silverfish, but these colorings may not be permanent and at some time either become mottled or entirely change to golden hues; though this rarely occurs with white or albinoid fishes; and when it does is usually just before or during the breeding season, thereby proving that the fish was only a dull colored, colorless or uncolored goldfish. Sometimes the color is entirely white with an iridescent or rainbow lustre. These are known as pearlfishes, their oftentimes red eyes proving them to be albinos.

When they have almost transparent scales and bodies, as sometimes happens with the white or very light-colored fishes, hybrids crossed with Japanese or Chinese stock, they are called transparent goldfishes, and these offer most interesting study in the aquarium, as all the functions of their existence may be observed through their transparent sides. Others of the goldfishes have a deep, resplendent blue-brown color on the sides and so dark a tone on the back as to appear to be black, with the scales sometimes outlined with metallic purple-bronze or bluish tints. These are commonly known as black goldfishes and are not highly prized, though a close study of the beautiful and fleeting changes of color should lead to a higher appreciation. These fishes usually lose their colors and assume those of the ordinary goldfish. All the common goldfishes are at first of a dull greyish-brown or olivate color.

Another fine distinction is in the shape of the head. When its outline, from the snout to the dorsal fin, forms an even upward curve, the head somewhat flattened on the sides, with the lower side of the body, from the gill covers to the caudal fin, nearly on a straight line, the fish is known as a Ram's nose; and when the head is very broad and rounded on the sides, with thick lips, is slightly depressed at the interorbital space and where the head joins the trunk, and the back very much rounded, the whole fish having a porcine appearance, it is known as a Hog's nose. These characteristics have been bred by the Japanese and Chinese, but

sometimes occur with the common goldfish, probably due to an admixture of an oriental strain or a variation in or from the parental type, to which this fish is particularly liable.

The desirable characteristics of the common goldfish are perfection of form, head and eye; fine, clean even and symmetrical fin development; evenly imbricated and uninjured scales; a clean and healthy general appearance, with distinct and brilliant colors.

Perfect development of the finely bred varieties are hereafter described; but the more general imperfections in these fishes consist of slight malformations of body and fins, and too great length of body in the short-bodied breeds or too short-bodies in those which should be long and slender. Some imperfect fishes of the double-tailed breeds have the upper lobe of the tail single and the lower lobe double. These are known as "Tripod-Tails". Others have the otherwise double tail joined at the top or margin and are known as "Web-tails", while when the double tail is joined at the centre and flattened on a horizontal plane, they are known as "Dolphin-tails". Another frequent imperfection of some breeds is a single instead of a double anal fin or the anal fin may be entirely absent. Some have the main ray of the dorsal fin crooked, due to the "hinge" or interspinous bone of the first ray being above the surface of the back, which prevents the fish carrying the dorsal fin erect, or the dorsal fin may be too short and consist of but three to six rays.

By careful breeding more or less fixed varieties may be produced, but none of these forms are permanent, as the goldfish is naturally inclined to variations under domestication or will revert to the original stock except under most careful breeding and selection, and what may be considered imperfections in some breeds are desired characteristics in others, as will be seen in the descriptions of the oriental goldfishes hereafter given.

Except only the Comet, the finer breeds should have very short heads, short bodies, evenly rounded backs, long pendant fins, small scales and large eyes.

THE JAPANESE AND CHINESE GOLDFISHES

The culture of the finely bred goldfishes has been conducted in the warmer parts of Japan and in China for centuries, all the varieties now known in the United States having been derived from these sources. The original parent stock was a Cyprinoid similar to the Crucian carp, with which albinism is of frequent occurrence, the colors of albinoid fishes of every species being bright orange and golden hues with occasionally white or uncolored individuals. By careful selection these colors were

made permanent in the goldfish, though the Oriental breeders did not confine themselves to this but developed combinations embracing every shade and color combination. Variations in body and head, difference in eye, fin and scale were also developed to such an extent as to produce all those strange varieties and almost incredible monstrosities which can be bred in all domesticated animals.

After the desired type had been established, breeding was carried forward generation by generation, until those wide differences were produced and perpetuated which now characterize the various breeds of Japanese and Chinese Goldfishes; but China, even more than Japan, is so truly the land of the bizarre that this is also most evident in their goldfishes; and, to the uninitiated, the forms and colors developed by them would appear like nightmares or caricatures of the fish when judged from the standard of European and American breeders. Every conceivable variation in bodily appearance, head, snout, mouth, eye, fins, tail and color has been developed and bred so as to force the conclusion that nothing is impossible to the Chinese breeder. All the varieties are not known in the United States, as some especially of the Chinese breeds, have probably never been exported or failed to survive the long journey; but the widely diversified appearance of those with which we are familiar leads to the expectation of even greater marvels as the result of that Oriental patience and perseverance which is proverbial in the Mongolian race. By methods apparently known only to themselves they have succeeded in developing and perpetuating malformations of structure which entirely change the appearance of every part of the fish. Some varieties of their goldfishes have the bodies modified in every conceivable way; shortened, elongated, rounded, curved, crescent-shaped, triangular in section or twisted and otherwise distorted into strange forms; with the dorsal fin sometimes only half its normal length or entirely absent. Others have the paired fins lengthened and abnormally shaped, the anal double or absent; the caudal of every conceivable form; the head so much shortened and the snout malformed as to produce an almost bulldog appearance, or covered by papillomatous growths, the eyes almost wholly projecting beyond the orbits, to appear like globular or tubular projections, with the pupils pointing sideways, forward or straight upward. Others have the scales raised from the sides to give an appearance like a ruffled fowl; some are so transparently scaled as to appear entirely scaleless or have a few scales on an otherwise apparently scaleless body. The marking and colors are equally fantastic and baroque and show every grotesque and fanciful design and color combination. No single detail seems to have been omitted that could produce the wierdest conceptions of what might be considered a diseased imagination.

To find beauty in this wild fantasm is surely "an acquired taste" but their rarity and singular appearance, their extreme contrast with every other kind of goldfish, led to the Chinese varieties being the highest prized of any of the aquarium fishes.

In the following descriptions and illustrations the Japanese and Chinese goldfishes will be treated of in the order in which they differ from the ordinary goldfishes and from each other. It may be here stated that the racial characteristics of the Japanese and Chinese are clearly reflected in their goldfish breeding; the innate, though often oddly expressed, appreciation of the beautiful of the Japanese race, and the search for the bizarre, the grotesque, and often to the Occidental mind the horrid, on the part of the Chinese.

It should also be premised that the illustrations are accurate, unflattered drawings from life of the most perfect fishes of their respective kinds, seen or owned by the author, except in a very few instances of those varieties which are now extinct in the Eastern States and for which descriptions and sketches were obtained from their one-time owners, to whom credit is given. Nearly all of these different breeds have been fully acclimated and most of them are American bred.

Early naturalists distinguished between the few then known toy varieties of the goldfishes, of Chinese and Japanese origin, by more or less appropriate Latin and Greek descriptive designations, which Dr. E. Zernecke applied to the now generally known varieties and added others. For instance, the Japanese double-tailed fishes were known as *Carassius auratus, varietas japonicus*, (Japanese variety of the goldfish); but which did not designate the Fringetail or Fantail and applied as well as to the Comet, Nymph or others of Japanese origin and derivation. Dr. Zernecke proposed *Carassius auratus, var. japonicus, bicaudalis*, (double-tailed Japanese variety of the goldfish); which would not include the single-tailed varieties, but could be applied to both the Fringetail and the Fantail. The following nomenclature for the toy varieties now known and bred in the United States is proposed and here adopted with the hope that it will meet with general acceptance:—

- The Common American Goldfish—*Carassius auratus, var. americanus*.
- The Common European Goldfish—*Carassius auratus, var. europensis*.
- The Japanese Comet Goldfish—*Carassius auratus, var. japonicus simplex*.
- The Japanese Fringetail Goldfish—*Carassius auratus, var. japonicus pendulibicaudalis*.
- The Japanese Fantail Goldfish—*Carassius auratus, var. japonicus erectibicaudalis*.
- The Japanese Nymph Goldfish—*Carassius auratus var. japonicus, nymphea*.
- The Japanese Barnacled Goldfish—*Carassius auratus, var. japonicus verrucosus*.
- The Japanese Hooded or Lion-headed Goldfish—*Carassius auratus, var. japonicus leocephalus*.

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- The Chinese Telescope Goldfish—*Carassius auratus*, var. *chinensis macrophthalmus*.
The Chinese Mottled or Variegated Goldfish—*Carassius auratus*, var. *chinensis variegatus*.
The Chinese Fringetail Telescope Goldfish—*Carassius auratus*, var. *chinensis pendulibicaudalis*.
The Chinese Moor or Black Telescope Goldfish—*Carassius auratus*, var. *chinensis maurus*.
The Chinese Tiger Telescope Goldfish—*Carassius auratus*, var. *chinensis tigrinus*.
The Chinese Lettered Telescope Goldfish—*Carassius auratus*, var. *chinensis scriptus*.
The Chinese Eggfish—*Carassius auratus*, var. *chinensis oviformis*.
The Chinese Blue Telescope Goldfish—*Carassius auratus*, var. *chinensis cyaneus*.
The Chinese Celestial Telescope Goldfish—*Carassius auratus*, var. *chinensis uranoscopus*.
The Chinese Tumbler Telescope Goldfish—*Carassius auratus*, var. *chinensis saltator*.

The adoption of these polynomials to designate the numerous artificial variations of the Goldfish, *Carassius auratus*, is done without intention of conflicting with the codes of nomenclature of zoologists.

THE JAPANESE COMET GOLDFISH

This variety was bred from the ordinary goldfish by crossing with the Japanese Fringetail or with fishes derived of this stock, and authorities claim first known in the United States about the year 1872. The efforts of the breeders were directed to the production of a pronouncedly elon-

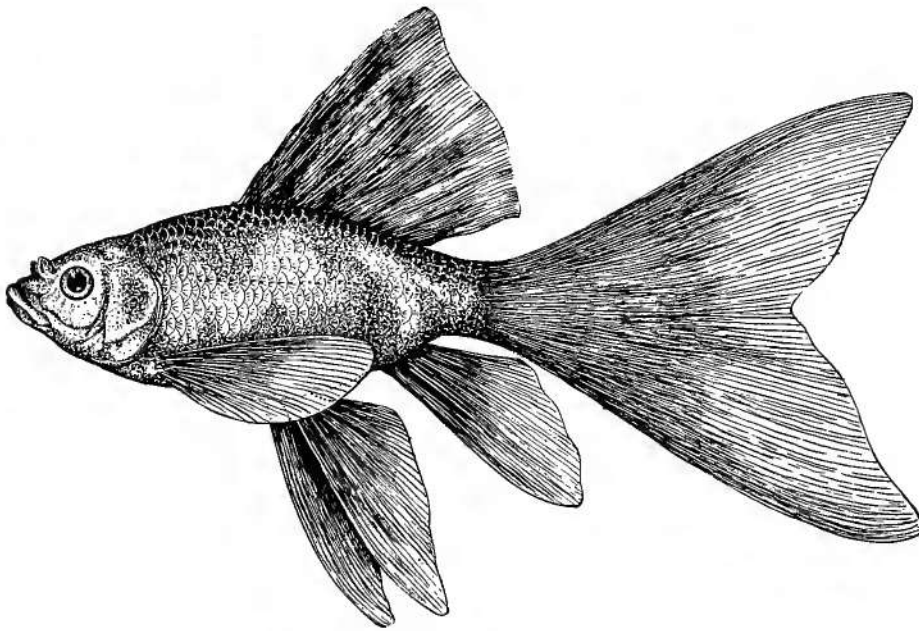


FIG. 8.—Japanese Comet Goldfish
Carassius auratus var. *japonicus simplex* Two-thirds life size.

gated body and tail, a long and narrow head with pointed snout, erect nostrils, thin lips and flat eyes; small uniform scales, long and erect dorsal

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and long pendant pectoral, ventral and anal fins. Of these the pectorals and ventrals are paired and the dorsal, anal and caudal fins single; the desired characteristic being a very slender, flat-sided and long-drawn fish, as the well-applied name would indicate. The colors are those of the ordinary goldfish.

The Comet is a most elegant, graceful and dainty fish, very hardy and easily bred; the personification of grace and rapidity of movement. Since its introduction, American breeds have produced a considerable

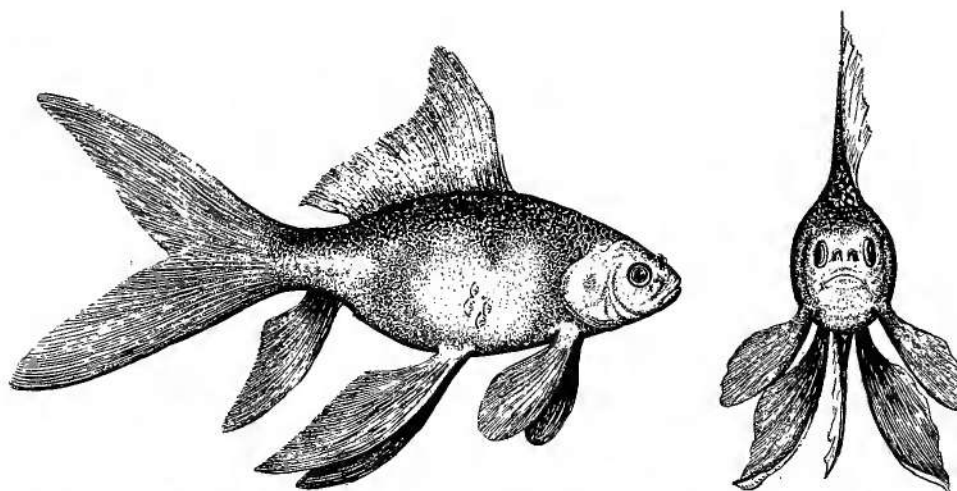


FIG. 9.—Transparently Scaled Japanese Comet Goldfish. Lateral and frontal views.
Two-thirds life size.

variation of the scaled parent type, and fanciers now distinguish between Ram's nose and Hog's nose scaled and scaleless (transparently-scaled) Comets, having either full, broad tails or with the tails very considerably bifurcated and spread, the most prized and rarely to be obtained being scaleless sharp-nosed Comets of a deep oxblood red color on the body and white fins with very long pendant lower fins, erect dorsals and widely spread single tails, either full or bifurcated, carried straight out behind and considerably longer than the body of the fish. These command high prices and are in beautiful contrast to other finely bred goldfishes.

THE JAPANESE FRINGETAILED GOLDFISH

Carassius auratus, var. japonicus pendulibicaudalis. Figs. 10 and 11.

Of the finely bred aquarium fishes the beau-ideal is unquestionably the truly magnificent Japanese Fringetail. No other variety has so richly rewarded the efforts of the breeder as this wonderful specimen achieved by careful selections on the lines of beauty, symmetry, grace and elegance of

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color. Patient, discriminating labor with thousands of generations has produced in the perfect Fringetail the handsomest of all goldfishes. The long, lace-like fins and tail, the rich burnished metallic lustre, the marvelous

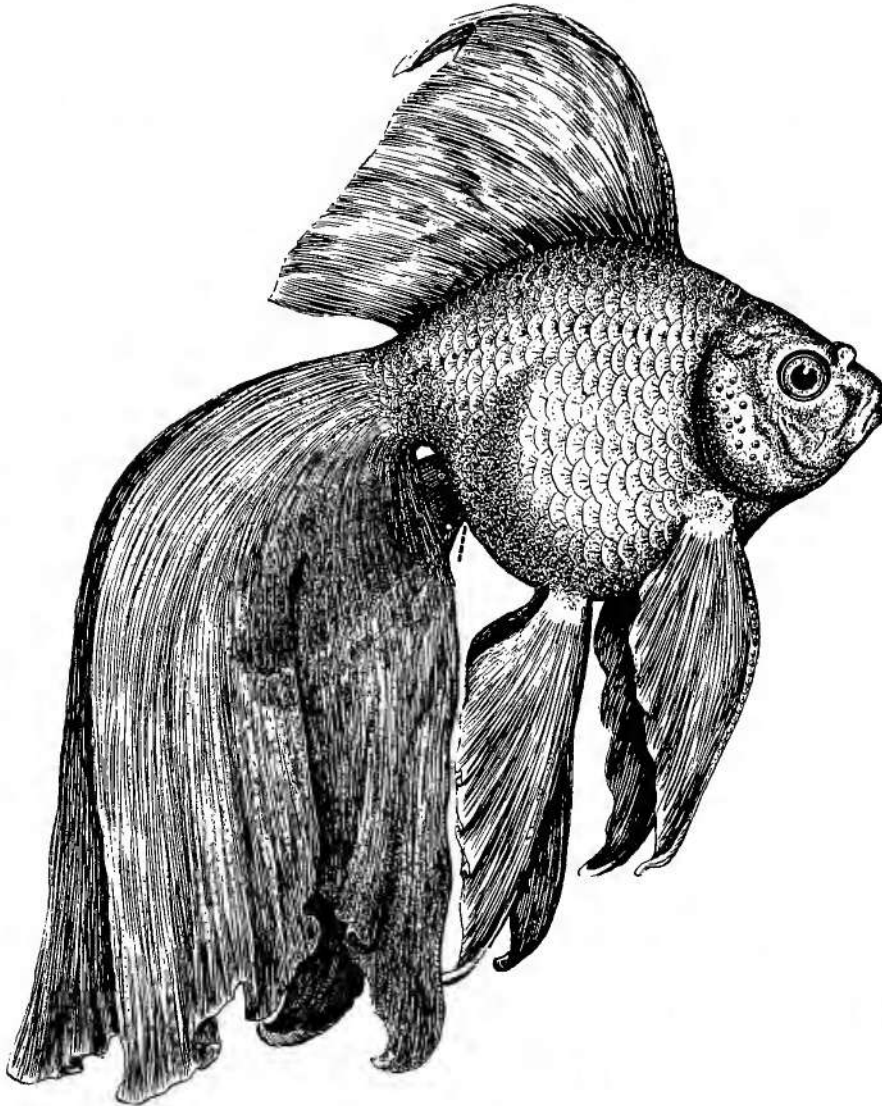


FIG. 10—Adult Japanese Fringetail Goldfish
Carassius auratus, var. japonicus pendulibicaudalis. Two-thirds life size.

brilliance of color, the finely modeled form and the perfection of graceful movement are truly typified in this justly prized fish. The full development of the beauty of the species is only attained upon maturity; although the fancier can discern in quite young fishes, those that give promise of future perfect development.

The fine mature Fringetail is a small-scaled, short-bodied and short-headed, thick, almost egg-shaped fish with evenly rounded sides, having

all the very long pendant fins paired, except the long, wavy and lace-like dorsal; and an immense delicate drooping double tail, divided quite to the base and floating behind the body like a great mass of most dainty lace; much longer than the body of the fish. The two separate tails are exactly alike in conformation, length, droop and texture.

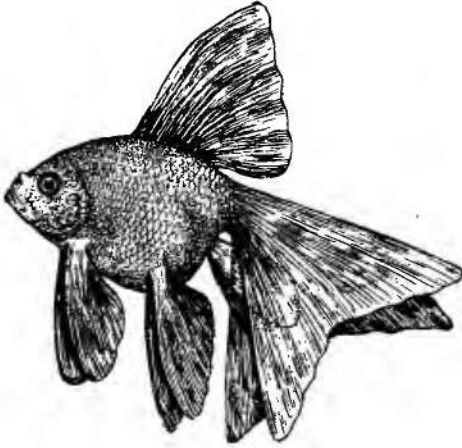


FIG. 11—Young Japanese Fringetail Goldfish.
Two-thirds life size.

By crossing with the Chinese transparently scaled fishes, American breeders have produced a larger black-eyed transparently scaled fish that is handsomer than the Japanese Fringetail, though otherwise it has all the characteristics of the imported fish; but is even more delicate and dainty in fin and tail development and more pronounced in color.

In moving through the water the stately appearance of the fully developed Fringetail is most graceful, majestic and fairy-like; the beautiful tail, floating behind and following every movement, is carried as though the fish were proud of its almost regal appearance.

THE JAPANESE FANTAIL GOLDFISH

Carassius auratus, var. japonicus erectibicaudalis. Fig. 12.

This beautiful fish has certain distinguishing characteristics which clearly mark it as a distinct variety, though in many particulars it bears a close resemblance to the Fringetail. Authorities agree on these distinctions which are recognized by fanciers. The Japanese breeders developed decided differences in conformation of body and fins which are very apparent in finely bred specimens, though these are more rare than is generally supposed, as most of the goldfishes known as Fantails are usually Fringetails with either short or imperfectly developed tails; or web-tailed Japanese fishes.

The Fantail is a scaled short-bodied fish, very thick, round-backed and deep-bellied, of almost oval outline; its body being best described as of short pumpkin-seed-form, with the horizontal longer diameter of slightly greater length than a true oval, and so formed that an imaginary line from the upper lip to the base of the tail would show the upper and lower halves of the body of almost the same conformation. It has a short, broad head, distinctly hognosed, a large mouth with full lips, erect nostrils and eyes like the ordinary goldfish, but larger. The long and erect dorsal fin sits far back on the spine, all the other fins being paired; the pectorals and

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ventrals are long and pendant, the double anal fins are long and extend almost straight backward, while the broad double tail, which is the principal characteristic of the fish, is divided quite to the base and the two distinct tails stand directly vertical on the same plane and are carried straight

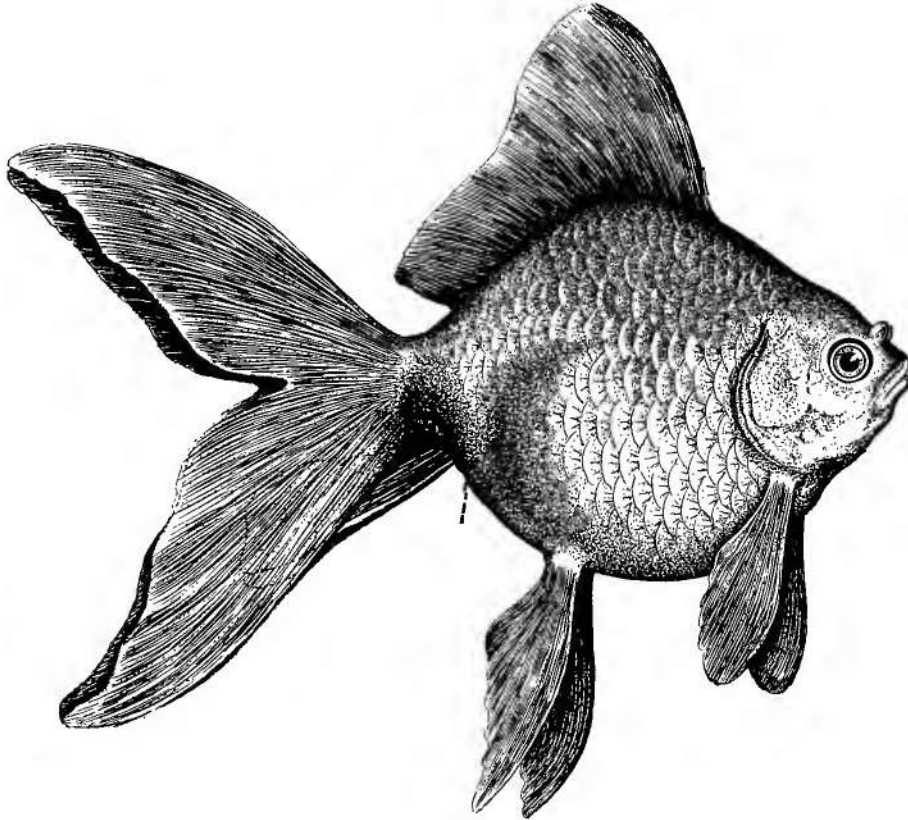


FIG. 12—Japanese Fantail Goldfish
Carassius auratus, var. *japonicus erectibicaudalis*. Two-thirds life size.

out behind the body without the least drop or droop; the upper and lower lobes being of exactly the same length so that a perpendicular line from the end of the upper will exactly touch the end of the lower lobe on each side. This is never the case with the imperfectly developed Fringetail; the upper lobes are always the longer, and the relative position of the double tail is not directly vertical or parallel to each other but at a decided angle when the fish is viewed from the rear, while the perfectly developed Fantail has the appearance of having two separate single tails placed side by side. The tail of the Fantail never exceeds the body in length.

The colors are identical with those of the Fringetail, but the scales are larger and usually coarser; this variety also having no transparently scaled members, either of pure or crossed stock. It is a characteristically handsome fish though not as "showy" as the Fringetail.

THE JAPANESE NYMPH GOLDFISH

Carassius auratus, var. japonicus nympha. Figs. 13 and 14.

With all finely bred domesticated animals there are always some individuals that have a tendency to partially revert to the ancestral type. This frequently occurs with goldfishes, as many of the progeny of the

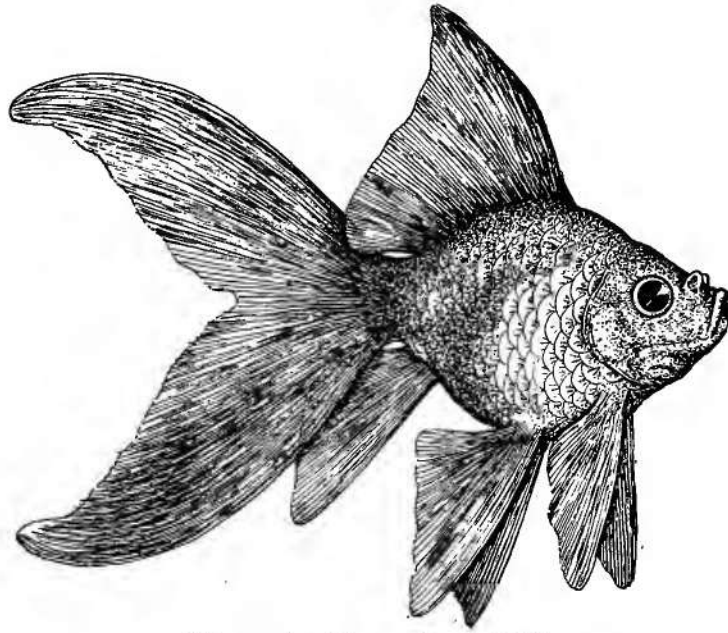


FIG. 13—Scaled Japanese Nymph Goldfish
Carassius auratus, var. japonicus nympha. Two-thirds life size

finest strains develop characteristics different from their parents and clearly indicate the type from which the breed was derived. An instance of this is the Nymph goldfish, the name of which would indicate some such thought on the part of the breeders. It is now recognized as a distinct

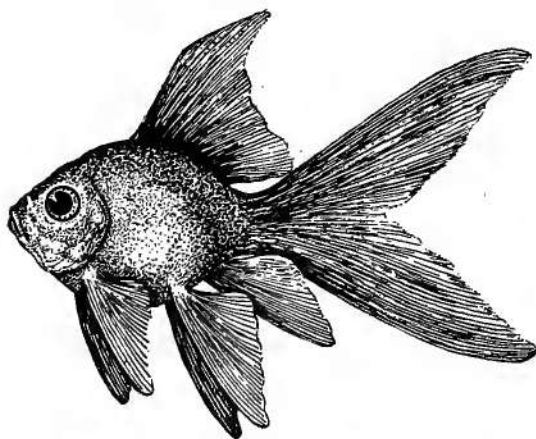


FIG. 14—Transparently-scaled Japanese Nymph Goldfish
Two-thirds life size

variety and may be bred by crossing the Comet and the Fringetail, but is more usually accidentally produced from Fringetail stock; being what is known, in the parlance of the breeder as a "sport." The finest specimens have all the characteristics of the Fringetail with a single Comet-like tail. Fine specimens of the Nymph are very handsome, having long pendant pectoral and ventral fins,

a very high dorsal and a straight single anal fin; a delicate, very long single tail, and the head, eyes, small scales and general conformation, as well as the rich lustrous colors of the Fringetail. The body is shorter, broader and fuller than the Comet, those with almost circular flat-sided bodies are the highest prized.

In the aquarium they make an agreeable contrast to the other fine breeds and have an individuality of their own which warrants their being classed as a distinct variety. Some fanciers still consider them single-tailed Fringetails, but the general consensus of opinion is that these fishes should be classed as Nymphs, the most typical having short flat-sided bodies and straight Comet-like tails, though some Nymphs have tails of such great length that they of necessity droop. These may be considered a separate variety, and are quite as much prized as the straight tailed fishes. They occur both scaled and transparently scaled.

THE JAPANESE HOODED OR LION-HEADED GOLDFISH

Carassius auratus, var. japonicus leocephalus Fig. 15.

The form, scales, fins and color of this peculiar Japanese or Korean goldfish resemble the Fringetail but the dorsal fin is absent; the distinctive difference consists of a peculiar growth on and over the sides of the head,

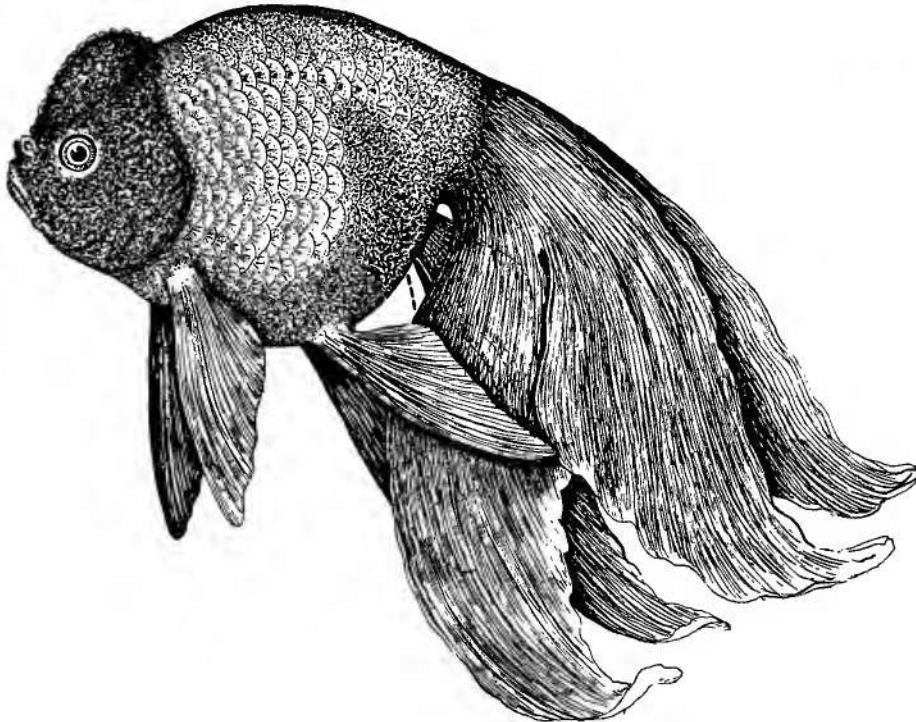


FIG. 15. Adult Japanese Hooded or Lion-headed Goldfish
Carassius auratus, var. japonicus leocephalus. Two-thirds life size

surrounding the orbits, so that the head of the fish has an appearance similar to that of the "Owl" breed of pigeon, surmounted by a hoodlike excrescence of bright pink or of crimson color. This papillomatous growth consists of rounded tubercles, about pinhead size, evenly placed and entirely covering the head.

This peculiar goldfish was described by Mr. Hugo Mulertt who imported a number from Europe, and has also recently been reintroduced into the United States. Fine specimens are of pearl-white color on the sides with occasional regularly placed single brilliant red scales; others are of golden color, but all have the characteristic crimson papillæ on and over the head. Occasional fine specimens are devoid of anal fins.

In writing of the "Corean breed," known as the "Maruko" or "Ranchiu," now largely bred in Japan, Prof. S. Watase states that it has an exceedingly short body, being in some instances almost globular in form. The dorsal fin is entirely absent and the head is distinctive of this breed in having rough-looking protuberances of the skin which often attain a considerable size and length.

Two specimens of this fish were shown in alcohol in the Japanese section at the Chicago World's Fair, as they did not survive the voyage to the United States. These had developed the peculiar growth into long and hair-like manes and were designated by the Japanese as "Lions." No others were seen by the author until recently and these had the papillomatous growths and general characteristics of the illustrated fish. Dr. Hugh M. Smith of the Bureau of Fisheries at Washington, during his visit to Japan saw and had drawings made of some remarkably developed fishes of this breed.

THE JAPANESE BARNACLED OR PARADISE GOLDFISH

Carassius auratus, var. japonicus verrucosus Fig. 16.

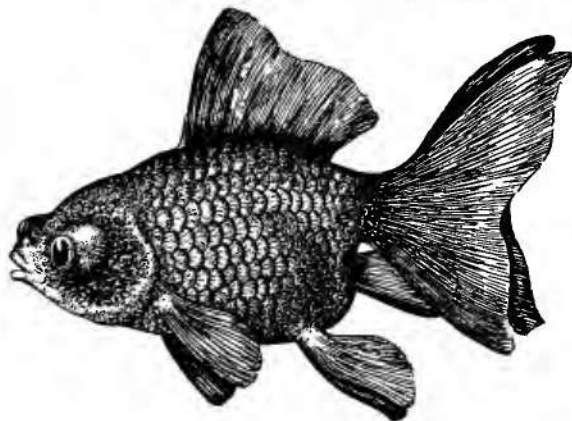


Fig. 16—Japanese Barnacled Paradise Goldfish
Carassius auratus, var. japonicus verrucosus. Two-thirds life-size

This exceedingly rare Japanese goldfish has the body and fin development of the Telescope, with the large tubular eyes pointed forward; a shortened head and long snout, moderately large paired fins and a double tail. The skin is covered with wartlike growths or papillæ, which cause the thin scales to curve and

stand from the sides as though they were ruffled, and giving to the fish somewhat the appearance of being covered with barnacles. The scales are unevenly imbricated, so that they appear somewhat scattered, like those of the mirror carp; although they entirely cover the body of the fish.

The singular appearance of these fishes led American breeders to suppose them to be diseased, but later they were recognized as a variety of the Japanese Telescope, the distinctive peculiarity being the scale formation. The colors are mottled red and white with black and white fins and tail. So far as is known, these fishes are now extinct in the Eastern section of the United States, the last importation having been received in 1897. Recent repeated inquiries and efforts to obtain breeding fishes by direct importation have been unsuccessful, leaving it an open question whether they should be recognized as a separate breed or an accidental variation which was lost.

THE CHINESE TELESCOPE GOLDFISHES

This singular breed is of Chinese origin but is also bred in Japan. In it may be observed the peculiarities of the Chinese breeder and his desire to produce abnormalities. The head and snout are considerably shortened; the body is rounded and egg-shaped, the dorsal fin erect and set far back on the spine; all the lower fins are paired; and the double tail is divided to its base and carried straight out at a downward angle. The vertebral column

is also curved downward behind in an abnormal way to produce a hunchbacked condition. There are both scaled and transparently-scaled Telescopes, the former being generally recognized as of Japanese breeding. As the name implies, the principal peculiarity is the development of the projecting eyes, Fig. 17, which have the character of spheres, ovoids, truncated cones or segmented spheres set upon the sides of the head, the eyeballs appearing to almost wholly project from the orbits, and the cornea forming a segment of a much smaller sphere than does the eyeball proper. As a result of this peculiarity, the anterior portion of the eye is more acute than the larger posterior portion. The iris is also very distinctly outlined. In addition to the abnormally

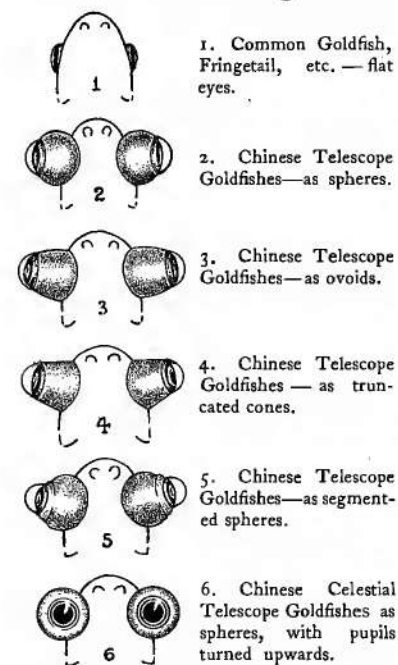


FIG. 17—The Eyes of Goldfishes.

shaped body, projecting eyes and peculiar droop of the tail, fanciers prize the remarkable colorings developed by the orientals. The prevailing colors of the scaled Japanese fish, Fig. 18 are those of the ordinary goldfish, but most oddly placed. Certain fishes have clear golden-red bodies with the backs and all the fins jet-black and have black eyeballs; others have white bodies and deep-red fins and red eyeballs

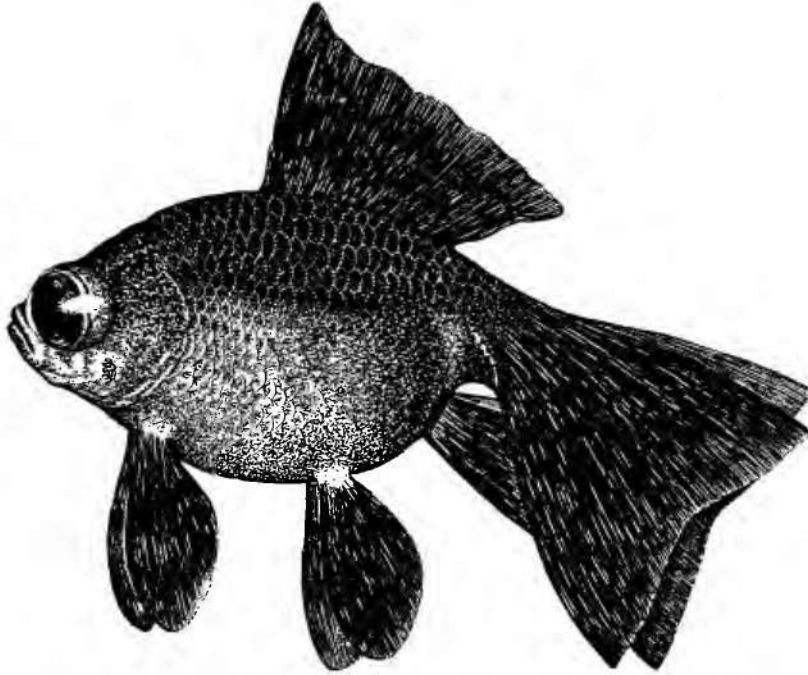


FIG. 18—Scaled Japanese Telescope Goldfish
Carassius auratus, var. japonicus macrophthalmus. Two-thirds life-size

with black irides; some have red or golden-yellow bodies and white fins with red, white and black eyes; and others pearly-white bodies, and fins mottled with red, and red and black eyes, though none of these colorings are necessarily permanent. The colors of these fishes are so fantastic that French, German and American authorities class them as much by these color peculiarities as by changes in body structure.

The following are the most generally known of the Chinese telescopic-eyed goldfishes bred in the United States:

THE CHINESE MOTTLED OR VARIEGATED TELESCOPE GOLDFISH

Carassius auratus, var. chinensis variegatus. Figs. 19, 20, 21 and 22

This variety of the Telescope is commonly known as the Calico, as best describing its fantastic markings. The body is short and thick; the spine has a decided backward curve; the snout is formed to give the short

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head a pugnacious appearance ; the mouth is placed almost vertically at the front of the head ; the lips are distinct ; the nostrils small but erect, and the eyes very large and usually disclike or tubular in form. The

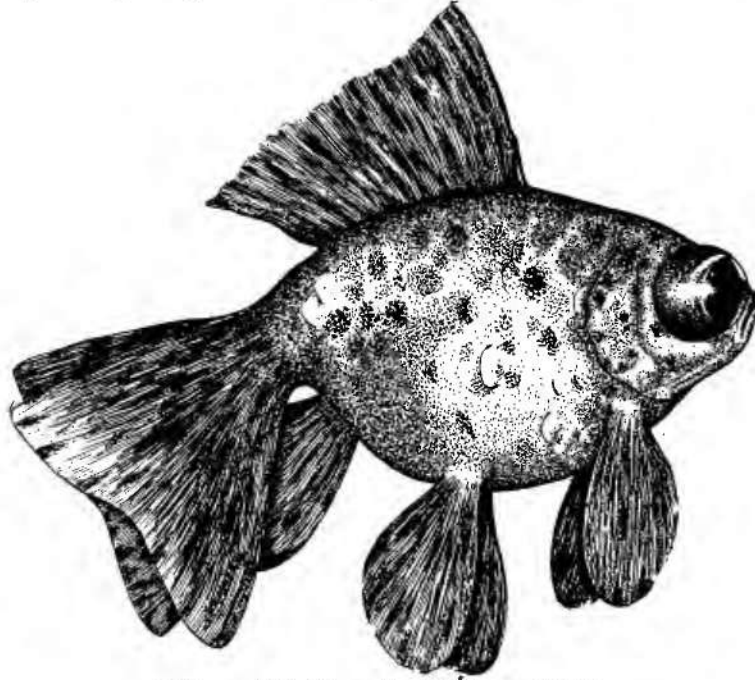


FIG. 19—Adult Chinese Mottled Telescope Goldfish
Carassius auratus, var. chinensis variegatus. Lateral view. Two-thirds life size

dorsal fin is high and short ; all the lower fins are paired, long and very broad ; the tail is double and the two separate tails are carried at an angle

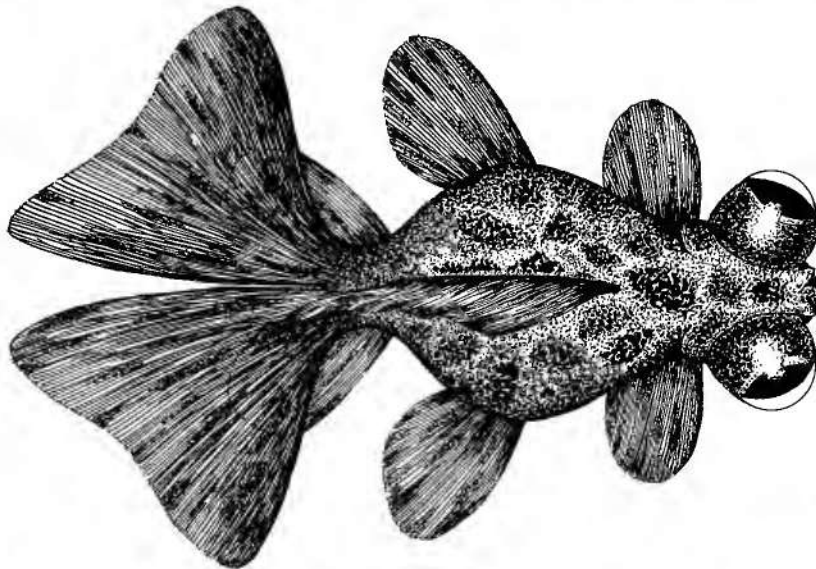


FIG. 20—Adult Chinese Mottled Telescope Goldfish
Dorsal view. Two-thirds life size

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to each other, straight, drooping and at an angle with the body. Its markings are most peculiar and consist of irregular blotches of all shades and shapes, distributed at random over the entire fish, including body, fins

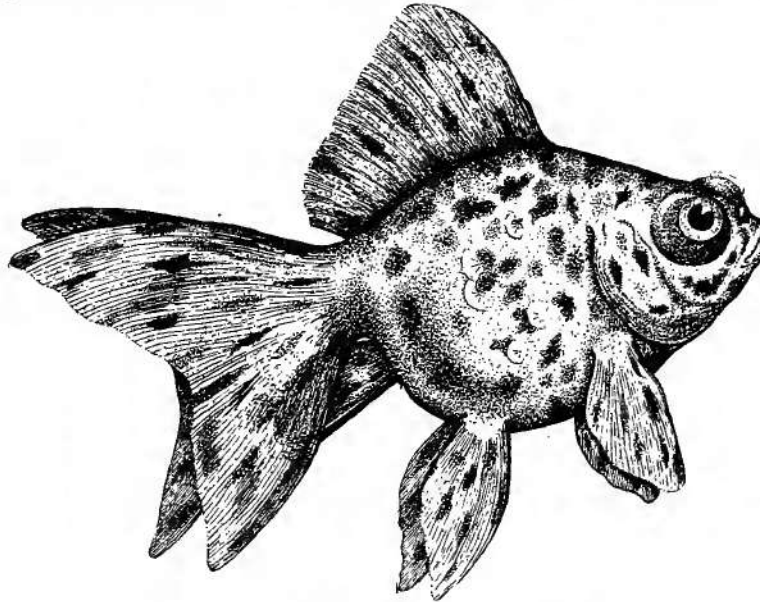


FIG. 21—Young Chinese Mottled Telescope Goldfish
Lateral view. Life size

and tail. It is so transparently scaled that the flesh tints, which are often of a pronounced bluish hue, may be seen through the skin; upon which



FIG. 22—Young Chinese Mottled Telescope Goldfish
Frontal view. Life size

the red, yellow, brown, blue and black mottlings show most conspicuously. This is a handsome, most peculiar and highly prized fish.

THE CHINESE FRINGETAILED TELESCOPE GOLDFISH

Carassius auratus, var. chinensis pendulibicaudalis. Fig. 23

This variety has the body, eyes and fin development of the Calico, but differs in its markings. The transparent scales are invisible and the colors are most oddly distributed in patches of beautiful oxblood red, white and bluish tints over the head and body. The long, delicate, filmy, lacelike fins and beautiful long double tail are usually white.

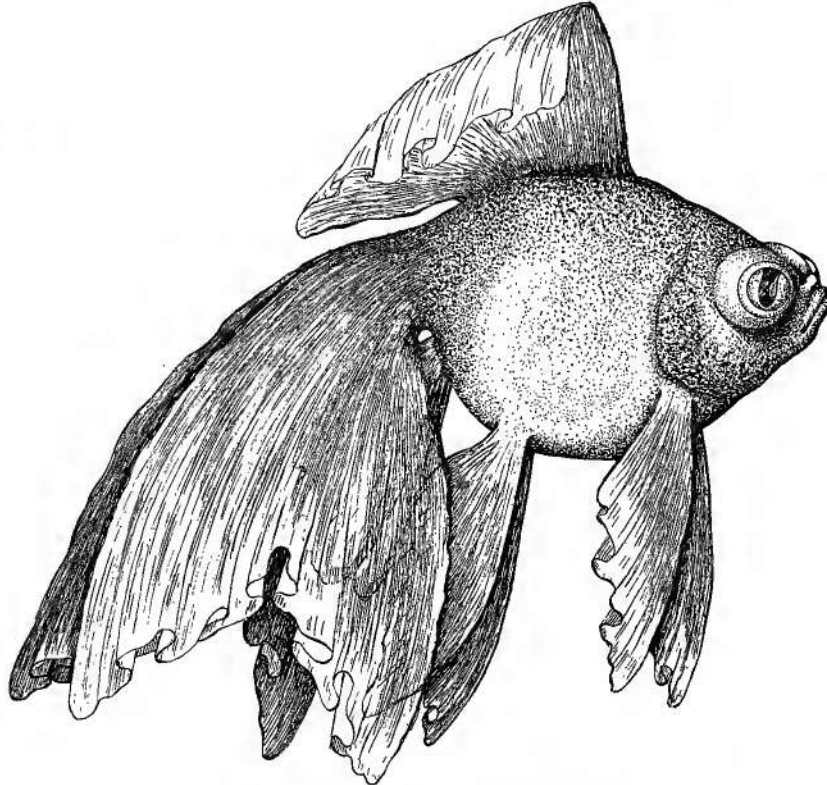


FIG. 23 --Chinese Fringetail Telescope Goldfish
Carassius auratus, var. chinensis pendulibicaudalis. Life size

Sometimes the fish is almost or entirely white, with delicate pink and blue tones, and so transparent that almost all of the internal organs and the skeleton are visible, a most interesting, curious and dainty so-called Transparent Fringetail Telescope Goldfish. These fishes are derived from the same parent stock as the Mottled Telescope and are bred from imported fishes. Oftentimes some of the young of Mottled Telescopes exhibit this character and are greatly admired, not only for their beautiful colors but also for their spheroidal eyes, which are usually deep blue in color.

The Chinese Fringetail Telescopes have most wonderful development of fins and tail, so dainty and lacelike as to seem too delicate to serve their uses. These are as long and pendant as those of the most perfect Fringetails. The illustration is of an 18 months old fish owned by the author.

THE CHINESE MOOR TELESCOPE GOLDFISH

Carassius auratus, var. Chinensis maurus Fig. 24

This magnificent variety, known as the Moor or Black Telescope, is a very rare and deservedly highly prized fish. Its general conformation is that of the Chinese Telescope, but the fins and tail are usually longer.

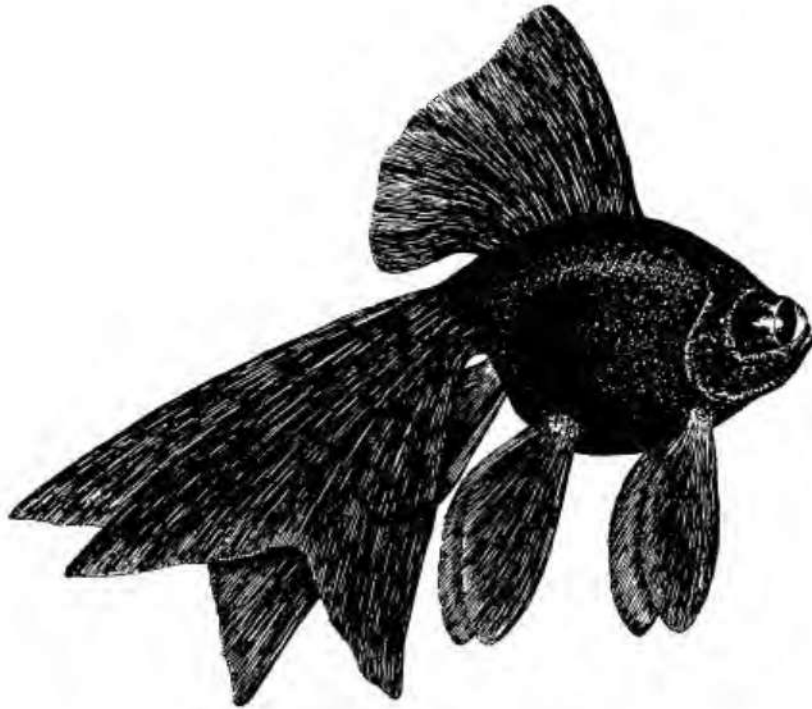


FIG. 24.—Chinese Moor Telescope Goldfish
Carassius auratus, var. chinensis maurus Two-thirds life size

The distinctive coloring is permanent in purely bred fishes and consists of an even covering over the entire fish, including the eyes, fins and tail, of a wonderfully rich bluish-black hue, so delicate and even in tone as to appear as though the entire fish were covered with the richest blue-black velvet, the magnificent sheen of which is such that one could expect to feel the very texture of the fabric. With many of the American bred Moors, however, the black color is not permanent.

The Moor is always a scaled fish, though these, due to the intensely dark color, are usually invisible. Sometimes in fishes bred from Japanese stock, the colors are black on the back and sides, with a delicate bluish or reddish-bronze tone on the abdomen, these scales have the appearance of being outlined with golden-bronze. The fishes so marked never retain their black color, but at some time in their existence, assume the darker colors of the goldfish. It is accepted among breeders that young Moors

which are white on the under side of the body, between the fins, are more likely to retain their black color than those which are yellow in this region.

No fish is handsomer in the aquarium than a fine Moor, as the beautiful form and color not only contrast with the other fishes, but tend to bring their brilliant colors more prominently into notice.

THE CHINESE PIEBALD OR TIGER TELESCOPE GOLDFISH

Carassius auratus, var. chinensis tigrinus Figs. 25 and 26

This fish has a most curious appearance both in form and markings. The tubular eyes are developed to a remarkable degree, often extending

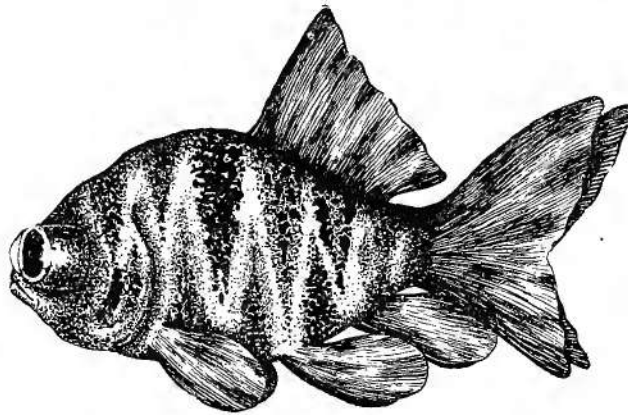


FIG. 25—Chinese Tiger Telescope Goldfish
Carassius auratus, var. chinensis tigrinus Lateral view Two-thirds life size

beyond the snout, directed sidwise and projecting $\frac{1}{2}$ to $\frac{5}{8}$ inches from the orbits. In transverse section the fish would appear almost triangular, with the flattened abdomen as the base. The body is short, thick and

malformed, scant of fins and tail, and the curious markings, from which the fish derives its name, are the pink and blue tones of the flesh under the transparent scales, as the prevailing color, overlaid with streaks and patches of black, dark brown, red and dusky grey on the back, sides and fins, with a lemon-yellow abdomen. But two good specimens of this breed have been seen by the author; European authorities depict them as characteristically marked with narrow bands of contrasting colors.

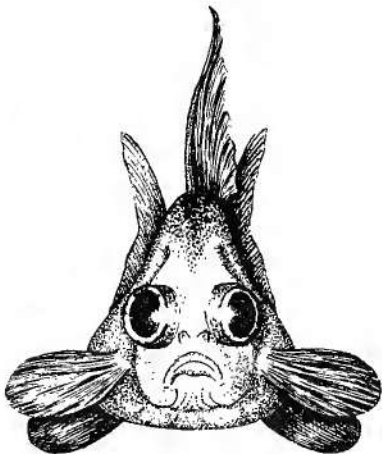


FIG. 26—Chinese Tiger Telescope Goldfish
Frontal view Two-thirds life size

THE CHINESE LETTERED TELESCOPE GOLDFISH

Carassius auratus, var. chinensis scriptus. Fig. 27

Another instance of the patient labors of the Chinese in developing desired characteristics in the goldfish is evident in the Lettered Telescope, a very rare fish, as but two specimens, both females, have come to the knowledge of the author, both owned in Philadelphia. No recent authority describes this fish, the following is a description of the two mentioned specimens.

The form and eye development is similar to that of the Tiger Telescope, though the body is rather more rounded and not so triangular in section. The eyes are distinctly tubular and directed forward at each side of the snout with a slightly upward trend, and the cornea is also directed forward and slightly upward. The head and snout are very short, the

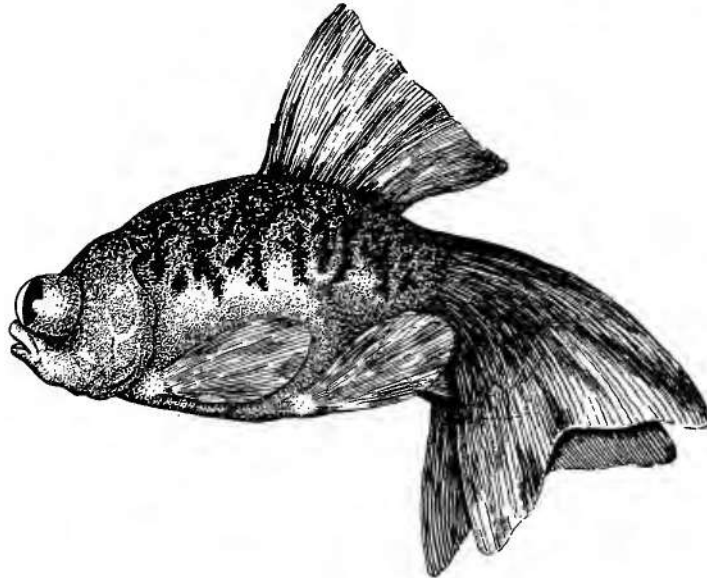


FIG. 27—Chinese Lettered Telescope Goldfish
Carassius auratus, var. chinensis scriptus. Two-thirds life size

body thick and quite as broad as high, with the fins and double tail fairly well developed, and the pectorals and ventrals extend almost straight out at the sides of the fish. The anal fin is double, as is also the tail, which is distinctly spread and divided to the base. The anal fins are used like the ventrals in swimming.

The chief peculiarity of this fish consists of the colors and markings. The transparently scaled body is dark olive-green on the back, citron-yellow on the sides, and yellowish-white under the abdomen; covered with brown markings which have the appearance of Chinese characters written in sepia.

It is a most curious, almost repulsive fish and odd-looking aquarium inmate, rather more remarkable for oddity than beauty. See Cuvier and Valenciennes description of this fish, the *Quen-yu*, and also that of de Sauvigny.

THE CHINESE BLUE TELESCOPE GOLDFISH

Carassius auratus, var. chinensis cyaneus

The fish is described as a scaled Telescope, silvery on the abdomen flushed with rose-pink, a rich azure blue on the back and sides, the whole fish having a metallic lustre. Those seen or owned by the author are transparently scaled, with a velvety, ultra-marine blue color on the back, reddish-blue transparent lower sides and a blue-white or greyish abdomen, with a dark bluish-brown or black dorsal fin, white or grey lower fins and dusky-grey or brownish double tail. The eyeballs are prominent and of a blue color, the whole color tone being bluish and bluish brown with local tones of pinkish blue and bluish-white.

This is a handsome Chinese goldfish and is greatly admired. The author has never seen one sufficiently perfect to serve as a type. The colors are best seen when the fish is viewed in a strong light, together with brilliantly colored goldfishes.

THE CHINESE CELESTIAL TELESCOPE GOLDFISH

Carassius, auratus, var. chinensis uranoscopus. Figs. 28 and 29

The most curious of the highly bred Oriental goldfishes is the Celestial Telescope or Stargazer. This fish has an extremely shortened snout,

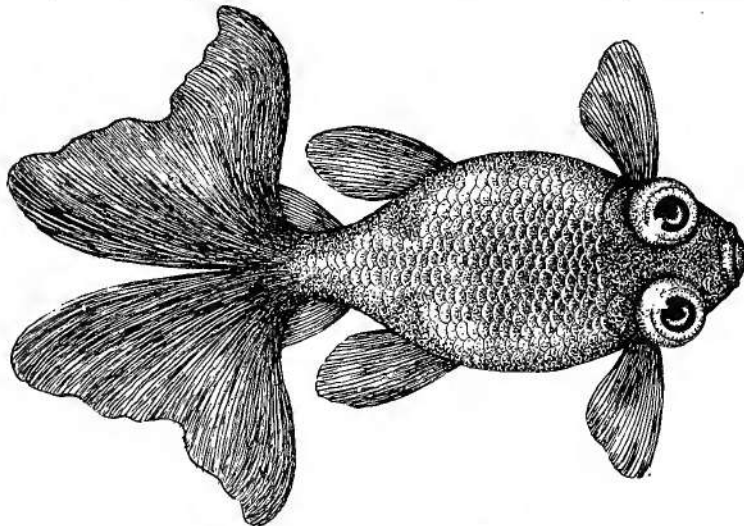


FIG. 28— Chinese Celestial Telescope Goldfish
Carassius auratus, var. chinensis uranoscopus. Dorsal view. Two-thirds life size

with the large spheroidal projecting eyes, having very small irides, turned upward over the head, so that the gaze of the fish is always directed to the surface. Its eyesight is very defective. The dorsal fin has been entirely eliminated, as the scales are evenly imbricated over the back and sides. The body is egg-shaped, very tapering at the tail. The fins are broad and pendant, and the tail is carried at a slight downward angle and very widely spread to maintain the balance of the fish. Its movements are slow and languid. Due to its fixed upward gaze, the fish has acquired the habit of carrying its body at an angle, with the snout and eyes usually the highest points of the plane. European authorities depict this fish as

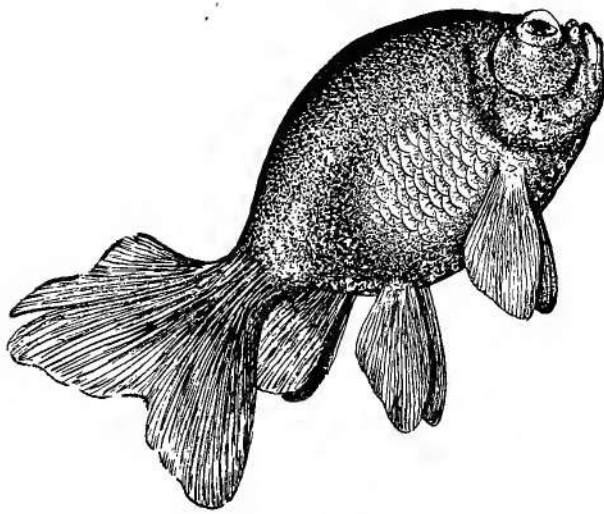


FIG. 29—Chinese Celestial Telescope Goldfish
Lateral view. Two-thirds life size

“dolphin-tailed,” and without anal fins. These would not be as highly prized by American fanciers.

It is stated that this fish is bred in jars to which the light is admitted through a slit in the lid or cover, thus inducing the fry to gaze upward for both light and food. It is considered to be sacred and is kept in many of the Oriental tem-

ples, probably on account of its constant heavenward gaze.

The Celestial Telescope is the most difficult of the imported goldfishes to rear or to keep alive in the aquarium, the author having no information of its successful breeding in the United States for successive generations and knows of but three authenticated instances of a long survival of the imported fish.

THE CHINESE EGGFISH

Carassius auratus, var. chinensis oviformis. Fig. 30

Several recent German authorities mention the Chinese Eggfish, a variety of the scaled goldfish which resembles the YA-TAN-YU or Duck-egg of Cuvier and Valenciennes and of de Sauvigny. It is described as having a perfect eggshaped body, very evenly convex and rounded on all sides, from the head to the base of the tail; with flat eyes like those of the Fringetail, which very seldom incline to the telescopic. The dorsal and anal fins are absent, the pectoral and ventral fins are normal and the

narrow double tail droops directly downward from the back. Those of a white color are most highly prized and are considered to be the most perfect and preferable to mottled or red fishes, as they more nearly deserve the designation of Eggfish.

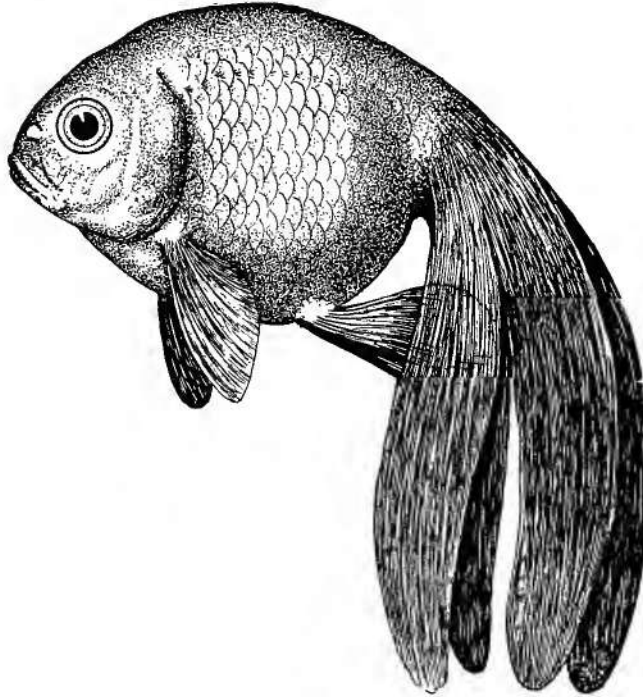


FIG. 30—Chinese Eggfish
Carassius auratus, var. *chinensis oviformis*. Two-thirds life size

None of these are bred in the Eastern States, the author having seen but one imported specimen; but young fishes of scaled Telescope parentage often exhibit some of the described characteristics, which by careful breeding and selection would in time produce this breed. At the time of this writing attempts in this direction are being made in Philadelphia.

THE CHINESE TUMBLER GOLDFISH

Carassius auratus, var. *chinensis saltator*. Fig. 31

This singularly developed goldfish is one of the most curious of the Chinese varieties as yet known in the United States. The accompanying illustration was made from the description and sketch obtained through the courtesy of Mr. Hugo Mulertt.

The curvature of the spine, the development and position of the pectoral, ventral and dorsal fins; the large anal fin and the peculiar double tail make this fish so out of balance that its only method of progression is by a series of backward somersaults, similar to the gyrations of the Tumbler pigeon. It is described as a scaled, telescopic-eyed fish of blue color flushed with orange, and is now extinct in the United States. In

1901, a Philadelphia breeder accidentally obtained several fishes in a hatching of fry of imported Chinese mixed parentage, which had many of

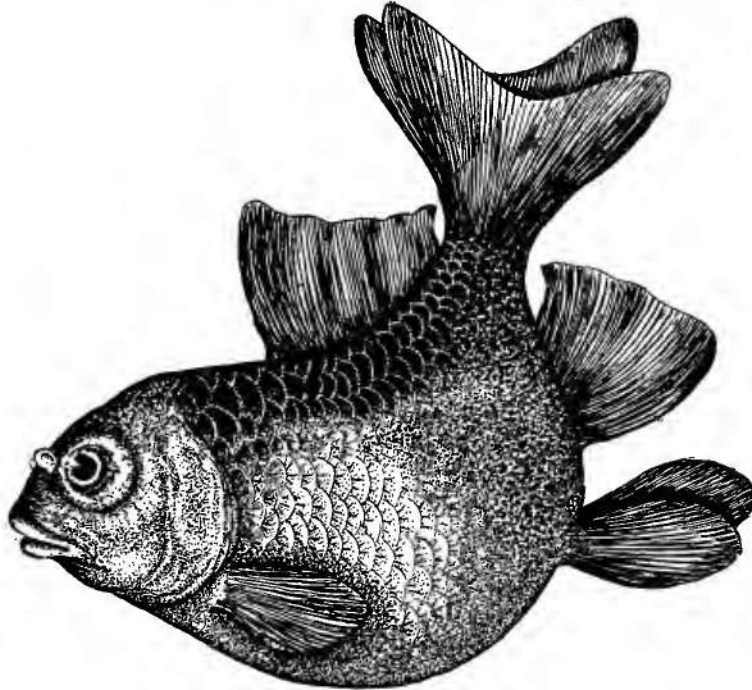


FIG. 31.—Chinese Tumbler Goldfish
Carassius auratus, var. chinensis saltator Two-thirds life size

the described peculiarities of this variety, but none survived to maturity. See de Sauvigny's description of the Kin-teon-yu.

OTHER VARIETIES OF THE GOLDFISH

The early authorities writing on the goldfish mention a number of other varieties not here described because they are still unknown to the author. The data concerning them is meagre and not sufficiently explicit for their certain identification. There are probably many with which the American fancier will become familiar later, as the appreciation of the finer goldfishes is of rapid growth so that the attention of Oriental breeders will be directed to this market for their, at present, very perishable wares. With increased interest, however combined with improved facilities of transportation, better accommodations upon arrival and rest before shipment across the Continent, as well as with a fuller understanding of their requirements for acclimatization, breeding and treatment of ills and ailment upon arrival, the mortality will be so materially lessened as to make their importation and propagation a profitable industry. When this has been accomplished, all the wonders in goldfish culture now only known through the insufficient descriptions of travelers not fully conversant with the subject, will be familiar to the American and European breeders.

HYBRIDIZATION. Hybridization is easy with the goldfish, as its evident by the many singular crosses produced by breeders. Fig. 32 is an accurate drawing of a goldfish, known in Philadelphia as Agard's Wonder,



FIG. 32—Agard's Wonder
Two-thirds life size

the product of crossing a transparently scaled Comet and a similarly scaled Telescope, which resulted in the production of this singular hybrid. It has the short hunchbacked body, the depressed snout and the paired fins and protruding eyes of the Telescope, together with the dorsal fin and long vertebral column of the Comet; to which is attached a very long deeply bifurcated double tail. Another peculiarity is the entire absence of the anal fin. This singular fish is so out of balance, due to the long spine and the great mass of tail,

that it rests upon the water plants balanced on the tail, and the elongated spine is so mobile that when it is curved under the body, the head of the fish is sometimes wrapped into the folds of the tail.

Another abnormality is shown in Figs. 33 and 34. This white fish has the body shaped like an egg, and when viewed from above, has very much the appearance of a white rat.

Many other singularities could be cited, and when it is remembered what faithful copyists both the Chinese and Japanese are, there can be no doubt that the goldfishes depicted on their ceramics and

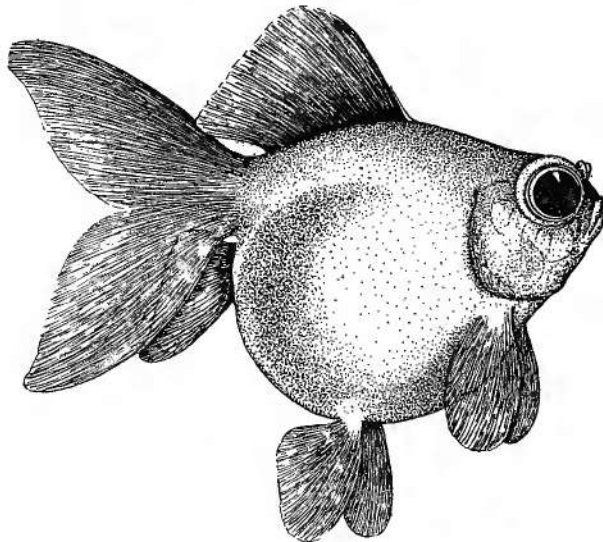


FIG. 33—Lawson's The White Rat
Lateral view Two-thirds life size

bronzes are accurate re-productions of fishes bred by them. Some of these are so astonishing in form and colors that to the layman they would appear to be willful exaggerations or caricatures, but to the experienced goldfish

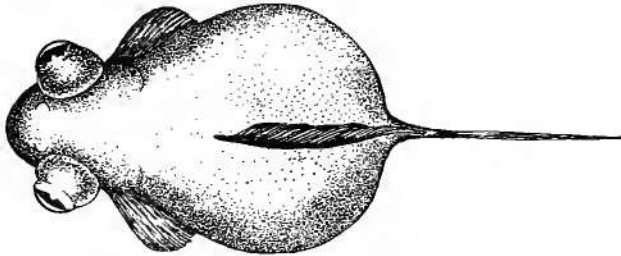


FIG. 34—The White Rat
Dorsal view Two-thirds life size

culturist are easily within the range of possibility and may be accepted by him without question. This tendency to variation on the part of the goldfish is one of the principal points of interest in its culture, as any

alevin may have a distinct character of its own and be either a wonder in its way or a "sport" not worth the trouble of raising. It should be stated that young fishes of marked abnormality do not usually survive which is very often also the case with those considered the most perfect by the fancier.

Description of the Goldfishes Depicted by De Sauvigny

This illustrated memoir of Chinese goldfishes is in the possession of the Academy of Natural Sciences of Philadelphia, and is entitled

Histoire Naturelle Des Dorades de la Chine,
Gravées par M. F. N. Martinet, Ingénieur et Graveur du Cabinet du Roi,
Accompagnée d'Observations et d'Anecdotes relatives aus Usages, aus
Mœrs et au Gouvernement de cet Empire,
par M. De Sauvigny,
Chevalier de l'Ordre Royal et Militaire de Saint Louis, Censeur Royal, &c.
a Paris,
De l'Imprimerie de Louis Jorry, reu de la Huchette, près du
Petit-Châtelet.
MDCCLXXX
Avec Approbation et Privelege du Roi.

It consists of forty-eight finely colored plates, and of twenty-four pages of text principally descriptive of the Chinese realm, government, laws and literature. The brief mention of the goldfishes occurs in the Preface and in the short article proper, a literal translation of which follows.

"Of the different species of goldfishes of China the one known in Europe is the least thought of there. The stories of our travelers and the history of Pere du Halde have only given a very imperfect idea and in several respects even a false one."

“These memoirs were made in Peking by a very able Chinaman, and have been sent to the Minister in France, who has allowed us to make use of them.

“All the fishes, redrawn and colored in France, have come to us with these memoirs and we are safe in saying that the burin and colorings of M. Martinet have made the copies better than the original drawings.

Only one species of goldfish is known in Europe; the Chinese recognize seven to which they have given the common name of KIN-YU, and they distinguish each by a particular name. We have taken the precaution of adding to the Chinese names the French equivalents because it must be remembered that all the names in the Chinese language, as in the greater number of the Oriental languages, have a descriptive significance and ordinarily take to themselves the principal qualities of the thing described.”

“There are then seven species of goldfishes or KIN-YU.

1. The KIN-YU, properly so called; this is the most common of all, first known in China, towards the year 950, and in the 18th Century brought to Port de l’Orient, to l’Hotel de la Compagnie des Indes.

2. The YA-TAN-YU, or Duck Eggs.
3. The LONG-TSING-YU or Dragon Eyes.
4. The CHOI-YU or Sleepers.
5. The KIN-TEON-YU or Tumblers.
6. The NIN-EUBK-YU or Nymphs.
7. The QUEN-YU or Lettered Fishes.”

“The habits of life, the development, the different changes, the manner of propagation and the increase of these fishes are no less marvelous than their external form and their brilliant colors.”

“It is a noteworthy fact that they have been given the name of a sea fish, with which they appear to have nothing in common. However, they may have originally come from the sea; indeed they were first known in the province of Tche-Kiang which extends as far as the sea on the Oriental coast. They may have ascended the rivers by which this province is watered, following the habit of the salmon, the shad, the sturgeon, the sole and many other species of fishes.”

“We know how actively Chinese industry is awakened by cupidity, but is it able to influence the Works of Nature? Is it able to change, so to speak, their habitation? However, if man has been able to transplant plants and quadrupeds from the northern meridian and from the old to the new hemisphere, what law prevents him naturalizing in the rivers some of the inhabitants of the sea? Some of the provinces abound in salt waters of which fish ponds can be made; would it then be impossible to people them with sea fishes? These questions, more interesting because

GOLDFISH BREEDS

of the benefit which they present than because of the curiosity which they excite, open a vast field of research for naturalists, which have not yet sufficiently attracted their attention.”

This meagre and unsatisfactory description is all the mention which the memoir makes of the goldfishes, but the plates are so interesting and curious that brief descriptions of the eighty-eight fishes of the mentioned seven breeds shown are only omitted on account of lack of space. The book is open to the inspection of the public in the library of the Academy, Cor. 19th and Race Streets, Philadelphia.

None of the plates show transparently scaled fishes or an absence of the dorsal fin which leads to the inference that these characteristics were of later development than the publication of this book.

