Fishes

Vol. III. APRIL, 1893. No. 27.

"Books in the running brooks,
Sermons in stones, and good in everything."

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DENOMINATIVE CHARACTERISTICS OF FRESH WATER FISHES.

ANATOMY OF FISHES.

(With illustration of the Black Bass.)

Fish belong to that great branch of the animal kingdom called *vertebrates*, the first of the four "structural conceptions" Cuvier, the great French naturalist, found in nature and to which man himself belongs. The vertebrates are subdivided into four classes in the following order: Fishes, Reptiles, Birds and Mammalia. The structural plan of the vertebrates, in the language of Agassiz, is "a backbone, with a solid arch above and a solid arch below, forming two cavities that contain all the systems of organs, the whole being surrounded by the flesh and skin. Now, whether a body so constructed lies prone in the water, like a Fish, or be lifted on imperfect legs like a Reptile, or balanced on two legs, while the front limbs become wings, as in Birds, or be raised upon four strong limbs terminating in paws or feet, as in Quadrupeds, or stand upright with head erect, while the limbs consist of a pair of arms and a pair of legs, as in Man, does not in the least affect that structural conception under which they are all included. Every Vertebrate has a backbone; every Vertebrate has a solid arch above that backbone, and a solid arch below it, forming two cavities, no matter whether these arches be of hard bone, or of cartilage, or even of a softer substance; every Vertebrate has the brain, the spinal marrow or spinal cord, and the organs of the senses in the upper cavity, and the organs of digestion, respiration, circulation, and reproduction, in the lower one; every Vertebrate has four locomotive appendages, built of the same bones and bearing the same relation to the rest of the organization, whether they be called pectoral and ventral fins, or legs, or wings and legs, or arms and legs."

It is not our purpose, however, to enter into a scientific disquisition upon the subject under consideration, but rather to bring before the intelligence of the reader a simple, yet correct, idea of the external and internal anatomy of fish.

The scientist proceeds in a methodical manner that to the uninitiated is not

intelligible, especially so where encumbered with technical terms and phrases that serve to befog the mere observer and discourage his efforts to learn.

We will then begin our study of fishes as we see them swimming in the water.

Upon approaching an aquarium or pond in which there are fish, we see something moving about in the water with more or less grace, and which to the eye is beautiful, pleasing, and interesting. To say that they are fish is very true, but the name does not necessarily convey any precise idea of the form or shape of the moving animal.

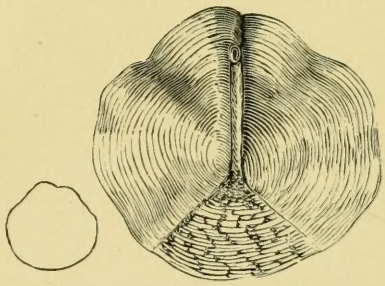
So great, indeed, is the diversity of forms that exist, that it is impossible to establish any standard by which the idea of outward appearance may be adequately conveyed to the mind; for instance, the flounder, the torpedo, the pumpkin-seed, sun, and the eel are all fish in the full acceptation of the term, yet neither of them resemble the carp, the trout, or the common gold-fish, with which almost everybody is more or less familiar.

There are two dominant characteristics, however, which pertain to fish, and by which they are known to nearly everyone. First: in nearly all cases the body is covered with scales; and second: the limbs are always represented by organs denominated *fins*, no matter how rudimentary or perfect their development may be.

We will consider, first, the *scales*, as they are, by the peculiar appearance they give to the fish, almost the first thing to strike the eye.

These scales, as they are called, are so arranged upon the surface of the body that they overlap one another, just in the manner a carpenter lays shingles on a roof, being disposed in such a way that the friction incident upon the movements of the fish in the water is reduced to the smallest proportion. As the fish grows older and larger the scales increase in size, being variously proportioned in different species.

Near the middle of the body and running along each side of the fish, there is a line or band of scales that possess peculiarities distinguishing them from other scales. These scales, in one entire row, are pierced with a tubular aperture, and the tube of which they are the exit are quite distinct and form the "lateral line," as the band is usually called Through these tubes a shiny substance or mucous is exuded, which covers the entire body, seemingly for the purpose of making the fish waterproof and of further reducing the friction in the water.



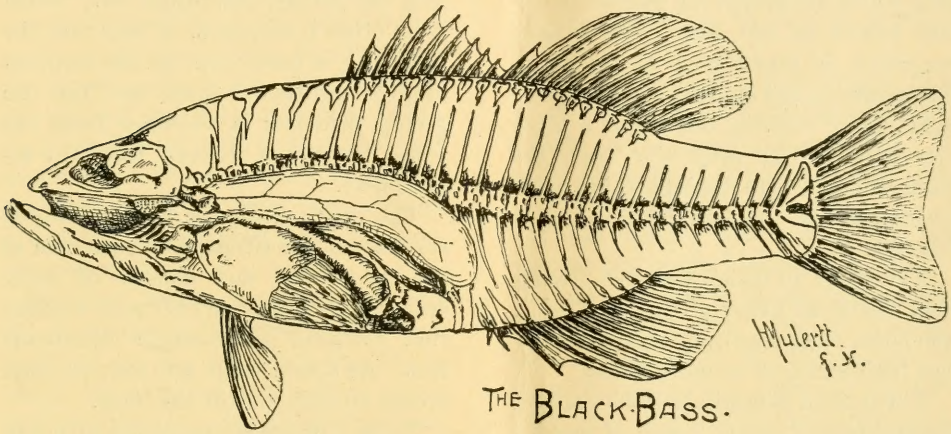
Scale from lateral line of Goldfish. (Enlarged).

The tubes always point from the matrix or root of the scale toward the tail of the fish, discharging their mucous in that direction. It is scales of this description that naturalists refer to when seeking to learn the species to which the fish belongs, because the peculiarities of their structure and function make them conspicuous amongst the rest.

Scales of either kind are readily replaced by nature when, from accident or otherwise, they happen to be removed. The color of the scales differ

according to the species of the fish and the modifying influences of the climatic surroundings and peculiarities of the locality the fish may inhabit. Also, when the spawning or breeding approaches, the males of many species assume a most gorgeous array, in obedience to a general law of nature, universal throughout animal life to a greater or lesser extent. When the spawning has been completed the unusual brilliancy of colors disappears, the fish again resuming the ordinary color of his species.

The next thing most noticeable are expanded projections from the body, and which are more or less in constant motion, propelling the fish here and there and guiding it in the direction it wishes to go. These are the fins, and are named according to their location upon the body of the fish, and subserve various purposes. As previously stated, the fins, or at least a part of them, correspond with the limbs of warm-blooded animals, and are also arranged in pairs, one on each side of the body. The *pectoral* fins are those situated in the place corresponding with the forelegs of animals, the wings of birds, or the arms of man—the *ventral* fins being placed where the hind legs of animals and the legs of birds and man are found. The *dorsal* fin is that one found upon the back of the fish, and does not necessarily exist in pairs, though some species are supplied with two, while others again may possess more. In case of plurality, that fin located nearest the head is denominated the *first* dorsal fin, the next one the *second*, and so on. That fin situated behind the anus receives its name from that part, and in consequence is known as the *anal* fin. The tail of the fish is properly called the *caudal* fin, though there seems to be a popular impression that the term "caudal fin" implies the existence of a fin situated in the neighborhood of the tail, but which is not the case.



THE BLACK-BASS.

The shape of the caudal fin differs greatly and is often a denominative characteristic. It is *emarginate*, when it is slightly forked; *furcate*, when forked like the tail of a common goldfish; *forficate* when deeply forked like a swallow tail; the tail is called *round* when it shows the shape of an open fan; and *truncate*, when it appears to be straight cut-off; *double-truncate* it is called, when it looks cut-off slanting on

the upper and lower ends, leaving a centre part run out into a point. When the backbone of a fish extends into the upper part of the caudal fin, for instance in the sturgeon, its tail is *heterocercal.*

The fins are constructed of a framework of bony spines or cartilage and these are connected with a web of skin. They are exceedingly mobile and are operated by especial sets of muscles, their motion adding very much indeed to the graceful appearance of the fish. If the spines supporting the web are of bone, the fin is then called a *spinous* fin ; while those composed of cartilage and which are branching and articulate are known as *soft* fins. The *adipose* fin which is found back of the dorsal fin on salmon and catfish, is not properly a fin, being nothing more than a peculiar fatty fin-like projection from the back, though it is a distinguishing mark characterizing the families to which it belongs.

The water in which the fish lives is very nearly as heavy as the fish itself, the latter then requiring comparatively but little strength to move about.

The motion necessitating the greatest expenditure of power is that of propulsion forward and is accomplished by the action of the caudal fin, it being supplied with the most powerful muscles. During the act of moving forward, this fin is twisted in a peculiar manner alternately from the right to the left, its action being the principle upon which the screw-propeller is constructed and from this the reader may gain some idea of the manner in which the fin operates.

The little strength required by a fish to move, readily accounts for its ability to swim against the stream in rapidly running waters, without any observable fatigue.

The pectoral fins are used to change the water in the neighborhood of the gills, thus serving as adjunct respiratory organs. The ventral fins are mainly useful to regulate upward or downward motions and as a brake when the fish wishes to come to a complete stop when in motion. The dorsal and anal fins serve the purpose of balancing the body, just as the masts and keel of a ship do; the former fin if spinous is also a weapon of offense and defence.

We come now to the consideration of the respiratory or breathing process and the organs by which it is carried on. In this particular, fish differ very much from other vertebrates, in this that the breathing is done through the medium of gills instead of lungs and the life giving principle is absorbed from the water instead of directly from the atmosphere.

The *gills,* which are the organs of respiration, are situated on each side of the fish's head and consist of bony arches, which are covered with a tissue that contains innumerable blood-vessels. As a rule there are four of such arches on each side of the head.

These gills are so connected with the mouth of the fish, that it is enabled to press all or a part of the water taken into the mouth through them.

The life-giving principle which supports all animal life is a gas called oxygen, and as this exists in the water, the function of the gills is to extract it. When the water passes through them it comes in contact with the blood-vessels and the oxygen is absorbed into the blood, for the nourishment of that fluid and the body generally.

It will thus be seen that it is not the water that the fish breathe, as many suppose, but the air that is contained in it, as can be proved by placing fish

in water from which the air has been taken by prolonged boiling or otherwise.

Also, fish that are kept in a vessel will come up to the surface where the air can be mixed with the water when that in the water of the vessel has been exhausted.

It would seem from the fact that the fish breathes only the air and not the water, that it could just as well live in the open air where it could get plenty. Such is not the case, however, for the gills are so constituted by nature that they need something to keep them apart so that their surfaces may be exposed and perform their function properly: they would close together and the blood-vessels would cease to absorb the oxygen, resulting, of course, in the death of the fish. It is necessary then that a stream of water should constantly flow through them, as it does, the absorption of oxygen then going on as nature intended.

In some species, however, the gills are so arranged that they do not stick together or dry up when the fish is taken out of the water, neither is the tissue containing the blood vessels so tender. This is true of the carp, making it possible to preserve it alive out of the water for days and without injury to the fish, the only precaution necessary is to keep the gills moistened with wet moss. Just the contrary is the case with the herring, which, when taken out of the water, dies almost instantly.

The heart of a fish lies just behind the head and between the gills. It is a muscular organ, consisting of three parts, an auricle, a ventricle, and an arterial bulb.

The venous or stale blood is pumped into the gills by the heart, where it receives a fresh supply of oxygen. From the gills it is sent to an arterial trunk lying along the under side of the vertibral column, from which it is distributed all over the body of the fish.

As fish have no lungs they cannot possess a voice; the sounds made by a few fish, as in the drummer, for instance, are caused by the air when it leaves the air bladder. Some years ago the *Popular Science Monthly* contained a paragraph, stating that the fish called the "maisir" is capable of uttering several distinct sounds, but this may only be conjecture.

Most fishes are supplied with an air bladder, which can be filled or emptied at will.

This bladder is a sac formed of a tough membrane, situated between the spinal column and the stomach. It varies in shape in different species, and is also subdivided.

Those species destitute of the air bladder live at the bottom of the water and can only rise to the surface by the action of their fins. The air bladder then appears to be for the purpose of either increasing the weight of the fish when it is empty or decreasing it when full, thus exercising a modifying influence upon the weight of the fish when compared with that of the water.

In many cases the jaws of the fish are armed with teeth, and sometimes the tongue also, as in the piscivorous species, where the entire mouth, the tongue included, is covered with teeth. Those species that have none in the mouth are generally provided with pharyngeal teeth; these are bony tubercles on the pharyngeal bones or plates situated in the throat.

The function of the eyes differs greatly in different species; as a rule those fish having barbles on the lips

have bad sight. This may be accounted for by the fact that these barbles (which are elongated appendages around or in front of the mouth) assist the fish in seeking food in muddy water or the mud itself, where eyes would be useless, and in a measure render the use or need of eyes unnecessary. It is a law of nature that when an organ ceases to be used, it gradually disappears, as may be proved, so far as the eyes are concerned, by examining the fish found in Mammoth Cave, Ky., which are entirely destitute of anything like eyes.

So far as hearing is concerned, opinions differ and the question is still disputed. It may be stated that if fish hear at all, it is with great difficulty.

It is the custom in some places where fish are bred, to call them to the feeding place by tolling a bell, and they come, but it is a question whether they come because they hear the sound or that they see the motions of the person ringing the bell and that of the bell itself; this then cannot be cited in proof of the theory that they do hear. Music or the report of firearms does not affect them at all, but the flash from the discharged gun will scare them.

Do fish sleep? Yes!

In the act of sleeping they do not close the eyelids for the very good reason that they have none, neither do they select the night for that purpose. Fish have been seen asleep in the broad sunlight of the forenoon, and the same varieties have also been found sleeping at midnight. Their time for resting then does not occur at stated periods, but whenever their surroundings are quiet and peaceable and the desire comes upon them.

Goldfish may very easily be observed in slumber, remaining perfectly still, the only motion being that of the breathing apparatus and the pectoral fins, the action being very slow but regular. All the other fins are at rest and the pupils of the eyes appear to be drawn back.

To satisfy curiosity as well as to demonstrate the fact, a dip-net was used on such occasions and slowly introduced into the water, catching the fish every time, not waking it until touched by the net.

The other senses, taste and smell are very well developed in fish, as can be demonstrated if so desired.

(*To be continued.*)

PRESERVING CUT FLOWERS.

It is not every one who has the opportunity of cutting choice flowers from the plants just at the moment when they are required for use. Under such circumstances their preservation for a few days, or even hours, becomes a matter of importance. Even professional bouquet-makers who receive supplies of fresh flowers every morning, find it necessary to adopt preservative measures, and we have often thought that if amateurs, and especially ladies, understood more thoroughly what precautions were necessary, they would not be so often disappointed in their attempts to keep cut blossoms and foliage fresh.

The flowers should be cut with a sharp knife, for scissors crush the tubes of the stems, and so prevent their power of absorption.

If the flowers are not immediately required they may be preserved fresh for several days by placing them in flat zinc or earthenware pans of water and living sphagnum moss. Each flower should be placed separately, inserting its freshly-cut stem through the moss into the thin

stratum of water below. The edges of the pan should be deep enough to overtop the flowers and foliage, and as each pan is filled, dip a cloth or napkin in cold spring water, and, after wringing it out, spread it evenly over the surface of the pan. If the latter is over a foot in diameter, some support must be placed in the centre, so as to keep the cloth off the flowers. Another excellent plan, where flowers have only to be kept fresh for a few hours, is to spread a wet cloth on a flat board, and to gently lay the flowers on it, covering the whole afterward with a large glass shade or bell glass ; or if this is not at hand, an earthenware, or even a wooden box, may be inverted over them, and will answer nearly as well. This plan may also be modified in the case of bouquets not immediately required.

The florists keep their choicest cut flowers in close-fitting drawers or boxes, lined with zinc, a layer of moist sphagnum, or wood moss, being laid on the bottom to keep the atmosphere cool and moist. Sometimes they are laid on wet moss in a tray and placed on a cool, moist cellar floor, where they will keep fresh for a considerable time. Any of these plans, the main object of which is to check evaporation, may be adopted in cases in which it is requisite to keep flowers for a short time after they are cut, and before they are required for use. Clear water is as good as anything for vases in which flowers are arranged, and if these are of transparent material, nothing else can be used ; but wet sand, which may be used in opaque vases, has the advantage of retaining flowers more firmly in their places.

Our flowers always keep best in clear water, changed every morning, when the bases of the flower stems are cut with a sharp knife, so as to afford every facility for active absorption of moisture.

AQUARIUM PLANTS.

(Contributed.)

The Parrot's Feather, botanically known by the long name of Myriophyllum proserpinacoides, is a most indispensable plant for the aquarium if treated in a certain way. Grown in the ordinary method it looks well for a week or two and then assumes a brownish tint on the submerged leaves, while the growing points rise up out of the water. It is, therefore, not very suitable for large aquariums as it grows so rapidly and looks untidy in a short while ; the best use for it, I find, is in hanging globes ; it can be planted in a very small vessel containing rich soil covered with sand and sunk to the bottom. In a week or two it will grow up out of the globe and then hang down over it. When the water is clear and the fish can be seen well, this makes one of the most beautiful objects obtainable for a room window.

AN AQUARIUM SOCIETY!

A number of gentlemen of New York City, all enthusiasts in the Aquarium line, met March 12th in that city and formed an Aquarium Society. The society will be known as "*Triton*" of New York. Baron von Schlichting was elected its president. This is a step in the right direction and we heartily wish the society success.

The United States Fish Commission wanted to secure our services to arrange the fresh-water tanks in their display at the Columbian Exposition in Chicago. Other contracts, however, which we had entered into, interfered with this flattering offer.

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SALAMANDERS.

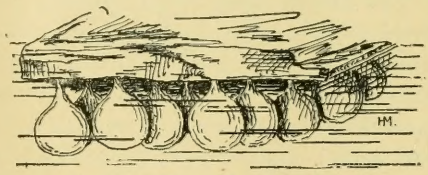
Owing to the nocturnal habits and the peculiar localities which most salamanders frequent, a great deal of mystery has surrounded this class of animals during all ages. The ancient Greeks believed they could live in fire, the moist skin of the animal, which is at all times icy cold to the touch, seemed to prove that, and even now it has not been entirely dissipated. Many people of the present age are simple enough to believe that these innocent animals are fire-proof.

The love of the marvelous, fostered by ignorant appeals to superstition, has gone farther than this. It has been asserted that the hottest fire becomes extinguished when a salamander is thrown into it. In the "Middle Ages" this notion was held by most people, and it would have been dangerous to gainsay it. Salamanders were necessary animals in the conjurations of sorcerers and witches; accordingly painters, among their symbolic emblems, represented them as capable of resisting successfully the most powerful heat.

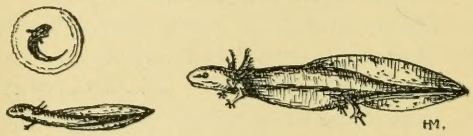
Naturalists and philosophers have taken the trouble to prove by experiments the absurdity of these tales.

The salamander is a close relative to the common frog, in fact we may call it a frog with an elongated body and a tail. Frogs and salamanders form the order *Batrachians*, of which the former are the tailless and the latter the tailed representatives.

Because salamanders resemble in their shape a lizard, they are often supposed to be a lizard, and called water-lizards. Nothing is more incorrect than this. There is as little relationship between a lizard and a salamander as there is, for instance, between a bat and a swallow—both of these can fly; catch insects for food; one is of nocturnal habits and the other is not, but still each belongs to an entirely different order of the animal kingdom. Salamander and lizard both walk on four legs; feed on insects or worms; the former are of nocturnal habits, frequenting cool, moist, dark localities, or even the water, while the latter abound in dry, warm places, and catch

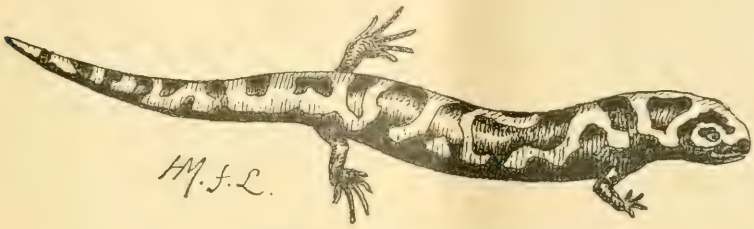


SPAWN OF DUSKY SALAMANDER.



Egg two days before hatching. Larva two weeks from the egg, showing the development of the front legs, and larva four weeks old. (Life size.)

their food in the bright sunshine. But the main points in which they differ from each other, and which can be seen easily by any casual observer, aside from their anatomical structure, are: that the skin of the lizard is covered with scales, like the skin of a snake; while that of the salamander is naked and moist, like that of a frog; that the toes of the former have claws like a bird, while those of the latter have none.



THE CHAIN SALAMANDER—NATURAL SIZE.

THE SPOTTED SALMANDER—NATURAL SIZE.

THE CRESTED TRITON—NATURAL SIZE.

THREE EXAMPLES OF TERRESTRIAL SALAMANDERS.

The Chain Salamander (Amblystoma catenis), of the Southern States, showing cylindrical tail; and a body without costal folds.

The Spotted Salamander (Amblystoma punctatum), of the Eastern and Central States, showing dorsal groove, costal folds and compressed tail.

The Crested Triton (Triton cristatus), male, of Germany, showing crest and much compressed tail, the "breeding dress." These changes he undergoes only during the breeding season, when he frequents the water.

The mode of reproduction differs very materially, too, in the two animals now under comparison. The lizard deposits oblong eggs, covered with a parchment-like substance, into the soil or sand, from which the young hatches as a perfect little lizard, the counterpart of its parent, only differing in size ; the salamander, however, deposits round eggs, covered with a slimy, gelatinous matter, like those of the frog, into the water, and from them hatches after a certain period larvae, which do not at all resemble their parents, and which, breathing through gills like fish, spending their first period of life under water.

There are many genera of salamanders, or tailed batrachians, comprising a great many species, and most of them are natives of America.

They are all innocent creatures, not poisonous ; only the larger species attempting self-defence. All, however, while inhabiting the water for the purpose of depositing their spawn or during their aquatic existence, are extremely injurious to young fish, on which they prey.

Although they all deposit their eggs or spawn during the spring into the water, each species does it in a different manner. The *Common Newt* (Diemyctylus viridescens) deposits them singly, fixing them on some aquatic plant by means of the hind feet, the eggs being covered with an agglutinous substance that causes it to adhere firmly to anything it touches.

The *Tiger Salamander* (Amblystoma tigrinum) deposits its eggs in clumps of the size of a large hen's egg in ponds. Such a clump contains about twenty to thirty eggs, each one-quarter inch in diameter, and is enveloped in a thick coat of gelatinous matter.

The *Dusky Salamander* (Desmognathus fusca) spawns in swift running creeks, where it fastens its eggs on the under surface of projecting flat stones in such a manner that each egg hangs like a drop of jelly from the lower surface of the stone into the water, where it is kept in constant motion by the current. (See illustration)

In the early spring in certain localities such deposits may be found by turning over the stones, which lie hollow and in such positions, that the water underwashes them. Such spawn, if carefully removed (we use a pair of scissors for that purpose, cut each off singly, and let it drop into a small vessel with water), will hatch also in standing water, for instance in a preserve jar, wherein the hatching and the highly interesting transformation to the perfect animal may be observed. The young, while yet in the egg, develop the gills, which they keep until they leave the water as perfect salamanders. After the young have developed the front legs, which contrary to the development of the frog, appear before the hind legs do, they must be fed on very small pieces of earth worms, or where it is practicable with an abundance of very small water insects. Four weeks after they leave the eggs, they have all their legs, and if it is intended to keep them, a place should be prepared whereon they can land, for as soon as the gills disappear they are no more able to live under water and will drown in it.

The *Fire Salamander* (Salamandra maculosa), of Germany, deposits its young alive, or rather the embryo leaves the egg at the same instant it is deposited by the adult into the water.

Besides the terrestrial salamanders, which is spoken of above, there are also aquatic salamanders. The *Siren* (Siren

lacertina), of the Southern States ; the *Proteus*, or *Olm*, of Hungaria ; the *Waterdog* (Necturus lateralis), of the Great Lakes and Western streams ; the *American Giant Salamander* (Hellbender), (Menopoma alleghaniense), and the *Japanese Giant Salamander* (Cryptobranchus japonicus) belong to this group.

These have gills through their entire existence, and are therefore unable to live outside their element. Their mode of reproduction is the same as that of the terrestrial group.

In another article we shall speak of the individual species and their peculiar habits.

THE LUDWIGIA MULERTTII.

(With illustration.)

Like many other good things now under cultivation, so has this species of Ludwigia come to this country by accident. In the packing used to pack water lily roots which we received, years ago, from South America, we found about half a dozen sprigs of it. These received good care and they soon developed into thrifty plants. From year to year they improved under cultivation and are much admired and sought after by fanciers of choice aquarium plants.

The accompanying illustration represents the plant in its natural size. A plain engraving in black ink however cannot do it justice. It must be seen to be appreciated. The color of the foliage differs on different parts of the plant. Old leaves are dark green above and violet crimson underneath; young leaves are sometimes a brilliant light green, at other times a bright pink. In several instances we saw the entire plant, including the stems, in all the tints of crimson, from the most delicate hue to the deepest shade. The shapes of the leaves are very graceful. There is no stiffness about them, each one is curved or turned in a different manner, thus giving a great variety of forms. Especially striking in the effect, when some of the leaves are partly turned over and show some of the crimson.

Besides being a very showy plant for a parlor aquarium, it is also a very good oxygenator. It grows all the year round, and is seldom molested by goldfish. Accompanying our Ludwigia we have sketched a group of our pets as they may be often seen, when they gather in their favorite spot in the aquarium before or after meal time. Beginning with the one nearest the top, we see "Blackey," a three-years old Fringe-tail telescope. This fish is jet black, with a purple lustre ; next we see "The Bride," a noble-looking fish of the Comet tribe, pure white, sparingly spotted with vermilion ; "Frieda" is seen swimming towards the right. This is a small fan-tailed goldfish of the Narwal tribe; it is deep orange in color. "Harun al Rashid" is the one swimming downward, giving us a full view of his lower parts. It is a scaleless Fringe-tail, white, mottled with vermilion." "Ruby" is the one swimming directly toward us ; he is ruby-red, solid color, with a golden yellow abdomen, of the Faintail tribe.

The one on the lower right is "Brutus," a fair representative of the Nymph variety, mottled vermilion and white. He is a very noble creature, and although quite plain regarding his fins, he is by no means the least attractive one of the group. Last but not least comes "Red-Riding-Hood," a little Fringe-tail of the Hooded tribe, His peculiarity is, as the sketch shows, a swelling of the skin on the top of his

TYPES OF JAPANESE GOLDFISH AND LUDWIGIA MULERTTII.

head, which disappears at times. While in Europe a couple of years ago, we saw, at the Exhibition of the Berlin Aquarium Society, a pair of large Telescope fish with "hoods" the size of a large hazel nut. These fish attracted a great deal of attention, but they were not for sale at any price.

In future numbers of THE AQUARIUM we shall have portraits of some famous goldfish in the possession of private parties. These will no doubt be of great interest to our readers.

CULTURE OF THE WATER HYACINTH.

(Eichhornia crassipes major.)

So much has been written concerning the Water Hyacinth, and yet so little information given, that would help an amateur in its successful culture, that I could not refrain from writing my experience and success with this most beautiful and interesting of aquatic plants. Early last spring I obtained two small plants, both as near one size as possible. I placed one plant in a small mackerel bucket, the other in an eight-gallon tub. In each vessel I put four inches of good, rich soil, topped with a layer of sand mixed with dry manure. I then placed them in the sunniest part of the yard, being careful to always keep them well filled with water. They took root immediately. As the plants expanded and grew, I clipped off all semblance of dead matter and discolored leaves. I was well repaid for my care. The middle of July the buds commenced showing, and they have kept flowering ever since, the most beautiful lilac-shaded flowers. On the plant in the small vessel I have already had thirty-three spikes of flowers with the buds still shooting up all over the plant. On the plant in the larger vessel I have had forty-eight spikes, with plenty of buds also showing. I must say, however, that on the plant in the small vessel the flowers last much longer, the foliage is much more compact, and does not grow near the height of that in the larger vessel.

The flower is but ephemeral, and judging from my experience the smaller vessels are the best for a showy appearance and durability of flowers. Cut off each spike to body of plant after it has done flowering. Never plant them in the same vessel with the Water Poppy; the Poppy will eventually overrun the Hyacinth and dwarf it. They have excited a great deal of admiration in our locality, where so many have met with only partial success, owing, without doubt, to lack of attention in their primary stage.

Give each vessel two coats of bronze green paint, and as the runners grow over the sides of the tub elevate it on bricks.

—Mrs. E. S. MARTIN, in the *Mayflower*.

The Water Hyacinth is a close relative to our native Pickerelweed, *Pontederia cordata*, so abundant along the borders of most creeks or little lakes all over the United States, but its flowers are far superior both in shape and size. The delicacy of the flower reminds one of an orchid. The leaves are of a glossy dark green, borne upon a curiously puffed-up but comparatively short stem. This stem consists of innumerable little air cells which make the entire plant buoyant. The roots, which appear in great profusion, form hairy tufts hanging into the water below. When not in flower the odd shaped leaves, being arranged like a large rosette and the tufts of roots hanging from it, make it a very attractive plant for the aquarium, where it is seen from above and below at the same time.

TROPÆOLUMS OR NASTURTIUMS.

Having sent a large order to a well known florist, I received a few extra packets of seed, among them one labeled Tropæolum, Mixed.

It was a new name to me, and as there were no directions for culture, I planted the seeds in the open border, and awaited developments. I was surprised and rather disappointed, when I discovered from the leaves of the little seedlings, that they were Nasturtiums. But disappointment soon changed to admiration, when I realized the wonders contained in that one package of seeds.

It certainly was "mixed," for there seemed to be no two alike, and I thought I could discover a plant to represent all the numerous varieties, described in the many catalogues consulted. After learning their possibilities then, several years ago, I have never wanted to be without them since.

A pot of Nasturtiums for the window garden is a joy all through the winter; but why be without them at any time? There are very few plants so easily grown and satisfactory, and one package of seed, judiciously planted, will give quantities of blossoms throughout the year.

This is my plan—a large packet of mixed varieties is purchased in the spring, and half of the seed planted outside. They will soon begin to bloom, and will produce quantities of blossoms all summer, until killed by the frosts. Do I eat these blossoms as salad? No! I do not! I think, like another contributor, "I should feel like a cannibal;" although many recommend them for use in this way; and a writer, in a well-known Floral magazine, says: "They make the handsomest and most delicate salad in the world." Don't send us the recipe, we don't want it. All the beautiful blossoms which can be spared will be sent to brighten some home where flowers are scarce.

But late in the fall you will find many green seed pods, even if the blossoms have been picked before fading, many down back of the leaves, will form seeds before you notice them and just before the frost, the last blossoms may be allowed "to go to seed;" and you will be surprised to find what a quantity of these pods may be gathered from a few feet of trellis, which has been covered with the vines all summer. These are excellent when pickled; and it does not seem so barbarous to eat the commonplace pickles as the beautiful flowers.

About the middle of summer a few seeds, from the half packet, are planted in a pot and sunk in the open border, and the vines trained on a fancy trellis fastened securely in the pot. This will be entirely covered with the beautiful foliage, and many blossoms will begin to appear, when it is time to take it in the house.

Another pot full is started at this time, and trained up the sides of the window or conservatory.

A few seeds may be started in a pot of good garden soil at any time, and as they will begin to bloom about nine or ten weeks from the time of planting, you may plan to have a large pot of the blooming beauties, ready to present to an invalid, or friend, whenever you wish, during the winter.

A gallon paint can, set out of sight in an ornamental vase, in a corner of the conservatory, contained several varieties last winter; among them, Empress of India, with its beautiful, dark,

purplish leaves, and a golden-leaved variety. The foliage alone, of these two, would have made that corner lovely all winter; and combined with the varied blossoms, the effect was grand. The large, bright yellow flowers of the Golden King, the Pearl—delicate cream, nearly pure white, King of Tom Thumbs, beautiful, brilliant, velvety scarlet, and many variegated, spotted and striped. Handsome, all of them! And if you could have seen them you would not wonder at my enthusiasm. These remained in bloom in the conservatory until those outside were blooming, and as soon as they began to fade, another can of seedlings took the place of the exhausted plants, and that vase of Nasturtiums is often more admired than the most expensive plants in the conservatory, although they were grown from a few seeds in a five cent packet.—PHEBE R., in *The Mayflower.*

It is with much pleasure that we call attention to the World's Fair Edition of Vaughan's Gardening, illustrated. It is the handsomest catalogue we have seen yet. We have been dealing with this firm since it first started, years ago, in Chicago. Mr. Vaughan has met with continued success and now has established an elegant large, completely stocked store for the convenience of his Eastern customers at No. 26 Barclay street, New York. The catalogue is sent free to applicants, who mention the AQUARIUM.

OVER THE WIRE.

The voice from the telephone: "I wish you'd cut off the heads of one Mrs. Hobson Hobbs, one Sarah Jones, two Alpheus Hardys and a Peter Pinkerton, and send them to my house this evening in time for dinner."

The voice at the transmitter: "Great guns! what?"

The voice at the telephone: "Oh, excuse me, I've got the wrong number. Thought you were Grubby, the chrysanthemum-grower."—*Exchange.*

POET-TREE.

"Oak Caroline fir yew I pine,
Willow, will you not be mine?
Thy hazel eyes, thy tulips red,
Thy ways oh larch have turned my head.

"All lindens shadow by thy grate,
I cypress on my heart and wait,
Gum; beach chosen Caroline,
We fly for elms of bliss divine.

"Oh! Spruce young man, I cedar plan,
Catalpa's money if yew can;
Yew sumach ash but not my heart,
You're evergreen and may depart.

"You'd like to poplar, that I see,
Birch yew walnut propose to me;
Here's pa—you'll see hemlock the gate,
He maple-lightly say 'its late.'"

Locust that lovyer while he flew
Before that angry parent's shoe;
He little thought a dogwood bite,
And make him balsam much that night,
Hawthorny path he traveled o'er,
Till he was sick and sycamore.

—*Exchange.*

OVERFEEDING FISH.

Mr. F. C.—The cause of the water in your aquarium having a milky appearance, is, overfeeding your fish with wafers. Never put in more food than the fish will immediataly consume. Add a pinch of table salt to the water in your aquarium and stop feeding for three or four days altogether; this will clear the water again.

Mr. M. J., Cin., O.—There are several aquatic plants that resemble Vallesneria spiralis at first sight. V. sp. has brilliant green leaves (blades) about one-quarter of an inch wide, keeping the same width from the root to the top. These, under favorable circumstances, attain a length of over four feet, but they never grow erect above the water. At a close inspection these ribbon-like leaves will be found bordered with deeper green, giving them the appearance of a silk ribbon of two shades of green. The flowers appear in July on a spiral stem above the water and at night time, when they are fertilized. This spiral stem contracts after that and draws the flower down to the bottom, where the seed ripens.

The V. sp. is a native of Northern climes, and its foliage disappears with the approach of cold weather. It propagates through seeds and stolens or sets.

Sagittaria natans, S. New Era, and Juncus fluitans resemble V. sp. very much at first sight, but only at first sight. The submerged leaves of S. n. are blades, but always more or less tinted with silver, bronze or crimson; they terminate into a sharp point, while those of V. sp. are blunt. The floating leaves of S. n., which appear during the warmer season, are oval in shape, sometimes nearing an arrow shape, and speckled with black. The plant blooms in day time; flowers and seeds are altogether different than those of V. sp. It is a tropical or sub-tropical plant and keeps on growing and flowering all the year round.

J. fl. is a Northern plant, which resembles V. sp. much more than the preceding, especially when young; the blades are of a uniform green color, ribbon-like when submerged, but with the approach of warm weather they stand upright above the water. It is known as false Vallesneria. Like the real V. sp. it too dies down during winter. There are several other plants that resemble V. sp. in their early stage of development.

Mrs. S.—You can have specimen plants for your unfavorably located aquarium in a reserve tank, and in this expose them to strong sunlight or to shade, and to a warm or cool temperature, just as wanted. Thus you can regulate the coloring of the foliage or forming of flower buds, and have them at hand whenever you want them for an extra fine display in your aquarium. In this regard aquatic gardening likens parlor gardening—certain plants have to be sent to the greenhouse occasionally, to attain high colors or for the formation of new buds.

Mrs. J. S. P.—A healthy aquarium in a warm room, exposed to a strong light, will turn green very rapidly. What you want for your aquarium are tadpoles and snails to eat away the algae growth when in its first stage, and secondly a more shaded position. Remove your aquarium about twelve to fifteen inches towards the room and close the shutters when the sun shines against it, or cover the side of the aquarium that faces the window, with blue paper. Also add a pinch of table salt to the water. You need not be alarmed about your fish, as such an aquarium is very healthy, although not very attractive.