

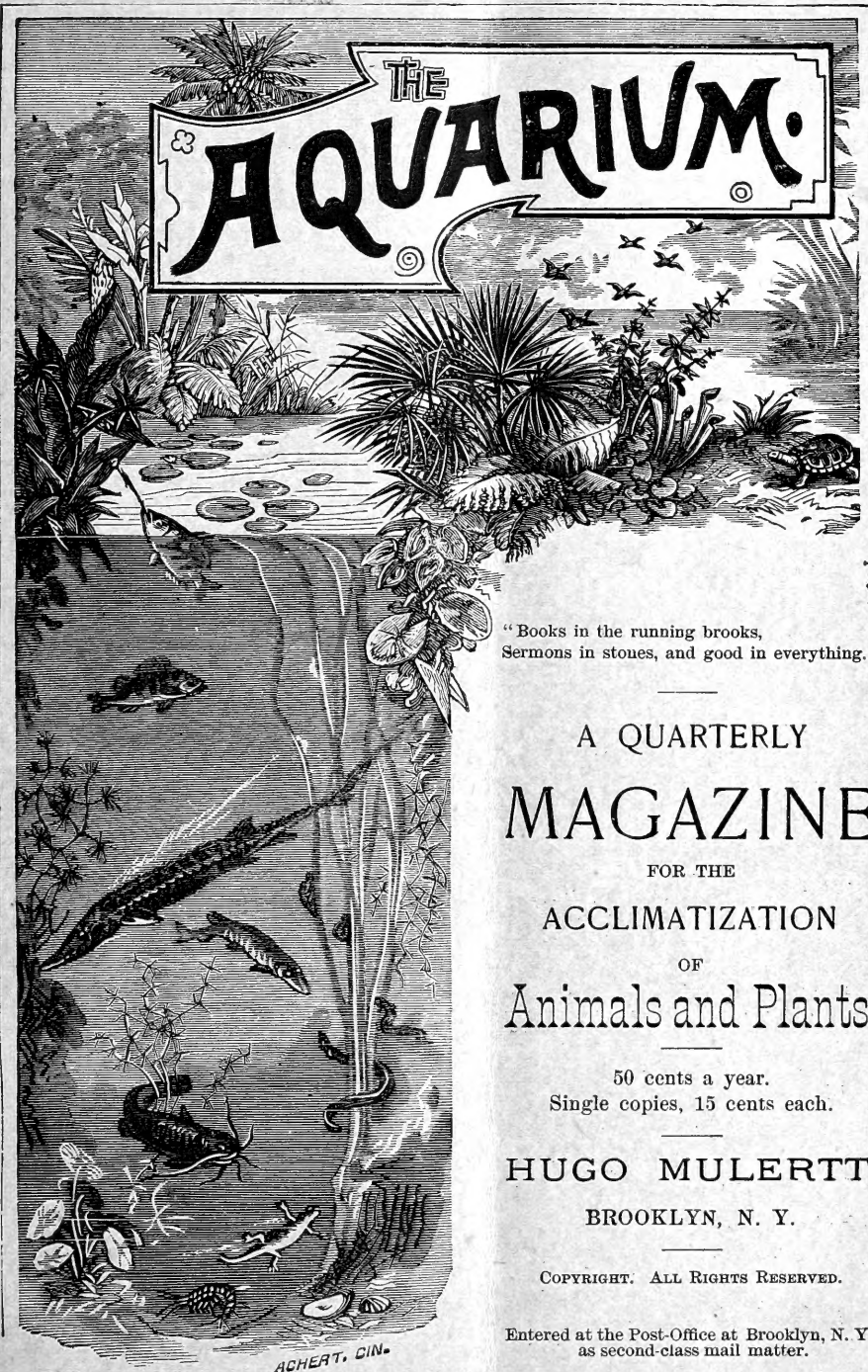
Fishes

268504  
JUL 5 1893  
cancelled

DIVISION OF FISHES  
Vol. III. NATIONAL MUSEUM

JULY, 1893.

No. 28.



THE  
**AQUARIUM**

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

A QUARTERLY  
**MAGAZINE**  
FOR THE  
ACCLIMATIZATION  
OF  
**Animals and Plants.**

50 cents a year.  
Single copies, 15 cents each.

**HUGO MULERTT,**  
BROOKLYN, N. Y.

COPYRIGHT. ALL RIGHTS RESERVED.

Entered at the Post-Office at Brooklyn, N. Y.  
as second-class mail matter.

CHRISTIAN  
NATIONAL MUSEUM  
ACQUISITION

590.773

HEADQUARTERS FOR THE FINER VARIETIES OF

# Gold Fish, Japanese Fantails,

ALSO PARADISE FISH,

— AND —

## ALL KINDS OF AQUATIC PLANTS.

*For Descriptive, Illustrated Catalogue, send two cents.*

— ADDRESS, —

### EDWARD S. SCHMID,

*AQUARIUM DEPOT,*

No. 712 Twelfth Street, N. W., WASHINGTON, D. C.

---

## Fresh Seeds of Aquarium Plants.

Ludwigia Mulerttii,	=	=	=	per package,	25	Cents.
Sagittaria "Francis M.,"	=	=	"	25	"	"
Sisyrinchium Anceps ( <i>Little Blue-eyes,</i> )	"	"	"	10	"	"

**NOW READY.**

SENT PREPAID BY MAIL, ON RECEIPT OF PRICE. ADDRESS,

### HUGO MULERTT,

173 Nostrand Avenue, BROOKLYN, N. Y.

---

ESTABLISHED 1876.

## WATER LILIES

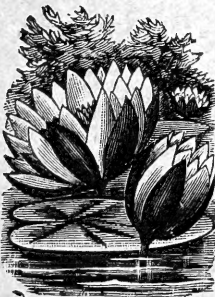
OF ALL COLORS.

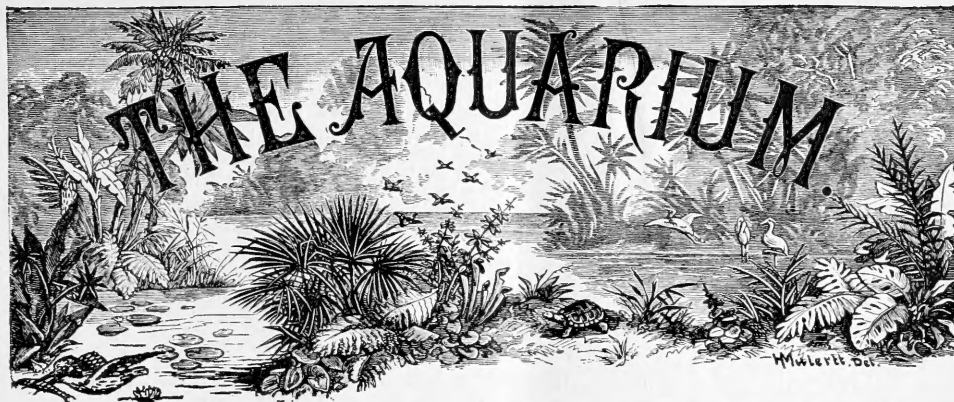
### Aquatic Plants in Greatest Variety.

The finest Parks and Gardens in America have been supplied from our unrivaled collection. Catalogue with prices and full instructions for culture, sent free.

### EDMUND D. STURTEVANT,

BORDENTOWN, NEW JERSEY.





## DENOMINATIVE CHARACTER- ISTICS OF FRESH-WATER FISHES.

### II.

We come now to the process of reproduction in fishes, the organs for which in nearly all are distributed between two individuals, the male and the female.

The form of the female organs or ovaries, most common among fish, consists of two sacs uniting towards the posterior end in a single oviduct, which discharges outside behind the anus. On their inner surface of these sacs, in nearly all fish, are found leaflets, placed either crosswise or lengthwise, and which contain the eggs in thousands. These increase in number and size when the spawning season arrives, greatly distending the ovarian sacs.

In some species of fish the ovaries do not present the sac-like form, but resemble two ribbons (for there are a pair of them) more or less twisted, running along both sides of the intestine to the dorsal wall of the abdominal cavity; such an arrangement can be seen in the sturgeon and the eel.

The ripe egg, when it separates from the ovary, passes through a tube (the oviduct), the opening of which as before stated is outside, behind the anus.

In the male fish the spermatogenic organs secrete a thick, white fluid, which contains innumerable, small, organic bodies which, when in a fresh condition, move about under the eggs, impregnate it and start the development of the embryo. These bodies, which are called spermatazoa, consist of an anterior thicker part, the so-called head, and a more attenuated part or tail. In the water these little organisms can live but one or two minutes, but when taken from the fish and put in a bottle kept at the proper temperature, they may be preserved alive for six days.

This discovery was made by a Russian fish culturist in 1856, and is very important to the artificial propagation of fish, as it enables the crossing of different species.

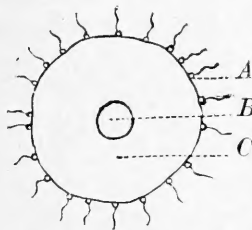
The fecundation of the egg is effected in the viviparous species, inside of the body of the fish, while in the great majority it takes place outside of the body and in the water, where the male fish during the spawning season pursues

the female, all the while ejecting his sperm over the eggs.

The eggs when first spent in the water have the shape of a slightly pressed-in rubber ball, and as soon as they come in contact with the liquid they expand and suck it in through a microscopically-small hole.

The spermatic germs of the male being present in this liquid are thus introduced and fertilize the egg.

The fecundation of the egg consists in the entry of the spermatic corpuscles



FERTILIZATION OF FISH EGG.  
ENLARGED.

- A. Spermatic corpuscle.  
B. Germinal disk.  
C. Nutritive yolk.

and the subsequent production of a subdivision of the germinal disc, which phenomenon is called the process of "segmentation" or "furling." This is followed by a series of successive changes, of which the final result is the embryo, which, subsisting or being nourished by the yolk, gradually develops into the perfect fish.

The young fish when first hatched is supplied with a sac called the yolk-bag, from which it derives its nourishment during the early period of its independent existence. When this has been exhausted it is then ready to seek other food, and this it finds in various microscopic organisms that exist in profuse abundance in the water. As the fish grows larger and gains strength, other and coarser food is sought and devoured.

NOTE.—Although fish spawn a great number of eggs, comparatively few of them are destined to develop into perfectly mature fish. Nevertheless they cannot be said to be totally wasted, as short-sighted enthusiasts suppose, "for

nature doeth all things well." There are many denizens of the water whose sole duty it is to devour these superabundant eggs, thus preventing what would otherwise be a destructive overproduction. Insects and crustacea feed upon them, and are in turn consumed by fish that in their turn serve as food for larger ones or titillate the palate of omnivorous man.

## THE TROUT-LIKE FISHES.

### *Salmonidae.*

The several members of this family of fish are highly esteemed for the table. They are found at any elevation, from the sea level to the snow limit. They vary greatly in several particulars, according to the locality in which they thrive, the quality of food upon which they subsist and the differences incident upon age and sex. For these reasons: The family has been subdivided into a great number of species, which subdivision is, at best, but nominal. The dominant characteristic by which any species may be distinguished and which is common to all, is an adipose, or fat fin, back of a short dorsal fin. They may be further characterized by the naked head, a body covered with comparatively very small scales of uniform size, both jaws being armed with sharp teeth, the belly round and the air-bladder large and simple. Another distinction is conspicuous by its absence, namely, barbles. There are about 160 recognized species of this family, from which we select the following ones as the leading representatives of their type.

## THE SALMON.

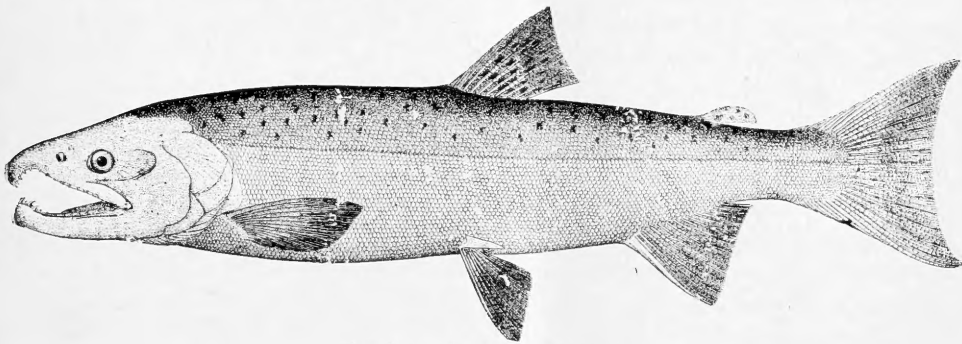
*Der Lachs. Salmo Salar. Le Saumon.*

The body of this fish is long, the head sharp and, compared with the size of

the body, small. During the breeding season the point of the lower jaw is bent upwards, somewhat like a hook. The back is blue black or dark gray, while the belly is silvery, and often dotted here and there with spots of red and black. At maturity it attains a length of three feet and a weight of from 40 to 50 pounds. The salmon, "the king of fresh-water fish," is migratory in its habits, spending the earlier days of youth in fresh water, but eventually making its way to the sea, from which it again returns to its native river when the spawning season arrives. The speed with which this fish swims is

effort is renewed and generally crowned with success. It is not unusual for the fish to persist until it is killed by the violence of its exertions in accomplishing the object.

The spawning season is in the fall and early winter (the California salmon, however, spawns during the summer). Before entering the fresh water of the river, the fish remain in the brackish water of tide-ways, as they also do when making their descent to the sea. This habit prevents the great and sudden change that would ensue if the passage was made abruptly from salt to fresh water or *vice versa*. It is also at this



THE SILVER SALMON OF ALASKA.  
*Oncorhynchus kisutch.*

remarkable, and should the depth of the water be favorable for the exploit, it will accomplish the distance of fifty miles in an hour's time. Its strength is no less remarkable, enabling it to maintain its high velocity in shooting up the most oblique and glancing rapids and if need be, leaping falls ten or twelve feet in height. The greatest perpendicular height to which the salmon can attain in leaping is believed to be about fourteen feet. Should the first attempt at leaping a water-fall be a failure, the fish will make the trial again and again, evincing the most obstinate perseverance. Resting between times to recruit its exhausted strength, the

time that they get rid of parasites that become attached, after a protracted stay, in either salt or fresh water as the case may be. The female is the first to enter the river and locate in a suitable place for spawning, the male following about a month later. With a spirit of true chivalry, the male salmon is wont to engage in desperate battles with other males, for the possession of the female, the result of the struggle not infrequently being the death of the weaker. The spawn is not deposited until the water has receded to a temperature of about 10° F. The next step is to prepare a receptacle or nest in which to drop the eggs. The female

does this by digging at the gravel on the bottom, all the while fanning away with the fins the mud and finer sand, thus cleansing the gravel that is subsequently to be used to cover and protect the deposit. The spawn is not all deposited at once, a portion being extruded at intervals, each deposition then carefully covered with gravel. During this time the male stands guard against intruders, though he himself cannot resist the temptation to devour any stray eggs that have been overlooked by the female. The weight of the eggs is sufficient to sink them, and in addition they are covered with some glutinous or adhesive substance. These two properties are evidently for the purpose of preventing their being washed away by the stream until covered with gravel by the parent fish. On the average each female deposits about 10,000 eggs, each of the size of a currant berry; out of these, it is estimated, about five per cent. develop to a full sized salmon. The act of spawning, as above described, may continue throughout several days, and when completed the fish are weak and unfit for the table. They now slowly make their way to deeper water, and when ice covers the river they go on to the ocean to regain strength.

The eggs are hatched after a period of incubation varying from 45 to 140 days, according to the temperature of the water. For the first four or six weeks the young derive nourishment from the yolk-bag. The fully developed young are of a light brown color, and marked with some nine or ten dark cross-bars. Although hatched in rapidly running water, they prefer at this age to remain in quiet, shallow water, and where, if need be, they can find shelter and protection among the stones.

When about a year old, say in May or June, the strongest, which then measure three or four inches in length, change color, assuming a brilliant silver tint. They gather together in shoals, and go down stream to the ocean, remaining there for from one to three years, at the end of that time returning to the river.

The weaker of the newly-hatched young remain in the river until the succeeding year before the journey to the ocean is made.

Once in the ocean, the young salmon grow at a wonderful rate; marked specimens having been caught eight weeks after were found to have attained a weight varying from two to five pounds. Under favorable circumstances the salmon will in the lapse of two years' time acquire a weight of twenty-two pounds.

The food upon which the salmon subsists and thrives, consists of the various kinds of crustacea, so abundant in salt water. This rich and nutritious aliment gives to the fish the color and exquisite flavor that so delights the palate of the gourmand. The flavor, however, will vary according to the locality in which the fish is reared and the quality of food consumed. As an instance of this, the smoked salmon from the Rhine yields just double the price per pound than that from the river Wesser (Germany).

Throughout the various stages of growth the fish is known by several names; during the first year it is called "parr," while on the first trip to the sea it is known as "smolt," on the first return to the river, "grilse." The name "salmon" is given to it at the age of three years and when it is ready to spawn.

## THE SALMON-TROUT.

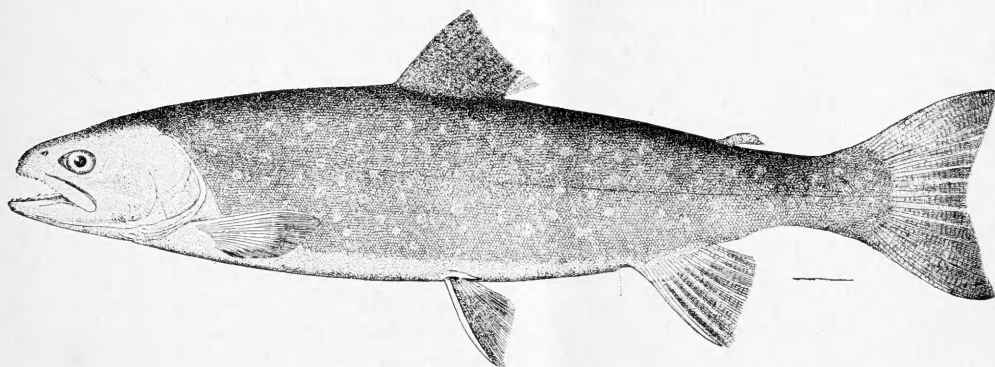
*Salmo trutta.**Die Lachs-Forelle. La truite de mer.*

The salmon-trout is very much like the salmon in shape; the head, however, is blunt, and the body in consequence appears shorter. The color varies considerably, though usually the back is dark blue, while the sides and belly are silvery, spotted here and there with black. It is somewhat heavier at maturity than the salmon, frequently weighing between 50 and 60 pounds, this weight not being anyways an exception. Its large size and weight may be

## THE GREAT LAKE-TROUT.

*Salmo lacustris.**Die See-Forelle. La truite de lacs.*

This species is best distinguished by the caudal fin or tail, which instead of being forked is as straight on the edge as though it had been cut off. The coloring also is different from those named above. The back is of a dark bluish-green, the sides and belly silver-white and marked with black spots encircled with a yellow rim. It is found native in the great lakes of Switzerland, Bavaria, Austria, Ireland and Scotland. In these countries it is es-



THE DOLLY VARDEN TROUT.

*Salvelinus malma.*

the result of a most voracious appetite. In the breeding season they obey the same habits as do the salmon, and, like the latter, acquire their growth in the salt water of the ocean. The color of the flesh varies a great deal more than that of other species, and has been the cause of their receiving two additional names: "Sea-trout" when of a reddish tint, or, as commonly understood, "salmon colored;" and "bull-trout" when the flesh is white or colorless. This difference in color is due to a different diet, the latter being not near as palatable as the tinted fish.

teemed the most valuable of all their lake fish. The young are hardy, and very readily withstand the vicissitudes of transportation; with equal facility, adapting themselves to the changed circumstances of pond culture. The adult weighs somewhere from 30 to 40 pounds, the flesh is white, and in flavor fully on a par with the brook-trout.

## THE BROOK-TROUT.

*Salmo fontinalis.**Die Bach-Forelle. La truite.*

This handsome and well-known fish is native in the United States; it frequents the clear water of running

brooks, and to this habit undoubtedly owes its name. Care must be taken not to confound it with the European variety, *salmo fario*.

In the natural state its greatest length is about one foot; cultivation has both increased its size and weight, the latter not rarely reaching 20 pounds. The body of the trout appears somewhat stunted, which fact may be due to the blunt and rounded mouth. Though possessing minute scales, they are not apparent to either sight or touch. The color of the body varies in the different localities in which the fish is found, often being that of the bottom over which it swims. It is, however, usually olive green on the back, though occasionally entirely black; silvery on the belly, but in all cases is the fish marked with red and black spots. The coloring depends upon the kind of food the trout eats and the depth of water in which it lives. In the first instance, trout subsisting almost exclusively on insects are most abundantly marked with bright red spots; while in the second instance, deep water having the effect of deepening the shading and shallow water the reverse. The usual food of the trout consists of crustacea, insects, etc., but it frequently preys to no small extent upon its own kind. The color of the flesh may be either white, yellow or red, and is governed by the quality of the diet; it is very delicious and commands a high price in the markets. The popular idea that trout thrive only in rapidly running, cool water, is an error, for they are successfully cultivated and fattened in ponds and kept in vats to be colored, all of which is done to supply the demands of the market. In almost any clear creek with a gravel bottom, with now and then a shallow spot suitable

for the deposition of eggs, trout will almost surely be found.

Trout spawn at the same time of the year and in the manner of the salmon. The little piles of gravel containing the eggs have an appearance of flattened mole hills, the eggs being distributed through them like raisins in a pudding. As a rule, the belly of the female is larger at the near approach of the spawning season, owing, no doubt, to the increase in size of the eggs as they near maturity. The color of the fish also changes at the spawning season, the female becoming dark and sombre, while on the contrary the male becomes brilliant; the abdominal fins turn scarlet, a scarlet hue, too, often appears at each side of his belly. It is only in the spawning season that the difference between the sexes may be determined with any degree of certainty. Seth Green said that "by handling them much and watching them closely, the trout breeder comes to know the male and female apart almost instinctively, but would be puzzled to tell just how he knows it."

Trout if in good condition will commence spawning as early as the end of the first year. At two years of age they produce from two hundred to five hundred eggs; at four or five years the number spawned is about two thousand.

This fish is not any more sensitive to impure water than are other fishes. If the proper care is used in selecting young specimens for transfer, the chances for keeping them in captivity are as good as with the common sunfish. The trout seems to be endowed with some degree of intelligence, for they may easily be taught to feed from the hand, and have been taught to perform several tricks.



## THE RAINBOW TROUT.

*(California Mountain Trout.)**Die Regenbogen Forelle. Salmo iridea.*

This species is sometimes called "the trout of the future," and we think justly, in view of habits that render it more profitable, when bred for the market. It was but lately introduced from California and did not seem to take well with the culturists. They did not expect much from it, thinking that the somewhat unattractive exterior of the fish would militate against its sale as an article of diet. However this may be, the species is a valuable one and found favor in the eyes of those who did not judge solely by appearances. In Germany it is now very extensively cultivated, yielding large profits to the culturists. In form it very much resembles the brook-trout, although it is not so beautifully marked. In color it is of a dark grayish brown; this fact probably being the objection urged against it as rendering it unattractive to the eye. Although this is true, the fish possesses a redeeming trait, if judged by coloring alone, and that is, its iridescence, which no doubt is due to some peculiar property of the surface in decomposing the rays of light into its primary colors. The effect is beautiful and reminds one of a fragment of rainbow turned loose in the water, flashing and glistening here and there, reflecting back the gorgeous colors of its heavenly prototype. The rainbow trout possesses the advantage of being well adapted for warm rivers and thrives well in pond water. Its growth also is much more rapid than that of the brook trout, and to add to its value it spawns in the spring of the year. These two facts tend to make the breeding of it profitable.

## THE GRAYLING.

*Thymallus.**Die Aesche.**L'ombre.*

This species is found native in the cold waters of both Europe and the United States; Michigan being the State in which it is principally found in abundance. It is a handsome fish, the meat thought to be delicious and brings as high a price as that of the brook-trout. The grayling is of a purplish gray color on the back and sides, the belly, in common with others, being silvery. The dorsal fin is very large, and especially during the breeding time; it is ornamented with rosy markings and rows of green or blue spots, the whole making a pleasing effect. The spawning season, like that of the rainbow trout, occurs in the spring of the year, so that by the following winter the fish is fit for the table, just at a time when trout generally are out of season. It commences spawning at two years of age, and proceeds in the same manner as the trout.

## THE WHITE-FISH.

*Coregonus albus.**Maraene.*

The body of this fish is compressed on the sides, and is covered with rather large, loose scales. The head is very small, and the mouth devoid of teeth. The color is silvery white, but dark on the back. The form of the fish varies more or less according to age and surrounding circumstances. It is native in all the great lakes of the United States, where it grows to perfection. It has been introduced into the lakes of Germany and other European States. As a food-fish, the white fish is pre-eminently the best, purely fresh-water fish in the world.

It feeds upon the microscopic mol-

## THE AQUARIUM.

A QUARTERLY MAGAZINE.

50 cts. a Year. Single Copies, 15 cts. Each.

Sample Copies Free.

Advertising Rates on Application.

HUGO MULERTT, Publisher,

173 Nostrand Av., Brooklyn, N. Y.

luses, which abound in all our lakes; this rich and nutritious diet undoubtedly giving to the fish the delicate flavor for which it is so eagerly sought. Whitefish live in shoals and go to the shallow water to spawn in October or November. They deposit a great number of eggs, which they drop loosely on the sand. Naturally, a great many are thus lost, either devoured by other fish or crustacea, or, what is more destructive, are washed upon the shore during storms. To counterbalance this loss to the fishing interest, the governments of the several States bordering on the lakes have established "hatching-stations" near the lakes, where the eggs of this valuable fish are properly cared for until hatched. When old enough, the young fish are turned into the lakes to grow. The eggs are procured from the old fish captured for the purpose. The eggs and milt are extruded from the body by compression in the hands; the impregnation is subsequently done by artificial means.

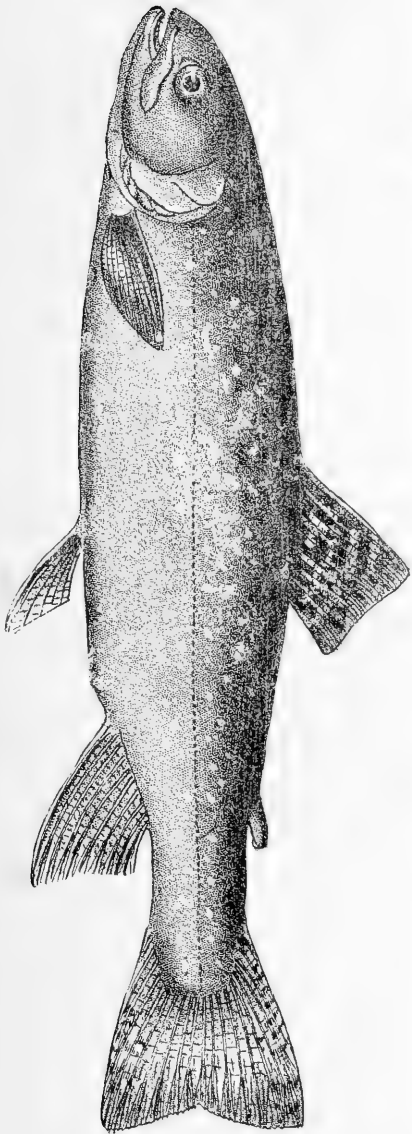
It may not be improper to state in this connection that all fish of the maraene family merely drop their eggs and leave them to hatch as best they can, not protecting them with sand or gravel as does the salmon.

(To be Continued.)

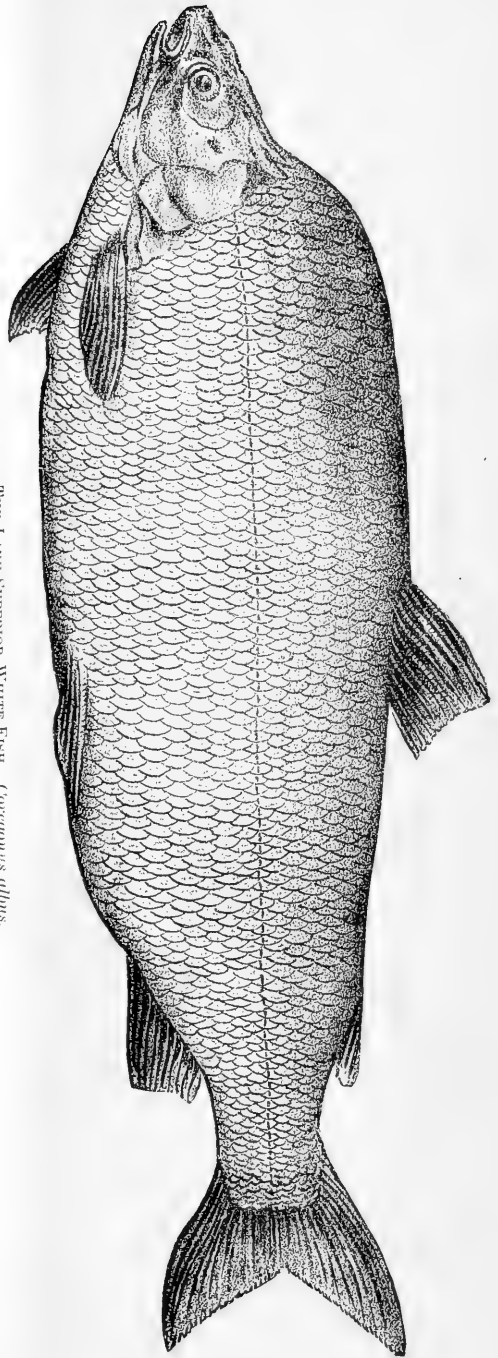
## HOW TO BREED THE PARADISE FISH.

In the spring of the year when the weather becomes warm and the temperature of the water in the Aquarium rises to about 70°F. the breeding tank is arranged. Such a tank is best when narrow and long and in height not less than twelve inches, inside. If it is to be made to order, have it as long as the window is wide. Put sand in the bottom and arrange plants and rockwork in two or three different groups, (but be careful not to introduce the carnivorous *Utricularia vulgaris*, which plant also catches young fish,) one on each end and the third one in the middle. These three groups are then divided off in as many compartments by two panes of glass. These should fit loosely, their support being the sand in the bottom of the tank and wedges of cork on the top. The tank is now filled to one half of its capacity with water, and after this has attained the room temperature, the paradise fish, selected for breeding, are introduced. The male is put in the middle apartment, the female or females to the right or left of him, or one on either side. The food given to these fish should now consist mostly of live insects, cut-up worms, scraped raw beef, etc. If the weather is favorable, clear and warm, you will soon see the male building his bubble nest and parading in his most gorgeous dress alongside the glass wall that separates him from his chosen one. He will expand all of his fins, and with wonderful grace he will execute all kinds of evolutions to attract her attention. Has he impressed her favorably she will come close to the glass wall, turning pale, acting, as it were, "bashful." The male tries now to force his way through

THE BROOK-TROUT. *Salmo fontinalis*.  
TWO OF ONE FAMILY.



THE LAKE SUPERIOR WHITE-FISH. *Coregonus albus*.



the glass wall; not succeeding of course, he tries to overleap it, with which attempt he is often successful; often, however, it causes his death when he happens to jump too high and out of the tank. For that reason the tank is only half full of water and it is best to also cover it with wire gauze or mosquito netting. At this period we remove the glass wall, and sometimes in less than ten minutes they spawn immediately under his nest. Both may be seen for minutes after this collecting stray eggs with their mouths and spitting them on top of the bubble nest. This being completed, he takes charge of the nest and drives her away in a rather rough manner. She will seek shelter under the rockery and amongst the plants, and as soon as we notice this we should drive her to her apartment and replace the glass wall. The presence of the female is absolutely unnecessary after the eggs are deposited, and it would be cruelty to leave her exposed to his, then, very bad temper.

A breeding aquarium need not be large. Paradise fish will spawn in one gallon of water; an oblong all-glass battery jar will do very well, as far as the spawning part goes.

Thirty-six hours after spawning the young will hatch. About ten days later they have the shape of their parents and can support themselves. The mate builds a new nest and goes through the same performance over and over again until the cold weather puts a stop to it.

Only two broods should be allowed to remain in one tank together; the third brood would be devoured by the first, as soon as hatched. The young may be fished out of the aquarium with the aid of a white saucer, or they may

remain in company of their father, as he will not injure them. Some females are also harmless to their young, but as a rule they are not. Another way is to remove the old ones from the tank, the glass partitions are taken out, too, in that case and the tank filled up to within one inch from the top. The young are fed with finely, scraped raw beef mixed with drops of water to a thin paste; with powdered prepared fish-food; and as they gain in size with mosquito larvae, etc. Should, as it sometimes happens, the parents eat their eggs or young, do not worry! there was a good reason for their doing so, which, however, these fish alone understand. They will soon spawn again and prove to you that they understand their affairs well.

---

#### A NIGHT-BLOOMING CACTUS IN FRUIT.

Mrs. N. P. Millard, of Iberia, La., has a curiosity in a night-blooming cereus (*P. phyllanthus*), which is bearing fruit.

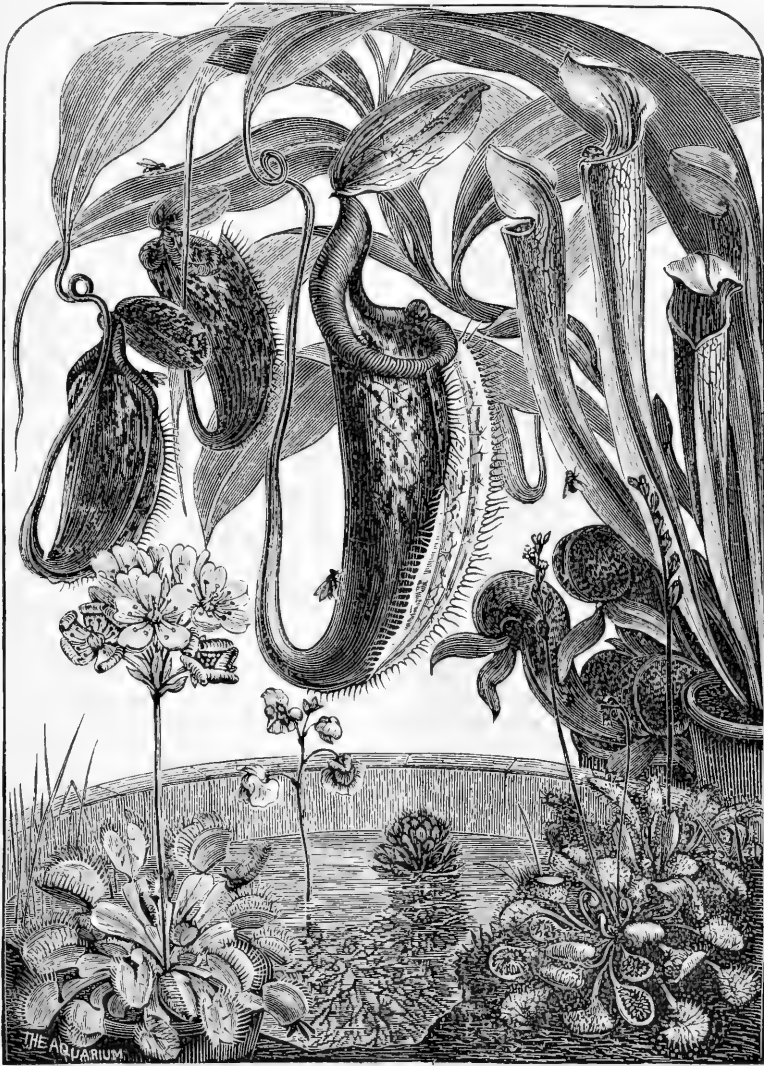
This is the first time a plant of that kind has been known to bear fruit in this country. In its native country the fruit takes two years to mature. The fruit is about seven inches in length, nine in circumference, of a blood red color, in appearance very much like a Balsam apple, having a rough skin. It has burst open on one side showing a white, mealy interior like an apple. The plant measures about eight feet in height, branching out about nine feet in diameter at the top. Two years ago it bloomed in the day time; at eight o'clock in the morning twenty-five beautiful flowers expanded.

## CARNIVOROUS PLANTS.

(With Illustration.)

Plants that attack their like, to nourish themselves at another's cost, the so-called Flatters are known in large

aided eye) almost invisible molds, fastens itself to strong and healthy plants causing them to present a sickly appearance and finally killing them. All of this has come to our knowledge by experience, but that there are higher orders



CARNIVOROUS PLANTS.

numbers; they most betray themselves by outward appearances, being of a pale color or only showing a trace of green. The smallest form of these (to the un-

aided eye) almost invisible molds, fastens itself to strong and healthy plants causing them to present a sickly appearance and finally killing them. All of this has come to our knowledge by experience, but that there are higher orders

late investigation, and is now a definitely settled fact. The first intelligent description of these rooted 'Fra Diavolos' was forwarded by the naturalist Ellis, in a letter to Linne about 1768. He had one of these brutal plants sent to him from the swamps of Carolina, so that he could himself observe these habits of trapping its game. He described this bandit in about the following manner: The plant sends out of a peculiar shaped leaf rosette a spike of flowers of a beautiful white color. This plant Ellis named (*Dionea muscipula*) Venus' fly-trap, which name Linne also adopted. The margin of the leaf is encircled by small delicate bristles, and on the upper surface of each half of the leaf three to four of these sharp bristles are also found. Between these last are found glands which secrete a reddish, viscid fluid, by means of which the insects are induced to venture on this dangerous parquette. The instant this occurs the two halves of the leaf close, the marginal bristles close over the edges like the hands clasped in prayer, the force being so great that the leaf becomes torn, if the effort to open it is persisted in. Ellis asserts that the insect is impaled on the central bristles, not unlike the victims of the middle ages, being inclosed in the machines of torture. This idea of impalement was erroneous and Linne seems to have considered the whole letter as such, he refused to accept the theory of digestion, of which Ellis had hinted. He (Linne) considered Venus' fly-trap as a new species of the Sin-plant and therefore reasoned, the leaf only remained closed as long as the irritation was kept up, when it would again open, without having utilized the cadaver.

Already Ellis had noticed that by irritating the upper surface of the leaf

with a needle or piece of straw, it would close, but on perceiving it had no insect inclosed, would soon unfold itself, while this does not occur when an insect is caught. Linne held to his belief. Only the elder Darwin concluded there must be some use for this system of preying, and thought that the flower was surrounded by the leaves to prevent insects from making their ascent to the flowers and there causing destruction. The son of Darwin, next to the German botanists, Sprengle and Miller, has given the clearest explanation of this habit of catching insects by these plants. The bright colors and exudation of the honey-like substance would exclude the idea of protection, more readily serving the purpose of a bait.

We often see illustrations of spiral plants, with heart-shaped leaves and a tube-like flower. This is the common snake root (*Aristolochia clematidis*), the flowers of which to a certain degree resemble a mouse trap. The mouth of the flower is covered with stiff hair, the points of which are directed to the interior, allowing an insect to readily find entrance to the interior of the flower, but with difficulty making its exit. This does not occur before it has deposited the pollendust brought from some other plant and has again taken up some new in place of that deposited, when the hair will become smooth with the body of the blossom, allowing of an easy exit, the insect now being free, leaves, soon to fall into a new trap, there again to perform the same duties.

Before the investigations of Darwin it was thought that these arrangements of Venus' fly-trap were of no use to the plant. Dr. Curtis, of Wilmington, N. C., in 1834 noticed that the dead insects became dissolved in the exudation of the leaves and finally disappeared.

This observer also noticed the seat of excitability, namely, the three bristles on the upper surface of the leaf. If a cautious insect walked between these without touching them, it would escape all danger. Thirty-four years later another American naturalist substantiated these observations in so far that, if a small piece of meat was laid on the leaf it would close and not open again until it was fully digested, when the leaf would unfold itself ready for another meal. He noticed also that cheese was undigestible and very often destroyed the vitality of the leaf. These already wonderful observations were partly explained by the English physiologist, Dr. Burdon Sanderson, in that he declared that the nerve of this sensitive leaf is traversed by a current of electricity, not unlike the muscles and nerves of animals, so that it presents some resemblance between the organs of motion and digestion of animals and this plant. In the turf swamps and moors of middle Europe are found plants not unlike our *Dionæa*, and belong to the finest of the flora found there. We refer to the Sindew, which is unknown to most of the readers. The oldest German botanists looked upon these with awe and mystical wonder. The appearance of these plants cannot be forgotten by any one who has seen them in their beauty.

In the height of summer may be found in the middle of the moor a small rosette of light green, with proportionately long stemmed leaves, from the centre of which a flower about a foot in height makes its appearance, which only unfolds itself to the noon-day sun.

This flower is white and star-shaped; this last is of less interest to us than the leaves. The one variety appearing

in greater numbers is the *Drosera rotundifolia*. The other varieties appear less frequently, namely, the *Drosera longifolia* and *Drosera intermedia*. (See illustration.) The margin and upper surface of the leaves are covered with numerous reddish, or of lively red colored hair several lines in length. Each one of these hairs carries on its point a drop of fluid as clear as crystal, which gives the leaf the appearance of being encircled with a band of diamonds. The contrast between the green leaf covered by these reddish hair and the never coalescing fluid, presents a grand sight. During the heat of the day, after all of the dew had disappeared from the grass, investigators noticed that these plants only showed this crystal fluid, in consequence of which they named them Sin-dew or Ever-dew; later the name *Ros solis* was conferred on them. In those days when they thought to read the use and medical properties of a plant from external appearances, they came to the conclusion that they surely had a remedy for wasting diseases, to wit, consumption and other chronic troubles. To arrive at this conclusion they reasoned in the following manner, that the sun being unable to dry up this secretion on the leaves, the plant must surely possess the life-giving properties. Alchemists also became interested in this plant and thought they had now found the thing to yield them the elixir of life, and the long sought for material for gold tincture. Arnoldus de Villanova, the chemist, who was professor at Barcelona, at the end of the sixteenth century, but later banished by the Spanish clergy under the stigma of gold maker and scholar of the devil, contributed greatly to the fame of this plant. He prepared in Italy, to which

country he fled, his celebrated gold water (*Aquae auri*), from the plant, which should heal all diseases, so that it was made into a pleasant tasting mixture, under the name of *Rosoglio* (from *Ros solis*, sun-dew), and it is still to this day prepared and used in Italy. The German botanist Roth in the year 1779 was the first to describe the nature and use of these so-called dew drops. He noticed on several small hairs bent to a central point, and also that the margin of the leaf was slightly curled towards the centre. When he examined several of these closed leaves he generally found inclosed a more or less decomposed insect. The closed leaf he compares to a many fingered fist. On this discovery he planted several specimens in pots at his home, so as to be able to more accurately observe their nature. When a live ant or small bug was placed on the surface of the leaf, it was observed that the exuded fluid adhered to the feet of the insect and forming small threads, in this way preventing its escape. After a short period the hairs on the leaf were noticed to bend upon themselves, and a little later the marginal hair also. It took several hours before the leaf had completely closed, when it resembled a new leaf making its appearance. The same careful observer also noticed that they were more sensitive in warm air and sunshine than during cold and rainy weather. Further observations showed that they were not so sensitive to inorganic substances, as to live insects, also that the long leaved plant to possess itself of its prey rolled up on itself from the point, while in the *Rotundifolia*, it merely formed a trough, the work of destruction being carried on by the hair.

These repeated observations of different botanists were not further studied

for eighty years, until recently, when the plants again attracted the attention of naturalists. Besides the English naturalists, Darwin and Bennett, and the Frenchman Ziegler, an American lady, Mrs. Mary Treat, of Carolina, has distinguished herself as an observer of these plants. She experimented with ordinary ones found in the swamps, and also with the more rarer one, the *Drosera filifera*, and saw not only small insects, such as ants, spiders and flies caught, but sometimes larger ones, such as the ordinary miller, which flies around our lamps during summer evenings. If she placed insects or small pieces of raw meat on the leaves during the warm hours of the day, it was observed that the leaf soon commenced to fold up, which was generally complete in two hours. While a piece of raw meat irritated it as readily as an insect, such substances as grains of salt, pieces of lime, grains of corn, etc., had no effect in twenty-four hours. Wet lime naturally irritated on account of its caustic properties. There is no doubt that the leaf has the power of distinguishing between mineral and animal substances. Mrs. Treat even believes to have observed that they are acted on by these from a distance, because in July, 1873, she fastened a living fly at a distance of one-half an inch above the leaf, and after forty minutes noticed that it was strongly bent upwards, and in ten minutes more had seized it within its arms of prey.

(To be Continued.)

A REFERENCE TABLE in shape of a bookmark, containing the Fahrenheit, Celsius and Reaumur thermometer scales, inch and centimetre measure, foreign money, etc., sent gratis on receipt of two cents postage.

Address THE AQUARIUM.



## AQUATIC PLANTS FROM SEED.

To grow aquatic plants from seed, take an ordinary square crockery pudding-dish, cover the bottom of same one half inch deep with clean, sharp sand which has been baked in an oven to kill all germs of conservae. On this sand sprinkle sufficient cold water, which has also been freed from any spores by boiling, to make it reach to just below the surface of the sand. On this wet surface sow the seeds and cover them by sifting dry sand prepared as above over them to a thickness of less than a straw. The moisture from the sand below will soon penetrate to the new surface and the seeds are thus evenly imbedded. Cover the dish with a pane of window glass to avoid too rapid evaporation, keep in strong light but protect against the direct rays of the sun. Never allow the surface to become dry, but when sprinkling always use water that has been boiled; of course when used it should be of ordinary temperature. When the seeds begin to sprout and show above the sand, use the water more liberal and keep on raising the water depth from time to time at the same rate as the young seedlings grow. They should always be near the water surface. If, in spite of all precaution, fine green conservae growth begins to appear on the young plants or on top of the sand, introduce some young frog-tadpoles, the younger the better; these feeding on the conservae will soon clean the plants without injury to the latter. When the seedlings have completed their third or fourth leaf, they should be transplanted or thinned out, but they must be kept under the same careful treatment until they are strong enough to outgrow any injuries.

## THE SAGITTARIA FRANCIS M.

Our seedling *Sagittaria*, "Francis M.," which is now two years old, proves to be an aquarium plant of the very highest order. All winter it is very attractive through its broad ribbon-like leaves (blades), which are of a delicate, but brilliant green. The network of veins in these leaves are almost as distinct as those of the *Patamogeton crispus*. The leaves, although rather strong, are by no means stiff looking; they are always in graceful curves, no two being alike. Last February the aerial leaves appeared. On a triangular stem these rise eighteen inches above the surface of the water. They are lance-shaped, strong in texture and gracefully curved. Never more than five leaves are in perfection at once; whenever a sixth one appears, the oldest one turns yellow and is promptly removed with the knife. In the beginning of March it sent up the first flower spike, which bore twenty-four perfect flowers. These opened in succession, each day three, thus the spike remained in bloom for nearly ten days. The individual flowers are of the size of a quarter of a dollar, pure white, with rich yellow stamens. They are not fragrant however. We were just looking at the last faded flowers when we noticed a second flower spike shooting up above the surface of the water; this having bloomed a third one appeared, and now, June 20th, while we are writing this, the fourth flower spike is about six inches above the water and will display its flowers in about three days. Now if we consider that this plant was raised from seed in an ordinary parlor aquarium near a window in our room, from seed which was obtained by crossing two distinct species, which were also

growing in aquariums in our sitting room, the result is remarkable, and shows what can be done in an aquarium which is properly located. The plant grows in ordinary aquarium sand and gold fish and tad-poles are its companions.



We cheerfully answer at once, all queries made in regard to Aquariums or Window Gardening if return postage is enclosed.

E. H. H.—N. There are a great many species of *Ludwigia* in this country; only three, however, including my own, are useful for an indoor aquarium. The *Polyconum* is very beautiful in ponds or basins, where seen from above, especially when in bloom, but they amount to but little indoors.

Aquatic plants should be grown on the same principle as house-plants are. Small glass salve jars are excellent 'pots' for them; sharp sand is most suitable for them; some species, however, delight in a soil consisting of two parts sharp river sand and one part peat, while again some prefer a heavy rich clay. Water poppy (*Limnocharis Humboldtii*) will do best if grown in rich soil in a water depth of about three to eight inches. Our native water plants may all be grown for a short period in a parlor aquarium, but most of them will soon perish, so soon that it hardly pays to introduce them into a collection. The only reliable plants are those which were grown under cultivation and conditions similar to those that await them.

It is always risky to introduce plants into an aquarium that were collected in creeks or ponds, as they may contain the eggs of injurious insects and mollusks, or the spores of undesirable fungi.

MRS. H. B.—N. O. Putting a whole or a half sheet of prepared fish-food in an aquarium with the intention to give the fish their weekly allowance at once, can be compared to placing enough fresh beef on a dinner table to last for a week. It will not only lose its value as food, but will also poison the water. Offer your fish food every day, but if they don't seem to care for any, don't give them any. At no time should any food remain on the bottom of the aquarium; remove it by means of a dipping tube.

MR. G. A.—L. To secure free blooming of *Anthurium scherzerianum*, transplant in August and not disturb it in spring.

MRS. N.—D. To make dahlias bloom profusely, nip off the tip end in July and cause them to branch out. Do not enrich the soil, but keep it well worked.

MRS. R.—C. Place your rubber-plant out doors where it is shaded from the hot sun. If there is no danger of its getting stolen, leave it out doors over night. Rubber plants delight in night air. Never let it suffer from want of water.

A second aquarium society has been formed in New York city since the last issue of *THE AQUARIUM*. Its name is "Salamander." Dr. A. von Duering was elected president and Mr. H. V. Letkemann secretary. The "Salamander" had an exploring excursion to Bronx River Park for its members May 21st, which was well attended.



Eine Zeitschrift in Deutscher Sprache

FUER

Practische Naturkunde, Aquarium, Terrarium und Zim-  
mergaertnerei in Nord=amerika.

Alle viertel Jahre erscheint ein Heft. Abonnementspreis, \$1.00 das Jahr.

Probenummer gratis. Das erste Heft wird im September erscheinen.

HERAUSGEGEBEN VON

**HUGO MULERTT,**

173 NOSTRAND AVENUE,

BROOKLYN, N. Y.

**HUGO MULERTT,**

(Oldest Aquarium Establishment in America.)

**Aquarium Plants & Ornamental Fish**

173 NOSTRAND AV., BROOKLYN, N. Y.

NO STORE. New Catalogue and Price List now ready.



# THE FISHING GAZETTE,

**A WEEKLY JOURNAL.**

THE ONLY PUBLICATION IN AMERICA EXCLUSIVELY DEVOTED TO THE

Fishing Interests, Fish and Oyster Culture, Fresh  
and Salt Water Angling, Etc.

A VALUABLE MEDIUM FOR THE ADVERTISER. TRY IT.

SEND FOR A SAMPLE COPY.

**\$1.50 per year, post paid.**

**To Foreign Countries, \$2.00.**

(ESTABLISHED 1884.)

G. E. JENNINGS & CO., Publishers.

Address **THE FISHING GAZETTE,**

**317 Broadway, New York.**

J. W. FISKE,  
 MANUFACTURER OF  
**AQUARIA,**  
 39 and 41 PARK PLACE, NEW YORK.  
 AQUARIA STOCK ALWAYS ON HAND.

Gold, Pearl, Silver, Sun,  
 and Rock Fish, Turtles,  
 etc.,

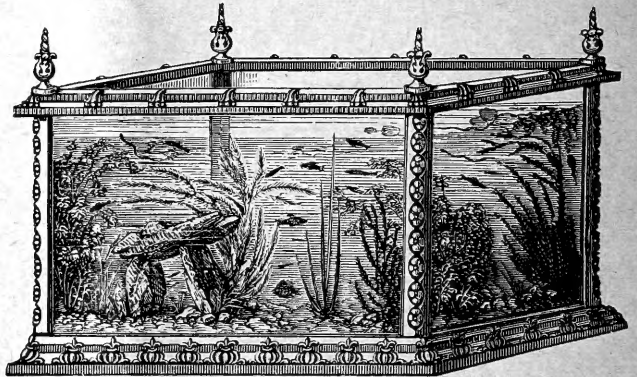
IN THEIR SEASON.

*Japanese Gold Fish*

ALSO

Aquaria Plants, all varieties.

Full line of Grottoes,  
 Arches, Rocks, etc., car-  
 ried in stock.



Also Manufacturer of Fountains, Drinking Fountains, Settees, Chairs,  
 Lamp Posts, Railings, etc.

CATALOGUE FURNISHED GRATIS UPON APPLICATION.

SIFTED  
**BIRD SEED.**

IF YOU WANT BIRD SEED FREED FROM  
**DIRT, GRAVEL and MOTES,**  
 ASK YOUR GROCER OR DRUGGIST FOR

♣ **McALLISTER'S.** ♣

This seed is carefully selected best quality of canary,  
 German rape, and imported millet seeds, and is put  
 up fresh in one-pound boxes.

IF YOUR BIRD HAS LOST ITS VOICE,

**SHEPPARD'S SONG RESTORER, OR TREAT,**  
 Is an invigorating tonic that is sure to get the bird  
 into song again.

FOR SALE BY ALL DRUGGISTS AND AT ALL BIRD STORES.

**F. E. McALLISTER,**  
 -- DEALER IN --  
**FLOWER AND GARDEN SEED, ETC.,**  
**22 DEY STREET, - - NEW YORK.**

**McALLISTER'S**  
 SUPERIOR PREPARED  
**MOCKING-BIRD FOOD**

-- FOR --

Mocking-birds, Thrushes, Blackbirds,  
 Robins, Nightingales, Skylarks,

+ AND ALL SOFT-BILL BIRDS. +

This preparation is the purest, healthiest, and  
 cheapest bird food known, its ingredients approxi-  
 mating closely to the food of birds in their natural  
 state; and its use in all cases causes a marked im-  
 provement in their song and appearance.

**SHEPPARD'S GENUINE PREPARED FISH FOOD.**

A perfectly pure article,—specially prepared for  
 feeding Gold Fish, etc. kept in aquaria or globes.