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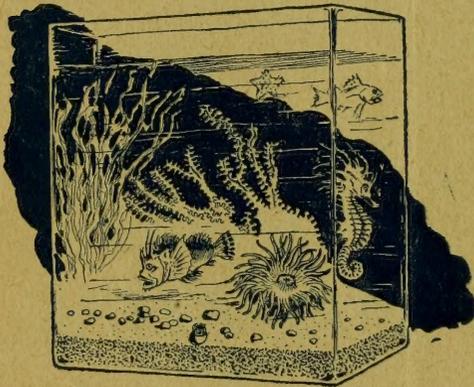
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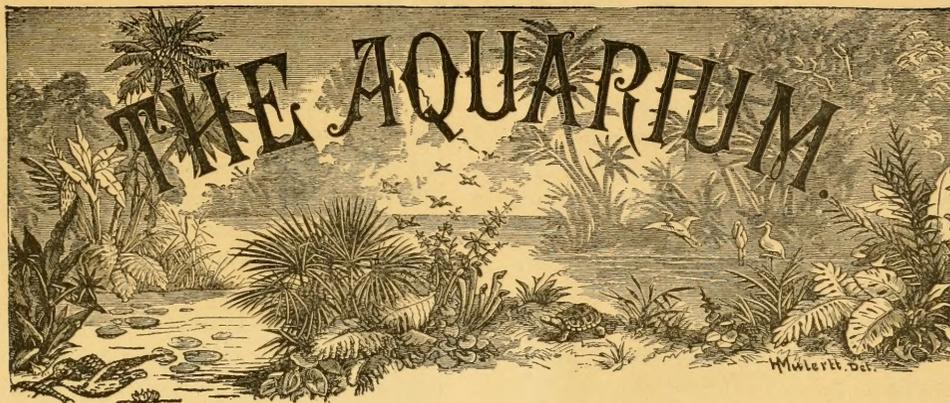
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THE GOLDORFE, AND HOW TO BREED IT.

(With illustrations.)

The Goldorfe (*Cyprinus orphus Idus melanotus auratus*), also called Golden ide, is a member of the Carp family and a native of Southern Germany. Body slender, much compressed on the sides, and covered with uniformly sized scales; back and sides orange red, more or less speckled with small, irregular intensely black spots; abdomen silvery white; head small; mouth without barbules; eyes large and of a golden hue; dorsal fin short and far back; caudal fin deeply forked; abdominal fins small; all fins rounded at the ends, pinkish at the roots and tinted vermilion in centre. Young specimens, excepting the color, resemble very much our American shiner.

There is scarcely a fish which, as an ornamental fish, so satisfactorily meets all the demands made of it as the Goldorfe. In summer and winter it is constantly seen near the surface of the water where it seeks its food, which consists of insects, tadpoles and small water plants. It does not feed on the

bottom and, consequently, it does not muddy the water, which is such an objection to Carp.

It attains a length of 24 inches and a weight of about 4 pounds.

The raising of the Goldorfe as an ornamental fish has a peculiar advantage over that of the goldfish, the young swimming about in large schools, shortly after leaving the eggs, present a remarkably beautiful appearance. Having at that stage a thickness of about two lines and a length of about a quarter of an inch, their color being bright orange with a black head, the easily frightened school swim with lightning-like rapidity from one place to another.

In the year 1558 Gessner wrote in his Natural History that the orfe enjoyed a high reputation as an article of food, especially when fried, particularly in the months of April or May. Permission to sell the orfe was only given when it had reached a certain size, as they were considered an excellent food for the sick, and consequently it was desirable not to let the species die out. From the habit of those days to bring them to women in confinement, this fish was called the Ladies' fish.

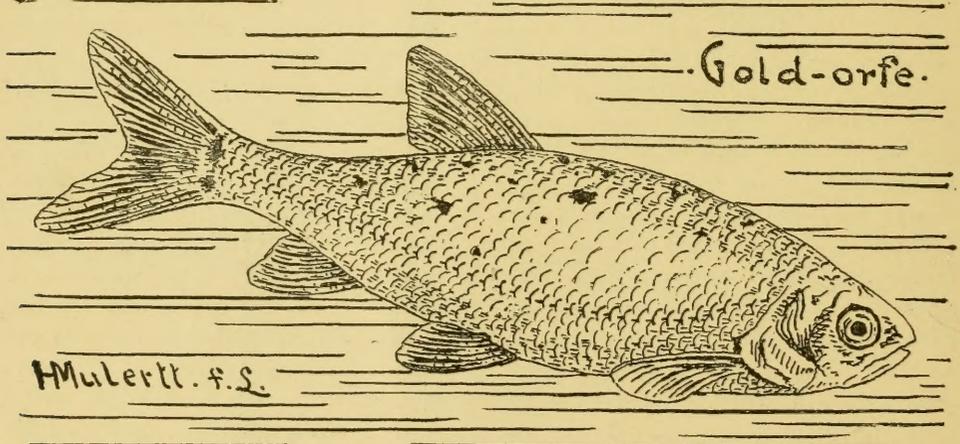
The movement of the Goldorfe is very graceful and quick. It is very watchful, giving warning to other fish of any approaching danger; for that reason they were kept in Carp ponds as a kind of guard for the other fishes and for the same purpose they were cultivated in the moats surrounding the castles during the middle ages.

The Goldorfe was introduced to this country by the United States Fish Commission and also by us in 1882; the former introduced it as "Golden Ide," by which name it is known to English writers, while we stuck to the name by which it was known for cen-

Although introduced twelve years ago, this beautiful fish is yet very little known; the cause of this, we think, is the difficulty in breeding it. In the following we give a description of our method to propagate it and hope that it may be inductive to a more frequent cultivation of the fish.

BREEDING THE GOLDORFE.

In the spring of the year, when the temperature of the water in the ponds has risen to about 65° F., we prepare a spawning-bed for the goldorfe in a rectangular rearing pond, of which the banks run due south and west, in the following manner:



turies in its native country and which for business purposes we found the better of the two, as it avoids disappointments. Several cases we have recorded where the customers asked for *golden-eyed* fishes, and in one case for *golden-eyed* Carp. In both cases the parties having heard of the fish, but not seen its name in print, were under the impression that it meant Goldfish or Carp with golden eyes. The name *Goldorfe* is easily pronounced and might, for that matter, be spelled "orphe;" one could then raise orphen and call his orfen pond an orphan asylum.

Eight feet west of the northeast corner of the pond we place a slightly perforated board partition, which projects four feet into the pond and reaches a few inches into the bottom of it, while it extends six inches above the water surface. Four feet south of same corner, running due west, a similar board partition of eight feet in length is placed. Where the two ends of these boards meet, a stake is driven into the bottom of the pond, against which they are both fastened. (See diagram.) Over this bed a wire screen of $\frac{3}{4}$ inch mesh is placed, mounted on

hinges. The shallowest parts of this bed, the east and north sides, are covered with four inches of water; the deepest part is the southwest corner, with a water depth of about twenty-four inches.

All along the shallow sides bunches of fibrous roots and grasses are laid in profusion, and no current of water is allowed to enter this bed. When all this is complete, we place three females and four males of twelve to fifteen inches in length in it and close the wire screen. Tadpoles of frogs may now be had in plenty; some of these we catch daily and throw alive through the screen for the spawners as food.

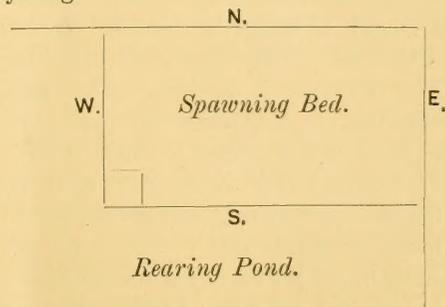
When the weather is nice and warm the fish will begin to spawn towards the latter part of April; if not, they may delay it till June. The clumps of rootlets which were placed in the bed as spawn-catchers, are therefore examined every morning, and if found covered with eggs, which are watery white and double the size of a pin head, they are at once carefully removed and placed by themselves in a hatching pond. This is a little pond, eight feet each way, with a water depth of six inches, through which a moderately flowing current of water is allowed to pass. The clumps of roots to which the eggs adhere are placed over some dry brush or tree branches, which are placed in the pond for this purpose, in order to support them free in water and near the surface. No insects, frog or other enemies of fish eggs are to molest these eggs.

After six days the eggs hatch. The young at first have a milky appearance, which changes after a few days into a cream color, the top of the head at the same time becoming darker—almost black. They swim in schools, near the

surface, and frequent the place where the water enters the pond. It is therefore necessary to protect the inlet with fine wire gauze, to prevent their escape and also to protect the young fish against enemies that may lie in waiting at that same place. This pond, like the former, is also covered with wire netting.

When about one inch in length, the color of the young fry is bright orange and the tops of the heads still black. At this age we take them from the hatching pond and plant them at the rate of one hundred fish to a rearing pond measuring about ten feet one way and twenty feet the other, with eighteen inches water depth. In handling these young fish, care must be taken to have the buckets which convey them covered, as they are great leapers. At an age of six months they will have attained a length of from four to six inches; the back, including the head, has become deep orange in color, more or less dotted with little spots of intense black, while the abdomen is silvery white. In the third year, if circumstances are favorable, the fish will measure twelve inches and over, and at that age will begin to spawn.

It may be in place to state, also, that eggs which were not cared for as above described never came to anything. The parent fish devour their own eggs, and are the greatest enemies of their own young.



GLIMPSES BENEATH THE WATER.



This past summer the Paradise fish reigned, and this intelligent little beauty, which so quickly becomes the pet of all who have the opportunity to watch it, should wear the crown. But of course where there is much light, there is shade too, and so has the Paradise fish faults as well as other fishes have theirs. I refer to the haughty temper of some of the males, in fact of all the males, for they all treat their mates sooner or later "really cruel." What can be the cause of this? I have one pair which had twelve different broods this summer. Their home is a good sized aquarium, so arranged that it can be divided into four different apartments. When they had the second brood this spring the male acted rather cross for a couple of days; he bit the female, even tore several scales off her side. She remained in a corner a few days after that, to heal her wound, and then came forward again. Both "made up" again, and after that had ten broods. Everything during that period went on charmingly. They both got along together finely; her wounded side had all healed again, and they were the

prettiest pair of fish I had in the house. You can imagine my surprise when one morning, not many days ago, I found the female all bit up in a corner of the tank. The male looked at her with angry eyes even when I removed her to a different compartment, where she is now rapidly recovering.

What could the quarrel have been about? These little creatures are very interesting in many ways.

The young Paradise fish one has raised himself in an aquarium are naturally great pets. They measure now all the way from one-eighth of an inch to one and one-half inch, the latter showing already the beautiful colors of their parents, and the young males may be seen fighting with each other, especially after meal times, like young roosters in a poultry yard. A small tank, say of two and a half or three gallons capacity, will accommodate about fifty of such little fellows; they should be fed twice a day, however, or even oftener, and besides that a sunny location of the tank is necessary in order to stimulate the growth of the plants, which under favorable conditions also supply no small amount of healthful fish food.

But although the Paradise fish has claimed much attention this year, the old favorite, the Goldfish, has been by no means neglected. Many amateurs have bred these too, and in a few cases beautiful cross breeds have been made. Large finned Comets and Fringe-tails are as much in demand as ever, and one cannot have too many of these varieties, provided that one aims to get differently marked specimens. The Fantails of last Spring's importation turned out to be a healthy lot of fish. I hope that the lots which are now nearing San Francisco may prove equally as

good. Telescope fish are as scarce as ever, and the beautiful and odd "Rams-nose," a sub-variety of the Nymph, are principally in the hands of private parties.

A comparatively new fish for our aquariums is the Gold Tench (*Tinea auratus*.) This fish was certainly not sufficiently known when it was said that "it hides all the time under rocks and plants, and once or twice in a year you get a peep of it. The only satisfaction one has, is, that he knows that he put a Gold Tench into his aquarium. If he wants a visitor to see it he will have to stir it up with a stick." I have found this fish very easy to domesticate; it required but a few days to teach them to come to the surface of the water to take food out of my hand. They are a much livelier fish than the goldfish; very playful, just as attractive in color as the latter and always in view, intelligently following the spectator around the sides of the tank in expectation of some dainties.

Now, while the time is at hand to clean and re-arrange the aquarium for the colder season, a new supply of aquatic plants is often wanted, for even the best of us will meet with an accident sometimes and lose a valuable plant, while others, for the sake of variety, wish to try some different kind. Fortunately for us all, the number of species and varieties of aquatic plants which answer our purpose is steadily increasing. *Sagittaria* 'New Era,' a seedling of the good old *Sagittaria natans*, is a good novelty, being more robust in growth than its parent. Still larger than the preceding is the Sag. 'Francis M.,' a hybrid between New Era and *Sag. lanciolata*. Its immersed leaves are gracefully curved, while those growing out of the water are decidedly lance-

shaped. In either stage they are very decorative. The different varieties of *Cabomba* especially the *C. rosaefolia* look well with *Sagittarias* as a background, while *Ludwigia Mulertii* is the plant par excellence for a conspicuous open space in the tank, the beautiful shapes and colors of its leaves having then a chance to develop to perfection.

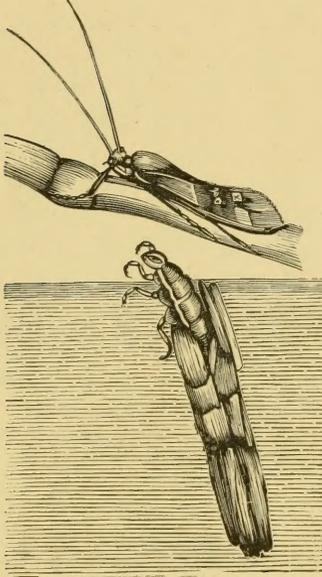
A very interesting plant of recent introduction is the Parrot's feather (*Myriophyllum proserpinacoides*). It is a near relative to our American Millfoil (*M. spicatum*). It grows best if allowed to float about on the surface of the water. If permitted to overhang the aquarium frame it adds greatly to the appearance of the whole collection.

The Water Hyacinth (*Eichhornia crassipes*) is a curious and pretty floating plant. Its large feathery roots are no less attractive than the odd shaped leaf-stems. If the aquarium is favorably located and large enough, a large blue flower-spike will frequently make its appearance.

The smaller floaters, such as *Trianea bogotensis*, *Salvinia amazonica* and *Azolla palustris* should not be forgotten when restocking the aquarium for the winter. Floating plants impart to the aquarium that peculiarly charming appearance which is so much admired along the shores of small lakes. An aquarium is nothing more nor less than a miniature lake; then why not copy the lake in all its details? AQUARIUS.

The Chinese umbrella plant (*Cyperus alternifolia*) is an excellent aquarium plant, but only for ornamental purposes. For the purpose of aerating the water, one must have plants that grow below the surface of the water.

THE CADDIS OR CASE-FLY.

(Phryganea.)

Although the larvae of the caddis flies (the caddis worms) are very destructive to aquarium plants, which they attack at the tender tops to obtain building material for the enlargement of their houses, they are also very amusing, if kept in a jar with aquatic plants by themselves. We see them busy at the bottom, adding fragments of plants, pebbles, minute shells, even if the snails within them are alive and any small debris that their fingers can seize hold of. Last season the writer had amongst a large number of cads, one that had his case nearly destroyed by accidentally falling from the table. I removed from him what remained of his case, and threw him into a jar with a water soldier (*Stratioides aloides*) and a few snails (*Lymnea*). He set to work to repair his tabernacle, and the snails helped him, for they nibbled a leaf of the *Stratioides* into shreds. These shreds the cad gathered

and every day he added a fresh piece, so that, in about ten days he appeared in a suit of green, his clothes bulged out to an enormous size, and everywhere studded with points and corners, the most comical sight that could be imagined. Since he could find nothing of a small neat pattern, he took what he could, and became a perfect Jack in the green, nearly an inch and a half in length, and thicker than a carpenter's lead pencil.

The movements of these creatures are as comical as their specimens of tailoring. We see them mounting a stem or leaf with great gravity, when suddenly up goes the tail, the legs hold tight, and the case turns completely over, as if on the first of May Jack-in-the-green were to dance on his head. When the creature is hidden, and the case sways to and fro like a buoy attached by too short a rope, the sight is very curious.

The perfect insect bears resemblances to the two families which stand on either side of it—the Lepidoptera or true butterflies, and the Neuroptera, of which the dragon flies and other membranaceous winged insects are members. As soon as he enters the world, he begins to show his skill in tailoring, and by means of silken threads and gluten constructs his case of bits of stick, straw, pieces of leaves, or shells, in fact, whatever he can get, and as long as he retains the worm like form the case is his castle, and he can defy the world. The case outside is generally a rough affair, but if you draw out the cad you will see that inside it is perfectly cylindrical, smooth, and polished, and around the doorway, through which the larvae makes acquaintance with the world, it is neatly finished with a very circular rim.

When you have removed a cad from his case, if you throw him into an aquarium tank you will learn in an instant what is the use of his case, for his soft nakedness is no sooner exposed, than the minnows finish him, and find the flavor excellent. But to see a cad in his proper uniform molested is a very rare sight indeed. When he feels the numbness of death creeping over him, the cad draws in his six legs, and sets to work inside to weave a winding sheet and to shut the shutter, for he knows that his time is come, and there is no one to do such melancholy offices for him. All alone in his solitary cell, the hermit works day and night, and hourly his fingers grow more feeble. We look and find the shutters closed, and by this time the larvae has changed into a pupa.

The mode in which the worm closes its cell is curious enough. Over its entrance it weaves a grating of silk, which hardens in water and remains insoluble. It may be seen very plainly by the naked eye, but under a good lens increases in interest. The grating is placed a little inside the margin of the opening, and fits exactly within it, and its object is to protect the pupa from invasion, and at the same time to admit water for respiration.

But the escape of the pupa when about to undergo its last metamorphosis is as interesting as the fact of closing the shutters to announce its own death. It is provided with a pair of hooked mandibles, with which to gnaw through the grating, and no sooner have these accomplished their purpose than they fall off, and the pupa takes its last shape of a four-winged fly, as represented in the cut.

S. H.

THE FANWORT. (*Cabomba*.)

Fourteen years ago we received in a letter from one of our correspondents in the State of Louisiana, a sprig of a green-water plant. In the letter the writer stated that in his rambles about the wild swamps he ran across a little pool in which he found this plant growing. As he had an aquarium at home he gathered some of it to plant in his tank. Here it was much admired, but nobody seemed to have ever seen this variety of water plant before and he therefore concluded to send it to us in order to find out its name.

As it was in winter season, the plant, or rather the sprig of it, was not in bloom and we were not able to analyze it to a certainty. We, however, supposed it to be a variety of *Ranunculus aquatilis*. (See illustration.)

The sprig in question received its proper care, and with the approach of the warmer weather it formed flower buds, then differently shaped leaves, and finally it bloomed. We recognized it now as a member of the water-shield family—*Cabombacea* (*Gray*). An English work on botany which we consulted had a very correct illustration of it and gave Brazil as its home, but nothing else was said about it.

The plant proved a valuable acquisition to our collection of aquarium plants. Everybody who saw it wanted to buy it. As a matter of course we wrote to our correspondent in the South for more, but he was unable to find the pool again from which he had obtained it, and had even lost all that he had had in his own aquarium. We then wrote to different parts of the South, but for a long while without success. In the meanwhile, we propagated our stock from cuttings.

THE AQUARIUM.

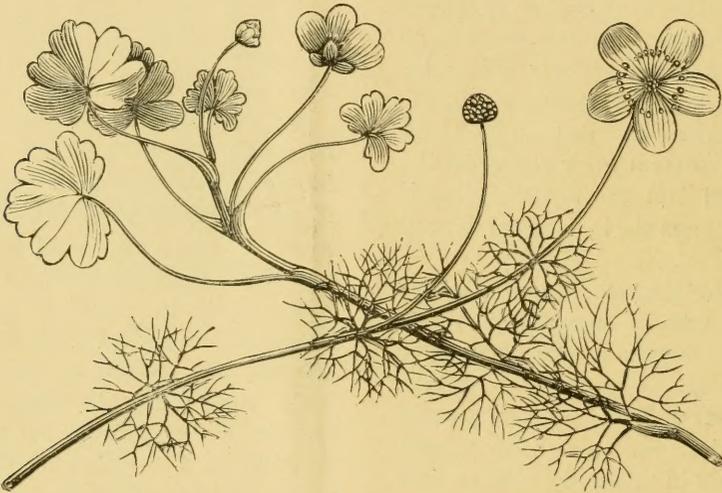
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varieties. They grew side by side and received the same treatment, but each developed its respective characteristics. The Louisiana variety in the more regular shape of the fan-shaped leaves and a brilliant, glossy, light green color on the upper surface, while the under surface was covered with a silvery lustre; the Florida variety showed the same habit of growth, but the stems and leaves were in the different tints of



RANUNCULUS AQUATILIS.

At last we received an assorted lot of water plants from Florida, among which were some Cabombas, but not of that brilliant green color which distinguished our Cabomba from all other water plants. The color of this Florida lot was rather dull, being a kind of brownish green. But this, we presumed, could have been caused by a difference in locality or quality of soil and water, and believed it to be the same variety.

For the sake of acclimating these plants we planted them in several of our shallow open-air ponds and here we discovered that we had two distinct

varieties. The new leaves as they appeared being of salmon color, deepening as they became stronger to a brilliant pink, then a dark carmine until they were of a brownish violet when oldest.

The leaves sit opposite each other, they are cut in a systematical manner into a great many fine shreds, which altogether spread in such a way as to form a regular little open fan.

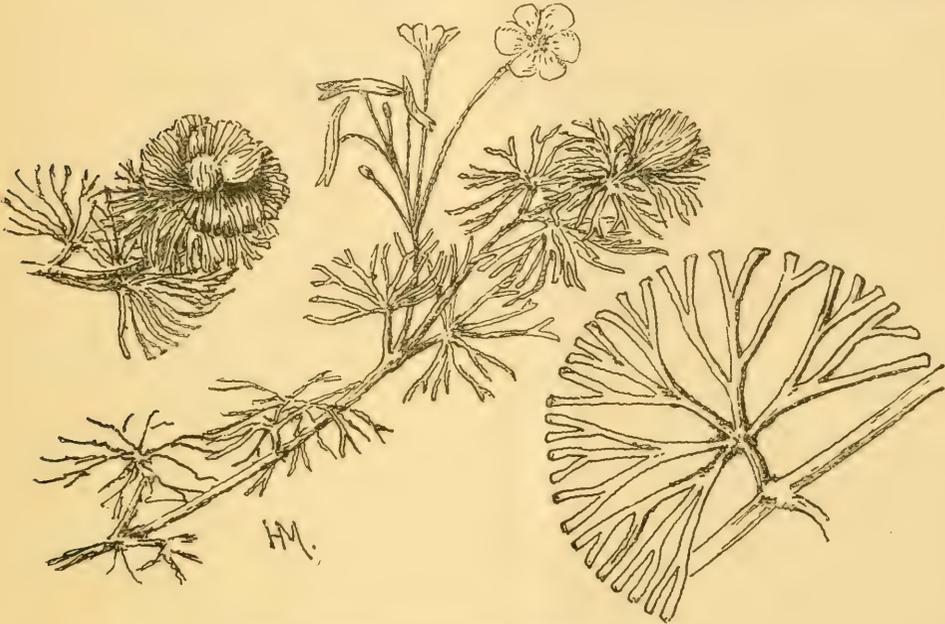
The flowers of both varieties are alike. They are of a trumpet shape, somewhat similar to a single Geranium flower, silvery white with a yellow centre, six petaled, and are half an inch in

diameter. Together with the flower buds there appear several small arrow-shaped leaves; these float upon the surface in support of the flowers. The latter are borne about two inches above the water, opening about 9 or 10 o'clock in the morning to close again about 3 o'clock in the afternoon, very much like the flowers of the white pond lilies.

According to their habit, we would

grown together in a fountain basin with their branches intermingled, and seen from above then, one imagines seeing a submerged bed of pink and light green roses.

This distinction in color led us to name them accordingly *C. viridifolia* and *C. rosaefolia*. Both are ornamental water plants of the very highest order. They are of easy culture, but north of Virginia they are not hardy. As an



CABOMBA ROSAEFOLIA AND SINGLE LEAF OF *C. VIRIDIFOLIA*.

call the Cabombas "creepers," as it is their nature to creep along the bottom and strike roots near every joint where a shoot forms a fork. New shoots or sprouts have an upright tendency until too heavy. These shoots tend to make the plants wonderful in their effect upon an observer. When the whorls of leaves appear about four to six inches below the surface of the water, sometimes three inches in diameter, they resemble a *Hermosa* rose in full bloom, a mystery to most spectators, especially when both varieties are

additional point of interest it is to be stated that the Cabombas sleep after dark. In this condition they close their leaves and lay them in an upright position close to the stems.

A third variety, *Cabomba Carolinensis*, is very pretty, too, but without a decisive character neither one way nor the other, it being of the ordinary common green observed on other plants. This is of very easy culture and very abundant in ponds and creeks in Maryland and Virginia, where it was introduced by carp culturists.

CULTURE OF THE HYACINTH IN GLASSES.

The Hyacinth is one of the most suitable for this elegant, though somewhat unnatural system of culture; and here we would just remark that failures may be more generally traced to mistaken kindness than neglect. Its roots, like those of other plants, shun the light with instinctive care; therefore, dark-colored glass should be selected. Place the bulbs in the glasses and fill with rain-water or drip water of the ice-box, so that it barely touches the bottom of the bulbs, and set them in a dark, cool, dry cellar or closet. When the bulb rests in the water at once, there is slight danger of moldiness ensuing. Examine them occasionally, and remove gently any scales that may be decaying, but be very careful not to injure the young roots. When the glasses are moderately filled with roots, which will be the case in three or four weeks, place them where they will receive a moderate light; and as soon as the plants assume a healthy green color, remove to the lightest possible situation, and where they can have abundance of fresh air. A close, heated atmosphere is very unfavorable to the development of handsome spikes of bloom.

When in actual growth sprinkle them freely, keep them as near the window as convenient, and turn them occasionally to prevent long, weakly, ill-shaped stems; the water should be changed at least every three weeks, using pure rain water of about the same temperature as that in which the bulbs are growing. The flowers will receive a check if you do not attend to this. A small piece of charcoal or a small pinch

of salt in each glass will keep the water sweet longer.

When the roots have nearly reached the bottom of the glass, there sometimes collects at the extremity of each a pellicle or covering of mucous matter. This soon stops up the mouths of the roots, by which the food of the plant is conveyed to the leaves. To prevent this the roots should be drawn carefully out of the glasses, and a wide vessel should be placed handy, filled with clean water from which the chill has been taken off and to which a little table salt has been added; in this immerse the roots of the bulb and draw the mass carefully through the hand, pressing them gently. Do this two or three times, until the roots are white and clean. Whilst one person is doing this, let another be washing out the glass and wiping it quite clean and dry. Then gradually work the clean washed roots into the glass before putting in any water. To get them in when numerous it will be found necessary to twist them around until they reach their old quarters, and the bulb rests upon the neck of the glass, then fill with clear rain or soft water and replace it in the window. A "double" Hyacinth glass, lately introduced, is very handy in this respect. One washing will generally be sufficient. After this no more care will be necessary, except occasionally changing the water. The single Hyacinth is best adapted for water culture.

For giving vigor to the plants and color to the flowers, we know of no better means than to dissolve into a quart of rain water an ounce of guano, and to pour one teaspoonful of that into each glass once in a fortnight after the flowers begin to appear.

REPOTTING PLANTS.

When repotting plants see that the soil you use is in proper condition, neither too wet nor too dry. If too wet, it will clump together and the roots can not penetrate it. A good compost, suitable for nearly all kinds of house plants, is wood mold and sandy loam, equal parts, mixed with one-third its bulk of rotten cow manure. This is worked over until it is reduced to a fine, evenly grained compost.

But other precautions are necessary, besides having a suitable compost, to be successful in raising and keeping house plants. When they are first potted (taken in from the garden) it is important that they gradually become accustomed to their changed mode of life. They should be taken up from the ground while there is yet growing weather, carefully pressed into the pot, pruned to diminish the evaporating surface, and shaded a few days till they recover. When the plants are taken indoors, it is best to keep them in a room without a fire, and where they can have plenty of air on mild days. October is a good month for potting most flowers for the winter.

Let the pots be new if possible; if you use old ones have them well washed inside and outside, and dried again before use.

All pots in which plants are to be grown must have at least one hole in the bottom, so the surplus water may run off; if it remains, the plants will soon die. Pots should be also of porous material; such as the common flower pots are made of is best. Never paint your pots, therefore! Ornamental china pots are intended merely as a cover of a common pot.

Regarding the size of pots, it may here be stated that, as a rule, ama-

teurs use too large pots for their plants. Always bear in mind that not the quantity but the proper quality of the soil is what grows the plant, if otherwise properly cared for, to perfection.

A CHEAP EXPERIMENT.

HOW AN INGENIOUS PROFESSOR MADE A ONE HUNDRED DOLLAR FEE.

Before the Fish Commissioners decided to stock the streams of the State with that much despised but powerful fish, the German carp, they were greatly concerned as to whether the species would live in certain waters, says the San Francisco *Examiner*.

They debated the questions through several meetings, grew red in the face over it, and to save heat and a possible disruption of the board, determined to submit the question to Professor Hochstadter, the eminent pisciculturist, for decision.

Numerous samples of the water were obtained and turned over to the professor, who in a very brief space submitted a report and a bill for \$100. The bill was paid and the devastating carp turned loose to disorder the rivers.

It was not until the other day, however, when Judge Henshaw and Professor Hochstadter were straining their imaginations over fishing experiences while crossing on the Piedmont, that the truth about the great scientist's experiments with that water came out. He chuckled so much over telling about his bill for \$100 that Henshaw asked:

"But how did you ascertain that carp would live in the water submitted to you?"

"Why, I bought a carp for ten cents and put it into the water. It lived."
—*Exchange*.

THE CHINESE PRIMROSE.

The *Primula chinensis* is the gem of the collection of window plants. None surpass it in beauty; and for continuous bloom, certainly none can be found more desirable. It is one of the best of all plants for the decoration of the drawing-room or dining table, and always at home in the conservatory or greenhouse. For nine months out of twelve they may be made to yield flowers, though more profusely from November to May, and with their colors of red, white, crimson, purple and pink, they form objects of curious ornaments.

They are objects of easy care, requiring attention only in watering. The soil should not be allowed to get dry, and yet the roots are so tenacious of life they will cling closely till the last moment around any particle of moisture in the earth. Keep the soil moderately moist, but not over saturated. If evaporation or drainage is slow, and the circulation through the pot impeded, the plants will turn sickly and die off. We do not advise manure water; plain warm water is the best. The best varieties for window gardens are the double white primroses and *Rubra plena*, a double red variety, indescribably charming. The single-fringed varieties are very fine, but the above are now the most popular. One great advantage which the Primrose possesses over most winter flowering plants is that it is rarely ever infested with greenfly or other troublesome pests. Primroses are propagated mainly by cuttings and seeds. Cuttings taken from the side shoots in April will make vigorous plants by autumn. From June to October they should be kept from the hot sun in a shady location, with but little water. The soil should be largely composed of leaf mould.

The single varieties are largely grown from seed, which should be sown in April or May, under a square of glass. When four or five leaves are developed, plant in small thumb pots, and shade for two or three days. During the summer keep the pots in a shady location, but in the winter the nearer they are to the glass the better and brighter will they flower.

If any unusually fine flowers reward your care, they can be increased by cuttings. The Primrose is a perennial; the seed is usually sold in mixed colors, but they can be recognized nearly as soon as the leaves appear, by the color of the stems. No plant flowers more profusely, and sometimes five hundred florets are gathered from one plant.—*Williams' Window Gardening.*

CROSSES AND CROSSING OF PLANTS.

This was the subject of a paper read at a late meeting of the Massachusetts State Board of Agriculture by Professor L. H. Bailey, of Cornell University.

Speaking of "crossing strengthening existing types," the Professor said: "The improvement of existing varieties by crossing is a more important office than the summary production of new varieties. This is the chief use which nature makes of crossing—to strengthen the type. Think, for instance, of the great rarity of hybrids or pronounced crosses in nature! No doubt all the authentic cases on record could be entered in one or two volumes, but a list of all the individual plants of the world could not be compressed into ten thousand volumes. There are a few genera, in which the species are not well defined or in which some char-

acter of inflorescence favors promiscuous crossing, in which hybrids are conspicuous; but even here the number of individual hybrids is very small in comparison to the whole number of individuals. That is, the hybrids are rare, while the parents may be common.

“Darwin was the first to show that crossing within the limits of the species or variety results in a constant revitalizing of the offspring, and that this is the particular ultimate function of the operation. Darwin’s results are, concisely, these: self-fertilization tends to weaken the offspring; crossing between different plants of the same variety gives stronger and more productive offspring than arises from self-fertilization; crossing between stocks of the same variety grown in different places, or under different conditions, gives better offspring than crossing between different plants grown in the same place or under similar conditions; and his researches have also shown that, as a rule, flowers are so constructed as to favor cross fertilization. In short, he found, as he expressed it, that ‘nature abhors perpetual self-fertilization.’ Darwin’s well-known experiments show that crosses between fresh stock of the same variety were nearly thirty per cent. more vigorous than crosses between plants grown side by side for some time, and over forty-four per cent. more vigorous than plants from self fertilized seeds. On the other hand, experiments showed that crosses between different flowers upon the same plant gave actually poorer results than offspring of self-fertilized flowers. It is evident, from all his experiments, that nature desires crosses between plants, and, if possible, between plants grown under somewhat different conditions.”

On the subject of “producing new plants” Professor Bailey says: “The second result of crossing, the summary production of new varieties, is the subject which is almost universally associated with crossing in the popular mind, and even among horticulturists themselves. It is the commonest notion that the desirable characters of given parents can be definitely combined in a pronounced cross or hybrid. There are two or three philosophical reasons which somewhat oppose this doctrine, and which we will do well to consider at the outset. In the first place, nature is opposed to hybrids, for species have been bred away from each other in the ability to cross. If, therefore, there is no advantage for nature to hybridize, we may suppose that there would be none for man; and there would be no advantage for man did he not place the plant under conditions different from nature or desire a different set of characters. We can overcome the refusal to cross in many cases by bringing the plant under cultivation where new conditions overpower its former antipathies. Yet it is doubtful if such a plant will ever acquire a complete willingness to cross. In like manner we can overcome in a measure the comparative seedlessness of hybrids, but it is very doubtful if we can ever make such hybrids completely fruitful. It would appear, therefore, that with plants in which fruits or seeds are the parts sought, no good can be expected, as a rule, from hybridization, and this seems to be affirmed by facts. It is evident that species which have been bred away from each other in a given locality will have more opposed qualities than similar species which have arisen quite independently in places remote from each

other. In the one case the species have struggled with each other until each one has attained to a degree of divergence which allows it to persist, while in the other case there has been no struggle between the species, but similar conditions have brought about similar results. These similar species which appear independently of each other in different places are called representative species. Islands remote from each other, but similarly situated with reference to climate, very often contain such species, and the same may be said of other regions much like each other. Now it follows that if representative species are less opposed than others, they are more likely to hybridize with good results; and this fact is well illustrated in the Kieffer and allied pears, which are hybrids between representative species of Europe and Japan. We will also recall that the hybrid grapes which have so far proved most valuable are those obtained by Rogers between the American *Vitis labrusca* and the European wine grapes and that the attempts of Haskell and others to hybridize associated species of native grapes have given, at best, only indifferent results."

Touching on hybridization the essayist says:—"among the various characters of hybrid offspring, the most prejudicial one is their instability; it is difficult to fix any particular form which we may secure in the first generation of hybrids; and, therefore, we find that the great majority of the best hybrids in cultivation are increased by bud propagation, as cuttings, layers, suckers, buds or grafts. In fact, there are few instances of undoubted hybrids which are propagated with practical certainty by means of seeds.

This simply means that it is difficult

to fix hybrids so that they will come true to seed, and makes apparent the fact that if we desire hybrids we must expect to propagate them by means of buds."

Professor Bailey sums up his able paper in the following words: "Encourage in every way crosses within the limits of the variety and in connection with change of stock, expecting increase in vigor and productiveness. Hybridize, if you are curious to know what nature will do about it, but do it carefully, honestly, thoroughly, and do not expect too much. Extend Darwin's famous proposition to read like this: Nature abhors both perpetual self-fertilization and hybridization."—*Florists' Exchange*.

BAMBOO.

Among the foreign plants which have been tried to be naturalized in France, one of the most useful is that "treasure of China," the bamboo *M. Amiral Aulio* has sent to the Garden of Acclimatization a particular variety of bamboo, which, it seems, will very easily acclimatize, as well as two other kinds from *M. Simon*, French Consul in China. These latter, cultivated in the South, in the environs of Nimes, have answered all the hopes formed of them, and are used in the industry of light fancy furniture, tables, chairs, stools and etageres. These bamboos, now become French, are already the object of a commerce of export to England. This grass is most hardy, and little susceptible in its nature; for it is found in regions where there are fifty degrees of heat to support, as well as in countries where the winters are rigor-

ous. It also grows very rapidly, attains a height of thirty yards, and multiplies infinitely. Bamboo is truly the Providence of China; in the Celestial Empire no village is without one or many shops of bamboos, assorted according to the thickness and length. In every farm there can be seen behind the house a bamboo plantation for the daily wants. This is a piece of ground surrounded by a large ditch filled with water, and especially destined for the culture of the plant, whose massive leaves serve as a refuge to innumerable turtle doves. Bamboo is an indispensable element for the Chinese; they make bridges of it, water pipes, houses, fences, mats, paper, tinder, umbrellas, hats, summer clothes, pillows, mattresses, ladders, furniture, brushes, string, arms, musical instruments, screens, fans, baskets, etc. Lastly, the young shoots of the plant are eaten, sometimes in the guise of asparagus or salad, and sometimes as a seasoning instead of mushrooms. Fish grated over with bamboo is a much sought after dish. It is also used in the form of a whistle to drive away the wicked spirits, which, according to Chinese belief, haunt the habitations of man. This whistle, pierced in a certain way, is furnished with paper wings and thrown into the air at the end of a piece of string, in the same manner as a kite. The air in passing in the instrument causes sounds like those of an engine whistle, which has the property of not only driving the bad spirits away, but also of frightening the birds of prey which abound in China. The proprietors of pigeons, in order to protect their birds against their rapacious enemies, attach a similar whistle to the feathers of the tail, which whistles immediately the bird takes flight.



We cheerfully answer, at once, all queries made in regard to Aquariums or Window Gardening if return postage is enclosed, and publish only such answers in this column as may be of general interest.

Mrs. H. K.—J. An aquarium should be constructed on such principles, that it will be, to a great extent, a world in miniature, being self-supporting, self-renovating, and in fact, nature on a small scale removed into our parlor. In order to obtain this perfection of management some practice is necessary, and though we may fail once or twice in the attainment of our object, let us remember that every slight mishap is to be ascribed to a fault of our own, to some point, however seemingly insignificant, yet essential, which we have failed to take into consideration. Each such failure leads us to a vast amount of useful facts, not to be obtained otherwise, and which it is our own fault if we do not take advantage of. The thing can be done by you, as it has been done by others, so never despair.

Mrs. J. K., in Memphis, Tenn.—To find the capacity in gallons of a square tank, multiply the length, width and height together, and then divide by 231.

If cisterns are cylindrical their contents may be readily determined by the following rule: Multiply the square of the radius (one half of the diameter) by 3.14159, and this product by the depth, all dimensions to be in inches.

Then divide by 231, and you have the number of gallons, since the gallon contains 231 cubic inches. Three gallons of water weigh twenty-five pounds.

Mrs. J. S.—The straight-sided, square tanks are always preferable. The dimensions should be twice as long as wide, and the depth one-fourth higher than the width. For example: An aquarium sixteen inches in length, should be eight inches in breadth and ten inches in height; one of twenty-four by twelve, should be fifteen inches high. The glass should not be set in grooves; it should be laid against the frame, like a pane of glass in a window. The cement should be between the glass and the frame. It is useless to make the parts against which the glass lays wide, and to cover the joints from outside also with cement. If the glass is perfectly imbedded in the cement, the pressure of the water will keep it so, in fact it will steady it.

Mr. S. G.—The temperature of the water of an aquarium should not go below fifty degrees Fahrenheit; the best temperature is from sixty-five to seventy degrees. The plants will grow and act on the water; the fish will have good appetite and thrive.

Miss E. in Allegheny City.—Yes. The *Sagittaria natans*, also Sag. "New Era" blooms in the aquarium. The flowers are snowy white, with a yellow centre, about the size of a dime piece, and float after the style of the pond lily flowers on the surface of the water. One flower stalk has twelve to fifteen buds; one of these opens at a time and stays in perfection until the next day, when a new one opens. A plant will thus be in bloom for about two weeks. The flowering season is not bound to a certain time of the year. We have had them in bloom nearly all the year round.

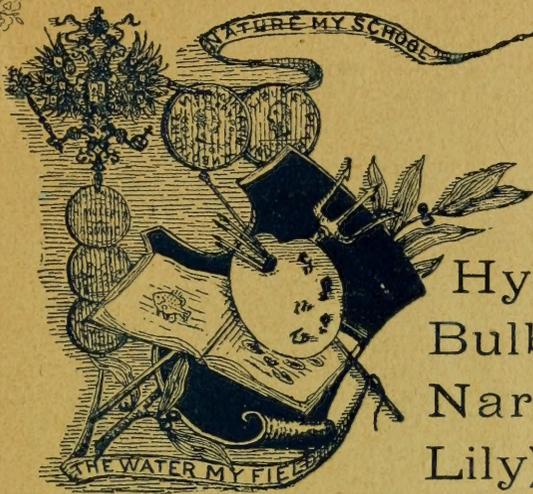
Miss ELLA.—Lizards have to be fed on live insects or their larvae. Meal worms, as fed to insectivorous birds, are excellent for them. They will also sometimes eat some wheatbread soaked in fresh milk or the yellow of raw eggs. You can easily winter them over if you keep them warm and now and then set them into the sunshine. They will eat but little during the winter.

The best way to winter over turtles is by placing them in a wooden box—a soap box will do, which is half filled with dead leaves and soil. In this they will bury themselves, and they should not be disturbed until spring.

Mrs. N., Nashville.—Tuffstein or any other rock can be cemented together with equal parts of silver sand and best Portland cement. The two parts should be well mixed before adding the water. Keep mixing only a little at a time, as it sets quickly. Let the cemented rocks become dry over night; then soak for a few hours, and then, after a good sponging, they are fit to be placed in an aquarium.

THE CHRISTMAS AQUARIUM.

The next number of "The Aquarium" will be issued the first part of December. It will contain, in addition to the usual articles on fish and plants, a detailed and illustrated instruction for the management of parlor aquariums. This we know will be desirable information to those who contemplate securing an aquarium for their homes. For those whose taste is inclined to the cultivation of Houseplants it will contain full instructions for the management of Ferneries. In sending your orders for "The Aquarium" please write your name and Post Office plainly.



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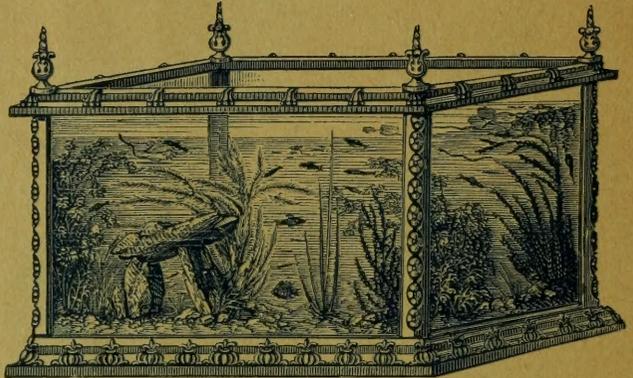
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