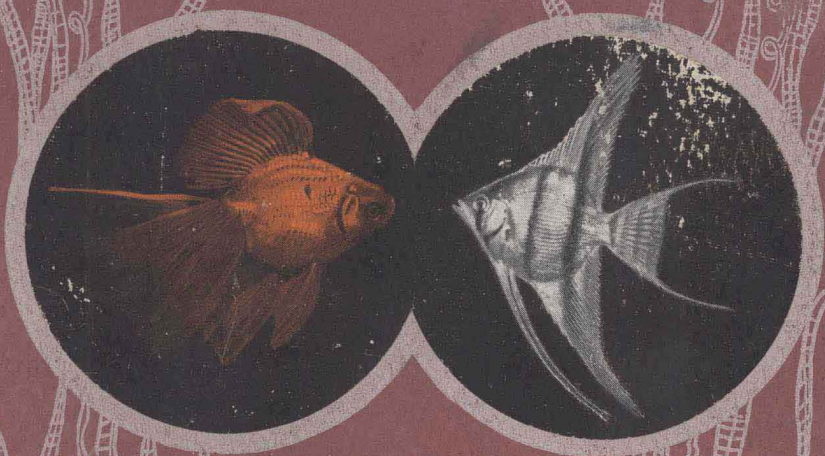


THE MODERN AQUARIUM



INNES

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by

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FOREWORD

Aquarium owners are divided into two general classes. First, there are those who regard the aquarium only as an attractive but troublesome household ornament. Second, there are others who take a lively interest in their pets and who want to understand their natural requirements and life habits. They get no end of pleasure out of this fascinating study. They usually succeed in making their aquaria not only beautiful, but have few fish losses and very little trouble.

This small book is designed to help both classes in an easy, practical way. It is a condensation of the most important points in our larger works, mentioned on the title page.

If, by showing the ease and simplicity of correct aquarium management, we may convert members of that large first-mentioned class of aquarium owners into the happier group of real aquarists, we shall indeed have done a service to man and fish.


Of recent years a great new interest in aquaria has sprung up on account of the discovery that besides the goldfish there are many other beautiful and interesting fishes available as pets. They are known under the general heading of "Tropicals," or "Exotics." The rapid spread of interest in these members of the aquarium family has been amazing. The reasons for this will be understood after reading the chapter on that subject.

As the treatment of the goldfish and of tropicals is somewhat different, we have considered them separately.

While many of our native fishes make good aquarium pets, the interest in them is too limited to warrant giving them space in a work of such modest size. In selecting material, our thought has been "the greatest good to the greatest number."

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Aquarium Principles

If a census could be taken of those homes possessing an aquarium, it is certain the total would run into surprisingly large figures. Yet it is safe to venture that the number enjoying this pleasure would be at least doubled if it were generally known how easily an aquarium is maintained in health if a few simple principles are observed.

Whether viewed as a collection of interesting pets or as a living, artistic adornment to the home, the studio, the professional office or the public place, an aquarium, whether great or small, never fails to attract attention. We love beauty and we love mystery. The aquarium supplies both.

Then it has other advantages. Fishes are among the very few pets which are neither noisy nor dirty. The superintendent of the great zoological park at Washington told the author that fishes are the only pets he will keep in his own home because they are the only ones which have no odor! If they have any, we, at least, cannot detect it through the water.

Two more points not always thought of and we are through with generalities. Provided the temperature is within reason, one may close up the house, go away for days at a time and have never a worry about the fishes. And lastly an aquarium supplies a never-ending source of study and observation for persons of all ages. Students have mastered the principles of aquarium maintenance, but nobody knows it all, and the ways of our aquatic pets leave something of mystery to be gradually unveiled by observation. This affords our boys and girls a splendid

opportunity of increasing their knowledge of natural history.

Now let us consider how to get the most out of our aquarium investment. What we want first is to keep our fishes *alive*, and the next thing is to make the aquarium *beautiful*. Both are easy.

Fishes have three main needs. That magic three consists of

RIGHT { *Feeding*
Breathing
Temperature

Let us consider them in order:

FEEDING GOLDFISH

Many a fish is killed by kindness. That means over-feeding. Fishes have good appetites, but in a state of nature they get little to eat, and have to work hard to get that little. It is therefore easy to see how wrong it is to feed them much, especially while they are leading the comparatively indolent lives of ladies and gentlemen of the aquarium. The part of kindness is to keep them hungry. Feed lightly, say once daily. That applies to goldfish temperature of about 65 degrees. If in the range of 55 degrees, every other day is enough. A good rule is to feed only as much as will be consumed in five minutes. Any surplus food should be removed by a dip-tube (described on page 22). This surplus not only tempts to overeating, but soon clouds and fouls the water.

{ *FOODS* } *What* to feed is not so important as the
quantity, but it is a subject to be con-
sidered. Goldfishes have such good appetites that they will eat almost any kind of food. We should adhere as closely as possible to what they would naturally get, and when substitutes for natural food are

used, they should contain the proper elements. Those brownish, composite, somewhat smelly foods, sold in tin boxes, are usually good. The goldfish thrives on ordinary porridge salted as for the table, especially when about 25% of ground dried shrimp is soaked into it. This is a standard item of supply and is a good food itself for most fishes. The porridge will keep several days in a refrigerator. Fishes enjoy and benefit by variety. Scraped or chopped bits of raw or cooked seafood or earthworms are relished. Fishes learn to pick at cooked spinach. It is fine for them.

Flies freshly killed by a "swatter" are excellent food for any fishes large enough to eat them.

BREATHING

Here is a most important subject, but one which will be easily understood. Like all animals, fishes must absorb oxygen to live. Water absorbs a certain amount of oxygen from the air. According to its temperature it can pick up just so much and no more. The fishes extract this oxygen from the water with their gills. *It is their breath.* Breathing uses up the supply. More must be absorbed at the surface. The great point is that *the surface must be large enough to renew the oxygen as rapidly as the fishes exhaust it.* Fishes can no more live and prosper in a state of semi-suffocation than can men. Unfortunately, most aquaria are in that condition. That is largely why this book is written. Too many fishes in too small aquaria. Usually overcrowded at least 50 per cent.

{ ‡ SUFFOCATION ‡ }	The infallible sign of suffocation is when fishes stay at the top to breathe. They know the oxygen is there. Some call it "sucking air." It is like prisoners crowding to a crack for air. They can live in this way, but not for long. Disease soon gets them.
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{ CAPACITY } Experienced goldfish fanciers and
 { RULE } breeders have worked out a practical rule which says that for every inch of body-length of fish in the aquarium there should be at least 20 square inches of air-surface to the water. This applies to common single-tail fishes. Fancy specimens of the cultivated "freak" varieties should have 25 square inches to the inch of fish.

Let us go back to schoolday calculation and see how this works out. Suppose we have an aquarium that is 10 inches wide and 18 inches long. (Never mind the depth.) That makes 180 square inches. This would allow for nine inches of fish length. It could be either nine one-inch fishes or three three-inch fishes or any other combination that is wanted, so long as the total is not over 9 inches when they are all added together. It is not necessary to get out each fish and measure it exactly, but it is well to remember that these are minimum requirements. If possible, give still more air-surface than called for. It is a good investment in aquarium health.

An aquarium with an abundance of air-surface in proportion to the fish will not require frequent changes of water. It will only need to be changed once or twice a year, or when it becomes unsightly from accumulated dirt deposit.

{ PLANTS } In conjunction with the purification of
 { } water we have at hand one of Nature's loveliest and most useful agents—aquatic plants. These friends of fishes might be said to be complementary to their lives. That is to say, they give off oxygen, which fishes need, and absorb the waste products of fish life (mostly carbon dioxide). Each helps the other. However, to give off oxygen they need good light, and to be in a growing condition. If at a considerable distance from a window, where the light is too poor to read by easily, it is scarcely worthwhile attempting to

use plants, for as they turn yellow and die they do more harm than good. Electric bulbs or tubes in reflectors just over the water can either add to, or substitute for, daylight. Room illumination has no effect.

It would be difficult to over-rate the decorative or artistic value of aquatic plants in the aquarium. Without them we can never produce the illusion of a bit of aquatic nature transplanted into the home. The fishes, too, seem to enjoy playing around them.

There are several kinds available from dealers. It might be said that most of them gathered from streams and ponds do not transplant well into the aquarium.

Be it understood that one or two plants cannot work miracles. To have appreciable effect on the water, and to produce the most pleasing appearance, an aquarium should be planted liberally. There is no danger of overdoing this as long as the fishes have free swimming space.

{ "BALANCED" } This interchange of benefits between plants and fishes produces
{ "AQUARIUM" } what is known as a "balanced aquarium." When properly set up and working, an aquarium is a complete, self-contained little world within itself, and really requires few changes of water. *Thus by having sufficient air-surface to give the needed oxygen, plus that furnished by the plants, we have the great principle which abolishes that troublesome problem of frequently changing the water, that bugaboo which discourages so many from keeping an aquarium.*

While plants are a valuable help, it should never be imagined that they can compensate for overcrowding of fishes. Plants function favorably to fish life only in good daylight, but fishes must breathe at night. Therefore see to it that there is always sufficient air-surface-per-fish so that they will be comfortable if all extra helps fail.

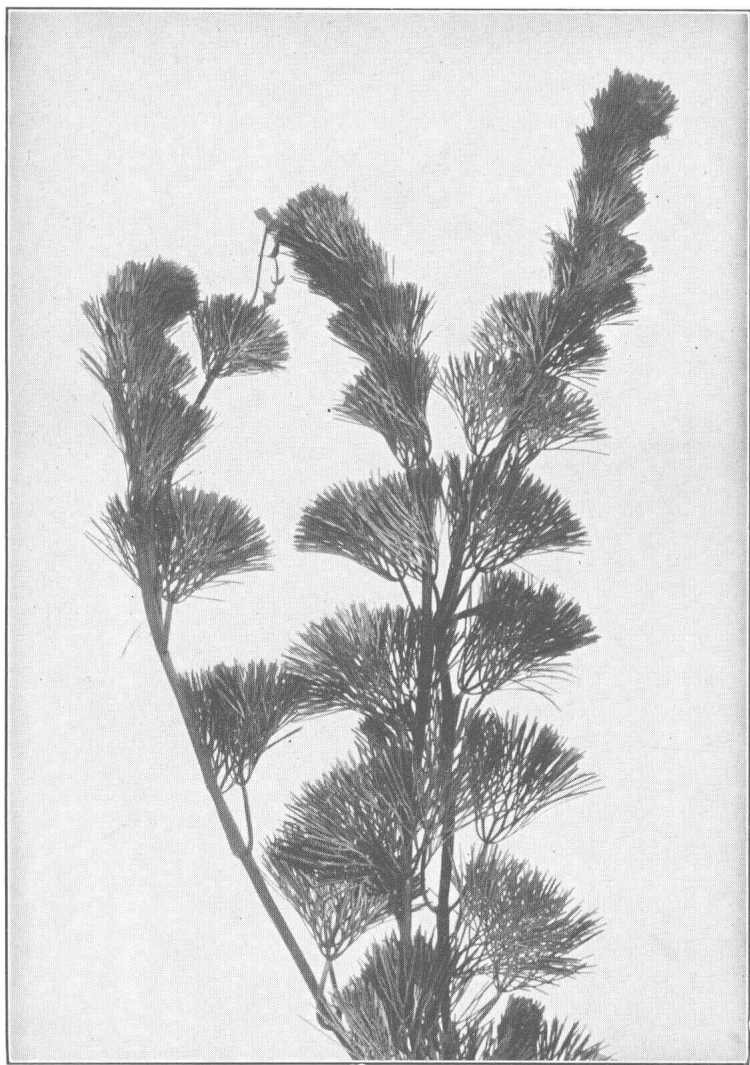
Now a few words about the plants themselves. For the benefit of those who have not heard these names, we

give a pronunciation-help by showing the accented syllable.

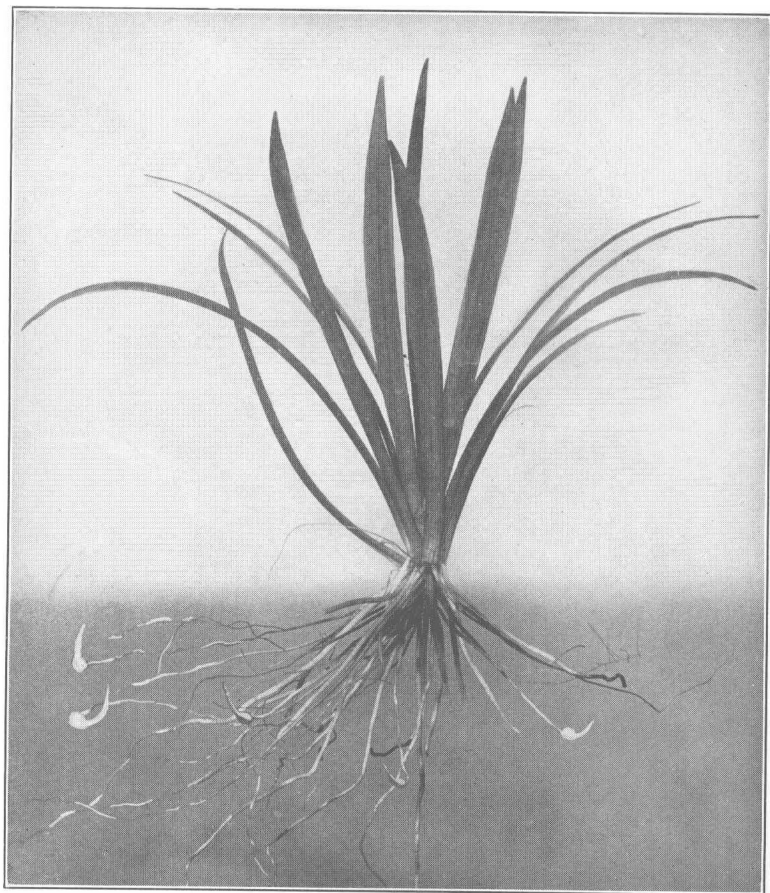
CABOM'BA. The most easily purchased aquatic plant is Cabomba, more popularly known as Washington Grass. It is the one usually sold in bunches fastened together with a bit of foil. It has prettily-cut foliage of a rich shade of green. The illustration will tell of the form. It is better to slightly separate the stalks in planting. This is true of all plants bunched when bought. Cabomba likes a good light and will do fairly well if with fishes not big enough to pull it to pieces. It is so pretty that one cannot blame them for chewing at it.

SAGITTA'RIA. This is one of the author's favorite general aquarium plants. It is of grassy form and comes in three principal varieties for aquarium use. *Natans*, similar to the illustration, is from 5 to 8 inches in height. *Subulata* is slightly taller, with narrower leaves, while Giant, or *Sinensis*, is from 10 to 12 inches, and with much broader, somewhat blunt leaves. Sagittaria is essentially a rooted plant, and the roots have the effect of purifying the soil. The leaves are rather tough and withstand considerable buffeting about by fish nets and fishes. It is a good oxygenator. Unfortunately, it is not always to be had. Aquarium-grown plants are more satisfactory than those taken from the wild. Propagation is mainly from runners. The illustration shows two corms or bulbs on the roots. This is another method of reproduction.

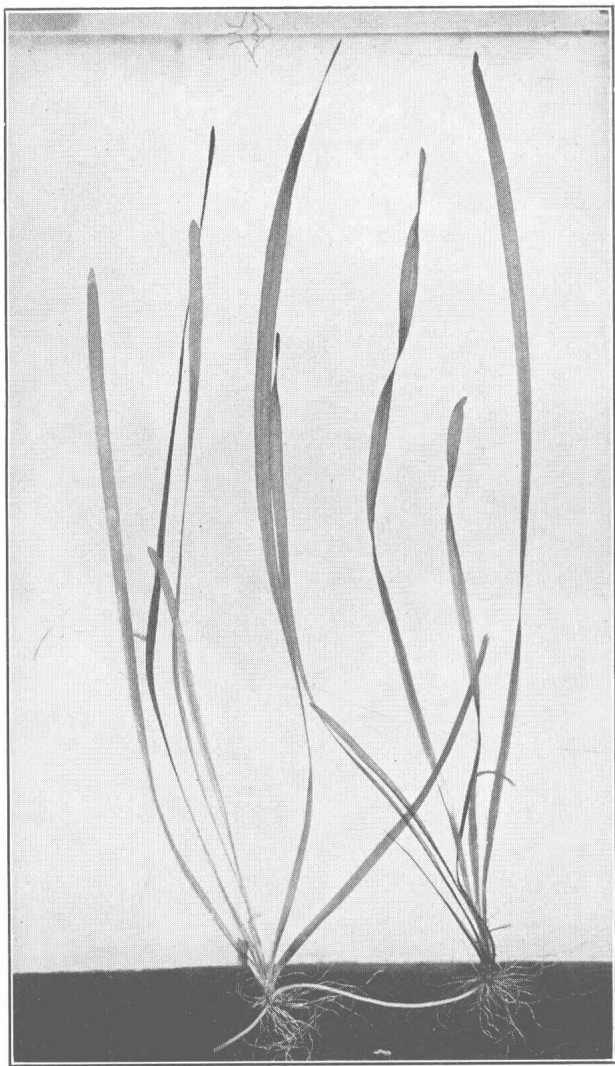
VALLISNE'RIA. For sufficiently deep aquaria this plant is very satisfactory and most beautiful. The narrow leaves, anywhere from 8 to 20 inches long, rise in gently wavy upright lines, and owing to rapid multiplication soon make a charming aquatic thicket of a silky green color. This also forms a good refuge for young tropical



CABOMBA



SAGITTARIA



VALLISNERIA

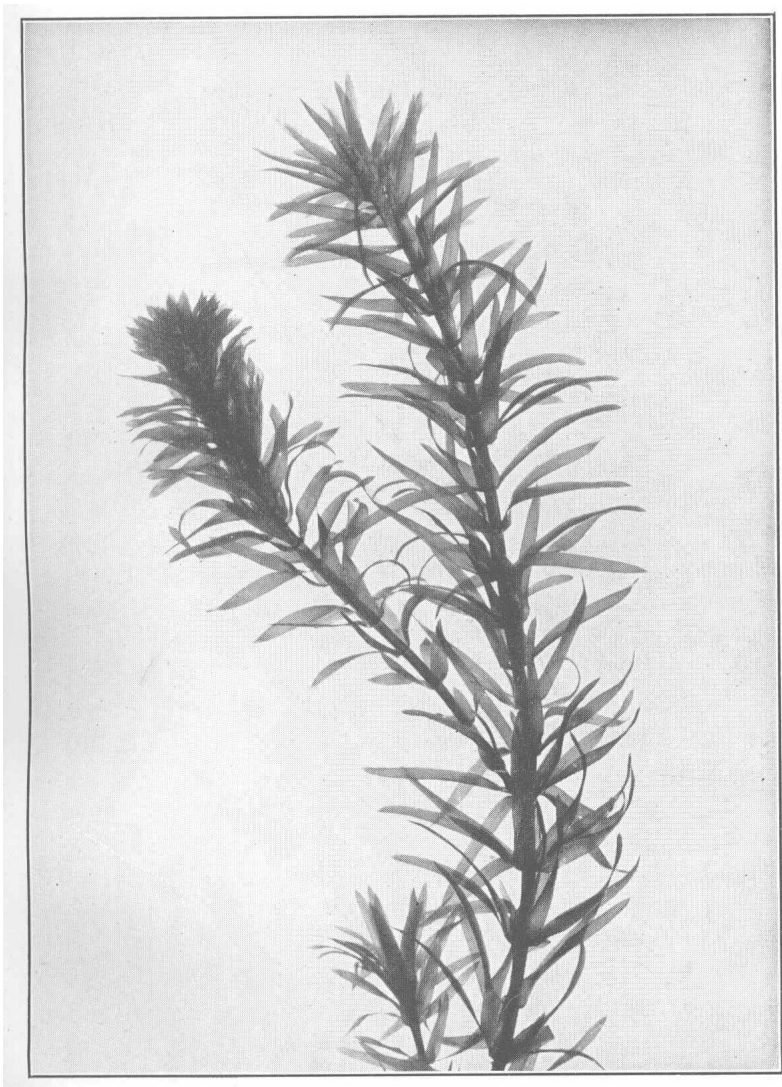
fishes. The roots purify the soil in the same way as *Sagittaria*, although not going in so deeply. The illustration of *Vallisneria* shows the character of runners employed by both these excellent plants in reproduction. The twisted "Corkscrew" variety is shorter, and is splendid for small tropical tanks. Plant the crowns just at the top of sand level.

With *Vallisneria* and particularly with *Sagittaria*, one should not be discouraged too soon if the appearance of new leaves is not rapid. These plants take a time to become settled, and in the process some of the older leaves turn yellow. Under favorable conditions, new leaves should appear within about three weeks. It is better when planting to remove any leaves which show signs of decay. Always secure cultivated stock, if possible.

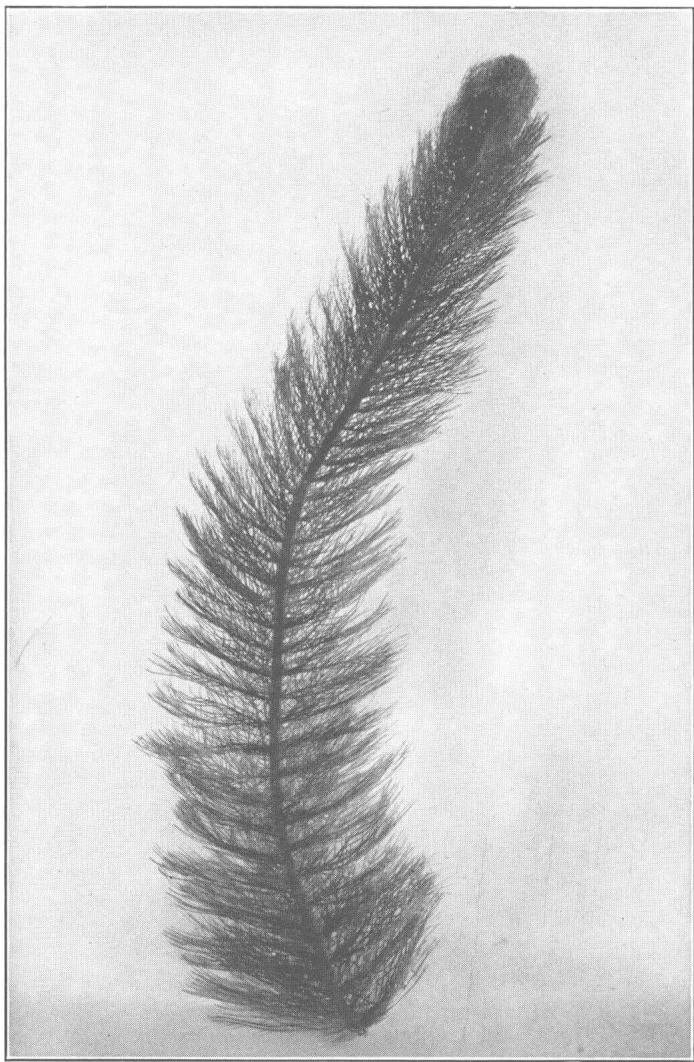
ANACH'ARIS. This is the fastest-growing of the aquarium plants. It luxuriates in moderate warmth and plenty of light. For that reason it has a tendency to become spindly over the winter months.

Many aquaria are unfortunately too small to properly stock with rooted growing plants. For such as these there is nothing superior to a few bits of *Anacharis* thrown loosely on the surface of the water. Roots seem to be of little value to this plant. As the old stems become yellow, they should be pinched off. There is always ample new growth. Without plenty of light it gradually becomes thin and should be renewed. It is inexpensive.

MYRIOPHYLLUM. The comments on *Cabomba* largely apply also to *Myriophyllum*, but the leaves are much more finely divided. That characteristic gives it a special use. This consists in catching and holding the adhesive eggs of the goldfish and other fishes. It is not so freely obtained as *Cabomba*, and is purchased largely in the spring, when goldfish breeding is at its height.



ANACHARIS



MYRIOPHYLLUM