SeaScope is being introduced as a newsletter for marine aquarists. Each issue will have several short informative articles dealing with the science and art of marine aquariums. Topics may include such diverse areas as water chemistry, nutrition, mariculture, system design, and fish health, to name a few. The goal of the publication is to aid the aquarist by presenting significant advances in marine aquarium methodology. Some articles will report on research at Aquarium Systems and Instant Ocean Hatcheries, or other institutions; others will review and summarize work presented in recent books or journals. Reports on new products will also be included.

Beginning in 1984, SeaScope will be published quarterly for free distribution through local aquarium dealers. Those interested in receiving copies directly, should send name and address, along with $1.00 for postage and handling, (four issues), to: SeaScope, Aquarium Systems, Inc., 8141 Tyler Boulevard, Mentor, OH 44060.

Keeping Marine Plants, In Review

Marine plants (Macro algae) can enhance the appearance of any aquarium.

For years, plants have been considered an essential part of fresh water aquaria, but this has not been true for marine hobbyists. However, two recent articles by John Tullock (1982, 1983) demonstrate growing interest in keeping marine "plants", actually macro

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Gradually, optimal levels and sources of nutrients, such as proteins, lipids (fats), vitamins, minerals, and pigments, were determined. In the case of proteins, for example, it was found that marine sources were not essential, and due to better handling and storage techniques, other items were preferable. This was not found to be the case for marine oils, which contain essential fatty acids not available elsewhere. These oils are deposited in the yolk of fish eggs; thus, they are critical in conditioning fish for spawning.

Other nutrient categories were studied similarly. This research has led to the production of Instant Ocean® SeaFood®, a combination of meats and natural marine algae supplemented with marine fish oils, meals, vitamins, minerals, and pigments, suspended in a gelatin base and stored frozen to preserve its quality. Unlike flake foods and dry meals, water soluble nutrients are not rapidly leached out of the food because they are bound in the gelatin matrix, and unlike single item frozen products, such as brine shrimp or krill, SeaFood® is a complete, balanced diet developed specifically for omnivorous feeders.

As part of the continuing research on a wide variety of marine tropicals, it was found that SeaFood® is eagerly accepted by all types of tropical fishes and many invertebrates.

Several methods have been developed for feeding. Pieces can be broken off, while frozen, then crumbled into bite-sized portions for medium to large fishes. For smaller fishes, a grater or knife can be used to shred particles into the water. A method, used for juveniles at Instant Ocean Hatcheries, is to cut the food into cubes (one-half inch) and hang them in the tanks for the fishes to nibble on at their leisure. These cubes generally hold together for ten hours or more, so uneaten food can be easily removed. For scavengers, pieces are dropped to the bottom daily. Any uneaten portions can be removed with a net or siphon to prevent pollution of the water.

A second food, SeaSalad® is a blend of several marine algae from three groups, green, brown, and red. It too is bound in a gelatin base and is supplemented with vitamins and minerals. Tank rearing of the principal ingredients assures a consistent, high quality, contamination-free product. SeaSalad® is usually fed in cubes to be picked at by the selective feeders.

Research at Instant Ocean Hatcheries is a continuing process as we strive to improve our fish production techniques. Thus, these food products are constantly being tested and refined. As advances are made, they are incorporated into the food with the benefits passed on directly to the consumer.

Some deficiency in intensity can be overcome by extending the light period up to 16 hours. However, most plants do require a dark phase, preferably 6 or more hours.

Tullock's second article (Tullock, 1983) reviewed necessary water conditions and handling of specimens. He listed essential trace elements he felt should be routinely added: Thiamine, Biotin, Vitamin B-12, Phosphate, Iron, and Manganese. These are not stable in marine aquariums and must be supplemented.

Low pH is another problem that can be devastating to algae, especially the calcareous types. Levels of 8.2 to 8.4 are recommended. Additions of baking soda can be used to raise pH safely, if necessary (Bower, 1983).

Use of copper medications can be disastrous because marine macroalgae are very sensitive, and the residual copper on the gravel may inhibit growth long after the treatment is finished. However, copper is included in algae nutrients at a very low level as it also is an essential element.

Several commonly kept algae are shown by Mr. Tullock. The easiest to keep are members of the genus Caulerpa, such as Caulerpa prolifera and C. mexicana. They grow rapidly, and are relatively easy to care for.

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algae. Following is a summarization of these articles plus additional information from other sources, including studies at Instant Ocean Hatcheries.

Lighting is a major limiting factor in many home aquaria. Tullock's first article (1982) reviews causes of inadequate light: low output bulbs, too few bulbs, distance from plants, and photo period. Stephen Spotte in his book, SeaWater Aquariums, gives a more extensive discussion.

From their writing, it can be concluded that the major problem is use of low output bulbs in conjunction with standard aquarium hoods, which often have only one tube. The so-called plant-grow bulbs, such as Gro-Lux®, (930 lumens/40W) only produce 29% of the output of standard cool white or warm white bulbs (3,200 lumens/40W) which, when used in combination, have an acceptable spectral quality.

Light intensity of approximately 8,000 lux (a unit of light measurement) is considered necessary for good growth of "green" macroalgae. To achieve this level in an aquarium less than two feet deep, warm or cool white bulbs should be spaced approximately four inches apart and extend the length of the aquarium.
Other popular types, such as the Merman's Shaving Brush (Penicillus sp.) and Baby's Bows (Holimeda sp.), are more difficult. Often this is due to damage during collection when part or all of the hold-fast system is lost leaving a situation similar to a plant without any roots.

This situation is being improved by the availability of tank-raised macro algae. Currently, Instant Ocean Hatcheries is marketing two types of Caulerpa and several strains of Gracilaria, a bushy plant (3-5 inch clumps) composed of fleshy branched filaments.

Research in algae culture at Instant Ocean Hatcheries has resulted in the production of SeaGarden® Algae Nutrients. Regular supplementary additions of SeaGarden® will provide both micro-end macro algae with essential micronutrients that are not otherwise readily available in marine aquariums.

Additionally, many invertebrates have been found to benefit from the use of SeaGarden®. Anemones, for example, which have beneficial algae living beneath their skin, benefit directly by absorbing nutrients. Other organisms, such as Feather Duster Worms or Flame Scallops, benefit indirectly by consuming algae.

Marine aquariums are best known for their color and varieties of animal inhabitants. Plants can now be added to the list while providing both habitat and added nutrition for your fish.

References
Tullock, John H. "Light in the Marine Aquarium". Freshwater and Marine Aquarium, 5(4). April, 1982

**Salinity**

(Reprinted from The SeaWater Manual ©1981 Aquarium Systems, Inc.)

Of all the measurements that can be made with seawater, none is more basic than salinity, which, quite simply, is a quantity that indicates the amount of salt dissolved in the water. Concentrations are commonly expressed as parts per thousand (ppt or 0/00). Normal seawater salinity is 34 parts per thousand. Normal seawater salinity contains 34 grams of dissolved salts.

Marine aquariums are usually maintained at salinities slightly lower than natural sea water, commonly 27 to 31 parts per thousand. This lower salinity benefits fish by requiring less energy to maintain osmotic balance.

Aquarists ordinarily determine salinity indirectly by measuring specific gravity, which is a comparison of the density of a solution at a specified temperature (usually 15°C) to the density of pure water at a specified temperature (usually 4°C). A specific gravity of 1.100 means that at 15°C, the solution being measured is 1.100 times more dense than pure water at 4°C.

Changes in the amount of salt dissolved in the water affect the specific gravity in a predictable manner. Therefore, each salinity has a corresponding specific gravity. If specific gravity is known, salinity can be found by use of the conversion tables.

Specific gravity is conveniently measured with a hydrometer. Higher specific gravity causes the indicator to float higher in the solution. Lower specific gravity causes it to float lower.

For ease of use, a hydrometer should be calibrated at a temperature near that of the water being tested. Most high quality aquarium hydrometers are calibrated for use at 75°F. Hydrometers calibrated at significantly different temperatures, such as 60°, require corrections to obtain the actual specific gravity.

For most marine aquariums at 75°F a reasonable estimate of salinity can be obtained by taking the last two digits of the specific gravity reading and multiplying by 1.35. (Example: Specific Gravity — 1.020. Multiply 20 x 1.35 = 27 ppt for estimated salinity).

In actual practice, most hobbyists dispense with the use of salinity and simply refer to the specific gravity. The range 1.020 to 1.023 is most common.
Catch A Winner!

Maintain animals that are colorful, healthy and disease resistant through good nutrition.Supplying an adequate diet to fishes maintained in captivity has always been a problem. Instant Ocean® SeaFood® is the solution to that problem.

Unlike more common flaked or dried foods, which seldom retain the nutritional value of their ingredients, Instant Ocean SeaFood, prepared from fresh, natural food organisms, is quickly frozen to preserve important natural nutrients. Additionally, supplements, vitamins, and minerals are added to meet the special requirements of marine animals that are maintained in captivity.

Instant Ocean SeaFood is a complete, mixed diet in a single package. A gelatin base insures that the food remains intact until it is eaten, so there is never any danger of fouling the water as is common with many other frozen food products.

Fishes and invertebrates will thrive on Instant Ocean SeaFood. Developed by Instant Ocean Hatcheries, the world’s leading producer of tank-raised marine fishes, it has been tested for more than eight years, and specially formulated to promote spawning, growth, and color. Used daily in the production of thousands of vigorous animals, continuing research assures the aquarist of receiving the most advanced food on the market.

A companion product, Instant Ocean SeaSalad®, is a mixture of freshly harvested marine algae also blended into a gelatin base. A natural food, not a substitute like lettuce or spinach, it is particularly valuable for maintaining herbivorous species, such as Angel and Surgeonfishes.

Available frozen in four-ounce packages, ask for Instant Ocean SeaFood and SeaSalad wherever Instant Ocean products are sold. Call for more information, or the names of your nearest dealers.

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