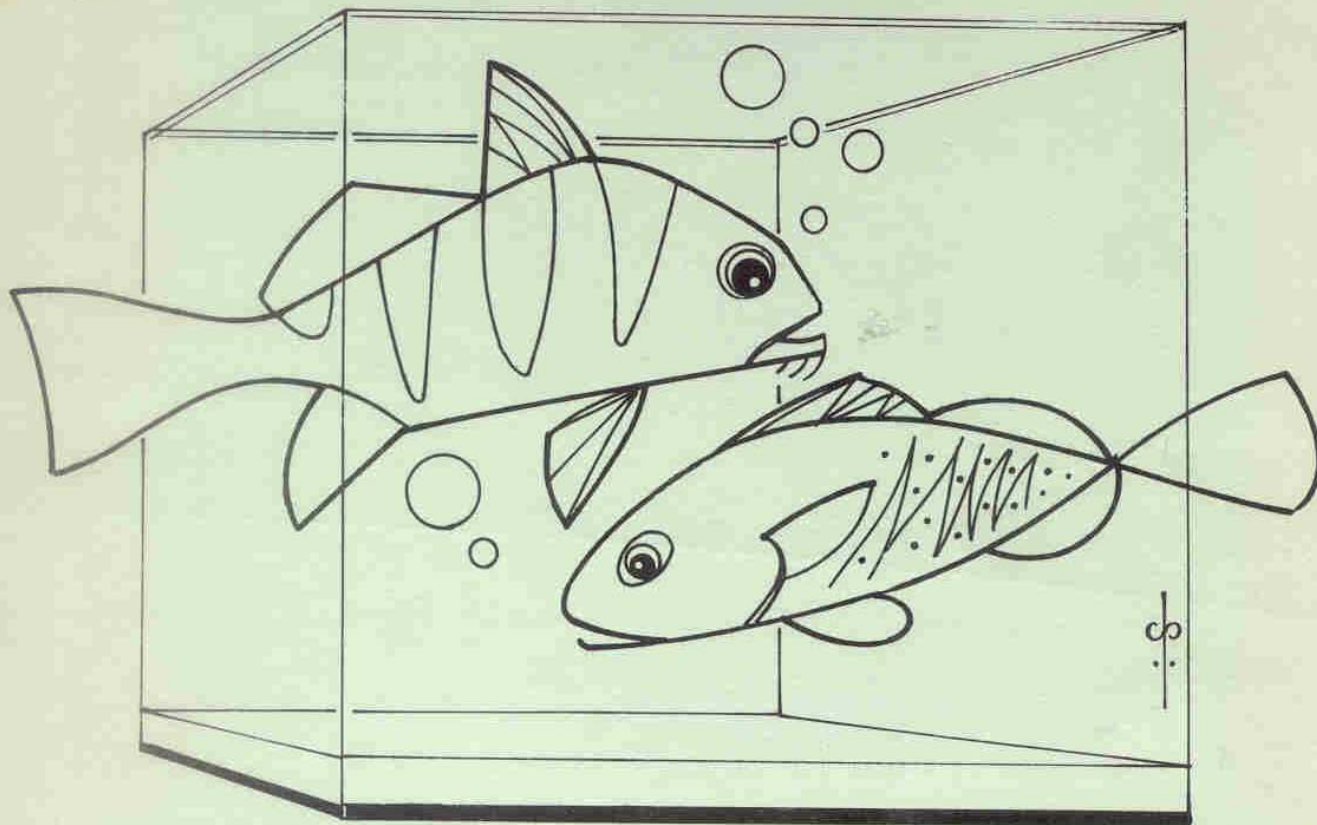


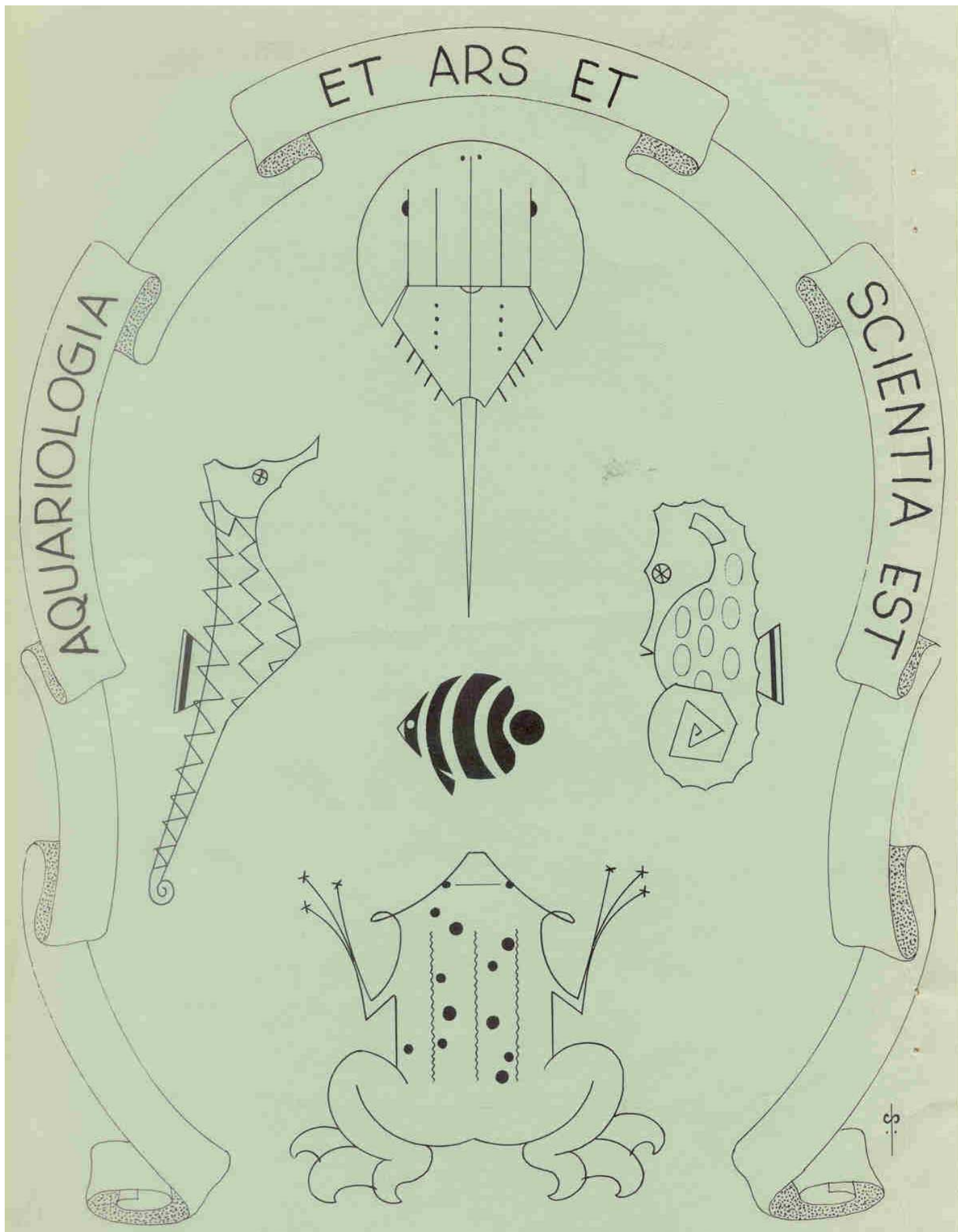
DRUM and GROAKER



Volume LXVIII, Number 2

MAY 1968

THE INFORMAL ORGAN
OF THE
AQUARIUM RESEARCH SCIENCE ENDEAVOR



DRUM AND CROAKER

The Informal Organ
of the
Aquarium Research Science Endeavor

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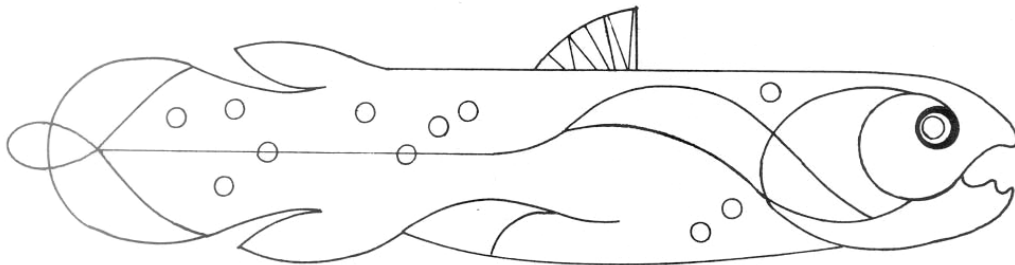
Craig Phillips Assistant Curator
National Fisheries Center and Aquarium
Washington, D.C. 20240

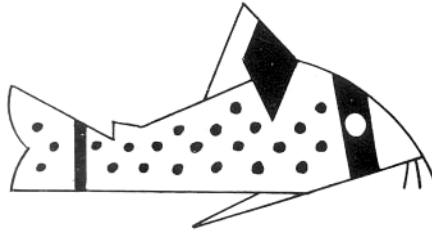
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To: Readers of the DRUM & CROAKER

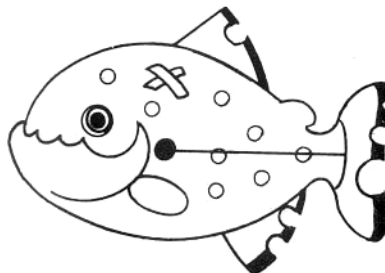
From: National Fisheries Center and Aquarium Staff

The National Fisheries Center and Aquarium has, for one year, attempted to produce the DRUM & CROAKER. As you know, Craig Phillips, has handled the majority of the work and we think he deserves a vote of thanks.

We originally planned to produce four issues; this second issue contains just about everything we have. So, should we attempt another issue, the following must apply:

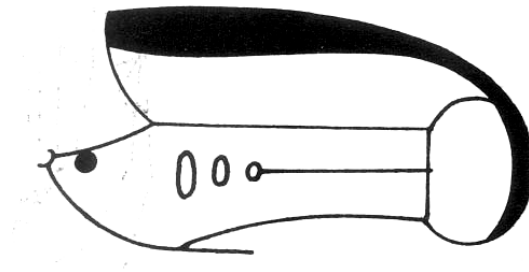
Send us your materials, including progress reports on projects underway, interesting occurrences or discoveries in your tanks, or anything else you judge to be of value. Should we receive nothing, we are stymied!

Those of you who would like single copies of Craig's art work on the inside cover and on the back cover, may secure these upon request. However, those requests accompanied by material for the next D&C cannot help but receive prompt attention--we can't assure the rest of you. So send in your box tops!



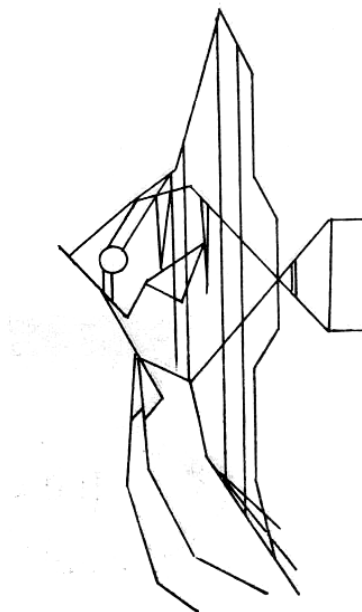
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AQUARIUM SYMPOSIUM

The American Society of Ichthyologists and Herpetologists meets at the Horace H. Rackham Building, University of Michigan, Ann Arbor, June 16-20, 1968.

The Aquarium Section of I & H is scheduled for all day, Monday, June 17. Bill Braker has invited aquarists to a "big blast" at the Shedd Aquarium after 5:00 p.m. on June 15.

Tentative Agenda

June 17, 1968

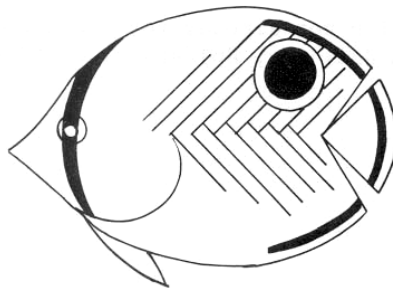
Morning

GENERAL PAPERS

Vince Penfold	Transportation and care of belugas
Murray Newman	Killer whale at Vancouver
Dan Moreno and/or Richard Segedi	Some observations on the spawning behavior of the Australian lungfish
Warren Zeiller	(No title available)

EDUCATIONAL SYMPOSIUM

John Prescott	Educational display in the aquarium
Dun Wilkie	Educational program and policies at Wayland Vaughn Aquarium
Warren Wisby	National Fisheries Center (film)
Murray Newman	The Vancouver Public Aquarium educational program



Afternoon

INVERTEBRATE SYMPOSIUM

Don Wilkie	Effect of copper on the California lobster
Vince Penfold	Capture and care of the British Columbia invertebrates
Steven Spotte	The Pacific octopus in closed circulating, artificial sea water systems

WATER QUALITY SYMPOSIUM

John Eaton	Chronic effects of heavy metals on fishes
Henry Armbrust	Diatomite and sand and gravel filters
Dan Gerber	Continual chemical monitoring
Vern Goldizen	Approach to designing and maintaining synthetic sea water systems
John Leonard	The effect of fish loading rates on the accumulation of ammonia, nitrites, and nitrates in recirculating fresh water systems
Herb Kumpf	Utilization of the Lorenz method for removing proteinaceous materials from fresh water systems
Earl Herald	Long-term results of ultraviolet sterilization of semi-closed circulating systems

For dormitory housing information not already received, contact Dr. Donald Tinkle, 2019 Museum Building, University of Michigan, Ann Arbor, Michigan 48104.

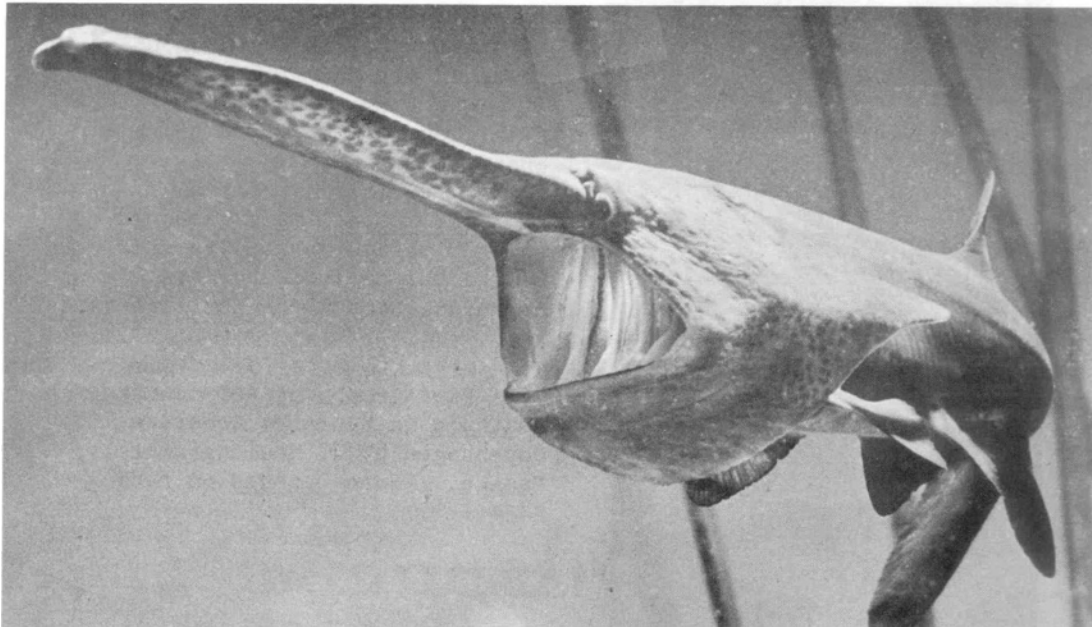
PADDLEFISH IN DENMARKS AQUARIUM

From a Note by Jan Boëtius

Editor's Note: These paddlefish were collected from a Missouri river impoundment by the reservoir research group and shipped by the National Fish hatchery, both at Yankton, South Dakota, and both of the U.S. Bureau of Sport Fisheries and Wildlife. The fish were transported by air over the North Pole directly to Copenhagen. An earlier identical shipment was a loss when left for 48 hours on a London airport platform.

The three specimens of paddlefish arrived on August 2, 1967, in perfect condition and since that day their special aquarium in our exhibition has been one of the most popular. Actually, this is the first time we have been able to demonstrate an exclusively plankton-feeding fish in action.

The fish are in permanent activity -- day as well as night. They never tend to school and they feed almost continuously. Their favorite food is small crustacea which are concentrated in clusters in their four cubic meters (1,056 gal.) tank by means of light effects. The paddlefish prefer Cyclops, small Daphnia and midge-larvae (Corethra). The last-mentioned organisms, however, are clever enough to escape.



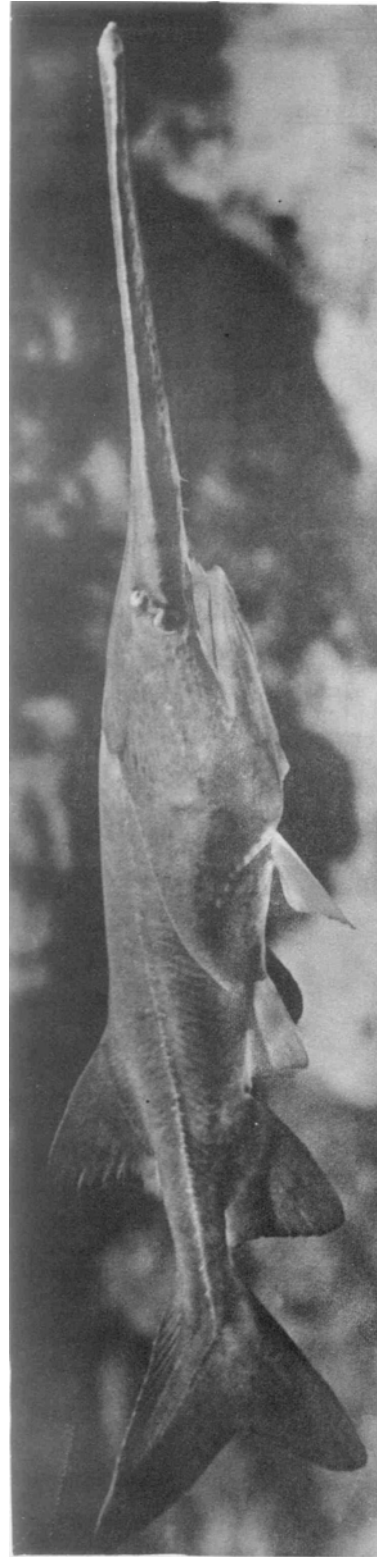
A few days after arrival in Denmark's Aquarium, the fish started feeding. That they have been thriving is indicated by their growth. Their size range increased from 10-15 cm. (4-6 in.) to 27-33 cm. (10-13 in.) during the first eight months. Roughly estimated, this will correspond to about a 15-fold increase in body weight. The temperature is kept within 15-19°C. (59-66°F.).

We have made no special observations which might explain the peculiar paddle-shaped snout. It is known to be very sensitive, but for some reason our fish were "trapped" by a vertical plastic wall placed in the background of their tank. Their snouts seemed to stick to this material when once in contact. A few bamboo sticks were placed in front of the wall at intervals of about 5 cm. This arrangement guided the fish away from the plastic.

When we watch our paddlefish in action, we feel inclined to interpret the prolonged snout as an organ fit for stabilizing the straight forward movement of the fish when swimming with mouth open.

(Ed. Note: Most authorities say the paddle is used to stir up the bottom mud, thus dislodging organisms upon which the fish feeds.)

Photographs of Polyodon spathula in Denmark's Aquarium, Copenhagen by J. Meulengracht-Madsen. (Note Daphnia on facing page.)



EXCERPTS FROM
RECENT RESEARCH FINDINGS ON THE
BIOLOGICAL EFFECTS OF LIGHT:
THEIR APPLICATION IN THE DENTAL OFFICE*

By

James W. Benfield
Assistant Clinical Professor, School of
Dental and Oral Surgery, Columbia University

Research has shown the importance of the full spectrum of natural light not only to plants, but animals and man as well. He stressed the near ultraviolet normally present in sunlight and compared the trace amounts known to penetrate the atmosphere to the trace elements in biochemistry which at one time were ignored as unimportant, but are now recognized to be of great significance. Light energy entering the eyes of animals directly stimulates the pituitary gland and other areas in the mid-brain and hypothalamic regions. Since the pituitary and pineal glands are known to exert great influence over the endocrine system, which includes the thyroid, adrenal, pancreatic and sex glands, it can readily be understood that light has a potential for widespread manifestations.

Among these manifestations, sex ratios were affected in mice and tropical fish born of parents kept under various types of artificial light; there was also a significant difference in the life span and in the time in which spontaneous tumors developed in O_3H strains of mice; complete necrosis of the tails of these mice occurred when these animals were exposed for 12 hours a day to pink fluorescent light, but this process could be reversed if the animals were returned to natural daylight before the damage had become severe. (Contd.)

*Presented at the thirty-eighth annual meeting of the American Academy of Restorative Dentistry, Feb. 4, 1968 in Chicago, Illinois.



Biological Effects of Light (Contd.)

In my 1967 report, I stated that the Miami Seaquarium had successfully treated exophthalmus in fish by adding ultraviolet in the 370 nanometer range to their tank lights for short periods of time twice a day. The curator and his staff at the Seaquarium have since advised me (personal communication) that they have been able to keep certain species of fish in captivity that previously had died after a short time. They had attributed these fatalities to the probability that they did not know, what to feed then. Now, they believe that lack of ultraviolet was responsible. They also report that tissue damaged from handling, equipment and by other creatures heals with unusual rapidity.

Controlled animal studies on rats were begun at the Environmental Health and Light Research Institute in Sarasota, Florida, as soon as the new full spectrum fluorescent light source became available some nine or ten months ago. One group is under standard cool white fluorescent and the other under the Vita-Lite at a level of 750-foot candles for 12 hours a day. Both groups are under the same number of tubes of similar wattage and at the same distance from the cages. All conditions other than the light sources are identical. As of this writing, the animals under cool white fluorescent have had fewer litters and fewer in the litters. They lose equilibrium quite easily and hold their heads high and at an angle to the spinal axis. A population explosion is occurring under the new fluorescent light. No abnormalities have been observed and the birth rate is comparable to that of similar animals raised under daylight.

Now that it is evident that light must be taken into consideration as an environmental factor in the raising of experimental animals, those engaged in such research will note with interest that Hoeltge, Inc., of Cincinnati, Ohio, one of the largest manufacturers of laboratory animal cages, has designed a new series of cage racks equipped with special lighting so that all animals in each cage will receive a uniform intensity of standardized light, including a proportionate amount of ultraviolet. One internationally known scientist associated with Rockefeller University in New York made the comment to me recently that it is incredible that the scientific community should have overlooked light as an environmental factor



AQUARIUM THERAPY By Douglas Welch

It turns out now that the home aquarium is an “educational and tranquilizing tool.” Experiments with neurotic persons have established that an aquarium is astonishingly restful if a patient will stare at it not less than three hours a day.

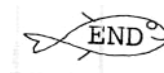
A woman from New Jersey is one of many attesting its curative powers. “I had a husband like he was pretty crazy before we got this here aquarium into our house,” she writes to an Eastern psychiatric research project. “Now I got no complaints except that after watching the aquarium instead of television, he opens and closes his mouth on every breath and sometimes he makes bubbles. And once in awhile at night he has this terrible dream where a sun fish is going to get him. But he don't sit around on top of the house to more.”

Hospitals have found, we are told, that a large aquarium installed in the father's waiting room outside a maternity ward will reduce anxiety in expectant fathers. “I don't seem to have you on my list,” says the nurse to the father who is staring fixedly at the goldfish bowl. “When did your wife cam, in?” And he says, “On, she came in two weeks ago, and took our new twins back home last Friday. I'm just here for a little peace and quiet...”

The best aquarium, of course, is one which features an octopus. Unhappily, unless you live on a coast, it is costly and a good deal of trouble to have salt water shipped to you regularly. But if you can afford it and have the patience, there is no household pet as rewarding and relaxing as a small octopus with a spread, say, of not more than five feet.

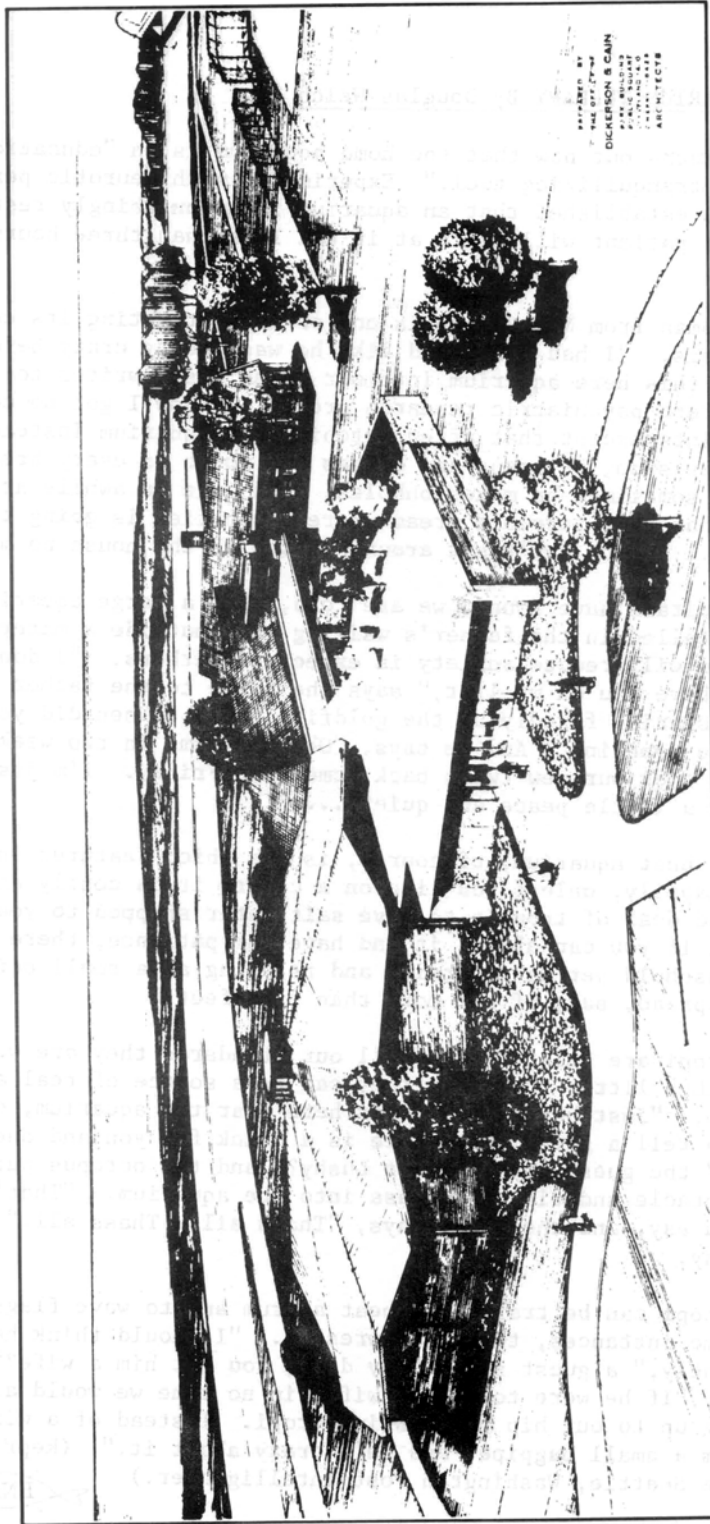
Octopi are quiet, and by all our standards they are well-behaved. With a little training, they cam be a source of real amusement too. “Just have a seat over here near the aquarium old boy,” you tell a guest, “and here is a drink for you and one for Lushy.” And the guest says, “Who's Lusby?” and the octopus puts out a tentacle and tips his glass into the aquarium. “That's Lushy,” you say, and the guest says, “Thass all. Thass all.” Short stay.

Octopi can be trained to beat a drum and to wave flags and, in some instances, to Indian-wrestle. “I should think he would be lonely,” a guest says, “why don't you get him a wife?” And you say, “If he were to have a wife, in no time we would all be standing up to our hip pockets in octopi. Instead of a wife, we gave him a small bagpipe, and he's crazy about it.” (Reprinted from the Seattle, Washington Post Intelligencer.)



The new aquarium at Cleveland features a 60-foot wide aquatic mural at the entrance, and an attractive moss green roof over the eight-sided main building. The old aquarium is in the background, placed in operation in 1954. The site is in Gordon Park overlooking Lake Erie.

Drawing by John "Wally" Skinner, Staff Artist.



THE CLEVELAND AQUARIUM

By

Daniel H. Moreno, Director

On April 29, 1968, The Cleveland Aquarium celebrated its first year of operation as an expanded facility.

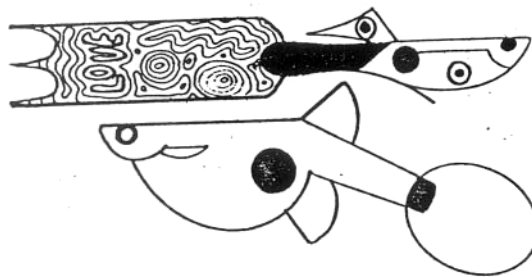
The new addition was made possible by a gift from the Leonard C. Hanna, Jr., Final Fund of \$300,000. Total cost for the new building, complete, came to \$404,000.

The Aquarium thereby tripled its size from 5,500 to 16,500 sq. ft., increased tank capacity from 8,000 to 82,000 gallons, began exhibiting vastly larger numbers, kinds, and sizes of fishes, invertebrates, plants, and other kinds of aquatic vertebrates.

With the opening of the new addition, a charge was instituted, as follows -- adults 50¢, children 6 to 18, 25¢, and children under 6 free. Tuesday free to all.

Visiting hours are 10:00 a.m. to 5:00 p.m., Sunday 12:00 noon to 6:00 p.m..

There were 235,000 visitors during the first year of operation of the expanded Aquarium. These were comfortably accommodated, thanks to air-conditioning throughout, spacious corridors, and one-way (clockwise) traffic flow through the entire building.



MORE ON PLYWOOD FROM THE VETERAN AQUARIST

I would like to add my two bits to Edward J. Peterson's interesting note on the use of plywood panels in aquarium construction.

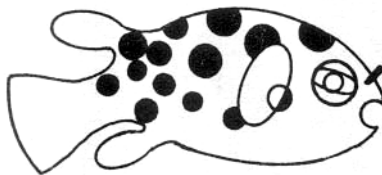
In 1956 when we were struggling to open the new New York Aquarium and space ran out with too few exhibition tanks, we found a stretch of wall about fifty feet long in front of which we could put some tanks if they were not more than two feet from front to back. Money was also a little tight so we decided to try some plywood tanks and could fit in eleven four-foot ones.

We used 3/8" fir marine plywood, since the bonding material is virtually impervious to water. A welded angle iron frame was support. The front glass was approximately 2'x2'. These, with a few spares we made at the same time, are still in use. They seemed to be successful so we tried something bigger, 8'x4'x4', using 1" marine plywood in 3"x3"x1/4" angle irons. These, too, were successful and are also in use after more than ten years.

Becoming still more ambitious, we thought we would try a 16'x8'x4' tank, with glass on one long side. The bottom was of four 4'x8'x1" panels, butt-welded on a flat iron strap. The corners 4"x4"x3/8" angle. This tank too, with two viewing windows approximately 8'x3'6", is still in good condition and use. (Eight years.)

The sealant in all these tanks was a Thiokol preparation modified locally for ease of application.

All the tanks are presently painted with a black epoxy resin which has been eaten off in some places by invertebrates of one sort or another, with no ill effects. However, we had originally painted some of the tanks with blues and greens, but found that both fresh and salt water fishes were dying in them, fairly rapidly. When the same tanks were painted over with the black epoxy, deaths stopped and breeding, in many cases, started.



More no plywood from the Veteran Aquarist (Contd.)

Aside from the ease of assembling plywood tanks, their relative lightness and inexpensiveness, we find that they lend themselves very well to changes of water in- and outflow, for holes may be bored or plugged with few tools and little effort for the accommodation of pipework.

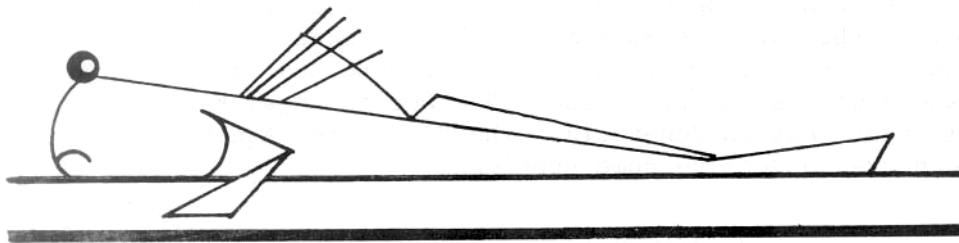
Modern plastics have much to recommend them, but dollar for dollar, we have found they are not competitive with plywood aquariums.

With all good wishes, and I hope your plea for papers finds a good response. (Ed.: We didn't do very well.)

Yours very sincerely,

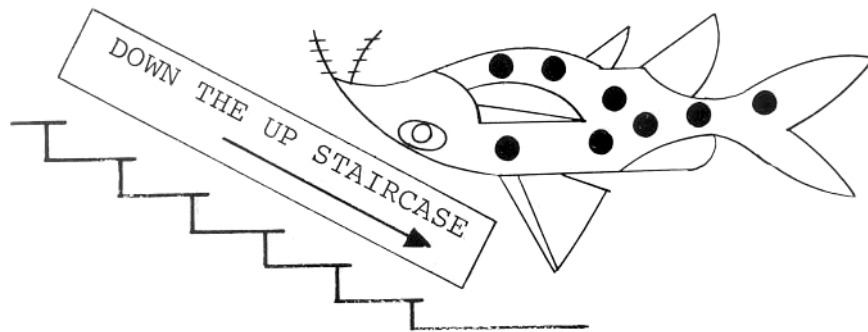
(signed)

Christopher W. Coates
Aquarium Consultant
587 Third Street
Brooklyn, New York 11215



VANCOUVER KILLER WHALES

Murray Newman's whales received nation-wide attention in a filmed news spot on Walter Cronkite's evening news coverage the 25th of April.



UP UP AND AWAY

AFRICA--Arne Schiøtz, Director of Danmarks Akvarium, Copenhagen, has been in East Africa since mid-April and will not return until June. We presume that he is doing some collecting. We expect a report when you return, Arne.

ORINOCO AND BIMINI--Bill Braker, Director, and Don Zumwalt, Curator, of the Shedd Aquarium returned in mid-April from a collecting trip to the Cinarco River, a tributary of the Orinoco, about 350 miles south of Caracas, Venezuela. About 600 fresh water fish of 35 species were shipped home. During the last half of May these travelers planned to be in Bimini.

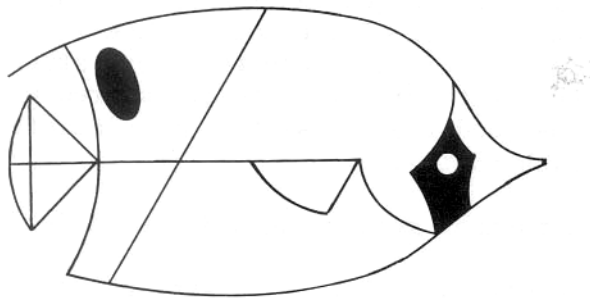
ANGEL FALLS—In mid-August a prestigious group from the Pittsburgh Zoological Society, the Pittsburgh Explorers Club, the Carnegie Museum and the American Museum of Natural History will explore the remote and little known waters and wilds above 3,100-foot Angel Falls in southeastern Venezuela. The Pittsburgh Aquarium expects to receive some specimens.

AUSTRALIA--Dr. Ernest P. Hodgkin, University of Western Australia, Nedlands (Perth) has visited a number of aquariums in the United States and plans to visit others in Europe. He is conferring with aquarists on design and operations to assist in planning an educational aquarium at Perth.

PUERTO RICO--Warren Wisby, Director, National Fisheries Center and Aquarium, has twice recently gone to Puerto Rico to assist local authorities with plans for the development, or non-development, of an ecological area for the public's benefit. Included are a coral reef, a lagoon, and a mangrove swamp, all of which lend themselves to public access and interpretive services.

MORE UP UP

HAWAII--Garrit "Gerry" Klay, Aquarist-Diver-Collector at the Cleveland Aquarium, went to Hawaii on a collecting trip from March 28th to April 23rd. As a result of his efforts, and those of Joseph Bauer, M.D., who also sponsored the expedition, the Aquarium now has hundreds of exhibit specimens of about three dozen species of fishes. Spencer Tinker, Director of the Waikiki Aquarium, provided invaluable help to the two-man collecting team. Klay and Bauer used SCUBA equipment and hand-nets to capture almost all the specimens air-freighted back to Cleveland.



T. WAYLAND VAUGHAN AQUARIUM-MUSEUM

Don Wilkie, Director, of this facility at Scripps, advises of staff changes and an opening:

Carr Tuthill, aquarium-museum curator and staff member for 16 years will retire in July 1968. Charles Farwell, aquarium-biologist will assume his working title of curator and take over his administrative duties. An exhibit preparator will be hired to be responsible for the design and construction of oceanographic exhibits. This is now open and applications will be accepted. The starting salary is \$644 per month.

Mrs. Bernice King for 25 years at Indiana University has assumed the position of bookstore manager at the aquarium. She replaces Mrs. Carolyn Sharp who has transferred to the University Bookstore as a buyer.

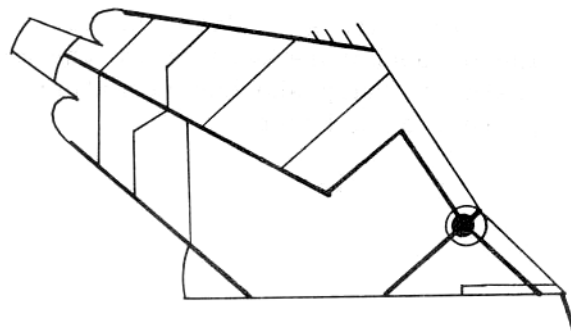
NEW ENGLAND AQUARIUM

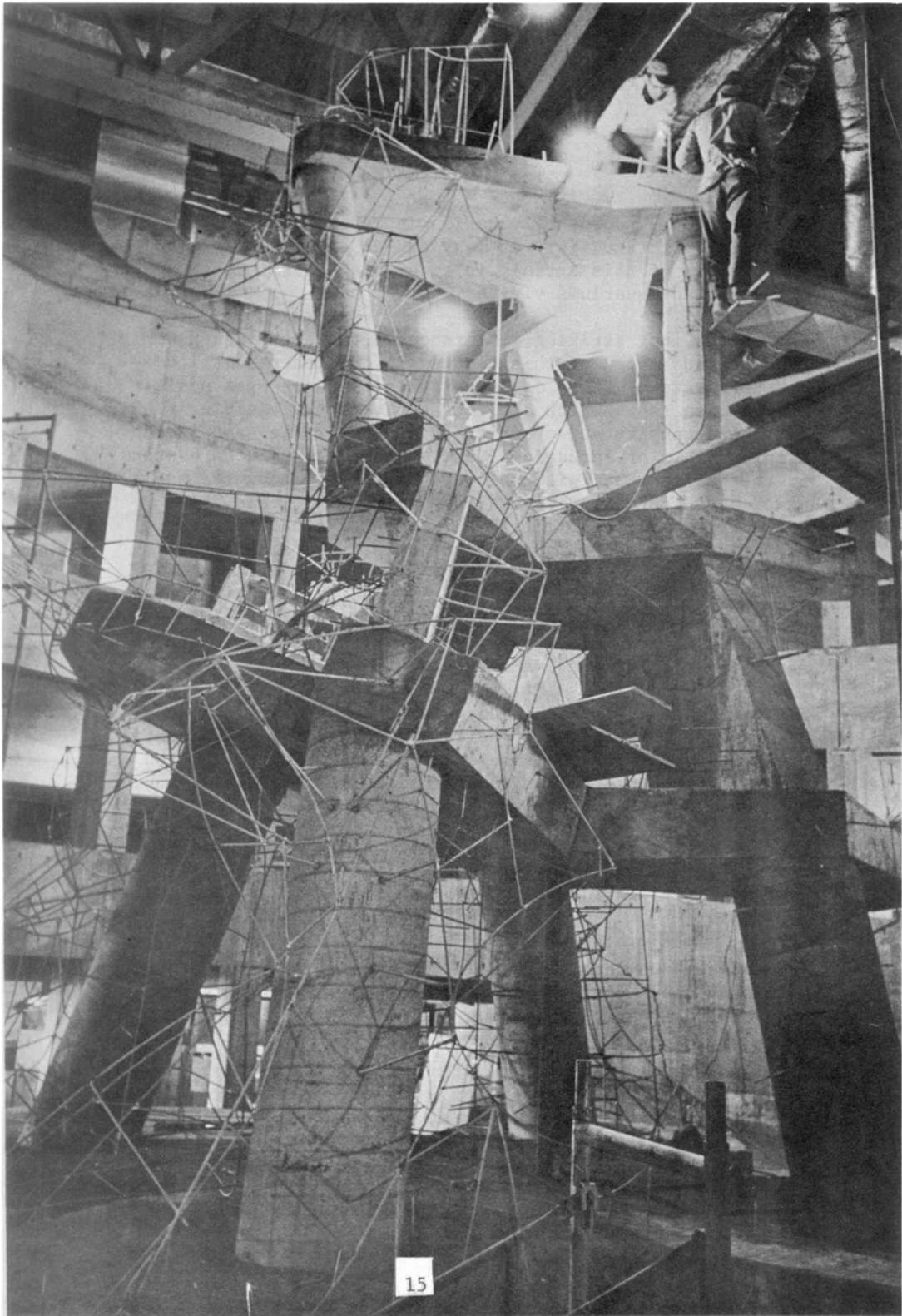
The New England Aquarium Corporation is an independent, non-profit organization created in 1958 to establish a public aquarium in the Metropolitan Boston area. Construction is presently well-advanced at a site on Central Wharf on Boston's waterfront. The aquarium is scheduled to open this fall.

On the facing page is an interesting photograph of the basic construction phase of the rock in the 180,000-gallon Giant Tank. This is a concrete core structure, steel reinforced, with wire mesh to be covered with polyurethane foam and fiberglass to form simulated grottoes for fish habitat.

Professional personnel at New England are as follows:

J. H. Cunningham, Jr.	Asst, to Pres.
D. M. DeHart	Exec. Dir.
David Miller	Curator
E. H. Taylor	Curator, Fishes
C. A. Mesta	Curator, Educ.
Richard Vahan	Asst, Curator
Edith Kraska	Exhibits
Dr. K. R. H. Read	Research Fellow
R. M. O'Grady	Bus. Mgr.
Earl Jennings	Engr. Services
Fred McMahon	Engr. Services
James Wood	Chief Engr.
M. F. Wynne-Willson	Mgr., P.R.
P. A. Newsome	Consultant, P.R.





A LOOK AT SOME PUBLIC AQUARIUMS IN JAPAN

By
Richard M. Segedi, Curator
The Cleveland Aquarium

In June 1966, I spent my vacation in Japan and while there made it a point to visit as many public aquariums as possible. The purpose of this article is to give a general report on those public aquariums visited.

One of the most striking differences between the aquariums of Japan and those of this country is the general attitude of the visitors. Most Japanese aquariums have open pools and/or open tanks which are accessible to the visiting public. Yet coins, papers and other trash are not to be seen in the displays. In one aquarium (Yase) there is a tank on a stand in the public area, with the top completely uncovered and unwatched, containing several specimens of Pterois. In another (Suma), the electric eel demonstration equipment, as well as the eel's tank, is out on a table in the public area.

Japanese aquarium visitors also spend much more time in observing individual displays. They read all labels and watch the display specimens intently.

Virtually all of the aquariums visited have a small museum display somewhere in their buildings. These displays contain preserved specimens of those animals not easily kept which are important to a fuller understanding of the aquatic world. Many oceanographic tools are also shown.

In most of the institutions there is a good representation of aquatic animals in the live exhibit. Mammals, reptiles, amphibians, fishes and several groups of invertebrates are displayed.

A notable exception is the Lake Biwa Aquarium near Kyoto. Here only those fishes found in Lake Biwa (Japan's largest body of fresh water) are shown, except for some American Bluegills presented to the aquarium by the Emperor.





琵琶湖文化館
(Lake Biwa Aquarium)

定価 ¥50

The largest aquarium visited was that in Ueno Park, Tokyo. This four-story building contains a large curved oceanarium on the main floor (of about 50,000 gallons) and smaller displays on the next two floors. The top floor houses a very fine reptile exhibit which includes two fine specimens of the Komodo Dragon, each about six feet long.

The most lavish aquarium is in a Disneyland-like park, just outside of Yokohama, called Yomiuri-land. It is housed in a stainless steel-clad geodesic dome. Inside, the exhibit, are arranged around a central core facing outwards. A spiral ramp winds around this core taking the visitor upwards past the displays and eventually out of the building to other attractions in the park.



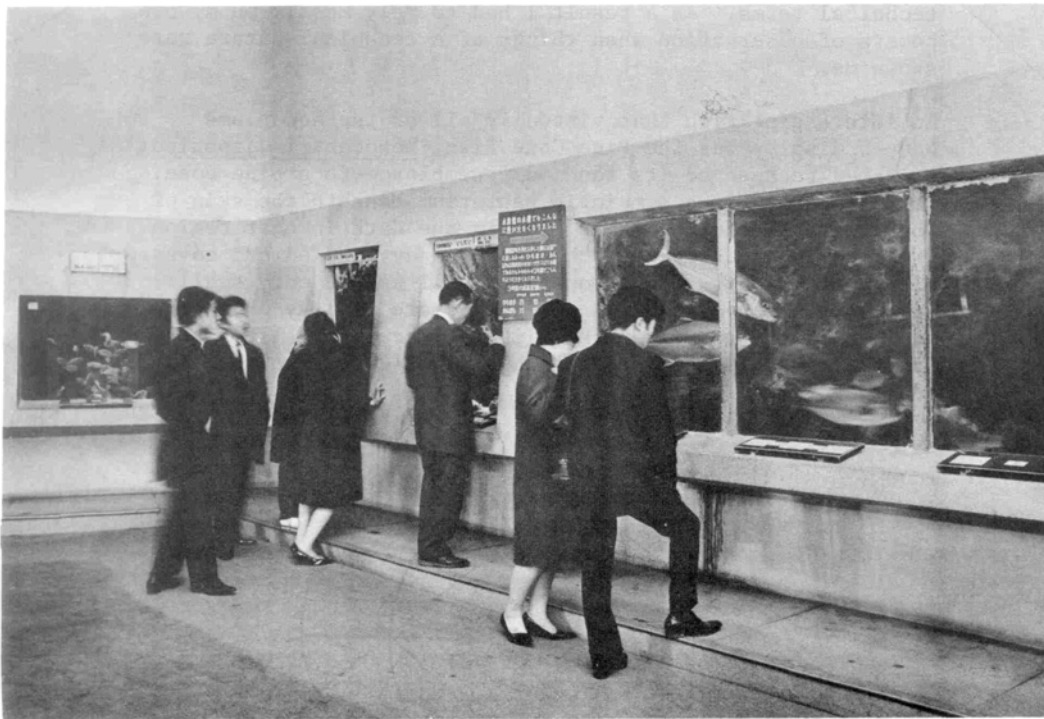
The Enoshima Scientific Aquarium

The Soma Aquarium in Kobe is another Marineland-type, aquarium. The Australian Lungfish is one of the main displays here. A demonstration of color perception in fishes is given periodically in a large open tank. These fishes have been conditioned to swim to a certain color of light for food. A battery of colored lights at each end of the tank is switched on and off, and the colors alternated in such a way as to cause the fishes to race back and forth in the tank, making for an interesting and meaningful demonstration.

The Yase Aquarium, near Kyoto, is the furthest inland marine exhibit in Japan. Their seawater is trucked in and their marine fishes are all healthy and good looking. There is a large marine pool in the middle of the building which is viewed from above. This pool is about four feet deep by about forty feet square and contains sharks, rays, turtles and other large marine species. Peripheral tanks show smaller specimens and a row of open tanks on stands contain auxiliary exhibits. A special tank is constructed to show the visitor the manner in which the water is filtered in the main exhibit.

This aquarium has the most impressive tide pool exhibit I have ever seen. The spiral ramp crosses it as the visitor enters the building. The rock work in the pool is constructed mostly from artificial materials.

The Enoshima Aquarium boasts the world's largest oceanarium. It holds two million gallons of seawater and is the home of twenty-two whales and dolphins. Across the street from the oceanarium building is the Scientific Aquarium, housing many individual tanks containing an excellent collection of aquatic life. A fine oceanographic museum is attached to the aquarium which features some interesting push-button displays.



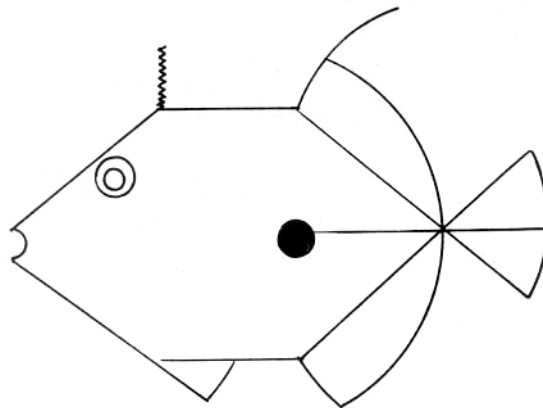
The Enoshima Aquarium

Public Aquariums in Japan (Contd.)

All of the aquariums visited charge admission, between ten and thirty cents for adults. Most are highly instrumented with large panels of electronic recording apparatus and electrical controls to operate the valves and pumps which regulate the flow of water through the systems.

Though we can learn from the Japanese public aquariums, and they in turn can learn from us, the language barrier is such that even though I had an interpreter most of the time, I had great difficulty communicating with my hosts. This was mostly due to the fact that the interpreters were not sufficiently versed in aquariology to be able to properly translate technical terms. As a result I had to rely early on my own powers of observation when things of a technical nature were shown me.

An interesting fish that virtually all of the aquariums had on display was the Pine Cone Fish, Monocentris japonicus⁽¹⁾ so named because of its fancied resemblance to a pine cone. This fish harbors a symbiotic bacterium beneath the skin of the lower jaw causing it to glow in the dark in that region. The fish is about three inches long, heavy bodied and covered with short spines. Pine Cone Fish will accept only small live food, such as adult Artemia, and are finicky about the quality of the sea water in which they are kept. They are, however, a striking display fish and would be a worthwhile addition to any collection.

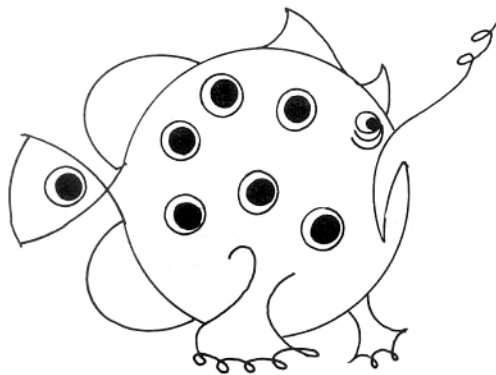


Public Aquariums in Japan (Contd.)

The Japanese are very much interested in trading specimens with American aquariums. They can offer Giant Salamanders (Megalobatrachus japonicus), Giant Spider Crabs (Macrocheira kaempferi), Pine Cone Fish (Monocentris japonicus), and other species in return for Gar (Lepisosteus sp.), Bowfin (Amia calva), and other North American aquatic animals. Shipping live specimens is difficult and costly, however, which tends to discourage attempts at aquatic animal exchange.

In contrast to the bright, airy, rather showy looking American aquariums, the Japanese aquariums I visited give the impression of comfortable, old established museums. The personnel operating their aquariums seem more interested in informing rather than entertaining the visitors, yet the attitude of the viewing public is obviously one of deep interest and pleasure.

(1) J. L. B. Smith, The Sea Fishes of Southern Africa. pages 144 and 149.



RICK SEGEDI, Curator of the Cleveland Aquarium, and who has been with the Aquarium since 1956, plans to return to Western Reserve University full time this fall to complete the necessary two-year's work for his bachelors degree. He will continue as Curator by working on week-ends at the Aquarium, and plans to return full time the summer of 1970.

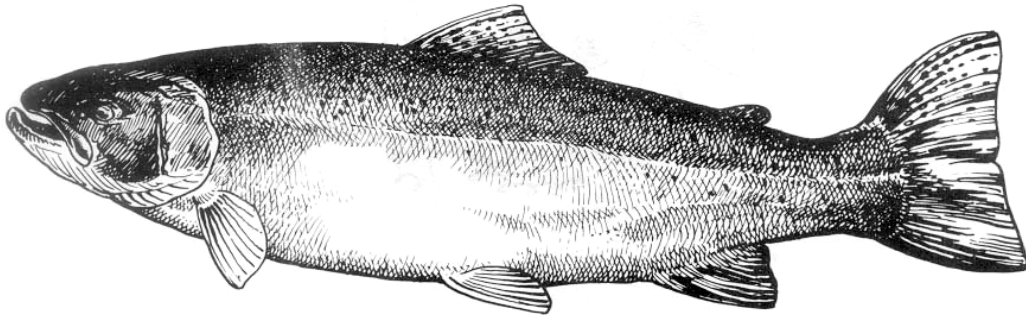
FANCY

OREGON SALMON

The recent frightful accident which happened to a stage in southern Oregon cannot fail, says the New York Times, to call attention of the state authorities to the necessity of protecting settlers against the attacks of salmon. The stage in question was crossing Applegate Creek when it was suddenly attacked by a drove of salmon. The stage was instantly overturned, and the hungry fish swarmed over it, while the stage driver, with great presence of mind, cut the traces of the horses and throwing himself across the off wheel horse--a powerful animal--formerly the property of Dr. Goodrich, of Olympia--managed to escape. The dispatch which conveys to us this painful story says nothing of the fate of the stage passengers, but, unfortunately, there is every reason to believe that they fell victims to the salmon.

The Oregon salmon has long been regarded by experienced western hunters as the most dangerous animal infesting this continent. It is much larger than the salmon of the Atlantic coast, and unlike the latter, which is timid and inoffensive, this fish is fearless and aggressive.

(Clipping from a Manchester, Iowa, newspaper dated March 16, 1885.)



Chinook, Oncorhynchus tshawytscha

FACT

The "hungry" salmon probably were fall chinooks on their spawning migration up the Applegate, a tributary of the Rogue River. Salmon do not feed after entering fresh water and, lest some of you fear to ford a stream in a stagecoach, they will attack neither man nor beast.

Hippocampus Hippocampus erectus erectus

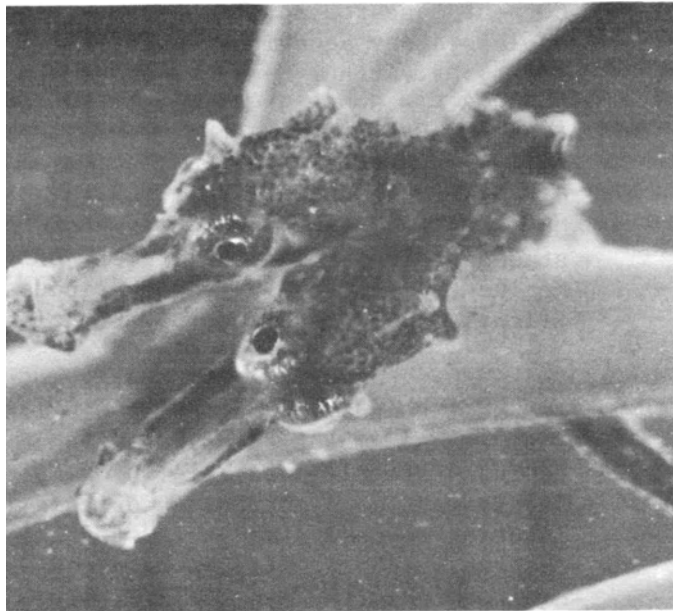
By

Warren Zeiller, Curator of Fishes, Miami Seaquarium

No sea monster this, but a live, two-headed spotted seahorse just two days old which was donated to Seaquarium shortly after its birth. The baby (babies) was 3/16 of an inch in length over-all.

Both heads were functional and joined a common body behind the operculae. This definitely was a case in which two heads were not better than one. The tiny creature was so top-heavy that it was incapable of swimming. Unless wedged in a plant or otherwise supported it was unable to assume the upright stance of seahorses and would drop head first to the bottom of the aquarium. Excedrin headaches Nos. 3,001 and 3,002.

Photographs by Jim
Latourrette Miami
Seaquarium



AQUARIUM RESEARCH AT THE
ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA

Submitted by
Neal R. Foster
Assistant Curator
Department of Limnology

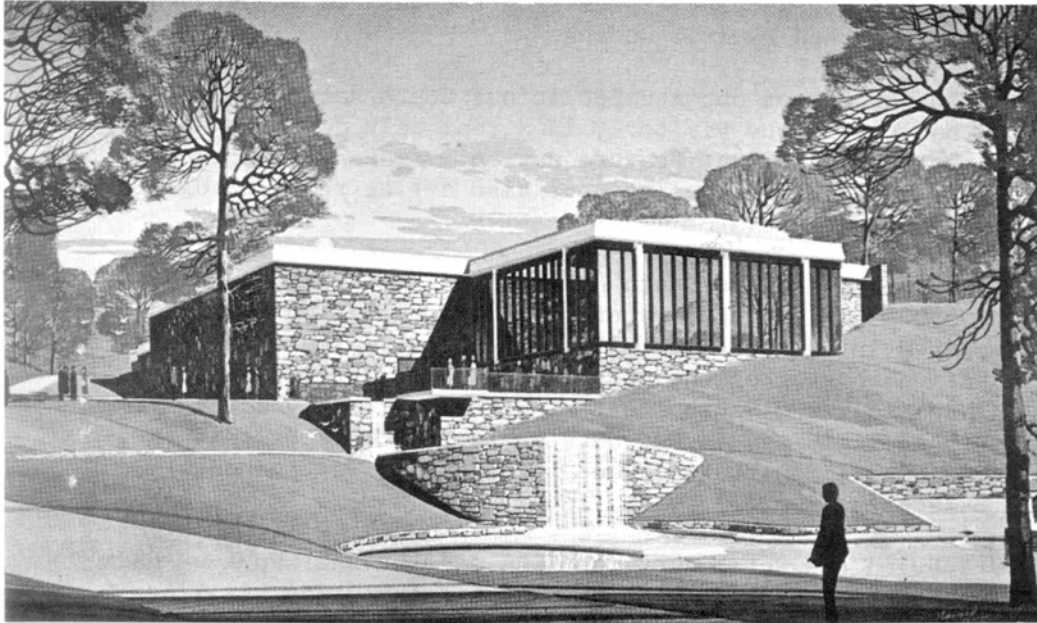
Current research activities involving large-scale, maintenance of laboratory aquarium facilities at the Academy are two-fold. First, Dr. Arthur Scheier, under the auspices of a grant from the U.S.P.H.S. is studying the influence of various kinds of chemical toxicants on the critical flicker* frequency of bluegills, Lepomis macrochirus, swimming in a specially constructed circular chamber. In addition to the flicker frequency studies, Dr. Scheier is in charge of a broad program of fish bioassay studies to determine the effects of samples of potential effluents submitted by various industrial firms which are clients of the Department of Limnology.

In another tank-filled laboratory within the Limnology Department, Dr. Neal Foster is continuing his long-term studies on the biology and evolution of killifishes. These studies attempt to integrate all available information on the ecology, behavior, development, and morphology of this interesting group of fishes in order to understand the "strategy" of the evolutionary changes which killifishes have undergone. To date, Dr. Foster has been able to study, alive, over 40 species, representing about half the genera and five of the eight subfamilies within the family Cyprinodontidae.

In 1964, Dr. Donn E. Rosen placed the killifishes, needlefishes, flying fishes, halfbeaks, silversides, pallostethids, and the peculiar Australian rainbow fishes together in a new ordinal grouping, the Atheriniformes. Dr. Foster has been studying selected species of these other groups in addition to his killifish stocks in order to test the validity of this still somewhat controversial grouping of teleost fishes. The behavioral and developmental characteristics which he has observed in killifishes, in one species in each of the genera Xenotodon, Dermogenys, Menidia, Bedotia, and Pseudomugil, and three species of Melanotaenia appear to substantiate the validity of the Atheriniformes as a natural group. The research is being carried out with the support of a recent grant from the National Science Foundation.

*Look it up. (Ed.)

SPECIAL TO DRUM AND CROAKER
FROM BILL FLYNN, CURATOR OF THE PITTSBURGH AQUAZOO



PITTSBURGH AQUARIUM

Our new Aquarium, scheduled to open on July 4, 1967 but delayed by strikes in the construction industry, opened its doors on October 1, 1967. From that date until March 1, 1968, we have had over 125,000 paid visitors at \$1.00 for adults and 25¢ for children under 16.

We have 35 fish display exhibits ranging from 240 gallons to 3,300 gallons. Seven of these feature North American species, and our four-tiered trout stream furnishes us our eighth facility for native species.

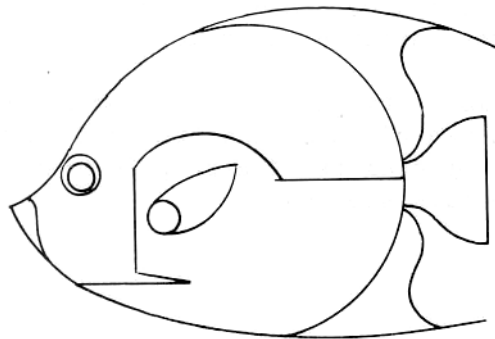
Pittsburgh AquaZoo (Contd.)

Our reef room contains two refrigerated salt water tanks to exhibit king crabs and giant octopus, nine marine tropical exhibits to display fishes from the warm waters of the Atlantic and Pacific Oceans.

The feature of our AquaZoo is our South American walk that weaves the visitors, in a real walk down the Amazon, past 16 tanks that feature not only fishes--from the piranha to the Arapaima--but also a fine reptile collection and amphibians.

Further on in our South American walk, we wind around a 35,000-gallon fresh water porpoise collection that includes three Inias, and hopefully this spring, also three Sotalia. At the bottom of the porpoise display, we feature Caiman, Manatees and South American Otter. Directly across from these exhibits, is our outstanding Electric Eel display, designed, constructed, and furnished by Westinghouse Electric.

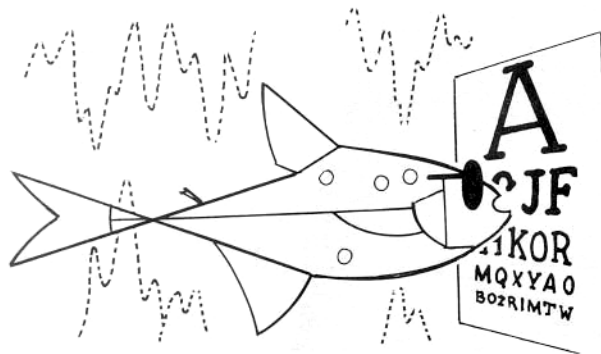
Between the North American Room and the Reef Room we have a fine refrigerated Penguin exhibit featuring six Kings, three Macaronis, and three Rock Hoppers. Interestingly, we have had this collection of birds since June 1, 1967, and have lost none. We are happy, as well as proud of the fact that we have been able to keep these fine animals in top condition for this period of time. Fred Zeehandelaar was our supplier for the Penguins.



Pittsburgh AquaZoo (Contd.)

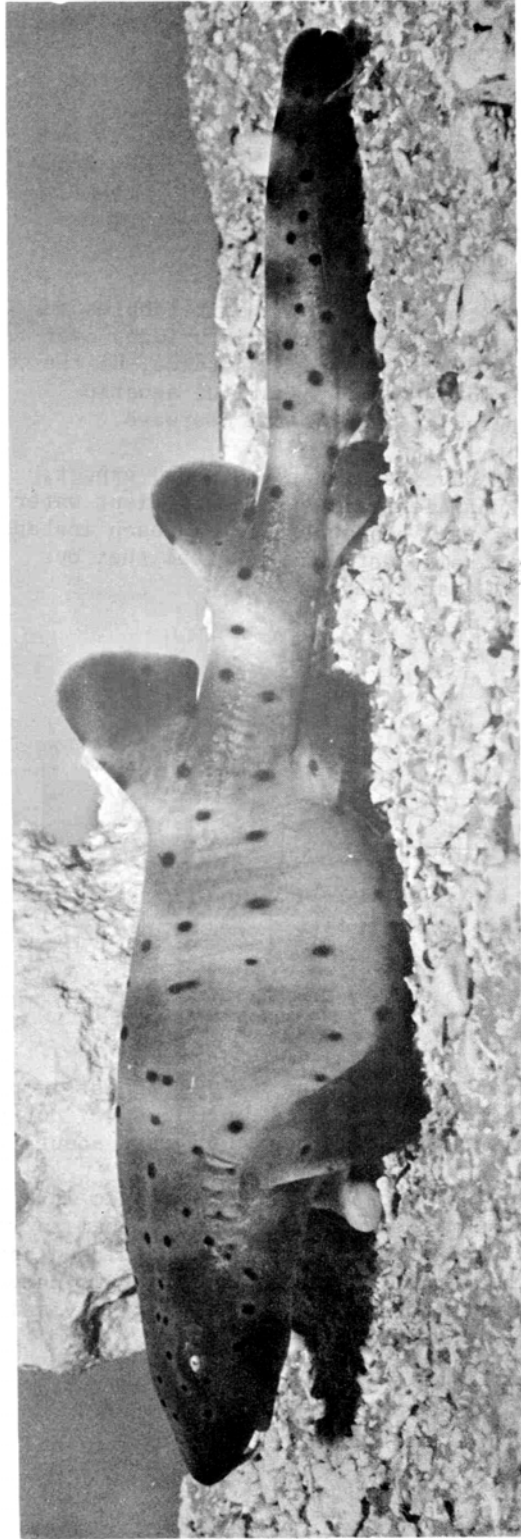
We are most happy with the entrance and exit lobbies in our AquaZoo. Visitors enter and leave via bridges over pools, and are within earshot, in each instance, of the 16-foot fall of our trout stream. Beautiful aquatic stained glass is featured at each of the doorways.

Our technical problems have been what you would expect, no more, no less; insufficient air and insufficient water pressure have given us real headaches, but in each instance we have been able to make adjustments and feel that our institution is in full gear today.



AN OCEANARIUM similar to several on the West Coast is planned by a Rhode Island firm to be located in Mill Cove, north of Wickford, Rhode Island, and is expected to cost about \$750,000.

This type of oceanarium places the viewing public in a large barge or tank with submerged windows enabling them to view the marine animals and plants held in a plastic-enclosed specimen area surrounding the barge. Filtered sea water is pumped into the specimen area. Visitors board the oceanarium via a gangplank and descend into the viewing area.



This day-old, eleven-inch baby nurse shark was born prematurely. Note the protruding yolk sac under the gill area and stomach distended with unabsorbed yolk.

Photograph by James W. LaTourette, Miami Seaquarium

BABY NURSE SHARKS

By

Warren Zeiller
Curator of Fishes
Miami Seaquarium

The diver working in the Main Seaquarium tank paid little attention to the seven-foot nurse shark as it swam slowly by. The shark had been caught the day before in 35 feet of water south of Biscayne Bay, Miami, Florida. She was a fine, fat, and healthy specimen which seemed to be quite at home in this half-million-gallon artificial environment.

A small brown sphere covered with tiny black dots caught the diver's eye as it ejected from the shark with amazing force. It tumbled over and over for several feet and then, much to his surprise, a newborn baby untangled itself and swam slowly to the bottom; a miniature polka-dotted image of its mother. By the end of the day, an additional three had been born.

During the next four days the number of births increased to a total of seventeen. The nine female and eight male babies ranged in size from 9 1/2 inches to 11 3/8 inches. Some still had a small external yolk sac, possibly indicating that they were premature. A week later a second birth sequence took place in the same tank. This nurse shark had been caught on the same day and in the same locale as the other. The twenty-two babies born of this female were all about twelve inches in length, probably full-term. All the young were removed from the large tank and placed in one of the 500-gallon display aquaria where they are viewed by the public.

Nurse sharks (Ginglymostoma cirratum) are ovoviviparous; their eggs resemble large skate eggs (often referred to as the Mermaid's Purse), but are retained within the body of the female until the young are hatched, expelled, and swim away. The divers searched the main tank daily for several weeks for remnants of the leathery keratin egg cases, but none were found. Perhaps they had been reabsorbed by the parent.

Baby Nurse Sharks (Contd.)

The small, nearly harmless baby nurse sharks do not enjoy parental care. Apparently, such protection for them is unnecessary for survival. Often, during the course of many dives in Florida waters, I have been surprised to find a juvenile nurse shark living in harmony with a green moray. The young shark could be taken only after the moray had been driven away from its niche in the reef. This may be a case of commensalistic symbiosis, where the shark baby finds a ready-made, well-protected home in which to live until it is large enough to roam safely alone. I do not see that the shark's presence in the moray's lair adds to the well-being of the latter. The newborn nurse shark is just "bite size" for the moray, why is it not eaten?

Emil Hanson, Captain of the Seaquarium collecting boat, has reflected similar phenomena. The Seaquarium Shark Channel contains numerous bull (Carcharhinus leucas) and lemon (Negaprion brevirostris) sharks, as well as nurses. Bulls and lemons born in the channel are consumed immediately by any larger than themselves. Even the parent may join the frenzied feast. Newborn nurse sharks are another story. Captain Hanson has observed this a number of times and has reported that at birth the nurse shark babies simply drop to the bottom of the channel, poke about, and are bypassed by the others as what might best be described as inedible fare. Why?

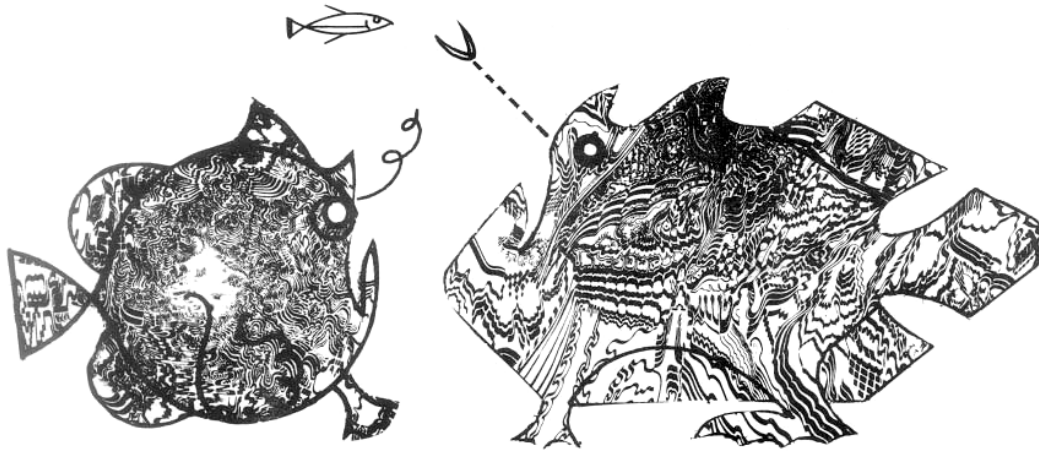
Captain William B. Cray, Seaquarium Director of Collections and Exhibits, vividly describes similar instances from his many years of observations. Specimens such as groupers measuring less than three feet are now displayed in other aquaria, but some years ago these were housed in the Main Seaquarium with morays, sharks, rays, sawfishes and the bottle-nosed dolphins. "I watched through the underwater viewing windows as the boat crew introduced a very heavy female nurse shark into the tank. She no sooner entered the water than she started dropping babies all over the place. I thought they would all be goners because the groupers were right there rolling their eyes at those little nurse sharks. They would swim right up to one and open their mouth as if to inhale the little fellow in one gulp--and stop! No sir, they did not take one! Those babies just found a rock or something under which to hide and everything went about its business as if nothing at all had happened. Even the dolphins, which generally will engage in rough play with or eat any small specimens, passed them by without a glance." Why?

Baby Nurse Sharks (Contd.)

Total lack of interest of larger species in the baby nurse sharks was observed again during the most recent births. Other fishes of equivalent size would have been fair game for the larger creatures. What is there about juvenile nurse sharks that seems to bestow upon them a high degree of immunity from predation? Individuals and corporations investigating shark repellents would do well to give thought to this enigma which may have bearing on man's ability to survive in what is still the hostile environment of the sea.

ACKNOWLEDGMENT

Normally the receipt of items for the DRUM & CROAKER will not be acknowledged. Items not suitable for D&C will be returned. Papers, photographs, charts, etc., used will not be returned unless requested. Items received too late for the current issue will be retained for future use.



MAILING LIST

We are up-dating the D&C mailing list. Please complete the form below and mail it to the National Fisheries Center and Aquarium, Room 2013, Department of the Interior, Washington, D.C. 20240.

Failure to return the form will result in removal of your name from the mailing list.

PROHIBITION OF HARMFUL FISH IMPORTATIONS

The Bureau of Sport Fisheries and Wildlife, Department of the Interior, has announced the issuance of new regulations, effective July 1, 1968, banning the importation of fishes or fish eggs that may harbor certain diseases.

As reported in the Federal Register (volume 32, number 246, December 21, 1967, Title 50 CFR, Part 13):

... all live or deadfish or eggs of salmonids of the fish family Salmonidae are prohibited entry into the United States for any purpose unless such importations are by direct shipment, accompanied by a certification that the importation is free of the protozoan Myxosoma cerebralis, the causative agent of so-called "whirling disease," and the virus causing viral hemorrhagic septicemia or "Egtved disease."...

Exceptions to the certification requirement are (a) salmonid fish or eggs that have been canned, pickled, smoked, or otherwise prepared in a manner whereby the protozoan and virus are destroyed; and (b) salmonids caught in the wild in North America under either sport or commercial licenses.

SAFETY

Persons responsible for aquarium operations should be alert to accidents and safety hazards which are unique to their activities. Recently, an employee of the National Aquarium was severely burned on the hands while holding calcium chloride during the preparation of artificial sea water. The accident was serious enough to result in time lost from the employee's job. Although his hands were wet, the Aquarium aide was handling the chemical as always. It is impossible to determine at this time, whether this accident represents an idiosyncratic sensitivity of the employee to this particular substance or whether it resulted from causes which are not determinable. Aquarists should be alert to the possibility of such a hazard.

CONTROLLED ENVIRONMENTS FOR SALMONOID
PROPAGATION, by Roger F. Burrows and Bobby D. Combs, U.S.
Bureau of Sport Fisheries and Wildlife, will appear in the July 1968
issue of the PROGRESSIVE FISH CULTURIST.

This excellent paper will be of great interest to aquarists having,
recirculating water systems and may be obtained (in July) from the
Superintendent of Documents, U.S. Government Printing Office,
Washington, D.C. 20402. Single issue --25¢. Year's
subscription--\$1.00 domestic; \$1.50 foreign.

HELPFUL HINTS

To remove octopus dandruff* from your tank, simply pinch the incoming waterline for a few seconds so that the pressure forces a fine jet of bubbles into the water. These will adhere to the flakes and float them to the surface where they can be skimmed off with a small net.

*Our term for the disk-shaped cups that are periodically shed from the sucker arms into the water.

