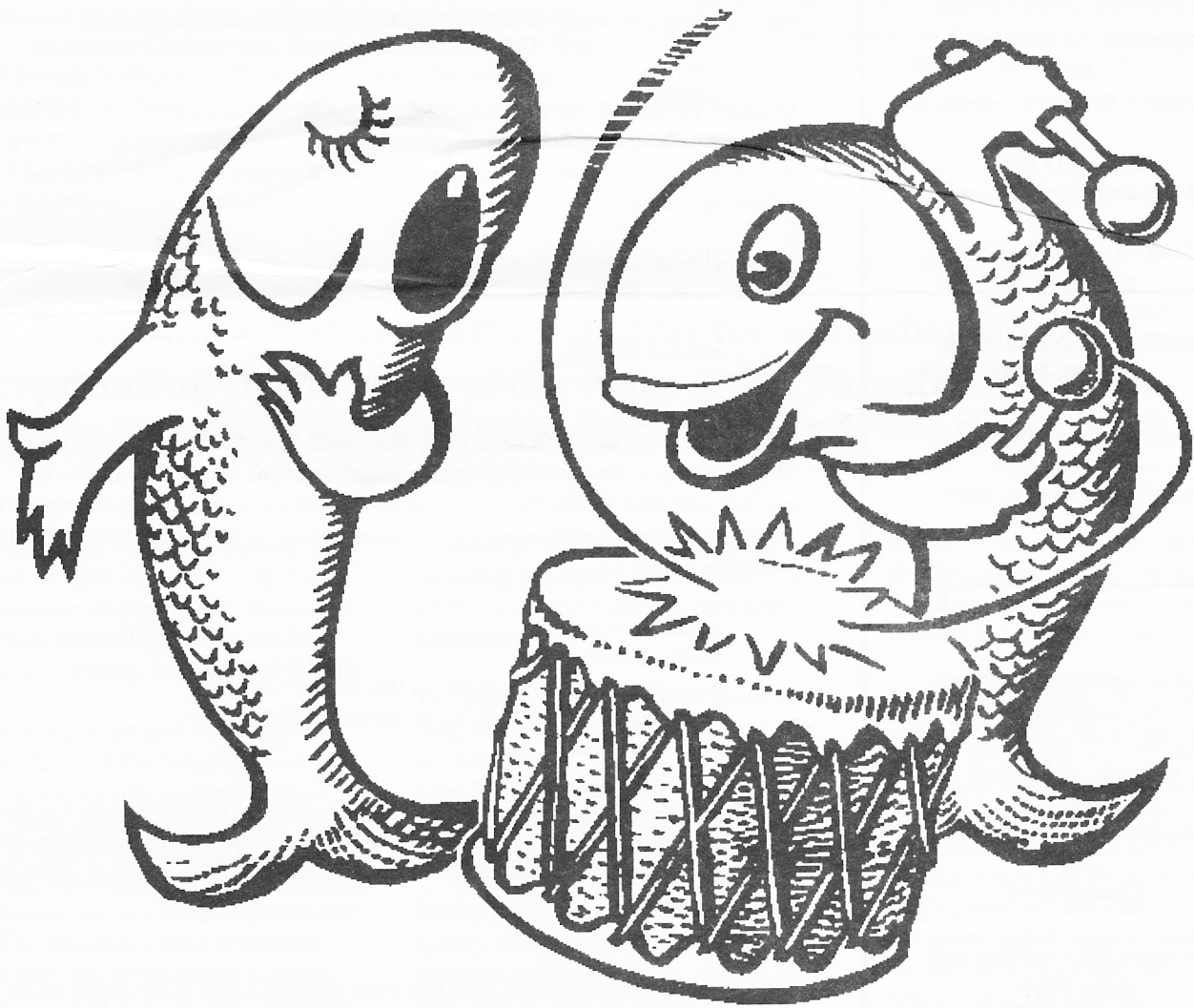


# DRUM & CROAKER



FALL 1989  
VOLUME 22, No. 2

## DRUM & CROAKER

a publication for and by  
public aquariums.

Issues are published quarterly.

Subscriptions: \$7.50/Volume  
Two complimentary issues  
of every volume are  
provided to recognized  
public aquariums.

PUBLISHED BY  
The Staff of Fishnet

WITH GRANTS FROM  
Aquavet, Div. of Novalek, Inc.  
and  
Aquascience Research Group, Inc.

EDITED BY  
John and Carol Kuhns

DRUM & CROAKER  
c/o Fishnet  
102 Hiram Street  
Sheffield, Alabama 35630  
205/381-4945

Submissions welcome.  
Due Date for  
Next Issue: Dec. 1, 1989

Public aquarium staff are  
encouraged to use  
the Public Aquarium/IAAAM  
message and library  
areas of  
Aquarium Fish Forum  
on  
CompuServe

For more information, call  
John Benn  
205/381-4945

## NOTEWORTHY

### I.A.A.A.M. News

submitted by: Michael Stoskopf [72007,144]

At the 1988 International Association for Aquatic Animal Medicine Annual Meeting it was moved and accepted by the Executive Committee that the Association adopt the concept of Merit Awards for members with recognized outstanding contributions to the field of aquatic animal medicine. The three Merit Awards listed below are distinct and separate from Honorary Membership in the Association, in that specific contributions to specific aquatic animal species or fields will be recognized, as opposed to longevity within the Association.

The Executive Board of the International Association for Aquatic Animal Medicine establishes herewith the following merit awards, which may be conferred annually, and which will consist of appropriate symbols of recognition for outstanding contributions made to the discipline of aquatic animal medicine.

#### IAAAM AWARD FOR EXCELLENCE IN AQUATIC CLINICAL MEDICINE

This award is to be made to a member of the Association, who in his/her activities within the past 10 years, has achieved a record of excellence in one or more of the following areas:

clinical scientific research;  
clinical therapeutics;  
clinical diagnostics; and/or  
clinical education.

#### THE MARK KEYES AWARD FOR MARINE MAMMAL CONSERVATION

This award is to be given to an active member of the Association, who in his/her activities within the past 10 years, has made a significant impact on the conservation of one or more species of marine mammal through any or all of the following areas:

scientific research;  
political action;  
management of the species in the wild;  
management of the species in captivity; and/or  
education.

Dr. Keyes was for many years a veterinary researcher and diplomate for the National Marine Fisheries Service, and was instrumental in the northern fur seal management program of the Pribilof Islands, Alaska. This award is given in his honor.

#### THE N.O. CHRISTENSEN AWARD FOR EXCELLENCE IN FISH HEALTH

This award is to be given to an active member of the Association, who in his/her activities within the past 10 years, has made significant advances in the field of fish health and medicine through one or more of the following areas:

basic scientific research;  
applied research; and/or  
education;

Dr. Christensen was for many years Director of Fisheries Medicine at the Royal College of Veterinary Medicine in Copenhagen, Denmark, and this award is given in his honor.

All awardees are to be recommended by any current standing members of the Association to the Executive Board by receipt of nominations by the President or President-Elect, 10 days prior to the Annual Meeting of the Association. Upon approval by two-thirds of the Executive Board, the nominations will be placed on the floor at the Annual Membership Business Meeting for approval by members in attendance at that Meeting.

Members wishing to nominate Association members for these awards in 1989 should send a letters of nomination, curriculum vitae for their nominees, and any other pertinent information to Committee Chairperson, Dr. Leslie Dierauf, P.O. Box 2925, Olympic Valley, Ca 95730 or President, Dr. Michael Stoskopf, 2742 N. Calvert, Baltimore, MD 21218, by May 4, 1990. All nominations received will be turned over to the Awards Committee for evaluation and possible recommendation to the board.

## Grants Awarded and Available

submitted by: Don Johnson [71631,42] ,  
*Today's Aquarist*

The W. Alton Jones Foundation, Charlottesville, VA, has awarded a \$75,000 grant to the National Aquarium in Baltimore for new graphics and interpretive material for the Aquarium's South American Rain Forest Exhibit. Through its Sustainable Society Program the Foundation provides grants to organizations endeavoring to preserve the earth's diverse plants, animals and ecosystems.

The Nixon Griffis Fund for Zoological Research awards grants semiannually. Grants, not to exceed \$3,000, are available to keepers, curators, veterinarians or research and consulting biologists. Closing periods are Jan. 1 and July 1. For information contact: John Behler, Coordinator, Nixon Griffis Fund for Zoological Research c/o New York Zoological Society, Bronx Zoo, 185th & Southern Blvd., Bronx, NY 10460.

## The Aquarium - resource and stimulus for multidisciplinary interpretation in the work of the Norwegian Forestry Museum

by Christian Andersen, The Norwegian Forestry Museum (Forestry, Hunting, Fishing) N-2400 Elverum, Norway

The Norwegian Forestry Museum was founded in 1954, and is the only Norwegian museum whose sphere of interests is the utilization of the wilds and backwoods, i.e. forestry, hunting and fishing.

The museum is located in Elverum, in the very heart of Norwegian forest land, and in a district rich in hunting traditions; some 150 Km north of the capital Oslo. It lies on the bank of the River Glomma, for centuries a timber floating watercourse and a source of freshwater fish. The museum's field of interest ranges over the entire country, including the island of Spitsbergen. Approximately 100,000 people visit the museum annually. Among our visitors, 20,000 are pupils and students. The staff

numbers 25 permanent employees including a research staff of four. In addition there are several part-time employees.

The aquarium exhibits have been arranged under the title "Mountain lake to river estuary". It was opened on June 22, 1979, and is the only Norwegian aquarium in which the main emphasis is placed on freshwater fish.

Basically the aquarium exhibits some 30 species of Norwegian freshwater fish in biotopes resembling their natural habitats. The 41 species found in Norway have all arrived within the last 9,000 years or so (i.e. since the end of the last glacial period, or ice age). Most arrived

of their own accord, but some were deliberately imported. An information board on the way down to the aquarium informs the visitors on this subject.

Study material and other information is placed on a shelf below the information board. Along the stairway down to the exhibition hall there are transparencies showing various habitats from high mountain down to sea level. A special showcase contains displays of laboratory equipment, measuring instruments etc. employed in aquatic studies. Groups with particular interests can be instructed in the kind of equipment relevant for investigations and studies, and loans sometime occur, besides utilization in the museum's field

activities.

### General Information

The aquarium obtains its fresh water from a well outside the museum building. Some 8,000 liters of water per hour are pumped up from a depth of 30 metres and run without filtration through a pressure regulating tank and straight into the main water pipes. It maintains a relatively constant temperature, varying in the course of the year between 5.6°C and 9.5°C. There is a constant flow through most of the individual aquaria.

The brackish-water and seawater aquaria, together with some of the smaller aquaria, are maintained as separate closed units, each with its own cooling plant. Water temperature varies between 10°C and 13°C. Lately smaller aquaria (3-500 liters) have been installed in the cultural history department for freshwater fish. Here there are no water pipes, therefore these aquaria are run as closed units based on Eheim filter and cooling systems. Under construction is an aquarium depicting a pond with water insects and other small animals included in the fishes' bill of fare.

The largest aquaria have a water capacity of 2,300 liters, the medium-sized ones hold 500 liters, whilst the smallest can take almost 200 liters. In the river aquarium there is an intake of approximately 25,000 liters of water an hour, most of which is recirculated. The water of the brackish-water and seawater aquaria are kept clear by means of Photozone® treatment and protein skimmer. Photozone® is created by irradiating the air with short wave light from an ultra-violet lamp.

### Descriptions of the Individual Aquaria (representing different fish biotopes)

#### Mountain Lake Biotope providing only meager nutrition

Lakes of this kind are bluish in color, and contain a plentiful supply of oxygen at all levels. Plant life in the fringe zone between land and water is usually

sparse. The most common species of fish are trout and grayling.

#### River Biotope

The water of Norwegian rivers is, for the most part, clean, clear and rich in oxygen. Among the species common to rivers, trout and grayling are exhibited here.

#### Lowland Lake Biotope providing only meager nutrition

Though this type of lowland lake has much in common with mountain lakes, the greater fertility and luxuriance of the surrounding land and vegetation necessarily influences the kind of nutrients found in the lake. Beside trout and grayling, the commoner species of fish include powan, burbot, vendace, pike, perch, and minnow.

#### Shoal Fish Biotope

Smelt and vendace are the species in this aquarium.

#### Forest Tarn Biotope

This type of habitat is prevalent in forest and marshland. A forest tarn is usually small and relatively deep. The water is poor in minerals, and is yellowish-brown in color. The bottom layer receives little or no oxygen. Forest tarn water often has a high acidity, and is poor in both plant and animal life. Perch and pike are the dominant species of fish.

#### Lowland Lake Biotopes rich in nutrients

This type of lake is usually found in agricultural areas. It has a plentiful supply of oxygen in the upper layers of water. On the lake bottom, however, the decomposition of organic debris requires a great deal of oxygen, and this may result in a shortage of oxygen in the lower layers of water. Water color may vary from green to yellow-brown, often resulting in little depth of visibility. Common species here are roach, bronze bream, rudd, ruffe, ide, pike, perch, silver bream, bleak, asp, chub, and zander. Those species which are exhibited have been divided between two aquaria, thereby avoiding the

problems arising from competition between the species.

#### Migratory Fish Biotope

This biotope represents a river pool and contains anadromous and catadromous species, i.e. species that migrate between freshwater and saltwater. Atlantic salmon, sea trout, and arctic char are the anadromous and eel the catadromous species.

#### Brackish Water Biotope

Normally the water in this aquarium has a 25 ppt salinity. It contains flounder, Atlantic salmon and sea trout.

#### Saltwater Biotope

The salinity of the water is approximately 34 ppt. This aquarium contains species commonly found in Norwegian inshore waters.

The smaller aquaria contain species of fish that have been deliberately imported into the country, including among others brook trout, brown bullhead, tench, and Crucian carp.

The aquarium also offers a small hatchery with rainbow trout. Here the visiting public can follow development from egg to fully-grown fish. There is a special photographic exhibition in this connection under the title "From egg to food resource". Lines of communication are drawn to e.g. cultivation (strengthening of natural fish stocks) in rivers and lakes, and commercial fish farming of Atlantic salmon, rainbow trout, Arctic char and other species. Teaching and interpretation based on the aquarium exhibits is adapted to the needs of people living inland to gain insight into the form of aquaculture, especially in connection with freshwater species which takes place in coastal districts. Latterly commercial fish farming has grown explosively in Norway in later years, and has been chosen as one of the main development areas by the authorities.

The fish species in the aquarium are collected from surrounding lakes and waterways, and some are presented to



us from collaborating biological stations and hatcheries.

As fish food we use mussels (*Mytilus edulis*), Euphausiids (krill) and mosquito larvae, - in the hatchery dry feed.

For a number of reasons - particularly educational - we strive always to have several fish of each individual species in stock, both in the public aquaria and in the quarantine department. Because of the teaching programs connected to the aquarium it is important that the species can be observed throughout the year. Working with Norwegian wild fish species we cannot supply the stock during the year by shopping in zoo stores, as the tropical fish aquarists may do. When during late autumn the ice forms on lakes and rivers we are prevented from collecting new species until late spring or early summer.

#### The Aquarium as a Teaching Aid

The main purpose of the Aquarium is to show the close links between natural history and the cultural history that falls within the museum's sphere of research (forestry, hunting and freshwater fishing), and further, to promote and encourage interest in the study and observation of natural phenomena. It also aims to provide teaching programs within the disciplines of natural and environmental studies. These programs have been designed to accommodate the various levels of instruction, ranging from preprimary school (kindergarten) to university level.

Teaching and the dissemination of information are among the foremost tasks of the Norwegian Forestry Museum. Consequently the planning, layout, and presentation of the various exhibitions have been undertaken with school parties in mind. Since the education service was inaugurated in 1973, we have established contact with a large number of teachers. Hundreds have made use of the teachers' in-service training program to find out what the museum can offer. Through the aquarium we try to focus not only on the species man has exploited for

domestic and commercial purposes throughout the ages, but also on the importance of the environment and living conditions of the fish, for the benefit of future generations. This includes taking up questions like conservation, especially industrial waste and air pollution, resulting in acid rain which is affecting flora and fauna in a negative way. One aim of the museum is to elucidate knowledge on the relationship between natural environment and cultural development. This will heighten understanding of the social problems connected with environmental pollution, and might pressurize politicians into taking steps to avoid an environmental disaster which threatens man's existence on earth.

One should always bear in mind that visitors to the aquarium have various needs and requirements. This is important when considering how much information should be made available in addition to what they see through the glass walls of the aquarium tanks. For school parties, in particular, it is often desirable to allow them to concentrate on one thing at a time, and to restrict the amount of direct information available.

In our aquarium the public is given information on: 1) the specific name in Norwegian, Latin, Danish, Swedish, English, German and French; 2) species habitat (by way of color transparencies); and 3) species distribution, generally in Europe, on distribution maps.

Identification is usually necessary, but should only be an opening to more information. The main purpose is to transfer knowledge, not to exhibit the subject. It is relevant and important to emphasize biologically relevant features, e.g. a biotope with its content.

For educational purposes 50 quiz sheets have been worked out for school parties ranging from 6 - 16 years of age.

To increase the capacity of the aquarium, and to make efficient learning

possible, we have suitable premises close by where pupils can complete written and practical assignments in connection with their visits. These consist of a seminar room and auditorium, also making it possible to supplement visits with lectures, and relevant film and video presentations.

In Elverum there exists a local aquarium society with whom we keep a certain amount of contact. Some of their meetings and activities are held at the museum. We would like to widen this contact to comprise various forms of "workshops", i.e. for building and running aquaria, field studies, etc.

Visits can be implemented in another way. A visit which starts in the aquarium can quite naturally continue in the cultural history section where information about the history of freshwater fishing, the role played by fish in the subsistence economy, and various methods of preparing and serving fish is readily available. The integration of a number of related subject areas as described here is consistent with those taught in the elementary school: local history, social studies, environmental studies, natural sciences. For secondary schools the aquarium offers even more imaginative possibilities. The reorganization of secondary education (from the age of 16+) in Norway enables secondary schools to offer a range of new optional studies. A number of these could have their starting point here. Some might appear to be rather academic or even abstract, but the very fact that one can avail oneself of living creatures in one's studies gives those studies a different perspective; clothes them with a reality which no text book, however well illustrated, can achieve. Just consider the possibilities that exist for the study of movement, of color change and camouflage, of courtship and mating, of the care and protection of the spawn, or the morphological character of the fish and their adaptation to light and dark, to vegetation, and to varying currents. Observations made in the aquarium will also constitute a good starting point for understanding

the fish's internal structure and physiology. And so on!

As a service the aquarium offers smaller, special-interest groups the opportunity to go behind the scenes. One can, of course, provide the same information and instruction by means of close-circuit television. However, understanding, practical insight and a feeling of involvement are best achieved by allowing people to wander around among the various technical devices, seeing for themselves. Such a scheme has its undoubted disadvantages in offering a good deal more noise and disturbance than is strictly desirable. However, the practice can always be discontinued if it should prove to have a negative effect on research projects. In principle I believe that a department such as ours ought to be public-minded and that complicated and difficult research projects should be left to the purely research institutions.

Running an aquarium is interesting and challenging work, especially when it can be given a wider dimension. We are now working on a scheme by which specially interested groups will be able to follow up their visit with various field activities (excursions, field study courses, etc.).

The River Glomma with its situation along the museum area is ideally suited for studies of the flora and fauna of running water, and other parameters within this type of ecosystem.

In this connection it is natural to mention our newly acquired center of timber floating, "Sorlistoa" at Lake Osen some 65 Km north of the museum, where a museum is being established. This property was purchased because of the concentration here of the multifarious activities of timber-floating on Lake Osen and its river systems. The site also offers potential for a combined natural history and cultural history instruction. Lake Osen is well stocked with fish with rich traditions especially within trout, powan and vendace fisheries. Communication

lines can thus be drawn between this field station and the aquarium and fishery department at the museum. Living accommodation necessary for field courses and other activities is being constructed. Relevant groups for these activities are school parties, hunting and fishing associations etc. Field courses in aquaculture will probably center on subjects like: 1) the use of drift and floating nets, ground nets, seines and pots; 2) investigation of lakes based on natural resources and fishery biology; 3) environmental studies (acid rain, pollution, hydro power regulation); and processing of fish haul.

#### Conclusion

Museums are in fact important service institutions. In my opinion aquaria should be considered in exactly the same way, and should be organized so as to promote the exchange of information, ideas and opinions, and to stimulate public interest. This cannot be adequately achieved by allowing the aquarium visitor to walk round, passively observing objects, illustrations, displays and fish tanks. It requires more - imagination, initiative, a willingness to go out to people - which the Norwegian Forestry Museum is endeavoring to do.

Of interest in this connection are the results of a public survey which the museum made in 1983. Among other things, this survey showed that the museum's exhibitions and displays appeal to people in all social classes and more than 85% of those interviewed had seen all the indoor sections.

The most popular section of the museum was the hunting, trapping and animal section. A clear second, however, was the aquarium.

With imaginative thinking aquaria (and museums) can be turned into first class teaching institutions whilst at the same time providing a considerable public service.

#### Appendix

Freshwater fish found in Norwegian lakes and rivers (imp. indicates that the species was not originally native to the country, but was deliberately introduced by humans).

1. Perch (*Perca fluviatilis*)
2. Asp (*Aspius aspius*)
3. Brook lamprey (*Lampetra planeri*)
4. Brook trout (*Salvelinus fontinalis*) imp.
5. Bream (*Abramis brama*)
6. Lake trout (*Salvelinus namaycush*) imp.
7. Brown bullhead (*Ictalurus nebulosus*) imp.
8. Lampern (*Lampetra fluviatilis*)
9. Silver bream (*Blicca bjoerkna*)
10. Pike (*Esox lucius*)
11. Zander (*Stizostedion lucioperca*)
12. Dace (*Leuciscus leuciscus*)
13. Goldfish (*Carassius auratus*) imp.
14. Grayling (*Thymallus thymallus*)
15. Four-horn sculpin (*Myoxocephalus quadricornis*)
16. Bullhead (*Cottus gobio*)
17. Ruffe (*Acerina cernua*)
18. Carp (*Cyprinus carpio*) imp.
19. Crucian carp (*Carassius carassius*)
20. Pacific salmon (*Oncorhynchus keta*)
21. Smelt (*Osmerus eperlanus*)
22. Vendace (*Coregonus albus*)
23. Burbot (*Lota lota*)
24. Atlantic salmon (*Salmo salar*)
25. Bleak (*Alburnus alburnus*)
26. Roach (*Rutilus rutilus*)
27. Pink salmon (*Oncorhynchus gorbuscha*)
28. Rainbow trout (*Salmo gairdneri*)
29. Arctic char (*Salvelinus alpinus*)
30. Powan (*Coregonus lavaretus*)
31. Chub (*Leuciscus cephalus*)
32. Alpine bullhead (*Cottus poecilopus*)
33. Three-spined stickleback (*Gasterosteus aculeatus*)
34. Nine-spined stickleback (*Pungitius pungitius*)
35. Tench (*Tinca tinca*)
36. Rudd (*Scardinius erythrophthalmus*)
37. Ide (*Leuciscus idus*)
38. Minnow (*Phoxinus phoxinus*)
39. Trout (*Salmo trutta*)
40. Twaite shad (Rare!) (*Alosa fallax*)
41. Allis shad (Rare!) (*Alosa alosa*)

## References for Further Information

Andersen, C. 1980: The Educational Function of an Aquarium. Report on Scandinavian Aquarium Symposium, University of Trondheim, 47-54.

Andersen, C. 1985: The Aquarium "Mountain lake to river estuary" in the Norwegian Forestry Museum - Forestry, hunting and fishing. 12 pp. [Presented at the International Symposium for Vivaristic May 24-28, 1985 in Tulln (Vienna), Austria.]

Andersen, C. 1985: From the public investigation in the Norwegian Forestry Museum 1983. 12 pp. [Presented at ICOM-CECA, Annual Conference Nov. 5-12, 1985, Barcelona, Spain.]

Andersen, C. 1987: Some aspects of fish farming in Norway. Vie Marine Hors serie no. 8 - 1987. Annales de la Fondation oceanographique Ricard, Ile des Embiez, Var-France, 58-72.

## Aquarium: An Educational Tool

A round table, very usefully augmented by comments from the audience, treated the question of the role of education in aquariums.

We all were, I believe, in accord on the central point: in performing the mission of the public aquarium, EDUCATION is an integral part. In accomplishing education, we saw five main questions:

1. What is the balance between recreation and education? The answer is simple: you need both. But up to now, frankly stated, education is lagging and needs more of our attention and resources. The example was given of France, where lack of government support for such education has put the burden on aquariums themselves. We must go forward!
2. Whom do you teach? No conclusion

was reached. Some pointed out that it was more efficient and cost effective to teach teachers. Others desired a focus on the children themselves. Above all, we all agreed that the *family* is a vital target. By introducing the ethics of conservation into the home, we increase the chance that the world of water will survive man's abuse.

3. How do you evaluate the success of your educational program? It is very difficult, but also very important. Three specific evaluation tools are mentioned:

- a) Scientific sampling of visitors, such as in quarterly exit surveys (sampling only yearly gives false results because of the different types of visitors in high and low seasons)
- b) Observation of visitors' interaction in front of specific exhibits.
- c) Intensive questioning of visitors to test the knowledge gained.

All this must be done by specialists. Additionally, it pays large dividends to make mock-ups of planned exhibits to see how sample test audiences react.

4. How do you handle the need to communicate with visitors speaking different languages? In this regard, after substantial discussion, we arrived at the conclusion that it is necessary to include the Latin (scientific) name on identification labels. Above that, a vigorous editing of interpretive material will hopefully permit making tests short enough so they can be reproduced and displayed in several languages.

5. What do we teach - biology, ecology, behavior, conservation or what? Again, the answer is everything, realizing that in fact very little learning does take place in any case. The message must be different for different occasions, but clearly conservation is KEY. Also, use of field trips, hands-on artifacts and interactive exhibits is very useful.

Education is an integral part of the role of an aquarium to pass any message on conservation, environment, pollution etc. to our visitors. One should anyway avoid submerging the visitor and not try to "over-educate" as this might lead to losing achievement of the primary goal which is the purpose itself of education.

## General Conclusion

## Addition of Artificial Coral and Mirrors to the Great Barrier Reef Tank of the Fort Wayne Zoo

by: Warren W. Pryor, Australian Adventure Curator, Fort Wayne Zoo, 3411 Sherman Boulevard, Fort Wayne, Indiana 46808

The Great Barrier Reef Tank is a 17,000 gallon aquarium containing artificial seawater and about 100 specimens of 25 species of Indo-Pacific fish. Airlifts circulate water through three filter beds (total area 12.3 m<sup>2</sup>) at about 10,000 gallons per hour. The display tank is rectangular: 25' long, 6' wide, 10' deep. Decorations are artificial fiberglass coral. The exhibit was opened to the public in June 1987. Due to miscommunication of a water level change during construction, the top 24" of the coral facade was lacking in the desired amount of detail. The decision was made in the autumn of 1988 to add detail to the upper 24 inches of coral facade.

Two methods were used to improve the appearance of the top of the facade. One was to install mirrors at strategic locations. The other was to add artificial coral to the facade.

### Mirrors

PVC angle stock was used to construct brackets to hold the mirrors (Fig. 1). The PVC brackets were suspended from 2' x 4' wooden brackets which serve as clips over the side of the tank (Fig. 2). The assembly was built to easily replace the mirrors in the future.

The coral facade was cut free from the wall at four locations and the brackets and mirrors were inserted between the wall and facade. The only part of the mirrors visible to the public is a narrow strip between water level and the top of the irregular cut through the facade, a maximum of about 6" (Fig. 3). This creates the illusion of water over and behind the wall, much like a partly submerged reef crest.

At this writing, the 1/4" plate glass mirrors are beginning to show the effects of

four months in artificial seawater: the silver is becoming pitted. Thanks to the design of the PVC brackets, however, these can be easily replaced with new mirrors.

### Artificial Coral

Pieces of artificial staghorn coral (*Acropora*) and potting holes were purchased from Richard Rush Studio, Inc. (168 N. Clinton Street, Chicago, IL 60606). Twenty potting holes were set in the facade by first drilling holes in the facade with a hole saw in a brace and bit. Six 1/8" holes were then drilled through the flange of the potting hole and into the facade (Fig. 4). Epoxy glue was applied to both the flange and facade and 3 nylon electrical ties were passed through pairs of 1/8" holes. The electrical ties zipped flange to facade, giving the glue time to set, and adding mechanical strength to the potting hole.

The epoxy glue (Aquatapoxy flexible gel, American Chemical Corp., Hamilton Court, Menlo Park, CA 94025) was mixed with lamp black

paint pigment (PTC, Color Corporation of America, Rockford, IL 61101) using 10 cc disposable syringes to manipulate the two parts of the epoxy. The mixed glue was transferred to a third syringe which allowed the scuba diver to easily control the epoxy underwater. The small amount of black pigment made the brilliant white glue a gray shade that blends well with the existing facade. Pieces of artificial staghorn were inserted into the potting holes after the epoxy set. These can be removed for periodic cleaning like many of the pieces of simulated coral in the exhibit.

### Conclusion

The addition of mirrors and staghorn coral greatly enhanced the appearance of our main display. The task was accomplished without disruption of the fishes on display, since all the work was done by divers, eliminating the need to drain the tank. One drawback is the need to periodically replace mirrors, so I welcome suggestions on extending the service of mirrors in seawater.

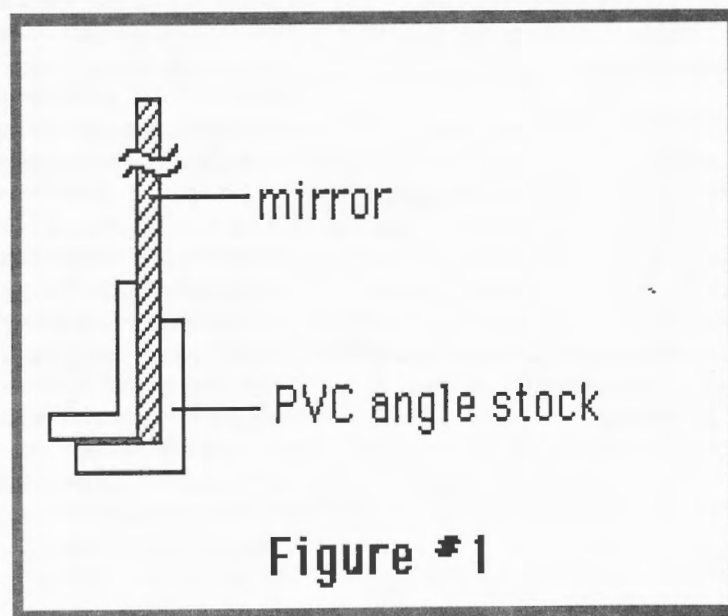
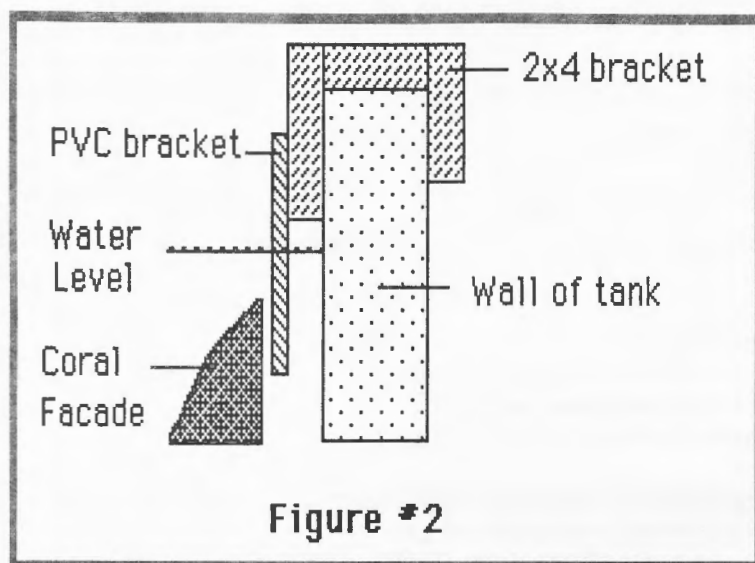
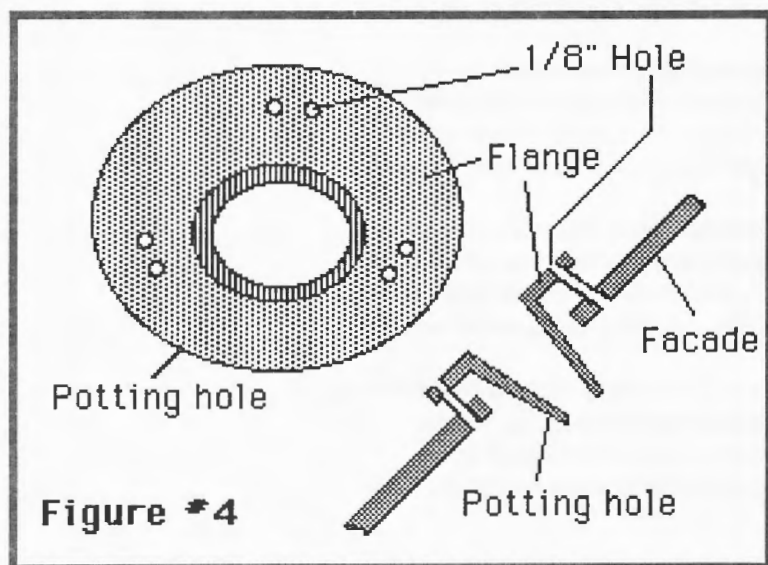
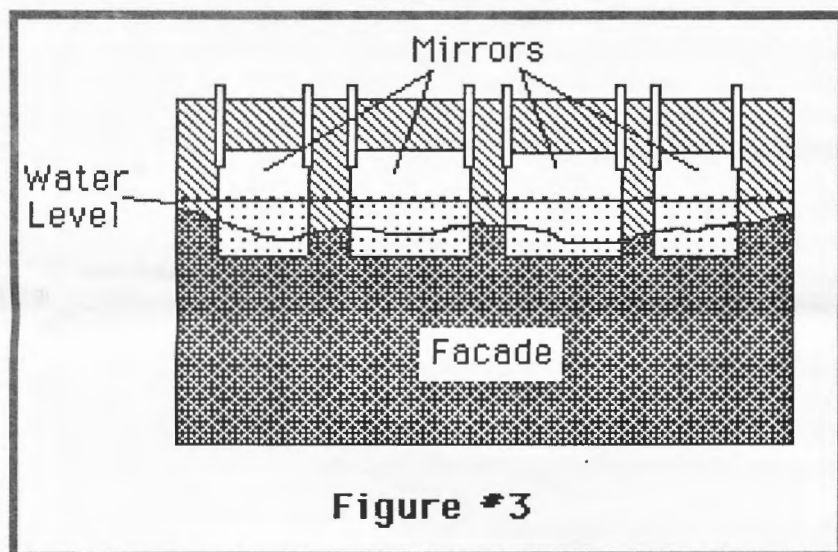


Figure #1



**Acknowledgements**

Thanks to Beverly Walker-Hunt and Gary Stoops for their skills in construction and scuba. Tanks also to Earl Wells and Jim Anderson for esthetic guidance, to Dan Morris for technical advice, and Judy Bennett for typing the manuscript.



## THE EDITOR

by: Jerry Corcoran [76077,500]

J.L. Scott Aquarium, Marine Education Center, Biloxi, Mississippi

'Twas a pleasant springtime evening, as pleasant as you could wish,  
At the first annual meeting of the forum on tropical fish.  
As the lies and fishy stories spread around the room,  
A vagabond crept slowly in, his face was filled with gloom.

"Where did it come from?" someone said. "A seine has dropped it in".  
"What does it want?" another cried, "some scales, gills or a fin?"  
"Here dogfish, get him, if your stomach can stand the stench-  
I wouldn't touch him with a dip net, or even with a tench".

This bad-mouthing the poor wretch took with stoical good grace;  
In fact, he smiled as tho' he thought he'd found the proper place.  
"Come, boys, I know there's kindly hearts among so good a crowd -  
To be in such fine company would make a porpoise proud.

"Give me a drink - that's what I want - I'm fresh out of fish, you know,  
When I had the means to treat the gang, this hand was never slow.  
What? You laugh as if you thought I know nothing about tropical fish;  
I once was fixed as well, my boys, as any of you could wish.

"There, thanks, that braced me nicely; God bless you one and all;  
Next time I pass this fish place I'll make another call.  
Give you a song? No, I can't do that; my singing lacks some clout;  
My voice is cracked, my throats worn down, and my gills are all dried out.

"Say! Give me another brandy and I'll tell you what I'll do -  
I'll tell you a funny story that'll really tickle you.  
That ever I was a decent man not one of you would think;  
But I was, some four or five years back. Say, give me another drink.

"Fil 'er up Joe, I need some more life in my frame -  
Such little drinks to a bum like me are miserably tame;  
Five ounces - there, that's the way - and beautiful brandy too.  
Well, here's luck my boys, and barkeep, my best regards to you.

"You've treated me pretty kindly and I'd like to tell you how  
I came to be the dirty sot you see before you now.  
As I told you, once I was a man with muscle, frame and health,  
And, but for a blunder, should have made considerable wealth.

"I was a 'quarist - don't you know - not messing with guppies and such,  
But an artist, and for my age, was noted for my touch.  
I worked hard at my tanks, just as hard as I could.  
And included in my displays plastic, rocks and wood.

"I designed a set-up, perhaps you've seen, 'tis called the "Ultimate Tank".  
It made me a fortune at the time, and added to my bank.  
Then I joined a club - now comes the funny part -  
Whose promises petrified my brain and sank into my heart.

"Why don't you laugh? 'Tis funny that the vagabond you see  
Could ever join a club or have a club take me.  
But 'twas so, and for a year or two, I enjoyed the club newsletter,  
And when I was given half a chance I said I could edit it better.

"Boys, did you ever see an article that you churned out,  
Get into print the very next month with nothing turned about?  
Without so much as a comma changed and the tenses left alone?  
If so, you know how I felt, for it thrilled me to the bone.

"I put out the word both far and wide for articles to print,  
For I thought deep down the members would love to give a hint -  
About their fish or tanks or plants or just to see their name -  
In such a fine newsletter, it could have led to fame.

"I was waiting for an article, one afternoon in May,  
When the mailman said for the fiftieth week, 'there's nothing today'.  
So I sat down again and wrote, for I thought that I had better  
Try to come up with something more to fill the blank newsletter.

"It didn't take long to realize, and before the year had diminished,  
That any writing would be done by me or the newsletter go unfinished.  
And when two years of misery had passed above my head,  
The newsletter so lovingly prepared was seldom ever read.

"That's why I took to drink, boys. Why, I never saw you smile,  
I thought you'd be terribly amused, and laughing all the while.  
Why, what's the matter friend? Is that a teardrop in your eye?  
Come, laugh with me; 'tis only babes and women who should cry.

"Say, boys, if you give me another brandy I'll be glad,  
To show you all the unanswered pleas that finally drove me mad.  
I'll show you all the letters, begging for just a few lines,  
About breeding or cleaning, about guppies or cichlids or how a starfish dines.

Another brandy, and with ink stained hands, the vagabond began  
To build imaginary aquascapes, all complete with sand.  
Then, as he placed an imaginary rock upon the missing stratum -  
With a fearful shriek, he leaped out the door, and since then no ones seen him.

## Aquatic Data Center Is Here!

by John Farrell Kuhns [76702,447], Assistant Manager, Aquatic Data Center

In August FISHNET premiered a new supplemental reference area to the Aquaria/Fish Forum named the AQUATIC DATA CENTER. This new area features some database-like areas for literature abstracts, business directories, identification/information guides for fishes (and invertebrates and aquatic plants), society profiles and a publication guide. ADC will also feature the exclusive and recently updated Fish Drug Index Service (derived from the original FISHDRUG/TXT database) as well as the *CODEX of Fishery Chemicals*.

FISHNET unveiled the AQUATIC DATA CENTER on Monday, August 7, 1989. On this date, the navigational command "GO FISHNET" was replaced with two separate "go" words; for the standard Aquaria/Fish Forum it is now "GO AQUAFORUM", and for the Aquatic Data Center is "GO AQUADATA". For members using TapCIS or CIS Navigator you'll need to modify the internal reference for the Aquaria/Fish Forum as well as add the AQUATIC DATA CENTER. Full details on how to do this have been posted online.

The following information has been taken directly from the various announcements which can be found in AQUADATA:

### General, welcoming information about the Aquatic Data Center:

== Welcome to the AQUATIC DATA CENTER! ==

You are about to access one of the most exciting reference areas available online for aquarists, hobbyists, fishery scientists and professionals. As a natural adjunct to the ever growing diversity of the Aquaria/Fish Forum, the AQUATIC DATA CENTER is a unique collection of reference resources.

=== What is the AQUATIC DATA CENTER? ===

The AQUATIC DATA CENTER is a special collection of several database areas containing a wealth of reference material. Each of the databases has been constructed using standard CIS forum library structures. All of the usable data is contained in these libraries while the Message area and Conference areas have been set aside to help assist members in learning and accessing the available data.

With its premiere, ADC offers several database resources including :

- #1 - Abstract Service
- #2 - Business Directory
- #3 - *CODEX of Fishery Chemicals*
- #4 - Fish Drug Index Service
- #5 - ID Guide - Fish
- #7 - ID Guide - Invertebrates
- #9 - Publication Guide
- #10 - Society Directory

Initially, ADC has over three hundred data files with additional ones being added daily. The ADC Staff projects that by January 1, 1990 there will be over 2,000 data files.

=== How Do I Use ADC? ===

Each database has been configured for quick reference using the standard BROWSE and SCAN commands. Check the Description file for each database for a full explanation on how to use these commands.

= Help and Assistance =

Message Section 1 - ADC Help Center - has been established to answer questions about using ADC. Messages posted to this area will usually be answered within 24 hours.

If you need more immediate help, please check the STATUS to see if there is an ADC Staff member online. If available, the Staff member will be able to offer assistance to you in the ADC Conference Room.

= Voice Help Line =

FISHNET offers a Voice Help Line at (205) 381-4945 from 9 AM to 9 PM (CDT). If you are having problems using ADC, please call the Help Line. The Help Line operates seven days a week.

= Suggestions? =

If you have any suggestions for improvements in ADC, please leave a message addressed to "Sysop". Also, if you have access to additional files and materials that could be considered for inclusion in the ADC database, please leave a message to "Sysop".



**The Aquatic Data Center Message Board**

There is only one Message Section currently in use, Section 1 - Using ADC. Any questions on how to use ADC will be answered here. Please address inquiries to "SYSOP".

An ADC Staff member will usually answer your question within 24 hours.

**The Aquatic Data Center's Conference Area**

This area of ADC is set aside for real time exchanges between members. Currently there is one Conference Room - ADC Help Center - which is accessible by all members using ADC. If you have questions about how to use ADC, check this area to see if there is a Staff member online available to assist you. Feel free to drop in and ask questions of Staff members. Periodically the ADC Staff will host online training sessions to help instruct members on effective ways to use this special reference area.

== Helpful Hints ==

Use -

/HELP for a list of CO commands.  
/USERS ALL to display a list of all members online  
/EX to exit the CO area and return to ADC's main menu  
/OFF or /BYE to log off CIS

**The "Heart" of the Aquatic Data Center - Its Libraries**

Here is a brief listing of additions to the ADC databases during the last thirty (30) days.

== #1/Abstract Service ==

(Steve Meyer, Manager)

100061 Fish Diseases, etc.

== #2/Business Directory ==

(Bill Rogers, Manager)

200005 Profile - Aquarium Products, Inc.

== #3/CODEX of Fishery Chemicals ==

(John Kuhns, Manager)

300002 Monograph - Malachite Green Oxalate

== #4/Fish Drug Index Service ==

(John Kuhns, Manager)

400005 References on Erythromycin

== #5/ID Guide - Fish ==

(Laura Sawyer, Manager)

500020 ID Entry - *Betta splendens*

== #7/ID Guide - Invertebrates ==

(D.J. Curtiss, Manager)

700020 ID Entry - Mantis Shrimp

== #9/Publication Guide ==

(Chuck Lawson, Manager)

900101 Abstract - *All About Bettas*

== #10/Society Directory ==

(Art Deacon, Manager)

A00020 Profile - Bucks County Aquarium Society 83

**Submissions**

The ADC Staff invites you to submit material for inclusion in the ADC databases. For more information on submission procedures, please leave a message to "Sysop".

1) ABSTRACT SERVICE - This database provides an extensive, but relatively specialized, collection of literature abstracts drawn from several sources. The core of the collection has been, and will continue to be, uploaded from the United States Fish and Wildlife Service (USFWS), and consists of abstracts of papers and articles relating primarily to all aspects of aquaculture, aquaculture and mariculture. These abstracts have been taken from scientific journals, governmental publications, professional/trade publications and newsletters.

2) BUSINESS DIRECTORY - This database includes profile entries consisting of names, addresses, FAX and phone numbers, CompuServe PPNs (if available), and some brief background information for those businesses who sell fish, plants, supplies or other services that are of value to aquarists. The database is searchable by name, city, state or "type" of business. The database divides businesses in the following "type" categories:

RETAILER - Any pet shop or fish store that has both a business address and regular business hours.

MANUFACTURER - Any company that either manufactures or imports dry goods items of interest to aquarists.

MAILORDER - Any company that offers any of the various dry goods products through mailorder.

FISH - Any supplier of live fish including private breeders, hatcheries, farms or importers.

SERVICE - Companies or individuals that offer special services such as Pond or Aquarium Maintenance.

PLANTS - Distributors or growers of either aquarium or pond related live plants.

MISC - Any business that does not fall into one of the above categories.

3) CODEX OF FISHERY CHEMICALS - This database contains the full text of the CODEX of Fishery Chemicals and is the only electronic version of this compendium of specifications and test methods for aquaculture and fishery drugs and chemicals. Each entry consists of information taken directly from the original, print version, and will include specifications, tests of identity and purity, recognized uses, and treatment levels, a selected bibliography, and graphical representations of the molecules.

The CODEX of Fishery Chemicals will be of interest to everyone making, selling, or using fishery chemicals, including aquarists, fish farmers, aquatic researchers and veterinarians.

4) FISH DRUG INDEX SERVICE - The basis for this database is the copyrighted FISHDRUG/TXT, a computer generated bibliography of all of the drugs and chemicals used in the treatment of fish diseases. This database is internationally recognized as the only file of its kind.

Fish Drug Index Service is a searchable database organized by name of compounds followed by the attendant bibliographic information needed to obtain full-text reprints or copies from libraries, authors or publishers.

The literature covered by Fish Drug Index Service comes from all sources in which fish disease treatments are covered. These include so-called "published" sources (primarily professional and technical journals) and "unpublished" sources (trade magazines, consumer publications, government pamphlets, and manufacturers' product literature). The file's indexing is based solely upon the compound names as printed in the given bibliographic source: no editorial corrections are made for known or suspected misspellings in the original sources, and all synonyms listed are taken only from each source's text.

The database files are provided in two formats for ease of search. One format is to collect all drugs and chemicals beginning with the same first letter (i.e. "M" for Malachite Green) in a single file (all numeric drugs and chemicals have been collected in a single file). The second format compiles all references on a single drug or chemical into a single file. This is done by the ADC Staff (as time permits) and involves a subjective determination of which entries should be interrelated.

5) ID GUIDE - FISH - This database of the ADC is the most ambitious of all of the database areas which are included in the system. In simplest terms, the ID Guide database consists of individual files on each of the described species of fishes. While always in a state of development as new species are described and others reclassified, this database normally involves the addition of nearly 100 new entries each month.

An individual file consists of the species' common and

scientific name (Family/Genus/Species). As the files are more fully developed additional information will include a physical description, behavior, geographical information, aquarium maintenance requirements (including breeding and nutrition) and other general information.

7) ID GUIDE - INVERTEBRATES - This database of the ADC is another ambitious project which is included in the system. In simplest terms, the ID Guide database consists of individual files on each of the described species of invertebrates. While always in a state of development as new species are described and others reclassified, this database normally involves the addition of several new entries each month.

An individual file consists of the species' common and scientific name (Family/Genus/Species). As the files are more fully developed additional information will include a physical description, behavior, geographical information, aquarium maintenance requirements (including breeding and nutrition) and other general information.

9) PUBLICATION GUIDE - This database contains information on books and texts of interest to aquarists and related fishery sciences. There are two types of files in this database. One type consists of an "abstract" of a particular book or text that includes information on author/editor, book length, publisher and date of publication. When available a synopsis of the book is included. The second type of information includes full-text of selected book reviews.

The files in this area are searchable by either author/editor name or significant words in the book title.

10) SOCIETY DIRECTORY - The area includes reference files on selected local and national aquarium societies as well as professional and trade organizations. The profiles contain information about the group's charter, activities, meeting locations and time, publications, and other relevant information. The files usually provide an up-to-date membership application as well as information about dues/fees.

Information on local aquarium societies is searchable according to city and state while that of national specialty groups may be searched according to name or specialty area.

#### How to Join ADC

Upon first entering the Aquatic Data Center each first time visitor will be presented with a "Visitors Menu". Anyone who wishes to join in can just select menu item #5 and come aboard to a very special and exciting place! For those using the new forum software only option #8 need be selected from the Forum function prompt. Membership in ADC is open to everyone who has use for the information contained therein. Beyond the regular CIS connect and time charges there are no additional charges for accessing the information in ADC. This area features several database-like

segments that serve as a primary reference resource for aquarists, hobbyists, fishery scientists and professionals.

The ADC Staff asks that everyone register using both first AND last names.

#### The Aquatic Data Center Managers and Staff:

John R. Benn/ADC Manager

CIS ID# 76703,4256

Address : 102 Hiram St., Sheffield, AL 35660

Phone : Home - (205) 381-4945 Office - (205) 764-4011

Computer: Apple Macintosh Software: Red Ryder, CIS Navigator

Personal: Attorney, IBC, ACA (ACA Trading Post Editor)

John Farrell Kuhns/Asst. ADC Manager

CIS ID# 76702,447

Address : 7601 East Forest Lakes Drive, N.W., Parkville, MO 64152

Phone : Office - (816) 842-5936 Home - (816) 891-6671

Computer: home: Kaypro 286i (running TapSYS)

office: Huyndi 286C (running TapSYS)

David L. Hendrickson/Publicist

CIS ID# 74446,3626

Address : 3259 S. Swain Court, Milwaukee, WI 53207

Phone : Home - (414) 744-1949 Office - (414) 771-9850

Computer: IBM PC Software: TapCIS, Procomm 2.4.2

Bill Rogers/Business Directory

CIS ID# 76446,111

Address : 2212 Lakeside Ave. N.W., Canton, OH 44708

Phone : Home - (216) 454-7722 Office - (216) 453-9031

Computer: Commodore Amiga 1000 Software: Whap!, Access!

Art Deacon/Society Directory

CIS ID# 73647,3647

Address : 63 Green Meadow Blvd., Middletown, NJ 07748-3147

Business: AT&T Bell Labs, Crawfords Corner Rd. HO2D423, Holmdel, NJ 07733

Phone : Home - (201) 957-0435 Office - (201) 949-5947

Computer: AT&T PC 6300 (MS-DOS) Software: CTRM

Chuck Lawson/Publication Guide

CIS ID# 71511,2117

Address : 3303 Lemmontree Lane, Plano, TX 75074

Phone : (214) 424-4090 (eves/weekends)

Computer: AST Premium 286 Software: TapSys, Telix

Macintosh SE Software: ZTerm

Personal: Software Design Engineer; Membership Chair, Texas Cichlid Assoc.

Steve Meyer/Abstract Service

CIS ID# 73117,3720

Address : 19 Axdell Road, Sudbury, MA 01776

Phone : Home - (617) 443-4026 Office - (617) 253-8078

Computer: Tandy 2000, Tandy 200 Software: Telecommuter

Laura Sawyer/ID Guide - Fish

CIS ID# 72277,2445

Address : 3616 Beech Run Lane, Mechanicsburg, PA 17055

Phone : (717) 732-3908

Computer: Dell 220 AT clone, IBM PC, Commodore 64

Software: TapCIS

D.J. Curtiss/ID Guide - Invertebrates

CIS ID# 71041,2034

Address : 1801 Madison, Evanston, IL 60202

Phone : (312) 864-2308

Computer: Apple Macintosh Software: CIS Navigator, Microphone

**DRUM & CROAKER**  
**c/o FISHNET**  
**102 Hiram Street**  
**Sheffield, Alabama 35630**