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# Captive Husbandry of the Japanese Reef Squid at The National Aquarium In Baltimore by Mark S. Verbin, Aquarist

The Marine Biomedical Institute, operating under the University of Texas Medical Branch, has recently made available hatchlings of the Japanese Reef squid *Sepio-teuthis lessoniana*. The National Aquarium in Baltimore (NAIB) has acquired a small group of these animals and this article will report on the captive husbandry they require.

Sepioteuthis lessoniana is found in and around the Sea of Japan. They are an inshore species that frequently encounter vertical barriers. This is the basis for their suitability for a captive existence. Unlike the more pelagic Loligo sp., Sepioteuthis is able to spend much of its time hovering or moving calmly about the tank, thus reducing the chances of impact with the tank walls. The more pelagic species have a greater tendency to collide with the walls of the tank, causing abrasions which lead to bacterial infections and ultimately death.

S. lessoniana are large animals. At maturity they can achieve a mantle length of 14.2 inches. Growth rates are impressive even for a cephalopod. Young individuals gain 7-12% body weight per day. A weight of 2.2 lbs. can be achieved in about six months. Maturation comes quickly with first matings being observed as early as 130 days post hatching and spawning as early as day 153. The average life span of S. lessoniana is 8-9 months when kept at a temperature between 68-77° F. Hatchlings were shipped from Galveston to Baltimore at an age of two months and had an average mantle length of 2.5 inches. A total of ten animals were shipped Federal Express. Total transit time was 15 hours. The squid were slightly anesthetized using magnesium chloride. Smaller squid were packed two per quarterbag. Two larger animals were packed singularly in quarter bags.

The squids were acclimated to tank water in the shipping bags. Acclimation took approximately 30 minutes per bag. When temperatures were equivalent, the animals were transferred to the tank inside a plastic container. It seemed best not to remove the squid from the water. It also appeared to be less stressful on the squid if the transfer container was held at a 45 degree angle as opposed to being held straight up and down. This aided in deterring the animal from jetting backwards inside the transfer container. Many of the squid inked as soon as they were in the water.

One of the large animals arrived DOA. Apparently it had aspirated its own ink during transport. The shipping water was only slightly cloudy, however, the mantle was filled with ink, suffocating the animal. A second animal died with 30 minutes of being transferred into the tank after it collided violently with a wall. *S. lessoniana* require a round tank of at least 6 ft. in diameter, however, larger tanks are desirable. Here at NAIB we use an 8 ft, 1000 gallon tank to house eight individuals. The interior of the tank is coated with black Gelcoat. The squid are quite demanding in terms of water quality. They require water free of particulate material, as well as low levels of dissolved organics. Their tolerance of nitrogenous wastes is also quite low, hence filtration systems that are to be used on tanks containing squid should contain elements for mechanical, biological, and chemical filtration. Ultraviolet sterilization is also recommended to reduce the bacterial load in the water.

The concentration of nitrate is of particular concern. Nitrate levels must be maintained as low as possible, below 10 ppm, measured as nitrate-nitrogen. The total effect of high nitrate concentrations is unknown, however there is evidence to suggest a form of nitrate irritability. In concentrations above 10 ppm NO<sup>-</sup><sub>3</sub>-N, the squid tend to ink more often and appear to be more nervous.

At NAIB, water leaves the tank via a 4" stand pipe where it flows into a reservoir of approximately 100 gal. A 3/4 HP pump delivers the water to a Hayward S-240 rapid sand filter. The water leaves the sand filter and is divided, the majority of the water is passed over activated carbon or through a large foam fractionator before returning to the reservoir. The remaining water is passed through a 120 watt U.V. sterilizer then delivered to a trickle filter. The water then gravity feeds back into the tank through a spray bar fitted vertically against the side of the tank.

The spray bar produces a gentle circular flow that is very important in helping to accumulate wastes and food remains towards the center of the tank where they can be siphoned easily. It also helps to keep the animals toward the center of the tank and off of the walls.

Flow rates are currently 600 gal/hr into the tank. This flow rate will increase as the squid get larger. Flow rates must not be so high as to create a violent vortex where the water enters the standpipe. If this happens, the squid can easily be trapped against the sides of the standpipe strainer.

It is very important to protect the squid from outside disturbances as well as protecting them from jumping out. Disturbances can frighten them, causing a panic response that can lead to impact damage. Disturbances also cause the squid to ink. The tank is equipped with a 3 ft jump barrier around the entire perimeter which is covered with a black curtain to prevent outside disturbances. The PVC stanchions that support the barrier have been painted black so they are not visible to the squid.

The tank has two viewing windows, one at either end. These are kept covered with black plastic to limit the effects of outside commotion.

The tank is fitted with an 1.5 inch bulkhead fitting situated 1 inch below the level of the standpipe. This is used to carry out flow through water changes, eliminating the need to drop the water level in the tank. Water changes (25%) are performed as least once a week suing synthetic sea water.

The tank is illuminated 24 hrs a day by a 150 watt outdoor flood lamp. The constant illumination is crucial in preventing impact damage. This provides the squid the light needed to see the walls of the tank at all times and prevents any sort of shock that might be caused when the rest of the lights in the gallery are switched on in the morning. The lack of photoperiod does not seem to have any adverse effects on the animals.

Sepioteuthis lessoniana will accept live food only. The squid rely on the jerky movements of the prey items to get their attention. Once the animals are aware of the presence of food items, they move into position and seize the prey with the tentacles. The food is then drawn into the beak, suing the arms to handle it. More than one food item may be handled at a time. The souid are able to catch prey items 1/2 their mantel length and smaller. It is better to feed smaller food items as this reduces the amount of resistance the souid has to deal with. These animals can become "bored" with the same food items day in and day out, so it is necessary to provide them with some variety. When they do become bored, food intake drops.

Currently at the NAIB, we are feeding our animals feeder guppies as well as grass shrimp. As they grow larger, we plan to use feeder goldfish, killifish, crayfish, etc. The squid are fed 3-4 times daily. The largest feedings are the first two, with the p.m. feedings being smaller. The squid feed best when unobserved. Even the slightest motion is enough to draw their attention away from the food.

It is important to note that the squid are messy eaters, and siphoning of debris is a daily task. The rapid sandfilter on the tank is backwashed every 2-3 days. The squid will often catch a fish, only to chew it for a while and then discard it. This tends to happen more during the feedings in the p.m.

There has been very little work done as far as treatment for squid medical problems and the results have not been very effective. As mentioned earlier, the most common problem is the treatment of bacterial infections that are the result of trauma. Infections are most commonly caused by *Vibrio*, *Pseudomonas*, and *Aremonas sp.* These bacteria readily invade open wounds. There has been some degree of success treating bacterial infections with chloramphenicol in the food. Squid blood does not clot, therefore,the loss of fluids through open wounds is also a problem. Few studies have been conducted on the cephalopod immune systems. From the information collected, it seems that squid do not possess what would be called an aggressive immune system. The best treatment for all of these problems is prevention.

The behavior of the Japanese reef squid is by far their most interesting attribute. When calm the squid position themselves with their arms held together either straight out or somewhat sloped downward. The outermost arms may oscillate back and forth. The coloration that is usually seen associated with these body postures is somewhat translucent with green iridescent markings about the dorsal surface of the mantle. The internal organs can be viewed in detail. When he squid become agitated they tend to take on a more ominous body posture. The arms will be held somewhat played out and somewhat flattened, either four on each side with the tentacles somewhat displayed in the center, or with the arms and tentacles being held out in front of the head equidistant apart. These body postures usually coincide with a darkening of the dorsal mantle and the appearance of 2-4 dark bands on the ventral mantle. There may also be prominent false eyespots displayed on either of the outermost arms. These are only a few of the many dramatic poses that the squid display. What they all mean, no one can be sure. Hopefully, with accurate observation, some patterns can be distinguished.

The degree to which the squid interact with each other tends to increase as maturity is reached. When the animals become sexually mature, there are bound to be male-male conflicts as well as male-female interactions. These interactions can be somewhat dangerous in that they may result in injuries. Theoretically, a population made up of only females will result in a decrease of these types of harmful interactions. This is difficult to achieve

for two reasons. First, a slight sexual dimorphism becomes apparent only after maturity is reached. Secondly, the mature squid do not react favorably to being transferred to a new tank. Operations of this type would, in all probability, result in some type of trauma.

There has been some problems with larger squid intimidating smaller ones. The smaller animals go off their feed and in the end are consumed by their larger tankmates. This type of interaction is inevitable and little can be done to alleviate it. The addition of artificial plants as hiding places for smaller squid may help.

The squids ability to ink has caused no real problems. With the exception of when they were first introduced into the tank, no more than one animal has been seen inking at any given time. They will not hesitate to release a small cloud of ink if they are frightened. Often a small cloud will be released after the capture of a food item. The ink is somewhat buoyant and is easily removed in a system that is surface skimmed. Activated carbon will also remove the ink from the water.

The squid will become quite

# American Elasmobranch Society Annual National Inventory

The American Elasmobranch Society is creating an official national inventory for captive skates,rays, and sharks in the United States.

The national inventory will be divided into regions and your help is needed to facilitate the inventory process within the Great Lakes region, which includes the states of Michigan, Ohio, Indiana, Illinois, Iowa, Wisconsin, Minnesota, Kentucky, and Missouri. If you are an elasmobranch aquarist or know of other elasmobranch aquarists, professional or hobbyist, please fill out and return the attached form.

All participants in the AES National Inventory will receive the compiled national inventory upon its completion. tolerant of routine husbandry tasks that are performed in their tank. It is important to move slowly when working around them. Once they have become accustom to a certain motion or activity they are not disturbed by it. It is when they are presented with something new that there is the danger of causing a panic response.

The husbandry of *Sepioteuthis les*soniana is relatively straight forward as long as careful attention has been paid to the design of the system they are to inhabit and to the supply of food. These large animals are very impressive display animals and their suitability for a captive existence is, to this point, unsurpassed by any other squid.

I would like to thank the staff of the Marine Biomedical Institute for their help in developing this program at the NAIB. Special thanks to Drs. John Foresythe and Phil Turk, as well as to Bill Browning. The model that our program is based on belongs to them. It has been their hard work and perseverance that has given us the opportunity to keep these interesting and delicate cephalopods.

# News from Cleveland Metroparks Zoo

The Cleveland Metroparks Zoo has been awarded an Institute of Museum Services grant to gather, organize and interpret pertinent information concerning captive breeding of the Australian lungfish, *Neoceratodus forsteri*.

The International Australian Lungfish Breeding Workshop was held at the Zoo on May 9-11. For information, please write, phone or fax: Supervisor, RainForest & Aquatics; Cleveland Metroparks Zoo; 900 Brookside Park Drive; Cleveland, OH 44109; 216/661-6500; FAX# 216/661-3312

### **Regional Aquatics Workshop**

The Regional Aquatics Workshop met September 4-6, 1991 on South Bass Island, Lake Erie, Ohio. R.A.W. is an informal meeting of aquarium personnel and professionals from related fields. This fall's agendaincluded exploring the use of a state fish hatchery on Lake Erie as a public education center and possibly to propagate native endangered species. For further information contact Doug Warmolts, Columbus Zoo, 9990 Riverside Drive, Box 400, Powell, OH 43065-0400.

	AMERICAN ELASMOBRANCH SOCIETY ANNUAL NATIONAL INVENTORY		
NAME			
ADDRESS			
PHONE			
Please return	this form to:	Beth Firchau AES Inventory Regional	Coordinator
		Johnson Aquatic Compl	ex
		Columbus Zoo 9990 Riverside Drive Powell Obio 43065	

# Newsletter of the Lake Victoria Research and Conservation Program - 1991:1 May From the Editor

This is the third issue of "The Grim Reaper." The Reaper began as a round robin newsletter for the Lake Victoria Captive Breeding Specialist Group. However, the project has grown quickly toward the goal of a Lake Victoria Research and Conservation Program (LVRCP) with research, conservation, restoration, and education components, both in Africa and abroad. The goal of LVRCP is to rescue a portion of the native fauna, from extinction, and to restore these species to some self-sustaining role in the ecology and economy of the Victoria Basin. Whether or not they can ever be successfully reestablished in the lake proper is a matter for seers more than scientists at this point.

The Reaper will now assume the role of newsletter for that effort. If participants have items to contribute, they are asked to submit them by heading, as a WordPerfect file on MS-DOS computer disk (the little ones ship more safely). The headings are:

#### I. RESEARCH

A. Limnology and Ecosystems Dynamics

- **B. Ecology and Functional Morphology**
- C. Evolutionary Biology
- D. Nomenclature

#### **II. CONSERVATION**

- A. CBSG action items
- B. Husbandry notes and comments
- C. News from field breeding centers
- D. Food fish restoration programs
- E. Status and trends of native fishes

#### **III. EDUCATION**

A. Museum, aquarium and zoo interpretive programsB. Media and public relationsC. Training opportunities

#### **IV. ADMINISTRATION**

- A. Directory of participants
- B. Major new initiatives
- C. Upcoming meetings and seminars
- D. Field schedules

#### I. RESEARCH

There are presently three centers of multinational research activity, one in each country. The Haplochromine Ecology Survey Team (HEST/TAFIRI) is continuing their work out of Mwanza Gulf, Tanzania, but most of their activities are presently taking place at the University of Leiden, including laboratory research, description of new taxa previously discovered, and publishing of results. HEST is led by Dr. Kees Barel, with major contributions by Drs. Frans Witte, Els Witte, Martien van Oijen, Tys Goldschmidt, Geerit Anker, Kees Goudsward, and many others.

Research on the northern portion of the lake (Kenya and Uganda) is proceeding under the auspices of The Lake Victoria Research Team (LVRT), with Kaufman presently serving as Team Leader. The work in Kenya is in collaboration with two government institutions: the Kenya Marine and Fisheries Research Institute (KMFRI) in Kisumu, and the National Museums of Kenya in Nairobi and Kisumu. The Kenyan PI (principal investigator) is Mr. Peter Ochumba (physical limnology), joined by his colleagues Mr. Andrew Asila (fisheries) and Dr. James Ogari (fisheries), who is the regional director for KMFRI. The national director of KMFRI, Dr. Ezekiel Okemwa, has provided invaluable assistance and it is hoped that he might be able to become more directly involved in the project very soon. Mr. James Maikweki of the National Museum has been active in the project since its inception. Dr. Stephen Njuguna, Associate Director for the National Museum, has expressed interest in eventually becoming personally involved in the research, but has already been very helpful in administrative matters.

Work on the Ugandan waters of Lake Victoria is being carried out by a large and very enthusiastic team at the Ugandan Freshwater Fisheries Research Organization (UFFRO) in Jinja, with Dr. Fred Bugenye, Dr. Pereti Basasibwaki, and Dr. Richard Ogutu-Ohwayo the principal participants. Dr. Bob Hecky played the major international role in advancing limnological work at Jinja. LVRCP also has a member-at-large in western Uganda, Dr. Lauren Chapman of Harvard University, who is attached to the Kibale Forest Project. With aid from US-AID, Lauren and our Ugandan colleagues are exploring the fishes of the crater lakes, and will hopefully be @8 able to lead expeditions to Lakes Edward and George as well.

International scientists in both the Kenyan and Ugandan LVRCP activities include, beside myself: Dr. Bill Cooper (Michigan State University, fisheries and ecosystems), Dr. Bob Hecky, Great Lakes Laboratory at Winnipeg (limnology), Dr. Moshe Gophen, Lake Kinneret Limnological Laboratory (phytoplankton and zooplankton dynamics), and Dr. Lauren Chapman of Harvard. We are hoping for continued involvement by the Museum of Natural History (formerly the British Museum of Natural History), and Dr. Humphrey Greenwood is an honorary team member who has expressed some vulnerability to being cajoled into renewed activity on Victoria. Several graduate students are now involved. Mr. Paul Sackley, University of Massachusetts at Boston, has thus far been the most active American student on the project. Mr. Ionis Batjikas of Southeastern Massachusetts University, is planning to work on Oreochromis in Lake Victoria.

The LVRT and HEST cooperate fully, although it may be a while before the full potential of this exciting collaboration can be realized because of staff and financial constraints. The most important thing is that research efforts by the three fisheries research organizations (KMFRI, UFFRO, TAFIRI) and their multinational collaborators is a

group effort, though fundraising, development and training, and research activities are likely to remain at least partly self-standing within each country.

A. Limnology and Ecosystem Dynamics During 1990, the LVRT launched three major expeditions on Lake Victoria and about nine others that were more restricted. There have also been monthly sampling runs during 1991, although the Kenyan work was impeded by serious engine problems on the UTAFITI, which will require about \$7000 worth of repairs, money that we do not have at the moment. The major expeditions were dedicated to limnological survey, visual reconnaissance by remote operated vehicle (ROV), successful coring of the lakebottom's surface sediments, and a variety of other tasks. All expeditions carried out hydrological and meteorological survey and a limited fisheries survey by means of trawls and traps.

The results of the limnological survey work are now being compiled. Bob Hecky has assumed responsibility for drafting the first manuscript synthesizing data on oxygen depletion in the lake. The lake below 30m depth appears to be consistently oxygen depleted for most of the year; this is but one of a cluster of profound limnological alterations to the lake since the late 1960's, when Talling collected important baseline data. Above 30m the lake exhibits a fourfold increase in productivity and turbidity over the past three decades. The cores confirm that the major limnological changes were very recent, almost certainly after the early 1960's, but the precise chronology with respect to Nile perch impacts has yet to be worked out.

B. Ecology and Functional Morphology The laboratories of Barel, Kaufman, and Husseyne are collaborating on a study of bone plasticity in *Astatoreochromis*. Paul Sackley (Boston) and Jan Smit (Leiden) are both working on experimental theses as part of this project.

Huber and Kaufman (Boston) are about halfway through a comparative morphometric study of brain morphology in the east African great lake cichlids, including those of Lake Victoria. We have also begun experimental work on *Haplochromis argens*, to see if there are dark-induced changes in brain morphology. Henny Van der Meer in Leiden has already demonstrated changes in the retinas of dark reared *H. argens*.

Of course, it goes without saying that myriad projects are underway in Leiden, Boston, and many other places on various aspects of haplochromine biology; it is not our purpose to provide a complete review of the field in this newsletter.

#### C. Evolutionary-Biology

Dr. Tom Kocher at the University of New Hampshire is analyzing high-level phylogenetic relationships among east African great lakes cichlids using DNA amplification and sequencing techniques. Kocher and Kaufman have worked out a collaboration in which they will examine an array of Lake Victoria cichlids made available through the breeding program. Robert Dorit of Harvard University (soon to be at Yale) and Kaufman are planning to submit a proposal to study the molecular biology of speciation in remnant haplochromine populations. A proposal to NSF to study extinction dynamics of Lake Victoria haplochromines was reportedly well received but not funded, and will be resubmitted.

#### D. Nomenclature

Revision of the genus Haplochromis is incomplete. For this reason, as well as to avoid any potential confusion in the future, all species of haplochromines past and present will continue to be listed *Haplochromis*.

Correct all program listings to reflect the following:

1. *Haplochromis* "lividus"- to "thick-skin".

2. *H*. "nigricans"(in program prior to '91)- to "cross-dresser".

3. H. "all red"- to "purplehead".

4. *H*. "sauvagei"(Selbrink stock)- to "small-spot".

5. H. "pellegrini"- to perrieri.

6. *H*. "barbarae"-to "rock kribensis" Update all records.

#### **II. CONSERVATION**

#### A. CBSG Action Items

Included in this package is a priority listing of the various program species and they're critical data. Note the assignment of species according to priority category. Although the categories do illustrate our priorities in terms of space and resource allocation, all of the species we now have are considered important.

B. Husbandry Notes and Comments Only those fishes acquired through official channels or with post hoc approval are admissible to the program.

In order to track population structure in at least some of our species, it will eventually be necessary to tag individual brood stock so that an accurate assessment of founder representation can be calculated. The InfoPet system of permanent implantable tags familiar to zoo and aquarium folks has been used on cichlids (mostly Leiden stock sauvagei) at the Franklin Park Zoo by Bob Wilson for many months now, with no ill effects. Unfortunately, these implants are rather large and are only practical on fishes larger than about 10 cm. SL. Lauren Chapman has developed a micro-spaghetti tag system that we are now experimenting with. Instructions for making and using these tags are included in this package. Although the tags were tried by Lauren on Cichlasoma nigrofasciatum with success, our early attempts in the Edgerton Research Laboratory (New England Aquarium) haven't worked out very well. In most cases so far, the fish managed to work the tags out. We are trying to improve the anchoring system, and strongly encourage others to experiment as well. Don't use program fish for this purpose until we get the technique down. Let us know how you do.

For the meantime, we can not use SPARKS or ISIS but we do need standardized software to track our collections. We have been using DBASEIII at NEAq. With the help of Mr. Andrew Staroscik, 0f one of our conservation research interns, we have employed a local, enthusiastic hacker to develop a custom program shell to adapt DBASEIII to the specific needs of the program. A copy of this shell should be available for distribution by the end of the year.

Long term observation of several of the species we have in Boston has suggested to some participants that some of our species may be changing sex from female to male in captivity. We must be extremely cautious about this, because the fishes thus far observed doing this were treated with testosterone to aid species sorting while they were at Old World Exotics in Homestead, FL. The females so treated definitely continue to function as females for at least a while, though they show some degree of masculinization in secondary sex characteristics, including pectoral darkness, permanence of the lacrymal bar, and intensification of ocelli with acquisition of some male structure to the ocelli (beginnings of a transparent ring around each eggdummy). This ought to be watched, especially for fishes not so treated.

C. News from Field Breeding Centers Kisumu- Bill Cooper secured a grant from the EPA to assist us in refurbishing a sorting and conservation breeding center for endangered Lake Victoria fishes, based in KMFRI in Kisumu. The project will take place at KMFRI-Kisumu, National Museum Kisumu, and the KMFRI fish hatchery at Sangoro, on the Sondu-Miriu River. Ochumba and Kaufman agreed on specific objectives and a timeline for the project during Ochumba's recent oneweek stay with Kaufman in Boston. The project was held up by the Persian Gulf war, and is now awaiting completion of some administrative details in Kenya. We are hoping to be able to send funds over soon, followed quickly by Cooper to help get things going.

Ochumba has been able to mount several expeditions to Lake Kanyaboli, which has one of the few known remnant populations of *Oreochromis esculentus*. We need a great deal more founder stock, most of which will be managed by KMFRI. We are hoping that refuge population in the US can be established by Dr. Jim Williams, with the National Fish and Wildlife Service in Florida. It is important to keep the American population under close control so that chances for escape and naturalization are kept to a minimum.

We have begun to utilize the Kisumu Aquarium in its role as the Kenyan Sorting Center for the Lake Victoria Fishes captive breeding program. Fishes caught during our expeditions are being maintained in display tanks, and the staff has begun to interpret this to the public. The Kisumu Aquarium is in need of design and fabrication assistance so that they can upgrade their interpretive graphics- if anyone of our affiliated institutions can allocate funds to assist with this (or volunteer to create graphics), please contact me. This is not a large-scale job, and the help would truly be appreciated.

Jinja - Haplochromine work at UFFRO is under the direction of Dr. Pereti Basasibwaki. Basasibwaki has seen to the repair and upgrade of the UFFRO aquarium room, and has begun search and rescue operations for haplochromines in a limited scale with the aid of funds from our NSF and NOAA grants. During a visit to UF-FRO in December, Kaufman examined a very large aquaculture facility in Kinjasa, near Kampala, belonging to Ugandan Fisheries. We have since been informed that this facility is available to the LVRCP if we can find funding to support it.

D. Food Fish Restoration Programs There is hope that CBSG activities over the long term could contribute to the local economies through the captive breeding rescue, followed by market rearing of native food fishes of the Lake Victoria Basin. These are still very much in demand, despite the fact that the populations are severely depressed or biologically endangered. An attempt to rear both *Oreochromis esculentus* and *Labeo victorianus* is among the top priorities of the work in Kenya and

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Uganda. By rescuing the market for these and other native species (e.g. *Bagrus docmac*, *Protopterus aethiopicus*, *Schilbe mystus*, *Mormyrus kanumae*) we might also succeed in rescuing the species. This provides a development facet to the captive propagation rescue effort; if this succeeds it might ultimately drive the entire effort.

E. Status and Trends of Native Fishes Kees Goudsward reports four known populations of *Oreochromis esculentus* on the periphery of Lake Victoria in Tanzania. With our one known site in Kenya, this makes five remnant populations of the species. Pereti Basasibwaki is searching for *O.esculentus* in Uganda...no word yet.

Peter Ochumba reports that *Labeo* victorianus (ningu) is greatly coveted where and when it makes its brief appearances, and a few large ones can still be found. This means that it is still feasible to acquire founder stock. An anadromous species, it is not sensible to enter ningu into the aquarium program; this work will be limited to Africa.

#### **III. EDUCATION**

A. Museum, aquarium and zoo interpretive programs We have lost track of which institutions have set up exhibits, interpretive programs, or curriculae on endangered fishes that use the Lake Victoria haplochromines as examples. Drop us a line to let us know. Also, please indicate if you have materials to offer others who may wish to develop such programs.

The only dedicated exhibit that we know of as yet is located in the new African Tropical Forest exhibit at the Franklin Park Zoo, Boston. Visitors can sit in a mini theater and watch cichlids in a 2000 gallon Lake Victoria display tank. The tank is see through to an exhibit of Clarence and Camille, pygmy hippos from West Africa, who provide the comic relief. Franklin Park is planning to update their graphics soon. Contact Bob Wilson for more information or to offer assistance.

B. Media and public relations During a recent visit to Michigan State

University to check on the progress of juvenile founders collected in 1990, Bill Cooper and Les Kaufman were inundated by local press. We got some good coverage. Other institutions interested in coordinated publicity for the program should contact Ms. Andrea Conley, Public Relations, New England Aquarium: (617) 973-5222.

#### C. Training opportunities

Among the key fundraising projects is a systematics training course on Lake Victoria haplochromines, to take place in Nairobi, hopefully sometime in 1991. The costs of African participants would be covered...a limited number of others in the program who can cover their own costs would be welcome.

Some aquariums may be capable of supporting African aquarist-in-training, as regular employees for one, or perhaps two-year terms. We would like to set up a program, but need to further investigate issues of immigration and customs, and the additional support for return airfares. Your comments are welcome.

#### **IV. ADMINISTRATION**

A. Directory of participants A new directory of participants is being prepared for distribution with the next Reaper.

B. Major new initiatives

SSP participants are advised that an effort is under way at NEAq, Edgerto Research Lab. to catalog SSP species colors and patterns with slides and video for eventual computer digitization.

We are fundraising for a planned meeting in Kisumu, hopefully early in 1991, of both African and international scientists and policy makers involved in charting a future for Eake Victoria and the Victoria Basin community.

C. Upcoming meetings and seminars Officials of KMFRI, the Kenya Marine and Fisheries Research Institute, will visit Boston June 2 - 7, 1991 to discuss training, aquaculture, research, and fundraising plans for the LVRCP in Kenya. Dr. Ezekiel Okemwa (Director, KMFRI), Dr. James Ogari (Regional Director, Kisumu) and Mr. Peter Ochumba (Research Director and LVRCP Coordinator for Kenya) will spend several days meeting with NEA staff, members of the funding community, local participants in the captive breeding program, and Bill Cooper, PI for the Kisumu Breeding Center grant from the Environmental Protection Agency.

#### D. Field schedules

International participation in field sampling is scheduled for mid and late 1991. Monthly work in Uganda and Kenya is ongoing. We hope soon to be able to report more fully on activities in Tanzania.

#### **PRIORITY-ONE**

Identified species in need of founder acquisition - priority trophic group.

1. *H. argens* - zooplanktivore - Mwanza Gulf

2. *H. bicolor* - oral crusher - Winam Gulf

3. *H. degeni* -oral sheller - Mwanza Gulf

4. *H. ishmaeli* -pharyngeal crusher - Mwanza Gulf

5. H. pectoralis -piscivore - Uganda

6. H. perrieri - piscivore - Uganda

7. *H. piceatus* -zooplanktivore -Mwanza Gulf

8. *H. pyrrocephalus* - zooplanktivore - Mwanza Gulf

9. H. sauvagei -oral sheller - Mwanza Gulf

10. *H. xenognathus* -oral sheller -Mwanza Gulf

11. H. sp. "flame-back" -insectivore -Uganda

12. *H*. sp. "large-mouth" - piscivore - Uganda

13. *H*. sp. "paedophage" - paedophage - Lake Kanyaboli

14. *H*. "2-strp wht-lip" - piscivore - Uganda

#### **PRIORITY - TWO**

Identified species, non-priority trophic group.

1. *H. nigricans* - epilithic herbivore 2. *H.* sp. "crossdresser" - epilithic omnivore

3. *H*. "rock kribensis" - insectivore 4. *H*. sp. "thick-skin" - insectivore

#### **PRIORITY - THREE**

Unsorted, WILD stock- unidentified.

#### **PRIORITY-FOUR**

Unidentified SSP species in need of further work, rearing and/or identification.

1. *H*. sp. "small-spot" - oral sheller - Uganda

2. *H*. "red little-mouth" - insectivore - Uganda

3. H. "yel. obliquidens" - Kenya

- 4. H. sp. "purple-head" Uganda
- 5. H. sp. "yellow-stripe" Uganda
- 6. H. sp. "pink-flush" Uganda
- 7. H. sp. "red-flush" Uganda
- 8. H. sp. "red-anal" Mbita
- 9. H. sp."'yel. serranus" Uganda
- 10. H. sp. "red/black" Uganda

#### **PRIORITY - FIVE**

Non-SSP species essential for research only.

1. H. brownae - insectivore - Uganda

2. H. nubilus - insectivore - misc.

3. A. alluaudi -pharyngeal crusher - misc.

4. *H*. sp. "velvet-black" - eplithic omnivore - Uganda

#### **PRIORITY - SIX**

Former SSP species that have been DROPPED.

- 1. H. riponianus
- 2. H. simpsoni
- 3. H. victorianus
- 4. H. sp. "black silver-tip"
- 5. H. sp. "like thick-skin"
- 6. H. sp. "funestus"