National Shellfisheries Association

QUARTERLY NEWSLETTER

SPRING 1992 / PROGRAM ISSUE *LEWES, DELAWARE*

President's Message

Aquaculture '92 is just around the corner and all indications are that it will be an outstanding meeting. Vic Kennedy has done a yeoman's job of keeping things under control. The program offers something for everyone, our own Ken Chew will be delivering one of the plenary lectures, and Mickey Mouse and friends will be there to greet us. I've still got an original pair of mouse ears, how about you? If you haven't already made plans to attend, do it now. Registration fees increase substantially after April 20th.

You should have received your ballots by now. Please make a special effort to read the biographies, think about the candidates and return your ballot. The Election Committee has worked very hard to put together a slate of candidates and these people have all agreed to serve the Association. These are the people who will ensure the continued growth and success of the NSA and your input is important.

As this will be my last message as President, I have a few random items to note:

Plans are continuing for an auction at the Portland meeting, so start saving your shellfish-oriented artifacts now. This has the potential to be a real moneymaker and a lot of fun at the same time.

Unfortunately, the publication of our cookbook will be delayed (but not canceled!). I have not had as many contributions as I'd hoped for, but this will give me a project to continue in my 'retirement'.

Many professional societies voiced their opinions regarding the proposed new ethics rules which would limit the participation of federal employees as officers in professional societies. I am pleased to report that this input resulted in a reconsideration of the policies being developed.

My last plea is for volunteers. You've heard it before, but we still need YOU to make this organization a continued success. Don't be shy. If you would like to serve on a committee, help out at the upcoming meeting or distribute materials at other professional meetings, let us know. Your input is important and the Executive Committee is always willing to listen to your criticisms and suggestions for improvement of the Association.

Finally, it has been a distinct honor to serve the NSA as President and I would like to take this opportunity to thank all of the officers, committees and members for making my task a pleasant one. I will continue to work for the Association in any way possible and I urge you to give Ralph Elston and his team of officers and committees the same support you have shown me. Start planning for Portland, Oregon now. See you in Orlando!

Sandy Shumway

AQUACULTURE '92 RAFFLE

Win two free passes to the **WALT DISNEY WORLD Resort** theme park of your choice and support the NSA Student Endowment Fund!!! Passes are good for two adult admissions to the **MAGIC KINGDOM Park, EPCOT Center, or the Disney-MGM Studios Theme Park** (a $66.00 value) and may be used any day until January 31, 1993! Tickets are $1 each or six for $5 and will be available at the registration desk and from student members during the Opening Reception on Thursday evening, May 21. All proceeds will support the Student Endowment Fund. Raffle to be held on Friday evening, May 22, during Happy Hour.

In This Issue...

Canadian Connection

We thank Jon Grant and Becky Field, both of Dalhousie University, for providing research profiles for this issue of the Canadian Connection.

Shellfish Research at Dalhousie University, Nova Scotia

There are a variety of shellfish research programs at Dalhousie, conducted mainly in the Departments of Oceanography and Biology. Much of this research has been stimulated by a Natural Sciences and Engineering Research Council (NSERC) funded Centre of Excellence, involving several universities, government and the seafood industry. A portion of the Ocean Production Enhancement Network (OPEN) involves biology and culture of the sea scallop *Placopecten magellanicus*. Research opportunities at Dalhousie are enhanced due to its ocean location and massive seawater facility (the Aquatron) which provides heated, chilled, filtered and unfiltered seawater to numerous labs. Additional components include phytoplankton culture units, mesocosms and tanks for large fish and marine mammals.

In the Department of Oceanography, Jon Grant, Craig Emerson and Barry Hargrave are studying the dynamics of food resources available to scallops in suspended culture. This field study involves particle sensors, water sampling and scallop growth experiments in order to characterize various coastal environments differing in temperature, phytoplankton, resuspension, etc... Physical oceanographers Tony Bowen, Darrell Sturley and Andy Trivett are utilizing current meter data and numerical modelling to assess seston fluxes and flushing of the culture site. Overall, a model of carrying capacity will be produced to plan future culture efforts. These studies include close collaboration with Bruce MacDonald of Memorial University. Jim Ekman is visiting from Skidaway to join in these research efforts. Grant has also conducted a series of related projects on blue mussel culture. Annamarie Hatcher has collaborated on the mussel work by looking at respiration and excretion of mussels and ambient sediments. She is also conducting laboratory studies of food/temperature interactions in scallop growth. Another project in Grant's lab is deals with the early life history of soft-shell clams *Mya arenaria*. In most of these programs close ties are maintained with the Department of Fisheries and Oceans Canada.

In the Department of Biology, Bob Scheibling and Bruce Hatcher are examining dispersal and predation in bottom seeded juvenile sea scallops. They have conducted extensive SCUBA surveys of scallop movement and mortality and are also collaborating with physical oceanographers to incorporate circulation into dispersal. Additional laboratory experiments involve scallop predation trials with seastars and crabs.

Ron O'Dor and Scott Gallagher in the Department of Biology are studying behaviour and feeding in scallop larvae. Using the 10 meter lower tank of the Aquatron, they can produce vertical gradients in salinity and food to observe larval activity. Coupled with sophisticated video techniques, complex experiments on larval swimming and aggregation are possible. O'Dor has additional research programs on cephalopod ecology.

OPEN also includes a genetics component carried out by the Marine Gene Probe Laboratory at Dalhousie, headed by Roger Doyle. Eleutherios Zouros and Martin Ball are using DNA fingerprinting and other methods as a means of isolating family and other genetic differences in sea scallops. It is likely that genotype plays a major role in growth performance and survival in culture, and these analyses allow a separation of genetic affinities following physiological measurements of growth in experiments with animals from various broodstocks.

Gary Newkirk in the Department of Biology heads the Mollusc Culture Network, an organization which coordinates culture efforts in various parts of the world (described in more detail below). Gary has extensive involvements in training and management of research projects in Asia, Africa, Latin America and the Caribbean. His participation concerns all aspects of culture from hatchery to growout, but he maintains an interest in genetics and selection as a means of stock improvement. Much of this work has been with various oyster species.

Dalhousie is committed to graduate student training with both M.Sc. and Ph.D. programs in Oceanography and Biology. Graduate students conduct or collaborate in all of the above research.

The Mollusc Culture Network

Tropical molluscs are an important resource for coastal communities where they are gathered in small scale fisheries for local markets or as a subsistence fishery. These harvests often go unreported in official statistics, but are known to be important in many areas.

The culture of oysters and mussels has developed as a small scale industries in Thailand and the Philippines but only sporadically in other tropical countries. The culture of other species, such as cockles in Malaysia, has been rare. The fact that bivalve molluscs feed on plankton and detritus makes it easier for small scale farmers to develop mollusc culture as there are no feed requirements demanding operating capital.

Though the value of bivalves has been recognized for many years, the development of bivalve culture for small scale producers has been limited. The International Development Research Centre (Canada) (IDRC) has devoted considerable effort to developing mollusc culture for small scale producers. Progress has been slow due to limited available biological information, the need to adapt imported culture methods, or the need to develop entirely new approaches. As in many efforts in developing countries, the obstacles are often social and economic rather than purely technical. A more interdisciplinary approach is currently being explored with technical development becoming more fully integrated and responsive to the social and economic concerns of the community. In addition, the compatability of mollusc culture with the culture of other species in coastal waters is being considered.

(continued on page 11)

Aquaculture'92 General Program

Thursday May 21, 1992

Conference Registration	12:00 pm - 8:00 pm
Opening Reception	6:00 pm - 8:00 pm

Friday May 22, 1992

Opening Session	8:00 am - 10:30 am
Welcome Address	
Plenary Addresses	
Exposition	10:45 am - 6:30 pm
Poster Session Highlight	1:00 pm - 6:30 pm
Workshops	
"Business Planning for Aquaculture" (A1)	2:00 pm - 6:00 pm
(2nd workshop if first is sold out)	
"Marketing in Aquaculture"	3:00 pm - 6:00 pm
"How to Use Your Computer to Manage Effectively"	3:00 pm - 6:00 pm
"Getting Started in Aquaculture"	3:00 pm - 6:00 pm
"Safety in Aquaculture"	7:00 pm - 10:00 pm
"Florida Aquaculture Association Fish Health Workshop"	7:00 pm - 10:00 pm
Technical Session	3:00 pm - 5:00 pm
Shrimp Culture	
Happy Hour	5:00 pm - 6:30 pm

Saturday May 23, 1992

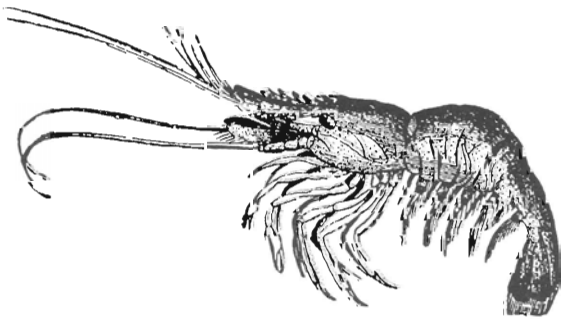
Technical Sessions	8:00 am - 12:00 pm
Shrimp Culture	
Hybrid Striped Bass Culture	
Reproduction, Nutrition & Physiology	
Scallop Culture	
Aquaculture Engineering	
Exposition	10:00 am - 6:30 pm
Poster Session	10:00 am - 6:30 pm
Lunch	12:00 pm - 1:30 pm
Technical Sessions	1:30 pm - 5:00 pm
Shrimp Culture	
Hybrid Striped Bass Nutrition	
Scallop Culture	
Aquaculture Engineering	
Reproduction, Nutrition & Physiology	
Happy Hour	5:00 pm - 6:30 pm
Workshop	
"Business Planning for Aquaculture" (A2)	6:00 pm - 10:00 pm
(only if Friday workshop is sold out)	

Sunday May 24, 1992

Worship Services	7:00 am - 8:00 am
Technical Session	8:00 am - 12:00 pm
Marine Finfish Culture	
Technical Sessions	8:45 am - 12:00 pm
Reproduction, Nutrition & Physiology	
Shrimp Culture	
Bivalve Culture	
Crustacean Shellfish Culture	
Poster Session	10:00 am - 6:30 pm
Exposition	10:00 am - 6:30 pm
Lunch	12:00 pm - 1:30 pm
Technical Sessions	1:30 pm - 5:00 pm
Reproduction, Nutrition & Physiology	
Shrimp Culture	
Larval Nutrition	
Bivalve Culture	
Catfish Culture	
Aquaculture in El Salvador	
Technical Session	3:30 pm - 5:00 pm
Aquaculture Effluents	
Happy Hour	5:00 pm - 6:30 pm
Presidents' Reception	7:00 pm - 9:00 pm

Monday May 25, 1992

Technical Sessions	8:00 am - 12:00 pm
Shrimp Culture	
Diseases and Health	
Presentation - FL Aquaculture Assoc.	
General Aquaculture	
Technical Session	8:00 am - 10:00 am
Bivalve Culture	
Technical Session	10:30 am - 12:00 pm
Sustainable Aquaculture	
Lunch	12:00 pm - 1:30 pm
Technical Sessions	1:30 pm - 5:00 pm
Molecular Genetics & Biotechnology	
Modeling Bivalve Production	
Aquaculture Economics	
Shrimp Culture	
Aquaculture Extension	



National Shellfisheries Association Technical Program
Aquaculture '92, Orlando, Florida May 21-25, 1992

PLEASE NOTE: NSA is chairing six technical sessions during the Aquaculture '92 meeting: Bivalve Culture (two sessions), Crustacean Shellfish Culture, Aquaculture Economics, Modeling Bivalve Production and Scallop Culture. Your presentation has been scheduled for a different session if it is not listed below (see General Program overview on page 3). Poster presentations are not listed in this program. Additional program information should be forthcoming from the Crest Organization, organizers of Aquaculture '92.

Bivalve Culture

Session Chairs: Catherine Enright, John Manzi, David Aiken

Grizel, H. Bivalve culture in the world: situation, main problems 45 minutes

Bodoy, A. Individual changes in the biochemical composition of diploid and triploid oysters *Crassostrea gigas* (Thunberg) during sexual maturation.

Eversole, A.G., C.J. Kempton, N.H. Hadley and W. Buzzi. Comparison of growth,survival and reproductive success of diploid and triploid *Mercenaria mercenaria*.

Coffee

Coutteau, P., P. Sorgeloos. Substitute diets for live algae in the hatchery and nursery rearing of bivalve mollusks: literature data, experimental results and reality. 30 minutes

Robinson, A.M. Effects of dietary algal and lipid supplements on gonadal and larval development of *Crassostrea gigas kumamoto* (Thunberg).

Wada, K.T. Recent advanced in marine bivalve broodstock development in Japan. 30 minutes

Utting, S.D. Procedures for the maintenance and hatchery-conditioning of bivalve broodstocks.

Lunch

Santos, J.M., S.L. Downing and K.K. Chew. The effects of water temperature on the sexual development of adult oysters, *Ostrea lurida*.

Grassle, J.P. P.V.R. Snelgrove and C.A. Butman. Experimental studies on larval habitat choice in the mactrid bivalve *Mulinia lateralis*.

Haws, M.C. and L. Dimichele. Mortality and utilization of fuel depots during metamorphosis of *Crassostrea virginica* Gmelin and *Crassostrea gigas* Thunberg.

Hadley, N.H. Effects of hard clam hatchery management practices on productivity and on broodstock quality.

Wallace, R.K. and D.B. Rouse. Growth and survival of eastern oysters cultured in an earthen pond.

Thomas, J. and G.M. Burnell. Commercial trials to assess the growth and survival of remote set Pacific oysters (*Crassostrea gigas*) larvae in shallow nursery ponds.

Coffee

Landry, T. and F. W. Shepton. Growth rates of *Mercenaria mercenaria* in Prince Edward Island.

Kayombo, N.A. Substrate grain-size analysis in cultured and natural populations of the edible cockle *Anadara antiquata* (Linnaeus, 1758).

Sturmer, L.N., D.E. Vaughan and S.K. Allen, Jr. Seasonal influences on cultivation of the American oyster, *Crassostrea virginica*, on racks in Apalachicola Bay, Florida.

Haywood, E.L.III, T.M. Soniat. The use of cement stabilized gypsum as cultch for the American oyster, *Crassostrea virginica*, and its effectiveness as compared to clamshell and limestone.

Open Discussion 30 minutes

Bivalve Culture - Day 2

Grizel, H. Disease management in bivalve culture. 30 minutes

Newkirk, G.F. Bivalve culture as a component of coastal aquaculture in developing countries: A review of conflicts and constraints.

Simons, J., E. Powell, J. Song and T. Soniat. An improved method for mapping oyster bottom using a global positioning system and an acoustic profiler.

O'Beirn, F.X., P.B. Heffernan, R.L. Walker and W.K. Fitt. Temporal and spatial recruitment variations of *Crassostrea virginica* within a Georgia estuary.

Hanson, C.M., K. Roberts and G.F. Newkirk Use of glass panels in a spatfall monitoring program for the mangrove oyster.

Bourne, N. A re-examination of the distribution of manila clams, *Tapes philippinarum*, in British Columbia, Canada.

Velasquez, D.E. Shell fragility in juvenile geoducks (*Panope abrupta*) and its implications for the geoduck enhancement program.

Coffee

Toba, D.R., D. Thompson and K. Chew. Effects of substrate modification on natural recruitment, growth and survival of hardshell clams in Washington state.

Prezant, R.S., H.B. Rollins and R.B. Toll. Repopulation dynamics of adult hard clams in estuarine habitats.

O'Sullivan, D. A review of oyster farming techniques in Australia.

Open Discussion 45 minutes

Crustacean Shellfish Culture

Session Chair: Arnold Eversole

Yeh, H.S. and D.B. Rouse. Indoor spawning of the red claw crayfish, *Cherax quadricarinatus*.

Pinto, G. and D.B. Rouse. Growth and survivorship of the Australian crayfish in earthen ponds.

Wetzel, J.E. and P.B. Brown. Growth and survival of juvenile *Orconectes virilis* and *O. immunis* at different temperatures.

Brown, P.B. and J.E. Wetzel. Production of *Orconectes virilis* further evaluations of feeding strategy and stocking densities.

Gunderson, J.C., C. Richards, and M. McDonald. Limitations of the life cycle events on orconectid soft shell crayfish production.

Chen, S., D. Xie, and R.F. Malone. Effects of temperature upon mortality and molt interval of red swamp crayfish (*Procambarus clarkii*) subject to eyestalk ablation.

Chen, S. and R.F. Malone. A mathematical model for soft-shell crawfish production management.

McClain, W.R. Growth rate and feed consumption of crawfish fed a formulated feed under commercial pond culture conditions.

Coffee

Eversole, A.G. and C.J. Kempton. Effects of water depths on crawfish production.

D'Abramo, L. and W.H. Daniels. Joint production of the red swamp crayfish Procambarus clarkii and the freshwater prawn *Macrobrachium rosenbergii* as part of a crop rotation system.

Daniels, W.H. and L. D'Abramo. Management of a closed, recirculating "clearwater" hatchery for freshwater prawns.

Zimmerman, S., E.M. Leboute and S.M.G. Sousa. The effect of different forages in feeds for freshwater juvenile prawns, *Macrobrachium rosenbergii* (deMan).

Siddiqui, A.Q. and H.M. Alhinty. Feasibility of freshwater prawn, *Macrobrachium rosenbergii*, culture in hard water in the central region of Saudia Arabia.

MacMichael, E.R. , S.R. Malecha, T. Desmond, P.A. Sandifer and L. Cotsapas. Innovative commercial production of freshwater prawns, *Macrobrachium rosenbergii*, in El Salvador.

Lunch

Aquaculture Economics

Session Chair: Rick DeVoe

Hatch, L.U and T.R. Hanson. Comparative analysis of economic performance of aquaculture as a development strategy.

Wang, Q., Y.C. Shang and P. Leung. Mariculture in China.

Roberts, K. and W. Keithly. United States demand for seafood and growth of aquaculture.

Posadas, B.C. and J. Holmziac. Cost and returns of open versus closed systems for producing soft shell crawfish in Mississippi.

Henderson, N.R. and D.B. Strombom. Market alternatives for south Jersey soft-shelled blue crabs.

Gregg, D.J. and R.J. Petrell. The use of informational technologies to enhance the corporate informational flow management functions of an oyster-clam grower-processor.

Coffee

Roberts. K. and W. Keithly. A financial software program for alligator producers.

Clark, K.D. Optimal harvesting eco-economic model for integrating farming systems.

Springborn, R.R., A.L. Jensen, W.Y.B. Chang and C. Engle. Optimum harvest time in aquaculture: application of economic principles to nile tilapia, *Oreochromis niloticus* growth model.

Spratt, M., J.P. Peyronnet, C. Vercelli and C. de la Pomelie. Modeling aquaculture production for economical and environmental impacts.

Modeling Bivalve Production

Session Chairs: Erik Powell and Carter Newell

Powell, E., E. Hoffman and J. Klinck. Modeling oyster populations. Population crashes and management.

Berger,R.C. Three-dimensional hydrodynamic modeling of Galveston Bay.

Wilson, E., E. Powell and S. Ray. Temporal variability in food availability to natural oyster populations.

Hoffman, E., J. Klinck and E. Powell. Modeling oyster populations. Critical feeding periods, growth and reproduction.

Klinck, J., E. Hoffman and E. Powell. Modeling oyster populations. Adult size and reproductive effort.

Dekshenieks, M.M. A physiologically-based oyster larval model, considering differing temperature and salinity regimes.

Coffee

Richardson, J.E., C.R. Newell and V. Panchang. Estimation of mussel seeding densities by mathematical modelling.

Sankar, S. , C.R. Newell and R. Geyer. A finite difference model for determining concentration contours above seeded mussel beds in Maine.

Newell, C.R. and S. Gallagher. Short-term variability in seston flux and physiological responses of bottom-cultured mussels (*Mytilus edulis*) in Maine.

Campbell, D.E. and C.R. Newell. New insights into mussel bottom culture through close interaction of modeling and field research.

Panchang, V. and J.E. Richardson. A review of mathematical models used in assessing environmental impacts of salmonid net-pen culture.

Scallop Culture

Session Chair: Bruce MacDonald

Rhee, W.Y. Status of scallop culture in North America

Parsons, G.J. and M.J. Dadswell. Seasonal and size related swimming behavior in the giant scallop, *Placopecten magellanicus*.

Dadswell, M.J. and G.J. Parsons. Suspended culture growout strategies exploiting the life history characteristics of various populations of sea scallops, *Placopecten magellanicus*.

Emerson, C. and J. Grant. Depth effects on the growth of *Placopecten magellanicus* in suspended culture: resuspension, food quality and temperature.

MacDonald, B.A., J.E. Ward, G.S. Bacon and J.P.A. Gardner. Feeding responses of *Placopecten magellanicus* under field and laboratory conditions.

Oesterling, M.J. Bay scallop (*Argopecten irradians irradians*) culture in Virginia.

Brotman, M. and W. DePaul. Comparison of three growout enclosures and two locations for *Argopecten irradians* on Virginia's Eastern Shore.

Ambrose, W.G.Jr., C.H. Peterson, H.C. Summerson and J. Lin. Recruitment of the bay scallop, *Argopecten irradians*, to spat collectors: effects of substrate type, position in the water column, and proximity to seagrass beds.

Coffee

Krause, M. Use of genetic markers to evaluate the success of transplanted bay scallops.

Lin, G. The toxicity of ammonia on the larvae of the bay scallop, *Argopecten irradians*.

Contreras, L and C.Caceres-Martinez. Extensive culture of *Argopecten circularis* in Mexico: 1. Movement experiments with protection against predators.

Felix-Pico, E.F. G. Bojorquers-Verastica, R. Morales-Hernandez and F. Garcia-Dominguez. Settlement, recruitment and yields available for the scallop *Argopecten circularis* fishery in Bahaias Magdalena and Conception, Baja California Sur, Mexico.

Maeda, A., P. Ormart, V. Polo, T. Reyonoso, P. Monsalvo, S.Avila and M. Espinosa. The potential predator impact on bottom cultured Mexican catarina scallops (*Argopecten circularis*).

Villalaz, J.R. Laboratory study of reproduction in *Argopecten circularis*.

Lunch

Aquaculture '92 Meeting Information

NSA members should have received meeting and registration information from the Crest Organization, organizers of this year's meeting. The pamphlet is white with teal-green printing and fluorescent orange highlights - just in case you misplaced it, here is some pertinant information: registration was MUCH CHEAPER if you registered by February 15, 1992. Those who missed the February cut-off may still reap substantial savings if you register by April 20, 1992 (see rate schedule below)! The meeting begins with on-site registration and Reception on Thursday, May 21, 1992 and concludes by 5:00 PM on Monday, May 25, 1992. American Airlines is offering special rates for meeting attendees - please call American at (800)433-1790 during the hours of 8:00 AM to 8:00 PM EST and refer to Star Number S01524J. Discount airfares are available between May 18-28, 1992. Room reservations should be made directly with the Marriott Orlando World Center (site of Aquaculture '92) and must be received no later than April 21, 1992. Please reserve early - the closest neighboring hotel is NOT within easy walking distance. Rooms are $106 for single occupancy, $118 for double occupancy and $107 for student triple occupancy (limited space for student rooms). Call the Marriott at (407) 239-4200 to make your reservations (or mail the housing form you received).

To request additional meeting registration forms please contact: Aquaculture '92, c/o The Crest Organization, 940 Emmett Ave., Suite #14, Belmont, CA 94002 Phone: (800) 222-8882 (outside CA), (415) 595-2704 (in CA).

Registration Rates	before 2/15/92	2/16/92-4/20/92	after 4/20/92
Member*	$230	$330	$450
Non-member*	330	430	500
Student	115	140	175
Spouse	175	175	175

* member and non-member registration includes Sat/Sun/Mon lunch package

BE SURE TO REGISTER EARLY!!!

HOW TO JOIN THE NATIONAL SHELLFISHERIES ASSOCIATION

Fill out and mail a copy of the application blank below. The dues are US$33.00 per year ($22.00 for students) and that includes the *Journal* and Newsletter!

NATIONAL SHELLFISHERIES ASSOCIATION - APPLICATION FOR MEMBERSHIP
(NEW MEMBERS ONLY)

NAME_____For calendar year_____Date_____

Mailing Address _____

_____

_____

Institutional Affiliation, if any:_____
Shellfisheries Interests:_____

_____

_____

Regular or Student membership:_____
Student members only - Advisor's signature *REQUIRED*_____

Make checks (*MUST* be drawn on a US bank) or international postal money order for $33.00 ($22.00 for students with advisor's signature) payable to the National Shellfisheries Association and send to Dr. Stephen Tettelbach, Division of Natural Sciences, Southampton College, Long Island University, Southampton, New York 11968 USA.

Thurlow C. Nelson Award

As we prepare for the 1992 Annual Meeting, it is appropriate to reflect on the distinguished researcher in whose honor the Best Student Paper Award is named. The following memorial was written by Melbourne R. Carriker and appeared in *Science* 132(#3443), 23 December 1960:

"Thurlow Christian Nelson, Marine Biologist

Thurlow Christian Nelson, marine biologist, was drowned on 12 September, 1960, off a storm-swept shore near his summer cottage at Green Creek, Cape May, NJ, while trying to secure his rowboat against Hurricane Donna. He would have been 70 years of age on 22 September.

He was born in Highland Park, NJ, in 1890 and attended Rutgers elementary and preparatory schools in New Brunswick, just across the Raritan River from his home. He graduated from Rutgers University in 1913 with a B.S. degree in biology, and from the University of Wisconsin in 1917 with a doctorate in zoology and physiological chemistry. During World War I he served as a first lieutenant in the Army Sanitary Corps.

He was invited to join the Rutgers teaching staff in 1919 as assistant professor of zoology, becoming associate professor in 1922 and professor in 1926. From 1925 to the time of his retirement in 1956 he was chairman of the department of zoology, and he was biologist in charge of shellfish investigation at the New Jersey Agricultural Experiment Station from 1916 to 1950. In addition he served as a chairman of the New Jersey State Water Policy and Supply Council from 1945 until his death. After his retirement he was named Julius Nelson Professor of Zoology in the Rutgers Graduate School, a chair founded in memory of his father, who began oyster research in New Jersey in 1888.

In 1934 Thurlow Nelson was honored as Rutgers' Distinguished Scholar and Gifted Teacher. Five years later the university awarded him an honorary degree of doctor of science and in 1958, the Rutgers Alumni Federation Award.

In American Men of Science Nelson's specialties are listed as biology of the oyster, estuarine ecology, marine biology, and limnology. His research in these ares resulted in more than 125 papers on the anatomy, physiology, and ecology of the oyster and associated organisms; on parasitology; and on water supply.

Nelson held membership in many scientific societies. He served as president of the American Society of Limnology and Oceanography in 1953, as president of the National Shellfisheries Association from 1931 to 1933, as vice president of the American Society of Zoologists in 1948, and as vice president of the American Microscopical Society in 1941.

Viewed in perspective, this long list of accomplishments is an impressive one. Equally impressive were Nelson's contributions as a teacher over a span of some 45 years. His keen mind, warm personality, sincere and forceful speech, genuine interest in people, and deep enthusiasm for biology attracted many students to him. As an active church leader with deep religious convictions, Nelson often wrote and spoke on the common ground of religion and science. He died in the midst of the elements which provided so much of the stimulus for his productive life."

Herb Hidu Retires!

Dr. Herbert Hidu, Professor, Department of Animal, Veterinary and Aquatic Sciences, University of Maine, retired in December 1991. Herb began his career as an undergraduate student at the University of Connecticut where he received a Bachelor of Science degree in Fisheries Management in 1958. From there he moved on to the Pennsylvania State University where he received a Master of Science in Zoology in 1960. During 1960-64, Herb worked as a Fisheries Biologist at the U.S. Bureau of Commercial Fisheries in Milford, CT, under the direction of Victor Loosanoff. He completed his Ph.D. at Rutgers University in 1967 under the direction of Dr. Harold Haskin. As an Assistant Research Professor at the Natural Resources Institute, University of Maryland at Solomons (1967-70), Herb worked on the development of commercial hatchery potential and conducted field research on soft-shell clams. In 1970, he joined the University of Maine and has remained there until his retirement.

Dr. Hidu's research has covered a variety of topics including: shellfish accumulation of heavy metals, gregarious setting in bivalve molluscs, culture of resources in cold-water marine environments, biological regulation of field recruitment in soft-shell clams, reproduction and growth in polyploid oysters, mussel seed collection systems, induced polyploidy in bivalve shellfish and genetic improvement in the American oyster, eelgrass - mussel interactions and commercialization of triploid American oysters. Throughout his career, Herb has been ever mindful of the applications of his research efforts to the aquaculture industry. His pioneering research in the area of polyploidy has led to commercial application of the technique and enabled aquaculturists to produce shellfish that feature increased growth rates, suppressed spawning activities and other commercial advantages. He is credited with efforts which led to the development of an oyster aquaculture industry in Maine with the development of American oyster farming using a combination of suspension and bottom culture techniques. Dr. Hidu's research also laid the foundation for Maine's mussel, soft-shell clam and shellfish hatchery industries.

A working scientist as well as a published scholar, Dr. Hidu is an active member of the industry's scientific and research organizations, among them the New England Shellfisheries association, the New England Estuarine Research Society and the Northeast Consortium of the USDA. He has also served in many capacities for the National Shellfisheries Association and was President in 1980-81.

A reception was held in early December 1991 at the University of Maine, Orono, and attended by many friends, colleagues and former students. After much socializing and a few formalities, Herb was presented with a hat denoting him as "Father Aquaculture" and a University chair. Herb's contributions to shellfish biology, the aquaculture industry and education are accomplishments of which he can be proud and they will serve as a lasting tribute to a job well done. At last sighting, Herb was busy chopping wood, scouting auctions and readying his golf clubs for an early spring. Congratulations, Herb--we all wish you a long, healthy and happy retirement.

Research News

The following is a contribution from Janzel R. Villalaz G., a scallop researcher in Panama.

The Tropical Scallop *Argopecten circularis*

Meteorological and Oceanographic Conditions in Panama

The climate on the Isthmus of Panama is characterized by pronounced seasonal changes in rainfall and wind velocity. During the dry season (January to April) high velocity winds from the north (Trade Winds) cause a distinct upwelling event in the Gulf of Panama on the Pacific side of the Isthmus. These upwelling events result in changes in water temperature, sea level, rainfall and nutrients. The upwelling brings colder more saline and nutrient rich water to the surface which leads to increased phytoplankton production. Life cycles of phytoplankton, anchovies, tuna and shrimp are related to upwelling events. The reproductive pattern of the scallop in the Gulf of Panama may be coupled to phytoplankton abundance and such physical factors as temperature and salinity.

Biology of Argopecten circularis

Argopecten circularis (Sowerby 1835) is the most common species of the family Pectinidae in the Panama province. The adult reaches a size of 50 mm in diameter. Geographic distribution ranges from Cedros Island in Baja California to Paita in Peru. *Argopecten circularis* is a functional hermaphroditic organism and is generally protandrous. An individual scallop can release both spermatozoa and ova in a single spawning period (personal observation). *Argopecten circularis* matures and spawns for the first time at approximately one year of age.

Fisheries

The Pacific side of the Isthmus of Panama has 1780 km of coastline and the most important fishing areas are located there, especially in the Gulf of Panama. In 1975 the fishing industry's contribution to the Panamanian Gross Domestic Product (GDP) was $7.2 million of a total GDP of $1137.2 million. That year (1975), the Panamanian Directorate of Marine Resources (government) reported exports of 6897 kg of scallops worth $5,696. Total exports in 1976 were 142,764 kg of scallops worth $351,029. The market disappeared in 1977 because US distributors (the only export market for Panamanian scallops) had freezer stockpiles of Panamanian scallops which were not selling. The U.S. scallop imports from Panama between 1981 and 1984 were 26.1, 3.9, and 1.4 tons, respectively.

The major development in Panamanian fisheries during the late 1985 and 1986 seasons was an increase in scallop catches. Catches were particularly good in the Pacific coast area between Veracruz and Rio Hato, at depths from 3-20 meters. Shipments for 1985 totaled 41.0 tons and for the first 6 months of 1986 shipments totalled 1,700 tons valued at $10 million.

Today, scallop populations are completely depleted from commercial fishing grounds in the Bay of Panama and it is directly affecting local fishermen and their families who depend on the harvesting of scallops for their livelihood. Scientists of the University of Panama's Centro de Ciencias del Mar y Limnologia (CCML) and the College of Marine Studies, University of Delaware have been working together to study the life history of *A. circularis* populations with the objective of production of scallops and other commercially important bivalve species in Panama. Scientists are also attempting to provide information to improve fisheries management and facilitate the development of hatchery protocols.

Employment

Assistant/Associate Professor of Animal, Veterinary and Aquatic Sciences, University of Maine, Orono, ME. Ph.D. required with experience and interest in bivalve aquaculture. Academic year appointment (60% research, 40% teaching); candidate is expected to develop research program and seek extramural sources of support. Salary commensurate with experience. Start date: September 1, 1992. Application deadline: April 1, 1992 or until position is filled. Send letters of application, curriculum vitae, transcripts (grad and undergrad) and names and addresses of three professional references to: Dr. Robert O. Hawes, Department of Animal, Veterinary and Aquatic Sciences, 128 Hitchner Hall, University of Maine, Orono, ME 04469 (Phone: (207) 581-2770).

Summer Technicians: Rutgers University Shellfish Research Laboratory, Port Norris, NJ. Laboratory and field-oriented positions in several areas of shellfish biology including aquaculture, genetics, physiology and parasitology, starting May 1992. Dormitory facilities available. We are seeking talented undergraduates or recent college graduates who have an interest in any of the above-mentioned areas. Closing date: as soon as possible. Send resume and cover letter to: Gregory A. DeBrosse, Haskin Shellfish Research Laboratory, 1 Miller Avenue, Port Norris, NJ 08349.

Conferences/Courses

International Conference on Seafood Irradiation, June 14-17, 1992, Royal Omni Orleans, New Orleans, LA. Conference will cover various aspects pertaining to irradiation of seafood (e.g. regulatory and scientific perspective, consumer confidence). For more information contact: Marilyn Kilgen or Mary Cole, Department of Biological Sciences, Nicholls State University, Thibodaux, LA 70310, Phone (504) 448-4700.

Shellfish Mariculture Techniques, August 9-15, 1992, University of Maine - Darling Marine Center, Walpole, ME. Intensive hands-on course on shellfish rearing techniques, including: bivalve spawning, larval rearing and microalgal culture techniques. Instructors: Mr. Chris Davis and Dr. Robert Hawes, and numerous guest lecturers. Enrollment limit: 10 (2 credit hours). Cost: tuition plus $128 course fee; room and board: $232. Registration deadline: July 1, 1992. For more information contact: Course Coordinator, Darling Marine Center, University of Maine, Walpole, ME 04573, Phone (207) 563-3146, FAX (207) 563-3119.

(continued from page ten)

Sixth Annual Acquacoltura Conference, October 23-26, 1992, Verona, Italy. International Exhibition of fish farming techniques, equipment and products. For more information contact: Acquacoltura, Ente Autonomo per le Fiere di Verona, 525 - 37100 Verona, Italy, Phone (045) 588111, FAX (045) 588288.

Publications

An Interdisciplinary Bibliography of Freshwater Crayfishes (Astacoidea and Parastacoidea) from Aristotle through 1988, prepared by Bill hart and Janice Clark, is now available on compact disc (CD-ROM No. 1 from the National Museum of Natural History, Washington, DC. This is an updated version of the hard cover book, *An Interdisciplinary Bibliography of Freshwater Crayfishes (Astacoidea and Parastacoidea) from Aristotle through 1987,* published in 1989 by the Smithsonian Institution Press (available for $35.00). A limited number of copies of the CD-ROM version are available for FREE by writing: C.W. Hart, Jr., NHB W-163, Smithsonian Institution, Washington, DC 20560. The disc also includes two other extensive bibliographies: *Literature on the Polychaeta (Annelida)* by Linda Ward and Kristian Fauchald, and *Cephalopod Computerized Bibliographic System (CCBS)* by Clyde F.E. Roper. CD-ROM reader and an installed copy of MS-DOS CD ROM Extensions (MSCDEX.EXE) version 2.0 or higher are required to use the disc.

Journal of Applied Aquaculture, Haworth Press, 10 Alice Street, Binghamton, NY 13904-1580. Volumes 1 (Spring 1991) and 2 (Spring 1992) now available for $28.00 each (Institution $48.00, Library $75.00). Published quarterly.

Oceanic Institute Shrimp Manual: Intensive Shrimp Production Technology, by James A. Wyban and James N. Sweeney. Topics covered include: nauplii production, production of postlarvae, juvenile production, growout in round ponds and shrimp health management. Technology development and publication sponsored by the Cooperative State Research Service of the USDA. Available for $15.00 from The Oceanic Institute, Makapuu Point, P.O. Box 25280, Honolulu, Hawaii 96825 USA.

NSA Quarterly Newsletter Contributions

Keep those announcements and comments coming! We had to go to a 12-page format for this issue in order to accomodate the Aquaculture '92 Program and even with the additional space some items had to be put on the shelf for inclusion in the Summer 1992 issue. Since it will be the Post-meeting issue, the deadline for contributions is June 10, 1992.

See you in Orlando.

Canadian Connection (continued from page 2)

The Mollusc Culture Network, formed in 1989 and based at Dalhousie, provides coordination and support for mollusc culture projects supported by the IDRC. The Network Coordinator is Gary Newkirk and activities of the Network include site visits and evaluations, arrangement of consultation expertise in the biological and social sciences for Network projects, development of training materials for formal and informal courses in mollusc culture, and the organization of Network meetings. Network communications is provided through the Network Newsletter, *OUT of the SHELL.* Direct inquiries to Becky A. Field, Network Administrator, Mollusc Culture Network, Biology Department, Dalhousie University, Halifax, N.S. B3H 4J1, Canada.

Contributions to this column should be submitted to Shawn Robinson or Peter Lawton, Biological Station, St. Andrews, New Brunswick, E0G 2X0, Canada. Phone (506) 529-8854, FAX (506) 529-4274. Next deadline: May 15, 1992.

Recruits Corner

Most student members of NSA are familiar with the Thurlow C. Nelson Best Student Paper Award, although few of us know much about the man after whom this award was named. As we prepare for Aquaculture '92 it is appropriate to reflect on the accomplishments of Thurlow C. Nelson. A memorial written by Mel Carriker appears on page 9 of this issue and is recommended reading for all NSA student members.

Dave Bushek (Rutgers) has organized a raffle which will take place on Friday evening, May 22, between 5:30 and 6:30 p.m. during the Happy Hour at Aquaculture '92. The prize, which was donated by the Walt Disney World Company, is a pass for two adults good for one day admission to either the MAGIC KINGDOM Park, EPCOT Center or the Disney-MGM Studios Theme Park. Tickets will be sold for $1.00 each or six for $5.00 during registration (noon to 6:00 pm) and the President's Reception (6:00 to 8:00 pm) on Thursday, May 21. All proceeds will benefit NSA's Student Endowment Fund. We need students to sell tickets at the registration desk, in the hotel lobby and during the President's Reception. Sandy Shumway has kindly offered an NSA sweatshirt and coffee mug to the student who sells the most tickets. If you are interested in selling tickets, please contact: Greg Shatkin, 327 Hitchner Hall, University of Maine, Orono, ME 04469, Phone (207) 581-2781. Or contact me at the NSA registration desk in Orlando as soon as you arrive.

Please don't forget to check out the Employment Service at Aquaculture '92 which will serve as a clearing house for positions, announcements and c.v.'s. There will also be a student mixer and panel discussion for student members - check your registration packet when you get to the meeting as to times and locations. Finally, if any students are willing to help man the NSA products table at Aquaculture '92, please contact me as soon as possible. We'll have a fine assortment of mugs, pins, sweatshirts and back issues of the Journal of Shellfish Research available for purchase. Thanks.

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