



NO BONES NEWSLETTER

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Department of Invertebrate Zoology



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Evolutionary Insights from the Deep Sea

Jerry Harasewych

The increasing use of deep sea submersibles for research over the past two decades has brought to light countless discoveries that have had profound impact on our understanding of the evolution of life on earth. Many organisms, representing newly discovered higher taxa, have significantly altered our concepts of the phylogeny of numerous invertebrate groups, among them the Mollusca.

Shortly after arriving at NMNH, I had the good fortune to be invited to participate in a research cruise to the "Charleston Lumps," an unusually rich habitat off Charleston, South Carolina. Although this site was relatively shallow (300 m) and the submarine (*R/V Nektan Delta*) com-

paratively unsophisticated, I was able to observe and collect living examples of many species previously known only from their shells. The opportunity to study "living fossils," animals common in the shallow water fossil record but today known only from deep water, has led to my participation in a dozen cruises and over a hundred dives throughout the western Atlantic, using the subs *Clelia*, *Johnson-Sea-Link I* and *II*, and *Alvin*, as well as dredging expeditions off Florida and the Ryukyu Islands. The resulting publications span the gamut from descriptions of newly discovered taxa to detailed phylogenetic studies of several groups endemic to the deep-sea [Slitsnails of the family Pleurotomariidae;



Scientists and Crew of a research cruise to the northwestern Bahamas. For details of the cruise, see: <http://www.mnh.si.edu/livingfossils/>

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C O V E R S T O R Y C O N T.

cocculiniform limpets of the superfamilies Coccuinoidea and Lepetelloidea; and vent limpets], using both morphological and molecular characters and involving multiple collaborators and post-doctoral fellows. Certainly the most significant result has been the accumulation of a frozen tissue collection of deep-sea mollusks that has made possible a number of broader scale studies of the molecular phylogeny of the classes Gastropoda and Bivalvia that include the multiple basal clades that are endemic to the

deep-sea.

Many of the dives have provided opportunities to make observations or to conduct experiments on various aspects of molluscan ecology. New species of cocculinid and pseudococculinid limpets, groups that live on sunken wood, were originally discovered on the same small twig. However, when an array of several different types of woods was deployed near the type locality and recovered six months later, cocculinids were found exclusively on white pine, while pseudococculinids were present only on coconut and palmetto fronds, indicating that their larvae have substrate preferences.

Using submersibles, we were able to collect specimens and simultaneously obtain measurements of the physical and chemical environments of each animal, and then use radiocarbon and amino acid racemization techniques [in collaboration with colleagues at the Carnegie Institution and the Lawrence Livermore National Laboratory] to determine the lifespan and demography of upper slope populations of slit snails from throughout

the western Atlantic. While species from the uppermost continental slope [150-300 m] have lifespans similar to those of shallow water species [maximum of 15 years], those from greater depths [600-800 m] have lifespans of 30-50 years, a new record for snails, but still short of the 100+ years reported for some bivalves.

Over the years, we observed that, when disturbed, slitsnails are unusual in rapidly secreting a thick, viscous fluid that envelopes the shell and animal. The presence of numerous repaired breaks in the shells of slitsnails indicates that these snails survive numerous attacks by predators, many times more than any other gastropod, either in the deep-sea or in shallow water. A reanalysis of published paleontological data has shown that this pattern of increased slitsnail survivorship from attacks by shell-breaking predators can be traced at least as far as the Pennsylvanian. We have harvested the secretion, produced by the hypobranchial gland, from several species of slitsnails. The active compounds have been isolated and are being characterized and studied by colleagues at Harbor

Branch Oceanographic Institution's Biomedical Research Laboratories. A long-range program to study the diversity and ecology of the deep-water faunas of the Straits of Florida that will involve prospecting for biologically active compounds is currently being developed with colleagues at Harbor Branch Oceanographic Institution and Florida Atlantic University.

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Please submit news or articles via email or disk by the 15th of the month prior to publication.

Publication in this newsletter does not constitute publication in a taxonomic or any other scientific context.



One living fossil eating another. The pleurotomariid *Perotrochus midas* (Bayer, 1964) feeding on a stalked crinoid. Off the Berry Islands, Bahamas, in 730 m.

C H A I R M A N ' S O F F I C E

Systematics and the Museum

We are in a debate about the role of research in the Smithsonian Institution. We have written one report after another describing what we do and why we have collections. To take the last first, our kind of collections represents an image of what was present in nature at a given location at a specific time. By having collections from the last 150 years, we may be able to track changes in the composition of the fauna; it is a rather incomplete record, but it is by far the best we have got. This of course makes it possible to find invasive species, to document unusual from normal changes in the biota and develop a general description of the fauna of our study areas.

I believe we have made everybody understand why we have these collections, but I am not so convinced that we have been able to explain what we do as scientists, and why it is important. We are comparative biologists, using morphological and molecular, and all sorts of other pieces of evidence in our comparisons. Over the last several decades analytic tools have been developed allowing us a rapid and comprehensive analysis of the data points we have. With-

out observations on specimens, whether done through a microscope or an analyzer, we cannot make any comparisons, and thus no generalizations. We are probably by and large scientists because we are interested in finding things out: A scientist is a person who never loses the curiosity otherwise much more characteristic of children. However, there are very good societal reasons why we should come up with solid, well understood generalizations. Some of them are related to human health, others to a sustainable use of our environment.

Some groups are well understood, relatively speaking, for others we are still in our infancy of exploring them, most often because they are small in size. We are still discovering undescribed taxa and in some groups, such as nematodes and other worm groups 10% or less are adequately described. To make the comparisons we do not necessarily need to have every last species described, but we do need to know that we are not missing something very important in terms of morphology or anatomy.

We need to develop what might be called predictive systemat-

ics. An example, the pharmaceutical industry is testing all sorts of animals for active products. If we have a well tested phylogeny of animals of which some members are known to have desirable properties, we may overlay the presence of these properties on our phylogenetic schemes and thereby find, in the tree, the names of related organisms likely to possess the same or similar properties.

With the combination of the new catalog in place and better analyzed bibliographies we may be able to extract all kinds of information out of the phylogenetic trees, make testable predictions in ecology or biogeography and test them. We are at the stage where we have arrived as a fully fledged scientific establishment with theories, data points and methods of analysis. All we have to be sure about is that the data, the primary descriptions, keep being produced.



O U T R E A C H

IZ Scientists and Colleagues in the News

A December 2000 *Corpus Christi Caller-Times* article "Playing the Scientific Name Game" described several Coastal Bend, Texas scientists honored with the use of their names in naming new species. Among them were Tracy Villareal whose *Nitzschia villarealii* was named by Greta A. Fryxell, now a retired oceanographer. Frank Ferrari was mentioned for nam-

ing a new copepod *Griceus buskeyi*, after Ed Buskey, a marine science professor at the University of Texas Marine Science Institute in Port Aransas. In a story by Dan Parker, Buskey, a friend of Ferrari, said he knew that Ferrari was interested in examining water samples from the coast of Kona, Hawaii, and while he was in the area researching another copepod, he

mailed some of the water he collected to Ferrari in Washington. Ferrari found the new copepod in the sample and named it after his friend. Buskey said it was an honor to have the animal named after him but that Ferrari did all the real work by confirming that it was a new species.

R E S E A R C H

Twenty five years ago, we changed forever the ecology of Ascension Island.

Dave Pawson

Ascension is in the middle of the Atlantic Ocean, a little below the equator. It is a volcanic island, discovered on Ascension Day in 1503 by Alphonse d'Albuquerque. Only one million years old and 35 sq. mi. in area, Ascension is dry, hot, and forbidding. Green Mountain, at the center of the island, is usually cloud-covered, and traps enough moisture to maintain some vegetation near its peak. Ascension was a busy British garrison from 1815 until 1821 while Napoleon was living out his days at St. Helena, some 760 miles to the southeast. Today, it has a population of a few hundred people, working for the BBC Atlantic relay station, or the US Air Force missile/satellite tracking station.

In 1970, Storrs Olson collected

a few crustaceans at Ascension and passed them on to Ray Manning. They were of such great interest that Ray himself visited Ascension in 1971 to collect some more. The result: *Procaris ascensionis* Chace and Manning 1972 (new superfamily, family, genus and species) and *Typhlatya rogersi* Chace and Manning, 1972. Ray also picked up numerous other marine invertebrates, including several new and unusual taxa. Five of us (Meredith Jones, Ray Manning, Dave Pawson, Joe Rosewater from IZ-NMNH, and Tony Provenzano, formerly of University of Miami) decided to return to Ascension to make more comprehensive collections of marine animals in the intertidal and subtidal.

Accordingly, at 6:30am on July 10, 1976, we took off from Patrick Air Force Base, Florida, in a USAF cargo plane; as there were no windows, we couldn't see where we were going. We flew for about three hours, and then the copilot came back and told us that in about ten minutes we would be landing - back at Patrick Air Force Base. There was some sort of mechanical problem. We took off again, flew for several hours, and again landed at Patrick. Finally, in the late afternoon, we took off for the third time, and at about 7:30 pm

landed at Patrick for the third time. We spent the night in the BOQ, and next morning took off again at 6:30am (was the movie "Groundhog Day" based on this experience of ours?). This time, we made it all the way to Ascension Island.

Over a two-week period we collected a wonderful assortment of animals. The weather was always sunny, and the spectacular rocky intertidal yielded many treasures. Large ocean rollers crashed on the shore, and occasionally a much larger wave would startle and drench the unwary, throwing seawater (along with Meredith Jones's camera) well beyond the high tide line.

At the southwest corner of Ascension, in an area accessible only by trudging across a brittle and treacherous lava field, is a series of pools, set well inland from the high tide mark. Two of these pools are the home of *Procaris* and *Typhlatya*. The largest pool, about 5 yards in diameter, contained about 18 inches of water, and the rocky bottom was covered with a flocculent muddy marl. This group of pools apparently has underground connections with the ocean.

On our 1976 trip we visited the pools, and we joined Ray in rejoicing over the fact that the two shrimp species were still flourishing there. But, there had been a change. In the pool with the marl bottom were three mangrove seedlings, each about three feet high. They were in a perfectly straight line, spaced about two feet apart. No mangroves had previously been reported from Ascension. If they had arrived there in the past, they had not survived. How did these particular

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Ray Manning at the Painted Rock. For the residents of Ascension who are stationed there for one or two years, there is a charming tradition: on the night before they leave Ascension, if they throw paint on this rock, they will never return to the island.

R E S E A R C H C O N T.



Ray Manning and Meredith Jones, after sampling Ascension's sandy intertidal.

waves, and did they then take root in a nice straight line? Now, Chace and Manning (1972) had noted that while the pools were difficult to get to, island residents would occasionally visit them to collect shrimps to feed to their aquarium fishes. Perhaps one of the resident aquarium enthusiasts

attempt to add some diversity to the biota.

We sat in the broiling sun and talked about the mangroves. If these mangroves were allowed to grow and reproduce, the biota of the area would indeed change dramatically. Would the two shrimp species survive in this new habitat? Probably not. We wondered about the strange linear arrangement of the mangrove seedlings. Finally, we made our decision. In a joyous fever of environmental activism we uprooted the mangrove seedlings and destroyed them.

And that's how we saved the shrimps, and changed forever (perhaps) the ecology of Ascension Island. Was our decision the correct one?

Ray, Meredith and Joe are no longer with us. I miss those ardent naturalists very much. I often look through my Ascension photos and recall those days in the sun ...

plants get there? Had they been thrown up into the pool by very large

had brought the mangroves from the U.S.A. and planted them there, in an

S P E C I A L R E P O R T

Roger Cressey Remembered

Roger Frank Cressey Jr., 70, Curator of crustacea from 1965 to 1990 died January 10, 2001 at his home in Purcellville, Virginia. He was born in Stoughton, Massachusetts and grew up on the coast, in South Portland, Maine. He was a graduate of Boston University, where he received his master's biology and doctorate in zoology under the late Dr. Arthur Humes. He served in the Army from 1947 to 1950.

While in the Department, he served as chairman and was president of the Smithsonian Senate of Scientists, editor of the Biological Society of Washington's scientific journal and

secretary of the Society of Systematic Zoology. Dr. Cressey's specialty was parasitic copepods. He made one of the first findings of fossilized parasitic copepods, which were found on a fossilized fish in Brazil and believed to be more than 130 million years old. His interest in fish-parasites led to analysis also of their hosts. For example, from the Indo-Pacific region, he documented several new species of a little-known fish group called lizardfishes.

A memorial will be held in the Waldo Schmitt Room Friday February 23 beginning at 2:00p.m.



O U T R E A C H

Caribbean Clades Symposium

Klaus Ruetzler, Jerry Harasewych and Mary Rice are scheduled to present papers on endemism and patterns of distribution in the marine environment as part of an international symposium on "Caribbean Clades and their Distribution," to take place at the International Center on March 27 and 28, 2001.

The Smithsonian Institution, Conservation International, and Center for Marine Conservation are organizing the two-day symposium which complements the January 2000 "Felipe Poey Memorial Symposium" organized by the Sociedad Cubana de Historia de la Ciencia y la Tecnología and the Sociedad Cubana de Zoología and held in Havana at the Carlos J. Finlay Museum. Both symposia are extensions of the Smithsonian's long history collaborating with Cuban scientists and are especially a tribute to biodiversity pioneer Felipe

Poey y Aloy. Poey corresponded with the first two Secretaries of the Smithsonian and deposited a large number of natural history specimens in the Smithsonian's National Museum of Natural History.



The March symposium will review research and data on the systematics, biogeography, and conservation of Caribbean biodiversity, including particularly those of Cuba and its surrounding waters. Biodiversity assessment will be considered both from a taxic approach based on clades, and from a faunistic/floristic approach based on geographic units. For a provisional schedule for the symposium contact Lynne Parenti at parenti.lynne@nsmnh.si.edu. A Web site will be established for registration and posting other information.

L I B R A R Y

INVERTEBRATE ZOOLOGY LIBRARIES NEW TITLES

Bieler, Rudiger and Paula M. Mikkelsen, eds. **Abstracts of the World Congress of Malacology, Washington, D.C., 25-30 July 1998**. Chicago: Field Museum of Natural History, 1998. QL401.W67 1998 Moll

Camp, David K. et al. **Checklists of Selected Shallow-Water Marine Invertebrates of Florida**. Petersburg: Florida Department of Environmental Protection, 1998. QK365.4.U6C36 1998 Invz

Cumberlidge, Neil. **The Freshwater Crabs of West Africa: Family Potamonautidae**. Paris: IRD Editions, 1999. QL444.M33C96 1999 Invz

Hendrickx, Michel E. **Los Camarones Pelagicos Del Pacifico Mexicano (Dendrobranchiata Y Caridea)**. Mazatlan, Mexico: CONABIO, ICML-UNAM, 1996. QL444.M33H454 1996

Higo, Shunichi et al. **Catalogue and Bibliography of the Marine Shell-Bearing Mollusca of Japan: Gastropoda, Bivalvia, Polyplacophora, Scaphopoda**. Osaka: Elle Scientific Publications, 1999. qQL426.J3H44 1999 Moll

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Revamped IZ Web Site Coming Soon

The new IZ Web site for the Department will soon be up and running. Developed by the IZ Web committee and SilverWeb of Reston, Virginia, the site boasts many useful additions and incorporates most of the previous Web site.

The Main page provides choices for Staff, History, Research and Collections, FAQs, Newsletters and

Visiting Scientists' sections. All pages use the new banner that Dennis Hasch created for the other new NMNH front pages but with an invertebrate rather than the elephant. A staff list with contact information and title and position has the added addition of photos and publications for the curatorial staff.

Research and Collections gives an overview of research and links to

the Smithsonian Marine Station and programs such as Caribbean Coral Reef Ecosystems, Declining Amphibian Populations Task Force, Neotropical Lowlands Research Program, Partnerships for Enhancing Expertise in Taxonomy and the United States Antarctic Program. Specialized sites for Living Fossils, Echinoderms, and Squid are also links to mention a few.

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LIBRARY CONT.

Jadamec, Luke S. et al. **Biological Field Techniques for Chionoecetes Crabs**. Fairbanks: University of Alaska Sea Grant Program, 1999. QL444.M33J33 1999x Invz

de Oliveira, Maury Pinto and Marcelo Nocelle de Almeida. **Malacologia**. Juiz de Fora-MG, Brasil: Editor Editora Associada, 2000. QL403.O45 2000 Moll

O'Shea, Steve, **The Marine Fauna of New Zealand: Octopoda (Mollusca: Cephalopoda)**. Wellington: National Institute of Water and Atmospheric Research, 1999. QL430.3O2O84 1999 Moll

Rayner, Nancy A. **Copepoda: Calanoida, Diaptomidae: Paradiaptominae**. Guides to the Identification of the Microinvertebrates of the Continental Waters of the World, 15. Leiden: Backhuys Publishers, 1999. QL444.C7R26 1999 Invz

Tirmizi, Nasima M. and Naseem Ghani. **Crustacea: Brachyura, Brachyrhyncha Part 1 (Xanthidae, Goneplacidae, Pinnotheridae, Ocypodidae, Grapsidae)**. Marine Fauna of Pakistan: 5. Karachi: University of Karachi. Centre of Excellence in Marine Biology, 1996. QL334.P4T57 1982x v.5 Invz

PUBLICATIONS

Bruno, M.C., J.W. Reid & S.A. Perry. 2000. New records of copepods from Everglades National Park (Florida): description of two new species of *Elaphoidella* (Harpacticoida, Canthocamptidae), and supplementary description of *Diacyclops nearcticus* Kiefer (Cyclopoida, Cyclopidae). *Crustaceana* 73(10): 1171-1204.

Ferrari, F. D. 2001. The Work of Thomas Elliot Bowman III. - *Crustacean Issues* 13:1-17.

Ferrari, F. D. and E. L. Markhaseva.

O U T R E A C H CONT.

Photos of the Wet and Dry Collections and descriptions of the Loan Policy, Acquisitions and Incipient (Manuscript) type make up the collections section.

Frequently Asked Questions (FAQs) combine some interesting information useful to our public such as recommended reading for care of hermit crabs as pets and such brain teasers such as what is the longest worm (*Lineus longissimus* which belongs to the phylum Nemertea—recorded at 150 feet).

Two Departmental newsletters

Crustacea Collections: a new state record for Oklahoma

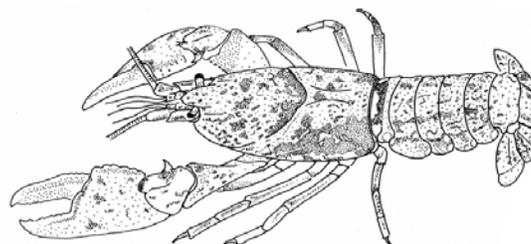
Christopher A. Taylor, *Illinois Natural History Survey, Center for Biodiversity, conducted research in the Crustacea Collection during January 2001 as well as in September 2000 with support from the Collections Improvement Fund. Focussing on identification of uncataloged freshwater crayfishes in the families Astacidae and Cambaridae, Taylor identified and catalogued a total of 330 lots and approximately 3000 specimens on this recent visit and identified 100 crayfish specimens last Fall. Noteworthy specimens included a significant range extension for a species within the genus *Orconectes* from Mississippi, a new state record (and significant range extension) for a species of *Fallicambarus* from the state of Oklahoma, and specimens from northern

can be found on line—*No Bones* and *The Virtual Echinoderm Newsletter* and extensive information for visitors to the Department to plan their stay and know the ropes when here.

Jazzing up the site are two streaming videos with sound; one depicts a dancing brittle star described by Porter Kier to Gordon Hendler from the window of the Johnson-Sea-Link and David Aguillar, Permanent Secretary for Natural Resources, Government of Belize, August 27, 1999 on Carrie Bow Cay at the re-dedication of the laboratory there.

Mississippi that may represent an undescribed species within the genus *Procambarus*. Other significant collections encountered during his visit included several sympatric collections of two species that have been the subject of numerous native species displacement studies. The USNM collections, made in the 1920s and 1930s within the native ranges of both species, will provide excellent baseline data for future studies on displacement/dispersal rates and on factors influencing native species displacement in regions of the United States where one of the two species has been transplanted.

*607 E. Peabody Dr., Champaign, Illinois 61820



V I S I T O R S

Rebecca Green, Virginia Institute of Marine Science(12/7-12/8)- To study and photograph *Rapana* collections for morphometric studies. Sponsor: **Jerry Harasewych**

Antonio Frias Martins (12/09-12/15), from the University of the Azores, spent a year (ending September 2000) in IZ on sabbatical working with Jerry Harasewych on the morphological and molecular phylogeny of the family Ellobiidae. Dr. Martins returned for a week for data analysis. Martins and Harasewych expect to present results of this research at the World Malacological Congress in Vienna, August 19-25, 2001. Sponsor: **Jerry Harasewych**

Dimitri Ivanov the Zoological Museum, University of Moscow(12/13-12/16). Dr. Ivanov was working with Dr. Scheltema in Woods Hole for a few months and came to Washington for a short visit to consult our collection of Aplacophorans and our library. Sponsor: **Jerry Harasewych**

Chris Taylor, Illinois Natural History Survey (1/1-2/1): Identification and nomenclature update of crayfish collection. Sponsor: **Rafael Lemaitre/Karen Reed**

Arthur Anker, Museum National d'Histoire Naturelle, Paris (1/11-1/21) Alpheid shrimp Sponsor: **Rafael Lemaitre**

Dorothy B. Berner, Temple University, Philadelphia (1/16-1/18) to consult with Dr. Ferrari on the list of paratypes from David Frey slides that she is compiling. Sponsor: **Frank Ferrari**

Rebecca Green returned to continue her work in the collections (1/16-1/17). Sponsor: **Jerry Harasewych**

Roger Mann, Virginia Institute of Marine Science (1/17)- To consult *Rapana* collections. Sponsor: **Jerry Harasewych**

Lena Gustavsson, Swedish Museum of Natural History, Stockholm (1/29-2/19) to examine oligochaete collections. Sponsor: **Jon Norenburg**

Mikael Thollesson, Uppsala University, Sweden (1/29-2/19) to work on manuscripts of nemertean molecular studies and on NEMERTES web site. Sponsor: **Jon Norenburg**

Traudl Krapp, Bonn Germany(March-April) Sponsor: **Brian Kensley**

D.L. Felder, University of Louisiana (2/20-3/2): Callianassidae (mud shrimps). Sponsor: **Rafael Lemaitre**

R.H. Heard, Gulf Coast Research Laboratory, MS (2/22-3/2); Carideans and peracarids. Sponsor: **Rafael Lemaitre**

J.L. Martin, Los Angeles County Museum(2/22-3/2); Decapods. Sponsor: **Rafael Lemaitre**

I. Zimmerman, Los Angeles County Museum (2/22-3/2); Decapods. Sponsor: **Rafael Lemaitre**

B. Galil IOLR, Israel (3/5-3/31): Leucosiid crabs. Sponsor: **Rafael Lemaitre**

Chris Richardson, University of Wales (UK) and Peter Kingsley-Smith (his grad student) To consult buccinid and naticid collections and to discuss methodology for determining age and longevity of shelled mollusks. Sponsor: **Jerry Harasewych**

PUBLICATIONS CONT.

2000. *Grievella shanki*, a new genus and new species of scolecitrichid calanoid copepod (Crustacea) from a hydrothermal vent along the South East Pacific Rise. - Proceedings of the Biological Society of Washington 113:1079-1088.

Ferrari, F. D. and E. L. Markhaseva. 2000. *Brachycalanus flemingeri* and *B. brodskyi*, two new calanoid copepods (Crustacea) from benthopelagic waters of the tropical Pacific. - Proceedings of the Biological Society of Washington 113:1064-1078.

Loftus, W. F. and **J. W. Reid.** 2000. Copepod (Crustacea) emergence from soils from Everglades marshes with different hydroperiods. Journal of Freshwater Ecology 15(4): 515-523.

Schotte, M. 2000. *Thermosphaeroma mendozai*, a new species from hot springs in northern Chihuahua, Mexico (Crustacea: Isopoda: Sphaeromatidae). Proceedings of the Biological Society of Washington 113(4): 989-995.

BIRTHDAYS

February

Linda Cole
Angie Cotton
Marty Joynt
Jon Norenburg
Jan Walker

March

Cheryl Bright
Molly Ryan