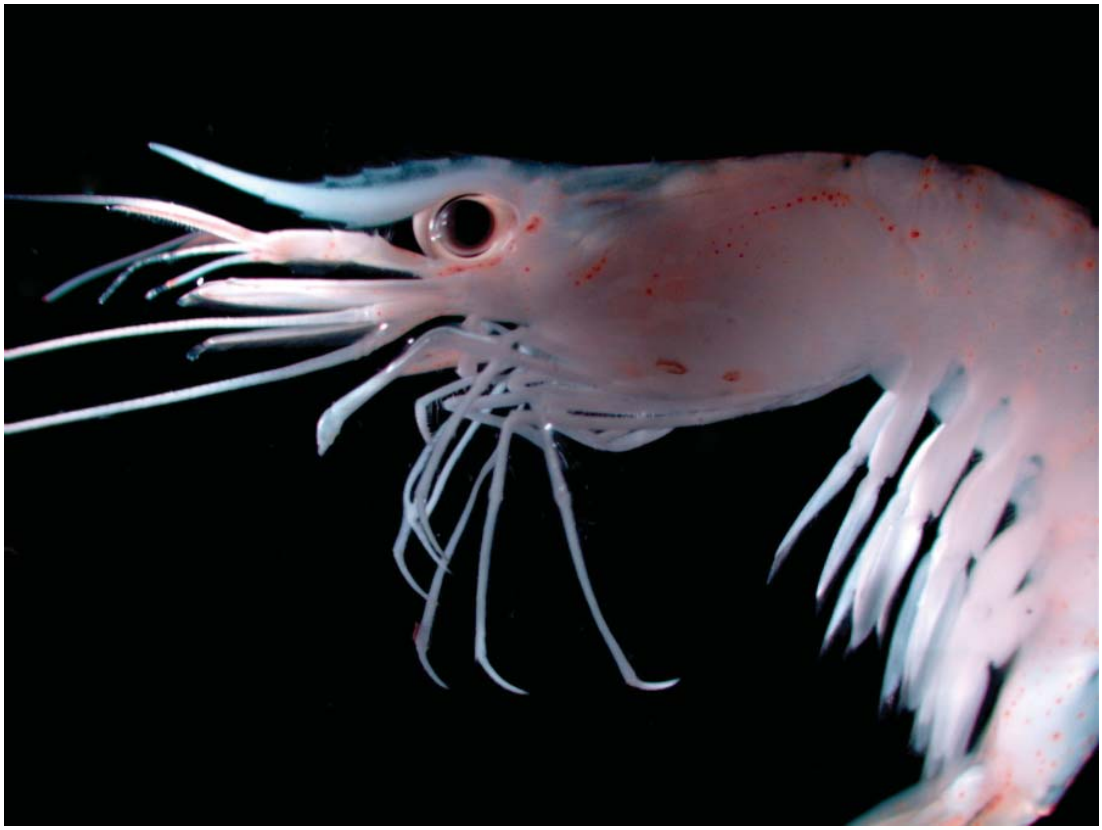
SOUTHERN CALIFORNIA ASSOCIATION OF MARINE INVERTEBRATE TAXONOMISTS

May-June/July-Aug, 2008 SCAMIT Newsletter Vol. 27 No. 1/2



Exopalaemon modestus photo by R. Velarde, City of San Diego

This Issue

MAY 12 2008

The May 12 meeting was held at the Santa Barbara Museum of Natural History. It was a Bivalves 101 workshop led by Paul Valentich-Scott. Nineteen people attended. All the microscope stations set up by Paul were occupied with overflow in chairs in the back of the room. President Larry Lovell opened the meeting with announcements regarding upcoming meetings and other items of interest. Paul then presented a power point presentation with an overview of bivalve body design, morphology, and terminology. He distributed a simplified version of the family key in Coan, Scott, and Barnard (2000) and provided copies. Paul had assembled a collection of dry bivalve specimens at each microscope station that were available to be worked through the key. Most of these were large and easily handled, but a few smaller species were also included. As attendees took their collection of specimens through the key they were able to consult with one another and Paul was available to answer questions and verify their results. One of the more critical steps that Paul led participants through was that of establishing orientation in these animals. Given the variety of different shell shapes present among Northeast Pacific bivalves, it is often difficult to tell anterior from posterior, and dorsal from ventral. Paul guided us through these determinations. Without such a grounding, use of any key becomes problematic. After lunch the group continued to work through the materials swapping different specimens Paul provided and examine other specimens that members brought for review. A copy of Paul's PowerPoint presentation will be available in the taxonomic tools section of the SCAMIT website soon.

UPCOMING MEETINGS

10 September 2009 - Taxonomic database meeting at SCCWRP. **9:00 - 3:30**.

21 September 2009 - Review of B'08 Trawl Invertebrates at SCCWRP. 9:30 - 3:30.

5 October 2009 - Terebellidae at LACMNH. Visiting researcher João Nogueira from the University of São Paulo, Brazil, will share some of his latest work on this group. 9:30 - 3:30.

19 October 2009 - Molluska: *Nuculana*, *Tellina* and *Boreotrophon* at OCSD. Meeting leads: Kelvin Barwick and Ron Velarde. 9:30 -3:30.

16 November 2009 - Decapoda 101 at LACSD. Meeting lead: Lisa Haney. 9:30 -3:30.

5 December 2009 - Christmas Party at Cabrillo Marine Aquarium. 5:00 - 9:00 pm.

JUNE 27 2008

The June 27 meeting was held at Cal Poly San Luis Obispo. It was a joint SCAMIT/SAFIT workshop on Estuarine Crustacea which was co-led by Don Cadien and Christopher Rogers and hosted by Dr. Nikki Adams. This meeting was a venture out of the normal geographic area for SCAMIT meetings, but was appropriate considering the involvement of SAFIT members who live throughout California and the topic habitat. There were eleven people in attendance, with a mix of members from both organizations, and interested visitors from resource agencies and elsewhere. The meeting was held in the invertebrate teaching lab with plenty of space and microscopes available. Larry opened the meeting with announcements of upcoming SCAMIT meetings. Christopher Rogers (SAFIT Vice President) subsequently made announcements regarding SAFIT meetings and activities. He then began with an overview on the crustacean fauna encountered in NE Pacific (CA-WA) estuarine environments and a review of the literature concentrating on arthropod groups primarily associated with fresh waters. Don followed with

his own comments, concentrating on the marine connections of most of the fauna. Both stressed the difficulty of working with the fauna of the estuarine environment, as neither marine nor freshwater workers typically explore waters of variable salinity. Literature specializing in the aquatic arthropods of bays, river mouths, estuaries, and salt marshes is generally less well developed than that of the terrestrial arthropods, which inhabit marsh and slough environments. The meeting was an attempt to focus attention on this data gap, and persuade attendees that the fauna could be worked with, even if currently under-explored. Don and Christopher handed out a spreadsheet of estuarine crustacean species that they had collaborated on. It provided scientific names with authority, habitat occurrence information, literature citations for identification purposes, and comments. Christopher brought preserved specimens representing many of the species on the list. He discussed each one briefly with comments and then those in attendance had the opportunity to take specimens to their microscopes to examine and identify them using the literature available. All those attending had been asked to bring copies of the new Light and Smith Manual, the Identification Manual by Christopher Rogers, and other pertinent literature to the meeting. Christopher had extra copies of his publication available for those who did not have it. After lunch the group examined live material that Christopher and Matt Hill (both from EcoAnalysts) had collected in Morro Bay the previous day. They had collected from a variety of locations including a stream entering the headwaters of the bay, a freshwater spring at the bay's edge, and night lighting at the docks in Morro Bay harbor. A variety of groups were represented, including decapods, amphipods, isopods, cumaceans, branchiurans, copepods, mysids, and ostracods. Quite a number of species were found and the most interesting specimens were preserved for further study. Representatives of amphipods typically found in estuarine habitat, including hadzioids, hyalids, and corophioids were well represented in the live material, and posed good tests for those in attendance. The group worked through these samples until the end of the day, with assistance and commentary provided by Christopher and Don as needed. Ron Velarde was in charge of photographing interesting specimens during the day and those images will be made available on the website. One of the more notable and unexpected species encountered in the live samples was the first record of *Paracorophium* sp, previously known from Humboldt Bay, introduced from an unknown source region. This species has been known for a number of years, and was recently illustrated in John Chapman's Amphipod section of the 4th edition of Light's Manual. A manuscript describing it is in preparation by Chapman and co-authors. Ron Velarde photo documented these specimens. Interestingly, this animal, although typically taken in marshes along the rim of Humboldt Bay at nearly full salinity, was found only in the freshwater spring, whose waters, even when mixed with the Bay waters it emptied into, were quite fresh.

JULY 2008

There was no meeting in July 2008 due to Bight '08 field activities involving many local SCAMIT members.

AUGUST 2008

The August 2008 meeting was held at the City of San Diego Environmental Monitoring laboratory and was a review of the non-polychaete changes to Ed 5 of the SCAMIT Species List. President Larry Lovell opened the meeting with announcements of upcoming SCAMIT meetings and other information of interest to members. He then turned the meeting over to Don Cadien. With the Bight '08 sampling involving many of the invertebrate identification labs in Southern California, it was decided that a review of name changes (with red font on the list) would act as a

good reminder to taxonomists and data managers at participating labs. Don began with Porifera, stressing that this was no longer applicable and needed to be replaced by Silicea and Calcarea, and worked his way through the list. Edition 5 introduced other major changes in the upper level classification used for several groups, leaving users used to the Edition 4 organization wondering where things were. These changes were discussed, and the rationale for their adoption reviewed. In all cases the changes had been circulated among the members for comment prior to adoption. In addition to this review, questions were raised regarding the decisions leading to some species level changes and the discussions leading to those decisions. Of particular importance was communal consideration of the decisions regarding provisional taxa in the Platyhelminthes and Nemertea, where provisional synonymies were complicated. All of the necessary participants were present at the meeting, facilitating this review. Newly discovered changes to the list not incorporated into Ed 5 were also mentioned. They will be added to the Ed 5 emendation list Don and Larry maintain, and will appear in Edition 6 once adopted. The entire list, not including polychaetes, was reviewed at the meeting. Handouts detailing the changes made between Edition 4 and Edition 5 were distributed to help focus the discussion. Since the criteria for inclusion on the Taxonomic List were significantly expanded between Edition 4 and Edition 5, many new taxa appeared in the later addition. The number of newly encountered taxa in the core habitats of the continental shelf benthos is dwindling with each new edition, but new taxa are still being recognized, and rarer species are still being taken for the first time. Expansion of Edition 5 to cover intertidal habitats introduced a number of new species to the list, but members are encouraged to submit more based on their activities. Likewise, inclusion of subtidal hard bottom habitat derived species should introduce many new records, and members are encouraged to revisit encountered taxa from their programs which were previously outside the purview of the Taxonomic Listing to see if they can now be included. If so, please submit the records to Don Cadien or Larry Lovell (if they are polychaetes) for consideration of inclusion in Edition 6.

LOST SPECIES

(Below is an article on taxonomy that UCSD undergraduate student, Rose Eveleth, wrote for a class assignment. Larry Lovell was interviewed as SCAMIT president for the article. It has been edited slightly from the original for inclusion in the newsletter)

In July 2000, *Nature* magazine published an article announcing that scientists had sequenced the genome for the *Xylella fastidiosa,* a bacteria that infects and kills plants. The virus is particularly damaging to orange trees, and is carried from plant to plant by insects that feed on the inner tissue of the trees. Next to the article, there is a photograph of an insect, but it is never identified. Not once in the paper do the researchers indicate the species involved in carrying the virus. M.R. Wilson of the National Museum of Wales wrote in to Nature - “Have we already reached the situation where more scientists can sequence a genome than can identify the potential vectors?”

In the eighteenth century, Carl Linnaeus wore a powdered wig, and attempted to standardize something humans have done for millions of years: name things. Linnaeus created the binomial system we are familiar with when we hear things like *Homo sapiens*, our own species, named by Linnaeus himself. *Homo* refers to the genus we belong to, and *sapiens* to our species. Linnaeus also named the genus *Siegesbeckia,* a small herb that lives in the mud, after his rival Johann Siegesbeck.

Today taxonomists are less reliant on the strict Linnaean system. Instead they look at something called clades, groups of organisms that share common ancestors. This approach allows scientists

not just to recognize and name species, but also to look at how they are connected. Cladistics is what lead to the discovery that birds and dinosaurs are closely related, and is what most taxonomists now work with.

As we move into a time where climate change and habitat loss are threatening species everywhere, the work of taxonomists is becoming more and more valuable. At the same time, they're becoming less and less common.

Dr. Phil Hastings manages the Scripps Institute of Oceanography's Marine Vertebrates Collection; more often called the Fish Collection. In a building overlooking the Pacific Ocean the collection holds over two million specimens, row after row of dead fish in jars. Hastings is an expert on blennies, colorful little fish with long bodies and big eyes. "I like to use the word systematist," he says "because systematics is a broader term, it applies to understanding the biodiversity. Taxonomy and nomenclature are parts of that."

Four years ago Robin Gartman, a biologist for the city of San Diego, was monitoring for potential pollution effects offshore from the International Sewage Treatment Plant. She was working with a sampling device that collects mud from the seafloor, called a bottom grab. Usually, the grab scoops up worms and other creatures living in the mud, but on this particular day she happened to grab a small spiny fish that she couldn't identify. The fish was eventually brought to Hastings, who instantly knew it was one they hadn't seen before. "When we first saw that thing we said 'wow we don't know what that is' and we dropped everything we were doing," Hastings said.

Local fish guides were examined, but no match was found. Guides from Canada and Mexico were similarly disappointing. It wasn't until Hastings pulled a book of fishes from Japan that he finally found something resembling the spiny fish they had.

Hastings knew of a few cases where fish brought over from Asia had established populations off the western coast of the United States. To see if this might be the case he contacted a museum in Japan, which sent a sample of the species they had found in the book. "They looked a lot alike" Hastings said, "but they were a little different, and different enough that we decided they were different species." So Hastings and coworker, H.J. Walker, wrote the paper describing the differences between this new species and the Japanese species. They detailed the differences in coloration, spines and eye size. After some searching, they located another specimen at the Los Angeles County Museum that had been misidentified as the Japanese species.

This kind of species identification, defining species that look "different enough" might seem arbitrary. Hastings explains, "that's another aspect of being a specialist is to understand a group of organisms well enough to kind of know how much variation you typically see within a species versus across species." Collections like the one at Scripps, in which there are twenty or thirty examples of the same species, allow scientists like Hastings to look at what the common variety might be. Just like using a single human as a sample would poorly represent the entire species *Homo sapiens*, using one fish to represent a whole species would create thousands of "new species." For humans, variation comes in the form of hair and eye color. For fish it's fin placement and scale coloration. Researchers can look through collections and see what the range of sizes, colors, and shapes are found in a species.

But misidentification, as in the case of the prickleback in the Los Angeles County Museum, is not uncommon. The World Register of Marine Species (WoRMS) exists to clarify the exact number of marine species out there. Experts research each species name to see whether it's already been

named elsewhere. To date, they have checked the validity of 93,936 species. About a third of the "species" have turned out to be redundant. The Breadcrumb Sponge, or *Halichondria panacea* has been described under 56 different aliases since its first description in 1766. Scientists at WoRMS estimates it will have to evaluate around 230,000 named species, and hopes to do so by 2010.

Programs similar to WoRMS exist across the county. The White House Subcommittee on Biodiversity and Ecosystem Dynamics founded the Integrated Taxonomic Information System (ITIS) as a partnership with the Smithsonian Institute to find and catalogue scientifically credible taxonomic data. Teaming up with the Species 2000 project – an international group of people managing taxonomic databases – ITIS created The Catalogue of Life (CoL), another database of the world's known species that aims to collect data of all known species by 2011. The Catalogue of Life publishes an Annual Checklist of known species each year, pulling data from 52 other databases. In the 2008 the list contained 1,105,589 species. The CoL is joined by several other databases of life, including the Global Biodiversity Information Facility, the Biodiversity Information Standards Database, the World Biodiversity Database, and the Encyclopedia of Life. If all of this seems confusing, that's because it is.

To make things even more convoluted, many of these catalogues depend on user-generated content. The staff at Hominin.net, maintain an online resource and database of *Homo* fossils (the Family Hominidae includes orangutans, chimps, gorillas, bonobos and humans) from around the world with the help of online users. The participants at Hominin log in and submit information about a fossil, including where it was discovered and what journal it was originally described in. The paper is then tracked down by Hominin staff, along with pictures and maps of the discovery site. To date, there are 103 specimens, each mapped out into a taxonomic tree, and 383 people have logged in and added information to the database.

Each of these databases work with a team of taxonomic specialists. The WoRMS team includes over thirty marine experts in different groups. The CoL works with over 3,000 taxonomists. But Hastings is still concerned. There may not be a lack of users online, generating data for these websites, but "there's definitely a smaller proportion of biologists working on taxonomy," he says. "There are some groups where we have almost no one who knows their taxonomy." As the field of biology continues to grow, the proportion of those biologists interested in taxonomy has not.

The loss of taxonomists is most likely a combination of several factors. "It's very difficult," he says, "there are almost no programs that train taxonomists as a unit." Students interested in taxonomy have difficulty finding universities that teach it. Most frequently students are trained in the taxonomy of a group by chance. Whatever groups are represented in the faculty of a university, are the ones the students will be able to learn. If a professor at your university is a sponge expert, you will be able to learn about sponge taxonomy. A student at Scripps however, "is going to be very hard pressed to become a sponge expert because we don't have any professors here who are sponge experts." Students can only learn what their professors can teach them.

Larry Lovell heads SCAMIT, the Southern California Association of Marine Invertebrate Taxonomists, an organization founded in 1982 to promote the study of marine invertebrates. "There isn't university level education, or even exposure to taxonomy like there was in the 20's, 30's, 40's even 50's and 60's," he says. Until the late 1970's schools around the country had programs to educate taxonomists. This is the system that educated taxonomists like Lovell and

Hastings.

The University of Southern California's Alan Hancock Foundation trained hundreds of taxonomists until its money was diverted elsewhere. From 1931 to 1962 the foundation funded expeditions on their four research vessels. The samples collected on these voyages lead to the description of over 150 new species of bryozoans (tiny animals known as "sea moss"), 25 new species of stony corals, 20 new species of flat corals, and 453 new species of marine algae. Both students and experts participated on the boats, directly collecting and analyzing samples. By 1962 the foundation had published 27 volumes of data from the expeditions. In 1965 Hancock passed away, and his money went elsewhere. "Molecular biology came into the fore and funding went that direction. There was a lack of interest in pursuing taxonomy and systematics," says Lovell.

The National Science Foundation has recognized the need for taxonomists. In 1995 they created the PEET program, Partnerships for Enhancing Expertise in Taxonomy. The program funds projects across the country for experts to train students in the taxonomy of lesser-known groups. The University of California at Davis recently received $300,000 from the program to train the next generation of nematode taxonomists. Similar programs focus on the taxonomy of groups like the spiders, worms, sponges and even bacteria.

Where sponges and bacteria might be hurting for specialists, other groups are booming. Tropical corals are good indicators of ocean health, particularly in reference to climate change. With climate change at the forefront of both science and politics, "lots of people are doing the genetics of coral populations now," Hastings shrugs, "and that wasn't necessarily the case years ago." Other groups get less attention, and have spawned efforts like PEET.

Even organizations whose purpose has never included education, are trying to pick up some of the slack. SCAMIT has begun offering beginner classes on mollusks and echinoderms. "One of the complaints we get is new members come to meetings and can't follow along," Lovell says. "We know what we're talking about, but somebody new might not." To get new taxonomists – who come from an education system low on specialized training – up to speed, Lovell has tried to incorporate new education workshops into SCAMIT's meetings, whose primary purpose is to standardize species names.

But programs like PEET and SCAMIT's new education goals, assume that students have already connected with experts. In many cases that step never happens. Experts working in labs conduct their research and retire without encountering students interested in inheriting the knowledge. This is what worries experts like Hastings. "There's no one watching over the whole system, making sure that the sponge experts don't all disappear," he says.

Yet, even if there were hoards of students being trained, the picture might not be any brighter. "New jobs have appeared in biotech, and whole lots of industries," says Hastings, "but not taxonomy." Taxonomists who find a way to learn a specialty, must then find a place to use it.

Hastings and Lovell represent the two areas where taxonomists are still finding jobs. "The best job for a taxonomist is to be a curator of a museum," says Hastings. But these jobs are disappearing. "The funding has been decreasing," he says, "and very few people are building new museums." So taxonomists have turned to what Hastings describes as "applied taxonomy," in positions like the one Lovell holds at the Los Angeles County Sanitation District. To be able to monitor pollution, or the impact a building project might have, scientists need to know the species in the area. People like Robin Gartman, who brought the prickleback into Hastings lab,

are taxonomists by necessity. When they pull up their nets, they have to be able to identify what they have before they can evaluate what's happening.

It is these kinds of jobs that Lovell thinks will boom in the next few years. The State of California will soon unveil several programs that will require the collection and identification of a wide variety of animals and plants. Sediment Quality Objectives that monitor pollution in bays and estuaries, and the Surface Water Ambient Monitoring Program (SWAMP) will both be looking for taxonomists and systematists to join their ranks. Large-scale building projects require Environmental Impact Statements – evaluations of the ecological consequences of a project – usually provided by private consulting firms. These firms tap into the expertise taxonomists for each project to assess what's in the area before building, and what could happen to these species if construction were to proceed.

With the boom in green building projects, and the continued investment in monitoring pollution, Lovell only sees these kinds of opportunities increasing. "There's going to be a demand for people do to taxonomy," he says. Yet he's still not entirely optimistic. "While I think there's going to be demand, there may not be anybody to fill those positions." Lovell worries that without the education in place to train taxonomists, scientists will begin incorrectly categorizing species. "It's a problem when people who are inexperienced, start working in an area they're unfamiliar with and then start producing data," he says.

The databases try to remedy this, to get everyone on the same page. Yet Lovell is still worried that if students aren't trained as rigorously as they once were, projects like SWAMP and new Environmental Impact Statements, could run into trouble. Even with the databases online like WoRMS and the Catalogue of Life looking to sort out the millions of species on earth, there is still a problem with standardization. "You don't have qualified people to fill that need," he says, "so there may be a problem with the quality of the data that comes out of these surveys." Universities aren't paying for taxonomy programs, and states don't want to pay for extra training of employees. Nor do they want to give the universities more money to build or begin taxonomy programs. This leaves Lovell wondering, "Where are the young taxonomists going to come from?"

It is not all grim though; Hastings has hope. "Genetics has revolutionized taxonomy, invigorated it," he says. Genetics provides taxonomists with a new tool to tease apart formerly confounding species. Experts with WoRMS have used genetics to find places where one species turns out to be two. In the Fish Collection, a student has been working with two species of blennies that look identical, but are genetically very different. "We still haven't figured out a fool proof way to tell them apart except by where they're from," says Hastings.

In this sense, it's an exciting time for taxonomists. Researchers in Santa Barbara have developed a way to screen for genetic flags that indicate what species are in a sample. In October 2008 a survey team found 274 new species of coral off the coast of Tasmania. Whole families of animals are being discovered and their connections worked out. Taxonomists are busy.

At the same time, it's hard to ignore the difficulties. Museums and collections like the Fish Collection are facing huge budget difficulties. As we sit in the collection, Walker points at a shelf full of colored binders. Each binder holds the data sheets for a collections voyage. On the worn spines there are dates. There are ten binders from 1970. There are two from 2008. "We just can't go out and collect as much as we used to," he says.

Even when programs like PEET succeed, and students connect with experts, experts find it hard to explain their knowledge. “There’s a lot of information that you have in your brain that you just can’t put in words,” says Lovell. As experts like Lovell and Hastings retire, they take much of their knowledge with them.

In a lab the floor below Hastings’s Fish Collection is the Pelagic Invertebrates Collection. Inside, the rows of shelves are lined with thousands of glass jars full of plankton. The Collection is run by Annie Townsend, an expert on krill (little invertebrates that look like shrimp). “There are only eighty six species,” Townsend says, “it’s not that hard.” She learned to identify them from her predecessor, Ed Brinton. Brinton got his PhD at Scripps and managed the Invertebrates Collection before Townsend. While there, he described several species of krill, and published a number of books on krill taxonomy. As he prepared for retirement, he worried about finding someone to pass his knowledge on to. “He didn’t think I could do it,” Townsend says, “but I wanted to prove him wrong, so I learned them all.” Now, Townsend can identify all 86 species on sight. She plans to retire in two years, with no one training to take her place.

When experts like Townsend retire, the University or museum then has to manage a vacant position. In some cases they look for a replacement. In other cases they do not. Lovell remembers Bob Hessler, who retired from a position at Scripps studying deep-sea ecology in 2001. “They didn’t hire anybody to replace him,” Lovell says. “They spent the money on somebody else.” But without students in training to fill these types of roles there may be no one else to spend the money on.

The Pelagic Invertebrates Collection is quiet most days. On a Wednesday afternoon I’m sorting through samples full of krill, trying to identify them. When I ask Annie for help she looks quickly into my microscope. “Oh,” she says, “that’s a *dificilis*. I know that because,” she pauses. “Well, I just do. It just looks like a *dificilis*.”

- Rose Eveleth

FINANCES

See attached SCAMIT Treasury Summary for 2009.

ANOTHER TROUBLING INVADER

See attached flyer on the introduced Dwarf Eel Grass.

Please visit the SCAMIT Website at: www.scamit.org

SCAMIT OFFICERS

If you need any other information concerning SCAMIT please feel free to contact any of the officers at their e-mail addresses:

President	Larry Lovell	(310)830-2400X5613	llovell@lacsd.org
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Secretary	Megan Lilly	(619)758-2336	mlilly@sandiego.gov
Treasurer	Cheryl Brantley	(310)830-2400x5605	cbrantley@lacsd.org

Hard copy back issues of the newsletter are available. Prices are as follows:

Volumes 1 - 4 (compilation)..... $ 30.00
Volumes 5 - 7 (compilation)..... $ 15.00
Volumes 8 - 15 ..... $ 20.00/vol.

Single back issues are also available at cost.

The SCAMIT newsletter is published every two months and is distributed freely to members in good standing. Membership is $15 for an electronic copy of the newsletter, available via the web site at www.scamit.org, and $30 to receive a printed copy via USPS. Institutional membership, which includes a mailed printed copy, is $60. All new members receive password protected website access to the most current edition of "A Taxonomic Listing of Soft Bottom Macro- and Megainvertebrates … in the Southern California Bight." All correspondences can be sent to the Secretary at the email address above or to:

SCAMIT
C/O The Natural History Museum, Invertebrate Zoology
attn: Leslie Harris
900 Exposition Boulevard
Los Angeles, California, 90007

SCAMIT Treasury Summary
2008 – 2009

Below is the treasurer's report for 2008-09. As you can see we have had a very economical year as our expenses have been pared down. Although some of that is due to our newsletter printing costs haven't caught up yet and our website has been under partial construction. Those expenses will become more apparent in the next month or so, especially as our new webmaster starts updating our site. Also you may notice below we now have a database fund due to an extremely nice donation from Orange County Sanitation District. This fund and its expenses is being maintained separately for an itemized accounting of costs associated with our on-line database project. SCAMIT did not award any publication grants this past year but as stipulated in our grant policy we do have 25% of our operating budget ($18,336.82) available for publication grants this year. SCAMIT did host another holiday party in December for all its members at the Cabrillo Marine Aquarium and we hope to again this year. Also, we have maintained our all time high for memberships (146). A few people retired and a few new members joined us and still a few tardy renewals will trickle in soon I'm sure…….(hint, hint).

Account Balances (as of 6/16/09)

Checking	$ 5,157.70
Certificate of Deposit	$13,024.92
Cash	$ 154.20
Database Fund	$ 13,881.10
Total	**$32,217.92**

Income

2009 Membership dues	$ 940.34
Interest from CD	$ 200.81
Total	**$ 1141.15**

Expenses (General Account)

Electronic newsletter (website/domain name)	$ 29.97
Hardcopy newsletter (printing/postage)	$ 336.94
Workshop/meeting expenses	$ 177.19
Holiday party	$ 258.93
Travel Stipends	$ 565.07
Total	**$ 1368.10**

Expenses (Database Account)

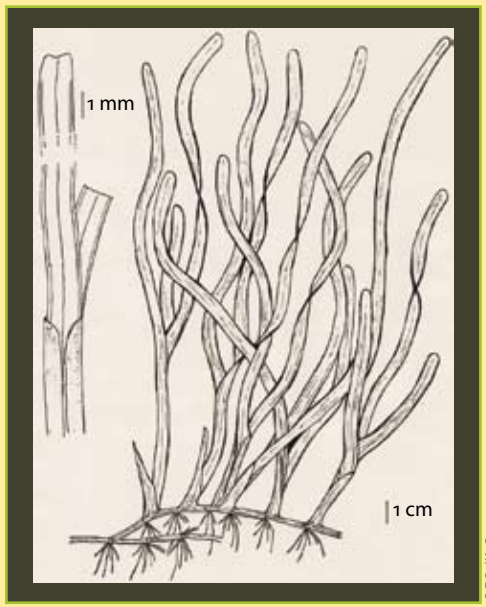
Morphbank workshop (food)	$ 103.41
Travel Stipend for Deb Paul (Morphbank)	$ 718.49
Database meetings (food)	$ 90.00
Database management by Katja Seltmann	$ 161.00
Total	**$1072.90**

Eelgrass is a grass-like aquatic plant that forms lush meadows in shallow, sheltered bays and estuaries. These meadows cushion our shoreline from wave energy, delay floodwaters, break down pollutants and support diverse wildlife. They also produce vast amounts of oxygen, which we all need to breathe.

There are two species of eelgrass in California. Pacific eelgrass, *Zostera marina,* is native to our coast and beneficial to the ecosystem. **Dwarf eelgrass**, *Zostera japonica*, is native to Asia and threatens to upset the natural balance of California's wetlands.

The recent introduction of dwarf eelgrass, which can be distinguished from Pacific eelgrass by its very narrow blades, is a serious concern to resource managers. Dwarf eelgrass invades mudflats, which are home to many creatures and vital feeding grounds for shorebirds.

Pristine coastal wetlands are rare in California and worldwide, and the invasion of dwarf eelgrass further imperils the little habitat remaining.



DFG/K. Ramey

Dwarf eelgrass, *Zostera japonica*

Native Seagrasses vs. Dwarf Eelgrass

- **Pacific Eelgrass** (*Zostera marina*)
  Blade width 2-15 mm
- **Dwarf Eelgrass** (*Zostera japonica*)
  Blade width 1.5 mm

- **Widgeon Grass** (*Ruppia maritima*)
  Has stems with many branches, and flowers emerge where leaves join the stem
- **Dwarf Eelgrass**
  Has un-branched stems, and flowers are enclosed on separate shoots

- **Surfgrass** (*Phyllospadix* spp.)
  Grows in wave-swept rocky areas
- **Dwarf Eelgrass**
  Grows on mud or sand in sheltered bays and estuaries

Report suspected sightings of dwarf eelgrass to:

California Department of Fish and Game
619 Second Street
Eureka, CA 95501
(707) 445-5365
kramey@dfg.ca.gov

California Sea Grant Extension
2 Commercial Street, Suite 4
Eureka, CA 95501
(707) 443-8369
scschlosser@ucdavis.edu

For more information, visit
www.dfg.ca.gov/invasives

Alternate communication formats of this document are available upon request. If reasonable accommodation is needed, call the DFG at (916) 322-8911. The California Relay Service for the deaf or hearing-impaired can be utilized from TDD phones at (800) 735-2929.

Cover photos (left to right, top to bottom): Dwarf eelgrass - *UC ANR/A. Eicher;* Heart cockle - *FoSBS, Boundary Bay, BC/C. Day;* Red rock crab - *DFG/A. Frimodig;* Curlew - *DFG/J. Mello*

2 HDPE

STOP THE SPREAD OF DWARF Eelgrass

Sea Grant California

Stop the Spread of Dwarf Eelgrass!

- **Rinse mud and debris from boats, kayaks, and canoes before moving to a new site.**
- **Rinse mud and debris from boots and other gear before moving to a new site.**
- **Rinse where runoff will not lead to storm drains or straight back to coastal waters.**
- **Report sightings of dwarf eelgrass to the contacts in this brochure.**

Dwarf eelgrass covers thousands of acres of rare coastal wetlands in the Pacific Northwest. It is, though, a relative newcomer to California, first discovered in 2002 in Humboldt Bay. Eradication projects are underway to find and rid our coast of new infestations.

The danger, however, is that people will unintentionally introduce dwarf eelgrass to new locations by dispersing its seeds, which can easily mix with mud and stick to boat hulls, boots and gear.

DFG / J. Mello

Godwits foraging on intertidal mudflat.

UC ANR / A. Eicher

Blades of dwarf eelgrass are much narrower than Pacific eelgrass.

Problems with Dwarf Eelgrass

Scientists studying the effects of dwarf eelgrass have learned:

- It colonizes open tidal mudflats, prime foraging grounds for birds.
- It slows water currents and traps fine sediments.
- Its dense root system binds soil particles, transforming soft mud into a firm bottom layer.

These changes destroy essential habitat for ghost shrimp and other small mud-dwelling and burrowing animals, many of which are staple prey items for shorebirds.

DFG / R. Bartling

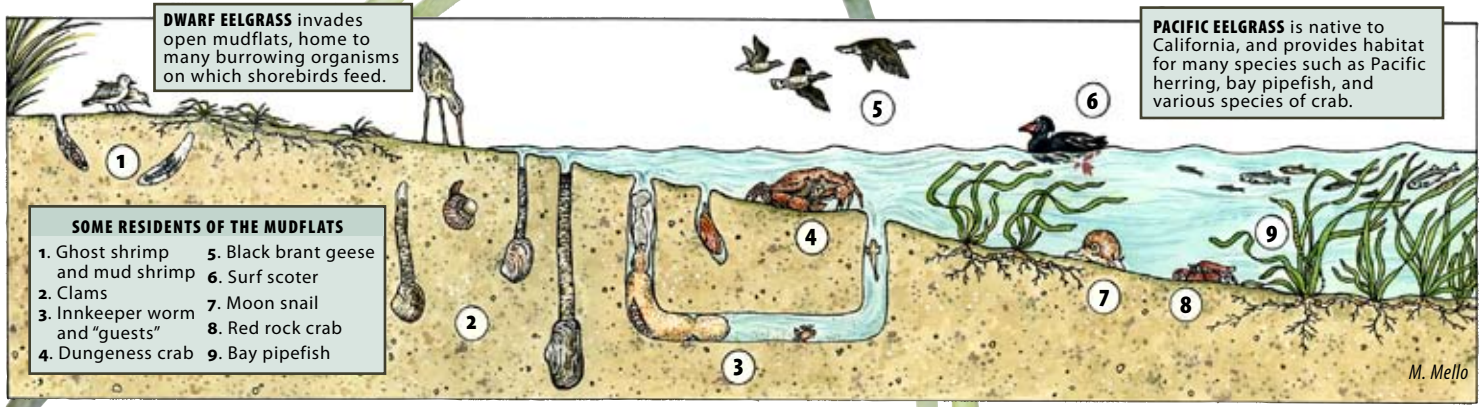
Pacific herring eggs on native eelgrass blades

The Value of Pacific Eelgrass

Pacific eelgrass meadows are as productive as our most fertile farmlands, forming the base of a food chain that you may enjoy as shellfish and finfish on your dinner plate!

Pacific herring lay their eggs on eelgrass blades. Juvenile salmon, lingcod, rockfish and Dungeness crab use eelgrass meadows to hide from predators, while the bay pipefish — a relative of the seahorse — seeks protection by camouflaging itself as a swaying eelgrass blade. The migratory brant goose would starve if it were not for eelgrass.

To preserve our coastal habitats, we must protect our native eelgrass and take measures to control the spread of dwarf eelgrass. The key to success is early detection of new infestations.



SOME RESIDENTS OF THE MUDFLATS

1. Ghost shrimp and mud shrimp
2. Clams
3. Innkeeper worm and "guests"
4. Dungeness crab
5. Black brant geese
6. Surf scoter
7. Moon snail
8. Red rock crab
9. Bay pipefish

UC ANR / S. Schlosser

Moon snail in Pacific eelgrass meadow