SOUTHERN CALIFORNIA ASSOCIATION OF MARINE INVERTEBRATE TAXONOMISTS

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Brisaster townsendi - Los Angeles County Sanitation Districts Trawl Survey, 9 November 2004. (unknown cause of spine loss during this survey)

This Issue

The SCAMIT newsletter is not deemed to be a valid publication for formal taxonomic purposes.

9 JULY 2007

We began the meeting with a presentation by Dawn Olson, from the CSD IT group, on behalf of Rick Rowe, who couldn't be present. Dawn gave us a synopsis and overview of morphbank, an image based website which is interested in working with SCAMIT to offer a place for, and toolbox to use, with our images. They are currently working within an NSF grant which runs through 2008, and are interested in expanding into marine images to augment their predominantly insect and plant image collections. Dawn fielded a number of questions from the group.

New President Larry Lovell gave a brief president's message thanking outgoing president Kelvin Barwick for all his service, and outlining some of the directions he thought SCAMIT might explore. He also summarized upcoming meetings.

UPCOMING MEETINGS

April 14, 2008: 9:30 - 3:00; at Cabrillo Marine Aquarium. Parasitic copepods led by Dr. Julianne E. Kalman.

12 May, 2008: at the Santa Barbara Museum of Natural History. "Bivalves 101", led by Paul Valentich Scott.

June 2008: Wetland arthropods to be led by Don Cadien and Christopher Rogers (SAFIT). Date and location TBA.

Don then introduced two pieces of new literature. The first concerned the commensal amphipod genus *Leucothoe*, which have been recorded from the floor of San Diego Bay. Megan Lilly discovered them during her dissections of simple ascidians from that habitat. The new paper is an open publication item on Zootaxa, and can be downloaded freely from the Zootaxa site. It is by J.D. Thomas and K.N. Klebba (2007) and describes 6 new commensal forms from invertebrates in the tropical West Atlantic (Florida and Belize). The discriminatory criteria require careful examination of the animals, all of which are relatively small, white, and shiny. The literature on the group is terribly confused, with large numbers of misidentifications, and frequent inaccurate reports of widely distributed taxa. Current investigations suggest that these peracarids are heavily speciated in many areas, with hundreds of new species to be described. Most of these would have been identified as *Leucothoe spinicarpa*, originally described from north-western Europe many years ago. Jim Thomas has been working on this for quite some time, and this is actually the second paper describing new *Leucothoe* with his coauthor.

It is likely that the species in the local ascidians is new, and probably also introduced along with the host. What has been known locally as *L. spinicarpa* in the past is almost certainly not that species, although *L. spinicarpa* may occur here as a package with an introduced eastern North Atlantic tunicate. Until more detailed information is available on the fine morphology of local species, the status of NEP specimens remains largely unresolved. Treating them as *Leucothoe* sp. might be a good idea. It is not clear if the locally described *L. alata* is in fact a single taxon, or represents a cluster of cryptic siblings such as is addressed in the paper cited above in the tropical West Atlantic.

The second New Literature item is actually an entire constellation of items (97 different contributions) which constitute the 4th edition of Light's manual, now renamed the Light and Smith Manual by editor Jim Carlton. He co-edited the 3rd edition with Ralph I. Smith 32 years ago, but handled the current new one by himself; Ralph Smith having passed on in the mean time. The list of contributors is extensive and impressive. Collectively they have provided a slightly uneven but very satisfying volume that represents considerable improvement in most areas from the last edition. Most of the unevenness comes from determined contributors that pushed the envelope established by the sub-title of the volume "Intertidal Invertebrates from Central California to Oregon". Many of the section authors interpret this scope broadly ("Well, it could be found dead in the intertidal after a storm") and include items which are almost entirely distributed subtidally. This produces much broader utility in the resulting volume, along with unevenness in coverage.

The book was long anticipated, and many years in the making. The fact that Jim Carlton is still (last time I talked to him) sane is a tribute to his stamina. I know that he had many wrestling matches with at least some of the contributors. Others died in the process, and someone had to be found to complete their unfinished manuscripts. Myriad other problems were also overcome, and we can now enjoy the result. I haven't talked to Jim about this, but I assume that he can take comfort in the fact that HE will not be the editor of the next edition. Twice is more than enough! He deserves all our gratitude for his part in this major undertaking, as do the contributors of the individual sections. Rich Mooi, who co-authored two sections with John Pearse, noted that we could be very sure that Carlton expended a great deal of effort guaranteeing the taxonomic accuracy and currency of the contributions. Several of the changes incorporated into this volume were discussed briefly, including the return of *Allocentrotus fragilis* to *Strongylocentrotus*, and the re-emergence of *Patiria* from synonymy with *Asterina*. We also noted that the synonymy of *Lytechinus pictus* and *L. anamesus*, which SCAMIT has recognized for many years, was adopted in the new manual. Anyone wishing to be sent a Pro-Cite database of the 97 individual contributions can contact Don Cadien at dcadien@lacsd.org for a copy.

We then proceeded to the main portion of the meeting, and had a very eventful interaction with Dr. Rich Mooi (California Academy of Sciences) regarding the discrimination of the two local *Brisaster* species. We had a free interchange, rather than a programmed presentation from Rich, with him fielding questions from the audience and loosely leading a discussion of echinoid biology and how it might impact *Brisaster* identification. A mini-workshop comparison of technique for caliper measurement of *Brisaster* specimens continued off and on for several hours. Megan produced a number of specimens of *Brisaster* collected at various sites by CSD, and Don Cadien brought out materials previously assembled by Lisa Haney from the LACSD collections. Megan also recapped the results of our earlier meeting with Boris Savic (in attendance) and used Boris' Powerpoint to show Rich a large variety of images of *Brisaster* examined in that meeting. The results of the comparative measurements of specimens from LACSD and OCSD by Lisa were presented as an overlay to the original plot of data from Hood and Mooi (1998). This showed that the LACSD materials, as well as those taken by OCSD, all fell within the *B. townsendi* cluster based on petaloid width vs. total length. At this point in the discussions it was still assumed that all we were getting locally was *B. townsendi*.

Megan continued to measure her material, and then have Rich repeat the measurements, and before long a series of specimens that fell into the *B. latifrons* cluster appeared. A few other specimens were intermediate between the clusters, and Megan decided to not identify them to species (leaving them as *Brisaster* sp). Rich also reexamined some of the LACSD specimens

previously measured by both Don and Lisa, and found them to fall into the *B. townsendi* cluster based on those measurements.

As part of Boris' powerpoint, photos of the *Brissopsis* sp LA1 specimens were seen. These were reviewed again (Rich had examined the specimens at the Cal Academy before returning them to LACSD last year) although the specimens themselves were not examined at the meeting. Don Cadien suggested that, based on their intermediate appearance and the nature of their spines and fascioles, these might just be intergeneric hybrids of *Brisaster*/*Brissopsis*. Rich agreed that this was a reasonable hypothesis, which he could support. No alternate hypotheses were advanced, and it is suggested that we adopt this position regarding those three specimens. Such a scenario helps explain why so few animals with this unusual appearance have been located. It was pointed out that we might be able to settle the issue with finality if the specimens were suitable for molecular analysis. They were, unfortunately, formalin preserved and thus poor candidates for such research.

The suggestion was made that it might be very easy to miss these among the mass of material that LACSD normally collects (often thousands of *Brisaster* per trawl), but this was rejected by Don. He mentioned that the sorting protocol used on-board was designed to find unusual specimens hiding among the masses of urchins present, and that obscuring mud was routinely removed to facilitate such recognition. Boris agreed with this, describing his experiences during the cruises on which he accompanied the LACSD crew prior to his 2005 presentation. Should additional specimens of the putative hybrid form be located, they will be frozen on-board rather than formalin preserved, and should be available in the future for molecular analysis to support (or refute) the present position. What to do about the name of the organism (currently *Brissopsis* sp LA1) if it is indeed an intergeneric hybrid remains for future determination. Since the two genera which are supposedly represented in these hybrids are in different families (Schizasteridae and Brissidae) a molecular analysis should prove quite interesting, and Rich urged further investigation if possible.

Over the next few hours the discussion continued and gaps in knowledge of the basic biology of these echinoids were noted. There are literature reports on the spawning season of *B. latifrons* (March as listed in Strathmann 1987), but nothing for *B. townsendi*. Strathmann also provides some information on length of larval life (67-167 days). Length of period of egg viability prior to fertilization, or of sperm survival, is not documented, so it is difficult to predict the likelihood of cross-fertilization and hybridization unless spawning in the two species is nearly synchronous. Such spring reproduction of broadcast spawners is often a matter of offering good survival prospects to planctivorous larvae by coordinating their production with the spring phytoplankton bloom. If this strategy is common to the two congeners, they may indeed spawn in near synchrony, or at least in strongly overlapping bouts. Strathmann also summarizes the literature on interspecies hybridization, which proves relatively common in West Coast echinoids. Although the hybridization of species of *Strongylocentrotus* was termed "ready" in the Light and Smith Manual echinoid section, no express mention was made of *Brisaster* hybridization. When asked about the probability of hybridization in the two species of *Brisaster*, Rich seemed to think that it was quite high. In Hood and Mooi (1998) the following comment appears in the discussion of *B. latifrons*: "To explain confusion of these two taxa [*B. latifrons* and *B. townsendi*], Mortensen (1951) raised the specter of hybridization between them". *B. townsendi* tends to be distributed only in the southern part of the range of *B. latifrons*. This high level of overlap makes it difficult to rule out the possibility of hybridization."

As the day progressed, and more measurements revealed the mixed population of the two *Brisaster* species in the San Diego area, but not to the north in Orange County, or in the LACSD area, we began to search for an explanation of this counterintuitive distributional pattern. Given the complex physiography and current structure in the SCB, distribution of the two *Brisaster* species, and of hybrids between them, may hinge on the patterns of current supplied larvae. We may assume that the southward flowing California Current carries exclusively *B. latifrons* larvae as it enters the SCB since there is as yet no evidence for the occurrence of *B. townsendi* above Point Conception. *B. townsendi* larvae should be riding north on the northward flowing Davidson Current, transported during their long larval existence from origin points far to the south off Baja California. Current jets driven by thermal mixing and wind should combine these two larval streams in the passages between the Channel Islands, providing ample larval settlers to sustain mixed populations in the northern Santa Barbara Channel. Under such mixed conditions it may not be possible to maintain stable hybrid zones, and we should probably expect to find hybrids scattered throughout the entire area, rather than locally concentrated.

The basic larval source signal of *B. latifrons* in the California and *B. townsendi* in the Davidson would, of course, be overlain by mixtures of locally produced larvae within the SCB, and by larvae from one or the other "pure" sources transported via persistent eddys split from the main current flow. Settlement from an eddy spinning into the San Diego area from further offshore might explain their present mixture of the two species in samples. With the probable complexity of larval supply, and its fluctuations over time in response to ENSO forcing and longer-term PDO oscillations, any agency should be prepared to find either species at any time.

How we would tell hybrids from both of the adults, and whether maternal or paternal source morphologies would be dominant or evenly mixed, is currently unknown. This is the stuff of laboratory based experimental investigation, and not answerable in our field based programs. Hopefully assistance can be found in local academic institutions to answer questions concerning the likelihood of hybridization, its relative frequency, its outcome in terms of percentage fertilization and developmental viability of crosses, and the phenotype and genotype of resulting hybrids. By the way, McCauley's contention (1967) that the two species are actually one, with *B. townsendi* a synonym of *B. latifrons*, was not completely discounted. Current data, however, including the analysis of Hood and Mooi, and our own material, suggests otherwise.

Attendees began to drift away towards the end of our discussions to begin their homeward trek. Conversation continued until dinner after the meeting. A bit earlier in the day Megan had also brought out several specimens of *Nacospatangus laevis* to donate to the California Academy Collections, for which Rich was very grateful. The CSD program takes these in relict red sands to the south of Pt. Loma in their International Treatment Plant (ITP) monitoring. Don Cadien described the sediment and environment in which a series of *Nacospatangus* had been taken in the Northern Channel Islands during Bight'03. These also came from a relatively coarse sediment, but not from relict red sands. It was instead strongly current-swept coarse sand with shell hash on a saddle between two islands. The trawls at this site contained a number of *Nacospatangus* as well as large numbers of *Acanthoptilum* , and *Florometra*. Rich pointed out that the pedicellariae of *Nacospatangus* bear very efficient poison glands which deliver their toxic load through terminal pores on the valves of the pedicellaria. The usefulness of this ability was discussed briefly, and suggested to be feeding deterrence. Megan also brought out for our examination (and Rich's confirmation) a series of small, juvenile *Spatangus californicus*. When small these animals look like they might be immature *Lovenia*, but details of the fascioles prove otherwise.

AUGUST 2007

President Larry Lovell led the business portion of the meeting, providing details of upcoming meetings, the looming closure of the input window for SCAMIT Listing Ed. 5, and announcements of upcoming symposia and meetings outside SCAMIT.

Don Cadien then took over and distributed his large review of the lysianassoid amphipods of the North East Pacific. This is now also posted on the SCAMIT website and can be downloaded by members. In retrospect it would have been preferable to have distributed the review prior to the meeting, and this will be done in the future. This meeting on the lysianassoids is the first of what will be a series of meetings reviewing the status of NEP amphipods. This review, (as will others in future), grew out of internal LACSD training documents. Eventually all of the Infraorders, and their constituent superfamilies, of amphipods will be reviewed. Sections of this continuing effort will be posted to the Taxonomic Tools section of the SCAMIT website as they become available. They will be periodically updated as new species are described, and additional information is generated on already completed groups.

The Infraorder Lysianassida contains the superfamily Lysianassoidea, with 15 component families and/or unofficial family level groups, and the superfamily Stegocephaloidea, with only the Family Stegocephalidae. Since no members of the latter family have ever been recorded by SCAMIT members in their monitoring, the review of the Stegocephaloidea will only be posted on the website and not discussed in a meeting.

The superfamily Lysianassoidea was the subject of the day's meeting, and Don started out with a Powerpoint presentation giving a general overview of the lysianassoids. The systematic treatment of the superfamily has been steadily evolving over the past 3 decades, with most of the impetus for change in treatment coming from Jim Lowry of the Australian Museum. He, along with his associate Helen Stoddart, have been pumping out major review papers on groups of lysianassoids in recent years. Much of the change embodied in treatment of lysianassoids in SCAMIT Ed. 5 comes from their efforts. Their work is ongoing, however. Several of the recognized groupings of genera within the superfamily do not have families into which they comfortably fit. Consequently only informal group names are available for what will eventually be either family or subfamily level taxonomic units. Such a group is the "conacostomines", a sizeable group of genera which are all characterized by their conical mouthpart bundles (*Acidostoma hancocki* is a good local representative).

During his introduction Don made note of the some of the important characters of lysianassoid families: Gnathopods 1 and 2, mouthparts, coxae shape and size (relative and absolute), urosome shape and ornamentation, pereopod shape. These structures are good for distinguishing among the families and family groups. However, the characters uniting the family into the superfamily are synapomorphies in the antennae and gnathopod 2. We then went through slides of representative taxa as Don explained the contents of his tome. Don's handout includes details of the various families and genera, along with references providing diagnoses, revisions, and/or keys to the taxa we see in the SCB. He also pointed out certain issues to be cautious of: For example, Doug Diener's key to the *Hippomedon* (1991) (modified from Jarrett and Bousfield 1986), includes several species not reported from the NEP, including *H. dentatus*. *Hippomedon keldyshi*, a species described from abyssal depths off Central California, would key to *H. dentatus* using Deiner's key. Also, shallow water specimens that key to that point are of questionable identification as well. Even J. L. Barnard had great difficulty with species boundaries within the

genus *Hippomedon*. Doug's key, in conjunction with the presented review, should allow better ability to speciate members of this genus. This review took most of the morning and the afternoon included a haphazard review of different species and character states. Several noteworthy observations arose from the afternoon session. The SCAMIT voucher sheet for *Aristias* sp A lists gnathopod 1 as "simple" when it is actually sub-chelate. Specimens were examined and the Gn1 was definitely not simple, but as illustrated on the voucher sheet. Somehow the text of the voucher sheet recorded the character incorrectly. In addition, specimen(s) of *Pacychelium* sp SD1 were examined and confirmed, although we determined that the illustration on the voucher sheet needed to be amended. Finally, specimens of *Lepidepecreum serraculum* and *L. gurjanovae* were compared and they appeared to be the same species. Illustrated differences appear to have resulted from gnathopod 2 being mounted at an angle in one figure relative to the other. Confirmation of this speculation requires examination of the type material.

Both those in attendance, and those who later download and use the lysianassoid review, are asked to provide feedback to Don on errors and omissions in the text. Subsequent to the meeting Ron Velarde of CSD demonstrated a specimen from their monitoring that would not fit in the generic key to the lysianassoids provided in the review, so the necessity for change and refinement is already apparent. Email questions, problems and suggested fixes to Don at: dcadien@lacsd.org.
- D. Cadien

JOB ANNOUNCEMENT

The following is taken from an email from member Kelvin Barwick concerning professional opportunities with the City and County of San Francisco.

"The City and County of San Francisco has two positions open in our Marine Biology section. They are both taxonomy positions. The deadline is April 1, no fooling. There are also positions open in our Fisheries and Wildlife section as well as Limnology. They are separate web links.
Thanks
Kelvin"

2483 Biologist I/II (Deep Class) Marine Biology Specialty
http://sfwater.org/JobDetail.cfm/MC_ID/18/MSC_ID/122/MTO_ID/368/CJOB_ID/713

2483 Biologist I/II (Deep Class) Fisheries and Wildlife Specialty
http://sfwater.org/JobDetail.cfm/MC_ID/18/MSC_ID/122/MTO_ID/368/CJOB_ID/744

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http://sfwater.org/JobDetail.cfm/MC_ID/18/MSC_ID/122/MTO_ID/368/CJOB_ID/745

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

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