

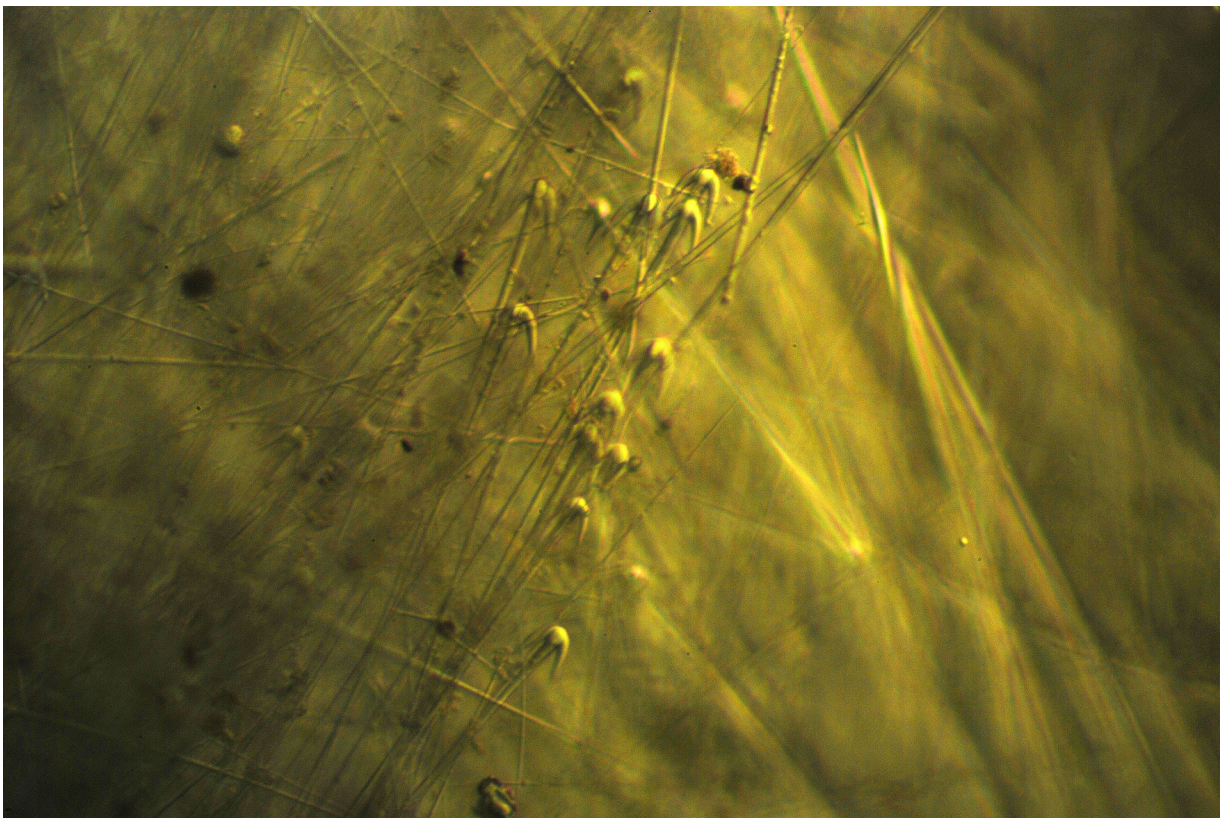
SOUTHERN
CALIFORNIA
ASSOCIATION OF
MARINE
INVERTEBRATE
TAXONOMISTS



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Anatriaenes from a Tetillid sponge; Mission Bay, San Diego, CA, 2008, 2m. Photo by M. Lilly

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

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**10 SEPTEMBER 2012, CRUSTACEANS – GUEST SPEAKER DR. GARY POORE,
NHMLAC**

Attendance: Dr. Gary Poore, Museum Victoria, Australia; Ron Velarde, Katie Beauchamp, Tim Stebbins, CSD; Don Cadien, Larry Lovell, LACSD; Michael Vendrasco, OCSD; Dean Pasko, consultant; Tony Phillips, consultant; Carol Paquette, MBC; Leslie Harris, Adam Wall, Mark LeBlanc, Maria Peltekova, Phyllis Sun, Giovani Zelada, Dean Pentcheff, NHMLAC

UPCOMING MEETINGS

Visit the SCAMIT website at: www.scamit.org for the latest upcoming meetings announcements.

The meeting was opened by President Larry Lovell and began with a round of introductions since we had many new faces in attendance. Larry then covered upcoming meetings and shortly thereafter Dr. Gary Poore was introduced. Dr. Poore has been a curator of crustacea at the Museum Victoria for 30 years. His research has covered Port Phillip Bay, as well as shallower and deeper waters. There are no extensive minutes from this meeting, but below are a few of the questions Gary addressed in his presentation.

He started with a question concerning estimating crustacean biodiversity: are we there yet? How do we get there? The Census of Marine Life Project is trying to answer the question of how many species are in the ocean. There are other and various good projects, but not much progress has been made on answering the question. There are multiple approaches to estimating biodiversity, but the methods rely on existing data, and are the data reliable?

22 OCTOBER 2012, SPONGES - GUEST SPEAKER DAVE ELVIN, NHMLAC

Attendance: Megan Lilly, CSD; Laura Terriquez, Ken Sakamoto, OCSD; Carol Paquette, MBC; Don Cadien, LACSD; Lisa Gilbane, Bureau of Ocean Energy Management; Greg Lyon, CLAEMD; Leslie Harris, NHMLAC; Dave Elvin, consultant; Dean Pasko, consultant

Leslie opened the meeting with business announcements. She started by discussing upcoming meetings. There will be no x-mas party this year and SCAMIT is planning a summer beach BBQ next year, probably in the Corona del Mar area. SCAMIT will have a symposium next year at the SCAS meetings in May and the listed speakers to date are: Tim Stebbins and Don Cadien, who will be speaking on the deep benthic study. Leslie Harris, who will be giving a talk on cooperation amongst taxonomists for invasive species and discussing error rates in taxonomy. Other topic suggestions were; the history of SCAMIT; the taxonomy database project; taxonomy and barcoding. Lastly, Don wanted to let everyone present know that all of the Hancock Pacific Expeditions publications are on-line for free at the Biodiversity Heritage Library.

With the business announcements complete Leslie introduced our guest speaker for the day, Dave Elvin. Dave started his marine biology career in the late 1950's as a volunteer at the California Academy of Sciences. He then did a stint in the army and after his military service, went on to work in the Yale Peabody invertebrate collections. From there he went on to graduate school at Oregon State at the Hatfield Marine station. After completing grad school he became a zoology department faculty at the University of Vermont. He eventually left academia and formed Vermont Information Systems – he works on a visual identification system for marine invertebrates. Some of this work was done at MBARI and was based on ROV studies. He has many other projects and is currently developing the Oregon Marine Porifera Project (OMPP).



Dave started out talking about the “Sponge Book”, as it is affectionately known (“The Sponges of California. A Guide and Key to the Marine Sponges of California”). It started out as an on-line database and then turned into a hard copy publication at the request of funders.

Next he went on to discuss the Oregon Marine Porifera Project. In Oregon, large logs loose from timber harvesting, travel down rivers to the ocean and end up smashing intertidal areas. In doing so, sponges, and other intertidal marine species have suffered. At the 8th world sponge conference in Spain it was decided that the sponge fauna of Oregon needed work/cataloguing; Dave was approached for a list of Oregon species. He set about listing specimens from museum collections that had Oregon listed as the collection locale. There were a little over 1000 bottles, with many specimens in a single bottle. Dave discovered an average of 4 species per bottle. Processing time just to Family level is 2-3 hours with 90% of the sponges in collections labeled as “unidentified”. Dave estimates 10,000 hours of time to examine specimens, make spicule preps, and input data. He feels the number of images to come out of the project will be close to 30,000. He needs to convince someone to put it on their server.

Next to be discussed were problems facing the OMPP. Collection methodology (trawls, etc) damages and contaminates sponges. Expertise on the west coast is limited and additionally there is high turn-over in project directors and technicians. Add to this a rapid change in taxonomic categories based on molecular and biochemical analysis. Much of the current research being funded emphasizes non-taxonomic characters such as biochemistry. The above mentioned issues have created a morass of difficulties for the sponge taxonomist.

Dave’s solution – build a visual archive and then create on-line training. It is difficult to use words to describe skeletal structure and images are much more effective. There is a need for a virtual component to collection specimens, and an on-line identification guide. This could help create a triage level of expertise; sorters-slide makers-experts. The larger question is whether or not this solution is financially sustainable. In an effort to make it so, Dave is creating a non-profit in Oregon.

For the OMPP Dave had to create rough boundaries as to what constitutes an “Oregon” sponge; He set the boundaries from Astoria canyon to Gorda Basin; the environment can be slope/banks/abyssal. A set of coordinates were developed and then it was off to museums to look for specimens within those coordinates.

Dave discussed a collection from Heceta Bank. Most of the specimens were collected via ROV dives and were therefore in good condition. They were collected from 80m-200m near methane seeps. The area is being looked at for potential future methane drilling. Oil platforms can act as artificial reefs and create more diversity. It is disappointing, however, that there is no marine sanctuary but there are marine preserves. Divers went into one of these preserves and took pictures of sponges first, then scraped, collected, and sent them in.

Next to be discussed were Oregon currents and water characters. The currents are bringing the 2011 Japanese tsunami flotsam to the Oregon coastline (among other areas in the Pacific Northwest); Some sponges from the Japanese dock that washed up are already being collected and sent in for study.

Based on PISCO studies, coastal upwelling could bring anoxic waters thereby affecting sponges.

Carbonate solubility is another issue facing sponges. In summer months the top layers of the



ocean become super-saturated and it used to be thought that sponges had to remain in the top 1000m due to this fact, but that has turned out not to be true and they extend down to 4000m.

Sponge shape will often be determined by habitat. For instance, in rocky habitats, sponges tend to be flat. In muddy areas they tend to be stalked. Cobble habitat is usually inhabited by foliose sponges while boulders and large cobbles often have shelf sponges. And, large rocks can support barrel shaped sponges. There is often confusion interpreting collection labels for e.g., barrel vs vase.

There is the potential for smaller species living on bigger species, with epizoic complexes being common. It is relatively easy to distinguish two sponge species growing on top of each other when they are alive and in the field, but once preserved and colorless, the task becomes much more difficult. Without knowing it, the taxonomist could be cutting through two species thereby finding confusing spicules when examining the slide prep.

With this chilling announcement regarding confusing species, Dave went on to give examples. On one sponge he found 7 other little species growing on it, all within 1 inch. Additionally, he found 7 or 8 species on one small 1/2 inch rock.

Dave admitted that currently he is doing 19th century biology – cutting things up and looking at spicules under a microscope.

And sponges are much more complex than just their spicules. Sponge larvae contain bacteria, collagen fibers, and a small packet of spicules from which to start. But as taxonomists we are only looking at spicules which is a limited aspect of the animal. There is a wide variety of “soft stuff” involved which we don’t examine. Studies have shown some indication that there are specific bacteria which are accepted at the surface of the sponge; bacteria live within the mesophyll in cells, in endocytes, all over the places. What is the symbiotic relationship between the bacteria and the sponge? There is some thought that the bacteria might control the shape of spicules. It has been found that in some sponges 2/3 of their biomass can be microorganisms.

Another interesting aspect of sponges is their biochemistry. There is now some work being done to try to use their specific biochemistry as taxonomic indicators. Predators of sponges have picked up on the biochemistry aspect. Dorids, for example, *Diaulula*, can chemically sense the specific sponge they need. The compound is water soluble and they can “sniff” them out. Research suggests that they are extremely specific and will not prey upon similar species even within the same genus.

The skeleton of sponges, with regards to size and shape, can be affected by environmental factors such as season and depth. Additionally levels of silicon in the environment can affect skeletal development as well, e.g., width of the spicules. So, short and thin spicules and short and fat spicules can exist in the same species depending on the time of the year. The same species can have multiple forms/morphology based on its location, time of year, ocean chemistry, predation, etc. At this point in the day, many wanna-be sponge taxonomists were shaking their heads in mild despair.

Dave feels that you need SEM images for proper spicule detail. Due to so many difficulties facing sponge taxonomists, he estimates it takes about \$100/specimen to get to Family. This number does not factor in SEM cost, collection time/effort, preservation, sorting, glass ware/labels, and final identification. People need to be trained on how to separate the multiple specimens



potentially growing on one another and it takes about 2 hrs per specimen to do slide work.

Many labs are now using sponges for all sorts of research and sponge farming might be the wave of future.

Dave threw out a last tidbit for us to ponder when considering the wonderful world of sponges - he suspects that sponges have unique relationships with the animals they might be growing on, such as tunicates, corals, etc.

With that we wrapped up the day. We were all very grateful to have a true sponge expert in our midst but we left the meeting a bit overwhelmed with our newfound understanding of just how difficult the task of identifying sponges really is.

5 NOVEMBER 2012, MOLLUSCS, OCSO

Attendance: Megan Lilly, Wendy Enright, CSD; Heather Peterson, SFPUC; Kelvin Barwick, Ken Sakomoto, Michael Vendrasco, Mike McCarthy, Laura Terriquez, Rob Gamber, OCSO; John Ljubenkov, DCE; Larry Lovell, Bill Power, Terra Petry, LACSD; Tony Phillips, consultant; N. Scott Rugh, BFSA; Angela Eagleston, EcoAnalysts Inc.; Emile Fesler, BioVeyda; Carol Paquette, MBC; Bryan White, CSUF/SCCWRP

President Larry Lovell opened the meeting with the usual round of introductions and upcoming meeting announcements. Additionally he announced the upcoming 2013 SCAMIT officer elections and the nomination of Laura Terriquez (OCSO) for Treasurer, as for the other positions, current officers were nominated for another term.

Tony Phillips then asked those present, if possible, to collect some enteropneust specimens in EtOH for genetic and ID work.

The science portion of the day started with a presentation by Bryan White who is a graduate student of Dr. Eernisse at CSUF and is also working with SCCWRP. His thesis project deals with coalescent DNA techniques and he gave an informative and concise presentation explaining how using these techniques might help us more easily separate and determine cryptic species. An overview of his presentation is below.

Coalescent-based species delimitation: A new method of delimiting species for use in DNA barcoding with applications in species identification, biomonitoring, and conservation

Bryan P. White

DNA barcoding is a rapidly growing field with applications in species identification, biomonitoring, and conservation, and typically focuses on the amplification of a single mitochondrial gene, cytochrome oxidase I (COI), and the delimitation of COI sequences into haplotype clusters. However, there is no widespread accepted standard method through which haplotype clusters are delimited into putative species. Many workers have suggested using strict genetic distance cutoffs within range of 1-3%, but strict cutoffs yield differing results depending on the data set and are based on the assumption that mutation rates are similar across all animal phyla. This study seeks to test a new method of species delimitation called coalescent-based species delimitation (CBSO). According to CBSO, species entities are delimited based on common coalescent points, the points at which all members of a population share a common ancestor, so that all individuals that share a common coalescent point originated from



the same species. In order to test this method of delimitation, three samples of benthic marine macroinvertebrates (300 individuals each) will be collected near the long outfall pipeline from the Orange County Sanitation District. Three-hundred individuals will be collected from each sample, sorted to individual, and sequenced for the 658 bp barcoding region of the COI gene. Obtained sequences will be delimited using the CBSD method and compared to morphological identifications and concordance between morphological and DNA barcoding will be measured. I expect that identifications obtained through DNA barcoding will closely match morphological identifications and clarify morphological identifications thought to be cryptic.

With Bryan's talk complete it was time to move on to Kelvin Barwick's mollusk presentation.

[Editor's Note: All Figures referenced in the mollusk minutes below can be found as an attachment at the end of the NL]

Kelvin began his presentation on *Lirobittium*, a genus which historically has not been treated with equal taxonomic effort by the various agencies. He began with a brief nomenclatural history of the group. The first large scale review of west coast *Bittium* was done by Bartsch in 1911. He relied entirely on shell characters from both extant and fossil material describing a number of species, genera, and subgenera. Houbriek (1977) synonymized 13 genera and subgenera under the genus *Bittium* placing it in the Subfamily Cerithiinae. In 1981 Hertz attempted to address 3 closely related species of *Bittium* from the Eastern Pacific, (*Bittium asperum*, *B. rugatum*, and *B. suplanatum*). He illustrated types and addressed some of the nomenclatural issues as well as proposing shell characters separating the three species in question. Next, in a follow up to his 1977 paper, Houbriek (1993) conducted a phylogenetic analysis of what had become Subfamily Bittinae using external soft tissue, radula, reproductive structures, and the shell. Based on the cladistics analysis he proposed 5 genera (Figure 1). He further warned against relying solely on shell morphology for identification. Houbriek noted that *Lirobittium* is the only genus known to have an egg mass that resembles "a group of small balloons with their strings attached together." Development is direct. Kelvin showed images of local specimens with these egg masses attached above the aperture (Figure 2). McLean (1978, 1996 and 2007) reviewed and illustrated the extant species recorded from near and offshore waters of California. All southern California species were placed in *Lirobittium*. He used shell characteristics alone. The take away message from previous work is that an emphasis solely on shell morphology leads to taxonomic confusion and difficulty as there is a large range of variability within a species. However, for many of us working in monitoring labs, the idea of grappling with soft tissue characters is problematic. In an attempt to look at the anatomy, Kelvin has found that the animal is so tightly enclosed within the shell in preservation that it is difficult to discern, conclusively, the characters outlined by Houbriek.

With this as a background Kelvin presented images of various taxa from specimens provided by most of the participating agencies, contractors and individuals. We worked as a group to try to reach a consensus. The presentation included numerous images of local specimens compared to published illustrations and is available on request (kbarwick@ocsd.com). The following SCAMIT (2012) taxa were considered: *Lirobittium attenuatum* (Carpenter 1864); *L. calenum* (Dall 1919); *L. larum* (Bartsch 1911); *L. paganicum* (Dall 1919); *L. quadrifilatum* (Carpenter 1864); *L. rugatum* (Carpenter 1864); *L. fetellum* (Bartsch 1911). Friendly arguments and bantering ensued but we finally agreed on the following: *L. larum*, *L. rugatum*, and *L. quadrifissatum* are considered to be too poorly understood and confused in the literature to be



separated by those present. It was decided that these three taxa would be joined under one name as a species complex. Kelvin agreed to produce a voucher sheet and choose a name. **[K. Barwick note June 24, 2016: To date this has not been done.]** The remaining SCAMIT 2012 taxa (*L. paganicum* and *L. fetellum*) were determined to be valid forms consistent with published literature and could be reliably separated by those present. *L. calenum* (a single record from B'08, 510m) was also retained despite the lack of any published images. Dall records that it was found off "San Luis Obispo Bay, in 252 fathoms". It was compared to an image provided by J. McLean (unpublished manuscript) of a deep water form (400m) from off Palos Verdes. In addition, the previously unreported taxon, *L. purpureum* (Carpenter, 1864), was proposed to be added to the next edition of the species list (Edition 8). This was agreed upon by all those present.

With that Kelvin moved on to scaphopods, specifically, deeper water Gadiliforms. In 2007, Kelvin acquired a copy of Pilsbry and Sharp (1897-1898) in electronic form. With this new to him information, he began to wonder if he had been confusing *Cadulus californicus* Pilsbry & Sharp 1898 and *Gadila tolmiei* (Dall 1897). This led to a more thorough investigation of the literature and later, a review of specimens provided by most of the participating agencies, contractors and individuals.

First the literature: Pilsbry and Sharp contains the original description of *Cadulus californicus* (Figure 3) as well as a re-description with figures for *Gadila tolmiei* (Figure 4). Also included is a description of *Cadulus (tolmiei var?) newcombei* (Figure 5) as a new variant, however Steiner and Kabat (2004) consider it a synonym of *G. tolmiei*. It appears that based on the reported relative lengths, Pilsbry and Sharp illustrated a different specimen of *G. tolmiei* than Dall (Figure 6) in his original description (type locality: "Near Victoria, Vancouver Island, 60 fms."). In their description of *C. californicus* they state that the apical aperture had "irregular breakage, but possibly two lateral nicks may be normally present." No such "nicks" were reported by either Dall (1897) or Pilsbry and Sharp (1897-1898). Furthermore, the latter authors state that *G. tolmiei* was less inflated than *C. californicus*. Burch (1945) suspected that these were the same species noting that "If the tip of a specimen of *Cadulus californicus* were broken off, it would answer the description of *Cadulus tolm[i]ei*". He acknowledged that there has been a lot of confusion around the identity of these two species. Shimek (1998) states that *C. tolmiei* is less inflated at its widest point than *C. californicus*. He describes *C. tolmiei* with an apical aperture possessing 2 to 7 lobes. He did not describe or illustrate his concept of *C. californicus*. And finally, SCAMIT (1996) reported that after reviewing NHMLAC lots of both species "it was apparent that what was being recorded as *C californicus* by LA County was actually *G. tolmiei*." It was reported that *C. californicus* was "more slender" than *G. tolmiei*.

A review of specimens was conducted. Results presented at the meeting showed that most workers are consistent. In general, the wider specimens with or without (broken?) apical lobes were recorded as *C. tomiei* and relatively narrower specimens with or without lobes were referred to *C. californicus*. This seems to indicate that the two species are being reversed when compared to their original descriptions as Kelvin suspected. However, it is his opinion that there remains enough confusion in literature that, until which time a more thorough investigation can be undertaken, no changes are warranted. **[K. Barwick note June 24, 2016: At the time of the meeting Kelvin stated that he would draft voucher sheets for these two species. Upon further reflection he believes this is premature, pending further study.]**



As a public service, here are a few minor corrections to figure origin citations for Burch, 1945 (Explanation of Plate I, page 17). Figure 36 is from Dall 1897 (plate 1, fig. 8) not Pilsbry and Sharp. Figure 37 is from Pilsbry and Sharp 1897-1898 (plate 34, fig. 3) not Dall, as Burch suspected.

To B or not to sp B?

And last, but certainly not least, we revisited the *Tellina* spp conundrum. Mike McCarthy created a test, of sorts, with dishes holding various combinations of *Tellina* spp. The dishes were not labeled and at least one representative from each agency present examined the dishes and recorded their identifications. The results were tabulated and for the most part everyone was on the same page, with the biggest difference being in the name usage. All the agencies, except CSD, consider *Tellina cadieni* Valentich Scott & Coan 2000 a separate and distinct species found in very shallow water and bay habitats. The off-shore “pinkish” *Tellina* is identified by this group as *Tellina* sp B SCAMIT 1995. However, CSD identifies the off-shore pink form as *T. cadieni* based on conversations with Paul Valentich-Scott and Gene Coan at the May 14, 2001, SCAMIT meeting [K. Barwick note: this conversation did not make it into the official meeting minutes]. At this meeting both men examined specimens of the offshore species and thought that they were probably the same as the *T. cadieni* they described from the bay. CSD does not sample in shallower water and/or bays and so has yet to see an example of what some of the other agencies would call the true *T. cadieni*, which they maintain, despite the input from Paul and Gene, is **not** the same as the offshore species. They felt that Paul and Gene did not see enough examples of the bay form and the offshore form side by side, and if they had, they would agree they are two distinct species.

At this point in the discussion, Kelvin brought up the fact that there is no formal voucher sheet for *T. sp B* to compare to *T. cadieni* which was described in Coan, et al., 2000. Kelvin, who does not have a clear concept of *T. sp B*, called for a volunteer to create, at the very least, an ID sheet for *T. sp B*. Amongst deafening silence, Megan Lilly volunteered to create a sheet showing images of both the *T. cadieni* from Paul Scott, and *T. sp B* (the off-shore form). She will be sending the sheet to Tony Phillips and John Ljubenkov for input [**M. Lilly note June 24, 2016: this was never done, largely due to the fact that she has no specimens of the *T. sp B* of other agencies from which to create a sheet**]. To date, Tony and John are the only two taxonomists present to have recorded *T. cadieni* as part of their work in the bay. [**K.Barwick note June 24, 2016: The SCAMIT Newsletter (May, 2001; Vol. 20(1)) sheds some much needed light on this problem of attribution and description of *Tellina* sp B. In the minutes for the May 14 meeting there is an explanation and justification for erecting this provisional. Some of the confusion stems from the fact that the correct year should be 2001 (based on the May newsletter) not 1995 as was codified beginning with Edition 4 of the Species list published in 2001. This was not known or mentioned by those present at the time of the 2012 meeting.**]

10 DECEMBER 2012, PRE-B'13 ECHINODERM REVIEW, OCSD

Attendance: Megan Lilly, Robin Gartman, Wendy Enright, CSD; Dean Pasko, consultant; Tony Phillips, consultant; Don Cadien, LACSD; Laura Terriquez, Kelvin Barwick, OCSD; Larry Lovell, Cheryl Brantley, Fred Stern, LACSD; Craig Campbell, Greg Lyon, CLAEMD; Carol Paquette, MBC

There are no business minutes from the December meeting, but following is a summary of the echinoderm presentation by Megan Lilly.



The purpose of the meeting was to review echinoderm species which had either caused some taxonomic difficulty in the past, could potentially be new occurrences for some of the agencies, or had not experienced standardized taxonomic treatment among the SCB taxonomists. This was all in preparation for the upcoming B'13 project.

Megan started by discussing *Ophiura luetkenii* and its historical pattern of occasionally showing up in large numbers in some of the POTW's trawling programs. 2012 was one of those years and the summer sampling by CSD and LACSD collected record abundances of this species. She looked at historical data from the City of San Diego and noted that high abundances (> 100 individuals per trawl) of *O. luetkenii* had occurred previously in 1989, but had not reached the numbers that were seen starting in 2011 and peaking in 2012 (close to 3k individuals in one trawl for CSD and over 14k in one of the LACSD trawls). With regards to both agencies, the high



Andy Davenport, CSD, holds up a handful of *Ophiura luetkenii*
17 July 2012.

abundances seemed to center around 60-m stations with the exception of one CSD 32-m station (SD-17) in the spring of 2011.

Cheryl Brantley, then gave a presentation on LACSD's record-breaking abundances of *Ophiura luetkenii*. She had ROV footage which showed massive mounds of the species, numbering in the thousands and piling up and appearing as a moving mountain. There was some speculation on this bizarre sight and many thought it might be a reproductive behavior.

As for how to handle large catches of this species, it was decided that an aliquot technique made the most sense. Since the animals are relatively light, determining the number of individuals in .5kg was settled upon as the proper aliquot.

After discussing some life history of the genus, Megan next went on to discuss the 3 species that could possibly be encountered during the B'13 project; *Ophiura luetkenii*, *O. leptoctenia*, and *O. sarsi*. For separating *O. luetkenii* from *O. leptoctenia* see Hendler's treatment of the species in the MMS Atlas Vol 14. The primary distinguishing feature is arm comb morphology. In the Southern California region, *O. leptoctenia* is seen in deeper habitats. As for *O. sarsi*, again arm comb morphology is going to be a key character, see Clark 1911 for further details on this species. It



appears to be mostly seen north of Pt. Conception although Maluf (1988) has the range listed as Alaska to Cortez Bank. **[M. Lilly update June 24, 2016: Since this NL is being written years late, the B'13 project has come and gone during which there was 1 individual of *O. sarsi* collected].**

Next we went on to discuss taxonomic convention for the treatment of juvenile ophiuroids. For instance, with juvenile individuals in the family Amphiuridae, Megan does not set a strict size limit, but rather prefers to look at the development of the oral papillae to ascertain an ID. A juvenile animal with a well-developed pair of infradental papillae but with no other oral papillae present is left at the family level ID of Amphiuridae.

Some species can be identified down to extremely small sizes regardless of oral papillae development, or lack thereof. Megan discussed two examples of this – *Ophiuroconis bispinosa* and *Amphichondrius granulatus*. *O. bispinosa* has a distinctive looking jaw that even at small sizes is recognizable and granules will be present on the oral frame and disc cap on small juveniles. As for *A. granulatus*, again even at small sizes, the elongate 3rd oral papillae can be seen and the “minute angular granules” will be present on the oral aspect of the disc cap.

Next on the agenda was to review the protocols for dealing with echinoids, specifically, *Brisaster* and how to separate the two species – *townsendi* and *latifrons*. Please visit the Taxonomic Tool section on the SCAMIT website for documentation of the protocols. Additionally see SCAMIT NL's Vol 23 no 5 and Vol 26 no 2 for a more detailed discussion of this subject.

At deeper stations (200m+) large trawls of *Brisaster* have occurred. In the event of such a trawl it was recommended that a subset of 30 animals be brought back to the lab for ID and the subsequently determined ratio of species be applied to the estimated total catch.

Megan then reviewed the distribution data of *Brisaster townsendi* and *B. latifrons* from the B'08 project. During the project, the majority of *B. townsendi* sampled in the southern region of the Bight were from 400m or deeper. As the stations moved north they were sampled usually between 200-300m. As for *B. latifrons*, they were sampled primarily between 100-200m. She said she'd be curious to see if the pattern “held” during the B'13 project.

Staying on the subject of Spatangoids, Megan next discussed the unusual and rare *Brissopsis* sp LA1, first found during the B'03 project. This animal, to date, has only been found at depths below 300m, and CSD has only seen it below 400m. See SCAMIT NL Vol 26 no 2 and the Taxonomic Tool section of the SCAMIT website for further discussion of this species. Whether or not it is a hybrid between *Brissopsis* and *Brisaster* (making it a hybrid between 2 different Families), an ecophenotype of *Brissopsis pacifica*, or an as of yet undescribed species of *Brissopsis*, still remains to be determined.

A general slide showing a few species of heart urchins of the CSD monitoring program was then reviewed. It contained images of *Lovenia cordiformis*, *Nacospatangus laevis*, and a growth series of *Spatangus californicus*. At juvenile sizes, these species can be difficult to separate. However, habitat/depth can be used as an indicator of which species you may be dealing with, i.e., *S. californicus* is usually found at 60+m, whereas *L. cordiformis* and *N. laevis* are found in 30m or shallower. Additionally presence/absence of an anterior ambulacral notch and fascioles are characters to assist in identification.

Sand dollars were reviewed and fairly straight forward, but everyone was reminded that two species of *Dendraster* exist in the SCB - *D. excentricus* and *D. terminalis*. *D. excentricus* is

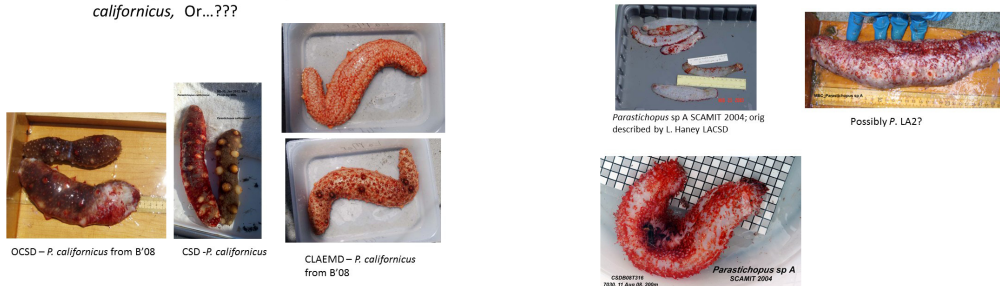


found in shallow, high energy habitats, either at the mouths of bays or in subtidal sandy beaches, whereas *D. terminalis* is also usually collected in sandy habitats but in at least 20m of water, outside the area of stronger wave action. This difference in habitat preference is evident in their morphology, with *D. excentricus* have a thicker more robust test and spines and *D. terminalis* having a thinner test and more delicate spines. Due to its delicate nature and pale coloration, *D. terminalis* was initially thought to be a “dead” test of *D. excentricus* by some So Cal taxonomists, but luckily work by Dr. Mooi cleared up the confusion. See Mooi 1997 for a thorough discussion of *Dendraster*.

Holothuroids were the next Class to be discussed. Megan briefly covered protocols for dealing with juveniles. An animal needs to be at least 1 cm in order for an ossicle mount to be effective in determining species level identification. In smaller animals the calcareous ring can be used for Family level ID’s assuming the animal is large enough for a proper dissection. If the animal is too small for successful dissection and/or ossicle mounts, assuming it is a “tube foot” variety, an ID of Dendrochirotida is used.

Next was the primary conundrum facing SCB echinoderm taxonomists – *Parastichopus* spp. During previous surveys a few unusual looking *Parastichopus* had come to the attention of the LACSD taxonomists, and one was given the provisional species name of *Parastichopus* sp A. Going in to the B’08 project, field taxonomists were on the look out for 4 species in the genus *Parastichopus* – *luekothele*, *californicus*, *parvimensis* and sp A. Prior to B’08 trawls, the species were reviewed at a SCAMIT meeting and everyone thought they had a handle on it. However,

The problem: Natural variability within *Parastichopus californicus*, Or...???



upon review of B’08 voucher specimens of *P. californicus* and *P. sp A* from various agencies, it was soon evident that a greater problem was present than previously thought. The variety amongst the animals being identified as *P. californicus* and *P. sp A* was soon obvious.

Megan took some time comparing ossicle mounts from different vouchers for both species, and came to no conclusion other than “we have a problem”. She strongly feels that there is possibly more than one undescribed species of *Parastichopus* existing in the SCB and more work needs to be done. However, it is a project for a grad student more so than a POTW monitoring program taxonomist with limited resources and time. Not only do morphometrics and ossicle morphology need to be studied more thoroughly, but DNA work would also be conducive to teasing out an answer concerning this mystery.

She asked her fellow taxonomists at the meeting for their thoughts and opinions and was met mostly with resounding silence.....

To continue in the theme of confounding holothuroids, Megan then went on to review the three species of “unknown Phyllophorids” from the B’08 project; Phyllophoridae sp SD2, SD3, and



SD4. All three of the species were sampled at B'08 Channel Island station 7527. Unfortunately, all the specimens were juveniles with the max size of those considered large enough to identify, being 1.5cm. There was some discussion of the ossicle mounts and external appearance but no identification for any of the three provisional species was achieved. Megan was hoping that more, larger, specimens would be sampled during the B'13 project, allowing her to continue her efforts at identification.

Lastly Megan went over a series of slides showing interesting trawl caught echinoderms from past Bight projects. Focusing mainly on those species that occur outside standard monitoring program depth ranges. Since the Bight projects tend to sample different habitats, unusual/not often seen species are frequently encountered.

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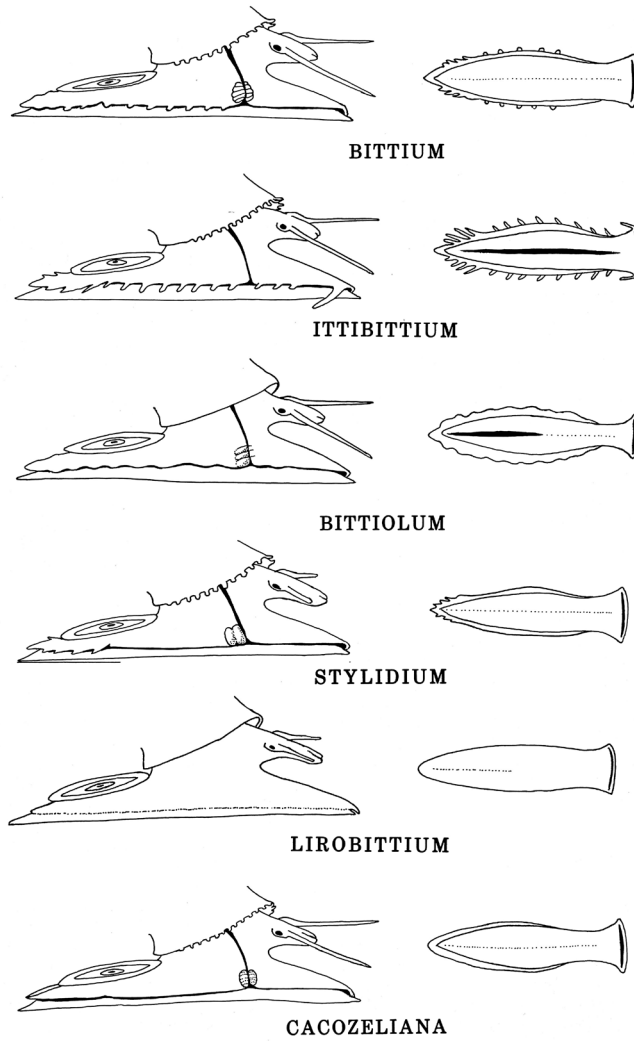


Figure 1 Genera proposed by Houbrick (modified from Houbrick 1993)

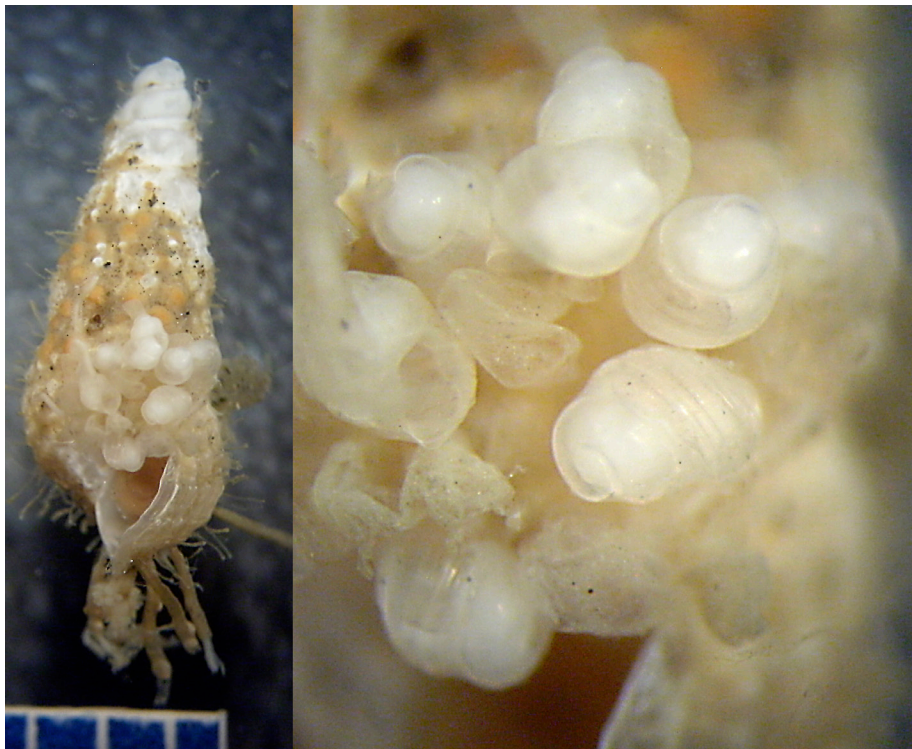


Figure 2 *Lirobitium* sp with attached egg mass. (Image by K. Barwick.)

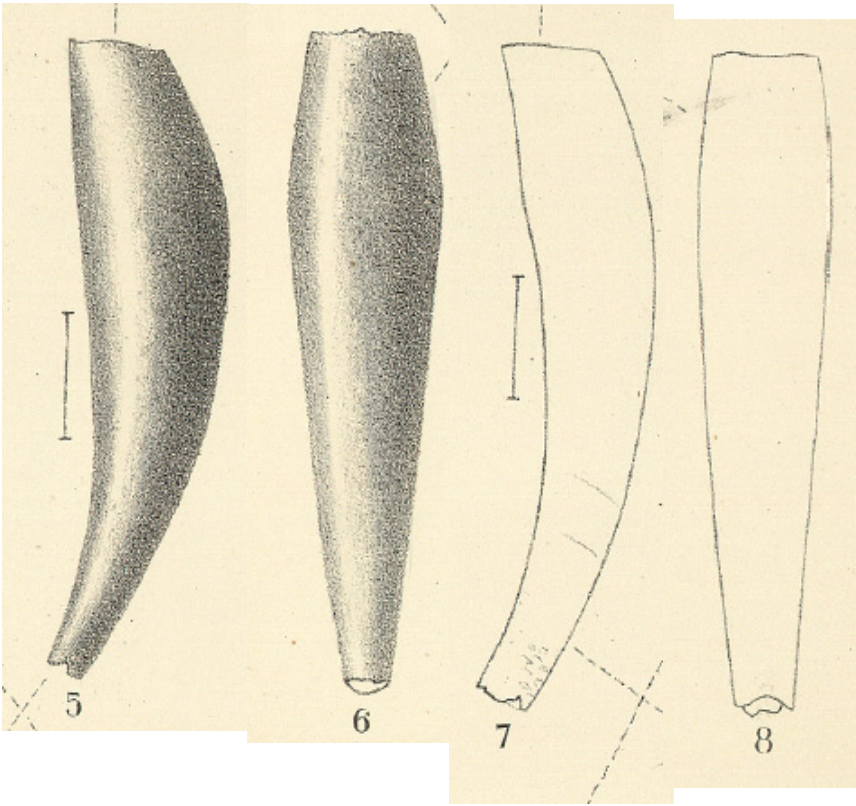


Figure 3 *Cadulus californicus* Pilsbry & Sharp 1898; 2 individuals each in different viewing pairs: 5 and 6 are the type specimen, length is 14.3 mm; 7 and 8 length is 14.6 mm (modified from Pilsbry & Sharp 1897-1898)

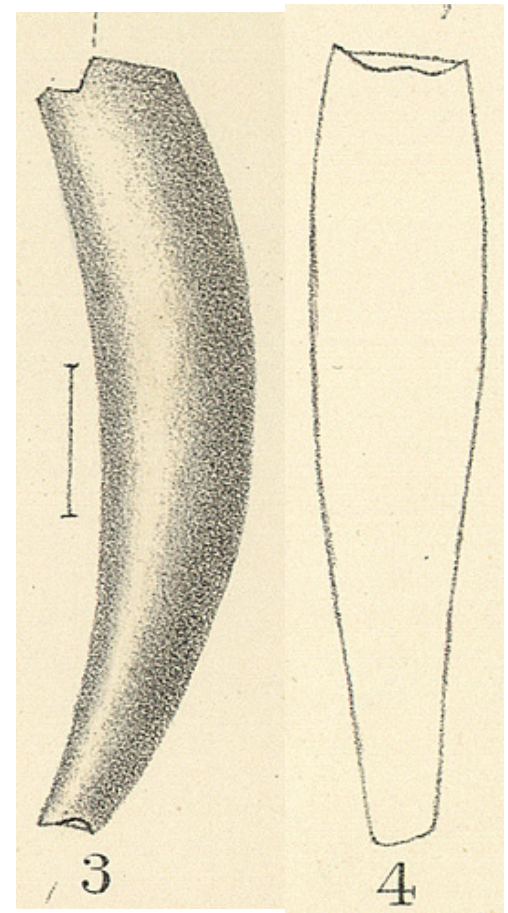


Figure 4 *Gadila tolmiei* (Dall 1897); 10.7 mm (modified from Pilsbry & Sharp 1897-1898)

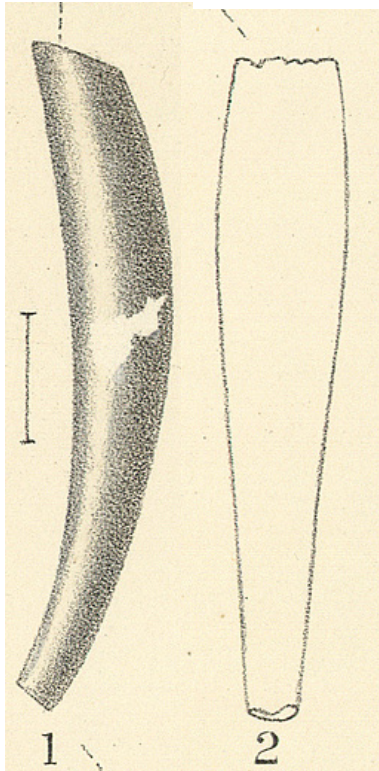


Figure 5 *Cadulus (tolmiei var.?) newcombei* Pilsbry & Sharp 1898; 11.0 mm (modified from Pilsbry & Sharp 1897-1898)

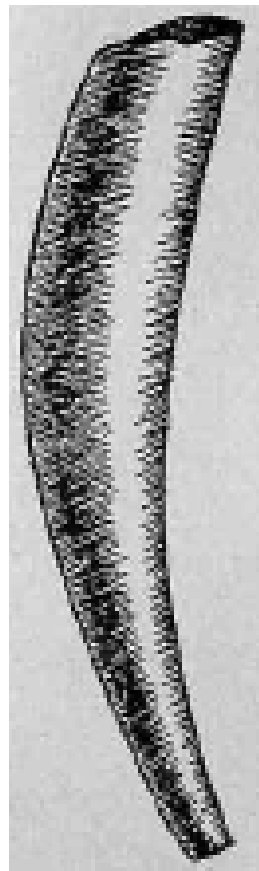


Figure 6 *Gadila tolmiei* (Dall 1897); 12 mm; type? (modified from Dall 1897)