Southern California Association of Marine Invertebrate Taxonomists

3720 Stephen White Drive
San Pedro, California 90731

March, 1998

SCAMIT Newsletter

Vol. 16, No.11

NEXT MEETING:	Demonstration of Digital Camera for Polychaete Taxonomists
GUEST SPEAKER:	Rick Rowe (CSDMWWD)
DATE:	27 April 1998
TIME:	9:30am - 3:30pm
LOCATION:	City of San Diego's Marine Biology Lab 4918 N. Harbor Dr. Suite 101, San Diego

Digital image of *Malmgreniella sanpedroensis* provided by R. Rowe (CSDMWWD)

APRIL 27 MEETING

We will be privileged to observe and perhaps participate in application of the CSDMWWD's digital imaging system to polychaete taxonomy. After a period of experimentation and optimization, the lab personnel have learned to use their system to provide high quality color and/or black and white images for use in their taxonomic program. How such images are currently being used for research, teaching/inter-calibration, and quality control will be discussed. Application of the system for other invertebrate groups will be discussed at future meetings. If you have a few problem polychaetes which you want to try the system with, bring them along - there may be time available to look at them. Contact the Secretary if you need a map.

FUNDS FOR THIS PUBLICATION PROVIDED, IN PART, BY THE
ARCO FOUNDATION, CHEVRON USA, AND TEXACO INC.

SUCCESSFUL INVASION?

A recent communication from Kevin Li in Seattle (METRO) reopened the files on a species introduced to our shores from the Western Pacific, the amphipod *Eochelidium sp A*. It is assumed introduced because all it's congeners are in the western North Pacific. He had taken a specimen he was tentatively calling *E. miraculum* (described from Vietnamese waters by Ingram in 1969) from the Elliott Bay area of Seattle and asked about reports that I had seen the animal elsewhere. Although I have not seen his specimen I assume it is *E. sp. A* which occurs in Puget Sound as well as in the Los Angeles-Long Beach Harbors complex and perhaps elsewhere in the Bight. It was first seen in 1993, and was called *Synchelidium sp A* at that time.

With the publication of Bousfield & Chevrier (1996) it became apparent that the taxon belonged in *Eochelidium*. Specimens have been taken in the Los Angeles-Long Beach Harbors complex infrequently and in small numbers since the initial record, but the species seems to be tenuously established in local waters. No specimens have been taken since the major winter rains and run-off of the current season, and it may have succumbed to the rigor of the elements. We now have a better means of keeping track of this species, with eyes watching at both ends of it's reported eastern Pacific range. Fewer specimens have been taken in the north, but introduction there may also be successful.

NEW LITERATURE

Faunal connections between the western and eastern North Pacific are also apparent in Imajima (1997), who reports on polychaetes from Suruga Bay, Japan. Many of the species are also taken here in the Southern California Bight, and he reports *Goniada annulata*, *Leitoscoloplos pugettensis*, *Phylo nudus*, *Califia calida*, and *Monticelliina tesselata* from Japan for the first time. No new species are described, but the distributions of many species are extended.

Sato and Masuda (1997) consider genetic differences between two sibling species of *Hediste* (*Neanthes*) [your choice on which to use - see recent discussions on Annelida]. Results of electrophoretic examination of 14 gene loci confirmed that two "forms" of *Hediste japonica* separated by their egg size did indeed differ genetically. They had complete allele substitutions at 5 of the 14 loci examined. These results reinforce earlier evidence from reproductive behavior, development, and karyotype. Despite this the authors did not propose a name for the new form, or indicate which of the forms corresponds to *Hediste japonica*.

A more generalized consideration of genome in polychaetes was offered by Gambi et al (1997). They found a strong positive correlation between genome size (as quantity of nuclear haploid DNA) and mean body length. Surprisingly genome size was not significantly related to diploid chromosome number. Nearly half of the taxa examined came from interstitial groups. These exhibited both lower chromosome numbers and lower genome size than macrobenthic species. Along with reductions in many organ systems, and in overall size and complexity, meiofaunal polychaete have reductions in chromosome complement and genome size. The authors suggest this may affect the potential for genetic recombination in interstitial polychaetes.

Isabel Pérez Farfante and Brian Kensley have joined forces to provide a new world-wide treatment of the penaeoid and sergestoid shrimps (Pérez Farfante & Kensley 1997). Issued as a volume of the Mémoires du Muséum national d'Histoire naturelle, Paris, this hardback provides keys and diagnoses for both families and genera, and lists species and subspecies currently allocated to each genus. The families Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae, Solenoceridae, Luciferidae, and Sergestidae are covered. It is available from Backhuys Publishers for 120 Dutch Guilder + postage and handling (the 30 March quote on Guilder put its value at roughly 49 cents). They can be reached at http:// www.euronet.nl/users/backhuys/ or via e-mail backhuys@euronet.nl or at Backhuys Publishers,

P.O. Box 321 2300 AH Leiden, The Netherlands.

A report of hybridization between members of two different phyla was examined by comparison of the DNA base pair sequences between the two putative parent taxa. The initial report was of fertilization of tunicate eggs by sea-urchin sperm. The results of the DNA comparisons were negative, but not conclusive. Several scenarios were offered which might account for the difference between the original results and the DNA sequence comparison. Although the hybridization has always appeared questionable, the inability of Hart (1996b) to disprove the claim with complete confidence remains intriguing.

Poore & Lowry (1997) reviewed the amphithoid amphipod fauna of south-eastern Australia. In addition to describing several new species, they provide a new key to the genera of the family world-wide. This is provided to remedy a few problems with the key provided by Barnard & Karaman. Although not stated in the paper, the first author seems to be Gary Poore's son, representing the second generation in a potential dynasty of crustacean workers.

The pluteus larvae of the irregular urchin *Brisaster latifrons* is described, and characterized as facultatively feeding by Hart (1996a). Although we are not likely to need identification of meroplanktonic forms of our benthic invertebrates, facts about their reproductive biology are always useful in interpreting adult distribution and ecology.

9 MARCH MEETING MINUTES

Our meeting on 9 March was attended by representatives of three agencies, CSDLAC, CSDMWWD, and ABC Labs. Although we still do not know how many agencies will be involved in the trawl sampling for Bight '98, it was clear we hardly had a quorum. This restricted base made it impossible for us to fully meet our goals of information exchange. We gamely pressed forward and attempted to do what we could with the group at hand.

Since ABC labs had intended to provide information prepared by MBARI in Monterey, we were eagerly looking forward to this new source of field ID aids. A glitch had developed in the process, and none of the materials were yet available. This left basically only materials used by the San Diego Lab and the L.A. County Marine Biology Lab as the basis for discussion and exchange.

Since we had largely already exchanged materials either through the Newsletter, or in previous meetings little new was gleaned by our two groups. Some of the materials, such as the keys, character tables, and discussions of the local *Astropecten* and *Luidia* species prepared by Don Cadien (CSDLAC) had not yet been distributed. They are updates and corrections to earlier attempts. Several tools developed by the CSDMWWD staff were also circulated. They have already distributed such things as the color photographs of the local octopus species at previous meetings.

It became apparent that there was no single, sufficient tool for identification of trawl collected shrimps. Don Cadien had hoped to have new keys ready to distribute at the meeting, but was not able to complete them in time. They have now been done, and are provided in the attachment (Trawl Caught Shrimp in the Southern California Bight: a guide to field and lab identification). Picture keys to shrimp families, and to the penaeoid, pandalid, crangonid, and alpheid shrimp are being constructed along the lines of the galatheid key distributed earlier, and parallelling the verbal keys attached here. They will hopefully be completed in time for inclusion as attachments to the next Newsletter.

Following the main portion of the meeting some specimens were examined. Included among them was the specimen of *Metapenaeopsis* sp. reported from San Diego in the last Newsletter. It proved to be *Metapenaeopsis mineri* based on the structure of the thelycum. This particular genus of shrimp requires examination of the external genitalia for specific level determinations. This is the first record of the species from within the Bight of which we have knowledge. These animals are relatively small

even as adults, so be careful with small penaeids; they may not be juveniles!

NEWS FROM SAN DIEGO STATE

Member Constance Gramlich (SDSU) dropped the editor a line with some information on El Niño related recruitments and species occurrence.

"Adrianne Mock (San Diego Floating Marine Classroom, Shelter Island), just asked me what this beautiful new shrimp was that they were getting in their trawl samples, and because you had just mentioned *S. penicillata* (with an illustration) in the February SCAMIT newsletter, I was able to tell her about the "target shrimp", and give her xerox copies of the blurb in the newsletter as well as Brusca's key and species description from the Baja Inverts book. Adrianne and her crew will be on the lookout for more specimens for me, (this time, with depth and location data) which I intend to use live for the SDSU Marine Invertebrate lab, then preserve for our collection.

It is because YOU took the time and trouble to get the information out, that WE can be provide more interesting information on these critters for our students. (Plus, it is a BEAUTIFUL little shrimp!)

P.S. You might be interested to know that I have seen a large recruitment of *Centrostephanus coronatus* at the artificial reefs in Mission Bay. The test diameter is about 2cms (March)."

Thanks for the friendly feedback, and for the information on *Centrostephanus*. All you divers should be on the lookout for increased numbers of this long-spined urchin throughout the Bight.

The Newsletter would be only too happy to print communications from members (whether friendly or highly critical). Please use us as your conduit to other members, and to the community at large. You do and see a lot; share it.

ALIENS COMPLICATE BIGHT '98 ID

These are neither illegal aliens nor blue-skinned aliens with big eyes; they're alien species introduced into local waters. For the most part, benthic monitoring around major POTW discharges has been restricted to areas where introduced species are few and far between. Our experience with *Philine auriformis* has been the only major exception to this.

With the expansion of Bight '98 benthic sampling into bays and harbors, we will be entering the realm of the introduced species. Over recent years we have chronicled a few introductions which have come to our attention - *Philine sp A* (suspected to be introduced); *Listriella sp A* and *Paradexamine* sp (almost certainly introduced); *Salmoneus sp A, Sinocorophium heteroceratum* and *Eochelidium sp A* (assumed introduced from the Western North Pacific) among them. There are probably many more, especially in phyla where the status of the local fauna is not fully understood (guess that covers about everything).

Setting aside the problem of which came first (was it introduced to the U.S. from Japan, or to Japan from the U.S.) as irrelevant to the practical problem of species identification, we must consider how we approach identification of locally collected samples. For most of us there will be a double whammy; collection from areas where we have no prior knowledge of the expected biota, and collection from areas where introduced species will probably occur and may be in the majority. This will probably be beneficial in that we will already be alert to the necessity for careful examination.

Although we do not have introduced species problems as massive as those experienced in San Francisco Bay (or Do we?), we will have a problem with unexpected species occurrences of some undefined magnitude. Suddenly all our usual regional tools become suspect, and we must find more comprehensive information sources. New meaning must be read into the injunction to "think Globally and act Locally".

Globally is the only way to approach species identification in areas of probable species introduction. Wherever possible we must seek reviews and revisionary treatments that cover worldwide species. Even if we find these too cumbersome for everyday use, we should have them available in case of need.

In many cases the introduction will differ profoundly from local species, and will be easily separable even without it's identity being known. More insidious are those introduced species in genera with a single local representative. If they are superficially similar, the tendency for the old "its the only one that occurs here" to assert itself will be strong.

In genera which already have several representatives locally, it is likely that newly introduced species will be recognized as different. As long as we do not confuse such species with our existing fauna, we are OK. We can give the animal a provisional name, even though it may have been described elsewhere under a name unfamiliar to us. The provisional name can later be synonymized with the published name once their identity is recognized.

We still have several months before the field work begins, and then more months before the first samples trickle out from sorting to go under our microscopes. In the mean time contemplate the following question "How can I tell that a species I haven't seen before is introduced, and not just a rare component of the normal fauna?". If you come up with an answer, <u>any</u> answer, please forward it to the Newsletter so that we can all consider it.

Until we get such an answer I can only recommend the path I take: 1.) do I know this animal?; if not, 2.) is it in local literature?; if not, 3.) is it in the north-east Pacific literature?; if not, 4.) is it in the world literature?; if not, it's a previously unrecognized species - do a voucher sheet and circulate it to other SCAMIT members to find out if they have seen it too.

- Don Cadien (CSDLAC)

ELECTION RESULTS

Apologies for the arrangement of the two ballots in the last Newsletter. They were intended to be on separate sheets since they had different return dates. Somewhere in the printing process the two were combined. I hope that none of you were disenfranchised on the officer elections (due 31 March) as you pondered the question posed in the special vote on the amendment to the bylaws (not due till May). My thanks to those who were willing to send in both in time to meet the 31 March deadline.

The results are in, and, given the restricted slate of officers offered, not too surprising. All the candidates were elected, three of the elections being unanimous. Write-in votes were received for Leslie Harris and Larry Lovell for the office of President, but the majority voted to return President Ron Velarde (CSDMWWD) for another term. Treasurer Ann Dalkey (CLAEMD) and Vice-President Don Cadien (CSDLAC) were reelected as well. Megan Lilly (CSDMWWD) was elected Secretary, succeeding the retiring Cheryl Brantley (CSDLAC).

Twenty ballots were received, leaving our voter turnout at under 25%. Our thanks to those who participated in the process. Perhaps next election we can provide a more exciting race if more members participate as both candidates and voters. With the separation of the job of webmaster from that of secretary, and the proposed separation of the Newsletter Editor's tasks from the office of Vice-President these two positions become less demanding. Consider running next time, your organization needs a broader spectrum of voices if it is to remain viable.

The outcome of the special election to consider the proposed amendment to the SCAMIT Bylaws is still open. Votes from those who have not already expressed their opinion are solicited. We still have plenty of time left before the close of the voting period.

Only two suggestions for future meeting subjects

were received: Wetland Fauna & Insects, and Wetland Restoration & Survey. Comments? Although interesting, these are at best peripheral concerns for most members. I'll look into the possibility, however. Any volunteers to present such programs?

ZOOPLANKTON MANUAL

The following announcement wended its way from the author through Mary Wicksten (TAMU) to President Ron Velarde (CSDMWWD). Hopefully some reader will be able to help out

"Gary Williams (Cal Academy) and I are putting together an identification manual to the California zooplankton roughly similar in format to Light's Manual (keys, illustrations, descriptions, annotated references, glossaries, diagrams, etc.). We have secured the participation of many local experts, but still have the following sections in need of coverage: copepods (can be broken into subgroups), mysids, euphausiids, and siphonophores. If any members are interested, please pass along the message or let me know. I can certainly supply more details upon request."

Respond to Lisa-Ann Gershwin, Department of Integrative Biology, University of California, Berkeley, CA, 94720; or 510- 642-1607; or gershwin@socrates.berkeley.edu.

MY LIFE AS A BIOLOGIST
By Donald J. Reish

Chapter 5: "Bend High and Beginning of WWII"

Bend, Oregon, was much different than Corvallis. In those days Bend was a saw mill town and very few of the high school graduates went to college. It was not an intellectual community. I think I liked Bend High because it was so different from Corvallis High. I did not take any science courses there, but those classes I remember most was journalism, speech, and choir. I had an outstanding speech teacher; in fact I spent an afternoon with her just some 30 years later when I was visiting my Dad just before he died. She remembers my playing the role of a "doctor" in the senior class play. The choir was very active and we sang in many local events (I sang 1st tenor.). Journalism was my main bag and I was active on the paper as a junior, and they too wanted me to stay and be sports editor. I decided to take my senior year at Bend rather than return to CHS; however I spent the summer with my mother and did various jobs during the summer.

One Sunday during my senior year my Dad and I came home from church; he turned on the radio and we heard at Pearl Harbor was bombed. The next day we crowded into a classroom and heard the President ask Congress to declare war on Japan. Many people thought that we would defeat Japan in six week! There was much confusion, but the impact of the war was to come later. My Dad decided to visit his mother in Florida since he had not seen her for years and we didn't know what the future was going to bring. On Christmas Day in 1941 we boarded a bus and headed for Chicago. His sister lived there and we spent a couple of days there including a tour of Chicago Tribune. Now, I had been around the newspaper offices in Oregon, but it was nothing like the Trib. We then headed to NYCity and spend New Years Eve in Times Square where we read where Oregon State had defeated Duke in the transplanted Rose Bowl. We saw many of the sights of NY including TV. My Dad went in one room and I saw him on TV; we then reversed positions for my first appearance on live TV. We then went to Washington, DC. Security was tight at this time since we learned later that Churchill was visiting FDR. We stopped at western VA where my uncle and family lived. This was my first and only visit with him. He was a minister in the Brethren Church. We then headed for Florida to near Sebring. It was my uncle's farm where my grandmother and my older cousin lived. My cousins were going to take me out to collect baby alligators on their property, but the weather was too cold. I picked oranges from a tree for the first time. My dad's sister was visiting there and we drove down to Key West. I really didn't react to the coral reefs or the mangroves, but it was a

beautiful drive. My dad got chiggers--little did I know that one of my best friends on the biology faculty at CSULB would work on this animal group. The situation in the South was a shock. Seeing separate drinking fountains, separate bathrooms, and segregated sections on buses. Fortunately times have changed.

We then headed across the country to LA. We stopped in El Paso and took the street car into Mexico for a couple of hours. (My father was still a Canadian citizen and when he applied for US citizenship they learned that he had gone into Mexico and reentered US "illegally". They started to deport him because of his illegally entrance--guess where? Mexico. Fortunately they didn't.) We spent a couple of days in the Pomona area. Orange groves all around; the smell of the blooms and blue, blue skies with temperature in the mid-70s. I was impressed. On our way back to Bend, the bus driver gave us a lecture of where the Shasta Dam was being built and what areas would be covered with water (our highway). I always look with interest at Shasta Lake when we drive to Oregon--Washington. Back to Bend 3-4 weeks later and back to school. A trip like that was a rare experience in those days. I did get some appreciation for the vastness of the USA as well as how climate and vegetation vary from region to region. Graduation was in May. So far the war had not really affected us.

I spent the summer with my mother. My brother was taking civilian pilots training; he later became a civilian instructor in the air corps. He had some time off and we worked at a saw mill where we stacked lumber (15' high) for drying. Gene had to leave and I changed jobs--building wooden man hole covers for an army base outside of Corvallis. Years later, I saw those man hole covers. I then became a bell hop. I entered Oregon State as a journalism major. I worked on the college paper as an assistant night editor. We put the paper to bed one night a week (until 4am). I took geology from the father of one of good friends. He was my baseball buddy. We went to the softball games together and we went to Salem to see our first professional baseball game. We ran into a Salem boy who we met at summer camp. Later we became lab partners in grad. school. I didn't care for physical geology but I liked paleo. In fact, I wrote my English term paper on paleo. I dropped out of journalism after the first term; it wasn't like high school journalism. Next: The army draft and University of Oregon.

SCAMIT WEBSITE UPDATE

We have received numerous inquiries in the last month about when our new and improved website will be on-line. We are hopeful that by the end of April it will be in place. Member Jay Shrake has done a great deal of work restructuring the layout and design. He has also added many digital images of our local invertebrates provided by the staff of CSDMWWD. The images will be accessed at the site by means of links from the Species List. You should look forward to viewing SCAMIT's new homepage very soon.

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Please visit the SCAMIT Website at: http://www.sccwrp.org/scamit/

SCAMIT OFFICERS:

If you need any other information concerning SCAMIT please feel free to contact any of the officers.

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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.

TRAWL CAUGHT SHRIMP IN THE SOUTHERN CALIFORNIA BIGHT : a guide to field and laboratory identification

Donald B. Cadien, CSDLAC, 3 April 1998

Because they are prominent in many trawl catches several comprehensive regional treatments of shrimp exist. The most pertinent are Schmitt (1921), Word and Charwat (1976) and Butler (1980). Each of these had a slightly different focus, and none is adequate for all the shrimp recorded from the Southern California Bight. Martin & Zimmerman (1997) cover the northern portion of the Santa Barbara Channel, but treat only eleven species. Butler provides the most extended descriptions of the species covered, but treats the fauna of the Pacific Northwest and lacks many southern species. Word and Charwat focussed on the Bight, using the same sort of monitoring records we currently do. Nomenclatural changes have reduced the utility of their treatment, and although nearly all species are keyed, little supporting description is supplied. Schmitt likewise offers little detail in his descriptions of the species. Taxonomic changes have rendered many of his names obsolete as well. SCAMIT Taxonomic List Ed. 3 will provide the synonymies which allow older usages like Schmitt's to be related to current usage. Other resources are available for particular groups, especially the series of papers by Wicksten dealing with southern California families, genera, or species (Wicksten 1976, 1977, 1978a, b; 1979; 1980; 1981; 1983a; b; 1984; 1986; 1989a, b; 1990a, b; 1991, 1992, 1996a, b; Wicksten & Butler 1983; Wicksten & Hendrickx 1991). Live appearance of many shrimp is documented by color photographs in Jensen 1995. Butler 1980 gives color drawings of many species from depths inaccessible to diving photographers. Species which are normally found to the south, but have made incursions into the Southern California Bight during the current strong ENSO event require additional references (Chace 1937; Hendrickx 1990, 1995, 1996; Hendrickx & Navarrete 1996; Hendrickx & Wicksten 1989).

Because such a variety of information sources is available on this group, the necessity of precalibration of trawl shrimp identification in the Bight '98 regional sampling effort is great. With that goal in mind, new keys to shrimps known from the Bight which can be identified in the field have been prepared where necessary. Members of the Alpheidae and the Hippolytidae do not easily lend themselves to field separation because of size and/or use of small or obscure character states in their identification. Members of these families should always be returned to the lab for identification. Other groups such as the Crangonidae may or may not be field separable depending on the experience and expertise of the observer. In such intermediate groups it is particularly important to recognize your own limitations. A good rule of thumb for deciding if specimens should be returned to the lab for further identification is "if you have ANY doubts as to the identity of the animals, they should be returned to the lab for confirmation." Not just a few representatives, BUT ALL SUSPECT SPECIMENS. Even in cases where the observer has no doubt as to the identity of the animals, vouchers must still be taken for lab confirmation. These should be collected by each individual who participates in the field identifications for each species they have identified.

These requirements are not new, but they must be followed by <u>all</u> participants to avoid data compromise. If only one participant fails to identify, or identifies incorrectly, material which has been discarded prior to the discovery of the data deficiency, all data provided by other participants must be degraded to the level of the non-conforming group prior to analysis. This unfortunately occurred on several occasions during the 1994 regional monitoring effort, and the utility of resulting data was diminished. These concerns become even greater during Bight '98 because the number of groups involved is being increased, and along with the number of participants the possibilities for non-conformity.

The following families of shrimp are known from historic records to have occurred in the Bight - Alpheidae, Aristaeidae, Crangonidae, Glyphocrangonidae, Hippolytidae, Luciferidae, Ogyrididae, Oplophoridae, Palaemonidae, Pandalidae, Pasiphaeidae, Penaeidae, Processidae, Sergestidae, Sicyoniidae, and Solenoceridae (less than half the 36 known families of shrimps). Of these sixteen families the

Aristaeidae, Luciferidae, Oplophoridae, Pasiphaeidae and Sergestidae are all holopelagic shrimps and not part of the bottom trawl fauna.

For those interested in these animals a list of species reported from our area and useful references for their identification are provided below.

Aristaeidae

Bentheogennema burkenroadi Krygier & Wasmer 1975
has been taken from the surface to 1000m depths

Bentheogennema borealis (Rathbun 1902)
seldom reaches depths as shallow as 200m. These two species are keyed, described, and illustrated in Butler 1980. Should you reach Aristaeidae in the Key to Shrimp Families you should consult Butler for further information.

Luciferidae

Lucifer typus H. Milne Edwards 1837
known from as far north as the middle of the Baja peninsula, this species may range into Bight waters on the northward ENSO flow. See Hendrickx & Navarrete 1996

Oplophoridae - Species of *Acanthephyra*, *Systellaspis*, and *Hymenodora* are known to range into our geographic coverage area, but all from deeper than our maximum depths. It is very unlikely that they will stray into our depth range. Although not yet reported from Californian waters, the genus *Notostomus* has been recorded as far south as Oregon (Butler 1980). Animals keying to Oplophoridae should be examined with Butler in hand. He provides both generic and specific keys to local species, as well as good illustrations and descriptions.

Pasiphaeidae - most species listed in Word & Charwat and Hendrickx & Navarrete fall outside the geographic or bathymetric limits of our study area.

Pasiphaea pacifica Rathbun 1902
known throughout the bight, but generally taken in deeper trawls, although may surface at night (0-1076m). See Butler 1980

Pasiphaea chacei Yaldwyn 1962 from off Baja California to off Oregon, generally deeper than 300 m. Given the dislocations caused by the ENSO event, these are probably all below our depth range at this time. We should be aware of the characters to check to distinguish this from *P. pacifica*. See keys in Word & Charwat 1976 and Hendrickx & Navarrete 1996.

Sergestidae - Species in the genus *Sergia*, while taken from the surface to over 1000m depth, are from oceanic water masses found outside the Bight in the Eastern Pacific, and are not considered here. The single reported species of the genus *Petalidium* to occur off southern California is similarly oceanic, and not recorded from inshore waters of the Bight. Both genera are covered by Hendrickx & Navarrete 1996, who provide a key to the genera as well.

Sergestes similis Hanson 1903
ranges from the Gulf of California to the Gulf of Alaska and from the surface to 1200 m - the only member of the genus to occur in inshore waters of the Bight. Other species may occur further offshore in the California Current or beyond (see Hendrickx & Navarrete 1996). The species is well described and illustrated by Butler 1980.

Of the remaining 11 families known from the area three are penaeoids (**Solenoceridae**, **Sicyoniidae**, and

Penaeidae) all at one time considered to be subfamilies within the Penaeidae. If additional information on penaeoid biology or morphology is desired consult Dall et al (1990). A separate key is provided for benthic members of these families known to occur within the Bight plus a very similar species not yet known from the area (see attached key).

The eight benthic families of caridoid shrimp known from Southern California waters are all included in the family key. All members of the **Glyphocrangonidae** occur too deep to fall within our coverage. Distributional records are provided by Wicksten (1979), and a good illustrated key by Hendrickx (1995). All local members of the family **Ogyrididae** occur too shallowly to fall within our coverage. Although *Ogyrides alphaerostris* was reported from the area by Wicksten & Hendrickx (1991), the local species is still undescribed. Information on it should be sought from Jim Roney (LACEMD), who is in the process of describing these shrimp. We will probably see these small burrowing shrimp in our shallowest benthic samples, but not in our trawls.

Two of the six remaining families (Processidae and Palaemonidae) are represented by only a few species. The **Processidae** have only two local representatives, *Ambidexter panamensis* and *Processa peruviana*. *Ambidexter* has been reported only from shallow water in San Diego Bay, where it is taken both in infaunal samples and in seines. It is apparently a burrowing species, and may only be taken during night or crepuscular samplings over mud/algal bottoms. Given the dearth of records, the population in the bay may be quite localized. Abele (1972) describes the animal. If shallow water samples are taken in San Diego Bay we might get this species. *Processa peruviana* has only been taken once in local waters; off Palos Verdes in 1995. This animal is larger than *A. panamensis*, and was taken in the open sea, not in a bay, where it favors fine sand bottoms (Hendrickx 1995). It was taken at night, and may also be a burrower. Wicksten's original description (1983), supplemented by information in Hendrickx (1995), should allow identification of further specimens. Hendrickx also provides a key to separate these two genera. The normal range of the animal extends only as far north as the tip of Baja California, so occurrence in our area is undoubtedly related to ENSO transport.

Local **Palaemonidae** can be adequately field separated with the key of Word & Charwat (1976), which covers all species recorded to date. If you reach Palaemonidae in the family key, consult the above key. Members of the genus *Palaemon* occur only in shallow estuarine areas such as Huntington Harbor. Although an indigenous species exists (*Palaemon ritteri*), all recently caught *Palaemon* have been the introduced *P. macrodactylus*, which would key to the same place in Word & Charwat's key. Of the remaining four species in the key, two are commensals and not likely to be taken in a trawl sample. *Pontonia californiensis* is an endocommensal of tunicates, living within the branchial basket of the host. *Pseudocoutierea elegans* is an obligate commensal of muricid sea-fans, and may abandon a host caught in a trawl net and swim away. Specimens are usually taken from sea-fans collected by divers, but could also come from trawls which take sea-fans. The remaining species, *Palaemonella holmesi* and *Periclimenes infraspinus*, though rarely taken, could be caught in shallow water trawls within the Bight. *Palaemonetes hiltoni*, described from San Pedro by Schmitt in 1921 has not been seen since, and is no longer considered to occur in the Bight (Wicksten 1989). Under the current ENSO transport regime, we may refind it or other southern palaemonid species which have not yet been reported here. Wicksten's key (1989) to the family includes species not yet known from the Bight, and should be consulted for specimens which appear to key poorly or not at all in Word & Charwat 1976. Any specimens keying to the family should probably be retained for laboratory verification. The two-volume monograph by Holthuis (1951, 1952) should provide information on species (such as *Palaemon macrodactylus*) not described in other works.

Members of the families **Alpheidae** and **Hippolytidae** should always be returned to the laboratory for identification, or for verification if large and characteristic enough for field ID. No specimens of these families should be discarded in the field. The sole exception to this rule is the hippolytid *Lysmata californica*. This species is large enough, and has a characteristic enough live appearance (see photograph in Jensen 1995)

for reliable determination in the field. Voucher specimens should still be returned to the lab for verification, but large collections of *L. californica* can be returned to the sea. Although nearly all hippolytid species can be correctly determined with the key in Word and Charwat, we should use that in Wicksten (1990). California alpheids can be separated using the attached key, which includes undescribed species not in Wicksten (1984).

Species in the families **Crangonidae** and **Pandalidae** should be identifiable in the field in nearly all cases. Some damaged specimens and some very small juveniles may require laboratory confirmation, but few specimens should fall into these categories. New keys to both these families are presented here to incorporate taxonomic changes and new species records which render existing keys incomplete.

Resource Guide - Recommended Standard References for Bight '98 Trawl Shrimp Identification
F= field key, L= laboratory key, C= combined field and laboratory key

Trawl Shrimp Families - attached Family key (C) - all families below are included in the key

Alpheidae - LABORATORY ID ONLY, collect all specimens - attached Alpheid key (L)
Aristaeidae - all members excluded as holopelagic
Crangonidae - attached Crangonid key (C)
Glyphocrangonidae - all members excluded as outside depth limits
Hippolytidae - LABORATORY ID ONLY, collect all specimens - Wicksten 1990b key (L)
Luciferidae - all members excluded as holopelagic
Ogyrididae - all members excluded as outside depth limits
Oplophoridae - all members excluded as holopelagic
Palaemonidae - Word & Charwat 1976 key (F), Wicksten 1989a key (L)
Pandalidae - attached Pandalid key (C)
Pasiphaeidae - all members excluded as holopelagic
Penaeidae - attached Penaeoid key (C), Hendricks 1995 key (L)
Processidae - Hendrickx 1995 key (C)
Sergestidae - all members excluded as holopelagic
Sicyoniidae - attached Penaeoid key (C)
Solenoceridae - attached Penaeoid key (C)

List of Species Taken in Association with Monitoring Programs in the Southern California Bight at depths between 10-300 m

Suborder Penaeidea
- Superfamily Penaeoidea
  - Family Aristeidae
    - Bentheogennema burkenroadi Krygier & Wasmer 1975
  - Family Solenoceridae
    - Solenocera florea Burkenroad 1938
    - Solenocera mutator Burkenroad 1938
  - Family Penaeidae
    - Metapenaeopsis mineri Burkenroad 1934
    - Penaeus californiensis Holmes 1900
  - Family Sicyoniidae
    - Sicyonia ingentis (Burkenroad 1938)
    - Sicyonia penicillata Lockington 1879
- Superfamily Sergestoidea
  - Family Sergestidae
    - Sergestes similis Hansen 1903

Suborder Caridea
- Superfamily Pasiphaeoidea
  - Family Pasiphaeidae
    - Pasiphaea pacifica Rathbun 1902
- Superfamily Pandaloidea
  - Family Pandalidae
    - Pandalopsis ampla Bate 1888
    - Pandalus danae Stimpson 1857
    - Pandalus jordani Rathbun 1902
    - Pandalus platyceros Brandt 1851
    - Pantomus affinis Chace 1937
    - Plesionika beebei Chace 1937
    - Plesionika trispinus Squires & Barragán 1976
- Superfamily Alpheoidea
  - Family Alpheidae
    - Alpheopsis equidactylus (Lockington 1877)
    - Alpheus bellimanus Lockington 1877
    - Alpheus californiensis Holmes 1900
    - Alpheus clamator Lockington 1877
    - Automate sp A SCAMIT 1995 §
    - Betaeus ensenadensis Glassell 1938
    - Betaeus harfordi (Kingsley 1878)
    - Betaeus harrimani Rathbun 1904
    - Betaeus longidactylus Lockington 1877
  - Family Hippolytidae
    - Eualus herdmani (Walker 1898)
    - Eualus lineatus Wicksten & Butler 1983
    - Heptacarpus brevirostris (Dana 1852)
    - Heptacarpus decorus (Rathbun 1902)
    - Heptacarpus fuscimaculatus Wicksten 1986
    - Heptacarpus flexus (Rathbun 1902)
    - Heptacarpus palpator (Owen 1839)
    - Heptacarpus sitchensis (Brandt 1851)
    - Heptacarpus stimpsoni Holthuis 1947
    - Heptacarpus taylori (Stimpson 1857)
    - Heptacarpus tenuissimus Holmes 1900
    - Heptacarpus tridens (Rathbun 1902)
    - Hippolyte californiensis Holmes 1895
    - Hippolyte clarki Chace 1951
    - Lysmata californica (Stimpson 1866)
    - Spirontocaris holmesi Holthuis 1947
    - Spirontocaris lamellicornis (Dana 1852)
    - Spirontocaris prionota (Stimpson 1864)
    - Spirontocaris sica Rathbun 1902
    - Spirontocaris snyderi Rathbun 1902
  - Family Ogyrididae
    - Ogyrides sp A Roney 1978 §
  - Family Processidae
    - Processa peruviana Wicksten 1983
- Superfamily Crangonoidea
  - Family Crangonidae
    - Crangon alaskensis Lockington 1877
    - Crangon alba Holmes 1900
    - Crangon handi Kuris & Carlton 1977
    - Crangon holmesi Rathbun 1902
    - Crangon nigricauda Stimpson 1856
    - Crangon nigromaculata Lockington 1877
    - Mesocrangon munitella (Walker 1898)
    - Metacrangon spinosissima (Rathbun 1902)
    - Neocrangon communis (Rathbun 1899)
    - Neocrangon resima (Rathbun 1902)
    - Neocrangon zacae (Chace 1937)
    - Rhynocrangon alata (Rathbun 1902)
- Superfamily Palaemonoidea
  - Family Palaemonidae
    - Pseudocoutierea elegans Holthuis 1951

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KEY TO SHRIMP FAMILIES RECORDED IN THE SOUTHERN CALIFORNIA BIGHT

D. B. Cadien (CSDLAC) - 7Dec1994 (rev. 25Mar1998)

(based on Chace 1972, Burukovskii 1974, Dall et al 1990, and Hendrickx 1995)

1. Third legs chelate; pleura of second abdominal somite not overlapping that of first somite; . . . . . Suborder Dendrobranchiata 2
   Third legs not chelate; pleura of second abdominal somite overlapping that of first somite; . . . . . Suborder Eukyphida 7
2. Legs 4 and 5 well developed; gills numerous . . . . . Superfamily Penaeoidea 4
   Legs 4 and 5 reduced or absent; gills few (<9) . . . . . Superfamily Sergestoidea 3
3. Legs 4 and 5 absent; carapace elongated anteriorly by narrow "neck", eyes widely separated from mouthparts . . . . . Luciferidae
   Legs 4 and 5 reduced; carapace not elongated anteriorly, eyes just slightly anterior to mouthparts . . . . . Segestidae
4. Antennular flagellae subequal and originate distally on the 3rd segment; 5th leg lacks epipod 5
   Median(upper) flagellum much shorter than lateral (lower) and originates near base of 3rd segment; 5th leg with an epipod . . . . . Aristaeidae
5. Cervical sulcus reaching <⅔ the distance from the hepatic spine to the top of the carapace; postorbital spine absent; 4th leg lacks epipod 6
   Cervical sulcus reaching the top of the carapace; postorbital spine present; 4th leg with an epipod . . . . . Solenoceridae
6. Third to 5th pleopods each with 2 rami; prosartema (eye brush) present on antennula; exopods present on 2nd and 3rd maxillipeds . . . . . Penaeidae
   Third to 5th pleopods each with a single ramus; prosartema absent; no exopods on 2nd and 3rd maxillipeds . . . . . Sicyoniidae
7. First leg subchelate 8
   First leg chelate or simple 9
8. Carpus of 2nd leg unsegmented . . . . . Crangonidae
   Carpus of 2nd leg multisegmented . . . . . Glyphocrangonidae
9. First and 2nd legs chelate; fingers of chelae with pectinate edges . . . . . Pasiphaeidae
   First and/or 2nd legs chelate; fingers without pectinate edges 10
10. Carpus of 2nd leg unsegmented; 1st leg with well-developed chela 11
    Carpus of 2nd leg multisegmented, **OR** 1st leg not chelate 12
11. Legs with exopods . . . . . Oplophoridae
    Legs lacking exopods . . . . . Palaemonidae
12. First legs with at least one well developed chela 13
    First legs with chelae very small or absent . . . . . Pandalidae
13. Rostrum edentate or dentate, but without subdistal tooth 14
    Rostrum with distal notch covered with bristles and forming subdistal dorsal tooth . . . . . Processidae
14. Eyes on long stalks, reaching nearly to end of antennular peduncle, and several times longer than eye diameter . . . . . Ogyrididae
    Eyestalks not unusually long, not or only slightly exceeding eye diameter 15
15. Eyes usually partially or entirely covered by carapace, incapable of free lateral movement; rostrum absent or spinelike . . . . . Alpheidae
    Eyes exposed and freely movable; rostrum well developed, toothed . . . . . Hippolytidae

KEY TO THE SO. CALIFORNIA BIGHT CRANGONID SHRIMP

Donald B. Cadien (CSDLAC), 20 March 1998

(based on Word & Charwat 1976, Kuris & Carlton 1977, Wicksten 1977, and Butler 1980)

1. Dactyls of 4th and 5th legs flattened; eyes partly concealed by carapace . . . . . *Argis* 2
   Dactyls of 4th and 5th legs not flattened; eyes not partly concealed 3

2. Carapace with 2 median dorsal spines posterior to rostral spine . . . . . *Argis californiensis*
   Carapace with 4 median dorsal spines posterior to rostral spine . . . . . *Argis levior*

3. Abdominal somites heavily sculptured; 3rd abdominal somite with rostrate posterior margin, 4th and 5th with posteriomedial spine . . . . . *Rhynocrangon alata*
   Abdominal somites weakly sculptured or unsculptured; 3rd abdominal somite not posteriorly produced, 4th and 5th somites lacking posteromedial spine (may be carinate) 4

4. Gastric region of carapace depressed 5
   Gastric region not depressed below general level of carapace 7

5. 1-2 spines ventrally on abdominal pleura . . . . . *Metacrangon spinosissima*
   Abdominal pleura without ventral spines 6

6. Carapace lacking lower submedian spine . . . . . *Metacrangon munita*
   Carapace with lower submedian spine . . . . . *Mesocrangon munitella*

7. Carapace with 1 median dorsal spine . . . . . *Crangon* 8
   Carapace with 2 median dorsal spines . . . . . *Neocrangon* 13

8. Sixth abdominal somite with bold lateral blue pigment spot(s) . . . . . *Crangon nigromaculata*
   Sixth abdominal somite lacking lateral pigment spot 9

9. Inner flagellum of antenna one distinctly longer than outer 10
   Inner and outer flagella of antenna one of equal length . . . . . *Crangon handi*

10. Sixth abdominal somite grooved ventrally 11
    Sixth abdominal somite not grooved ventrally 12

11. Spine of antennal scale extending well past end of blade . . . . . *Crangon alaskensis*
    Spine of antennal scale not or barely extending past end of blade . . . . . *Crangon nigricauda*

12. Ischium of 3rd maxilliped flattened and laterally flanged . . . . . *Crangon alba*
    Ischium of 3rd maxilliped not especially flattened and not flanged . . . . . *Crangon holmesi*

13. Third through fifth abdominal somites dorsally carinate . . . . . *Neocrangon communis*
    Abdominal somites not dorsally carinate 14

14. Rostrum bearing terminal "moustache" of setae projecting obliquely downward; rostrum variable, typically horizontal or slightly elevated . . . . . *Neocrangon zacae*
    Rostrum with lateral field of setae, but lacks "moustache"; rostrum variable, typically bearing a ventral blade, and strongly elevated above horizontal . . . . . *Neocrangon resima*

REVISED KEY TO THE PANDALIDAE OF CALIFORNIA

Donald B. Cadien (CSDLAC) - 20 Mar 1998

(modified from Burukovskii 1974, Wicksten 1978, Butler 1980, and Hendrickx 1996)

1. Rostrum articulated to front of carapace . . . . . *Pantomus affinis*
   Rostrum not articulated, integral to carapace 2

2. Third maxilliped with an exopod . . . . . *Plesionika* 3
   Third maxilliped lacking exopod 6

3. Second legs markedly unequal in length . . . . . *Plesionika mexicana*
   Second legs equal or subequal in length 4

4. Rostrum with 2-8 small spines dorsally near it's base; ventral spines (if present) very small and restricted to the distal half of the rostrum . . . . . *Plesionika sanctacatalinae*
   Rostrum with 10-14 well developed spines dorsally, and 12-18 spines ventrally on the rostrum; ventral spines not restricted to distal half of rostrum 5

5. Carpus of second legs with 8-9 segments; median carapace teeth near rostral base fixed . . . . . *Plesionika beebei*
   Carpus of second legs with 14-17 segments; 3 median carapace teeth at rostral base moveable . . . . . *Plesionika trispinus*

6. Discoid widening of inner margin of ischium of first leg prominent . . . . . *Pandalopsis ampla*
   No discoid widening of inner margin of ischium of first leg . . . . . *Pandalus* 7

7. Carapace, abdomen and legs a uniform translucent pink; third abdominal somite with dorsal carina forming a lobe on posterior margin . . . . . *Pandalus jordani*
   Carapace or abdomen with white lines,spots or flecks, or if uniform pink, with yellow bands on legs; third abdominal somite not carinated dorsally 8

8. Carapace with white lines and abdomen with white spots OR legs with yellow bands; dorsal spines confined to anterior half of carapace 9
   Carapace with scattered small black specks and minute red dots, abdomen with white lines dorsally and black lines laterally; dorsal spines extend to posterior half of carapace . . . . . *Pandalus danae*

9. Carapace and abdomen uniform translucent pink, legs 3-5 pink with yellow bands; sixth abdominal somite length $\geq$ 2X width . . . . . *Pandalus tridens*
   Carapace red with white lines, white spots on 1st and 5th abdominal somites, legs red and white banded; sixth abdominal somite length <2X width . . . . . *Pandalus platyceros*

KEY TO SOUTHERN CALIFORNIA BIGHT BENTHIC PENAEOID SHRIMP

Donald B. Cadien (CSDLAC)- 20 March 1998

(based on keys in Hendrickx 1995, and Dall et al 1990)

1. Cervical sulcus reaching less than 2/3 the distance from the hepatic spine to the top of the carapace; postorbital spine absent; 4th leg lacks epipod 2
   Cervical sulcus reaching the top of the carapace; postorbital spine present; 4th leg bearing an epipod . . . . . Solenoceridae 3

2. Third to 5th pleopods biramous; prosartema (eye brush) present; exopods on 2nd and 3rd maxillipeds . . . . . Penaeidae 4
   Third to 5th pleopods uniramous; prosartema absent; exopods lacking on 2nd and 3rd maxillipeds . . . . . Sicyoniidae 6

3. Pleura of first abdominal somite broad and ventrally bilobed . . . . . *Solenocera florea*
   Pleura of first abdominal somite little wider than rest of segment and not bilobed . . . . . *Solenocera mutator*

4. Rostrum dentate both dorsally and ventrally . . . . . *Penaeus* 5
   Rostrum dentate only dorsally . . . . . *Metapenaeopsis**

5. Gastrofrontal carina well defined, reaching to orbital margin . . . . . *Penaeus californiensis*
   Gastrofrontal carina often inconspicuous anteriorly, not reaching orbital margin . . . . . *Penaeus brevirostris***

6. Carapace bearing lateral "bulls-eye" marking or brown spot inside a larger light area laterally 7
   Carapace without brown spot or other pronounced marking . . . . . *Sicyonia ingentis*

7. Carapace carina with 4 post-rostral teeth; anterior dorsal tooth of 1st abdominal somite sub-equal in size to last tooth of carapace dorsal carina . . . . . *Sicyonia penicillata*
   Carapace carina with 5 post-rostral teeth; anterior dorsal tooth of 1st abdominal somite much larger than last tooth of dorsal carina . . . . . *Sicyonia disedwardsi***

*= specific separation based on details of external genitalia not determinable in the field. Only *M. mineri* has been taken within the southern portion of the Bight to date, although *M. kishinouyei* and *M. beebei* have similar ranges along the Baja California peninsula and might be expected to occur here as well. Consult Hendrickx 1995 for genitalia characters.

**=not yet reported from area, but may range into it during strong ENSO events. Included for differentiation from closely related species known to occur in the southern California Bight.

REVISED KEY TO THE ALPHEIDAE OF CALIFORNIA

D. B. CADIEN (CSDLAC) - 23MAR 1998

(based on the key in Wicksten 1984)

1. Triangular movable plate articulated at posterolateral angle of sixth abdominal somite lateral to uropod base 2
   No triangular plate lateral to uropod base 9
2. Rostrum prominent, orbital hoods armed with spines . . . . . *Alphaeopsis equidactylus*
   Rostrum absent, carapace front without spines . . . . . *Betaeus* 3
3. Dactyls of walking legs slender and simple 4
   Dactyls of walking legs stout and bifid 6
4. Chelae of first legs with fingers > than palm; large male with fingers of chelipeds gaping . . . . . *Betaeus longidactylus*
   Chelae of first legs with fingers ≤ than palm; large male with fingers of chelipeds not gaping 5
5. Blade of antennal scale broad distally; fixed finger of first cheliped decreasing in width evenly to sharp curved tip . . . . . *Betaeus harrimani*
   Blade of antennal scale narrow distally; fixed finger of first cheliped truncate before sharp curved tip . . . . . *Betaeus ensenadensis*
6. Carapace front curved, not emarginate; commensal with sea urchins (*Strongylocentrotus* spp) . . . . . *Betaeus macginitieae*
   Carapace front emarginate; commensal with abalone or free living 7
7. Emargination of front shallow; telson with posterolateral spines small or missing; commensal with abalones (*Haliotis* spp) . . . . . *Betaeus harfordi*
   Emargination of front deep; telson with posterolateral spines well developed 8
8. Peduncle of first antenna less than ½ carapace length; merus of cheliped with lower inner ridge with long bristles, upper ridge ending in sharp tooth; chela with fingers subequal to palm; chela 3 times as long as wide . . . . . *Betaeus gracilis*
   Peduncle of first antenna ≃ carapace length; merus of cheliped with lower inner ridge usually tuberculate, upper ridge with tuft of hair; chela with fingers longer than palm; chela twice as long as wide . . . . . *Betaeus setosus*
9. Eyes partially or fully exposed dorsally 10
   Eyes fully covered by carapace dorsally 12
10. Eyes fully exposed dorsally, rostrum shorter than eyestalks . . . . . *Automate* 11
    Eyes partially exposed dorsally, rostrum much longer than eyestalks . . . . . *Salmoneus sp A*
11. Propodus of 3rd legs bearing spines on the posterior margin . . . . . *Automate dolichognatha*
    Propodus of 3rd legs setose, but lacking spines on posterior margin . . . . . *Automate sp A*
12. Legs lacking epipods; dactyls of legs 3-5 bifid . . . . . *Synalpheus lockingtoni*
    Legs with epipods; dactyls of legs 3-5 simple . . . . . *Alpheus* 13
13. Dactyl of major chela closing horizontally; merus of 3rd leg with prominent inferior spine . . . . . *Alpheus clamator*
    Dactyl of major chela closing vertically; merus of 3rd leg lacking prominent inferior spine 14
14. Orbital hoods spined; minor chela with prominent spine posterior to movable finger; movable finger flattened (lamellate) . . . . . *Alpheus bellimanus*
    Orbital hoods not spined; minor chela without prominent spine posterior to movable finger; movable finger not flattened . . . . . *Alpheus californiensis*