Opisthobranch Newsletter

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EDITOR'S NOTES:

Thanks to those of you who have supported this publication with your subscription. Please help get the word out to those people who haven't found us. About 400 users access the opisthobranch web page each month – only a handful have paid for their subscription. I want to keep the ON widely available.

I would like to develop a list of opisthobranch type specimens and their locations. If anyone wants to help, please contact me. I would also like to have lists of species named by authors from past years. These will be included with their biography information and available through the search engine. Please send what information you can.

Thanks to Mike Miller, Bob Bollander, Kerry Clark, Dave Behrens, Terry Gosliner, Kathe Jensen, Alexandre Meinesz, Gil Gat, C. Swennen, Alexandre Meinesz, Gilianne Brodie, Rebecca Schrödl, Sandra Millen, Renato Chemello, Alan Grant, Katharina Noack, Nick Kunst & Gary McDonald for help with this issue.

READER FORUM:

***Caulerpa* Control:** I have just learned from a newspaper article, of an attempt to control the introduced marine algae, *Caulerpa toxifolia* (sic?) which is spreading rapidly from Spain to Croatia, with the introduction of a "SLUG".

Does anyone have information on this situation? Is the report serious? Is the slug a Sacoglossid, if so which species? -- David W. Behrens

***Elysia, Aplysiopsis* & *Oxynoe*:** The slug is an ascoglossan, but I'm not sure which one they are actually using. I identified two, *Elysia subornata* and *Oxynoe azuropunctata*. Prof. Alexandre Meinesz is the contact at the University of Nice-Sophia Antipolis in France; some of the work was done at the Monte Carlo marine lab, and some of the work was done by Jennifer Melnyk, at the time an LIU student on internship at UNSA. Both of the slugs have direct development (1), which is probably critical in establishing a population. I have some concern about introducing species, but apparently the *Caulerpa taxifolia* had become a serious pest and was spreading rapidly through the Mediterranean. And *C. taxifolia* is a Caribbean species, so there is certainly some logic in importing a biocontrol species from the Caribbean. Meinesz published a paper which should not be too much trouble to find (2).

Brian LaPointe and I also discussed introduction of *Aplyiopsis zebra* into Bermuda to control a similar problem, in which *Cladophora gracilis*(?) irrupted due to high nutrient levels in Harrington Sound, but the algal bloom abated before we could pursue the concept (fortunately, because *A. zebra*'s type locality, at Fort Pierce, FL, was obliterated by a beach replenishment project, and I have not seen it since then).

(1) **Clark, K.B.; Jensen, K. 1981.** A comparison of egg size, capsule size, and development patterns in the order Ascoglossa (Sacoglossa)(Mollusca Opisthobranchia). International J. Invertebr. Reprod. 3:57-64.

(2) **Meinesz, A.; De Baugelas, J.; Hesse, B.; Mari, B. 1993.** Spread of the introduced tropical green alga Caulerpa taxifolia in northern Mediterranean waters. J. Applied Phycology 5: 141-147.

-- Kerry B. Clark

***Caulerpa taxifolia* (?*mexicana*):** I believe I may be the "indirect cause" of this discussion. During a workshop on the "killering action" of the *Caulerpa taxifolia* (or *C. mexicana*, these seem to be the same), I spoke with Prof. Meinesz about the presence on another species of "lessepsian" *Caulerpa* (*C. racemosa*) of an abundant population of *Ascobulla fragilis*. From this to hypothesize a "biological control" of the *Caulerpa*s in the Mediterranean using Ascoglossa the step is very long. I am an ecologist and I don't really believe it is advisable. Using extramediterranean Ascoglossa is madness for most problems. – Renate Chemello

Introduction of Extramediterranean Species: I agree, introduction of extramediterranean species is probably not a good idea. It certainly creates problems in determining the primary distribution of species, because many Mediterranean species also occur in the Caribbean, but we do not have all possible records. Ascoglossan slugs also have the potential to spread plant pathogens (which I noted in 1975), and there is always the potential of displacement of native species.

(added) Note that Dr. LaPointe and I made no attempt to introduce *Aplysiopsis zebra*; we merely discussed the scenario. – Kerry Clark

***Elysia* sp.:** As far as I know the slug is a tropical *Elysia* sp. (makes somewhat sense). The problem apparently is fairly grave, although I had not seen it when I had been diving in the Med the last time (1992). The outbreak had not occurred yet. – Daniel Geiger

Possible Introduction: In Dec. 95 I was contacted by Prof. A. Meinesz, who wanted my professional opinion on the possible introduction of the 2 Caribbean sacoglossans *Oxynoe azuropunctata* and *Elysia subornata* to control the introduced alga *Caulerpa taxifolia*. He also sent me a xerox copy of a manuscript presented at a workshop in Barcelona, Spain in Dec. 1994. The title of the manuscript was: Meinesz, A., Melnyk, J. Blachier, J. & Charrier, S. (1994). Etude preliminaire, en aquarium, de deux ascoglosses tropicaux consommant *Caulerpa taxifolia*: une voie de recherche pour la lutte biologique. I sent him my - doubtful - reply at once, and I have not heard anything since then, but possibly they have now got their grant to continue these studies. – Kathe Jensen

Current Research on *Caulerpa*: We are studying the biology of two ascoglossan from Martinique (French Caribbean): *Elysia subornata* and *Oxynoe azuropunctata*. Dr K. Clark has received two years ago some specimens of our culture to identify them. Now more than 3 Million square meters of Mediterranean coasts are more or less covered by *Caulerpa taxifolia*. The aquarium clone of this tropical introduced *Caulerpa* resists 3 month at 10°C ! The algae was cultivated in the Museum of Monaco in early 1980 and found the first time in 1984 in front of the museum (1 square meter). Since this time the algae is spreading every year. For more information on this spreading you can have a look on our web site: http://www.unice.fr/html/passeron/html/intro_LEML_txt.html Daniel Geiger can find in this address the actual geographic situation of *Caulerpa taxifolia*.

In response to Renato Chemello: *Caulerpa mexicana* (lesseptian or Atlantic species living in Mediterranean on the coast of Israel, Lebanon and Syria) is definitively different from *Caulerpa taxifolia*. Differences are explained in two publications:

Meinesz, A.; C.-F. Boudouresque, C.-F. 1995. Origine de *Caulerpa taxifolia* en Mediterranée. C. R. Acad. Sci. Paris, Life Sciences, 319: 603-613.

Meinesz, A. et al. 1994. Notes taxinomiques préliminaires sur *Caulerpa taxifolia* et *Caulerpa mexicana*. **Boudouresque C.-F, Meinesz A., Gravez V., (ed.)** First international workshop on Caulerpa taxifolia. GIS Posidonie publ. 1994:105-114.

I 've never seen, in the major region invaded by *Caulerpa taxifolia* (Croatia, Sicily, Liguria and Provence Côte d'Azur, *Ascobulla fragilis* eating *Caulerpa taxifolia*. The native Mediterranean ascoglossan *Lobiger serradifalci* and *Oxynoe olivacea* eat *Caulerpa taxifolia* but the life cycle is planctonic and the larval dispersion is great. So we have never found enough native ascoglossan on *C. taxifolia* beds able to control its expansion.

The Caribbean ascoglossans have a benthic cycle and eat directly *Caulerpa taxifolia* after hatching from the eggs. Since February 1994 we have a culture of the two ascoglossan species in aquarium -- far from the sea! Many biological studies have been made on the reproduction, the feeding and the temperature resistance.

We are working now on a culture of this species (*Elysia*) obtained from eggs daily sterilized during their incubation time (15 days) with an antibiotic medium in sterilized sea water. The eggs of this new "clean" generation were also sterelized with the same method. We have now thousands of *Elysia* issued from these two treated generations.

We have asked the French government for agreement to experiment the ascoglossan at sea. Before this *in situ* experiment we have asked the French government for consultation with international specialists. We have given

the names of Kerry Clark and Kathe Jensen. The letter has been sent in December 1995 -- we wait for the answer to begin the experiment in open sea!

There are only two questions: 1) do we have to stay passive when facing the most important invasion of an alien species in open sea (Caulerpa taxifolia) which can potentially invade most of the ecosystems of all the Mediterranean coasts between 0 and 50 meters deep with a biomass of 5 to 10 kg per square meter? 2) which is the higher risk: introduce a new ascoglossan species or let *Caulerpa taxifolia* cover all the natural ecosystems ?

Elysia subornata seems able to control the situation with two strong controlling parameters: 1) it eats only *Caulerpa taxifolia*. 2) it dies during the winter time (13°C on our coast)

If it is not enough to control the expansion of Caulerpa taxifolia, we could also introduce *Oxynoe azuropunctata* ("the joker") which is more resistant at low temperature and perhaps able to survive during winter time in the Mediterranean sea.

In response to Kerry Clark, I would like to remind you that you gave me the idea to use "introduced gastropods" to control the *Caulerpa taxifolia* in your letter of 11 June 1992. I think now that it was a good idea. No experiments were carried out on ascoglossan in "Monte Carlo marine lab". Only our laboratory is working on this problem.

In response to Kathe Jensen I would like to consider the two doubts that you wrote me (15 Dec 1995): the temperature limiting the tropical ascoglossan in Mediterranean and the high number of ascoglossans we need to control *Caulerpa*. For the temperature, *Elysia* seems the most sensitive to cold temperature (between 18 and 14°C they eat very few *Caulerpa* and finally die). Between 18 and 26°C they eat 2 to 3 fronds a day and lay from 400 to 1200 eggs a week. Two months after the laying day of the eggs the new generation of *Elysia* is able to reproduce. So if we introduce this species we are expecting that *Elysia* is going to eat *Caulerpa taxifolia* from May to November and die in December. They eat only *Caulerpa taxifolia* and not the other algae (cellular or siphoneous) except *Caulerpa prolifera* but not entirely.

To all reader forum: scientific papers about *Caulerpa taxifolia* (most of them in French) and the only one on our ascoglossan experiments listed by Kathe Jensen, are available! -- Alexandre Meinesz

Further on *Caulerpa*: I'm not saying you shouldn't introduce the slugs; just expressing a general conservatism about biological control introductions. The spread of the "weed" *C. taxifolia* is an important problem that should be addressed. Most biological control experiments seem to have succeeded well, when the appropriate questions have been answered. Your experiments on temperature tolerance provide an important result. Since *E. subornata* does not disperse rapidly, and your strain does not overwinter, release into an isolated *Caulerpa* bed should provide a correctable experiment. Do any Mediterranean slugs feed on *C. prolifera*? One scenario of concern is that *E. subornata* may adapt to optimally feed on *C. prolifera*, and displace a native slug. I think that's not very likely while *C. taxifolia* is abundant, but it could occur once *C. taxifolia* comes under control.

Our Florida *E. subornata* are able to tolerate 12 deg. Celsius, probably because the developmental pattern favors genetic isolation and local adaptation; Florida temperatures fall much lower than Caribbean temperatures where your stock was collected. We haven't seen our slugs feeding on *C. prolifera*, which might prevent the scenario described above if there is a native *prolifera*-feeding slug. – Kerry Clark

Additional Cautions: I know well the situation of the biological invasion of *Caulerpa taxifolia* but I would remember that there are two different opinions about *C. taxifolia* and *C. mexicana*. The first is due to prof. Meinesz (*C. taxifolia* is different from *C. mexicana*, and I personally agree with him) and the second one is due to prof. Doumange and prof. Giaccone (*C. taxifolia* and *C. mexicana* are the same species).

I am an ecologist and pragmatism is my first rule. As ecologist I don't understand **why** we must intervene on an ecological phenomenon (not an event) as the biological invasion of *C. taxifolia*. We observe a system pratically unknown and it's absolutely foul to intervene before having the complete (or less incomplete) knowledge of the entire system.

Regarding previous experience on exotic species put into the Mediterranean Sea for different reasons (e.g. *Ruditapes philippinarum* for aquaculture, *Scapharca cornea* etc.) with some catastrophic results: disappereance of true Mediterranean species substituted by exotic ones, diseases carried by introduced species, heavy variations in community composition, lowering in biodiversity etc.

We don't know anything about the true robustness of *C. taxifolia* in Mediterranean Sea (not in laboratory) and on its capacity to compete with the original Mediterranean communities (e.g. *Posidonia oceanica*). We have only few years of data about the "competiton" between *Caulerpa* and other species. We know that the *Caulerpa* **potentially** can cover the coastal ecosystems between 0 and 50 meters deep. Why doesn't it do **exactly** this in all the stations in where it is present? For example, in Sicily, the patches of *Caulerpa taxifolia* aren't increased in area during these last two years. This is due to the hydrological conditions of the area? I don't know. Competition with other algae? I don't know. Biological control? I don't know. Why in France *Caulerpa taxifolia* spreads so rapidly? Hydrological conditions? Pollution? Other parameters? We don't really know.

I don't agree with the opinion that it's better to introduce a new species of ascoglossan **before** an accurate knowledge of the *Caulerpa* progression and on the ecological factors causing this. We can study the evolution of *Caulerpa* and only after that we can decide to do something to bring in some Ascoglossan.

We know, on the other hand, that similar situations occurred in the recent (and less recent) past and are well displayed by fossil records of shelled gastropods actually accompanying the *Caulerpa*. I believe that ecological equilibrium, also in this case, will be reached: we don't know in which time and what kind of equilibrium. Our "passivity" is only due to the scientific curiosity to observe an ecological invasion "in progress". I don't believe in the destruction of Mediterranean habitats but in a probable change in some components of few communities.

Don't be pessimistic! The description of "killer alga" is only a journalistic expression not based on scientific data, good to obtain research funds. -- Renato Chemello

PERSONAL NOTES:

From Gilianne Brodie: <Gilianne.Brodie@jcu.edu.au> I have finally got my act together with WWW and software etc. Enjoyed seeing the newsletter page for the first time!

How about Kathe Jensen (Copenhagen, Denmark) briefly visits Gilianne Brodie (Townsville, Australia) in search of new sacoglossans. Should we say that the wind blew 45 knots and the water was like chocolate milk! Ultimate conclusion, searching for sacoglossans is very different to searching for dendrodorids!

Jim McLean is back at work with a full schedule after surgery. Most of his efforts are going into a book manuscript on the shelled benthic gastropods of the NE Pacific.

Michael & Rebecca Schrödl have returned from their Chile collecting trip. Hope to get some comments soon.

Michael C. Miller is in the Seattle area (Issaquah), visiting his son, Quentin (and family). He will be here for most of December and then travel on to England to visit more family. Michael met with Terry Gosliner at the California Academy of Sciences earlier in November.

Sandra Millen will be spending Christmas at Bamf – skiing.

Mike Miller just returned from diving Baja in early November: Not much to report on the Baja trip. Went with wife and daughter for our wedding anniversary down to San Felipe. Daughter and I went out on low tide on two (2) occasions turning rocks and came up dry. Not one branch!

From Terry Gosliner: In Sept-October Gary Williams, Clay Carlson and I were in Palau where we collected about 100 species of opisthobranchs. I was back for ten days and then went to Australia and Papua New Guinea. In Sydney I visited Bill Rudman and then spent some additional time diving in Madang, Papua New Guinea. We found

several species there that we have not collected in the previous five trips. There is still obviously much more to find there. My graduate student, Rebecca Johnson and I are completing a work on Indo-pacific species of *Hypselodoris*. Another graduate student, Maria Schaeffer has been working on California species of *Doriopsilla*. I had an undergraduate intern, Rebecca Price, here this summer. We worked on the *Philine aperta* species complex and hope to publish a manuscript shortly on the systematics of this group. That should bring you up to date.

From Alan Grant: Yes, I have a video which I have produced. It's not that comprehensive, but it is a video, and probably the only one out there. The problem I have is all the footage I have shot is on Hi-8. I started a long overdue project with a friend transferring some of my best shots over to Beta-SP videotape, which is the "industry standard", is necessary for preservation. Unfortunately, the stuff did not transfer well. Numerous dropouts create black lines, pops and creases in the images. I still dive quite frequently, and take my video setup on almost every dive, and look for signs of nudibranchs everywhere I go. I had a trip to Morro Bay planned this weekend, with hopes of finding some secret slug sites at Morro Bay, but the visibility is now about 1 ft. I'm still hoping for a trip this winter, tides and visibility allowing. Since making my slug video, I've managed to accumulate some additional good "portrait" shots, and I continue to concentrate on small invertebrates with my macro setup. Hopefully, within a year or two, I will be converted over to an entirely digital video setup, and then the dropout problem will go away, but that's about $6000 worth of conversion, and the video to computer hard drive connection protocol is still being haggled about by the industry giants, so an investment in equipment right now is a guarantee for obsolescence! I'm interested in networking with anyone who can help me identify some of critters on video.

Harald Rehder, Zoologist (Emeritus), in the Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, passed away on November 10, 1996. Dr. Rehder served as a curator in the NMNH for more than 40 years before retiring in 1976. He published over 140 papers and, although having broad research involvement in malacology, was especially renowned as an authority on the taxonomy and biogeography of marine mollusks of the southern Indo-Pacific. – from Robert Hershler.

From Annette Kolb: currently I am doing my PhD on the phylogeny of opisthopbranchs. I am interested in the strucutre of the eggmasses in order to find out whether there are taxaspecific differences within the opisthobranchs. If you ever come across eggmasses, I would appreciate if you could collect and preserve them for me (4% formalin in seawater). The same holds true for the adult slugs because I am also investigating the genital systems. Next year I would like to go to Townsville, Australia to collect material there, but I have not found a funding for this project yet.

From Gil Gat: I am sorry I could not answer any sooner. I have just started a new job and did not have the time. My current address is given below. I don't know whether H. Mienis has an e-mail address. To the best of my knowledge he is working part time at the university (2 days a week) and does not have his own computer. I can try and find out though. Thanks again and keep up the good work.

RANGE EXTENSION:

***Aeolidia farallonensis*:** In the most recent Veliger [39(4)] we described two new deep water species of nudibranchs, *Armina cordellensis* and *Aeolidia farallonesis*, both from off the Golden Gate [San Francisco, California] in the two local marine sanctuaries, the Gulf of the Farallones and Cordell Bank. No sooner had the journal hit the streets, than we received a specimen of *Aeolidia farallonensis* from Jim Nybakken, collected from Monterey Bay [California] from 570-600 meters depth. Dave and I were convinced that it would be unlikely that anyone would collect *Aeolidia farallonensis* again for years, given its depth range from 500-1500 meters. Jim collected four specimens in Monterey Bay on October 29, 1996. It is not so important that finding it in Monterey Bay represents a significant range extension, because it does not. However, the finding of additional material is significant since the original description was based upon only two specimens. In fact, one of our reviewers commented that it might not be prudent to describe a new species based on two preserved specimens. it is therfore gratifying to find additional material which agrees completely with our original description. Incidently, Jim Nybakken says that these are the first specimens he has had of this species in the more than 20 years of trawling in Monterey Bay. – Terry Gosliner & Dave Behrens

INFORMATION EXCHANGE:

From Katharina Noack: I am a student at SUNY Stony Brook [New York] and I am currently working on a molecular phylogeny of Flabellinids for my thesis. I am desperate for samples and would appreciate it if anybody could help me out. I am looking for any species of *Flabellina*, the samples should be fairly fresh and be preserved in 70% ethanol or be frozen. If you think you can help me please contact me at: kat@life.bio.sunysb.edu"

From Nick Kunst: I have photos of nudibranchs I cannot identify. Is there a simple way to classify a nudibranch? (address below)

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