

electrophoresed on an ABI PRISM® 377 XL automated sequencer (Applied Biosystems, Inc). Sequences were edited and compiled independently using Sequencher™ ver. 4.2 (Gene Codes Corp.). Resultant sequences from hemolymph and mantle tissue from the same individual were compared for sequence identity in each of the three mitochondrial genes to determine the concordance between tissue types (hemolymph and mantle). In all instances, hemolymph-derived sequences were determined to be identical to mantle-derived sequences and proved to be a reliable source of DNA for genetic analysis. In general, differences between tissue types were minimal and assumed to be a result of the lower concentration of DNA in the hemolymph samples. These minor differences, which only affected the intensity of the sequencing signal occasionally, could probably be compensated for by using a polymerase specifically designed for low copy number samples or by simply increasing the concentration of template used in the initial PCR reactions.

Our previous studies have shown that sampling hemolymph from freshwater mussels is non-lethal if contact is limited to sampling once a month. The present study demonstrates that this same technique can be used to sample DNA for a variety of genetic studies. We have also shown that hemolymph genetically matches somatic tissues, thus avoiding the issue of doubly uniparental inheritance exhibited in gonadal tissues of many mussel taxa (Hoeh *et al.*, 2002). Widespread use of this method with appropriate photodocumentation of potentially confusing species could prove invaluable for conducting genetic studies involving threatened or endangered species of this critically pressured invertebrate group. This method will also facilitate large scale genetic sampling schemes necessary to ensure that augmentation programs minimize the effects of unintentional genetic biasing of their propagated stocks.

We acknowledge LeRoy Humphries for collecting *E. complanata* and drawing hemolymph samples for this study. This work would not have been possible without Lori Gustafson's dissertation research. This work was funded, in part, by a grant from the North Carolina Department of Transportation and North Carolina State University.

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## MARINE MATTERS

### New marine species recorded for the Mediterranean fauna of Israel

By Henk K. Mienis

During 2005, six species have been recorded for the first time from the Mediterranean waters off the coast of Israel.

#### Gastropoda

Two rock snails of the family Muricidae were recorded from the northern part of the Mediterranean coast: *Thais sacellum* (Gmelin, 1791) from the Akhziv-Rosh Haniqra area and Qiriyat Yam, and *Ergalatax obscura* (Houart, 1996) from the islands of Rosh Haniqra and in shallow water near Akhziv (Singer, 2005).

#### Bivalvia

The diminutive oyster *Nanostrea exigua* Harry, 1985 (family Ostreidae) was recorded from Al Manara Island (= Isle of the Flies), off Akko (Lubinevsky & Mienis, 2005). Another exotic oyster *Alectryonella crenulifera* (Sowerby, 1871) (Ostreidae) was found living on the pillars of the coal conveyor belt of the power plant at Hadera (Sharon *et al.*, 2005); this first record has since been confirmed by two additional finds.

#### Cephalopoda

The bobtail squid *Rossia macrosoma* (Delle Chiaje, 1830) (family Sepiolidae) was recorded from a depth of 375 m off Ashqelon (Mienis, 2005a). A small octopus species, *Octopus aegina* Gray, 1849 (Octopodidae), was recognized among unidentified material in the National Mollusc Collections of the Hebrew University of Jerusalem and the Tel Aviv University from the following Mediterranean localities off Israel: Atlit (collected in 1934) and at a depth of 20 m off Tel Aviv (Mienis, 2005b).

All of these species, except the bobtail squid, *Rossia macrosoma*, belong to the group of so-called Lessepsian or

other Indo-Pacific migrants now occurring in the Eastern Mediterranean Sea. The bobtail squid is a well-known species from the Mediterranean and eastern Atlantic Ocean. They may all be added to the checklist of marine molluscs found along the coast of Israel.

In the near future we may expect the publication of several additional new species for the fauna of Israel. Advanced work is currently being carried out on a tiny species of spiny oyster characterized by the presence of numerous rows of barbed spines, most probably of Red Sea or Indo-Pacific origin, a puzzling small bivalve apparently belonging to the genus *Scintilla* of unknown origin, and two Mediterranean cephalopods not previously recorded from Israel.

Because of the continuous arrival of new migrants among the molluscs, several students are currently involved in studies concerning the impact of all these exotic species on the autochthonous marine mollusc fauna.

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## Results of the giant Pacific octopus census in Puget Sound, 2000-2005

By Roland C. Anderson

In my job as the octopus caretaker at the Seattle Aquarium I am frequently asked how many octopuses there are in Puget Sound and how the population has been doing over the years. To answer these questions, on 19 February 2000, the Saturday of President's Day weekend in the U.S., we organized the first divers' census of giant Pacific octopuses in Puget Sound. We hoped to establish a baseline of how many octopuses are in the area and conduct this survey annually, to see if the population is healthy and if there are fluctuations from year to year.

In addition to the large cadre of volunteer divers at the Aquarium, we enlisted the help of sport divers in the area to look for octopuses. In support of this effort, I spoke to scuba diving clubs, sent information out by mail and email to dive shops and dive charters and made numerous phone calls alerting divers of the upcoming octopus census. In addition, our marketing department arranged for media coverage of the event, resulting in publicity in newspapers, radio and television.

We chose a late winter date because more octopuses are seen in winter. There is some evidence that octopuses migrate down to deeper, colder, darker waters in the summer, and because of this, more octopuses are seen by divers in the winter, although this may be because less kelp is covering the dens. President's Day weekend is a holiday weekend and although in the winter, usually has decent diving weather in the Pacific Northwest. The underwater visibility also tends to be better in the winter because of the lack of plankton. Reports from these surveys indicated that the visibility averaged 20-25 feet [6-7.5 m] during the survey, quite reasonable for Puget Sound.

I asked all divers to report any octopus sightings to me at the Aquarium. The information requested was the location of the dive site, where the octopus was in relation to shore landmarks, the depth of the water, time of day (so we could correlate the depth to the level of the tide), a description of the octopus's den, and an estimate of the size of the octopus, including the size of some feature of the octopus such as width of the largest sucker seen. This size estimate was used to distinguish between sighting of the giant Pacific octopus and another species present in Puget Sound, the little red octopus. I also asked how many divers participated, whether they saw any octopuses or not, to get an idea of diver effort in seeing the octopuses.

The first two years the survey was held on only one day, and on the basis of the results of the second year, when there was snow on the ground that day, we thereafter increased the reporting time to the whole three days of the holiday weekend. The octopus sightings then had to be carefully correlated to day, time, dive site and location of each octopus so as to not count each animal more than once.



I received reports from sport divers and shore observers who questioned emerging divers. In 2000 (one day only) 114 divers participated in the survey, plus four Aquarium divers diving in Elliott Bay at the Aquarium, a spot where octopuses are frequently seen. Other dive sites surveyed were scattered around the Sound, mostly in well-known dive sites but a few in unexpected areas. In total, 18 octopuses were spotted and reported back to the Aquarium, of which 13 were seen in southern Hood Canal, including four females guarding eggs.

Nearly all the octopuses seen had made dens under large rocks, in hollow sunken logs or shipwrecks. One was out in the open, sitting unprotected on the bottom, a large octopus, probably