DEVELOPMENT OF THE ASTROPECTINID SEA STAR, *PSILASTER CHARCOTI* FROM ANTARCTICA.

M. Komatsu[1], C. Murakami[1], D.Karentz[2], I.Bosch[3].
[1]Dept. of Biol., Fac. of Sci., Toyama Univ., Toyama, [2]Univ. of San Francisco, Cal., USA, [3]State Univ. of New York, NY, USA.

Many Antarctic echinoderms reproduce by free-spawning large yolky eggs, but this type of development with a barrel-shaped larva has not been described. The development of *P. charcoti*, a common coastal sea star throughout Antarctica, is described through metamorphosis. The breeding season in the Antarctic Peninsula is from September through October. Eggs are 0.7 mm in diameter, cream color, and float. At 0°C, the first cleavage occurs 12 hrs after fertilization. Development proceeds through a wrinkled blastula to a hatched gastrula 10 days after fertilization. A barrel-shaped larva, 1.5 mm in length, forms 4 weeks after fertilization. No bipinnaria nor brachiolaria larva were observed up to 2 months after fertilization, when metamorphosis begins. The juveniles, 0.7 mm in diameter, bear 2 pairs of tube feet and a terminal tentacle in each arm.

Notable findings of the present study are that the development of *P. charcoti* is similar to that of 3 temperate species of Astropectinidae, although the developmental rate is much slower.

TWO HALECHINISCID TARDIGRADES FROM JAPAN AND A SIMILARITY IN MARINE TARDIGRADE FAUNA BETWEEN JAPAN AND THE MEDITERRANEAN.

H. Noda, Dept. of Biol., Sch. of Med., Tokyo Women's Med. Univ., Tokyo.

Two halechiniscid tardigrades, *Halechiniscus chafarinensis* de Zio Grimaldi & Villora Moreno, 1995 and *Dipodarctus borrori* Pollock, 1995, occurred in Japanese waters. The former was collected from Shirahama, Wakayama Pref. and Kuroshima Island, the Ryukyu Islands and the latter from Kuroshima Island.

Although some species are known in common between Japan and the Pacific coast of the North America, species composition of marine tardigrades of Japan is similar to that of the Mediterranean. *Parastygarctus sterreri*, *H. remanei*, *H. chafarinensis*, *D. borrori*, *Orzeliscus belopus*, *Styraconyx nanoqsunguak*, *Tholoarctus natans*, *Batillipes pennaki*, and *B. similis* occur in both Japan and the Mediterranean.

GENETIC DIFFERENTIATION OF *EPILACHNA VIGINTIOCTOPUNCTATA*

N. Kobayashi[1], Y. Shirai[2], K. Tamura[3], T. Aotsuka[3] and H. Katakura[1]
[1]Div. of Biol. Sci., Grad. Sch. of Sci., Hokkaido Univ. Sapporo, [2]Natl. Ins. of Agr-Env. Sci., Tsukuba, [3]Dep. of Biol., Grad. Sch. of Sci., Tokyo Metro. Univ. Hachiôji

We determined a part of mitochondrial DNA cytochrome oxidase I gene (645bp) for 16 individuals from six populations of the phytophagous ladybird beetle *Epilachna vigintioctopunctata*, which is a notorious pest of solanaceous crops in SE Asia. Distinct genetic difference (58-60 substitutions/645bp) was recognized between the following two groups of populations: 1) Chiba (Honshu), Okinawa (the Ryukyus), Bangkok (Thailand), and 2) Kuala Lumpur (Malaysia), Padang (Sumatra), Bogor (Java). Crossing experiments indicated that there exists strong postmating reproductive isolation between these two groups of populations.

GEOGRAPHIC VARIATION IN MITOCHONDRIAL DNA OF JAPANESE STINGFISH, *Sebastiscus marmoratus* (2).

T. Ishii, N. Ebitani*, T. Kubo.
Life Sci. Inst., Sophia Univ., Tokyo, *Biol. Lab., Shohoku Coll., Atugi, Kanagawa.

595 base pairs DNA fragments of mitochondrial gene (cytochrome *c* oxydase subunit I) from *S. marumoratus* were cloned with PCR method and sequenced. Fishes were collected from Nagasaki, Fukuoka, Uozu, Akita (The Tsushima current line) and Kagoshima, Miyazaki, Tosashimizu, Uwajima, Hiroshima, Wakayama, Yaizu, Chigasaki, Chikura (The black current line). These two warm currents are branched off at Kagoshima. So that,we compared the mtDNA from fishes of Kagoshima with that of the others. In the mtDNA of fishes from Miyazaki and Tosashimizu, no replacement were found from the fishes collected from Kagosshima. In the mtDNA of fishes from Nagasaki and Fukuoka, a transition was recognized and it has conserved in fishes from Uozu and Akita. A trasversion has occurred newly in fishes from Uozu and it has conserved also in fishes from Akita and a new transition was found in the same fishes. In fishes from the black current, replacement of bases has occured in different bases from fishes of the Tsushima current line. Replacement of bases and their conservation increase as the following order, Uwajima, Hiroshima, Wakayama, Yaizu, Chigasaki and Chikura. Considering the above result, it must be suggested that fishes of the Tsusima current line and fishes of the black current line are on the starting spot of speciation.

GEOGRAPHIC VARIATION AND BIOGEOGRAPHY OF *CISTOCLEMMYS FLAVOMARGINATA* (TESTUDINES: BATAGURIDAE)

Y. Yasukawa Tropical Biosphere Research Center, University of the Ryukyus, Okinawa

Three subspecies are currently recognized for *Cistoclemmys flavomarginata* (Testudines: Bataguridae)—*C. f. evelynae* from the Yaeyama Group, *C. f. flavomarginata* from Taiwan, and *C. f. sinensis* from the continent. However, they are still rather poorly diagnosed. Results of analyses of morphometric and colorational variations showed that *C. f. evelynae* is most divergent, whereas the other two are hardly discernible from each other. It was reported that *C. f. evelynae* has a relatively large light-colored marking on each vertebrate and pleural. Results of this study, however, suggest that this character varies with the age rather than the geographic range of samples. Presumably, the ancestor of *C. f. evelynae* had entered into the Yaeyama Group during the latest landbridge connection between Taiwan and the southern Ryukyus, which most likely occured in early Pleistocene. The ancestor, then, should been isolated from its counterparts in Taiwan and the continent through more resent (middle Pleistocene) subsidence of the landbridge.

SURPLUS ENERGY IN STARFISH EGGS AND ITS FUNCTION

H. Shirai and Y. Kuroiwa. Ushimado Marine Laboratory, Okayama University, Okayama.

Surplus energy in an egg and its function was investigated experimentally. In Asterina pectinifera, determinant for archenteron formation (D) is known to localize at the vegetal pole. D cells, which are endowed with D and do not produce any cell that does not carry D, become esophagus and mesoderm and give inductive action to surrounding non-D-carrying cells to change their fate from ectoderm to endoderm. Since the first two cleavage takes place in parallel with the egg axis, any blastomere at 2-cell or 4-cell stage contains 1/2 or 1/4 of D at each vegetal region respectively, and could metamophose when isolated and allowed to develop. One vegetal blastomere at 8-cell stage (1/8V) could not accomplish the normal development, that is, never metamophosed. In co-culture of pairs of one 1/8V with a selected animal blastomere taken from a given cell stage, they accomplished the whole development including metamorphosis in the case with a blastomere from 16-, 32-, or 64-cell stage, whereas they did not from brachiolariae with a blastomeres at 128- or 256-cell stage. These results showed that only 14% cytoplasm of a whole egg containing 1/4 of D was required to accomplish the development, and near 86% egg cytoplasm was regarded as to be surplus. On metamorphosis, the size of brachiolariae just before the metamorphosis was almost equal in length in any cases (critical size for metamorphosis; about 1,000 μm). The smaller volume of cytoplasm the development started with, the longer duration was needed to reach the critical size. The meaning of the surplus energy in eggs was discussed.