

IDENTIFICATION AND ANALYSIS OF GENES WHOSE EXPRESSION CHANGE IN THE BRAINS OF THE WORKERS IN QUEENLESS COLONIES

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The European honeybee (*Apis mellifera* L.) is a social insect and the workers are engaged in various labors to maintain colony activities as a sterile caste. However, they abandon such altruistic behaviors when the queen is lost in their colony, and start laying eggs as laying workers. To clarify the molecular and neural bases underlying behavioral change of the workers during this process, we used the differential display method to screen for genes whose expression changes in the worker brains 4,7,10 days after removal of the queen. As a result, the genes for glutamine synthetase and transcriptional factor, *dachshund* homologs were identified as candidate genes. Using quantitative RT-PCR, we also suggested differential expression level of these genes between the queenright and queenless conditions. The changes of gene expression might be involved in regulation of the altruistic behaviors of the worker honeybees.

MOLECULAR ANALYSIS OF GALL REPAIR IN A SOCIAL APHID○Mayako Kutsukake¹, Utako Kurosu², Harunobu Shibao³, Xianying Meng¹, Yoichi Kamagata¹, Takema Fukatsu¹¹Institute for Biological Resources and Functions, National Institute of Advanced Industrial Science and Technology, Tsukuba 305-8566, Japan, ²Niiza, Saitama, 352-0011 Japan, ³Tokyo University, Meguro-ku, Tokyo 153-8902, Japan

In social aphids, it has been reported that soldier castes perform two kinds of altruistic behavior, colony defence and gall cleaning. Recently, a third kind of social behavior was found from a gall forming aphid, *Nipponaphis monzeni*, in which monomorphic first-instar nymphs repair their gall in a self-sacrificing manner (Kurosu et al., 2003). *N. monzeni* forms completely closed galls on the tree *Distylium racemosum*. Since the wall of growing galls is still soft in early spring, gall-feeders such as lepidopteran larvae often invade the gall by tunneling through the wall. When a hole was bored, the first-instar nymphs of *N. monzeni* immediately gathered around the hole, discharged a large amount of body fluid from their cornicles on the damaged area, and mixed the fluid by their legs. The discharged fluid soon became viscous and solidified, whereby the hole was filled up completely. To understand the molecular basis of the gall repair, we are analyzing proteinous components in the body fluid. We also suggest the possibility that the solidification may involve the prophenoloxidase cascade.

PATHOLOGICAL STUDIES ON CORAL TUMORS OF *PORITES* spp., OKINAWA JAPAN○Naoko Yasuda¹, Yoshikatsu Nakano², Hideyuki Yamashiro³, Michio Hidaka¹¹Laboratory of Marine science, Faculty of Science and Engineering, University of The Ryukyus, Nishihara, Okinawa 903-0213, Japan, ²Sesoko Station, Tropical Biosphere Research Center, University of The Ryukyus, Motobu, Okinawa 905-0227, Japan, ³Department of Tourism, Meio University, Nago, Okinawa 905-8585, Japan

We measured growth rates and physiological characteristics of tumors formed on *Porites* spp. in Okinawa. The tumors found in 2002 have survived more than one year without marked changes in their size, while some tumors show partial death of tissue. The skeleton of the tumors lost normal structure characteristic to the species and tissues were swollen and bleached. The tumors contained much less zooxanthellae and showed significantly lower photosynthetic capacity measured by net oxygen production than healthy tissues. Most tumors showed oxygen consumption even in light condition suggesting that their gross production was minus. Tumors developed on female colonies did not contain oocytes while those on male colonies contained some testes, suggesting that the reproductive output of tumors in female colonies was reduced. Although the energy budget of the tumor appeared to be minus, tumor tissue subsisted for more than one year in the field. This long life of the tumors may be maintained by energy supply from surrounding healthy tissue. The tumors of *Porites* act as parasite for host corals and may eventually decrease the fitness of the host coral.

EFFECTS OF LIGHT INTENSITY ON THE FLUORESCENT PIGMENT CONTENT OF THE CORAL *GALAXEA FASCICULARIS*

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Reef-building corals are known to display variety of colors. The color pattern of corals is determined by the content and distribution pattern of pigments (GFP-like proteins). It is not well understood whether the color of corals are genetically controlled or variable and influenced by environmental factors such as light condition. To investigate how fluorescent pigment content and its distribution pattern of corals are influenced by light intensity, we maintained isolated polyps of *Galaxea fascicularis* under different light intensities for a month. We measured the quantity of fluorescent pigments using a fluorescent microplate reader and distribution pattern of the fluorescent pigments taking photos under UV illumination. Different color morphs of the coral contained markedly different amount of fluorescent pigments. The pigment content decreased in low light intensity, though the distribution pattern of the pigments did not change markedly. The present results suggest that the distribution pattern of the pigments is determined genetically while the pigment content varied in response to light conditions.

EFFECTS OF ELECTROMAGNETIC FIELDS RADIATED FROM A RODENT CONTROL DEVICE ON PREGNANT MICE

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Exposure to electromagnetic fields (EMF) generated by an electronic rodent control device causes various physiological effects to mice. Previous results showed that adult mice and weaning juveniles were not affected by exposure, but that the exposure to EMF caused sever biological effects to suckling infants, although it was not clear whether the EMF directly influenced infants or their mothers.

To investigate the effect of EMF exposure on reproductive physiology of female mouse, 1 exposed pregnant female mice to EMF from a commercial rodent control repellent for 25 days. The exposure was started after about 7 days from copulation and ceased during lactating period.

As a results, one third females aborted and residual females delivered normal number of their young, but 10 pups were born dead. Finally, 75% of juveniles couldn't survive beyond weaning because of ceasing of the maternal care or cannibalism by their mothers during exposal period and/or succeeding 7 days. These results showed that the exposure to EMF from a rodent controller caused sever physiological effects to pregnant and lactating females.

CHANGES IN BLOOD CELL NUMBERS OF COLD-ACCLIMATED *XENOPUS LAEVIS*○Yuko Kuramochi¹, Nami Nogawa¹, Takako Ishida¹, Takashi Kato^{1,2}¹Major in Integrative Bioscience and Biomedical Engineering Graduate School of Science and Engineering, Shinjyuku-ku, Tokyo 169-8050, Japan, ²Department of Biology, School of Education, Shinjyuku-ku, Tokyo 169-8050, Japan

It has been reported that hematopoiesis affected by environmental temperature in vertebrates. To clarify the physiological mechanism, the changes of peripheral blood cell numbers was observed in cold-acclimated *Xenopus laevis*. The frogs were initially placed at 25°C and then acclimated to 10°C. The peripheral blood cell numbers decreased approximately to 50% of the initial number, and they recovered reversibly as the temperature returned to 25°C, demonstrating that hematopoiesis in *Xenopus* is affected by environmental temperature. To elucidate the mechanisms of the changes in blood cell numbers under cold temperature, morphological changes of hematopoietic tissues were examined. Moreover the number of surviving biotinylated erythrocytes in the circulation were measured to compare the alternation of lifespan of blood cells between normal and cold-acclimated *Xenopus*.

THE ENVIRONMENTAL POSITION OF THE REEDY MARSHES FOR THE TIDAL FLAD

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The reedy marshes appear in the estuaries. It is not clear how the salty marshes work on the environment of estuaries. In this study, we compared the gastropods fauna with the environment of the tidal flat which have reedy marshes behind at the estuaries in Okayama. We found two types of marshes in the estuary. The grain size of sediments of ellobiids habitat was different between ellobiids habitat and non-ellobiids habitat. The ellobiids seems to be dead out in the Eastern Japan. The marshes of reeds in which ellobiids inhabit would be sufficient from the view point of the fauna of gastropods.

INFLUENCE OF COASTAL POLLUTION ON INTERTIDAL CRUSTACEANS (*UPOGEBIA MAJOR*)○Takahiro Nanri¹, Masayuki Saigusa¹, Yuriko Hirano¹, Hideki Ikeda¹, Yoshitake Takada²¹Graduate School of Natural Science, Okayama University, Tushima-naka 3-1-1, Okayama 700-8530, Japan, ²Seikai National Fisheries Research Institute, Isigaki Tropical Station, Isigaki-si, Okinawa 907-0451, Japan

The organic matter is decomposed by chemoautotrophic and heterotrophic bacteria. Particles of organic production are condensed and accumulated on the bottom substrate. We investigated accumulation of the sediment in an artificial inlet at Kasaoka, Okayama Prefecture (300 m in width, 7 km long). The inlet was made by the reclamation works in 1968. A feature is a soft layer of anaerobic sediment that is composed of very fine grains mostly less than 250 µm in diameter. It reaches as much as 2m at the end of the inlet. The water hardly penetrates into this layer. This layer refuses burrows of infaunal invertebrates. *Upogebia* and *Callinassa* are only distributed in the bottom substrate until 1 km from the Inland Sea, where the anaerobic layer is not seen. Animals were exposed to this aerobic sediment for 24 h in the laboratory. A western blotting using mouse monoclonal antibody indicated that a large amount of the stress protein (HSP 27 family) was induced by this treatment. Much less stress protein was expressed in the specimens exposed to the sediment of their habitat. This suggests that the aerobic sediment is harmful to the infaunal animals.