JAPAN ROUNDUP

Professor Matsunaga and his colleagues at the Institute of Technology, Tokyo University of Agriculture and Technology, have successfully introduced magnetic particles derived from freshwater cyanophytes into algal cells.

The 0.1-micron magnetic particles occur in chains: the scientists used ultrasound to dissociate them. They then used a particle gun to inject the algae—a method that is much more efficient than conventional cell fusion (50 percent versus approximately 10 percent).

Because the magnetic particles are covered with a thin layer of organic matter, they have an affinity with organic materials. Further, they are magnetically maneuverable from the outside. These characteristics suggest that this system may be useful in drug delivery, with the particles coated with biologically active substances.

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Cellulase is multifunctional, hydrolyzing chitosan as well as cellulose. This finding was announced by researchers of the Governmental Industrial Research Institute Osaka (Agency of Industrial Science and Technology) at the 4th Symposium of Chitin/Chitosan held in Kyoto in May.

Cellulase hydrolyzes cellulose at an optimal pH of 4.8 and a temperature between 45 and 50 °C. In contrast, it hydrolyzes chitosan at pH 5.6–6.0 and 60°C, producing various chitooligosaccharides. The researchers are purifying various oligosaccharides to determine their physiological activities, and predict that this will become a new way of producing oligosaccharides.

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A research group from Keio University Medical School (Tokyo) and Waseda University Faculty of Science and Technology (Tokyo) has jointly developed an artificial erythrocyte which has an oxygen-carrying activity similar to that of natural red blood cells (RBC). Artificial RBCs don't require blood-type matching for transfusion. As well, they can incorporate oxygen whenever its concentration is greater outside than inside the cell, more efficiently than conventional artificial RBCs.

The artificial cells consist of chemically synthesized heme incorporated into 40-nm liposomes. In animal models, the cells bind with oxygen in the lungs and release it in peripheral tissue. Future experiments will address a mass production method as well as safety issues.

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Nippon Kayaku (Tokyo) and Keio University's Professor Yamamura have developed a mass-production system for a new antibiotic, oxetanosine A, and its precursor oxetanose. Conventional production systems have not been able to yield enough product for a precise pharmaceutical evaluation. The new method synthesizes oxetanose from epoxide, with yields of 25 percent. It also provides a way to produce various derivatives for pharmaceutical analysis.

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Two erythropoietins (EPO)—Kirin Brewery and Sankyo's Espo and Chugai Pharmaceutical's Epogen—have been approved for marketing, both for treating the anemia associated with kidney dialysis. Both EPOs are manufactured in Chinese hamster ovary cells. Approximately 100,000 Japanese receive dialysis treatments; 14,000 of those suffer from anemia.

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Researchers at the National Institute of Agrobiological Resources (Ministry of Agriculture, Forestry, and Fisheries) have isolated and sequenced the envelope protein of the virus that causes rice stripe disease.

Rice stripe disease is carried by several planthopper species, such as the small brown planthopper (*Laodelphax striatellus*). The disease affected approximately 220,000 hectares of rice fields in Japan in 1987, with yield losses as great as 50 percent.

The researchers intend to develop a virus-resistant rice strain by introducing into it the gene encoding the virus' envelope protein. This method has already been successful in developing tobacco mosaic virus-resistant tomatoes.

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A new method of vaccinating plants has been developed by scientists at the National Research Institute of Vegetables, Ornamental Plants, and Tea (Ministry of Agriculture, Forestry, and Fisheries). They infected tomatoes by spraying them with a mildly toxic strain of tobacco mosaic virus (TMV). The researchers then cultured small portions of the leaf or stem tip to develop seedlings. When challenged with TMV, none of these seedlings showed disease symptoms, whereas all of the controls (unvaccinated) did.

The total damage caused by viral disease in vegetables and fruit is estimated to be approximately 50 billion yen annually. Virus-free seedlings produced by stem-tip culturing are now widely available, but this approach is ineffective in preventing disease when the soil is contaminated with virus. Thus, vaccinating plants may be a way to produce virus-resistant seedlings in plants cultivated via vegetative propagation.

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