

Microscopy in Costa Rica

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Costa Rica is amazing. You probably know that Costa Rica has no armed forces and that fully a quarter of its area is given over to national parks and other protected areas. You probably don't know that Costa Rica is also amazing for its electron microscopy. Almost anonymously Costa Rica has a center for electron microscopy on a par with centers in the United States or Europe.

El Centro de Investigación en Estructuras Microscópicas, CIEMIC (The Center for Microstructural Research) has its own purpose-built building with an infrastructure that would make most of us envious. The four microscope rooms have independent concrete slabs for vibration-free mounting of the microscopes. The whole building has an emergency generator system to protect the equipment from power failures. There are about twenty rooms for sample preparation and related work as well as the darkrooms and offices. Since much of the research in the Center is related to analysis of delicate biological samples, temperature control is strict, instruments track and record the history of each sample including its temperature at all times. Critical equipment is duplicated so that tissue processing is not interrupted by instrument down time. Quality control and inspection of the quality control measures are maintained to the levels expected for the most demanding work of NIH, for example.



Figure 1 A view of CIEMIC, Costa Rica.

CIEMIC was founded in 1974 with support from the Japanese government. JICA (Japan International Cooperation Agency), the organization that created the Center, is to be congratulated on a job done extraordinarily well. For more than twenty years, the Center acted mostly as a center for teaching electron microscopy. Each year JICA funded a six-month course to train microscopists from all of Latin America. As a result many electron microscopists in the biological sciences across the Americas were trained in Costa Rica. In 1997, JICA ended its support for CIEMIC and everything changed. CIEMIC has reinvented itself as a center for research – and has done so with great success. The Center now publishes twenty or more publications each year in international journals. The infrastructure is supported from the budget of the University of Costa Rica, in which the Center is located, but the funding for the research

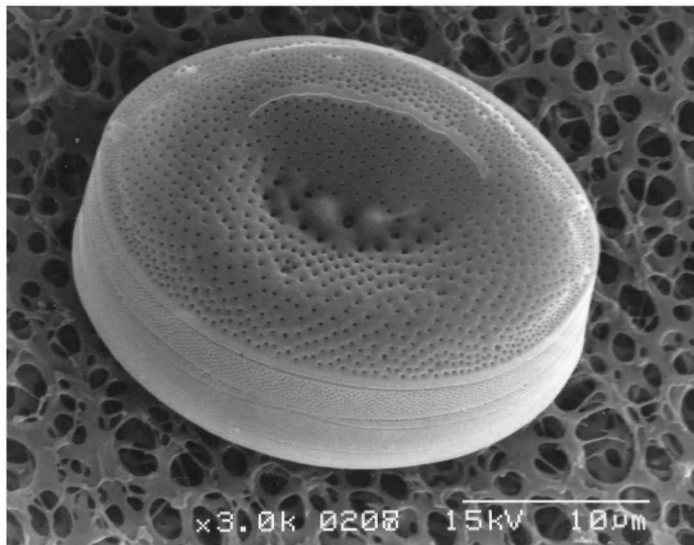


Figure 2 SEM micrograph of a marine diatom from Costa Rica. (Centric diatom, Order Bidduphiales, Suborder Coscinodiscenae, Family Thalassiosireceae, Genera *Cyclotella* cf. *litoralis*.) Taken on the Hitachi S2360N, 15 kV, 4 000X.

itself comes from grants. Grants are sought within Costa Rica, within the region and internationally. This research funding from grants currently runs at about US\$1M per year.

The Center has four electron microscopes: two transmission electron microscopes (Hitachi H-7100 and Hitachi H-7000) and two scanning electron microscopes (Hitachi S-2360N and Hitachi S-570). A confocal microscope will be purchased shortly. The instruments are not new. The most recent acquisition is now about 15 years old, but they are well maintained and are in very good condition. The original focus on biological applications is being broadened to extend to materials sciences too. As a part of this effort, EDS systems for chemical analysis have recently been added to one of the TEMs and to one of the SEMs.

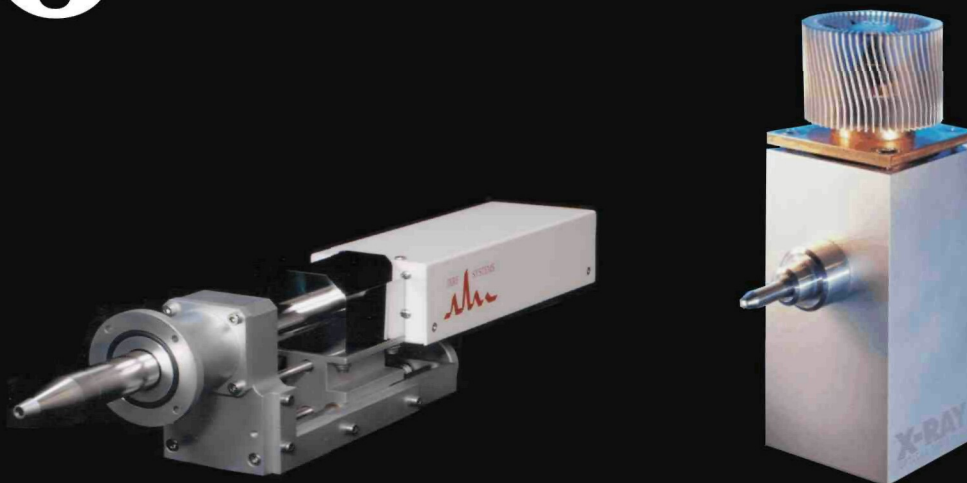
The main research activities are, as might be expected, related to the environment and economy of Costa Rica. Immunology and virology, both in the context of human health and in the context of agricultural problems, are leading fields. There is a program of research on red tides, which affect Costa Rica as they do many other coastal regions.

This may seem like paradise but there are problems. A recent change in the law regarding professorial pensions had the effect of causing a large fraction of the researchers working with the microscopes to retire in 2003. It will take some time to rebuild the strength of the research team. One result of this is that now is a particularly good time for the development of collaboration with CIEMIC. They have always wanted to strengthen collaboration but this is an especially favorable time. The other problem is that the microscopes will not last for ever and there is concern at the difficulty of getting the next instrument.

Anyone who is interested in more information should contact me at jae5@lehigh.edu or contact directly the Director of the Center, Enrique Freer, at efreer@cariari.ucr.ac.cr

Costa Rica is a small country but one that gives the impression of doing things right. Now if only they could fix the roads. ■

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