If It's Tuesday, This Must Be . . . Heraklion?

Greek-born, U.S.–trained scientists return home to Crete to carry on research in laser science, computers, math, and biology

Heraklion, Crete

OVER THE PAST FEW YEARS, a new and unexpected location increasingly has been finding its way into the address books of the conference organizers, grant-giving bodies, and journal editors of Europe's molecular biology community. This newcomer to the traditional list of Cambridge, Paris, Heidelberg, and Strasbourg is Heraklion, the capital of the Greek island of Crete.

Set in the middle of the Mediterranean 200 miles south of Athens, Crete is perhaps best known as the cradle of the Minoan civilization that flourished from 3000 B.C. to 1100. And the fertile geography that gave rise to this civilization remains the source of its two leading contemporary industries: tourism and agriculture.

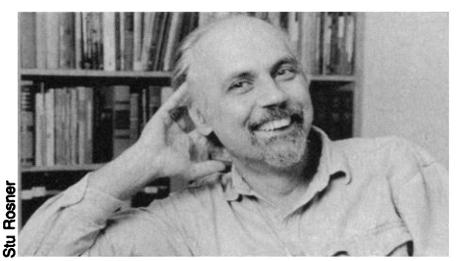
In recent years, however, a small group of Greek-born, U.S.–trained scientists has spearheaded an effort to introduce a third leg into the Cretan economy—high-technology based directly on advances in fundamental science. Its efforts have led to the creation of a high-quality research center concentrating in selected fields of laser physics, computer science, applied mathematics, and molecular biology.

"Instead of exporting oranges, we could be exporting high-tech services" says physicist E. C. Economou, who obtained his Ph.D. at the University of Chicago and also taught at the University of Virginia before returning to Greece. He is now president of the four research institutes known collectively as the Research Center of Crete (RCC).

Greece, like many less-developed European nations, has a relatively sparse scientific infrastructure. As a result, not only do almost all of the brightest science graduates carry out their postgraduate studies abroad (primarily in the United States), but few are enthusiastic about returning to an environment in which research funds are scarce and salaries are low by foreign standards (a university professor here, for example, can expect to start at the equivalent of $12,000 to $15,000 a year).

The RCC was established by Greece's socialist government in 1982, originally as part of the University of Crete. It has used funds provided equally from Greek and non-Greek sources, the latter being primarily the Brussels-based Commission of the European Economic Community (EEC) and the North Atlantic Treaty Organization (NATO), to try to create a sufficiently attractive research environment to entice back some of Greece's best and brightest.

"There are a lot of Greek scientists in the U.S. who would like to come back," says G. N. Papatheodorou, head of Greece's General Secretariat of Research and Technology in Athens.



Stu Rosner

F. C. Kafatos: *"Greece has a lot of potential . . . but the scientific tradition in recent years has not been so good."*

The center's scientific profile has been enhanced by the fact that its initial scientific agenda has been molded largely by a group of Greek-born scientists who have already established significant reputations in their respective fields, several of whom now hold joint appointments with the RCC and leading American universities.

"Greece has a lot of potential in terms of people with a good basic education, but the scientific tradition in recent years has not been so good," says Heraklion-born molecular biologist Fotis Kafatos, who is both director of the RCC's Institute of Molecular Biology and Biotechnology (IMBB) and professor of biology at Harvard University.

While the biology institute is relatively small by international standards, it has already established research groups in four areas: mammalian genetics, insect genetics (Kafatos' own field), yeast genetics, and plant genetics. The center also engages in applied activities such as the production of enzymes and monoclonal antibodies for use by other research workers in Greece.

Although they are relative newcomers, each research group has already established a significant place in the European molecular biology scene. The microbial genetics group, for example, will participate in a Europe-wide project to sequence the yeast genome. Financed by the EEC Commission, it starts this month.

Similarly, the insect group is playing a central role in a joint research project with scientists at the universities of Cambridge, London, and Tübingen to explore the structure and function of the *Drosophila* genome. The researchers hope that the techniques developed in this project might, if applied to the Mediterranean fruit fly, be used to eradicate a major threat to agricultural crops.

Ten of the 13 research scientists in the biology institute received their research training in the United States. They now stress that, perhaps even more so than for colleagues working in larger laboratories in northern Europe, collaboration with scientists in other countries is essential.

"It is vital for us to work as part of an active European scientific community" says Nikos Moschonas, whose research into the molecular basis of α-thalassemia in Greece, is likely to form the basis of the institute's participation in European human genome sequencing efforts.

The Center, which has an annual budget of $10 million, has been able to attract substantial funding from the EEC's regional development fund and from NATO's "Science for Stability" program. The RCC's Institute of Computer Science, for example, relies heavily for funds on the EEC's ESPRIT program in information technology, and its Institute of Electronic Structure and Lasers on the BRITE industrial technology program. Reliance on EEC funds allocated on a competitive basis ensures that the quality of RCC research projects is measured according to international criteria.

"What is missing in Greek research is a standard of quality," says Economou. "We do not have the same tradition of refereeing as in the U.S., and it can be a catastrophe for a country if low quality is allowed to have the upper hand all the time."

Establishing the RCC has not been without its major obstacles. One is Crete's distance from the scientific heartlands of Europe. Then there are infrastructure problems that do not exist elsewhere. The single runway at Heraklion airport, for example, has to be closed when the wind blows in the wrong direction, making even Athens inaccessible.

To a certain extent, these obstacles have been overcome by the heavy use of facsimile machines and data-networking technology. The RCC, for example, was, with the Uni-

versity of Crete, Greece's first gateway into the European Academic and Research Network (EARN), providing access to both BITNET and ARPANET. But technology cannot completely overcome the feeling, that coming to Crete is, as one scientist puts it, "often seen as a form of exile."

There have been political problems too. Part of the government's motivation in setting up a new research center in Crete is said to have been a desire to avoid the academic in-fighting that might have resulted from trying to start these projects within existing institutions. But its decision has generated opposition from those who claim, for example, that the money could have been more effectively used if the research center had been established in Athens.

Several political groups have also criticized the research agenda for being explicitly oriented to the long-term interests of private-sector enterprises (which in practice tends to mean foreign-owned transnational corporations), and implicitly to the political goals of NATO.

Kafatos acknowledges that there have been "some political difficulties" in setting up the center. But he is philosophical. "Anytime you do something radical and new, you have to accept that; you just have to acquire a thick skin, and adopt a long-term view."

More pragmatic is the continuing concern that the salaries offered to publicly funded scientists in Greece—low even compared with those in other parts of Europe—remain a major handicap in attracting top candidates working in the United States and elsewhere. This concern has prompted the proposal that EEC research grants, at present confined to project expenses, should include funds to raise scientists' salaries to a European-wide minimum.

That the RCC and its institutes have quickly managed to establish a growing scientific reputation is evidence of a determination to succeed (and, some would add, a certain single-minded independence in the Cretan character). The center's main task now, according to those responsible for setting it up, is to ensure continued growth and, as Economou puts it, "to replace the initial enthusiasm with something more tangible."

"Even though we have made the transition from a dream to a reasonably well-known research center, we still do not have the critical mass that you really need," says Kafatos. The scientific staff currently numbers 46 resident and 20 visiting researchers. "What we have going for us is an excellent group of young and active scientists. What we have to do is hold on to them and try our best to recruit more people and find the funds to support them."

■ DAVID DICKSON

Britain Reveals Astronomy Plan

London

British astronomers have announced that they are on the lookout for an international partner—or partners—prepared to split the estimated $55-million construction costs of a new 8-meter telescope optimized to work in both optical and infrared ranges.

They are also offering to collaborate with foreign astronomers on two other major projects: a new radar facility to be based on the Arctic island of Spitzbergen intended to study the dynamics of the upper atmosphere within the Polar Cap and a set of gravitational radiation detectors designed to gather information on neutron stars, black holes, and supernovae.

The three projects, along with a fourth purely British one, have been recommended for government funding by the Astronomy and Planetary Science Board of the Science and Engineering Research Council. The fourth, already approved, would create a new 32-meter radio telescope at Cambridge as an extension to the MERLIN radio interferometry network based at Jodrell Bank.

In a report published in London last week, the board describes these as "key projects" in a long-term strategy which would "take the UK forward in the forefront of astronomy and planetary science research into the next century."

If suitable international partners can be found, the board says that the four projects could be financed within an overall budget that is kept constant at current levels of capital investment in ground-based astronomy. To do this would require cutting back on some experimental programs.

It will also require finding other countries willing to contribute up to 50% of the costs of the 8-meter telescope, up to 75% of the $26 million for a gravitational radiation observatory, and about 75% of the $14-million price tag of the Polar Cap radar.

"The establishment of international partnerships will be essential to the success of the key projects," says the board in its report, adding that "the scientific benefits of working internationally are as important as the financial necessity."

The board also expresses concern about job prospects for British astronomers. It points out that, although a wave of retirements can be expected in 5 to 15 years, "academic career prospects for existing and immediate future students and postdoctoral workers are very poor indeed."

■ DAVID DICKSON

Chauvinism in Nobel Nominations

American chemists tend to be "chauvinistic" when it comes to making nominations for the Nobel Prize in chemistry. They also do not seem to understand the need for confidentiality in making nominations, says Bo G. Malmstrom, who recently resigned after 10 years as chairman of the chemistry section of the Nobel Prize Committee.

Malmstrom, who is about to return to Sweden after a semester at the California Institute of Technology, told *Science* that members of the committee have been unhappy for some years about the fact that Americans always seem to nominate other Americans even though they are supposed to be nominating "the most important chemists in the world."

Each year, professors of chemistry in 10 of a pool of about 50 American research universities are invited to make nominations. Malmstrom says that in the great majority of cases, Americans nominate chemists from their own departments. For example, he says, the three Germans who won the 1988 prize (for work on photosynthesis) received nominations from ten countries. But none of them received a nomination from an American chemist. This, he says, was "definitely against both the spirit of the prize and what we are after. We are dependent on getting good nominations from the outside."

Malmstrom believes that Americans are not deficient in their knowledge of work by foreigners but are just "more chauvinistic in this regard." He says the problem is particularly evident at big universities like Harvard and the University of California at Berkeley.

Malmstrom says that the committee about 5 years ago wrote a letter to American universities explaining the Nobel policy in detail, including the need for confidentiality. "We thought when we wrote this detailed letter that would improve the situation but it really hasn't." He says it is obvious from the pattern of nominations that Americans discuss them among each other. "We take confidentiality very seriously . . . apparently this is not in the American tradition."

Malmstrom's willingness to talk publicly about the committee's problems is an indication of how seriously concerned some members are over American behavior.

■ CONSTANCE HOLDEN