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WHERE PHYSICISTS GO TO TALK IT OVER

by Daniel Behrman

There is no loneliness like that of a theoretical physicist with no one to talk to at his own professional level. He grows rusty, he languishes and, perhaps, he leaves his own country to become another digit in the statistics of the "brain drain".

At the International Centre for Theoretical Physics in Trieste, however, he can spend a few weeks or a few months in the heady atmosphere of top-level science before returning to his laboratory or university with the assurance of being able to come back to the centre again.

Even a short visit to the centre leaves you with strong impressions: the site overlooking the Adriatic outside Trieste on the road to Venice, deep-green cypresses in the foreground and the sea beyond, the pale blue United Nations flag snapping in the wind in front of a low building set against a steep terraced hill; the building, a long concrete double-decker sandwich, two rows of wood-framed windows as the filling. A hushed sort of place; someone once called it a modern monastery. Two floors of office-cells behind the windows, a blackboard in each of them. No bustle, no hurry, no crowds, just an occasional knot drifting into the cafeteria or the reading room. Morning, noon and night, young men bent over books, journals and papers on desks lining the library's glass walls that soak up sunlight by day and radiate a neon glow at midnight.

That is the most unforgettable impression of all, these young men who have come to Trieste from Tanzania and Malaysia, Venezuela and Pakistan, from all corners of the developing world, to escape the isolation so deadly to theoretical physics. The apparatus is no more complicated than blackboards, chalk and talk, mainly talk.

Dr. Paul Vitta got his Ph.D. in the United States in 1970 and is now teaching at the physics department of the University of Dar-es-Salaam in Tanzania. "In Tanzania, I am the only nuclear physicist. I am in perfect isolation. I simply need to come to centres like this. With our teaching load, one very soon gives up all hope of research. So you pick a textbook. It gets out of date, but you're stuck with it." Dr. Vitta does not think that nuclear physics is the answer to Tanzania's problems but he is convinced that basic science is essential to the training of people in applied sciences. "Why, even in medicine, a doctor's office today is like an electronics laboratory."

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Dr. Lutz Dohnert had come from the Universidad Central de Venezuela where he now teaches physics in all its forms after getting his doctorate in 1968 from Massachusetts Institute of Technology. He wants to stay in Venezuela and he wants to stay in teaching. He, too, is convinced that basic science is a prerequisite for high-level education which, in turn, is the only way a developing country can get the scientists it needs. "If we do not have scientists, how can we appreciate whether foreign technology is being properly used in our country?"

Scientists often say that the best way to understand a phenomenon is to study an extreme case. In that respect, Dr. Toshar Gujadhur certainly qualifies as the most isolated of the theoretical physicists visiting Trieste. His home is on the Indian Ocean island of Mauritius and he was returning there after an absence of ten years that began when he went to Imperial College in London where he earned his doctorate in mathematical physics. He was about to take a post in a new teacher training institute on the island where he would teach modern mathematics. "I want to go back, my roots are there, but it will mean complete paralysis of the mind if I cannot get to Trieste every three years or so. I'm working in relativity and quantum mechanics."

More in an hour than a day

Professor Georges Ripka of the French Atomic Energy Commission at Saclay, who, with Prof. Luciano Fonda of the University of Trieste organized the nuclear theory course, believes that the scientist in a developing country runs the risk of doing "perfectly good but irrelevant work" if he only reads the literature. He cannot read every calculation, he is unable to keep up. "In a hour's conversation with a physicist", said Prof. Ripka, "I learn more than in a day in the library."

More than 500 scientists go through the Trieste centre every year and then go home. That is perhaps its most original contribution: it is a plug in the "brain drain", the flow of highly educated men from developing countries to more developed ones that offer better working conditions and professional opportunities. The centre now has sixty associates from more than twenty countries. It hopes to expand this list until it encompasses all the estimated 200 theoretical nuclear physicists in the developing world.

This is not its only function. In fact, every time one looks around in the centre, another function seems to appear. There is its system of

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federated institutions, twenty from sixteen countries, that have the right to send a scientist to Trieste for a period of up to 40 days a year. The institution goes on paying the man's salary while the centre covers his subsistence. Such is the thirst for theoretical physics that some institutions send a scientist for one day - and he stretches his allowance over nearly a week, staying in a modest hotel or with friends.

Theory leads to application

The approach at Trieste may be theoretical, but it certainly leads to applications. Among the problems taken up here in plasma physics by American and Soviet scientists working together are those that must be overcome before the thermonuclear power of the H-bomb can be converted into a new form of energy, pollution-free and almost inexhaustible. Solid state physics, which studies matter as a liquid or solid rather than a gas, has already given us semi-conductors best exemplified by the ubiquitous transistor and it shows promise towards in solving the problem of superconductors. If it does, electrical power could then be transported over long distances with little or no loss.

The International Centre for Theoretical Physics does all this on a budget of no more than \$600,000 a year. Of this figure, the biggest chunk is a generous \$250,000 grant from the Italian government which also financed the construction of the building at a cost of \$2,000,000. Then the International Atomic Energy Agency and Unesco, the centre's sponsors in the United Nations system, each give \$150,000. The remainder is made up mainly of contributions from the Swedish International Development Authority and the Ford Foundation. This sum covers virtually all expenses from fellowships through the publication of 130 papers a year to heating and administration.

It must be said that, in these days of rampant bureaucracy, the administration of the centre boggles the mind. The entire full-time professional staff could fit into a small Fiat or a short sentence: Prof. Abdus Salam from Pakistan, director; Prof. Paolo Budini from Italy, deputy director; and Prof. Andre Hamende, a Belgian, who is everything else. At Trieste, Parkinson's Law has been repealed. The staff has actually dwindled since the centre opened in 1964 but the number of scientists that it reaches every year has more than quintupled.

That is precisely the way that Prof. Salam would have it. He is truly the father and the founder of the centre. It might even be said that it sprang from his own life, from the isolation that he himself suffered

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when, after brilliant studies at Cambridge, where he took his doctorate, and at Princeton, he returned to Pakistan to teach in 1951.

"I was the only theoretical physicist in Pakistan at the time", he told me as I sat in his office sharing his lunch of sesame seeds. "The nearest one was in Bombay. I remember, I received a phone call one day from Wolfgang Pauli, the Nobel laureate from Zurich. He was in Bombay and he wanted me to come to talk to him. So I took a plane to Bombay and a taxi to his hotel. I went up to his room, I knocked on the door. He told me to come in and then, without a word of greeting, he said to me:

"The problem is, if we have derivative terms in Schwinger's action principle..."

Charged for absence

"I wrote a paper on super-conductivity following that meeting with Pauli. But when I came back, my principal charge-sheeted me and I was declared on leave without pay. We must rescue people in these situations."

Under glass on the wall to the right of his desk was the following quotation: "We have all of us to preserve our competence in our own professions, to preserve what we know intimately, to preserve our mastery. This is, in fact, our only anchor in honesty."

Prof. Salam might have written that himself but it was signed by the late Robert Oppenheimer, one of the earliest supporters of the Trieste centre.

It was Prof. Salam's fortuitous meeting with Prof. Budini at a symposium in Zagreb on elementary particle interactions that led to the creation of the centre.

Money came from a local bank, the Cassa di Risparmio di Trieste. An original offer of land, later converted to money was made by Prince Raimondo di Torre e Tasso whose nearby castle at Duino has played host to Mark Twain, Liszt, Rilke and, most recently, the 1970 Pugwash Conference.

In 1962, the General Conference of the International Atomic Energy Agency had approved the idea of creating a centre for theoretical physics. "That was the most momentous day of my life", Prof. Salam told me, "I seldom smoke, but I was so worked up that day that I smoked 50 cigarettes and went through a kilo of grapes. At the end of the debate, sixty hands went up in favour - and we had won."

The following year, the Italian government's offer of Trieste as a site for the centre was accepted and, in 1964, Prof. Salam and his staff

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moved into temporary quarters in the heart of the city. Four years later, they were in the present building at Miramare.

Prof. Salam and his collaborator, John Strathdee, share an office decorated principally by blackboards and equations. He told me that they were endeavouring to put under one roof the micro and the macro, to cover the frontiers between elementary particles measuring 10-15 centimetres (that is, the number one preceded by fifteen zeroes and a decimal point) and the so-called quasars of astrophysics, 10^{27} centimetres (the number one followed by twenty-seven zeroes) away from the earth. Prof. Salam is trying to understand better the "black holes of gravity" in space occupied by collapsed bodies imploded under the weak but relentless force of gravity.

To Prof. Abdus Salam, it is only the swing of history's pendulum. He likes to tell how Michael the Scot left his native land in a thirteenth century "brain drain" to work in the Arab universities of Toledo and Cordova. Or how Mamun ur-Rashid, caliph of Baghdad in the ninth century, sent the emperor of Byzantium a work concerning a new path in mathematics called algebra.

Prof. Salam sees no contradiction between his faith in Islam and his profession. "One cannot apply the methods of science to all of life. It was Einstein who wrote: 'Strange is the fate of man'. He knows not why he is here on this earth, nor does he know where he is going. There are things we can know only through belief."

(UNESCO FEATURES)

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EVERYONE'S DO-IT-YOURSELF GUIDE TO FIGHT POLLUTION

Do it is the title of a do-it-yourself guide published by the Toronto Anti-Pollution Centre to enable everyone to combat environmental pollution by explaining its causes and how to prevent or eliminate them.

The guide, published in a number of editions so as to cope with different situations in different parts of Canada, is being distributed throughout the country. But the centre recognizes that pollution is a universal problem and people living elsewhere can obtain a copy of the guide from Pollution Probe, 25 Harbord Street, Toronto 181, Ontario, Canada, or the Canadian National Commission for Unesco, 140 Wellington Street, Ottawa 4, Ontario, Canada.

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