

Vietnam calls its scientists to arms

VIETNAM hopes to have a "modern, scientific capability" in 15 to 20 years' time. This is the message which the government has relayed to the country's scientists. In return, the politicians expect the scientists to participate in a programme of reconstruction; science and technology are seen as the key to Vietnam's economic development.

Some scientific disciplines are better equipped than others to participate in the programme. In the past, the physical sciences received considerably more support than the biological sciences (see the first article in the series, 12 January, page 101). This will be remedied, however, in new allocations of funds. Support for agriculture and medicine is given high priority in Vietnam's new economic plan. It is the biologists who will be most actively involved in these two areas so they can expect more government finance in the future.

But the support could be some time in coming; Vietnam has virtually no extra resources to assist her scientists at present. Two disastrous harvests in the past two years have emptied the government coffers, and the government's dilemma is evident in the exhortations to the biologists to manage with the resources they already have.

Vo Nguyen Giap is the first Minister for Science and Technology, the one politician in Vietnam considered experienced enough to run the new ministry. Giap still retains his original portfolio, that of Minister of Defence, and it is apparent that he believes that some of the lessons learned in his years of military service are applicable to the problems of science. The biologists explained to him that they lacked resources in the form of equipment and chemicals and that this shortage would hamper their new research programmes. Giap replied with an analogy based on the Vietnamese army—a relatively unsophisticated body in terms of weaponry which still defeated a highly sophisticated American 'military machine'. "If the army could rise to the occasion then surely the scientists can do the same".

Some scientists, however, say that it is possible to do a certain amount of work using inexpensive equipment but for some programmes it is vital to have sophisticated technology. One research programme serves to illustrate their argument. Chemists and botanists are

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currently investigating plant sources used in traditional medicines. They hope to isolate the active components in the plants, identify them and if possible synthesise these ingredients chemically; the ultimate objective being to hand over the information to the pharmaceutical industry. To perform this schedule of work and provide the fine fingerprint of each active component it is necessary to have access to such techniques as nuclear magnetic resonance and mass spectrometry, neither of which is available in Vietnam. The final analyses are performed abroad at present and it is often two months before the results are available.

Building up biological research

But not all of the biologists have clearly defined research schedules. Many are now involved in detailed discussions on research required to assist agricultural development. Their views are as varied as their backgrounds, many having received their training in foreign countries. Most were trained in the Soviet Union, others in Eastern Europe, China, France or West Germany.

Dr Phan Thanh Luu, the only truly qualified biochemist at the Vietnam Scientific Research Centre in Hanoi, spent seven years in West Germany the last four of which were at the Max Planck Institute. On completion of his degree Luu was offered new research posts in Germany and the United States. He opted instead to return to Vietnam. Luu is one who believes passionately in the future of science in Vietnam. For him there was no dilemma involved in sacrificing a promising research career in the West and returning to help build biological research in Vietnam. He has no illusions about the difficulties faced by the biologists. He says: "We have to

General Giap, soldier turned scientist: "If the army could rise to the occasion, then surely the scientists can do the same".

Final part of Alastair Hay's series from Vietnam.

design a programme of research which will improve the efficiency of our agriculture. Unfortunately we don't all have the necessary experience, so it is no easy task". Luu maintains that in the immediate future better irrigation and the use of fertilisers could greatly improve crop yields. "So we are talking about research work that will only have an impact ten to fifteen years from now".

An obvious candidate for research is the floating fern *Azolla pinnata*. This is an important source of green manure and fodder for pigs, supplying about 20% of their protein requirements. In combination with a symbiotic blue-green alga (*Anabaena azollae*) it fixes nitrogen and for this reason is used as manure for rice. The crop grows readily in cool weather and about two-thirds is cropped weekly in winter. Maintaining a supply of fern over the hot summer as "seed" for the next season is still a problem. At one time the technique of doing this was jealously guarded from women in case they married outside the village and in passing on the knowledge ruined a valuable source of income from the sale of the "seed".

Luu acknowledges that research on *Azolla* is of considerable importance. Little is known about the biochemistry of ferns generally according to Professor N. W. Pirie, formerly of the Rothamsted Experimental Research Station in the UK, so a study of *Azolla* would be "an essentially Vietnamese matter". This is the kind of research which the government would finance readily.

Even if the biologists can justify their claim for more immediate funds and the government complies with their request there will still be a limit to the support the country can provide. The use of radioisotopes in research is something many biologists desire. But the technique requires a regular source of material and scintillation counters to perform the measurements.

This kind of equipment is simply out of the question at the moment. It might not have been so unrealistic had the United States not destroyed the one nuclear reactor in South Vietnam at the Atomic Energy Centre in Dalat 150 miles north-east of Saigon. When Dalat was in imminent danger of being cap-

tured by Communist forces in March 1975 the Pentagon acted swiftly to dismantle the reactor. US scientists were flown to Dalat to remove the reactor core and dynamite the buildings. The Pentagon justified its action on the grounds that the North Vietnamese would use the reactor for the manufacture of nuclear weapons. Yet the North Vietnamese insist that the Dalat reactor was designed for peaceful purposes. This is confirmed by a 1968 UNESCO publication on 'Science and Technology in Asian Development' which states that the reactor provided radioisotopes for use "in agriculture and medicine". Unless the function of the Atomic Energy Centre had seriously altered since 1969, many observers feel that there was little justification for the Pentagon action.

Discrimination against scientists

The Pentagon was not alone in voicing its fear about what would happen to South Vietnam when the Communists took Saigon. Many other governments expressed anxiety for the safety of residents in the city. But when it was realised that their lives were not in jeopardy a new fear rose like a phoenix to take its place: the fear of discrimination against those who supported the former president of South Vietnam—Thieu—either directly or tacitly.

The issue of discrimination against intellectuals and scientists was one I raised with Dr Tran Tri of the State Committee for Science and Technology. Tri is the scientist in charge of scientific relations with western countries. Tri admits that discrimination against intellectuals is a complicated social problem. "We have no difficulties with intellectuals in the North" he says, "but in the South there are two problems". According to Tri there is a class of intellectuals simply not prepared to work and another section anxious to return to their jobs but who are underemployed. "The first class" says Tri, "had a high standard of living under the previous administration and we are simply unable to maintain them in the standard to which they were accustomed so they are not willing to work for us. The other group of intellectuals including most of the scientists do want to share difficulties. In the South this is a period of transition. It is not a problem of freedom or discrimination; if people want to work they can."

Vietnam is still an underdeveloped country and as such cannot invest funds in many fields of science, Tri insists. "But our government" he continues, "tries to create facilities to enable scientists to work. We do not have enough rice to feed people yet we have built a new scientific centre—

the Vietnam Scientific Research Centre in Hanoi. Admittedly it is not well equipped, but we are trying hard for we think science is so important."

As for the universities in the south, all are open, says Tri. He adds that most of the research institutes have resumed working, and the scientists are being paid on a similar scale to those in the North. But salaries were not the only issue. According to some scientists, research institutes in the south did have a difficult period following the fall of Saigon in April 1975. In many cases 'political cadres' were appointed as temporary supervisors and scientists were under an 'air of suspicion'. However, with the gradual lessening of tension in Vietnam and the government's encouragement of a policy of 'reconciliation' this no longer seems to be an issue of great concern to scientists.



After the war: rebuilding begins

Prior to 1975 the majority of university graduates in South Vietnam were students of the social sciences or the arts. This is a pattern of education which has crippled the development plans of many third world countries. It is a state of affairs in Vietnam which will be changed. According to government sources much greater emphasis will now be placed on the teaching of science and engineering in the universities of the south.

Testimony to French presence

It would be wrong to discuss biology in Vietnam without referring to the National Institute of Hygiene and Epidemiology (IHE) in Hanoi. Standing in beautiful gardens the institute buildings are a lasting testimony to the French presence in Indochina. Buildings were designed for the comfort of French administrators. As such, they are ideally suited to house one of Vietnam's most impressive institutes.

When the IHE's function was explained by the Director Dr Hoang Thuy Nguyen it was easy to see why it was so well equipped. With the help of three sister institutes in the south in Saigon, Dalat and Nha Trang the IHE can supply enough freeze-dried

vaccines to meet the needs of the whole country. According to Nguyen they produce vaccines against "smallpox, tuberculosis, cholera, tetanus, diphtheria, whooping cough, leprosy, polio, rabies, encephalitis B and measles."

Nguyen's deputy Dr Trach has been involved with vaccine culture for many years. He says that "during the war we had a shortage of the vaccines for diphtheria and tetanus toxins, but for the others we had enough for the whole population". In the war years some sections of the institute were evacuated to the forests where according to Trach, vaccines were produced in equipment on a "smaller" scale. "This was much more expensive" says Trach "but we consider mass vaccination programmes to be one of the best methods of preventive medicine".

There is some doubt in Western medical circles about the usefulness of cholera vaccine as a preventive measure. Trach acknowledges this doubt but insists that the Vietnamese have found that cholera vaccination followed by booster doses every six months is an effective form of prevention. He adds that "improvement of hygiene" is obviously the best method of combating cholera, but that this takes "time and money". Immunisation is a way of doing this more cheaply as an interim measure.

With hygiene an important component of the IHE's work it is hardly surprising that it has pioneered a cheap, efficient latrine which enjoys widespread use in the countryside and is seen by many international aid agencies as ideal for many developing countries. It is simple in design, has separate channels for the collection of urine and faeces and makes use of a double septic tank. When the faeces tank is full, it is sealed to permit anaerobic degradation of bacteria after which the contents provide an important source of fertiliser. According to Nguyen they use the destruction of the "poliomyelitis virus as an index of measurement to determine how long the tanks should be sealed".

The IHE receives considerable financial support from the United Nations Children's Emergency Fund and for that reason it is one of the best endowed institutes in Vietnam. But the IHE, like many other research institutes in the country is really only at the beginning of its scientific development. Vietnam's scientists face tremendous obstacles before they can feel truly confident about the future. But given better harvests, the renowned resourcefulness of the Vietnamese, the assistance of the world scientific community, Vietnam will soon be making her own unique contribution to scientific knowledge. □