logy (ICGEB), which has overlapping interests. But the intention is that this half-laboratory (the other half is at Trieste, Italy) should move into a new building nearby when that is completed next year.

For practical purposes, the Delhi component divides its effort between problems concerned with human health and those of plant breeding by genetic manipulation. One of its functions is to provide training courses for people from the developing world, but there is also an international staff.

Like others, the laboratory is excited by the recognition that the form of hepatitis known as 'non-A, non-B' is often, in south Asia, a distinctive microorganism now known as hepatitis E. This accounts for 40 per cent of the cases occuring in India, but already there is evidence that very different strains are prevalent on the two coasts of the Bay of Bengal.

In relation to hepatitis-B, the laboratory has already made some progress towards the cloning of a multi-segmented peptide consisting of several peptide segments recognised as antigenic epitopes. Now it plans to clone the whole genome of hepatitis-E so as to identify the antigenic elements. At the same time, it is working up diagnostic tools for distinguishing between the various infectious forms using PCR techniques.

Technically, the UNIDO laboratory is simply an international laboratory (or half of one) that happens to be based in India. In reality, with the coming and going of people from overseas, it is bound to be of great value to an enterprising research community that is both scattered within India and more isolated from the rest of the world (by diffidence as much as time zones and the cost of travel) than it cares to think.

The Indian community of those seeking to apply modern biology to India's public health problems is substantial and, now, robust. Apart from the government laboratories, many of the universities and indepedent research institutes have much to contribute. But the CSIR laboratory, the Centre for Cellullar and Molecular Biology (CCMB) at Hyderabad has a pivotal role, perhaps not yet explored.

The laboratory has a strange (and recent) history. The idea was that of Dr Pushpa Bhargava, originally a member of the regional laboratory at Hyderabad, now renamed the chemical technology laboratory. Over a period of ten years, Bhargava fought the bureaucracy for a general purpose laboratory encompassing molecular biology and biotechnology. But under his successor as director, Professor D. Balasubramanian, the laboratory has become a research laboratory as much concerned with basic as with applied research.

Between them, the members of the laboratory have interests in most of the quickly moving fields of molecular biology, from gene transcription to genetics. There is even a substantial theoretical interest. But the laboratory also reckons to produce a steady stream of practical benefits — improved fish feed and even genetically improved fish, for example, as well as the materials for an Indian DNA-fingerprinting system.

Even so, CCMB is less likely than other CSIR laboratories to be able to raise 50 per cent of its expenditure from outside sources by 1996, as Delhi has decreed. Indeed, Balasubramanian has difficulties even now in paying the laboratory's electricity bill. The question not yet answered is whether this laboratory should be recognized as a national source of modern expertise (and of trained people) for a still evolving national research network in molecular biology. Meanwhile, Bhargava sulks in his tent, embarrassingly nearby, saying that his dream has turned to dust and ashes.

The Institute of Microbial Technology (known as IMTECH) at Chandigarh will have none of these difficulties. One of the two institutions run by the Department of Biotechnology (the other is the NII), the laboratory began life in 1984 in an empty industrial building with staff recruited from the distinguished Drug Research Institute at Lucknow. Now it houses India's Microbial Type Culture collections, and is distinguished by the substantial pilot-plant fermenters it operates in the national interest.

One of the biotechnical ventures already in commercial use is a process for producing alcohol more efficiently from molasses, the standard raw material in India. The trick has been to breed a strain of yeast that is tolerant both to high sugar concentrations in the starting material and to high alcohol concentrations in the product. Although the savings consist largely in the cost of energy for operation fermentation process, they appear to be substantial enough to have persuaded alcohol manufacturers to take them seriously. □

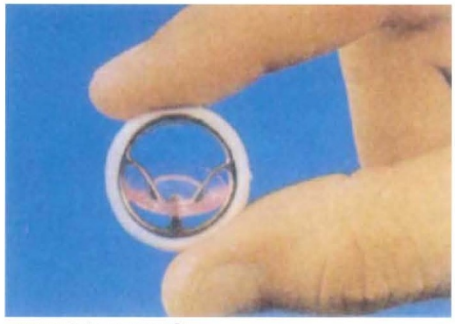
A valve that could do good

WILL India become the world's chief source of artificial valves for the human heart? There is at least a chance of that. Everybody who knows about this invention believes it will win an important place for itself in surgical practice. The National Research Development Corporation, which has acquired the rights in the invention from the Sree Chitra Tirunal Institute at Thiruvananthapuram, has already licensed TKK Pharma in Madras to make 10,000 valves a year. Enquiries about licences from outside India are, for the time being, being politely shelved.

N. K. Sharma, the corporation's managing director, is lyrical about the outlook. The essence of the advantage of the Indian valve is its cheapness. Valves imported into India cost Rs100,000, but the Indian equivalent costs only Rs2,500. The trick is the simplicity of the device, which consists of a specially manufactured disc of polyethylene oscillating in a circular aperture.

Materials scientist Dr S. Ramaseshan, previously director of the Indian Institute of Science at Bangalore, but now at the Raman Institute, is one of those consulted in the search for ways of ensuring that the polymer discs would be free of roughness even on a macromolecular scale, which would stimulate precipitation of macromolecules from the blood and perhaps even clotting. But Ramaseshan says that it has taken even greater ingenuity to enclose these discs in their titanium cages.

The immediate plan is to produce 10,000 valves a year at Madras, testing one in ten in dogs to establish reliability.



Promising much.

Sharma points out that even that production rate is a small proportion of the number of people in India with heart valves damaged by rheumatic fever, which affects an estimated 100,000 children a year.

In a sense, the marketing of these devices will be a crucial test of India's claim on technological prowess in the modern world. So far, its importance seems to have been fully appreciated. Sharma's people have given themselves the coming year to prove to themselves that their manufacturing methods do indeed produce reliable valves, and whether themselves to apply for regulatory approval, or alternatively to let licensees take on that chore.

It is generally agreed that a reputation for unreliability in manufacturing must either be avoided (by licensing a good idea) or met head-on, by indigenous manufacturing of reliable products. If all goes well, the Thiruvananthapuram heart valve could well make India's NRDC as prosperous in the 1990s as the cephalosporins made its British namesake in the 1960s. □