



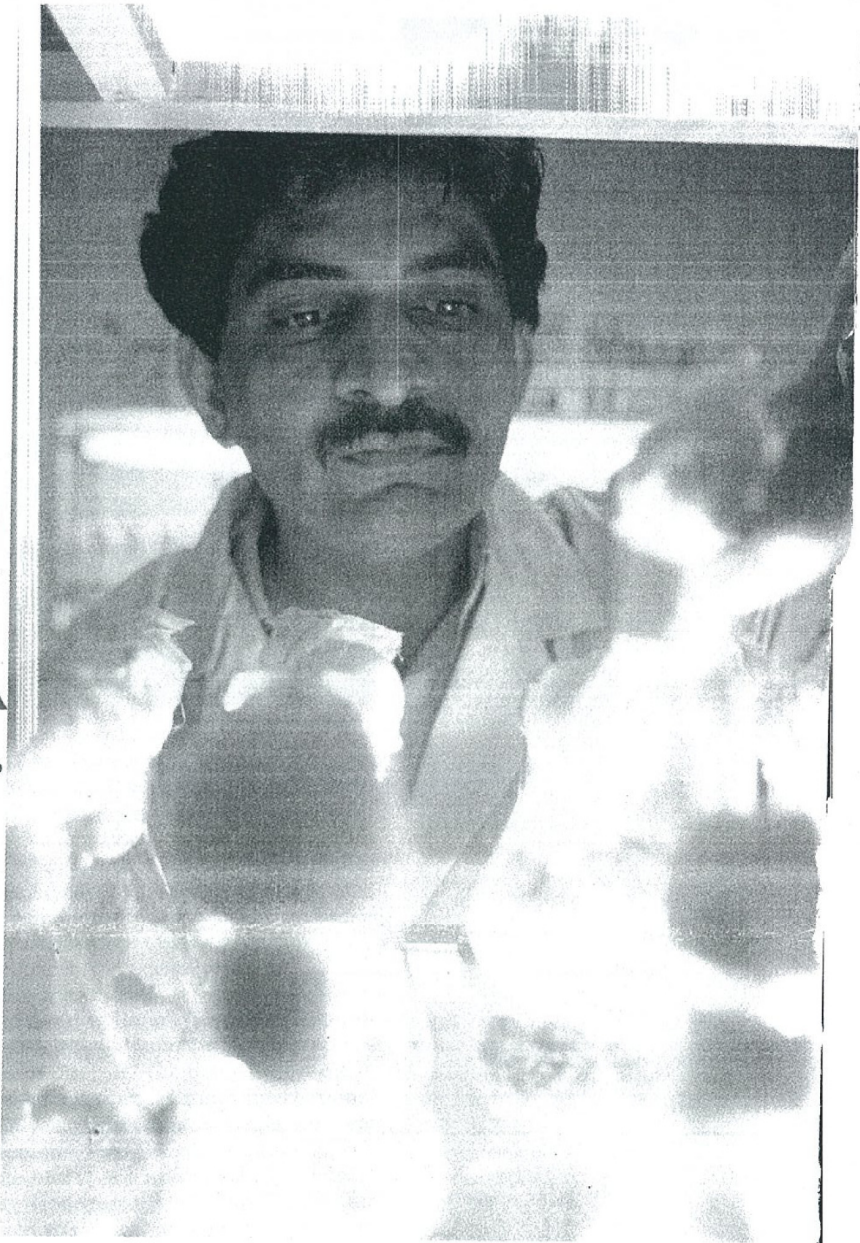
AN
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SUPERPOWER

Storm In A Beaker

The biggest experiment underway at India's government laboratories is their own transformation from sleepy outfits to commercially-savvy research crucibles.

BY SAHAD P.V.

VIVAN MEHRA



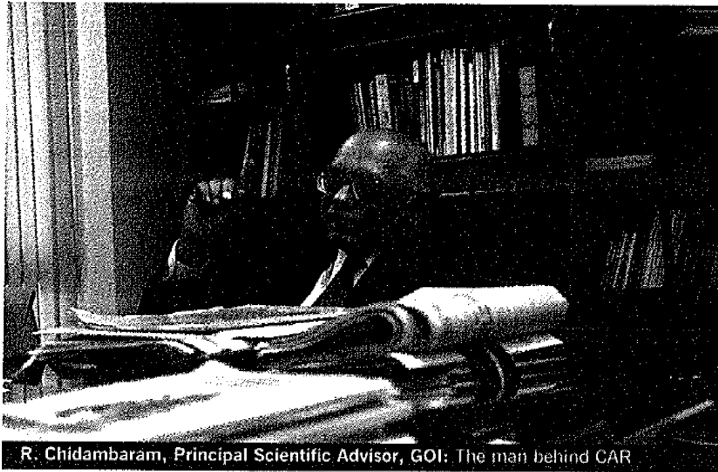
A new liquid crystal display (LCD) device with higher contrast ratio, symmetric and wide viewing angle features, and with a new driving scheme that runs on ~9 V direct current (trials are on to reduce voltage to 3 to 5 V).

A portable PC-based software for bioinformatics, called Biosuite, which will run on a variety of platforms including PCs.

A cost-effective Simple Office Computing (SofComp) platform to replace PC for day-to-day office work, and priced at between Rs 10,000 and Rs 26,000.



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R. Chidambaram, Principal Scientific Advisor, GOI: The man behind CAR

For a government lab, that may be a totally new language to speak, but it is fast becoming vox majority. For example, the National Chemical Laboratory in Pune has geared up for the product patents regime beginning 2005, by investing in a new combinatorial chemistry lab that will help discovery in drugs and agro-chemicals. Ranbaxy and Reliance Life Sciences are already using the facility. Says S. Sivaram, Director, NCL, which files the largest number of patents for any laboratory in India: "We are moving towards the backend of research for industry, an area where we can simply add value without getting into process execution."

Ditto Centre for Cellular and Molecular Biology at Hyderabad. Set up in 1977 to emulate the work being done at the pioneering Edinburgh University in the UK, CCMB did not have a single patent in its name up until 1996. Then, Lalji Singh took over as director. The first patent came in 1997, and since then the Centre has racked up 14 more international patents. Says Singh: "Till a couple of years ago, research used to be done for its own sake. Even scientists were not aware of the commercial potential of some discovery." To make sure that it never becomes an issue again, Singh has set up a marketing department that actively scouts for commercial opportunities for the centre's discoveries.

Marketing is something the defence ministry's research arm, Mishra Dhatu Nigam Ltd (or Midhani) in Hyderabad has started doing too. It not only "direct markets" its technologies, but also has an understanding with the Armed Forces Medical Service (AFMS) for development of indigenous bio-medical implants. The commercial potential of some of Midhani's technologies is immense. For instance, over the last 10 years, it has come up with at least half-a-dozen breakthrough products, including polio boots, Kalam-Raju stent (for use in angioplasty), pacemaker, titanium-based dental implants, and computerised cardiology equipment. Some of the products have already reached the market via industrial partners. But in others, the monetary potential remains untapped. Still, that's changing says Rahul Bajaj, Chairman, Bajaj Auto: "I am glad that the focus of research in India has changed from basic to commercial."



● **Centre for Cellular and Molecular Biology, Hyderabad**

DIRECTOR: Lalji Singh

NO. OF SCIENTISTS: 78

NO. OF PATENTS: Filed for: 16 overseas

ANNUAL COMMERCIAL INCOME: Rs 8.5 crore

BREAKTHROUGH: Developed DNA fingerprinting in 1998 and a DNA marker for hybrid seeds in 2001.

● **Centre for Development of Advanced Computing, Pune**

DIRECTOR: Sharad Purohit

NO. OF SCIENTISTS: 1,800

NO. OF PATENTS: 12

ANNUAL COMMERCIAL INCOME: N/A

BREAKTHROUGH: Has developed a network for super computing, and weather forecasting and climate modelling software.

● **Centre for DNA Fingerprinting and Diagnostics, Hyderabad**

DIRECTOR: Seyed Hasnain

NO. OF SCIENTISTS: 14

NO. OF PATENTS: 10

ANNUAL COMMERCIAL INCOME: Rs 10 crore

BREAKTHROUGH: Early intervention technique for primary congenital glaucoma, and three new high yielding hybrid varieties of silk worms.

● **Indian Institute of Chemical Technology, Hyderabad**

DIRECTOR: K.V. Raghavan

NO. OF SCIENTISTS: 250

NO. OF PATENTS: Filed for: 1,000 India; 400 Overseas

ANNUAL COMMERCIAL INCOME: Rs 15 crore

BREAKTHROUGH: Joint research with Toyota for chemicals used in special solar devices, which would convert solar energy into electrical and other forms of energy.

● **Indira Gandhi Center for Atomic Research, Kalpakkam**

DIRECTOR MATERIALS AND CHEMICALS:

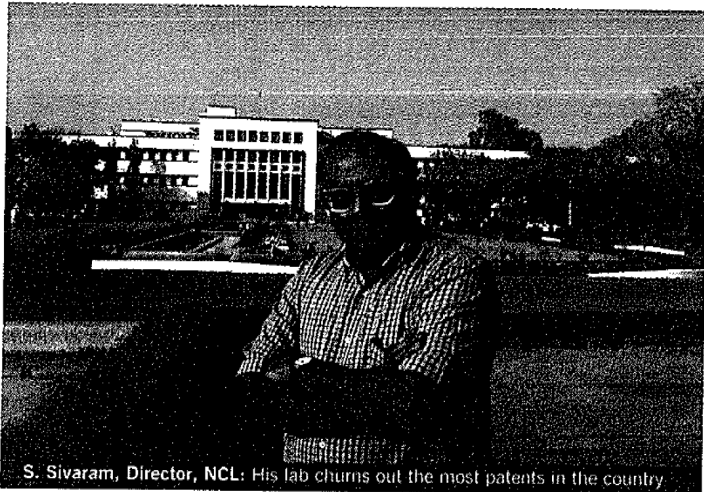
Baldevraj

NO. OF SCIENTISTS: 1,100

NO. OF PATENTS: Filed for 20 in India

ANNUAL COMMERCIAL INCOME: 20 per cent of the budget (Not quantified)

BREAKTHROUGH: Building country's first Fast Breeder Reactor with a capacity of 500 MW



S. Sivaram, Director, NCL: His lab churns out the most patents in the country

DIVYASO HSTINI

Bajaj should know. In April 2003, the auto industry and the government (rather, R. Chidambaram, Principal Scientific Advisor to the Government of India) joined hands to set up a Core Group on Automotive R&D (CAR). The only industry-government collaboration of its kind, CAR (it has big auto companies, including Bajaj's, and government research institutions as members) will drive fundamental research in six high-tech areas of automotive engineering: embedded systems, telematics, hydrogen energy, advanced materials, safety and recycling of auto systems and parts. Each area has a six-member panel that will come up with a research roadmap by mid-January 2004. Says Chidambaram, CAR's driving force: "Industry is going to need more and more Indian R&D." Adds Pawan Goenka, COO (Automobiles), M&M: "The idea is not to reinvent the wheel, but to develop technologies that are suited to Indian conditions."

Another role that CAR hopes to fulfil is of coordinating research taking place at various universities and government labs. For instance, there's a lot of research being done on hydrogen fuel at the Banaras Hindu University and IIT Madras, besides which companies like IOC and SPIC Foundation are doing work on the production end. But none of it adds up to much because of a lack of coordination. CAR expects to develop at least 1,000 hydrogen energy-run vehicles by 2008.

NMITL too has a keen eye on goals. It currently has 25 projects involving 50 industry partners and 150 R&D institutions. One of the projects is for developing a bioinformatics software called Biosuite, where TCS is the lead industrial partner to a consortium of 21 research institutions, that hopes to hit the market early 2004. Says Mashelkar: "We are looking at a new Indian industry. An industry that has moved from reverse engineering to forward engineering." Adds Mangal Rai, DG of Indian Council for Agricultural Research: "Industrial context is changing while the research community is responding to that change."

That may just be the scientific renaissance a resurgent India needs. ■

ADDITIONAL REPORTING BY VENKATESHA BABU
AND PRIYA SRINIVASAN



• **Institute of Genomics and Integrative Biology, Delhi**

DIRECTOR: S.K. Brahmachari
NO. OF SCIENTISTS: 40
NO. OF PATENTS: 18 India; 15 overseas
Filed for: 30 India; 70 overseas
ANNUAL COMMERCIAL INCOME: N.A.

BREAKTHROUGH: Developed vaccine for Anthrax and identified mutation of gene responsible for schizophrenia.

• **National AIDS Research Institute, Pune**

DIRECTOR: R.S. Paranjape
NO. OF SCIENTISTS: 15
NO. OF PATENTS: None
ANNUAL COMMERCIAL INCOME: Rs 3.5 crore

BREAKTHROUGH: First in India to establish a bank of HIV strains acquired from different parts of the country.

• **National Botanical Research Institute, Lucknow**

DIRECTOR: P. Pushpangadan
NO. OF SCIENTISTS: 100
NO. OF PATENTS: 45
ANNUAL COMMERCIAL INCOME: Rs 12 lakh

BREAKTHROUGH: Developed herbal lipstick, which alters mood and mental perception, and an especially designed garden for the visually impaired.

• **National Centre for Biological Sciences, Bangalore**

DIRECTOR: K. VijayRaghavan
NO. OF SCIENTISTS: 120
NO. OF PATENTS: N.A.
ANNUAL COMMERCIAL INCOME: N.A.

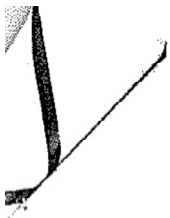
BREAKTHROUGH: Has helped fight cervical cancer caused by papilloma virus.

• **National Institute of Pharmaceutical Education and Research, Chandigarh**

DIRECTOR: G.L. Kaul
NO. OF SCIENTISTS: 75
NO. OF PATENTS: Filed for: 57 India; 10 overseas
ANNUAL COMMERCIAL INCOME: Rs 3 crore

BREAKTHROUGH: The first government institute in India to be involved in impurity profiling of active pharmaceutical ingredients.

COMPILED BY SUPRIYA SHRINATE



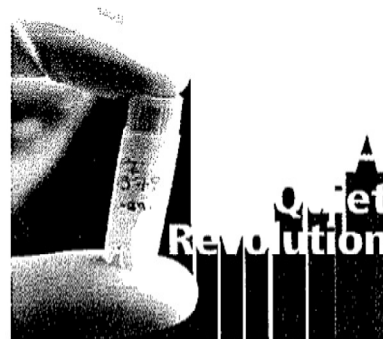
GUESS WHO'S WORKING ON BRINGING THESE NEW TECHNOLOGIES to shop shelves? Sony? No. Philips? Wrong. Samsung? Wrong again. It is the Department of Scientific and Industrial Research, a government of India establishment. Or to be more specific, it is the New Millennium India Technology Leadership Initiative (NMITLI), which the department has set up with the specific goal of achieving global leadership—as against catching up—in select technology areas by leveraging the skills of government labs, industry, and universities.

Even up until the mid-90s, expecting a government lab to have a commercial mindset would have been akin to almost insulting them. After all, the old argument held, science must be pursued for the sake of knowledge, and not the commercial patent or intellectual property that it creates. Fortunately for the labs and India, the argument has died a sudden death. Most of the forward-looking government labs realise that a breakthrough that has no commercial potential is no breakthrough at all. Ergo, NMITLI's efforts to develop an affordable PC.

No other government agency symbolises this profound transformation better than the Council of Scientific and Industrial Research (CSIR), which runs a network of 38 labs, including the famous National Chemical Laboratories, Pune, and the Centre for Cellular and Molecular Biology of Hyderabad. Until Raghunath Anant Mashelkar—who incidentally is also the man behind NMITLI—took over in June 1995, CSIR was your average government outfit. While it did have some superlative scientists, it lacked a commercial focus, did not have a deadline orientation, and was bound down by obsolete rules and regulations. Over the last five years, Mashelkar, who is CSIR's Director General, has roped in more than 1,000 scientists and researchers, done away with inflexible and uninspiring rules, and allowed his colleagues to move into the marketplace rather seamlessly. In fact, 40 per cent of CSIR's net income goes to its scientists. "Science that works in isolation is rather useless," quips Mashelkar.

That also means patenting ideas. Until Mashelkar arrived on the scene, CSIR only filed for a dozen or so international patents every year. But last year, it pocketed 189—the highest for a single organisation among the 150 countries that form the Patent Cooperation Treaty under the World Trade Organisation (it tied with Samsung). But it's not as if Mashelkar is on a patent shopping binge. Rather the idea is to not let up on commercial opportunities for a lack of patenting discipline. Says Tarun Das, DG, CII: "People like Mashelkar have brought a new meaning to scientific research."

Even vintage CSIR labs have benefited from Mashelkar's new broom. Consider the Central Drug Research Institute (CDRI), one of the oldest labs set up in 1948. For most of its history, CDRI researched only on family planning, *kala azar*, and a bit of malaria. Mashelkar, however, encouraged it to focus on newer areas such as osteoporosis and lifestyle-related diseases like diabetes. In 1999, the Centre joined hands with Danish drug major Novo Nordisk on a diabetes drug, which is entering the second phase of clinical trials, which involves testing the drug on a larger sample of patients. It will get milestone-linked payments (anywhere between \$13 and 15 million, or Rs 59.80-69 crore), and a 3 to 7 per cent royalty once the drug is marketed. CDRI, which now boasts of state-of-the-art equipment like high throughput screening machines, is even game for a risky play in joint development of drugs. Says the Institute's Director, C.M. Gupta: "I will not give away the molecule. We will share the profit and loss."



Contrary to popular perception, breakthrough-and commercialisable-research is happening at a lot of government labs. Here's some evidence:

• **Central Drug Research Institute (CDRI), Lucknow**
 DIRECTOR: C.M. Gupta
 NO. OF SCIENTISTS: 180
 NO. OF PATENTS: Filed for: 230 overseas, 370 India
 ANNUAL COMMERCIAL INCOME: Rs 10-13 crore
 BREAKTHROUGH: Pioneered robot-assisted technique to make large number of chemical compounds in a very short period of time.

• **Central Food Technological Research Institute, Mysore**
 DIRECTOR: V. Prakash
 NO. OF SCIENTISTS: 300
 NO. OF PATENTS: Filed for: 654
 ANNUAL COMMERCIAL INCOME: Rs 8 crore
 BREAKTHROUGH: Introduced the technology for instant convenient food in India.

• **Central Institute of Medicinal and Aromatic Plants, Lucknow**
 DIRECTOR: S.P.S. Khanuja
 NO. OF SCIENTISTS: 100
 NO. OF PATENTS: 100 International; 40 India; Filed for: 200
 ANNUAL COMMERCIAL INCOME: Rs 4 crore
 BREAKTHROUGH: Produced two varieties of high yielding menthol, Himalaya and Kosi; developed a plant-based malaria drug, Arimisin.

• **Central Leather Research Institute, Chennai**
 DIRECTOR: T. Ramasami
 NO. OF SCIENTISTS: 131
 NO. OF PATENTS: Filed for: 70
 ANNUAL COMMERCIAL INCOME: Rs 10 crore
 BREAKTHROUGH: Has helped shift to bio-processing instead of chemical treatment.

