New UV laser focuses on single cells

A chance meeting of minds between two laser physicists on opposite sides of the globe has resulted in the invention of a new type of ultraviolet laser.

The physicists—One from Monash University and the other from a physics institute in Hungary—are now perfecting the laser for potential applications as diverse as inscribing ultrafine circuits on computer chips and performing laser 'surgery' on individual cells.

Dr Rod Tobin, of Monash's Department of Physics, and Dr Karoly Rozsa, of the Hungarian Academy of Sciences' Research Institute for Solid State Physics in Budapest, each had been working on separate research projects to develop such a laser.

In fact, both researchers had foreseen its potential applications and were directing their research efforts to meet the commercial demand. Working together last year for just a few months at a time in each others' laboratories was the catalyst for their collaborative success.

Until now, the systems used to generate ultraviolet laser beams have been relatively expensive and complicated. The beauty of the new laser tube is its low power needs, low cost and long life.

Exploiting a known scientific principle, it can produce a highly focusable beam in the 200- to 300-nanometre ultraviolet range, just beyond the wavelength of visible light. This makes it suitable for a wide range of uses in biological science and technology.

"For a lot of applications, such as irradiating single cells, you don't need a high-powered beam, just a fine focus," Dr Tobin explained. "It works the same way as a magnifying glass focusing the warmth of sunlight into a very hot, bright spot.

"At wavelengths of uv light shorter than 250 nanometres, dna in living cells can be damaged; it is possible that our laser could be used to perform very small-scale surgery on pieces of dna.

"I became interested in the potential of uv lasers in absorption spectroscopy. The proteins strongly absorb ultraviolet light, and the fraction of the transmitted radiation can be used to measure the quantity of protein. "Existing devices use a mercury-vapour lamp, but it's an incoherent light source that can't be focused to the same degree as a laser. To measure protein in minute concentrations you must have a focused, stable light source of uv light. Our laser should provide that."

The laser could also be used in a technique known as immuno-fluorescence, in which mercury-vapour lamps are currently used to detect antibodies binding to cells. The antibodies, tagged with fluorescent dyes, show up under light of varying wavelengths (see background of picture at right for an example).

The very fine focus of the laser also makes it potentially suitable for photolithography to produce microelectronic circuits. A microcircuit is chemically etched from a surface covered with a light-sensitive material called photo-resist. The lines of the circuit are cut into a mask, and light is shone through the mask to expose the material.

As microcircuits have continued to shrink, manufacturers have moved to shorter wavelengths of visible light. Blue light is currently used, but finer circuits will require ultraviolet wavelengths. At this end of the light spectrum, any blurring of the beam can cause the exposure of the photo-resist to smear, resulting in a defective circuit.

Monash is considering applying for a patent for the Tobin-Rozsa laser. Already, an Australian company has expressed interest in commercialising the design.

"Normal research grants support the development of the science of an original concept, but to develop a commercial prototype will require additional investment," Dr Tobin said. "With adequate funds, we believe we could be ready for production in three years," he said.

Research liftout: A chance collaboration
Science takes CRC honours

Monash has been granted funds for six new Cooperative Research Centres (CRCs) in the third round of Federal Government grants to promote links between industry and universities.

The university dominated the round, in which 18 centres were funded. About $35 million will be spent on the new centres - four in the Faculty of Science and two in the Faculty of Engineering - next year.

In the second round announced early in 1992, the Engineering faculty was awarded $11 million for five centres. Over seven years, funding is expected to total $255 million.

The six new centres (see box) will undertake research in southern hemisphere meteorology, Australian geodynamics, freshwater ecology, international floriculture, new methods for power generation and telecommunications network technologies. The Dean of Science, Professor Ian Rae, commented that in addition to directing four centres, researchers from the faculty also were involved in the power generation CRC.

"The success of the faculty in competitive schemes emphasises not only the quality of its staff and their research proposals, but also the maturation of government plans to divert money from recurrent funding of universities into competitive schemes," he said.

"Thus, science finds itself having to reduce staff numbers to meet its recurrent budget at the same time that its leading scholars are granted access to substantial grant funds."

He said that following the faculty's success with large grants, in which science staff were awarded $894,500 in initial and competitive renewals (32 per cent of the Monash total), several proposals were funded under the ARC Mechanism B and C grants. Science also gained two of the three grants under the new Committee for the Advancement of University Teaching scheme.
Pilot project to tackle uni places shortage

VCE students will be given the chance to take first-year university subjects under a new pilot project launched by Monash.

The university has introduced Year 13, which allows students who miss out on tertiary places to study first-year university subjects, including those offered through Open Learning, at school.

The project, which has received a $14.6 million grant from the Department of Employment Education and Training (interim Reserve Fund), will involve nearly 1000 students at more than 20 schools this year. An expanded program will operate in 1994. Swinburne University of Technology will receive $1 million for its pilot program.

According to Deputy Vice-Chancellor, Professor Robert Pargetter, the pilot project offers Year 12 school leavers a great opportunity to study tertiary subjects.

"The project eases the pressure off Year 12 school leavers to repeat studies and provides students with guaranteed credit transfers into degree courses," Professor Pargetter said. "Year 13 increases the options available to school leavers and students who have missed out on places, and is an incredible opportunity to give them a head start in university studies.

"Monash will assist schools to develop support schemes for year 12 leavers who wish to access tertiary education through Open Learning," he said.

Under the Monash plan, students who successfully complete Open Learning subjects, will receive credit transfers if they enrol at a university or TAFE college.

Monash will provide a range of support services to assist schools, including briefing sessions for each Open Learning subject offered, study materials, teaching staff development programs, regular school visits to advise students on credit transfers and future pathways, as well as undertaking research and evaluation of the project.

"Schools taking part in the Year 13 project who choose not to charge student fees (apart from the Open Learning charges) will be provided with financial assistance to cover establishment and teaching costs, and to improve library and computer facilities. Monash has guaranteed that up to 100 places in the Bachelor of Arts will be available in 1994 for Year 13 students who successfully complete relevant subjects. More students than this may be admitted."
A unique agreement between Monash and the University of New South Wales will have a significant impact on research, teaching and international activities.

The Vice-Chancellor of Monash, Professor Mal Logan, said that both universities had a similar history, extensive research skills, ethnic diversity among students and staff, and were major players in the education of overseas students.

Between them, the two universities would also be able to present, where appropriate, a joint voice on matters relating to research, the quality of teaching and international activities.

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Becalmed in a sea of hectic activity

More than 8000 new Monash students will taste the calm before the study storm during Orientation Week.

Five days of orientation activities, beginning on Monday 22 February, have been planned for the university’s Clayton, Caulfield, Gippsland, Frankston and Parkville campuses.

The chairman of the joint orientation program committee, Dr Ian Ward, said Orientation Week filled a vital role within the university community. “Monash offers one of the largest student introduction programs within Australia, and is the first university to offer first-year student camps and student guides,” Dr Ward said.

A feature of the week-long program is the diverse range of displays and activities planned by the clubs and societies, supported by academic information sessions, a host scheme and guided tours. Activities include boating on the Yarra, picnics, and weekend camps at Somers and Torquay.

“The diversity of events planned for the program is enormous and includes cultural, sporting, and academic activities,” Dr Ward continued. “Parkville Orientation Week captures the spirit of Monash and the diverse range of displays and activities that students will be given an overview of the campus and a bus tour of the local area. The Pharmacy College, which is taking part in Orientation Week for the first time, will offer tours of the Parkville campus, picnics, river cruises, and boating at Studley Park. Frankston, Caulfield and Clayton campuses will present students with opportunities to tour the facilities and meet staff.

The whole idea of Orientation Week is to make the transition to university life less intimidating,” Dr Ward said. “This emphasis is on having fun and making new friends.” Full Orientation Week programs will be available on each campus.

A decade of economic change

When Professor Gus Sinclair reverted to the role of research professor early this year, it marked the end of a 10-year term as Dean of the Faculty of Economics, Commerce and Management (ECOM).

During Professor Sinclair’s deanship, the faculty has seen many changes. The Bachelor of Commerce, and Bachelor of Accounting degrees have joined the Bachelor of Economics to form a highly regarded set of programs combining economics, accounting and management studies.

The Graduate School of Management, which Professor Sinclair established, has developed into one of the leading programs of its kind in Australia. “This has brought prestige to the university and the faculty,” Dr Sinclair said.

The ECOM faculty has attracted Australia’s leading economic, actuarial and financial management students. The faculty is now a Centre of Excellence for Actuarial Science.

The establishment of off-shore delivery of the faculty’s courses is a particularly exciting development, he says. Since 1989, the first year of the faculty’s undergraduate program, has been taught at Sunway College, Kuala Lumpur. This was a radical development for Monash at the time and has become a model for other projects.

But perhaps the faculty’s biggest change will occur in the middle of this year when Dr Gus Sinclair retires as Dean of the Faculty.

He says the faculty has become more outward-looking.

“We were the first university faculty in Australia to establish a full fee paying overseas students program,” he said. “We were keen to respond to the government initiative because it provided a means of retaining our strong international student market. We are faring very well in this.”

Professor Sinclair attributes the success of his faculty to the strong leadership of the management team, including the first-year deans of the two faculties, who have been appointed by the university’s Sydney-based executive committee. He says, looking to the future, Monash needs to strike a balance between the internal and external environments.

“More than four decades ago, Monash needed to strike a balance between the internal and external environments. It needed to strike a balance between the internal and external environments.”

Law students taste banking

Law students have been going to lunch with Australia’s top banking executives to soak up the ambience of corporate life.

So far, more than 100 law students studying banking and finance have taken part in the full day visits to major commercial banks in the city.

At these visits, groups of about 20 third- and fourth-year students attend lectures given by senior bank managers on the activities and function of each bank and trends for banking in Australia. The students then have the opportunity to meet with the high-ranking executives at an informal boardroom-style lunch.

Associate Professor Wikree Wesserussoe, who teaches the subject of Banking Law, says the visits have considerable value for both the banks and the students. “The students are exposed to the culture of banking,” he said. “It is very unlikely that a university student would normally come into contact with senior bank managers. Most would only meet a bank teller or perhaps their bank manager.”

The bank get a chance to meet with senior students who soon will be practising as lawyers or working in corporate institutions. “They are their potential customers as well as their future employees,” Dr Wesserussoe said.

It was important that students were given experience of the marketplace. "Unlike we do that we are talking technicalities rather than the realities of banking," he said. "They are actually meeting the decision makers so they get some idea of what's happening."

Some students may change their opinion of the banking sector following the visits. “They can now put a human face to the image of corporate banking in Australia, which has recently been taken a heavy dose of bank bashing,” he said. “There are a lot of public perceptions about banking that are generated by the media and consumer groups and it would not be fair for students to leave university without having the chance to make up their own minds.”

The students do an assignment on the bank visits as part of their coursework. “It’s been as well received this year as they try to come for more than one visit,” Dr Wesserussoe said.
Examining anatomy on cue

An interactive computer learning program for first-year medical students has been developed by two undergraduates in the Faculty of Medicine.

As a third-year project, Mr Zeev Duieb and Mr Andre Cornioun set up a system for the study of histology (cell structure) and anatomy. Using high quality colour images, the program probes the students' knowledge and then provides a rating of their performance.

Mr Duieb says the user-computer program updates the current system where students examine histology slides during practical classes and are then assessed on their ability to identify images of tissues projected onto a screen. "With the interactive computer program, which uses questions taken from previous exams, students can test their own knowledge whenever and as often as they like," he said.

"The computer becomes the teacher and the student gets hands-on computer experience. It is now a necessity for medical people to use computers," Mr Cornioun added.

Computer interactive programming is one subject option available to third-year students under the Faculty of Medicine's new curriculum. Supervisor of the option, Professor David Barkla, says this sort of programming hasn't been done before by medical students in Australia.

The main advantage of the program is that a broad range of images -- including photographs, slides, drawings, and those taken directly from a microscope -- can be provided at just one outlet. Mr Duieb and Mr Cornioun transferred the various images onto the program using digital image acquisition techniques.

At present, only one computer in the faculty is running the program but as further resources become available the program will be installed more widely.

Pictured with an on-screen brain section from the interactive program are (left) Professor David Barkla and one of the students who developed the system, Mr Zeev Duieb.

Happiness is a touch screen

Six final-year computing students have made it easier to find out about the Biomedical Library with an innovative touch screen system.

The information service was designed as part of their last major group project. BLIS (Biomedical Library Information Service) provides information on where to find how to use the reference system, catalogues, photocopiers, audiovisual equipment, a telephone or a quiet discussion area.

The system is expected to be most useful at busy times, when library users will be able to access basic information without waiting in a queue.

Students in the group (photo left) were Elly Budishaja, Pedro Gonzalez, Noorali Kherani, Udaya Gammampilia, Priyanka Paramagama, and Deenesh Wicksmale.

Subject librarian Ms Vivien Bernstein says that working with the students was most enjoyable.

"The group was extremely dedicated to the project and spent many hours in developing this helpful system," she said.

"In addition to the final product, they also trained some of the library staff and provided a maintenance manual so that we can update the system when required."

The system is the first in the Monash libraries to use touch screen technology. The Hargrave Library has an information system called HARRI.

A summer of science

Almost 190 students from metropolitan, country and interstate secondary schools last month attended a science summer school at Clayton campus.

The fourth annual school for students beginning Year 10 was organised by the Australian Science Industries Association, Rotary and the Faculty of Science and was sponsored by Siemens. Throughout Australia, more than 2500 students attended 21 similar summer schools.

"We hope that the summer school will introduce them to the breadth and diversity of courses and careers in science," he said. "We believe that if they persist with science at school they will be better able to select appropriate tertiary science courses, leading to careers in science-based areas."

Students attended lectures by Monash academic staff, including Professor Roger Short, Dr Andrew Prentice and Professor Roy Jackson. They took part in hands-on laboratory work and visited university departments, the Telecom Research Laboratories, the Monash Medical Centre and cinema research divisions.

For the first time, school leavers were interviewed for the medical student intake.

More than marks in medicine

Monash's medical students were this year selected on their motivation and their ability to talk to patients, as well as their marks.

"Then comes the HARRI system," Mr Cornioun said.

The interview, conducted by a panel of three people (a faculty member, a Monash medical graduate and a lay person), was often one of the hardest and most enjoyable.

"I hope that the students become comfortable with them, the better."
Australia’s Aborigines were nomads who did not practise agriculture or build permanent dwellings – at least, this is what history and hearsay very different view of how Victoria’s Aborigines lived before the coming of the white man. She has pieced it together by searching through historic records and personal accounts of white people who lived during the century when catastrophic change occurred to a culture that had evolved over 60,000 years.

Her research has shown that Victoria’s Aborigines knew the state’s plants and ecosystems so intimately that they were able to make an easy, almost sedentary living. Certainly, they lived in a sustainable relationship with the land, but it was a land that they had extensively modified over the millennia to suit their own ends.

“Most people have a view of Aborigines as being constant nomads, moving from place to place,” Dr Gott said. “But this image is derived from the desert Aborigines who had to keep shifting because plant and animal resources were sparsely distributed in the arid zone.

“Early accounts from Victoria, for example by William Buckley, an escaped convict who lived with Victoria’s Aborigines, showed that they would stay for several months in one place because the resources were very rich, especially in the western district.

“There was plenty of permanent water – some of the lakes and streams have now vanished – which offered very large numbers of waterbirds, a plentiful supply of eels, lots of small mammals, which have now largely disappeared, as well as vegetable food.

“The western district is the one that I suspect has been most transformed by European settlement; the settlers had an urge to Europeanise the landscape. They hated the bush and they looked on the Aborigines as people who had done nothing to change the environment.”

Dr Gott says she set out to examine what might have happened to Victoria’s ‘bush’ as a consequence of Aboriginal activities before the Europeans arrived.

Contemporary accounts indicate that half their diet consisted of animals, while the remainder was drawn from hundreds of different plants, some of which also served utilitarian purposes. Their staple diet came predominantly from beneath the soil surface: from storage organs such as tubers, bulbs, and corms.

“If you look at the literature, there are a whole series of references to roots as staple foods,” Dr Gott said. “It appears to have been the case for most of south-eastern Australia and the south-west of Western Australia where winter rainfall predominates. The plants grow in winter and flower in spring, and then die back to resting tubers or other underground storage organs to survive the dry summer.

“People with a European mind-set see winter as being the unfavourable season, but for Aborigines it was the time of water scarcity. When you look at small herbaceous plants, you realise that plants rapidly became scarce.

“Moosin Moonin, an Aborigine from the Melbourne area, reported that cattle and sheep had eaten all the murnung around the Merri Creek area within five years of Melbourne being settled. The Aborigines knew what was happening with their food supply.”

Before Europeans arrived, women in dryland areas went out in small parties armed with digging sticks to dig up small tuberous plants. Dr Gott says these plants have a characteristic tendency to grow in clumps if left undisturbed. Women would dig in these patches but leave a number of plants behind and the remaining plants would grow better; a practice similar to a horticulturist thinning out seedlings so that the remainder will grow larger.

The Aborigines also ate large numbers of orchid tubers. Dr Gott and colleagues have conducted an experiment with a small patch of orchid tubers to demonstrate that this is a viable practice. The plants in the patch had re-established their former numbers – obviously from tubers that Dr Gott had missed or by growth into the cleared area.

She says there is evidence that Aborigines knew well to leave some plants to regenerate the dug patches. Neighbouring plants would invade from the edges of cleared areas, others would propagate by seed that germinated in the loosened soil of the patches, and surface litter turned into the soil during digging made the ground more fertile.

In practising this casual form of agriculture, Victoria’s Aboriginal tribes extensively modified the soil over huge areas; early settlers remarked on the very loose nature of the soil and its fine tilth. With the advent of hard-hoofed European grazing animals, the loose soil was compacted, hindering regeneration.

“The combination of loss of soil structure, and competition with alien grazing animals would have had serious effects on the tribes’ food supply.”

Dr Gott says there is also evidence that the Aborigines made extensive use of controlled burns, which had the effect of returning nutrients to the soil in ash, and of creating the extensive tracts of open, grassy box-ironbark woodlands that led Major Mitchell to refer to central-western Victoria as ‘Australia Felix’.

She assumes that Victoria’s Aborigines were using similar practices to those used in south-west Western Australia, where the elders of the tribe supervised the controlled burns. If the fires went in the wrong direction, green branches were used to beat them out.

“It was not a random business; it was informed by people’s knowledge of how the vegetation would respond,” Dr Gott said. “They were very careful not to burn when plants were in flower or seeding. Late summer, when the plants were dormant underground, was probably the optimum period.”

Dr Gott says that after the Ash Wednesday fires at Anglesea in 1983 and other fires that had apparently vanished from the landscape came up in their millions, apparently stimulated by the heat of the fires.

Dr Gott described the plains west of the Grampians being turned yellow by flowering murnung in spring.

“Edward Curr, an early settler in the Burmah area, described how the wheels of drays used to turn these plants up by the bushel,” Dr Gott said. “When Europeans introduced sheep into Victoria, they ate not only leaves, but dug up the shallow tubers and the plants rapidly became scarce.”

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CONTINUED ON RESEARCH MONASH 4
Digging deep for climate clues

In sheltered areas of Victoria's western plains about 100,000 years ago, pockets of rainforest flourished. So why did it die out? Fossil pollen buried in ancient lake sediments could provide the answer and help clarify our understanding of the greenhouse effect.

Deep sedimentary cores from crater lakes in western Victoria are showing that Victoria's vegetation has undergone dramatic changes, even in quite recent prehistory.

Dr Peter Kershaw's recently established Centre for Palynology and Palaeoecology, in the Department of Geography and Environmental Science, has recently extracted some of the deepest continuous sedimentary cores ever obtained from terrestrial sites in Australia.

The cores are from Lake Wangoom, Lake Terang, Pejark Marsh and Yallock Marsh, between Warrnambool and Terang - all extinct volcanic crater lakes. Dr Kershaw says because they are not fed by streams, the crater lakes act as natural rain gauges and the deposited pollen clearly reflects the surrounding vegetation. They are therefore ideal sites for reconstruction of past climate and vegetation.

He says the palaeoecological record preserved in these crater lakes assumes considerable importance as scientists attempt to determine whether human influence on a global scale - the enhanced greenhouse effect - is changing the Earth's climate. Without a record of past climate change it will be difficult to sit out the greenhouse 'signal' from the background 'noise' of natural, climate change.

Dr Kershaw excavated cores from similar crater lakes on Queensland's Atherton Tableland during the 1980s. They provided evidence that humans were deliberately firing the rainforest from about 13,000 years ago, causing its replacement by eucalypt forest. These cores from Lynch's Crater and Strenzkeff's Crater contained a record of climate and vegetation change over two complete glacial cycles - about 180,000 years.

The deepest of the new cores from Yallock Marsh, near Govec, extends 100 metres. Dr Kershaw believes it is likely to span at least three glacial cycles - probably more - and could preserve a record of the past half million years. Several of the other cores appear to go back at least 100,000 years, he says.

Recent evidence suggests that glacial periods occur in rhythm with so-called Milankovitch cycles, caused by long-period variations in the Earth's orbit around the Sun and changes in the tilt of its axis, which variously increase or decrease the amount of heat energy falling on the plane. The Milankovitch cycles follow three basic rhythms which can either counteract or reinforce one another; the longest takes 98,000 years to complete and corresponds to a major glacial-interglacial cycle.

Changes in rainfall and fire frequency drive changes in vegetation patterns which are reflected in the sedimentary cores as variations in the relative frequency of different types of pollen and fern spores; charcoal particles indicate the frequency of fire.

"One of the interesting findings is that we are now sure there was rainforest, at least in patches, on Victoria's western plains," Dr Kershaw says. "Dr Kershaw's own discovery of a similar transition around 130,000 years ago from forest dominated by fire-sensitive Casuarina, to a eucalypt-dominated fire-resistant vegetation. Dr Singh interpreted this as evidence of the arrival of humans - a controversial theory that has gained recent support from Dr Kershaw's own discovery of a similar transition during the preceding penultimate glacial when global sea levels were much lower than at present. Exposure of the extensive continental shelf areas within the Indo-Pacific region would have reduced water gaps between islands and facilitated human migration into Australia."

Dr Kershaw says Australia's palaeoenvironmental record is different from most other places in the world. While there was relative stability for some 300,000 years elsewhere, Australian records show great instability and a pattern of regional or absolute extinctions in plants adapted to wetter climates.

"Something different was happening in Australia," he said.

"The Lake George sediments show an abrupt transition around 130,000 years ago from forest dominated by fire-sensitive Casuarina, to a eucalypt-dominated fire-resistant vegetation. Dr Singh interpreted this as evidence of the arrival of humans - a controversial theory that has gained recent support from Dr Kershaw's own discovery of a similar transition around 130,000 years ago in a marine core extracted from the continental shelf east of Cairns."

The oldest accepted date for human colonisation of Australia is about 50,000 years, from a site in Kakadu National Park in the Northern Territory. Although some scientists consider a doubling of the age of human colonisation unlikely, Dr Kershaw has challenged them to explain how climate change alone could have produced such a transition, when there is no evidence for a similar transition during the preceding penultimate glacial.

"If the Yallock Marsh core yields a fire-driven transition of comparable age to Lake George and the Barrier Reef core, it would be further evidence for a much earlier human habitation of Australia. The 130,000 to 140,000 year date proposed by Dr Kershaw coincides with the penultimate glacial when global sea levels were much lower than at present. Exposure of the extensive continental shelf areas within the Indo-Pacific region would have reduced water gaps between islands and facilitated human migration into Australia."

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"We now have the capacity to look at these regional records in much more detail so that we can investigate the dynamics of plant communities and regional extinctions."
Fit ting in the outsiders

The decision to integrate intellectually handicapped children into normal schools in Victoria provoked much controversy a decade ago. But despite being a subject of worldwide concern, very little research on the effects of integration has so far been done.

When a new Victorian Government in 1983 began integrating intellectually handicapped children into normal schools, the policy was controversial. It is a measure of the complex social issues involved that it still is.

The move, partly a cost-saving measure, was also based on the belief that such children would benefit more from contact with normal children than from being isolated with similarly handicapped children in special schools.

"Nobody specifically said what the aims of integration were," says Associate Dean of Science and Interim Head of the Sub-Faculty of Nursing, Professor Stella Crossley. "The question is: how successful is integration?"

Professor Crossley, of the Department of Psychology, decided to conduct a study to evaluate the results of integrating children with Down's syndrome into normal pre-schools. "I took some of my Honour students into Melbourne preschools to look at the behaviour of handicapped children who were being integrated," she said.

The researchers studied 62 different children in 62 kindergartens. The focus was on single handicapped children: they did not want their observations confounded by the behaviour of other handicapped children.

The behaviour of the Down's syndrome children was compared with that of normal children, matched as closely as possible for sex, birth order and age.

The handicapped children tended to be three to five months older than the normal children, reflecting their slower intellectual development.

The first two studies were made entirely inside the structured environment of the kindergarten classes, ignoring free play in the outside environment. There were significant differences in behaviour: the handicapped children looked much more often at the teachers than did normal children, smiled more often at the teacher and engaged more often in solitary play.

For their part, the teachers paid more frequent attention to the handicapped children, and for longer intervals, which included giving them help and more time to complete tasks. Subsequently the researchers realised that the handicapped children tended to be more solitary than the normal peers they did not receive more attention from adults and more frequent attention to the handicapped children.

Applying the same study techniques for outside play, they found that normal children were more mobile and vocal when they were not interacting with teachers, and indulged in more group play. The handicapped children were more solitary, preferring to be onlookers, and seemed timid in the faces of boisterous group play.

"If the results of integration are to be improved, perhaps play should be more structured, to encourage more group interaction, and perhaps the teachers shouldn't worry if the handicapped children fail to finish their tasks. They should be allowed to go off and play with the others," Professor Crossley said.

Down's syndrome children sometimes spend two years in kindergarten. "In such cases it would be interesting to see if their learning and socialisation benefits from this more prolonged exposure to similarly aged normal children," she said.

Recently, the researchers set up another study in the special laboratory playroom at the university and invited eight mothers with Down's syndrome children and eight mothers with similarly aged normal children to participate. The children were observed two at a time in crossover pairings: Down's with Down's, Down's with normal, normal with normal.

Professor Crossley says one of the main issues of debate over integration is whether children interact more with other children at the same level of intellectual or physical function. Are deaf children better off learning with other deaf children or normal children? "It is true that non-handicapped children in contact with handicapped children learn what it means to be different, but if it is true that children's development benefits from contact with children at the same level, then integration might not be a good idea," Professor Crossley said.

"Our study did not answer this question because we found little child-child interaction in any of the pairs observed. We need to study more children over a longer period of time in future research."

Professor Crossley says that for teachers the choice is either to leave the handicapped children alone more so as not to distract them from joining in group play when it occurs, or to organise group play sessions to encourage social participation. Research is necessary to determine which strategy best suits the needs of all children.
Science sometimes moves ahead in mysterious ways. Take the collaboration between Dr Rod Tobin and Dr Karoly Rozsa, which led to the development of a new ultraviolet laser tube, as a case in point.

The second visit to Monash by Dr Rozsa last year culminated in a joint effort to develop a new ultraviolet laser tube, for which Dr Rozsa has applied for funds from the Department of Industry, Technology and Commerce to go back to Hungary in September.

"It has been a very effective collaboration," Dr Tobin said. "We have both contributed ideas and expertise. In the space of one year we came up with solutions to problems we had both encountered.

"In my past work, I've looked at things solely from the scientific point of view. But in this project we also looked at where the commercial demand was and found that there was interesting basic science in the applications too."

"We have also concluded that the joint effort is to be a commercial product, provide wonderful opportunities for students. University science should, wherever possible, provide this sort of research training through projects that support the development of industry."

"Whenever we can, we should exploit opportunities to assist the advancement of other branches of science and to support commercial developments. In this way, we can, I believe, play a useful part in the education of our students and to the wider community."

Diet's subtlety revealed

From Research Monash 1

She believes Aborigines knew of and exploited the fire adaptations of the Australian flora; the extent of the fire-adapted flora probably owes much to Aboriginal burning practices.

The people living in these pre-European landscapes were quite different from those depicted in the photographs of the latter half of the 19th century. Contemporary accounts describe them as strong and athletic—men commonly reached six feet tall—very intelligent, quick in their perceptions, with acute eyesight and exceptional tooth.

Quite possibly, pre-European Aborigines were healthier than the European of the day. "We have descriptions of a well-nourished people, who had managed over 30,000 years to sustain their food resources," Dr Gott said.

The marsupials they hunted provided low-fat meat, or meat low in saturated fats, and they also ate large amounts of greens. Like people in many other hunter-gatherer societies, the Aborigines were able to lay off rapidly when food supplies were tight.

The 'sparing gene' that allowed the Aborigines to lay down body reserves and give birth to fat babies when they needed them, may have contributed to their ability to store food energy as fats. Fructans are broken down in the gut by microbial fermentation. The gut flora of Aborigines is well adapted to break down starches rather than true polysaccharides, and fructans, whereas many white people eating fructan-rich foods tend to suffer indigestion.

Aborigines coped well with a diet high in indigestible tubers, which break down to produce short-chain fatty acids. Such acids are thought to play a role in preventing insulin-resistant metabolic syndrome, although the scientific literature on the subject is sparse.

Murgon, the most commonly consumed plant, was high in fructans, as were plants such as the vanilla lily, the sword and ling lily, Olearia and other early nancy (Anagaularia), milkmaids (Barteriella) and the aquatic water ribbons (Triglochin) and cumbungi (Bawdena) and provided starches.

Bracken (Pteridium) was also a source of starch; the northern hemisphere species of bracken contain carcinogens that can be broken down by a combination of heat and treatment with alkalis.

Dr Gott says Aborigines apparently knew of bracken's hazards because they would lay the shoots in the open fire and then pound them to extract the starch before eating. The population never outgrew the available resources. Among women, the hunter-gather practice of long and frequent suckling controlled ovulation, although there are stories that some plants were used as abortifacients or contraceptives, Dr Gott says.

"But the European men who recorded Aboriginal knowledge and lore last century did not record the knowledge of the women because it was not volunteered to them. The big men of a tribe practised a psychological form of curing people by palming stones and claiming that they were removing the bad influences from the body, but the women knew far more about the real plant remedies than the men because they used them daily."

Dr Gott has faced the formidable task of reattaching traditional names to plants that were incorrectly or inadequately identified; some people named plants without collecting specimens, while European naturalists collected plants and gave them scientific names without recording Aboriginal names.

"Victorian Aboriginal communities are faced with the necessity of rebuilding their culture," Dr Gott said. "Any thing I can feed back to them about what I use the language," she said. "This line is not written down and the only way to retain it and pass it on is to show young people the plants growing in the field and to give them their right names."

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Contemplating meditation as medicine

Medicine students will be better able to cope with stress now that meditation has been added to their courses, according to senior lecturer Dr Steven Sommer.

Dr Sommer and lecturer Dr Craig Hassed, of the Department of Community Medicine, together introduced meditation into the medical course last year. This year, meditation units will be available in the course's first, third, fourth and sixth years. The units are intended to benefit the students, both personally and professionally, because they commonly have problems dealing with the stress of their studies, and their future patients may also benefit from meditation as medicine.

Students have assessed the units as being of great personal value. On a five-point scale, they rated them 4.4.

"Doctors" psychological health in general is terrible," Dr Sommer said. "They have four times the suicide, drug and alcohol abuse rates of the general community, due largely to the fact that they must deal with stressful issues every day and yet appear calm and in control at all times. "They also have a problem about who to go to when they want help. They feel awkward about going to another doctor and other doctors feel awkward about seeing them." Only now is meditation becoming a more accepted form of treatment by traditionalist doctors. Dr Sommer says in the past it was disregarded because it didn't fit the "pill for every illness" model of medicine that most medical students around Australia have grown up with.

"Slowly medicine is moving away from this model as the profound effects of more holistic methods become apparent," he said. In one study published in the British medical journal The Lancet, breast cancer sufferers had doubled their life expectancy after turning to meditation after becoming disillusioned with the health system. "We need to open our minds to the limitations of the models we are using, and recognise that there are other ways of discovering the truth about health."

Dr Sommer, who runs weekly meditation groups, has also had results confirming the benefits of "willing the mind." For example, one patient who suffered severe weekly migraines for more than five years had a 40 per cent reduction in the number of headaches, and some patients managed to reduce their drug intake by half.

One technique that Dr Sommer teaches involves focusing on the breath while visualising light coming through the body. He says the key to meditation is not to block any thoughts that may come, but simply to learn to observe them and allow them to pass. It is learning to mentally "let go" which allows the release of both psychological and physical tension.

"Meditation actually wakes you up, it leaves you feeling alert and motivated," Dr Sommer said. "Fifteen to 20 minutes can actually give you more rest than several hours of sleep."

"Having learnt meditation, people better sleep, their self-esteem goes up, and relationships often improve because people listen more to their partners than to their superfluous thoughts taking place in their minds. It would take me hours to list all of the benefits sufficient to say the side effects are all good."

Despite these benefits, however, recognition of meditation by traditionalist doctors was virtually non-existent a few years ago. "What we have tended to ignore in our medical culture is empirical science, using experience," Dr Sommer said.

"Chinese medicine, which is based on empirical experience, has been around for thousands of years and yet it is only now that acupuncture and meditation are beginning to be considered legitimate forms of medicine. To disregard thousands of years of empirical science would be unscientific."

"We need to open our minds to the limitations of the models we are using, and recognise that there are other ways of discovering the truth about health. This is not to say that we should accept all new ways of treating illness blindly, but to open to subjecting them to investigation and practice to test their merit."

It was just such a process that brought Dr Sommer to an understanding of meditation as medicine. A six-year Monash medical degree and a two-year residency at the Alfred Hospital had left him disillusioned with the health system.

He recalls: "I often found myself in confrontation with others because their agenda was political, and not necessarily to the benefit of the patient. Following my residency, I really began to question whether medicine was the correct profession for me and so I took a year off in 1987 to travel. While in Israel I discovered meditation. On his return, Dr Sommer sought scientific confirmation and found there were over 400 research papers on the medical benefits of meditation."

He believes that "in the clear calm of the meditative state, the body comes to balance and all blockages and interferences to a natural healthy state are removed. The body's own healing mechanisms are facilitated. Once the mental unrest of an anxious and burdened mind is alleviated a healthy body and mind are more easily attained."

His views are becoming more widely accepted, and even supported, by the medical community. This year Dr Sommer has been asked to run a course on meditation for the College of General Practitioners.

For further information, contact Dr Sommer at 579 3188.

Information explosion raises privacy questions

International trends in privacy and data protection have come under scrutiny in a report by a Monash academic.

Mr Greg Tucker, Faculty of Business Coordinator at Frankston, has spent six months as a research fellow at the Organisation for Economic Cooperation and Development (oecd) in Paris. His report, Privacy and Data Protection - Issues and Challenges, was released late last year.

It looks at the mechanisms for protection of personal information in the 24 oecd member countries, including the US, Canada, Australia, Japan, and European and Scandinavian countries.

The report also examines trends in privacy and data protection and reviews the codes of conduct and even self-regulation which are used as the framework for privacy protection by the member countries.

As a result of his research, Mr Tucker, who is also the author of Information Privacy Law in Australia, was invited by the Faculty of law at Hitotsubashi University to present a series of lectures in Japan. He also made a presentation to the Independent Commission Against Corruption in New South Wales.

Mr Tucker said that cultural differences between countries play a major role in the stress that the adoption of privacy and data protection regimes varies considerably depending on the cultural and legal background of the country." He said.

There had been many positive steps taken worldwide over recent years in self-regulation and privacy and data protection. "Australia uses a mixture of legislation in some sectors and industries and self-regulation or coregulation in other sectors," he said.

"One current example of the misuse of personal information is the report of the Independent Commission Against Corruption in NSW," Mr Tucker said. "Privacy legislation is designed to protect personal information on the individual, which is held in many forms."

"Information may be gathered about individuals through the use of plastic cards, passports and the tax file number. In such cases, there is no awareness that data is being collected."

No comprehensive privacy legislation existed in Australia, nor was there any. Mr Tucker believes Australia will continue to adopt privacy laws on a case-by-case basis. "This will lead to unnecessary complications and make the law less understandable to those who it is designed to protect: you and me," he said.

MARCH 1993 MONTAGE
One in a hundred

The first female plumber to be employed by Monash's maintenance department, Ms Tammy Foster, won the job ahead of more than 100 male applicants.

Ms Foster, 24, has been working as a plumber for almost eight years, having completed her apprenticeship at the Mercy Maternity Hospital in East Melbourne. She worked as a self-employed subcontractor in roofing and maintenance, as well as for a commercial guttering firm.

"Like any other profession, you have to know the trade, being a woman doesn't change that," she said. "Other colleagues tend to want to know what you're capable of and what you're willing to do. I won't be seen to be good at my job, whether I am a man or a woman.

"I don't think women should have advantages. I wouldn't want to be seen differently as a plumber. I know I couldn't compete against 131 other male applicants for the position but I believe I got the job because of my capabilities." She is always being asked: How do you cope with the guys? "Well, the fourteen plumbers at Monash and others in the various shops are fabulous," Ms Foster said. "The guys have been great and accepted me as part of the team.

"The older ones tend to be more cautious, as when they were in their trades in their younger years, it was not the done thing. For the younger plumbers, they are more used to it. At first, I had some hard times with guys on the job but I learnt a lot from those experiences and can handle anything else that comes my way."

Outside her work, she is a cricketer who has played at state level for six years. She trains five nights a week, plays on Sunday and coaches in between.

Talking science

Monash, zoology graduate Ms Caroline Peters is one of a dozen top science graduates chosen to participate in a scientific communication course at the Australian National University.

Students enrolled in the one-year Graduate Diploma in Scientific Communication are assisted by scholarships provided jointly by the ANU, the Shell Company of Australia and the National Science and Technology Centre - Questacon. The course teaches them public speaking skills, how to work with the media and handle interviews. Its aim is to teach students to be competent, confident communicators of science and technology to the general public and to be productive in writing for scientific media. The scholars spend half the year taking a miniature version of Canberra's Questacon exhibition to regional and remote areas of Australia. In between the month-long tours, they study various forms of communication.

So far, 50 science communication graduates have followed careers in Australian and overseas museums, teaching, the media, scientific research and public relations.

Administration award

The Assistant Registrar, David Syme Faculty of Business. Ms Judith Willmore has been awarded a $5000 Caroline Chisholm General Staff Award. She will visit the US and Canada in August to study faculty administration and links with central administrative areas in multicampus institutes. Ms Willmore will be looking at the procedures, systems and technology at universities and business schools with particular reference to best practice.

New union president

Mr Trevor Stiles, 24 (pictured below), has been elected President of the Student Union at Caulfield, representing students at Caulfield and Frankston campuses.

Currently fulfilling a role in politics with a minor in sociology, he sees the union intends to become more representative of the part-time, postgraduate and mature-age student this year. "They have their own needs as students and, as equal members of the union, they should be repre­sentative and accommodated," he said.

At Caulfield, the renovated C Block coffee shop - renamed Merlins - will be open for first semester, providing an inviting cafe area, complete with an outside, sheltered seating area. Merlins will open from early morning to late at night.

At Frankston, construction of the new student complex, including a bistro area, gym and recreation facilities, will get underway.

"Other, more distant, plans include acquiring two floors in the new teaching complex at Caulfield for a bistro and merchandise bookshop," he said.

Before being elected president, Mr Stiles worked as the deputy president in 1992 and as the vice president in 1991.

Library service honoured

Librarian Mrs Joan Strzepek-Hodgson has been awarded the medal for 25 years of service at Monash. Paralysed at the age of 14 by a stroke, she doggedly fought to regain her mobility and speech and continue her education.

She began her career in librarianship as an assistant in the Peninsula Regional Library Service at Rosebud, eventually taking over the full-time librarian position. She studied for library qualifications by correspondence, private study and unit lectures.

In 1967, she joined the cataloguing department at Monash and, while still working full time, began a Bachelor of Arts, which she completed in 1973. She is now a senior member of the Technical Services Department.

Churchill Fellows 1993

Fifteen Victorians are among 70 Australians awarded 1993 Churchill Fellowships for a variety of investigative projects and overseas study. Projects to be undertaken this year range from support for homeless people to advances in puppet design. Thirteen of the state recipients are pictured below at a presentation ceremony at Government House last year.

Monash, which has been the regional headquarters of the Winston Churchill Memorial Trust since 1983, received 232 applications. Interviews by the regional committee, chaired by Professor Ray Martin, are held at the university and final selection is made in Canberra by the trust's national fellowship committee.

Applications for 1994 fellowships should be received by the University Secretariat in Monash by 28 February. Successful applicants are notified in June.

Gippsland head named

Professor Barry Dunstan has been appointed acting Pro Vice-Chancellor responsible for the day-to-day operations of the Gippsland campus.

His appointment follows the retirement of Professor Tom Kennedy as Gippsland's chief executive.

From 1 January, the former University College has become fully integrated into the university and is now known as Monash University Gippsland Campus.
**Hi-tech garbage removal comes at a price**

Pay-by-weight garbage removal could provide a new incentive for waste reduction, according to Monash researcher Mr Frank Fisher.

Mr Fisher, of the Graduate School of Environmental Science, said an ongoing pilot study into the viability of such a system, run in conjunction with the Melbourne City Council, was already showing reductions in the amount of garbage put out for collection.

More than 10,000 households are being encouraged to reduce their waste by separating, recycling and composting in return for a potential reduction in their council rates, according to the weight of garbage collected.

Next month, the council will create an Australian first when a state-of-the-art garbage collection system is tested in 500 houses. Waste will be collected in the usual 240-litre or 120-litre bins by hi-tech garbage trucks.

The bins — with microchips attached — are weighed and the data is electronically recorded. Under a pay system, the ratepayer would be billed for collection of garbage over a predetermined amount. This would result in a reduction in cost for some households.

Mr Fisher believes that, if successful, a pay-by-weight scheme would benefit ratepayers, the environment and councils, whose costly landfill levies would be reduced.

"We are noticing results in our study waste is already being reduced in these households," he said.

"By paying the annual council rates, people are removed by their lack of interaction with the processes. A rubbish removalist goes or how much of their annual rates are devoted to this service.

"With the pay-by-weight proposal, people will have direct feedback and actually an account for their rubbish removal. Bottles, plastics, paper and cans put out for recycling would not be charged and, with many recyclables such as cans, money is even returned from their sale.

"The pay-by-weight study is just one of the projects undertaken by the newly established Centre for the Innovation of Waste Management. The centre formalises the role the graduate school was already taking in the area of waste minimisation. Developed in April 1991, the study is investigating logistical and social problems associated with pay-by-weight garbage removal.

Mr Fisher said problems included industrial issues, such as what effect a reduction in garbage would have on jobs for garbage removalists. One answer could be the consequent growth in the recycling industry, which could create wealth and employment. Other factors include technology development and social issues including the potential problem of householders dumping waste into public containers to reduce the weight of their own garbage.

As well as determining the method for removal of rubbish and what people actually do in their garbage, a messy job for the researchers, the study is testing the acceptability of the scheme and participants' attitudes towards recycling and waste minimisation.

Mr Rob Curnow, of the Applied Psychology department at the Frankston campus, is conducting psychological and social studies into these issues and his results are giving an extra dimension to the overall social, psychological, political, physical, technical and institutional background of the proposal.

The Centre for Waste Management's consultancy work includes a project for KPMG Peat Marwick looking into 'difficult to recycle' products such as prunings, construction and demolition materials, road materials, rubble and soils. KPMG Peat Marwick is making an economic analysis of these products and the potential industry involved.

The centre is also involved in establishing a national municipal waste minimisation research database that will provide an overview of waste minimisation projects to date.

**Computer lab on the case**

A state-of-the-art computer laboratory established at the Frankston campus will assist students with research and employment opportunities.

Monash, the Victorian Education Foundation (vEF) and the Information Engineering Facility (IEF) have created a computer laboratory to cultivate skills, research and employment opportunities in Computer-Aided Software Engineering (CASE).

"Establishing the computer laboratory reflects the university's aim to provide students with relevant theoretical and practical knowledge, so they can be productive when they reach the work force," head of the School of Computing and Information Technology at Frankston, Professor Philip Steele, said.

Annually, the Frankston laboratory will provide 70 final-year Bachelor of Computing (Information Systems) students with hands-on experience in using the state's commercial CASE tools. The three-year course is designed to educate students for professional careers in computer systems analysis, systems design and application development.

"The laboratory is part of Monash's ongoing strategy to combat a skills shortage in this field, with vEF assisting with the funding and the university providing more than $500,000 in products, training and services. The university has a real commitment to developing CASE knowledge and this commitment will produce graduates who are well served in the leading edge CASE technology, utilising the most advanced tools," Professor Steele said.

**Speaking of fear**

Public speaking has often been described as a fear worse than death.

"Twenty Monash staff and students, however, have faced this fear and have taken on a new skill that is proving to be enjoyable, while giving increased self-confidence and presentation skills. The group is members' speaking, listening and presentation, body language, vocabulary and organisational skills. The Monash Toastmasters club, part of the famous Toastmaster International public speaking has often been described as a fear worse than death.

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**Bereavement support centre**

A new centre to develop education and support services for bereaved people has been launched at the Frankston campus.

The Peninsula Bereavement Support Project - run jointly by the Department of Applied Psychology, Frankston-Mornington Peninsula Hospice Service and the Peninsula Community Health Service - is funded by the Victorian Health Promotion Foundation.

Clinical and community psychologist, Mr Karen Spie, said the centre's role would be to provide strong community support. "Coming to terms with the death of someone close is very painful," she said.

"There is no timetable to recover from grief, no magic cure, no easy way to accept the loss. Grief can even be a health hazard. Increased rates of death, suicide, illness, accidents and drug and alcohol use are found among the bereaved."

Mr Spie said research had shown that support programs for the bereaved had helped people come to terms with their loss. "Educating people about the grief process creates an environment where it's okay to talk about how they feel," she said.

"It reduces the sense of isolation that most grieving people feel. "All bereaved people need support, care and attention. We all need to know how to help others and how to help ourselves in grief. We need to learn how to reach out."
Education talk on the menu

Secondary school principals have been having their say on education at a series of dinners held over the past year at Monash.

"It is essential that the university maintain two-way communication with secondary schools so as not to be ignorant of trends and their concerns in education," the Vice-Chancellor, Professor Mal Logan, who hosts the dinners, said.

"We have had overwhelming support from the principals who are interested in the contact with the university. I have been heartened to see the interest in the seminars," he said.

The six dinners have brought together principals from different areas in Melbourne to meet with the vice-chancellor and members of Monash staff. Discussions have centred on the vce, International Baccalaureate, admission policies, TV Open Learning and verification procedures.

The events follow on from the launch by the Office of University Development of a revamped Schools Update which is sent to principals and career teachers in each term. This is part of an overhaul of Monash's liaison with schools. Further details of this program will be released this year.

Geography refresher

Twenty-five geography teachers (pictured above), drawn from a variety of schools, enrolled in a one-day refresher course at Monash last month.

The course, jointly organised by the Department of Geography and Environmental Science and the Geography Teachers Association, consisted of four lectures based on the current research activities of staff in the department.

Dr David Dunkerley outlined the work that he and graduate students have begun on Australia's grid, describing the management lessons their research has produced.

Associate Professor Chris Maher covered research issues based on his extensive database of house prices in Melbourne.

Dr David Mercer explored environmental futures, reviewing current literature, policy and development trends in Australia and overseas. Professor John McKay concluded the course with a session on Australia's links with Asia, showing how a knowledge of Asian geography has been part of the Asia Institute's contribution to the national policy debate.

The lectures provided teachers with an intensive overview of four different areas of modern geography. In discussion, it was apparent that the material would be relevant in a number of areas of the school curriculum.

The course is seen by the department as a step towards a more substantial effort to enhance the professional development of teachers, an area that has attracted federal government attention. Teachers were interested in attending a regular series of lectures and classes as part of formally recognised professional development activities. The Geography Teachers Association and departmental staff will discuss ways of implementing a program.

"The vce and the vce have acknowledged geography as a core curriculum subject," said Dr Kevin O'Connor. "Regrettably in Australia, we are moving in the opposite direction. In the discussions of the proposed national curriculum, geography is not being included in core subjects such as English and maths."

"This seems a backward step for the education of young Australians. It is essential for knowing and understanding more about our surroundings environment and how to handle and maintain them. We are walking away from that need and we'll be left with people who are ignorant of their land and will not be in the position to protect and take care of it."
Pol Pot looms large in the recent tragic history of Cambodia. As leader of a radical and misguided communist revolution, he oversaw the deaths of more than one million of his nation's people in just four years.

More than a decade after the fall of his regime, and now at the head of a Khmer Rouge guerrilla army in exile, Pol Pot is still a menace and poses a threat to the fragile balance of power in a country still reeling from its inhuman policies.

But what of the man? The known details of his life are at best sketchy: born to a poor landed family, Saloth Sar ('steel') and Ho Chi Minh ('the enlightened one'), Saloth Sar took a new name after he had come to power, concealing his identity from the nation he was to rule. He had a vision of the total socialisation of the country. Granted, it was an absolute vision and hundreds of thousands of people were killed for it. He took on too many responsibilities. He was too proud to let go and too incompetent to handle his minimum. He was sane, but a lot of the time he was probably crazy and didn't know that he was.

"He was a completely political man. His personal life was planned down to the minimum. He was sane, but a lot of the time he was probably crazy and didn't know that he was," said Chandler. "I don't think he was very bright."

"At the tail end of the 20th century, we see how bad an unleashed and unabashed communist leader can be. He was rejected by the entire socialist movement. They tried to deny he was a communist, but he had a very genuine communist culture."

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Serials of masks
Brother Number One paints a picture of a man who was friendly, austere in his habits, and described by all who knew him as polite, charming and deferential. No one interviewed by Dr Chandler was prepared to associate the person they had known with the horrors of the 1970s. "It has been impossible to penetrate what may be a façade, a series of masks, or a chosen repertoire of skills to discover a rougher, more diabolical, supposedly more genuine Pol Pot," Dr Chandler writes.

"The man seems to suit his performance to the people he is with, making a 'genocidal mania' hard to find."

"Indeed, the disjunction between his granted charisma and the death toll of his regime is one of the mysteries that hangs over his career and poses serious difficulties in trying to make sense of his life. As a person, he defies analysis."

"Often in my research I had the uneasy feeling that Saloth Sar/Pol Pot was just outside my line of vision observing me. This elusiveness has been frustrating to me as his biographer but also indicates the kind of impression he has always preferred to leave, or to fail to leave, while proceeding in secret with incandescent revolutionary tasks."

Brother Number One: A Political Biography of Pol Pot is to be published in paperback by Allen & Unwin.

"Their view reflects the course of their national history. There is no sadness, joy or hope. Their emotions appear to be static and fixed. The light in their eyes expresses nothing but emptiness."

The English edition of Ms Hardjono's book, a joint publication by the Monash Asia Institute and Hyland House, was launched at the Sydney Writers Festival last month by the Foreign Minister, Mr Gareth Evans. Already it has sold more than 1000 copies.

"We are trying to create a greater awareness among Australians of not only the fact that we are living in Asia, but also how our neighbours view us in terms of profitable and amicable relations. So far, the institute has published a series on Japanese views of Australia, and we intend to keep developing the theme."

"I was scared to death," said the source, who was an archive of more than 2000 documents, from Khmer Rouge cabinet meetings, whose elusiveness has been frustrating to me as his biographer but also indicates the kind of impression he has always preferred to leave, or to fail to leave, while proceeding in secret with incandescent revolutionary tasks.

"I couldn't get any really good interviews, from people who had worked with him as head of Cambodia in the 1970s," Dr Chandler said. "I think they were still scared to talk."

Nevertheless, he procured documents from Khmer Rouge cabinet meetings, which had not been seen before, and some of Pol Pot's speeches. Another valuable source was an archive of more than 4000 'confessions' documents, that came to light at the Tuol Sleng interrogation facility in Phnom Penh. Many contained valuable first-hand accounts of Pol Pot's personality and activities.

"But all of this, Dr Chandler admits that an overall assessment of Pol Pot has eluded him. "It's not a very coherent personality: he didn't want anyone to get a handle on him," he said.
The lingering twilight of an army in exile

Although the Khmer Rouge pose an ominous threat to the peace in Cambodia, their insubstantiality is not a genuine military menace. The limits of their military potential is revealed by their recent flurry of small-scale attacks on United Nations personnel and scattered artillery duels with State of Cambodia forces. However frightening to the victims, these are not the tactics of a serious military threat.

Khmer Rouge armed forces have won only one major engagement since 1989, and none before that since the liberation of Phnom Penh in 1975. In two campaigns in Battambang in 1989–90, their forces withdrew in the face of attacks by the State of Cambodia. In Kompomong Thom in June 1990, Khmer Rouge forces pulled out of the provincial capital after failing to seal off roads into the city from Phnom Penh.

Since the arrival of the United Nations Transitional Authority in Cambodia (UNTAC) in early 1992, Khmer Rouge forces have taken part in no major engagements, although artillery duels and minor incidents have sometimes been magnified in the press to the level of military campaigns. The Khmer Rouge’s failure to go wholeheartedly into battle reflects their weakness, their caution and their desire to protect their leadership, to control their followers, to accord in October 1991 has been one of caution rather than revolutionary flamboyance. Khmer Rouge priorities have made substantial territorial gains in the early 1980s, they have not favoured full-scale armed conflict. In fact, scattered reports reaching Phnom Penh suggest that the 150 Khmer Rouge armed forces have been reduced over the past two years. Presumably the Khmer Rouge leaders believe that Cambodia will fall into their laps in due time as a reward for the confidence they have shown in their nationalist credentials.

While they have avoided full-scale battle, the Khmer Rouge have worked hard to improve their political position. They have made substantial territorial gains in the north-central province of Kompomong Thom, and the adjoining, less hospitable province of Preah Vihear. Smaller units in Kompomong Cham, Kompot and elsewhere have made serious efforts to endear themselves to local people despite – or perhaps by means of – occasional massacre of Vietnamese civilians.

These political tasks are being carried out by an armed force of less than 20,000 troops, according to UN military analysts, UNTAC planners assume that the Khmer Rouge are currently fielding two divisions, totalling some 2,000 fighters, in Kompomong Thom, and a similar number of front-line troops in western Battambang. Artillery barrages and mortaring are frequent in both areas. Small Khmer Rouge operations remain numerous elsewhere, but they have little light and pose a serious military threat. Support troops throughout the country are thought to number an additional 10,000 men and women. Many of these are employed in logging and other commercial operations.

Nationwide, the State of Cambodia (soc) army outnumber the Khmer Rouge by a ratio of 3:1. Unlike the soc, the Khmer Rouge have no motorised naval vessels, no aircraft and no helicopters. They have insufficient control of major roads to shift their units rapidly from one theatre to another. Although they are probably better led, supplied and psychologically prepared than their counterparts in the soc, UNTAC analysts believe they are not strong enough to capture and hold a provincial capital or to conduct a sustained military campaign.

In spite of these purely military disadvantages, the Khmer Rouge’s territorial position improved dramatically in 1992. The Khmer Rouge now control almost 20 percent of the country, but most of these areas consist of inhospitable, poorly watered territory in the north and northwest, where they have recently taken over several gold and sapphire mines. The largest rice-producing zone they control is in Kompomong Thom, whose provincial capital is less than 150 kilometres from Phnom Penh.

Kompomong Thom is crucial for north–south overland communications between Phnom Penh and the Thai border, and for travel between Phnom Penh and the Angkor region. By controlling the northern reaches of National Route 12, which runs from the provincial capital to Thailand, the Khmer Rouge have the ability to resupply their forces. Using depots in Thailand and sometimes as many as 20 six-wheeler trucks per week, they have also relocated some 20,000 civilian dependents and supporters from camps in Thailand into provincial Kompomong Thom. So far, soc forces have been unable to impede this traffic. Khmer Rouge control of Route 12 threatens to cut northern Cambodia in half.

The Khmer Rouge intend to stay in Kompomong Thom. Assuming that the UN-sponsored elections take place this year, an elective government will have come to terms with the Khmer Rouge by staying out of the region or by granting the Khmer Rouge de facto administrative control. Controlling parts of a province and defending it with a small number of troops is not the same as taking over the country. Despite the brazenness of their pronouncements – on 9 January, for example, a Khmer Rouge broadcast stated that UNTAC had "totally, bluntly and shamelessly sided with the Vietnamese and their puppet" – the Khmer Rouge are not in a position to rest power from the soc, or from anyone else.

Pol Pot places a key close grip on the strategy and tactics of the Khmer Rouge. He remains a major asset for the movement. The awful conduct of the Khmer Rouge when they were in power, as well as Pol Pot's failure since 1979 to deliver any victories, does not seem to have changed his followers' resolve or their willingness to take on an ever-greater burden.

No successors for Pol Pot are being groomed. When he held power in the 1970s, his distrust of subordinates led him to keep constant vigil on his armed forces. Although he maintained 30,000 of them in the Khmer Rouge interrogation facility at Tuol Sleng. Few if any high-ranking Khmer Rouge have been assassinated since 1979, but several have passed out of favour.

Only last year, the most competent and most visible Khmer Rouge military commander, Son Sen, dropped out of sight. Son Sen, a cabinet minister during the Khmer Rouge's years in power, had been sharing the Khmer Rouge liaison team in Phnom Penh. He has not been seen in the capital or heard from by UNTAC officials since last April, although he surfaced briefly in June at an international conference in Japan.

Before his disappearance, Son Sen had displayed what seemed like a willingness to cooperate with the soc. That was Khmer Rouge policy at the time. Pol Pot may have considered such friendliness contamination. Son Sen was also clearly a victim of the change of tactics proposed by Pol Pot at an important secret meeting rumoured to have taken place in April 1992. Soc officials believe Son Sen shifted from a policy of supporting the un peace process to continuing the existing course.

What prompted the change of tactics was the Khmer Rouge's failure to control the peace process, a failure that may also reflect the breakdown of the Khmer Rouge's movement. Throughout the 1980s, the Khmer Rouge enjoyed the active support of China and Thailand, and sub-road patro­nates from the United States. They appear to be following area's lead in isolating the soc and its predecessor regime by giving 'non-lethal' support to their military efforts.

The Paris agreements released the Khmer Rouge into the Cambodian political environment, where by and large they have failed to flourish. It seems likely that Pol Pot and his colleagues expected continuing support; instead, they were abandoned. The Chinese government and some elements of the Thai military, commercially allied with the Khmer Rouge since 1989, would probably like to see the movement participate, secretly or openly, in an elected government in Cambodia. After helping the Khmer Rouge to stockpile weapons and ammunition in 1992, they are unprepared to offer further military help.

Interestingly, a similar sense of abandonment pervades the soc vis-a-vis its long-term partner in the peace process.

In this atmosphere, Khmer Rouge leaders are understandably unwilling to undertake bold military initiatives. Instead, they seem to be content with probing the soc defences without provoking all-out retaliation. In this atmosphere, Khmer Rouge leaders are understandably unwilling to undertake bold military initiatives. Instead, they seem to be content with probing the soc defences without provoking all-out retaliation.

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