Bushfire system a trailblazer

Firefighting in Victoria soon will have a new airborne electronic weapon.

FireScan, a computer imaging system developed at Monash by master's science student Mr Andrew Matthews, interprets information from infrared scans of a bushfire area and then provides an accurate map for almost immediate use by ground firefighting crews.

A prototype of the system - developed jointly by the Earth Sciences department and the fire management branch of the Department of Conservation and Environment (DCE) - will undergo field trials this month. If successful, it is expected to be in service later in this year's bushfire season.

FireScan extracts more detail from infrared scans of bushfires than previously possible by using specially developed computer software. This will mean that for the first time infrared images, which show heat rather than visible light, can provide without delay the accurate information needed to fight bushfires.

Mr Matthews said that infrared scans currently were used by the department only in longer-term fire planning and forest management because of the time involved in manually processing the information, and the lower resolution of the images produced by the existing system.

"You can see paddocks, roads and streams but the fire itself is just a dark patch," he said. "Then you have to match the image to a map to see where the fire is."

"We are using the computer to analyse these images and define the fire boundaries and other fire features. We should be able to tell where the fire front is to within a few metres."

The FireScan project is also investigating the most efficient way to deliver this information electronically to firefighting crews on the ground. At present, one method used is to drop a canister containing the fire map from the aircraft.

Eventually, the new system could be completely digital. Using satellite communications, radio modems or radio fax, up-to-the-minute fire maps could be transmitted directly to portable receivers in fire trucks or fire-bombing aircraft.

In addition to accurately plotting the boundary of the fire, the system "sees" the hot air plume generated by the fire front, ground water and landmarks, including individual houses.

"It also shows burnt areas, so you can determine what's still burning and what already has been burnt," Mr Matthews said.

The high-powered Macintosh computer was last month connected to a duplicate of the line scanner installed in the DCE's twin-engine Beechcraft fire-spotting plane, Fireboss I.

"The aeroplane flies in a bumpy path, which causes distortions in the scanning, so you can't overlay the resulting computer image directly on to a map," Mr Matthews explained. "The aim is to get all the available information from the scanner because it has the ability to tell exactly where the fire is in almost real time."

The FireScan software developed by Mr Matthews, a physics and computer science graduate, "warp"s the scanned image to a scale map using an interactive plotting system. It has been designed - complete with helicopter and bulldozer icons - to be used by operators with no special training.

Mr Matthews said the data collected could be stored and analysed later in more detail for use in research into fire behaviour, forest management and the effect of fire on the environment.

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Five CRC grants awarded to engineering faculty

Five new Cooperative Research Centres (CRCs) are to be set up at Monash following the second round of Federal Government grants aimed at combining public and private research expertise.

More than $11 million will be given to the Monash CRCs, all of which are to be based in the Faculty of Engineering. The centres will research advanced ceramics processing, polymer blends, hardwood fibre and paper science, catchment hydrology and maritime engineering.

The Federal Government announced the 20 new CRCs in December after considering 74 applications from all major Australian higher education institutions. The first two rounds account for 55 of 50 CRCs to be funded by the Government under a $100 million a year program. A third round is expected to be announced this year.

About $40 million will be spent on the 20 centres this year, with their funding expected to total $150 million. Initial funding from the Government will be for seven years. Remaining funding will be provided by business, the university, Commonwealth departments and agencies including the CRCs. State departments and agencies, as well as medical research institutes.

The Dean of the Faculty of Engineering, Professor Peter Darvall, said that the announcement would provide a much needed boost for the engineering profession, which may finally be getting the recognition it deserves.

In addition to the CRCs, the Government would be establishing three Advanced Engineering Centres in 1992-93. These would be joint ventures between industry and universities, providing high-level training in industries of strategic advantage to Australia, such as mineral extraction, manufacturing and mining equipment.

"We cannot be a viable economy by buying and selling bits of paper," Professor Darvall said. "Nor is there much future in selling primary products; we actually have to make something."

The centres are:

- Advanced ceramics processing: Headed by Professor Paul Rossetter, it will design new polymers and alloys for domestic manufacturing and export. Partners: Monash University, Salford Institute of Technology, Centre for Ceramic Fuels Ltd, CRC Division of Materials Science and Technology, and ICI Advanced Ceramics.
- Polymer blends: Also headed by Professor Rossetter, the centre will help develop Australia's advanced ceramic sector into a fully integrated industry and develop new compounds. Partners: Monash University, RMIT, CSIRO Division of Chemicals and Polymers and Division of Materials Science and Technology, ICI Plastics, and Chemplex Australia Ltd.
- Hardwood fibre and paper science: Headed by Dr Peter Nelson and Dr Geoff Carrade, it will help develop an internationally competitive pulp and paper industry. Partners: University of Melbourne, Monash University, CSIRO Division of Forest Products, the Australian Pulp and Paper Institute, and the Pulp and Paper Manufacturers Federation of Australia.

So far, the CRC program has brought together 17 universities, the CSIRO, 52 State and Federal bodies and more than 50 company or industry groups.
Rural medical unit first in Australia

Senior lecturer Dr John Tognone checks the blood pressure of Professor Geoff Vaughan at the opening of the unit.

Community medicine has reached out into rural areas with the opening of a new hospital-based unit in Bendigo.

The Bendigo Rural Medicine Unit is the first of its type to be established by a university in a regional centre. The unit, to be operated jointly by Monash’s Department of Community Medicine and the Bendigo Hospital, was opened officially by the Deputy Vice-Chancellor, Professor Geoff Vaughan.

Head of the Department of Community Medicine, Professor Neil Carson said the unit — funded by the hospital — would provide extended medical services for the area and a base for undergraduate teaching, as well as develop a rural research program.

“In addition, we will be developing programs to upgrade country doctors’ skills, especially educational units for local GPs,” he said.

“Developing a research program is an area of particular importance, given that very little health research has been done in rural Australia.”

Cut-off scores rise

School leavers make Monash their choice

Monash is attracting more applicants to its courses than other tertiary institutions, said last year Monash carried applications for tertiary courses, and the reason was the huge increase in the Victorian Tertiary Admissions Centre (VfAC) system of supply and demand. The actual number of places offered has affected less than other applicants, with the work of Monash scientists conveying the message even more widely.

“Because of the likely high entrance scores passed those of the major industry sponsors: Trust Company of Australia, Brockhoff Foundation and Collier Foundation.

According to Dr Sharpley, most people are aware of the adverse effects of stress, but awareness alone is often not enough to prompt them to change their behavior.

“Most of the participants of brief, one-shot stress management training sessions find it hard to maintain the techniques taught,” Dr Sharpley said.

Dr Sharpley has developed a stress control program that shows people how stress affects them, and how they can control their supposedly automatic reactions. Participants are connected to monitors that measure their heart rate, tension or skin conduction (how much they perspire). A computerised graph illustrates their responses.

“Often people think they are relaxed, but the screen shows their pulse racing,” Dr Sharpley explained. “This method takes the guesswork out of stress management because participants can see their reactions.”

“With a variety of relaxation techniques so that participants can see on the monitor which works best for them. Simple breathing techniques are often the most effective way to relax.”

Clinic stresses relaxation

Psychologist Dr Chris Sharpley has gone into the stress business. He has established a stress management and counselling clinic on the Clayton campus as a direct result of his recent research.

The research by Dr Sharpley, associate professor in the School of Graduate Studies, into the effects and control of stress was funded by the National Heart Foundation and the National Health and Medical Research Council. The clinic has attracted funding from three major industry sponsors: Trust Company of Australia, Brockhoff Foundation and Collier Foundation.

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“Most people hold their breath when stressed. Taking a few deep breaths can very steadying. Other people find imagery techniques are effective. For example, imagining that they are lying on the beach.”

He said research with more than 300 volunteers had shown that stress could be effectively treated at an individual level by psychotherapy, relaxation training, diet and exercise management, biofeedback and meditation.

The clinic, on the ground floor of the Education building, will be open from 9 am to 5 pm Monday to Friday. Phone 79 5469 for appointments.

February 1992
Board’s tribute to professor’s achievements

Academic Board has paid tribute to Professor Geoff Vaughan’s contribution to the greater Monash during his term as Deputy Vice-Chancellor.

"He has earned the esteem and affection of his colleagues," a minute of appreciation said. Professor Vaughan leaves Monash this month to take up the position of national manager of the Therapeutic Goods Administration in Canberra.

This was for Chisholm a period of rapid growth and expansion during which research was galvanised, course development accelerated and the cooperation of industrial leaders obtained in the institute’s curriculum," the Academic Board said.

"Lanks with TAFET were initiated and maintained, and greater discussions with Monash were successfully concluded. The institute acquired under Vaughan’s leadership a number of valuable properties, and strengthened its links with local councils, schools and industries."

Before his period at Chisholm, he was the dean and director of the Victorian College of Pharmacy for nine years.

"He came to Monash with the reputation of a strong and humane administrator with an especial capacity for building on an institution’s strength and inspiring loyalty in his colleagues."

As Deputy Vice-Chancellor, Professor Vaughan took on a broad portfolio with responsibilities including student affairs, general staff matters, the development of the Chisholm campuses until, latterly, research.

He was instrumental in obtaining substantial research funds for the university, particularly the Cooperative Research Centres and the Australian Research Council Mechanism C submisions.

He chaired the Union Board, the Committee of Associate Deans (Research), the Board of Management for University Theatres, the Occupational Health and Safety Committee and the Computing Committee.

"To all these activities he brought clear-sightedness, determination and good humour, and became known in particular for his approachability and his unflagging energy," the Academic Board said.

"He has earned the esteem and affection of his colleagues at the greater Monash during his service as Deputy Vice-Chancellor."

First Union warden bows out

One of the original staff members of Monash retired at the end of last year after 30 years as warden of the university Union.

Mr Graeme Sweeney has seen the university grow from little more than mud-splattered fields to a diverse, multicampus institution. However, it is this growth that has prompted him to move on in search of new challenges.

The excitement of being part of an entirely new university first drew Mr Sweeney to Monash from the University of Melbourne where he was chairman of the Union board of management.

He says the warden is often caught in a no-man’s-land between administration and students. "I see the warden’s job as being one of encouraging students to see that a university education is different from an academic education," he said.

"A university education consists of both academic and non-academic activities. It is really worthwhile giving some priority to it in the decision making of how to spend time while at university."

"So, the first part of the warden’s job is to encourage students to have a broad view of what university education is about. The second part is to manage the funding and facilities which together provide a whole range of opportunities for students to enter into extracurricular activities and to receive helpful services."

He has seen many changes in the way that students make use of the University’s facilities and services. In particular, he says that aspects of the 1990s see university in vocational terms, whereas their counterparts of the 1960s see it as a step towards their personal development.

"This, however, does not relate to a lot of mature and part-time students who still look at being at university as a way of really broadening their understanding of what life is about," Mr Sweeney said.

Chancellor’s term finishes

Sir George Lush, Chancellor of Monash since 1983, has not sought a further term this year.

A dinner at the Hyatt-on-Collins hotel last week paid tribute to his service to the university, spanning more than a decade. He was also a member of the Council from 1969 to 1974.

Sir George served as a judge of the Supreme Court of Victoria from 1966 to 1983, following a distinguished legal career. A Queen’s Council, he served as chairman of the Victorian Bar Council, president of the Australian Bar Association, and was a former commissioner of Overseas Telecommunications Commission.

The new chancellor, approved by Council last last year, is Mr David William Rogers, a well-known figure in business and legal circles.

Mr Rogers, 65, is the senior partner with the law firm Arthur Robinson and Hederwicks, and chairman of Woodside Petroleum and the AMP Society’s Victoria Board of Advice. He holds other directorships, including membership of the BHP board.

Dr Graeme Sweeney

While he is reluctant to draw attention to any particular achievements as warden, he looks back with pride on the development of extensive facilities for Monash students.

"I am sad about leaving so many people who I’ve got to know well, enjoyed working with and tackled challenges with. But I’m also relieved, in the sense that 30 years is a long time, and that which drew me to the university in the first instance is clearly a different environment to that which now prevails," he said.

Arts precinct to link venues

Planning for a new Performing Arts Building is well under way, with tenders expected to be completed by September this year.

The building, which will be adjacent to the Main Library, will form a central component of the planned Monash arts precinct, linking up with Robert Blackwood Hall on one side and the Galleries and Alexander Theatre on the other.

The arts precinct idea was put forward by Head of the Department of Music, Professor Margaret Kantom, in her letter to Monash in October last year.

Extensions to existing buildings housing the Law, Arts and ECOMAN facilities will be made to alleviate overcrowding and take account of departmental shifts within those facilities.

In addition, several landscaping projects are under way on the Clayton campus.

The stand of pine trees west of the Eastern Science Lecture Theatre, and shrubs in the Forum have been removed in the first stage of an upgrading plan.

Landscaping of the area next to the science theatre will take place over two years. It will include seating, several pergolas, raised garden beds, a fountain and new paving.

In the grounds in the Forum, between the Union and Menzies buildings, advanced native trees have been planted in the existing garden beds and a new watering system installed.

Sir George Lush at the unveiling in Robert Blackwood Hall of his portrait by Clifton Pugh.
Untangling a genetic mystery

Up to half a million children die in developing nations every year from bacillary dysentery, contracted from water contaminated by pathogenic strains of Shigella bacteria. Research at Monash into how the virus works will point the way towards methods of controlling the disease.

Dysentery induced by the Shigella bacteria is not just a problem in developing nations with contaminated water supplies.

In developed nations, it is a problem among minorities that suffer from poverty, malnutrition and poor hygiene. American Indians living on reservations are at risk, as are the Australian Aboriginals.

Dysentery is 50 times more common in Aboriginal communities in the Northern Territory than in the general population. In its most severe forms, dysentery can kill a child weakened by malnourishment or without access to appropriate medical care, within two days.

The disease responds to a combination of antibiotics and simple fluid-replacement therapy to counter dehydration, but Shigella bacteria vary in their capacity to cause illness. Some strains cause acute shigellosis, while others cause only mild infection.

The genetic basis for this variation remains a mystery. If scientists could trace the series of genetic events that allow the bacterium to attach to and infect the cells lining the human gut, and link those events to the activity of specific genes, they might be able to develop novel ways to block or inhibit Shigella infections, or could develop powerful new vaccines through genetic engineering.

For his PhD study in the Department of Microbiology under the supervision of Dr Ben Adler, Dr Kumar Rajakumar has been investigating mutant strains of Shigella flexneri, a species of intermediate virulence.

He is collaborating with a microbiology research team headed by Drs C. Sasakawa and M. Yoshikawa at the University of Tokyo. The team has artificially generated the mutant strains in an attempt to define key genes -- called virulence genes -- involved in the infection process.

Shigella bacteria have proved difficult to study because they do not infect laboratory rats or other rodents -- only humans and some monkeys. However, they do cause a mild inflammatory reaction in guinea pigs, allowing researchers to discriminate between potentially virulent and harmless strains. Selected virulent strains can then be tested by infecting special cultures of human cells.

Dr Rajakumar says the Tokyo team used a biological technique to produce more than 9000 mutant strains of S. flexneri. Like most other bacteria, Shigella has some of its virulence genes -- as well as genes which confer resistance to some of the antibiotics commonly used against it -- on loops of DNA called plasmids.

Plasmid genes can be duplicated readily and passed around with other bacteria, facilitating the spread of genes that enhance survival. A plasmid's encoded genes are a variable kit of survival tools that can be passed between bacteria, or disposed of when they no longer serve a useful purpose.

"A great deal of work has been concentrated on a large plasmid which is known to encode a number of virulence determinants that are common to Shigella and certain strains of the gut-dwelling bacterium Escherichia coli that can also cause diarrhoea," Dr Rajakumar said.

"The plasmid genes have been quite extensively studied, and we are now beginning to understand how the virulence genes work. There is a fairly intricate pattern of self regulation, involving feedback control."

But Dr Rajakumar says other genes that are essential for the infection process are located more permanently on the bacterium's chromosome. There is constant crosstalk between chromosomal and plasmid genes.

He and his Tokyo collaborators are seeking to identify and characterise genes on the main S. flexneri chromosome that mediate virulence. The Japanese team isolated 50 mutant strains of S. flexneri that were incapable of infecting tissue-cultured cells; strains that had obviously suffered mutations in critical genes.

The chosen mutation technique also provides a way of locating the genes that have been mutated. It employs a transposable DNA element -- a transposon or 'jumping gene' -- that jumps at random to other sites in the chromosome. If that site lies within an important gene, the transposon deactivates the gene or impairs its activity, rendering the bacterium non-virulent. The jumping gene can be conceptualised as both a flag and a handle. Its DNA code can be recognised, flagging its location within the unmapped genetic terrain of the chromosome; a location that must lie within the deactivated gene.

It also serves as a handle because the molecular biologist can use a DNA probe complementary to the code of the jumping gene to recover it from the chromosome. Typically, the probe brings with it some of the chromosomal DNA flanking the site where the jumping gene was inserted, providing the molecular biologist with segments of the disrupted gene.

These segments can in turn serve as DNA probes to recover flanking regions from further along the disrupted gene. Step by step, the molecular biologist can recover and reconstitute the entire code of the gene by matching up shared DNA sequences on different fragments.

Rajakumar established that the troublesome small fragment came from one of these plasmids. Apparently a transposon had jumped from the main chromosome into the small plasmid and escaped detection.

Dr Rajakumar had selected a cloning technique that generally accommodated fragments no larger than about 12 kilobases -- roughly enough to accommodate the transposon, plus some four kilobases of the disrupted gene attached to either end. He could not have known that the transposon in the main chromosome was embedded in a DNA fragment exceeding this size, and was too large to be cloned into E. coli by the method he had chosen.

He was able to find his way round the problem by moving to a cloning technique that generated much larger DNA fragments -- up to 24 kilobases. At last, the elusive transposon showed up in a kanamycin-resistant E. coli colony, with its flanking segments of the disrupted S. flexneri gene.

Dr Rajakumar has recovered about 13 kilobases of the S. flexneri chromosomal DNA, which he is now decoding.
Anybody who has driven a car knows the signs: a whine from the gearbox, cracking suspension, telltale blue smoke is the exhaust. All machines age and require costly repair or replacement.

For industries that rely on machines costing millions of dollars, or whose production lines could be halted by the breakdown of one small component, machine failure can seriously affect production and profit.

Companies may find themselves in a bind: frequent preventative maintenance is costly, and unnecessary replacement or adjustment of parts can disturb the smooth running of a machine, bringing on the same problems a company had sought to avoid.

Associate Professor Jack Stecki, of Monash University's Centre for Machine Condition Monitoring (CMCM), says his colleagues recently saved BHP $5 million by advising that there was no immediate need to replace a large slew bearing, used to help moor one of its oil rigs.

The ship was in dry dock for maintenance in Singapore, and BHP knew that the bearing was beginning to show signs of wear. It would cost $1 million just to dismantle the bearing in order to inspect it. In a long-distance telephone conference, company engineers discussed the problem with Ms Marian Anderson from the CMCM's Wear Debris Laboratory.

Ms Anderson analysed grease samples from the bearing for signs of contamination by metal particles; they were present, but at a low level that indicated the bearing would not fail for about two years.

Mr Bruce Kuhnnell, who heads the CMCM, says the advice given to BHP highlights the major difficulty in machine failure diagnosis and prognosis. Detecting and quantifying wear is one thing, but predicting from the current rate of wear when the machine is likely to fail is a science in itself.

Different materials, different loads, and different types of wear influence how soon the component will fail. Each machine behaves like an individual; prognosis must take this into account. Research into prognosis is a challenge: "We can't experiment with a $5 million machine just to see if a prognosis is correct," he said.

Wear is an exponential phenomenon. A bearing kept properly lubricated and kept within loading and clearance tolerances close to the manufacturer's specifications should give no problems, up to a point.

But once wear has set in, feedback mechanisms progressively accelerate wear: "slip" develops, temperatures increase, lubricants become contaminated by metal particles and catastrophic failure can occur soon after.

Many factors may contribute to premature machine failure including improper lubrication, improper mounting, or too tight a fit. With bearings, many problems begin with incorrect assembly, causing a bearing to fail from metal fatigue. Contamination and overloading are also machine killers.

The CMCM had its origins in a visit to a shipyard in the United States. Mr Stecki said to the University of Oklahoma in 1981, where he studied wear problems in highly stressed military jet engines. The US Air Force was experiencing a high engine failure rate due to metal fatigue; each engine cost $2 million to replace, $200,000 to remove for inspection, or just $20,000 to take lubricant samples to analyse for wear.

In industry, the loss of a machine may affect production for a few hours or days. In a military jet aircraft, the loss of an engine can mean the loss of the aircraft and possibly, of human life. Because of the rapid onset of metal fatigue, there is little margin for error in maintenance or replacement schedules.

After 200 hours, a jet engine begins to show signs of wear. Just five hours later, the wear has become so pronounced that it would be dangerous to fly the aircraft. This exponential rate of decay is typically due to metal debris entering bearing systems - a common problem in industry.

"Pushing 20 micron metal particles through the clearances in a typical bearing causes stress similar to that which a human would experience if he tried to push a football into his ear," Mr Stecki said.

Returning to Monash, he talked to several colleagues in the Department of Mechanical Engineering, including Mr Kuhnnell, and Associate Professor Robin Anderson. They founded a machine-condition monitoring group, with support from the Australian Minerals Industry Research Association (AMIRA). It proposed a new approach to machine maintenance. Instead of scheduled maintenance at regular intervals, which can see machines falling between service intervals, regular monitoring would ensure that maintenance was carried out only when signs of incipient failure dictated.

Apart from eliminating sudden breakdowns, the approach would also help companies reduce their spare parts inventories. Mr Stecki says one large Australian company keeps $300 million worth of spare parts.

Dr Joseph Matthew joined the new group in 1982, and eight companies in AMIRA began to support research, including BHP, Alcoa, several CRA-group companies, Ranger Uranium and Mt Isa Mines. Mr Stecki says that apart from an $80,000 establishment grant from the university, the group has been funded solely by industry.

Two years ago the research group gained independent status as the Centre for Machine Condition Monitoring. Its research focuses on three modes of machine failure:

• Fatigue - involving scuffing, wear or spalling (the lifting of small surface patches of metal);
• Abrasion - involving the interaction of two or three components, when metal particles find their way into the gap between working surfaces;
• Adhesion - metal to metal contact results in a kind of spot-welding after lubricant failure.

"What is unique about our activities is that we combine vibration studies with wear debris analysis," he said.

"Other groups may specialise in one or the other, but if you go to the doctor and he tells you there is only one method of checking your health, you'll probably want a second opinion. By using integrated techniques, rather than regarding them as competing with one another, you can offer the best mix for a given problem."

While studying how metal fatigue influences the service life of roller bearings, CMCM researchers made a disturbing finding:

"Roller bearings are sold with manufacturer's ratings which are supposed to ensure that if they are not loaded beyond a specified limit, they should not fail within a certain service lifetime," Mr Stecki said.

"We were originally trying to determine why so many bearings seem to fail prematurely, and we were trying to determine whether the lubricant enhancer molybdenum disulphide increases bearing life...

Continued on Research Monash 4
In the past quarter of a century, the manufacture of semiconductors has become one of civilisation's most important industries. Occupying a twilight zone between conductors and insulators, semiconductors conduct electricity when bathed in light.

Light-emitting diodes, diode lasers, transistors and complex microchips all are manufactured from semiconducting materials such as silicon and gallium arsenide. Ions can be implanted in silicon by exposing them to intense radiation in nuclear reactors, or by using electronic guns.

But the most flexible and accurate way of producing complex semiconducting circuits is to deposit atomically thin layers of metal-doped semiconductors by metal organic chemical vapor deposition (MOCVD). In the Department of Chemistry, Professor Bruce West, Dr Ron Dickson and Dr Glen Deacon are leading research into the synthesis of novel compounds for specialised microelectronic devices produced by the MOCVD route.

Professor Bruce West explains that the process involves the synthesis of volatile metal compounds that will decompose when heated in the gaseous state, and condense as metal alloys on a substrate - usually a 5 cm wafer of gallium arsenide (GaAs). The deposited material grows in atomic layers, rather like a crystal growing in a supersaturated solution. This is referred to as the epitaxial growth of the semiconductor material.

Monash graduate Dr Geoff Pain is doing this work at Telecom's Research Laboratories, just over the road from Monash University, using a commercial MOCVD reactor. Semiconductor devices, including a novel laser diode that projects its beam vertically instead of horizontally from the surface of a chip, have been developed by other Telecom researchers.

The group uses mercury, and volatile cadmium and tellurium compounds which are mixed and then are vaporised in a reducing atmosphere of hydrogen, condensing out on the GaAs surface as mercury cadmium telluride (MCT). MCT is a semiconductor with the novel property of being sensitive to light in the mid-infrared region. Modern telecommunications use optical fibres to transmit information in the form of pulses of visible light; infrared light travels more efficiently along optical fibres than visible light, but the problem then is to detect it and transmit it across junctions. MCT devices mediate this conversion of optically-encoded information into electronic signals, underpinning the new technology called optoelectronics.

In the longer term, MCT sensors and switching devices will be important for the development of a new optical fibre telecommunications network based on ultratransparent fluoride glasses, being developed by other Monash and Telecom researchers. However, the momentary advantage for the current generation of silica glass fibres means that fluoride glass optical fibres may not supersede them until early in the next century.

Professor West says that in any situation where remote heat sensing is important - medical, instrumentation, security - MCT is potentially important. Because of its continuously variable energy gap, and its inherently high operating temperature, MCT has become the leading intrinsic infra-red detector material. Certain compounds correspond to atmospheric transmission windows; hence its surveillance applications.

The research group partners receiving funding under the Grants for Industrial Research and Development (GIRD) scheme in 1989 to pursue their research into the development of techniques to produce and characterise of optoelectronic materials and devices. Recently they were awarded a second GIRD grant to work on epitaxial growth of compound optoelectronic materials.

In each grant CSIRO and BHP are the commercial partners. Professor West says the project has been strengthened by an ARC grant to study the basic chemistry of these volatile organometallics, with Associate Professor Ron Dickson as principal investigator.

Research students involved in the work include Ms Kerryn Heagle and Ms Rebecca Berrigan.

"The thrust is towards providing the technology that will underpin the manufacture of devices for specific uses," Professor West said. "So we are now angling our chemistry towards special organometallic compounds - customised compounds - which can be used as dopants in the mercury cadmium telluride, to produce specific effects in semiconducting wafers.

"When a dopant has been targeted, the skill is to turn it into a volatile organometallic compound that will behave like the those of cadmium and tellurium in the MOCVD chamber. Some of the dopant element must take the place of the semiconductor metals in the material being grown."

Professor West says one interesting metal is manganese, which, used as a dopant, offers the promise of semiconductors whose electrical or optical properties can be "tuned" by a variable, external magnetic field. A manganese compound prepared at Monash has aroused considerable interest overseas. It is superior to the compound presently used to prepare diluted magnetic semiconductors.

Another member of the Monash research group, Dr Glen Deacon, has been contributing his expertise in rare earth element chemistry. Rare-earth elements, added as dopants, could produce electroluminescent or photoluminescent materials. In the former phenomenon a material emits light when an electrical current is passed through it; in the latter, materials respond to light by emitting light of a different wavelength.

Depending on the nature of the rare earth dopants, it may be possible to produce devices that will emit pure colours for use in flat screen televisions, computers and other display devices. Professor West says researchers are seeking to build tiny switches, called p-n junctions, into optoelectronic devices. The MCT grown in this project is intrinsically n-type. To create a p-n junction, selected regions of the material must be converted to p-type. The most promising dopant elements for this purpose are arsenic, antimony and bismuth.

"We are trying to synthesise volatile organometallic compounds to be used in MOCVD to produce MCT layers with one or other of these elements in them," Professor West said. "An antimony compound of considerable promise is being assessed.

"We synthesise the compounds, Telecom makes the materials, and the wafers are then analysed at the CSIRO Division of Materials Science and Technology by Dr Steve Wilkins and his group to determine their physical properties, topography and composition. Telecom then takes the wafers and builds up electronic components on them."

Professor West says the chemicals which are used in MOCVD need to be of the highest purity. This means that the laboratory has been developed to meet the highest standards. "We are working with techniques of the highest standards and with processes that have been used in the production of optical fibres for telecommunications."
**From Research Monash 2**

You simply can't catch them because it fails prematurely, the manufacturer will not disclose details, and the buyer has no way to check whether the increase is real, or just a way of keeping pace with another company.

The centre's researchers have been developing special computer-based monitoring devices for this purpose, but also use established techniques like analysing lubricants for metal or chemical contamination, or looking for temperature changes as a result of increased friction.

**From Research Monash 1**

On all indications, it plays some role in synthesising the lipopolysaccharide coat of the bacterium - a glutinous layer consisting of a complex of sugars and lipids. The mutant S. flexneri strain has a defective coat that may prevent it colonising gut or which makes it vulnerable to attack by the immune system's defensive arsenal.

The University has identified three different regions, or loci, in the chromosome that play some role in synthesising the lipopolysaccharide coat. They are designated by the code names IFA, IFB and IFC.

Dr Rajakumar's mutant is in the IFC category. He has subsequently mapped the transposons inserted somewhere in this region is of major interest, because it may contain carbon.

"We're constantly looking for new pounds with the right properties, and the Monash group must have skilled chemists, working in well-equipped laboratories with fume cupboards and vacuum facilities.

"This is not routine work," he said. "We're constantly looking for new compounds with the right properties, and it's not always clear what will be suitable. There's a certain amount of trial and error until we get on the trail of something with the right composition and properties that give the volatility we're looking for."

**Mutant bacteria mapped**

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**Novel chemical products**

**From Research Monash 3**

exceptional purity - 99.999 per cent pure or better - so that they will not introduce unwanted impurities that also can act as dopants. The pure material must be capable of vapourising at room temperatures. Another requirement is that the compound should undergo clean pyrolysis (decomposition by heat in the absence of oxygen) to yield pure metal-free of contamination by metal oxides or carbides.

This can be very tricky, because some of the organometallic compounds unavoidably contain oxygen in their molecular structure, and nearly all of them contain carbon. "We have to go to great lengths to avoid them breaking down to produce oxides, but carbides are the most serious problem," Professor West said.

The outcome of the Monash team's work will be novel chemical products, not previously available in the market place, that microelectronics manufac-

**Computer-based machine monitoring systems developed**

**From Research Monash 2**

The centre works very closely with the Ranger Uranium mine in the Northern Territory, which was called in by the Ranger Uranium mine to get a low-cost hand-held computer, based on the AVtech system, that can be plugged into a transducer on a machine to collect data. It will be used where a machine is critical to a process, but the owner cannot afford to install a large, permanent AVtech network.

Mr Stecki has been investigating ways of monitoring condition in hydraulic lubrication systems. He is adapting a device called a nephelometer, developed by Dr Clive Coogan of the CSIRO, originally developed to monitor fat levels in milk.

The nephelometer, applied to monitor viscosity in hydraulic systems, would monitor the scattering of infra-red light off metal particles in hydraulic systems. Optical fibres permanently set into the hydraulic line.

Aircraft designers currently use a system of magnetic plugs, which cause metal particles to signal their presence in hydraulic fluid via an induced electric field. Such sensors are expensive; an order of magnitude more costly than the system proposed by Mr Stecki.

The CMCM has signed collaborative research agreements with key overseas institutes in the same field, including Knolls Technical University in Poland, the Israel Institute of Technology, the National Research Council Institute for Machine condition monitoring in Italy, and the Vibration Institute in the US.

**RESEARCH MONASH FEBRUARY 1992**
Fibre and paper grant boosts APPI’s research

The Australian Pulp and Paper Institute (APPI) has obtained research funding from the Federal Government worth $3 million for a Cooperative Research Centre (CRC). The CRC for Hardwood Fibre and Paper Science has been established by the institute in collaboration with the CSIRO Division of Forestry Products, Melbourne University’s School of Forestry and the Pulp and Paper Manufacturers Federation of Australia.

The CRC is to be housed in the $1.7 million APPI building, opened in June 1991 on the Clayton campus. According to the APPI’s research director, Dr Peter Nelson, the CRC is just one of the institute’s many achievements since it was set up in 1989.

He said the institute had advanced the international competitiveness of the Australian pulp and paper industry through research and by producing a more specialized workforce through graduates. About 10 graduate diploma, master’s and PhD students graduate each year from APPI courses.

A founder of the institute, Dr Nelson said the aim was to increase this number to about 18 students per year. However, more funding was needed to both increase the output of specialists into the industry and to complete the new APPI building.

At present, the building has only one fully furnished laboratory. The other six — including a constant temperature humidity laboratory for measuring fibre properties — are incomplete.

The two-level building also has six offices, one lecture room and a computer simulation room.

Monash medievalists from (left) Dr Constant Mews, Dr Carol Williams and Ms Mary Atchison view a facsimile manuscript in the music department library.

Medieval sounds revisited

Three Monash medievalists are playing key parts in medieval music events. A workshop, concert and visit by a world-renowned musicologist have been organised jointly by Monash, LaTrobe and Melbourne universities.

Professor Hendrik van der Werf, an internationally renowned authority on medieval musicology, will be keynote speaker at the workshop, Medieval music in theory and practice: Interpreting the manuscripts record.

Dr Carol Williams of the Department of Music, Dr Constant Mews, Department of History and Ms Mary Atchison, a doctoral student in music, will talk about their recent research of manuscripts in Australia and overseas.

Students will have the opportunity to study ancient manuscripts at the State Library of Victoria with Professor van der Werf — a leading figure in medieval troubadour music, as well as medieval plainchant and polyphony — and specialists from around Australia.

Professor van der Werf — author of The Chansons of the Troubadours and Trouvères and other books on both the secular and sacred medieval repertoire — is best known for his radical questioning of traditional assumptions about medieval music transmission.

In his second visit to Melbourne in five months, Professor van der Werf says he finds the intellectual environment in Australia exciting because of the opportunity for dialogue between different disciplines.

The workshop, from 25 to 27 February, will combine many disciplines including history, visual arts and Italian.

Dr Mews, an Australian Research Council grant recipient, is to speak about the influence of thinking about music in the Middle Ages. He is particularly interested in the ideas developed by a visionary of the 12th century, Hildegard of Bingen (1098-1179). Dr Williams has been studying an 11th century manuscript containing a treatise on music written by Boethius in the fifth century, and another on polyphony, written in the ninth.

In association with the workshop, Hildegard of Bingen’s Odo’s Virtus is to be performed by Viriditas at Trinity College Chapel, Parkville, on 26 and 28 February at 8 pm.

Research Bulletin

New angle on HIV study

A multimedia system for modelling AIDS biology is set to provide researchers with a new means of studying the HIV virus.

Computational Tools for Biological Research, a joint project between Monash University, the University of Milan and the Macfarlane Burnet Centre for Medical Research, will provide research biologists for the first time with a means of interacting visually with a model of the AIDS infection process.

According to information scientist and coinventor, Mr Henry Linger, of the Department of Information Systems, Caulfield campus, the new system has no parallel anywhere in the world.

The program — which consists of the latest documentary and animated information on AIDS — allows biologists to navigate the course of the HIV virus, from primary infection to its later stages.

An initial overview depicts the methods of infection and means of virus integration. Each process of the disease is described in full and shown as a node on the computer screen.

At each stage, users may also watch a fully animated version of the infection on an accompanying screen. The level of detail here may also be selected.

In time, says Mr Linger, biologists will even be able to use the program to conduct experiments on the computer model. A prototype of the program was demonstrated successfully at the Seventh International AIDS Conference, held in Florence in June.

China’s waste dilemma

Waste water treatment in China could soon benefit from work done at Monash into a lowcost, lowtech alternative to modern sewage treatment plants.

Monash water pollution expert Mr Tom Davies, a senior lecturer in chemistry at the university’s Caulfield campus, was one of two foreigners invited to attend a wetland conference in Shenzhen last year. The wetland seminar was attended by about 80 delegates from universities and government agencies throughout China.

Mr Davies has been experimenting with reed bed purification systems — a sort of artificial wetland which removes biological waste. Research Monash reported last year on the technique which uses a biological partnership between plant thistles (rootlike subterranean stems) and bacteria to trap and digest the wastes that remain suspended in the water after primary settling treatment.

"Two papers on our constructed wetlands work were given at the conference in English with a Chinese interpreter translating into Chinese," Mr Davies said.

"They were well received and the technical information will be helpful in the application of constructed wetlands in China."

In addition, he gave two lectures to scientific and engineering staff of the South China Institute for Environmental Sciences, which conducts environmental investigations, designs waste water treatment systems and conducts research using pilot-scale constructed wetlands.

"Although the first constructed wetland in China was built early in 1990, there are about 70 small units either being constructed or at the design stage," he said.

"The Chinese people have a great need for western knowledge to prevent and solve environmental problems which are just starting to show."

Mr Davies said problems had been caused by the rapid expansion of population and manufacturing, particularly in the new Economic Zones where foreign capital is welcomed for huge joint ventures.

"Much manufacturing already has been transferred from Hong Kong, resulting in large numbers of people from the north relocating in these special zones," he said.
\section*{Science teaching award}

Mrs Christine Redman (below), a graduate of the School of Early Childhood and Primary Education, has won a $15,000 BHP Science Teacher Award. The award was for her work at Somers Primary School and at other schools on the Mornington Peninsula. She was one of four national recipients, recognised for their efforts to support, contribute to and improve the teaching of science in Australian schools.

Mrs Redman completed her BEd after taking a Diploma of Teaching (Primary) at Frankston, and is taking a MEd by research and thesis at Monash.

"The award acknowledges my attempts to facilitate science teaching in primary schools," she said.

\section*{Libraries honoured}

Three Monash libraries have been presented with certificates from the National Library of Australia, recognising their length of service and cooperation with other Australian libraries.

A senior representative from each library accepted a certificate from Director of the National Library of Australia's Network Services Branch, Mr Warwick Cather, at a ceremony late last year at the Royal Melbourne Institute of Technology.

The libraries are the Monash University Library, Caulfield-Frankston branch; the Monash University College Gippsland Library; and the Victorian College of Pharmacy Library.

Accepting the awards were Caulfield-Frankston cataloguing supervisor Ms Jean Tindall, MUCG cataloguing librarian, Ms Kay Steel, and VCP librarian, Mr Robert Thomas. The certificate honours the libraries for 10 years of contribution to the Australian Bibliographic Network.

\section*{Publication medal}

Mr Stuart Boucher (above left), an MA student from the Department of Geography and Environmental Science, has been awarded the Australian Society of Soil Science Publication Medal for 1991. He is pictured with the director of the Graduate School of Environmental Science, Professor Martin Williams.

He received the award for his monograph 'Field tunnel erosion: its characteristics and amelioration', published by his department and the Department of Conservation and Environment.

\section*{Chinese New Year}

The 1992 Chinese New Year — the year of the monkey — was celebrated on 4 February by the Centre for International Students (CIS), Caulfield campus.

CIS administrative officer, Ms Danielle Boucher (above left), an MA student from the Department of Asian Languages and Asian migration and trade with Australia increasing, a $1000 travel scholarship.

A Monash science graduate, he holds a postgraduate diploma in tourism management. He said with Asian migration and trade with Australia increasing, a master's in Asian studies would be of great use.

"Although English is the most widely used language for international business, it is important to know the customs of the country you are doing business with," Mr Holdaway said. "Living in a country is very important for picking up these things."

\section*{Science summer}

Almost 200 secondary students from the metropolitan area and schools in NSW, Tasmania and country Victoria attended a science summer school at Clayton campus last month.

The school for students beginning Year 10 was organised by the Australian Science Industries Association, Rotary and the Faculty of Science.

Its aim was to introduce students to the range of courses leading to careers in science and engineering.

Students attended lectures by Monash academic staff, including Associate Professor Ray Cas of the Earth Sciences department and Associate Professor Jim Dickson of the Chemistry department. They took part in laboratory work and excursions to CSIRO, Telecom, Dulux and BHP.

Pictured with students in the Year 10 Graphic Design class are (below, from left) Rotary district governor Mr Bruce Whitaker, Rotary representative Mr George Nixon, and physics lecturer Dr David Mills.

\section*{Graphics summer}

A computers and graphics summer school, sponsored by Australian Paper Manufacturers and the Gippsland paper industry, was attended this month by 25 students from eight regional high schools.

The school for secondary students about to enter Year 11 was conducted by the Digital Imaging Applications Centre (DIAC) at Gippsland campus.

Over four days, students were introduced to a wide range of modern computer software and hardware.

DIAC director Professor Ken Sprigg (above, front right) said the emphasis of the course was to learn while having fun. "Each segment involved a hands-on activity, a target product and a competition between the students," he said.

Activities included a computer graphics poster competition, mathematical computer games, a competition to identify components of a dismantled computer, a physics problem developed in a maths design package and a spatial orientation computer game.
**Recording Koorie dance**

Introducing secondary students to Aboriginal music and dance is the main aim of a unique educational package from the Centre for Continuing Education.

The package is a general introduction to Aboriginal music and dance with emphasis on the owners, the practitioners, their beliefs and environments. It has been written for educators, especially those who teach music and dance, Australian studies and social studies in secondary schools.

**Music and Dance in Aboriginal culture** was launched last month by the Deputy Premier and Minister for the Arts, Mr Jim Kennan, at the 6th Asian-Pacific Conference of Arts Educators at Frankston campus.

The author of the package is Dr Alice Moyle, the first student to gain a PhD in musicology at Monash. She is now researching Aboriginal music as an honourary visiting fellow at Australian Institute of Aboriginal and Torres Strait Islander Studies, Canberra.

The package includes Dr Moyle’s annotated sound recordings, collected during many research trips to the Northern Territory, north Queensland and Western Australia’s Kimberley districts. The traditional songs on two audio cassettes are for learning and accompanying dance steps.

A video cassette contains selected film clips of traditional dancing and five illustrated talks, and teacher and student handbooks are also included.

For more information, contact the Centre for Continuing Education, Frankston campus, on extn 74 4240.

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**Cheap thrills of yesteryear**

Seekers of thrilling fiction in the late 19th century often turned to tales between the covers of yellowbacks to pass idle hours while travelling.

Yellowbacks — so called because of their yellow cardboard covers — were known for their lurid pictures and sensational stories. According to rare books librarian, Mr Richard Overell, they were the down-market paperbacks of the day and were more or less disposable.

The books sprang up in response to the introduction of rail travel in the UK in the 1840s. Cheap series were written to cater for this new breed of traveller and sold in railway station bookstalls.

“The titles published in this form, and later as yellowbacks, were usually light reading but also contained non-fiction and literary classics,” Mr Overell said. Their appeal lay in their low price and in their distinctive covers.

The standard yellowback cost two shillings, much cheaper than the 31/6d charged for “three-deckers”, the typical three-volume Victorian novel, or the five shillings for the single volume editions,” he said.

“The cover scenes were often lurid and must have caused the yellowbacks to stand out from the more expensive cloth-covered books of the period,” Mr Overell said.

Yellowbacks were on display on the first floor of the Main Library, Clayton campus, are all from the rare books collection. The exhibition runs until the end of March.

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**Comic warns youth on drinking dangers**

Rosa, Con, Geoff, and Jodie are normal teenagers feeling the weight of peer group pressure. They are also a major part of a new Monash and YMCA initiative entitled Thinking about drinking.

The national awareness campaign informs teenagers about the dangers of alcohol abuse. It aims to minimise the personal and social harm resulting from excessive drinking.

A comic, produced by the YMCA and the Centre for Continuing Education in Monash’s Education Faculty, spearheads the campaign.

“Professionals and parents need more assistance in educating young people on this topic,” the director of the Centre for Continuing Education, Mr Dale Ingamells, said.

Aimed at increasing the safety of teenagers in social situations, the comic uses characters based on real people to outline health risks from alcohol abuse and problems of peer pressure and how to cope.

A number of themes are presented with various focal points and teaching techniques. The project emphasises that there are alternatives to alcohol use for coping with pressure, stress and in leisure time. The development of the program involved teenagers from the Frankston area who modelled for the drawings, suggested plots and advised on dialogue and clothing.

Before its release, the comic was evaluated in about 12 Victorian schools. A detailed questionnaire was distributed to students in the target age group, and to teachers, police and other professionals.

The evaluation was carried out by Monash University and funded by the National Campaign Against Drug Abuse. Monash will continue to play an active role in the project through its distribution of the Thinking about drinking comic and resource kit.

The finished product was endorsed by Victoria Police Chief Commissioner, Mr Kel Glare, at the launch last year. The Thinking about drinking material will be introduced in the Police in Schools program this year.

For further information, contact the Centre for Continuing Education on extn 74 4240.

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**Language study crosses spheres**

The science of language in Australia has taken a strange turn over recent years.

According to the head of the linguistics department at Monash, Professor Michael Clyne, about 75 per cent of professional linguists now work in departments other than linguistics.

This piece of information, contained in a new book edited by Professor Clyne, means that representation of linguistics in our tertiary institutions is often underestimated. But, judging by the contents of Linguistics in Australia: Trends in research, the work of the subject’s practitioners is not.

The chapters trace the rapid development of the discipline in recent years, particularly during the late 1980s when in the space of two and a half years six professors of linguistics were appointed and the National Languages Institute of Australia established.

Given such growth, and the recent spate of amalgamations, it was time to consider exactly where the study of linguistics in Australia was going. Professor Clyne said.

"Among the most important challenges facing linguists is the demonstration of the significance of their discipline to most other spheres of life and learning, and to prepare for the effects on language and communication of the advent of fifth-generation computers," he said.

Linguistics in Australia: Trends in research consists of contributions from some of the country’s most influential linguists. It covers the gamut of language study, from Australian English and Australian Aboriginal languages to Australian studies of other languages, and first and second language acquisition. Also included are chapters on linguistic theory and languages and language policy in Australia.
The old Soviet Union is dead, but its former republics are very much alive. They are now independent, each with its own political, social, and economic problems. Their emergence from colonial oblivion after 70 years of Soviet domination — and, in many cases, centuries of tsarist domination before that — poses a complex task for what used to be the discipline of Soviet studies.

Gone are the neat and seemingly unitary objects of study; vast and variegated, but unified by their historical and cultural profiles, resources and mixes of ethnic groups. The emergence of post-Soviet studies expert — all but meaningless.

Furthermore, the profession of Sovietology is at a crossroads. At the height of the Cold War, the Centre was dominated by centralized control, and the Centre's thumb, and many scholars did not even suspect the grass-roots rejection of authoritarianism. Now, however, for that is when the real work begins. The whole fabric of workaday life is being torn down. Jobs and reputations are sliced, and the former Soviet Union: not merely national, but also mass and cultural, economic, bureaucratic, and military.

Perhaps there should have been more consideration of such difficult questions as which values were strong or weak, and what various groups actually believed and desired. But the profession did fail, by and large, to discuss the possibility of what happened, and to subject it to scrutiny. The collapse of the old European State system in the late 1980s was not a total surprise.

In retrospect, one might argue Sovietology of having inquired too little into the various cultures of the old Soviet Union: not merely national, but also mass and cultural, economic, bureaucratic, and military.

by Marko Pavlyshyn

DI OGEN ES

A first-rate holiday, Ernest Hemingway once said, should be like a fishing trip without the bait. He then recounted once more, declaring, "It could be compared to a hunting expedition minus the artillery.

Hemingway may have known a lot about machines, but he knew very little about a few days off.

Had he lived long enough to discover that busman's holiday was phlegmatically titled "the conference", Papa would have been on even shakier ground. The new wave holiday, designed especially for skiers and sunbathers, may have been beyond even his powers of comprehension.

The conference, at least the way it is practiced in this country during the summer, seems to be an exercise in lack of exercise, always held within dosing distance of a swimming pool. The ambient temperature hovers at 29 degree mark, dropping off to 20 degrees at night. The vegetation is always lush, the river beside the conference hotel wide, and the taxis cheap.

Timetabling is important. Sessions should start at 10 am and then disintegrate until the only person left standing at 1 pm is the audio technician with a faulty mike and a pocketful of flat batteries. No one turns up for the after-lunch sessions on principle.

Dinners are always well attended, however, for that is when the real work is done. Business cards are shuffled and exchanged, confidences swapped, lies told, and trysts are broken.

The whole fabric of workaday life is laid bare, and, under the authority of two or three cocktails resembling liquid Hawaiian tee-shirts, participants talk to the thing with a knife.

Jobs and reputations are sliced, and the pieces kicked under tables. At 2 am, delegates walk home on a cloud of alcohol. It is messy and complicated.

The next day, when the whole shebang is scheduled to begin, most people have lost sight of not only their reason for being there but also their reason for being. By this stage it has become even messier and more difficult. Twenty per cent of participants have forgotten they are married, and another 20 per cent are trying very hard to do the same.

The morning after the dinner is not attractive. It is like a scene from a Fellini movie — everyone knows they have to be somewhere, but no one is quite sure why.

Wholesale memory loss sets in, until one by one conference satchels are recovered from bins and their contents inspected.

But by this time the conference is over. The colourful tourist train is still whizzing around the site, compete for reading time during the first session that day. By lunch, most participants have booked a cruise on the river.

That evening they are gambling on the coast. The following morning they are far away. The only person left at the hotel is a besotted technician clutching a dead microphone.

Russian studies need to be maintained and developed. Naturally, this is a program for the discipline world wide, not all parts can be implemented at every Australian university. But we should at least be aware of the scope of the assignment, and have a view about its ideal level of implementation.

Furthermore, post-Soviet studies might benefit from the emerging model of European studies, which are inter-disciplinary, cultural, and social science in their approach, and oriented especially toward the understanding of contemporary processes. The recognition and interpretation of common patterns, and the study of inter-relationships need to be balanced by a sharp focus on the new independent states.

Finally, post-Soviet studies must be post-colonial, both in their intellectual purview and in their ethos. They must recognize that the new nation-states will have to come to terms with a heritage both totalitarian and imperial. Although scholarship (however object) can be valuable, it might do worse than sympathise with its object at least as much as liberal scholarship in the West does toward the post-colonial aspirations of its former colonies.

It goes without saying that one of the most effective pragmatic ways to initiate such developments is personal contact between scholars of like disciplines: contact that is not limited to the privileged elites of the old imperial centres. We should welcome academic visitors from various parts of the former Union and make provision for their economic situation.

We should make the effort to establish links of our own. Monash has been something of an Australian pioneer in this respect, hosting long-term aca­demics from Ukraine and Russia through its Ukrainian Studies Centre. Through the Centre for Comparative Literature and Cultural Studies, the university has initiated a collaborative research project on environmentalism and culture in Europe involving research throughout the former Union.

There is, of course, room for a great deal more to be done.

The first conference of the Ukrainian Studies Association of Australia was held at Monash last month. Sixty participants attended, including five scholars from Ukraine and three from North America. Participants included the president of the International Association for Ukrainian Studies, Professor George B. Smolyaninov of Harvard University and President of the Association of Ukrainian Studies in Ukraine, Mr Ivan Dusha.

Dr Marko Pavlyshyn is a senior lecturer in the Department of German and Slavic Studies.