Health care for disabled moved to community clinics

A specialised health unit for people with intellectual disabilities - the first of its kind in Australia - is to be set up at Monash University.

Funding for the unit, will be provided by the state government as part of a unique medical services agreement.

Under the agreement, funds now used to employ medical officers in institutions, will be redirected to the departments of community medicine at Monash and Melbourne universities to help develop expertise in medical practice for the intellectually disabled, as well as to undertake research and education.

Over three years about $750,000 will be made available. The agreement was signed last week by the Minister for Community Services, Ms Kay Setches, the Deputy Dean of the Faculty of Medicine, Professor Denis Lowther, and Head of the Department of Community Medicine, Professor Neil Carson.

The head of the Department of Community Medicine, Professor Neil Carson, said the new unit would provide health care for the intellectually disabled "in a very broad way".

"We propose to set up a consultancy service for general practitioners and the families of these patients, and to develop the special skills needed to care for them in the community," he said.

"A major problem will be dealing with health problems with psychosocial overtones, such as family difficulties."

The department's educational role would be to highlight the awareness of GPs and undergraduates about the health problems of people with intellectual disabilities, as well as to improve community awareness.

Research would identify existing inequalities and particular problems of the intellectually disabled, and perhaps look at ways in which medical education needs to be modified to take these into account.

Monash shirts suit everyone body to a T

A new range of Monash University T-shirts is now on sale - and selling briskly. The first batch of 200 T-shirts has almost sold out but new stock is on the way.

In the style of US college clothing, the Monash T-shirt is available in grey or white, with the design in blue and pale blue, or red and yellow. Sizes are medium, large and extra large.

The T-shirts are on sale at the Union shop, ground floor, Union building for $20.

A range of hooded T-shirts is expected to be available in April.

Inside RESEARCH

1. The greening of agrochemicals
2. Putting friendly bugs in the system
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4. Getting teeth into animal design
A ceremonial tapa mat from Tonga now has pride of place in the Development Studies Centre.

The mat was presented to the director of the centre, Mr John McKay, and reader in politics, Dr David Goldsworthy, by librarians, Ms Gayle Whyte and Mr Jeffrey Bender, who spent two years in Tonga.

“We wanted to express our thanks for all the support we received from the centre when we decided to join the Australian Volunteers Abroad Program,” Ms Whyte said.

Tapa cloth is made from the bark of the paper mulberry. The mats are used at weddings, funerals, royal occasions and are given as ceremonial gifts.

Pictured with the mat (from left) are Mr Bender, Mr McKay, Miss Vi Finau, Miss Sela Cunninham and Ms Whyte.

CLAYTON

Executive director of the Public Sector Management Institute, Professor Bill Russell, has been appointed to a State Government panel which is to review the efficiency of the public health system.

It will investigate the administration of the public health system with particular emphasis on duplication of services, existing networks of community care, the accountability of health agencies, health promotion in Victoria, and community participation in decision making.

Headed by the executive director of the Preston and Northcote Community Hospital, Dr Ian Brand, the three-member review panel will report to the Minister of Health, Mrs Maureen Lyster, in December.

Second year medical student Ms Sophie Morris (pictured below) has added the Brighton Council’s Australia Day Young Citizen Award to her recent sporting achievements.

Ms Morris, 18, was nominated by Firbank Anglican School, where she was a prefect and member of the debating team, for her scholastic and sporting efforts.

She has been involved in sailing since the age of six, and has been a member of the Royal Brighton Yacht Club for eight years.

In January last year she won the Australian 420 Women’s Championship.

She later competed in the international 420 competition in Japan, finishing in the middle of the field.

The Royal Brighton Yacht Club has named her its Yachtsman of the Year.

This year she hopes to sail Olympic-size 470 boats while continuing her medical studies.

CAULFIELD

Professor Ramez Elmasri of the University of Texas, Arlington, conducted a seminar on database design at Caulfield campus last month.

Professor Elmasri is involved in research into temporal databases and improving database design. He is the author of a database textbook used by more than 150 universities in the US.

The seminar was organised by the database special interest group.

Research fellow, Ms Ann Capling, of the Public Sector Management Institute, is a joint winner of the Canadian Airlines International Canadian Studies Award for 1998.

Ms Capling, who is also attached to the Federalism Research Centre at the Australian National University in Canberra, will undertake two research projects: ‘Beyond the protective state: National policy-making in Canada and Australia’ and ‘The organisation and financing of the progressive conservative party of Canada between 1920 and 1960’.

The Canadian Airlines International Awards promote links between Australian and Canadian academics.
Computer graphics research, teaching boosted

Monash's international reputation in state-of-the-art computer imaging techniques has been recognised by the formation of a new centre for teaching, research and industry consultation.

A grant of almost $1 million from the Victorian Education Foundation this year launched the Victorian Centre for Image Processing and Graphics (CIPAG).

The centre, staffed by six academics from the Department of Computer Science, will provide educational, consultative and research opportunities for Victorian industry in all areas of computer imaging.

It aims to improve the quality and extent of liaison between tertiary education and industry in Victoria on several fronts including providing advice on specific problems, evaluation of equipment and products, and a referral service.

A teaching laboratory with 15 Silicon Graphics work stations has been set up and a second laboratory will be commissioned by next year. The existing computer imaging research laboratory, established by the department in 1986, will be used for research projects.

This year CIPAG will provide short courses for industry in computer-aided design and digital image processing. This is in addition to the undergraduate degree curriculum.

Postgraduate research degrees will be supervised by the centre in conjunction with industry, and postgraduate coursework qualifications will be introduced soon.

Research projects already under way include fast shading techniques for three-dimensional objects, fast animation algorithms, automated analysis of shape and texture and parallel image processing algorithms.

Results from this research already have been used in remote sensing, biomedical imaging and scientific visualisation.

A successful joint research project has been investigating an innovative way to reduce the amount memory space needed for storing digital computer images.

Storage space is an important issue in computer imaging because of the widespread use of large amounts of data such as high-definition pictures, complex technical drawings, multi-dimensional images and video sequences.

The new technique, known as context coding, is able to compress typical images to occupy less than two-thirds of the space that previous techniques achieved.

The leader of the four-person research team, Dr Peter Tischer, said user expectations and the demand for improved picture quality were increasing.

In many imaging applications, such as technical drawings and documentation preparation, very little image degradation could be tolerated, he said.

Dr Tischer said plans were under way to rephase the technique to suit other applications such as the storage of three-dimensional satellite, medical and seismic images and to cater for the compression of TV transmissions.

"It is also seen as a good prospect for compact disk read only memory (CD-ROM) image storage, for which effective standards are not very well defined," he said.

"Our algorithm is very simple but involves massive amounts of computational work. As little as five years ago it would have been considered impractical."

Staff sought for career development

Wanted: 20 perfectionists to improve career prospects part-time.

The Director of the Higher Education Advisory & Research Unit (HEARD), Professor Terry Hore, is seeking highly motivated academic staff to take part in Monash's new professional development program.

"The people enrolling in the program are some of our best and brightest. They are enthusiastic and keen, with a commitment to excellence," Professor Hore said.

He said the $220,000 pilot program, funded by the Federal Government, would enhance Monash's teaching and research reputation.

The two-and-a-half day a week course over five months covers all aspects of research, teaching and administration.

Subjects include curriculum design and evaluation, staff appraisal, research design, analysis and administration, plus graduate student supervision.

As well as course material, each participant will prepare a research proposal, redesign a course of lectures, tutorials or laboratory exercise and make a presentation to a school or community group.

"This program is demanding," Professor Hore said. "Participants need to be able to commit themselves to the program, and we'll be covering the cost of replacement staff in their workplace."

"However, it is also important for the participants to stay in touch with their normal responsibilities."

That way, they can apply the techniques they learn during the program. We want the course to be interactive and relevant to their daily duties."

The program is open to staff from all faculties, departments and schools on all campuses. The course begins in July and applications close on 31 March. For more information, contact Professor Hore on 75 2509.

11 March 1991
Students move back to the 19th century

A 19th century mansion will be home to 80 Caulfield campus students this year.

Monash University is buying the historic Frank Tate House from the Ministry of Education as a hall of residence. The mansion, on Dandenong Road, Armadale, only a few minutes from the Caulfield campus, is characterised by fine fixtures and fittings, including fire surrounds in most main rooms, a carved wooden staircase, and marble floors. The mansion has 41 bedrooms and 25 bathrooms.

Professor Keye, who was in Australia last month as part of Monash Medical Centre's visiting professor program, was speaking on "PMS: just have to put up with it - or do you?", at an evening session organised by the university's Centre for Reproductive Biology.

A respected obstetrician and gynaecologist, Professor Keye is head of the Division of Reproductive Endocrinology at the William Beaumont Hospital in Michigan. He is known for his research and publications on the emotional and psychological effects of infertility, menopause and PMS.

Inspired by an overwhelming response to an article on PMS symptoms, written by a journalist friend for an American women's magazine, Professor Keye decided on a career in PMS research. In his address Professor Keye dispelled notions that PMS is a myth, or an excuse for unacceptable behaviour. He urged women to "manage the problem, not be victimised by it."

Holistic approach

He promotes a holistic approach to managing PMS, and believes more rigorous therapies should be considered only if symptoms interfere with the quality of life.

His patients compile a chart of symptoms and dates, which must be kept for several months, to establish a correlation between menstruation and day-to-day symptoms. The chart is then presented to his patient, who can then identify changes in diet and lifestyle that might help to reduce symptoms.

Preserving history

What makes a building historic?

Graeme Davison, Professor of History, explains the how and why of preserving historic buildings in his latest book, A Heritage Handbook.

According to Professor Davison, joint editor of the book, many people are interested in preserving historic buildings or wish to understand the history of their own towns or suburbs, but are baffled by the technical language and legal complexities.

A Heritage Handbook is a guide to heritage issues in Australia. It explains how the idea of "heritage" developed and outlines the recent history of the Australia heritage movement. The book also provides a comprehensive review of heritage legislation in each state and the Commonwealth and shows, through a series of case studies, how major heritage issues have been contested and resolved.

The handbook also provides guidelines for researching the history of your own home, interpreting a historic site, determining the historic value of a building and presenting a case to a local planning authority. Historic technology is explained.

The greening of agrochemicals

Concern is growing about the effects of agricultural chemicals on the environment and in food. Dr Gottfried Lichti is developing a new generation of environmentally benign chemicals.

By the mid 1990s, some 90 per cent of the agrochemicals in use today will be out of patent. Companies will be at liberty to take the basic compounds and develop new formulations for the market. Given increasing concern about the impact of agrochemicals on the environment, the emphasis will be on developing more environmentally benign versions of today’s compounds.

The ideal agrochemical is one that can be applied at the lowest possible concentration, remains where it is needed for as long as it is needed, leaves little or no residues once it has done its job, and is easily handled by farmers with minimum risk to their own health.

Chemist Dr Gottfried Lichti, who heads Monash University’s new Controlled Release Sciences Group, believes Australia can develop a lucrative new agrochemical industry, based on controlled-release formulations developed by his research group. The chemicals will be bound to organic materials chosen for being cheap and readily available, and which will decompose naturally when the chemicals they carry have been exhausted.

Dr Lichti, who is employed by Daratech, the commercial arm of Victoria’s Department of Agriculture and Rural Affairs, says the most profitable products will be those that are used in intact microbe such as an insect-killing bacterium or fungus.

He says the active substance does not have to be a chemical – it could be a protein, an insect pheromone, or an intact microbe such as an insect-killing bacterium or fungus.

“The problem is how to improve the active ingredient’s activity using controlled-release technology,” Dr Lichti says. “Whereas the basic principle remains the same, that is, to enclose the active ingredient in a skin, membrane or matrix, the next step must be very specific to the structure and behaviour of the ingredient, and the type of problem you are attempting to solve.

“If you have a volatile herbicide, for example, the strategy for making a less volatile controlled-release product is totally different to the approach you would use for a herbicide whose weakness is that it leaches into ground water.

“An insecticide may be applied to the leaves of a crop, so the aim is to develop something that is rain-fast. Rain-fastness may be a total non-issue with pre-emergent herbicides, where you may want it to rain so that the herbicide is incorporated in the soil.

“The science, the skill and the art enter here, because not only do we have to surround the active ingredient with the right material, but for any broad-acre agriculture application, we have to meet stringent cost-benefit criteria.

“If you are developing a human medicine, it may be that you can spend $100 on a controlled release version of some active pharmaceutical. But in agriculture, where the typical price of a pesticide or herbicide is $10 per kilogram, there is no point in having a controlled-release version at $30 per kilo, even if it is superior.

“This places severe restrictions on the technology. One of the strengths of our group is that we have worked within this constraint, using only those substances that meet this criterion. We are exploring natural organic materials that break down naturally in the environment. It’s a bottom-up approach.”

Dr Lichti says the future for his new agrochemicals is “frightening”.

In its existing liquid formulation, the spray tends to stick to stubble. With the increasing popularity of minimal tillage techniques, where the stubble is left standing after harvest, much of the herbicide may stick to the stubble before it can reach the soil, and control weed infestation.

The current Trifluralin formulation employs a volatile hydrocarbon solvent that escapes into the atmosphere and contributes to the greenhouse effect. Dr Lichti describes the total solvent discharge to the atmosphere worldwide as “frightening”. The cans in which the concentrate is sold can create a waste disposal problem on farms using large quantities.

Trifluralin is a pre-emergent herbicide, that is applied to the soil before the crop germinates in order to kill weeds. It is very effective, but not always easy to apply. Over-application leaves residues that can depress the growth and yield of crops such as wheat and kapokseed.

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Putting friendly bugs in the system

An ecological chain reaction can be set off by the nutrients in sewage waste water. A Monash research group has been working on a system to remove phosphates from sewage biologically.

In the driest inhabited continent, water is a precious and sometimes scarce commodity. Disposing of waste water from sewage treatment plants can be a problem, particularly in country centres where residual nutrients in the discharged water can cause algal blooms in rivers, lakes and streams.

Some algal blooms produce toxic compounds which render the water unfit for human and animal use. After they exhaust nutrients, the algae die, and if the growth has been prolific, their decomposition removes oxygen from the water, killing fish and other aquatic organisms.

In addition, the discharge of nutrients, such as phosphate and nitrates, into bodies of water may result in eutrophication, leading to large economic losses through its impact on tourism.

Removing phosphate from sewage poses particular problems. Sewage treatment works have traditionally employed chemical precipitation, which involves adding the phosphate with iron or aluminium salts. The method is costly, and unavoidably adds traces of salinity to the effluent already in the water waste stream. The phosphates removed from the water form a slimy sludge that makes transport and disposal difficult.

For the past seven years, a research group led by Professor Ron Bayly and Dr John May in the Microbiology Department has been working with scientists from the CSIRO Division of Chemicals and Polymers on an alternative method of removing phosphate from water — one that relies upon a biological system for removing phosphates from sewage.

In 1975 engineers in South Africa carrying out research on sewage treatment, reported an unusual phenomenon: something in the sludge was removing significant quantities of phosphates from the waste stream independently of the conventional chemical treatment. Interestingly, the phenomenon seemed to be associated with episodes when machinery used to aerate the sewage was not functioning, suggesting that some anaerobic mechanism was responsible.

CSIRO scientist Mr Bill Raper approached Dr Bayly to investigate the microbiological mechanism responsible. Professor Bayly is a specialist in the genetics and physiology of microbes in the pipeline effectively becomes anaerobic. This seems to improve the phosphate-removal capacity of the Acinetobacter in the plant.

Typically, domestic sewage contains 10–12 milligrams of phosphate per litre. Before effluent is discharged, this level is reduced to no more than 1–2 milligrams per litre.

Professor Bayly said that mechanisms of synthesis of polyphosphate in sewage treatment systems was still the subject of detailed research. It required an unusual series of anaerobic and aerobic recycling processes involving the strict anaerobic Acinetobacter and a range of other bacteria.

In the anaerobic zone at the head of the system, anaerobic microbes synthesise carbon-rich compounds known as volatile fatty acids which were taken up by the Acinetobacter and converted to a storage compound, polyhydroxybutyric acid (PHB).

The energy for the latter reaction is obtained from the high energy bonds of the polyphosphate formed in Acinetobacter in the aerobic zone before they are recycled to the anaerobic phase. When the Acinetobacter pass from the anaerobic to the aerobic zone of the system, they use the PHB as a source of carbon and energy, and synthesise polyphosphate from the phosphate in the sewage.

Results from research in this area has enabled the Monash group to propose a mechanism for the synthesis of polyphosphate different to that which has been accepted previously.

It is easy to see how Acinetobacter can act virtually as a partner for itself in a looped aerobic-anaerobic system. Professor Bayly says the system installed at Ballarat bleeds off some 10 per cent of the bacteria after the aerobic stage, thus removing the phosphate. The remainder are recycled back into the anaerobic stage to keep the energy cycle going.

Most bacteria have plasmids — special loops of DNA. These function as a sort of Batman's utility belt, allowing the cells to synthesise enzymes needed to carry out specialised functions such as to degrade toxic chemicals or antibi­otics encountered in their environment.

Many Acinetobacter isolates carry several different plasmids. The presence of some of these may be the reason why such microbes function so well to remove phosphate in modified sewage treatment systems.

As with all biological systems, and particularly with sewage systems that employ biological treatment, the bacteria may be temperamental. For poorly understood reasons, their performance may drop off suddenly, or enter a period of slow decline before recovering spontaneously.

Problems of a short-term nature are usually due to mechanical malfunctions that take the environment of outside the bounds that are optimal for bacterial activity.

Professor Bayly believes that the slow decline in activity in phosphate removal is probably due to genetic mechanisms that may be a response to changes in the environment or competitive effects. The research team is studying the genetics of Acinetobacter, focusing on plasmid genes, to understand what is going on.

The problem is to detect the onset of the genetic decline as early as possible, so that the plant can be kept running at an efficient level. Professor Baylly's team is working to develop DNA probes so the presence of an adequate number of relevant Acinetobacter can be monitored.

That is not proving easy, because studies so far have not detected any differences in enzyme activity between active and inactive strains.

Meanwhile, the new technology is already moving into commercial use. The Ballarat South Water Board's treatment works was modified in 1989 for biological removal of phosphate and is now performing satisfactorily.

Monash and CSIRO have been collaborating with another group led by Dr Bob Seviour of the University College of Northern Victoria in Bendigo. Dr Seviour's group has been working with the Bendigo Water Board for the past four years on a pilot study of the technology. The board now is moving into the final stages of building a $20 million plant to remove phosphate biologically.

The plant, which will treat 20 megalitres of effluent a day, is due to come into operation by May. In the early stages, microbiologists, chemists and engineers will be attempting to optimise the rate of decomposition of sewage treatment — new and traditional — so that they are efficiently integrated and work at a normal level.

The Monash-CSIRO group's research is well supported through sponsorship and research grants. Sinclair Knight and Partners, the contractors for the Bendigo plant, are co-sponsors of the Bendigo project, along with the Australian Water Research Advisory Council, which supported much of the early research at the university and at CSIRO.
Reaching towards a robot reality

Robots still have a way to go to catch up to their science fiction image. But Professor Ray Jarvis believes it won't be long before robots are working in industry, agriculture, and even in the home.

A long, long time ago, in a galaxy far away, the popular 'Star Wars' humanoid robot Cee-Threeepo (C-3PO) walked, viewed the world in colour stereovision, reacted to environmental stimuli, displayed human emotions and, just for good measure, communicated fluently in a million languages. Many millennia later, on a more familiar blue planet, there are robots that lack all the major senses, except in forming the most simple tasks. Like babies, they tend to get lost and blunder into objects.

At the real world, robots are just beginning to find their technological feet. "The field is in its infancy," says Professor Ray Jarvis, director of Monash University's Intelligent Robotics Research Centre. "But the technology is starting to catch up - we can now do some of the things we only dreamed of doing a few years ago."

"It's exciting because there is enormous potential for creative experiments and scientific endeavour. There is lots of room for lateral thinking and bright ideas. That makes it interesting for students."

At the Intelligent Robotics Research Centre, Professor Jarvis and his team of six academic researchers, five students and five support staff are focusing on two difficult technical challenges - robot perception and robot navigation.

"The centre is concentrating on two aspects of machine perception - vision and touch. A robot must be able to see, and sometimes recognize objects in its environment, before it can accomplish any task."

After recognising an object, a robot may be required to pick it up or manipulate it - in human terms, it requires hand-eye coordination.

Its mechanical hands must be properly positioned, and must tell the robot's computer brain that contact has been made. The robot must grasp the object correctly, and with appropriate pressure, to avoid damaging or mishandling it.

Professor Jarvis's team has been experimenting with video cameras, using them at least two at a time to simulate binocular vision.

A typical two-dimensional colour video image contains 512 X 512 pixels, each with 24 bits of colour information. A single image contains some 77 million bytes of information. New frames must be stored and analysed many times a second if the robot is to function in "real time."

"The data tends to be vast," Professor Jarvis explains. "So we employ a technique called segmentation, which involves breaking the data down into large chunks that hopefully correspond to recognisable entities in each image.

"The computer extracts features of the components, looking for particular patterns that correspond with descriptions in its memory. We end up with a scene description, which answers questions like what and where things are."

"The next step in task planning, followed by trajectory/obstacle avoidance planning, is then translated for motion control, which delivers the instructions to the servo motors that control the robot's actions and movements.

"Each step is a research topic in its own right, and computer-intensive. Then the whole system must be integrated."

Professor Jarvis says that putting the components together takes a lot of time, and compromises must be made to achieve reasonable performance.

"We do our best, but there is only a certain amount of time that one can devote to computational analysis at each step, without making the robot too slow to be of any use," he says. "A lot of the frustration is that we may know of good methods, but are not able to meet realistic time constraints with them."

It is possible to achieve useful solutions by restricting the domain of applicability - we limit the robot to specific environments. If it's working in a nuts-and-bolts environment, it doesn't go looking for eggs and cats.

Ultimately, we and other groups are trying to push towards more general capabilities in robots. We know it's not impossible because we humans do it every day."

The problem is that so little is known about how human sensory systems work. Professor Jarvis says his team often uses biological systems as inspiration, for example the use of stereopsis for range-finding. By analysing disparities between left and right images of the same scene, as viewed by two video cameras, it is possible to determine the distance to particular objects.

But there are alternative ways to obtain ranging information, that have little to do with human vision. The Monash researchers have done experiments with a technique called time-of-flight ranging, which involves bouncing a laser beam off the target object and measuring how long the beam takes to make the round-trip.

Neural networks, a new approach to computing that mimics the function of interconnected nerve cells in the brain, has considerable promise as a means of analysing scenes to identify objects. Neural networks are particularly suited to rapid recognition of structures and patterns, shortening the time required to extract features and compare them against the robot's data base of expected objects.

"Once the robot knows where and what things are, it moves on to task planning, which has to do with estimating how to move from its current state to a goal state," he says.

"Task planning may involve working out in what order to perform a particular task - for example, how to pick up the lowest block in a stack of three blocks. The robot has to work out an order-of-action strategy, and then plan a trajectory for its own movements to achieve the task."

"The robot must plan its trajectory so that it doesn't knock over other objects, because as soon as that happens, it has altered the state of its environment in a random way, and it must begin scene analysis and planning all over again."
Getting teeth into animal design

We are what we eat. Dr Gordon Sanson is giving this new meaning with his studies into how the design of teeth ultimately influences animal biology, ecology and behaviour.

The little Northern Territory rock wallaby *Petrogale concinna* and Florida's manatee, *Trichechus manatus*, could hardly differ more in size, appearance and ecology.

One is a land-dwelling marsupial, the other a marine eutherian mammal, yet they share a trait possessed by no other mammal — the capacity to replace their teeth continuously throughout life.

It has been said that all biology reduces to chemistry, and all chemistry to physics. Dr Gordon Sanson's unconventional theory about teeth traces a species' physical characteristics, its ecology and behaviour, back to simple chemistry and physics.

They are high in food value, rather than softer plants with lower food value.

"We're interested in the physical properties of grasses and other plants — how do they break when the animal chews them," he said. "We talk about cutting, grinding, chewing, shearing actions, but we need to understand how tooth design relates to diet, we need to know the physics of each action — grinding, for example, has both lateral and compressive components."

Dr Sanson says the forces generated by teeth must relate to the physical properties of the food. The resistance of different foods to fracturing can be related to Young's modulus, a measure of the food's elasticity.

Young's modulus is calculated by plotting stress (the amount of force applied per unit area) against strain (the change in length of the material when it undergoes stretching).

Up to a certain point, a stressed material undergoes an initial change in length but will recover to its original length when the stress is released. Physicists call this the elastic phase and the short of the line is Young's modulus.

Beyond this point, the material begins to deform plastically. It no longer returns to its original length when the stress is released. Further stress will cause the material to rupture or fracture.

That work is performed by the animal's teeth and jaws. "It's obvious, but I'm not aware that anybody has said it previously — teeth must be built of a material that will not deform, but which must break materials which do."

Dr Sanson sees a strong relationship between social behaviour and diet, and says that this is strongly influenced by tooth design.

He has provided a new perspective into why animals relate to their environment and how the demands of the environment influence animal biology, ecology and behaviour.

Dr Sanson measures a magnified lower jaw profile.

Dr Sanson has conducted experiments that attempted to relate tooth wear to diet in kangaroos. A subtle but critical equation governs how the teeth pre-process the plants before they enter the digestive tract. Finely chewed particles gain such a large surface area that they are digested.

Dr Sanson points out that animals that grow teeth continuously cannot develop the crown structure needed to grind their food, since the crown wears away. Some animals, including fish, small cats and reptiles, have unlimited tooth replacement, but among mammals, only the manatee and rock wallabies have this capability.

Many mammals have deciduous or milk teeth in infancy, which are shed and replaced with permanent teeth that must last throughout adult life. Humans, Dr Sanson says, have deciduous teeth to last at least 70 years with reasonable care.

But human teeth tend to wear away at the edges, creating gaps. Dentists describe a phenomenon called mesial drift, in which the teeth move forward in the jaw, closing up any gaps thus created.

Other mammals, for example, kangaroos have refined mesial drift by having four pairs of molars that migrate forwards in the jaw as the preceding teeth wear out and are shed. "Elephants do something similar," Dr Sanson says.

Dr Sanson says that in the wild, any animal that eats its teeth prematurely will starve. Teeth are a vital resource, and each species must manage tooth wear and replacement rates to suit its lifestyle. The animal invests energy in growing teeth so they must not be ejected before they have worn out, or must they wear so rapidly that the animal runs out of teeth while still in its prime.

The hazards of premature tooth wear are clearly evident in some coastal areas of southern Australia, where sharks are growing containing high levels of abrasive silica. Veterinarians sometimes fit valuable rams with false teeth to prolong their stud careers.

Dr Sanson has focused on — Australian wallabies, *Petrogale peregrina*, and the koala, *Phascolarctos cinereus*. Eucalypt leaves are tough, typically low in nutrients and coated with toxic oils, and surely willstarve. Teeth are a vital eat.

Using the example of the koala, and noting that many species live much longer in captivity than they do in the wild, Dr Sanson wonders if teeth may play a much more important role in determining the life span of an animal than anybody has suspected.

Female ringtail possums breed in spring and in autumn; when there is a flush of new growth from eucalypts. The new growth is high in nitrogen, an essential element for synthesising proteins.

Dr Sanson says that in spring, the female ringtail doubles her food intake, so that she can sustain lactation for her newborn offspring. Spring and autumn breeding is not optional — at other times of year, the nitrogen supply from eucalypt leaves may be insufficient to sustain lactation.

Since the design and composition of an animal's teeth reflects its need to cope with a particular diet, Dr Sanson sees that understanding the physical properties of particular diets. His investigations have taken him beyond biology into materials engineering.

"We're interested in the physical properties of grasses and other plants — how do they break when the animal chews them," he said. "We talk about cutting, grinding, chewing, shearing actions, but we need to understand how tooth design relates to diet, we need to know the physics of each action — grinding, for example, has both lateral and compressive components."

Dr Sanson says the forces generated by teeth must relate to the physical properties of the food. The resistance of different foods to fracturing can be related to Young's modulus, a measure of the food's elasticity.

Young's modulus is calculated by plotting stress (the amount of force applied per unit area) against strain (the change in length of the material when it undergoes stretching).

Up to a certain point, a stressed material undergoes an initial change in length but will recover to its original length when the stress is released. Physicists call this the elastic phase and the short of the line is Young's modulus.

Beyond this point, the material begins to deform plastically. It no longer returns to its original length when the stress is released. Further stress will cause the material to rupture or fracture.

That work is performed by the animal's teeth and jaws. "It's obvious, but I'm not aware that anybody has said it previously — teeth must be built of a material that will not deform, but which must break materials which do."

Dr Sanson sees a strong relationship between social behaviour and diet, and says that this is strongly influenced by tooth design.

He has provided a new perspective into why animals relate to their environment and how the demands of the environment influence animal biology, ecology and behaviour.
Advancing Australia in sports and medicine

Two Monash identities are among ten Victorians presented with Advance Australia awards.

Mr Doug Ellis and Professor Michael Adamson were recognised for their outstanding contribution to the enrichment and advancement of Australia.

Mr Ellis was chosen for his service to sports education. He was one of the first nine members of staff appointed to Monash in 1960. During his 50 years at the university he has been instrumental in the development of sports and recreation facilities for both students and staff.

He was the first laboratory manager to be appointed, and the first deputy warden of the Union. In 1985, in recognition of the growth that had taken place in sports and recreation activities, the university established the Sports and Recreation Association and appointed Mr Ellis as its foundation director.

As director, and an executive member of the Australian University Sports Association, he has also contributed to local, national and international levels of sports education.

Professor Adamson, of the department of paediatrics, was recognised for his service to medicine. He is co-founder of three major hospital units: the Neonatal Intensive Care Unit, the Centre for Early Human Development and the Sleep Research Laboratory.

In 1985, Professor Adamson was appointed to the department of paediatrics. Over the past 14 years he has studied breathing patterns in infants and provided invaluable information to the Sudden Infant Death Syndrome Foundation. He now works closely with the foundation, providing expert advice to staff and counselling families.

Redressing the balance of care

The health professions need to concentrate more on caring, according to a visiting fellow to the Caroline Chisholm School of Nursing, Frankston campus.

US academic Dr Jean Watson says it is time for academics and health professionals to redress the balance. "The health profession has reached a point where caring is no longer present," she said.

Dr Watson is a former dean of nursing at the University of Colorado, and is now the director of the Centre for Human Caring. She has an international reputation for her writing and research into the art, science and ethics of caring.

She was instrumental in establishing the interdisciplinary centre, which undertakes academic and research projects.

"Those in the health professions tend to treat disease as an isolated unit rather than dealing with the human dimensions of care," Dr Watson said.

"There is a need to move from a focus on the person as an object to diagnose, treat and cure, to really looking at the whole context of the individual person, their responses and what their illness means to them."

"This shift has always been necessary, but has never been put into practice. We need to bring about a whole different relationship between care provider and patient."

Dr Watson is working with the School of Nursing to explore setting up a Centre for Human Caring at Monash. The Faculty of Professional Studies hope to use the centre as a model.

"The interdisciplinary nature of the faculty would lend itself to the establishment of such a centre," she said. Dr Watson also has been looking at developing a masters degree for nursing students in the ethics of caring.

As a result of the merger, Monash had an opportunity to look at new interdisciplinary studies, shared degrees, and opportunities for exchange between departments.

"A centre for human caring will benefit Monash by bringing together people with diverse backgrounds for common interest to look at what I think of as an emerging body of knowledge in human caring," Dr Watson said.

Dr Watson said, "The whole phenomena of having an absence of, or crisis in, caring is really coming from the public at large -- it is now up to the academics and practitioners to formally address the problem."

Staff development programs branch out

Staff development programs to familiarise employees with the greater Monash are moving into specialist areas.

Last month the Career Planning and Development Unit ran an Understanding Monash program designed especially for 30 staff from the Caulfield/Frankston branch library.

Staff Development officer Ms Beverley Dimisika said the unit was looking to offer more programs for particular interest groups, in addition to the four already planned for this year.

"We are available to discuss particular needs of departments in developing their own induction programs which can include attending an Understanding Monash program," she said.

Speakers at these programs talk on issues such as strategic planning for the university, the academic perspective and student services.

Participants also are given a brief introduction to areas of the university that provide services to help staff with their work.

Half-day Understanding Monash programs will be held on 13 March, 24 June, 13 September and 15 November.

Experts meet to examine role of outdoor education

Outdoor education experts, teachers and enthusiasts from around Australia and overseas gathered at the Frankston campus earlier this year to examine ways to improve outdoor education in Australia, and to identify its challenges in the 1990s.

The 1991 National Outdoor Education Conference theme, 'The Quest for Quality,' encouraged delegates to examine the role of outdoor education and re-establish links with contemporary educational philosophies.

Senior lecturer and course leader of the graduate diploma in outdoor education at Frankston campus, Mr Leon Costermans, said outdoor education was much more than a series of adventure programs.

"It forms a valuable part in the schooling of troubled youth and people with disabilities. More recently it has been used as an effective method of training managers and staff from the corporate sector," he said.

Conference workshops covered topics including the environment, aborigines, women, spirituality and fatalities in adventure programs, through to curriculum issues.

Four keynote speakers explored the conference theme, and the importance of outdoor education in the overall learning experience.
Research grants

NH & MRC R. Douglas Wright Awards

The R. Douglas Wright Awards are designed to provide outstanding researchers at an early stage in their career, with an opportunity for independent research together with a salary starting in the range of $25,000.

NH & MRC International Research Fellowships

Applications are invited from young Australians and other nations who are permanent residents in Australia working in the biomedical sciences, to enable them to undertake research in health-related fields in any biological or medical laboratory in the United States for two years.

Nominations for selected competitive research positions have to be made by the date specified.

Beit Fellowship

The Beit Fellowship is offered to students from a Commonwealth country with outstanding research ability in order that they may undertake a PhD in science and technology at the Imperial College, London University.

The award is tenable for three years and covers university fees and an allowance of £4500 a year. Further details and application forms can be obtained from the Senior Assistant Registrar (Admissions), Imperial College of Science, Technology and Medicine, London SW7 2AZ.

Asahi Fellowship Program

The fellowship program offers non-stipendiary and a limited number of postgraduate students, and other scholarships to students of any nationality, for undertaking full-time research at the Harvard Centre.

Villa I Tatti Awards

The Harvard University Centre of Italian Renaissance Studies will offer 10 stipendies and a limited number of non-stipendiary fellowships to encourage studies on aspects of Italian Renaissance.

The academic year 1992/93 is invited from scholars of any nationality, preferably holders of a doctorate.

For further details and application forms, contact Villa I Tatti Office, Harvard University, 134 Mt Auburn St, Cambridge, MA 02138, USA. 15 October.

Marine Research Grants

The Victorian Institute of Marine Sciences supports postgraduate studies in the marine sciences and technologies in the south-eastern Australian region. Grants of about $1,000 may be obtained to supplement the funding of research projects already under way.

For further details and application forms, contact the Director, Victorian Institute of Marine Sciences, 14 Parliament Place, East Melbourne 3002. 15 March.

Stuart Sisson Scholarship

Applications for the Stuart Sisson Scholarship are invited from full-time male students enrolling for the first year of an undergraduate course at the University of Melbourne in 1991.

Grants of about $1,000 may be obtained to support the student in his or her studies.

Further details and application forms can be obtained from the Director, Stuart Sisson Scholarship, Section Committee, DEET, GPO Box 3880, Canberra 2601. 15 March.

Japanese studies

The Japanese Studies Centre is offering a full range of Japanese language and studies courses during the coming semester. The studies courses are short one-month courses (4 sessions), reduced tuition rates apply for students at Monash.

Scholarships and Fellowships

Allan White Scholarship

ESCPA Australia Inc. is offering a scholarship to honour the services of Allan White to the animal welfare field worth E500. Undergraduate and postgraduate students undertaking full-time studies in an Australian Institution are eligible.

The application form must contain a copy of the applicants' involvement in animal welfare and must reach Mr Charles Wright, Executive Officer, ESCPA Australia, 4 Hobham Crescent, Deakin, 2600, 30 March.

Modern Languages

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Language courses

Beginners A 20 March & 26 March (Cite Office), 7:30-9 pm.

Beginners B 21 March & 25 March (City Office), 7:30-9 pm. Intermediate A 18 March, 7:30-9 pm.

Intermediate B 21 March, 7:30-9 pm. Advanced A 25 March, 7:30-9 pm.

Refresher course for Japanese language teachers A 19 March, 5.30-7 pm.

Studies courses

Literature and Society in Contemporary Japan 6, 12, 19, 26 March, 7-9 pm.

Japanese Musical Instruments 7, 14, 21, 28 March, 7:30-9:30 pm.

Introduction to Japanese Law 9, 16, 23, 30 April, 7-9 pm.

Japanese Business Etiquette 2, 9 April and 7, 14 May, 7-9 pm.

Industrial Relations in Japan Today 7, 14, 21, 28 May, 7-9 pm.

Communication Problems in Australia-Japan Contact Situations 8, 15, 22, 29 May, 7-9 pm.

Japanese Dance Past and Present 9, 16, 23, 30 May, 7-9 pm.

For further information and a brochure on these and other courses, contact the Centre's Research Assistant, Mrs Mala De Silva, 565 2506.

Accommodation

House sitter(s) wanted

Non-smoking house sitter(s) required for Canterbury family home, plus cat, for five weeks from 2 April. Contact Anne on ext 75 3794.

For rent

Furnished two bedroom flat in St. Kilda. Sunny, tasteful, older-style, close to transport. From mid-July to 1 January 1992. $250 per calendar month. Phone 134 3698 (a.h.), or Rose Lucia on ext 75 2874.

Notes and Diary

Send contributions to the Editor, Montage, Public Affairs Office, Gallery Building, Clayton campus, by Monday of the week prior to publication. Ext 75 2867, fax 75 2897.
Monash University has joined forces with the Australian Centre for Contemporary Art (ACCA) in South Yarra in a new joint management initiative that will boost Australian contemporary art.

The Vice-Chancellor, Professor Mal Logan, who also is Chairman of the Board of ACCA, described the move as exciting.

"The agreement is based on the recognition of existing common interests between the two galleries, and can only stand to benefit Australian contemporary art," he said.

Professor Logan will continue as chairman, but the Board will remain independent.

The Director of the Monash University Gallery, Ms Jennifer Duncan, will retain her current position, while also becoming director of ACCA. Monash Gallery staff will divide their time between ACCA and the Monash Gallery.

"This move will stabilise the future of ACCA as a national institution, ACCA will continue to provide a forum for ideas about contemporary art in Australia," said Ms Duncan.

The two galleries would retain their own identities, programs and contributions. "It is important to emphasise that the exhibition programs are quite separate — ACCA is not functioning as an extension of Monash Gallery," said Ms Duncan.

Part of her work at the gallery will be to consolidate the directions set up by former director, Grazia Gunn. Although both galleries are aimed at the general public, Monash Gallery also has more of an educational role, as well as contributing role to art documentation.

"ACCA is more about providing artists with opportunities not given elsewhere. It focuses on experimental art and a freedom to move both conceptually and formally," she said.

Some of the ancillary events at the Monash Gallery, such as public lectures, screenings and forums, may also be held at ACCA.

"The joint initiative demonstrates Monash's continuing commitment to the development of Australian arts," said Ms Duncan, citing Playbox Theatre as another example of the university's involvement in the area.

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The trouble is that industry is yet to recognise it, academic freedom may be availed, and where the fault is as much ours as theirs.

a wider cross-section of society destined to spend their lives in a wider range of pursuits and of independence in these critical tasks.

Universities have become too exposed to the tertiary institutions but in my view the academic staffs have more to gain than to lose.

Perhaps I am old-fashioned in my belief that the academic mind is the sharpest and most disciplined, but I do believe that there is a strong case for the academic community to recognise the advantages of their situation.

Universities have become too exposed to the primary source of support (government) in Australia and it is in the primary interest of universities to counter this.

by Brian Powell

No, the problem is roads. The marriage of the South-Eastern and Molloya freeways, for instance, was meant to streamline the flow of traffic into the city. Oh yeah?

I would like to mention one of the more recent experiments in streamlining: Mer-tickets. But I can’t. Nothing more remains to be said on the subject, because the entire collection of editorial attacks, public outrage and opposition criticism has been streamlined to save space in the government’s vaults.

It took a powerful computer to come up with the two words that summarised what the critics thought behind the government’s move.

Tertiary education is also merged, amalgamated or affiliated, and imploded as a result.

That raises the question: exactly what is hidden agenda? The expression is tossed around like a baby at a christening, yet is so worn out that it is meaningless.

A comparative lack of colour means that autumn doesn’t get a very good press around these parts. There are exceptions - the Royal Botanic Gardens do a good autumn, so do the in-town hotel has come up with the idea of colour bombing huge tracts of nearby state forest to give tourists their money’s worth.

Operation Palette will involve a fleet of converted fire-bombing aircraft dropping water-soluble paint in a carefully timed sequence over a period of weeks. Gold will befollowed by red, russet and finally, brown.

Also noted in the proposal is the option to drop white paint during a mild and snowless winter. And to give it an extra frisson (and the forest an added touch of authenticity), coats of yellow, red, orange, and later, black paint, could be slapped on during a cool and fire-free summer.

DIOGENES

Just as we were trying hard to remember a time when we didn’t have to console ourselves by remembering a time, our life sentences have become even more abbreviated.

All in the name of streamlining, a form of government that no one demands. Once escape its slipstream. Not even the unions. Not so long ago people joined unions. Now unions join unions.

Streamlining has a lot to answer for. Even the words moves faster than a breeding pallet.

And now words themselves are beginning to feel its effects. Once upon a dictionary, meat words enjoyed the single life - occasionally they’d find themselves hyphenated, but it was just a one-page stand.

No more. A dictionary dating services at work.

For instance, when was the last time you saw that old word-nose “augh” shifting across the pages of this page, or even the dictionary itself?

Now it’s rarely seen in public without “hidden” on its arm.

That raises the question: exactly what is hidden agenda? The expression is tossed around like a baby at a christening, yet is so worn out that it is meaningless.

Agenda once meant a schedule or list of items. Hidden agenda means, well, maybe it means a schedule or list of items someone has put on the reach of a newly baptised baby, if you can find something sinister there, go to the top of the class (that is, if you can find one that hasn’t – in the name of streamlining - merged, amalgamated or affiliated, and imploded as a result).

Streamlining is also leaving its mark on our traffic system. (Forgot cars – the reason that most of the concern has nothing to do with increasing speed and lowering fuel consumption. It’s done to avoid people who jam notices under windscreen wipers claiming damages for the injuries they suffered while stretching across unreaminled bonnets.)

The present system for relations with the business sector is hap hazardly and laughingly biased against the universities and staff. It will remain so for as long as there is no concerted approach to addressing the problem.

The Montechs of this world provide the opportunity and the wherewithal, but the system has not yet had the nerve to let enough of them do the job properly.

Montech is on constant touch with people in industry and we can find out, what they want researched, what funds they might have, and what their training needs might be.

We can assist in finding potential partners and advise on who, where and how to go about it. Often, we know what others are doing in the same field or with industry.

Through regular contact with the business community, Montech is also well placed to explore financing opportunities for research and development. We also have a broad range of contacts at political and bureaucratic levels.

In short, Montech should be the first group you think of for developing any idea.

It is time we looked more closely at what university-based innovation as consultancy companies, such as Montech, might be able to achieve in cooperation with the institutions they serve.

Brian Powell is managing director of Monash University’s business and consulting arm, Montech.

DIOGENES

Clever is the word, that’s for sure. Even the word moves faster than a baby.

Now they’d find themselves hyphenated, perhaps “augh”-merged, amalgamated or affiliated, and imploded as a result.

No more. A baby at a christening, yet is so worn out that it is meaningless.

I am less convinced, though, that it is clever.

I am less convinced, though, that it is clever.

But here autumn is looked on as the aftermath of summer, and the prelude to winter - a seasonal punctuation mark that promises more than the adverb.”

A comparative lack of colour means that autumn doesn’t get a very good press around these parts. There are exceptions - the Royal Botanic Gardens do a good autumn, so do the in-town hotel has come up with the idea of colour bombing huge tracts of nearby state forest to give tourists their money’s worth.

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