Sun signs of the ancient world

A Monash researcher has produced a radical – perhaps definitive – explanation of the design and purpose of Stonehenge, as well as other great prehistoric monuments.

Dr Neil Thomas (above), a retired engineer turned classical scholar, says Stonehenge and other prehistoric circles in Europe and Ireland were built to observe the annual cycles of the Sun and the Moon, and functioned as giant calendars.

In his PhD thesis, 'The Proto-Civilisation of Albion and Erin', he has described a pre-Celtic culture which had a sophisticated grasp of mathematical concepts usually credited to civilizations several thousand years younger.

Far from being herdsmen and hunter-gatherers, the inhabitants of Ireland and Britain performed prodigious feats of surveying, design and engineering.

They devised a 16-month calendar and probably worshipped, in addition to the Sun and the Moon – three gods equivalent to Odin, Thor and Freyr in the later Norse pantheon.

Their solar calendar divided the year into 16 months – each of four five-day weeks – supplemented by 45 intercalary days to make up a 365-day year. Such calendars apparently were still in use at least into Roman times.

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The four pagan festival days of their calendar are still celebrated today. They survived the Roman, Anglo-Saxon, Viking and Norman invasions, eventually being adopted by the Roman church as Christian festivals.

Although their original names have probably been lost or changed, the prehistoric week's five days probably honored: the Sun (Sunday), the Moon (Monday), Woden (Wednesday), Thor (Thursday) and Freyr (Friday).

Dr Thomas's supervisor, Dr Peter Bicknell, of the Department of Classical Studies, describes the core ideas of the thesis as "very convincing", and believes it is a major contribution to modern understanding of human activities and beliefs in pre-Bronze age Ireland, Britain and Europe.

Among his original insights, Dr Thomas has described the likely role in pre-Celtic society of the enigmatic Long Man of Wilmington, a giant figure holding two staves, carved into the chalk of a hillside in Sussex.

Dr Thomas argues, on the basis of the ancient units of measurement that occur in Britain's megalithic structures and the precision of those measurements, that the Long Man was a surveyor, and he is holding the tools of his profession.

He has calculated that the staves were used to measure a 2.073-metre length: the megalithic rod. The Long Man measures 33 megalithic rods from head to toe.

All the ancient British units of measure are related by multipliers of 2.5 and 33. Dr Thomas says the Long Man's height, which he calls one dod, is significant because when multiplied by 33 it yields another recurrent unit of distance – the megalithic mile.

He has found, using modern survey maps, that the prehistoric systems of angular and linear measurement were used to set out megalithic circles, engineering works and a complex network of connecting alignments.

The full story starts on page 3 of Research Monash.
The first annual awards for the AIM Diploma in Management were presented last in September. The diploma is a two-year course organised jointly by the Australian Institute of Management (AIM) and the Faculty of Business.

Mr Michael Renfree won the Syme School of Accounting Prize for the top accounting student, and the Prentice Hall Publishers Prize for the top marketing student.

Mr Paul Goglan was the winner of the Australian Chamber of Manufacturers Prize for the top student in macroeconomics and the Prentice Hall Publishers Prize for the top management student.

Mr Philip Stepe won the Public Transport Corporation Award for the best overall first year student.

Mr Dan Phelan, a lecturer in the Mechanical Engineering department, Caulfield campus, is among foreign speakers invited by the Japanese National Research Institute for Metals to present papers at a materials database technology seminar in Tokyo in February next year.

His work in this area has included development of an IBM PC metals database, which is marketed throughout Australia and New Zealand by the Institute of Metals and Materials Australia.

Chairman of the Department of Economics, Professor John Freebairn, has been elected a Fellow of the Academy of Social Sciences of Australia.

He is the seventh economist currently at Monash to be elected to the academy. The others are Professors Dixon, Head, Ng, Parsh, Powell and Stepe.

Two Monash economic historians - Professors McCarty and Sinclair - are also fellows of the academy.

The establishment of an intercampus bus service and greater autonomy on local initiatives were among issues discussed during the Vice-Chancellor's recent visit to Frankston campus.

Professor Logan visited Frankston to consider the campus master plan, inspect new buildings and meet with the Campus Development Committee and members of general and academic staff.

Responding to concerns raised at the staff meeting, Professor Logan said he would look into the issue of communication between Clayton and Frankston campuses, particularly in the areas of transport and provision of resources for local initiatives.

He said he was pleased with the progress of the amalgamation so far, and assured staff that Frankston would continue to remain a distinctive and integral part of the university.

Final year medical students at Monash were presented with a health care manual by SmithKline Beecham Pharmaceuticals at the Monash Medical Centre last month.

A Manual for Primary Health Care, prepared by Dr Selwyn Carson and Dr Edward Gawthorn, published in 1990, was offered to GPs early in 1991 for $20. The proceeds have been donated to the Australian Cancer Society.

The manual is divided into 10 chapters, each covering aspects of primary health care, such as emergency care, obstetrics, chronic illness and adult health care. Copies were also given academic staff members involved in the teaching of primary health care.
Seventy new ARC research grants approved

The results of the 1992 round of the Australian Research Council (ARC) large grants, approved last month by the Minister for Higher Education, Mr Baldwin, saw an increase in the ARC budget from $67m in 1991 to $77m in 1992.

Monash received a total of $5,101,000 for all new and continuing multi-year grants, representing 6.6 per cent of the total national allocation. The university was given 70 new large grants, a success rate of 32 per cent, compared with the average rate of 25 per cent.

Under the ARC Large Equipment Grants Scheme for items of equipment costing a minimum of $200,000, the university received ARC support of $490,000 from a total of $6,374 million allocated nationally. The successful submissions include $370,000 towards the purchase of a 200 kV analytical transmission electron microscope and $120,000 towards the construction of a glasshouse.

A breakdown of Monash’s grants is on page 8.

Seaborne study to probe earth’s crust

A $1.5 million survey of the ocean floor in treacherous waters off Papua New Guinea next year is expected to provide new insight into the way continents are formed.

The survey, funded by the US National Science Foundation, involves scientists from Monash, the prestigious Lamont-Doherty Geological Observatory of Columbia University, The University of Toronto and CSIRO.

More than 20 technicians and scientists, including Professor Gordon Lister of the Department of Earth Sciences, will take part. They will build up a picture of the ocean’s crust using deep seismic imaging techniques.

The work is based on award-winning geological research in PNG by Monash PhD student Ms June Hill (see story page 5). Over the past three years, while doing field work in the D’Entrecasteaux Islands off PNG’s eastern tip, she has found what are believed to be the world’s deepest, youngest rocks.

The rugged mountains of Goodenough Island and Ferguson Island in the D’Entrecasteaux group are made up of rock that came from more than 70 kilometres beneath the earth’s surface. This discovery, and work in the western US, points to the existence of deep faults in the earth’s crust which have ‘thrown’ rock up to the surface.

This represents a major challenge to the traditional theory on how the continents separated. This model involves pure shear, with the continental plates torn apart by enormous forces.

But the new theory envisages slippage along the faults (rifting), forming domes of contiguous crystalline rock from great depths.

The D’Entrecasteaux Islands are believed to have formed in this way; other domes are beneath the sea in the survey area, the Woodlark basin, adjacent to the islands. This is one of the few places in the world where active rifting is still believed to be occurring, associated with the formation of core complexes.

The international project will cross the region over 10 days in February and March, mapping the depth and location of the faults night and day. The waters are dangerous, infested by sharks, prone to giant whirlpools, and of greatly varying depths around the coral reefs. Local people will be enlisted to assist in navigation of the reef areas.

The team will use a reflection imaging method, in which an underwater air gun discharges regular sonic bursts. The reflections from the ocean floor are collected by a four-kilometre streamer towed behind the research vessel Mirriele Evans.

Professor Lister, who is also an Adjunct Professor at Columbia University, will help synthesise the data collected and provide a search strategy while on board the vessel.

“We have made educated guesses about what’s there,” he said. “We expect to make some fundamental advances in knowledge on how the continental crust of the Earth was formed.”

“We want to prove that these big faults exist and find out about their properties and how deep they go. We may also be able to prove that this part of PNG has fragments of what is now Canada.”

Seaborne study to probe earth’s crust

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Portrait of the artist at home

Howard Arkley is pictured in front of ‘Suburban interior ’83’, at the opening of an exhibition of his work at the Monash University Gallery. The exhibition runs until 30 November and is open Tuesday to Friday, 10 am to 5 pm; Saturday, 1 to 5 pm.

Cars, Kakadu and cameras

The Spring edition of the Monash Quarterly is now available.

The new 34-page edition includes features on Professor Noel Murray’s concerns about modem car design; Dr Pat Vickers-Rich and her dinosaur dig; photographer Steven Morton’s panorama camera; and Professor Mark Warfield’s food facts and fallacies. Historian John Arnold wanders down Melbourne’s memory lanes, Dr Ian Grant recalls the tensions in China leading to Tiananmen Square; and PhD student David Curt captures the spirit of Kakadu on film. Dr Ian Turner’s unique view of football is remembered and Campbell McComas recalls an infamous legal hoax. Contact the Public Affairs Office, extn 75 2067, for a copy, which includes a subscription form.
In newspaper parlance, the spike is the traditional resting-place for both unusable and used items. It's a sort of filing system and too-hard something of a record recently when Director, Professor David Beanland, little bits and pieces that are not proved useful in an article published in the Campus Review Weekly, the university's "built environment" was described as tending to the institutional-brutal cream cleanser; (b) a management concept; (c) a way of thinking about Australia. It's a useful concept for thinking through the media, and what we should know about Australia.

One of the highlights will be the second Donald Horne Lecture. This will be delivered by Professor Emeritus Geoffrey Harcourt in the Great Hall of the National Gallery of Victoria on 17 February. Melbourne born and educated, Professor Harcourt is master of Jesus College at Cambridge. His lecture will be on "Madness, markets and a middle way".

The week will conclude with the formal opening of the Powerhouse Museum in Sydney of 'The lie of the land', an exhibition of modern Australian cultural imagery. This will run for six months in Sydney and then travel to Canberra and Melbourne.

Ideas for Australia is a Federal Government initiative, coordinated by Monash through NCAS with assistance from the Australian Council. It was set up following the successful Ideas for Australia Week, held at Old Parliament House in Canberra in February.

Throughout the year, the Ideas for Australia Committee, chaired by Professor Donald Horne, has run a series of workshops around the theme of 'Understanding our own country'.

Topics have included making better use of our intellectual resources in the universities; breaking down barriers between academics and journalists; community history; Australian perceptions of Asia; and the normalisation of science as part of Australian society.

The program has also supported publication of major reference books, including the recently released Who's Who of Australian women, a comprehensive biographical guide to contemporary authors in this country.

Reports on each of the Ideas programs - or discussion starters, to use Donald Horne's phrase - are available from NCAS. Besides stimulating discussion they have provided themes for Ideas for Australia Week.

Most of the week's functions will be open to the public free of charge. A brochure and registration forms will be available shortly from NCAS.

I urge the Monash community to take advantage of this unique opportunity to contribute to the cultures of our country, and to promote a greater understanding of its identity.

John Arnold
Coordinator, Ideas for Australia

Letters to the editor

Letters should be about 300 to 400 words in length, typed and signed, and with the author's name cleanly written.

Please include a contact phone number for verification. Contributions may be edited for reasons of space.

Write to the Editor, Monash, Public Affairs Office, Gallery Building, Clayton campus.

The Communications Department offers:

Monash Christmas cards and presentation folders

Featuring the university's corporate image

Twenty full colour horizontal cards with envelopes cost $8, or 40 cents each. The message is: Season's Greetings from Monash. To order, contact Ms Susan Byrne on extn 75 5059.

Full colour loose-leaf presentation folders cost 80 cents each. A special rate applies for orders of more than 1000.

The A4 folders are ideal for brochures, papers, pamphlets, course notes etc. They also take thick documents such as Monash: An introduction. To order, contact Public Affairs, on extn 75 2067.
Music study to bridge cultures

A new course in Asian music aims to provide insight into the tastes, cultural beliefs and character of the region.

The three-year course in Asian music has been designed for people who intend to work or do business in Asia, as well as teachers of music or performing arts. Head of the Department of Music, Professor Margaret Kartomi, said because of growing cultural and business links, there was a need for Australians to be better informed about the music and arts of Asia. "In fact, they will have a definite advantage over their competitors if they know something about the performing arts of the region," she said. "Knowing the culture means knowing more about the people with whom they are dealing."

The major sequence of study includes a new course in Indonesian Gamelan Performing Arts, which includes puppetry and dance as well as gamelan (brass percussion ensemble) playing. Other subjects will cover the music of Sumatra, Java, Bali, Thailand and Korea.

The department will use its extensive collection of Asian orchestras and other instruments, puppets, costumes and field recordings, which are housed in its music archives.

"Courses in Asian music and performing arts provide an opportunity to learn about local concepts of artistic elegance, beauty and form," Professor Kartomi said. "Students also get the chance to play some of the music they are studying."

Geographers take out the trash

A recycling scheme in the Geography and Environmental Science department has achieved a dramatic cut in the volume of its disposable rubbish.

The scheme, in which each person is responsible for sorting recyclables, was introduced last month and has reduced waste by more than 90 per cent.

Each room is required to sort waste into recyclable groups - white paper, other paper products, compostables, and glass and aluminium. The sorted waste is placed in corridor bins each week.

The department has introduced a roster system in which each staff member takes a turn as weekly recycling monitor, collecting and dispatching the bins. In a department with 40 staff members, each is rostered on only once a year. The duties take about an hour to complete.

Chair of the department's recycling committee, Dr John Grindrod, said he had been surprised at how simple the scheme was to get going. He believes it could be a model for recycling on campus.

Geology student wins international award

Research in Papua New Guinea into the formation of the continental crust has earned a Monash PhD student an international geology medal.


"Normally mountains form when two plates collide. In this situation, mountains have formed as a result of a plate being extended," said Ms Hill.

"The islands have very deep rocks on the surface; some, from 3000 to 4000 metres. My research is trying to answer why they are coming up from such great depths, and what mechanism is bringing them up."

The main part of her work was detailed geological mapping. "This meant trekking through swamps, skirt the giant cones in the interior, retracing deep gorges in the mountains, and spending many days in the jungle with my party of hired native bearers. Her main assistant was a local man, David Peniasi, who became as invaluable an ally," she said. "When I approached, some of them ran and hid in the bushes. Occasionally I would turn up in a village and it would be deserted. Eventually I'd start hearing a whispering thought, and that the magmatism (i.e. intrusion of granite) was an important part of the rapid movement process. The rocks are being uplifted centimetres each year."

To determine how deep the rocks were, Ms Hill looked at their orientation and the amount of deformation. "When a rock is deformed, the minerals will tend to align," she said.

"As the rocks are uplifted, the conditions are changing: the pressure is decreasing and water is coming in. Using information about different rock compositions, she determined the pressures and temperatures at each stage of rock formation."

Ms Hill, who completes her PhD at the end of this month, has almost finished her research in the D'Entrecasteaux Islands. Next, she hopes to study intrusion of granites beneath the Antarctic.

November 1991
New unis an option in Victoria: minister

Two new universities could be established in Victoria, according to the Minister of Education, Mr Barry Pullen.

In a speech to Parliament last month on post-compulsory education and training, he left open the option to have seven Victorian universities. Until now, the Victorian Government has been pursuing a policy of five universities.

Mr Pullen said sufficient resources needed to be provided in order to support the high quality research and postgraduate teaching programs expected of universities.

Expansion in demand for higher education and increased levels of support for research meant it was possible to consider increasing the number of institutions with university status.

The two new universities could be the amalgamation of Royal Melbourne Institute of Technology and the Phillip Institute of Technology, and the proposed university in the outer eastern suburbs, to be modelled on Swinburne Institute of Technology.

Mr Pullen said the amalgamation process in Victoria had not gone smoothly but the restructuring was likely to be better advanced, "if the medium of the changes are yet to be measured," he added.

He also announced a ministerial task force, comprising representatives from education and training, to investigate accelerating links between higher education, TAFE and industry.

Government incentives for teaching excellence

Universities which provide quality teaching will be rewarded financially under a new scheme announced in the Federal Government's revised policy for higher education in the 1990s.

The Commonwealth will allocate $70 million in additional funding in 1994 to 1996 to universities which comply with self-determined standards of quality.

The incentive is on top of the $12 billion to be spent on higher education in the 1992-4 triennium. For the first time, the Government's funding exceeds one per cent of gross domestic product (GDP).

The policy statement, 'Higher education: quality and diversity in the 1990s', marks a shift towards greater institutional autonomy and further deregulation of the higher education system.

"It is for institutions to determine their mission, to define what they mean by quality of performance, and to identify and provide the evidence necessary for them to gauge their success," the statement said.

From 1994, "universities and operating funding will be merged, reducing the role of the Commonwealth in resource allocation and allowing for greater use of alternative teaching modes."

The statement provides $41 million for an extra 2,845 student places in 1994. In 1994-2, the Government will spend $10.5 billion on operating grants for institutions, with $750 million for direct research grants and a further $750 million for capital works.

Capital funding had been increased by $270 million in 1994, he said. However, the AVCC was disappointed that a stronger commitment to expanding the TAFE system was not made in the statement.

The Minister for Higher Education, Mr Baldwin, said participation in the $70 million quality assurance and enhancement program would be voluntary and the allocation of normal grants would not be affected.

He said an independent national body to be formed next year would assess quality management arrangements adopted by institutions, before allocating the funds.

An independent National Centre for Teaching Excellence in higher education also will be established next year to examine and disseminate information about good teaching practices.

The statement strongly opposes the introduction of fees for undergraduates, but not the Government's fee structure for postgraduate courses.

Radical plan for joint university-TAFE courses

Higher education and TAFE would offer joint foundation studies courses under a radical plan proposed by the Australian Vice-Chancellors' Committee (AVCC).

As part of its response to the Finn review of post-secondary education, the AVCC proposed joint foundation courses in TAFE and higher education.

The AVCC President, Professor Ken McKinnon, said foundation studies would provide generalist vocational training, decency paths between the sectors and a higher profile for TAFE.

A two-year module has been proposed to be designed by both sectors and offered either through higher education or TAFE institutions.

The first year would consist of a common module offering studies in language and literacy competency, numerical and mathematical skills and competencies, as well as other humanities, natural and social science studies.

After completing one or two years, students could opt to take either a higher education oriented year, which would provide credit transfer to a higher education award course, or a paraprofessional course leading to a TAFE qualification.

The AVCC also raised doubts about the implementation of key recommendations prepared by IBM Australia's chief executive, Mr Brian Finn. While broadly endorsing the report, the AVCC was concerned about a lack of initial consultation with higher education and the sector's representatives on working party set up to enact the findings of the report.

AVCC President Professor Ken McKinnon warned against courses being diverted from higher education to fund TAFE expansion. He said it had become clear that the TAFE sector saw the report as a reason to do so.

The AVCC strongly supports the thrust of the report, which envisages the production of a well-educated workforce with skill profiles at all levels that reflect the shift to advanced manufacturing technologies and economically efficient, value-added service industries, Professor McKinnon said.

"While encouraging the expansion of TAFE into the provision of more post-secondary education, Australia cannot allow TAFE to become the excuse to curb growth in the higher education sector by cutting funds there to pay for TAFE," he said.

He warned that the revival of interest in technical and further education must not mean diverting funding, or imposing artificial constraints on post-compulsory education.

Professor McKinnon said he was disturbed that higher education had not been represented on the Finn committee, leading to erroneous assumptions and biases in the report. Membership of working parties formed since its release also was skewed towards TAFE and schools, with minimal higher education representation.

The Finn committee's recommendation that there is a need to define the principal role of TAFE is absolutely correct," he said.

"But there seems to be a rush to enact certain expansionary sections of the Finn Report, rather than take up this crucial recommendation.

"Another disturbing trend from Finn discussions is the question of key competencies and the assumption that higher education will fit within sets of standards appropriate for, and designed for, industry purposes.

"There have been a number of moves by the faceless bureaucracies to impose rigid standards relating not to course content or teaching processes, but to inflexible competencies defined by employment requirements within an explicit national standards framework."

"Higher education has not been consulted on these actions, although the implications would have a significant impact on their work. Such a system would destroy the very diversity and flexibility which currently ensures the high quality and acceptance of higher education."

"Even within TAFE and schools, the imposition of such standards will act as a conservative force, restraining institutions from being able to respond quickly and effectively to changing conditions."

"It will only add to central bureaucratic control, while diminishing institutional control."

He said the foundation studies module approach would attain Finn Report objectives and ensure that bureaucratic control was minimised.

States examine TAFE cost

The Federal Government plans to take over full financial responsibility for the TAFE sector and other post-secondary training.

The Minister for Employment, Education and Training, Mr John Dawkins, presented the proposal to the Australian Education Council, which comprises education and training ministers, last month. The ministers set up a working party to explore cost implications of some of the options. The council's next meeting is early in November.

Under the plan, the Federal Government would control policy, and finance the expansion of the vocational education and training system. States would retain control of administration and TAFE courses up to Year 12.

Currently the states provide 90 per cent of TAFE finance. Their contributions would go to the Commonwealth, which would increase its share to 70 per cent. It would be the biggest reorganisation of vocational training since the Commonwealth took control of higher education in 1974.

The Finn review of education said that $1 billion per year needed to be spent by 2001 to provide training opportunities for 272,000 people — a 20 per cent expansion.

The more signifies a shift away from the emphasis on growth in universities to that of the TAFE sector. Commonwealth control was pressed in the Finn committee's final report, and is considered the only option that would provide the policy framework to implement the review's recommendations.

The proposal could see colleges of technical and further education renamed as Institutes of TAFE to improve their status, as well as community attitudes towards vocational and skills education.
Transforming unreal images of women

Much has been made of Naomi Wolf's extraordinary good looks, especially in light of what she does.

Her recent book, *The Beauty Myth*, is an account of how the diet, pornography, fashion and advertising industries have created unrealistic images of women. Women have become slaves to being thin and good looking, she says. But in Australia to promote her book, media attention has focused on her appearance. "The scrutinising of feminists' looks is just another way of trivialising what they are saying," she said in one interview.

At Monash, she was asked how successful she would have been without being so attractive. The answer: she wrote the book, not her looks.

The public lecture, organised by the Monash Fabian Society and the Women's Campaign Committee, attracted a standing-room only crowd.

Ms Wolf said *The Beauty Myth* is not about wearing or not wearing lipstick. Rather, it is about the current backlash against feminism. Rather, it is about the current backlash against feminism. So potent is her message about the effects on some of the multibillion dollar diet industry, that one of her Australian television interviews was cancelled because of fears that advertisers would withdraw their commercials.

"The average model weighs 23 per cent less than the average woman," Ms Wolf said, "compared with post-WWII fashion models who weighed in at about eight per cent less than average. The 17 year old, anorexic, surgically augmented model has become the new ideal woman."

She says the obsession with weight reduction has led to a culture where women are so obsessed with their image that they have become apathetic about significant issues, such as equal opportunity in the workplace.

This is in addition to the physical effects of obsessive dieting which include loss of brain function or libido, irregular menstruation and infertility.

More services and less politics: new MAS chair

Students deserve more value from their amenities fee, and less internal politics, according to the newly elected Chairperson of the Monash Association of Students (MAS), Ms Kerry Barker.

Ms Barker was elected chairperson of the association in last month's elections, which saw conservative students gain control of the association for the first time since Peter Costello occupied the chair in the late 1970s.

Ms Barker was a member of the Spectrum ticket which represented students from all Clayton faculties, most clubs and societies, overseas students and religious groups on campus.

While in office, she hopes to raise the profile of MAS and give students a greater awareness of its services.

"During the campaign, we asked students what they thought of MAS activities and how often they used the services provided," she said.

Few students even knew what services were available. To overcome this, she hopes to reduce the internal political activity in MAS to keep politics out of the whole Union.

Among the activities that Ms Barker wants to introduce next year is a Health and Fitness Week in conjunction with the Sports & Recreation Association and outside organisations such as Vic Health and the Anti-Cancer Council of Victoria. The week would promote the benefits of regular exercise and make students more aware of the damaging effects of drugs, alcohol and smoking.

Ms Baker said the role of MAS chairperson provided an opportunity to make a difference on campus. She wants to achieve greater student involvement in the political process at Monash, with MAS acting as an effective lobby group.

"Feminism is the logical extension of democracy. No one talks about this as a post-democratic age."
A major role in research management is being played by the Committee of Associate Deans - Research (CADRES) after only six months of activity, according to its chairman, Professor Geoff Vaughan.

With representation from each of the 10 faculties, Monash University College Gippsland (MUCG), and the Victorian College of Pharmacy, CADRES has created a direct line of communication from the Vice-Chancellor through to the faculties and colleges on research funding and research management.

The Vice-Chancellor's Advisory Committee on Research is the peak research management committee on campus. The VC's committee reports to a further committee chaired by Professor Vaughan, the new mechanisms are cumbersome, "with the balance of almost $1 million being distributed among the full-time research student load."

Although CADRES attracted a degree of criticism when it was established, Professor Vaughan feels that the successful work of the committee can now be appreciated at the faculty level.

Positive

"CADRES has reviewed its activities. We did that six months after we were established and generally the feedback I've had has been positive," he said.

"We need some time to prove ourselves. The immediate test has been about how to tackle new assignments and how to handle the transition from the old system to the new," he said.

"There are some critics of research management as a whole in the university, there is a review through the Waller Committee which has been put in place by the university. This is a critical issue, the old system was not well functioning and it is important that the new system is properly set up."

"Because there were some criticisms of research management as a whole in the university, there is a review through the Waller Committee which has been put in place by the university. This is a critical issue, the old system was not well functioning and it is important that the new system is properly set up."

"Although it is not a perfect system, we need to work with it and improve it. We are trying to find a way to make it work for everyone."
Changing values: a means to an end?

IN MY FIVE YEARS AS VICE-CHANCELLOR I have come to believe that there are particular challenges, given the rapidity of change in the economic and social frameworks in which Monash is embedded.

To protect and enhance its intellectual life, the university simply cannot continue to affect Australian universities, not to mention foreign universities, if it is to remain competitive, and, therefore, a far more competitive world. Universities face a rapidly changing world, with economic and political developments affecting the quality of teaching and research.

The Vice-Chancellor, Professor Mal Logan, envisages a university that is willing to adapt, and become more enterprising and international. This article is an excerpt from a paper presented to Council this month.

Professor Mal Logan: greater confidence about the future and less caution with the past.

Through the clawback mechanism we are still 'supporting' research at other institutions.

Teaching, as important as it is in any university, can no longer be seen as a trade-off for research activity.

manifests itself in many different ways - from the introduction of fee-paying courses to the licensing of technology development.

I have consistently argued that for Monash to protect and enhance its teaching and research, it needs to position itself to take advantage of a rapidly changing environment. This 'positioning' is predicated on a culture embracing a number of shared values that should extend across the institution. Briefly, these values (which are a means to an end and not ends in themselves) are:

- A willingness and a capacity to adapt to new circumstances, especially in the external environment, to seize opportunities rather than feel threatened by change. This will lead inevitably to a more heterogeneous and diverse institution with a wide variety of programs and, therefore, a far more competitive one capable of performing well in a more deregulated environment. Internationally, changes in the fortunes of various parts of the university will depend on the capacity of its academic leaders to adapt.

- An enterprise (or entrepreneurial) approach to problem solving. This will lead to a greater diversification of funding sources, more efficiency, and new ways of delivering programs. Examples include the full-fee program (from which Monash will generate some $20 million this year), new forms of cooperative education (which link business with university-based education) and the introduction of new ways of teaching.

- The internationalisation of the university. Traditionally, and quite properly, a university's reputation, throughout the world is based on the quality of its research output and its graduates. But given our particular place in the world and the great range of languages in Asia, our standing there will be based on things in addition to research output. Asia has some of the world's greatest universities, but there is a need for careful bridge-building to underpin our overseas full-fee program and to participate more fully in knowledge transfer. We have a particular place in the world which we can exploit to our advantage.

If these three sets of values were shared by the main decision makers in the university, the outcome of decisions would demonstrate a more proactive university, more outwardly oriented; a more mature institution with greater confidence in its future and less concerned with the past. The future and shape of the university and the protection of the enhancement of its scholarship will flow out of the implementation of these values.

A good deal of the administrative work at Monash over the past few years has been focused on creating new opportunities for deals to plan the futures of their faculties in a way not experienced before. We have for 1992 established greater certainty about the principles on which the annual budget is based. Research funding and equipment funding have been devoted to deals. A university-wide development fund is designed to promote new developments consistent with merit and the principles outlined above. We have a firm capital program which will greatly improve teaching and research across the entire university.

The faculties are the basic, standing units of the university and each should seriously work out its directions in the university as a whole. The first set of opportunities or challenges to be addressed in any planning exercise lie in the mergers which have been completed over the past two years.

Recently, there have been a number of surveys of Australian universities designed to rank them in ways that are not always fully understood. At least two books have been published and there have been a number of rankings published in The Bulletin and The Independent.

While all kinds of doubts can be thrown on the accuracy of the surveys, Monash has consistently come out very well, and the older universities, fairly poorly. Likewise, throughout Asia many of the newer, smaller institutions are better known than the older, and larger ones.

In the changing game in which Australian universities find themselves, the clients have suddenly become more important and are expressing different views to those of the past.

There is a particular responsibility to make the merger work. We must lift the level of outside support for research, and develop an understanding of its central role in the university.

Through the clawback mechanism we are still 'supporting' research at other institutions. Teaching, as important as it is in any university, can no longer be seen as a trade-off for research activity.

On the other hand, there are great benefits to any institution in diversity in its teaching programs. Here, Monash has quite remarkable strengths, which must be maintained. We are unique, and certainly no longer a clone of any other institution.

Our clients - the students - appear to be recognising this in their selection patterns. When all developments are up and running, this university will be much better placed to handle changing student and general community demands on higher education institutions.

Outside the university, I see nothing but increased competitive confidence in the way Monash sees its pre-eminent place in higher education in Victoria.
Notes

Get the safety book
Staff who joined the university after 1 September 1990 or transferred from Caulfield or Frankston to Clayton after 1 July 1990 may not have received the booklet. Occupational health and safety policy statement. Those who have not received a copy should contact their safety officer.

Bicentenary celebration
A seminar entitled Basildon's life of John son: his bicentenary celebration 1791-1991 will be held on Saturday 16 November. Speakers include Dr Runi Khan, a senior lecturer in the Department of Philosophy, and Professor Clive Probyn, Chairman of the English Department. The seminar, to be held at the Council of Adult Education, 256 Flinders Street, Melbourne, commemo
dates and celebrates the occasion and explores some interesting aspects of both author James Basildon, and subject Samuel Johnson.

For further information, contact Professor Clive Probyn, extn 75 2130.

Equal opportunity guidelines
Guidelines for ensuring equal opportunity in selection of staff have been re
duced recently. The new guidelines have been sent to selection committees. Copies may be obtained from the Equal Opportunity Unit, Room 212, second floor, Mathematics building, Clayton campus, extn 7 084.

John Medley Library hours
The John Medley Library, first floor, Union Building, will remain open until 15 December. Staff and students may borrow books until 15 November. All books must be returned by 20 November. From 1 November, the library will close at 5 pm. For further information, contact extn 7 5 2127.

Summer arts and crafts...
Bookings are now open for the Monash Arts, Crafts and Tuition summer school (1992). Courses include photography, design, wine appreciation, watercolour painting, and practical electronics. They are open to students, staff and the public. Enrol at the Arts and Crafts Building or contact extn 75 3180.

...and language courses
The Faculty of Arts is offering intensive four- and eight-week summer courses in introductory Chinese, German, intermediate German, Korean, Japanese and Thai. The courses will be con
ducted over four hours each weekday from 25 November to 20 December and 6 to 31 January. They are open to the public or may be taken for credit.

For further information, contact extn 7 5 2231 (Chinese, Korean, and Thai - Room S 51 5), extn 75 2256 (German - Room 312) and extn 7 5 2281 (Japanese - Room 408).

ANSE Conference
The 7th Australian Conference on Nuclear Techniques of Analysis, presented by the Australian Institute of Nuclear Science and Engineering, will be held at the University of Melbourne from 20 to 22 November.

The conference brings together Australian and overseas experts to dis
cuss recent and future developments in the field. University staff and research students whose nominations have been accepted by ANSE may apply for sup
port for travel and accommodation for the conference period.

For further information, contact Ms Joan Watson, (03) 543 9256.

Computer shop hours
The Computer Centre Shop on the ground floor of the Mathematics building, Clayton campus, is open from 9 am to 5 pm on all university business days. Purchases by departments are sales tax exempt. Staff and students pay sales tax on computer hardware, not software.

Notes

The following is a selection of the past month’s print media coverage.

1 October: Melbourne Morning Advertiser - Dr Stephen Troumbel, Community Medicine: Doctor helps peers to turn around.

1 October: The Australian - Dr Leonie Spiccia, Chemistry: 'Charged' windows react to temperature changes.

1 October: Private News - Ms Bronwyn Thorburn, Accident Research: Private jobs 'not needed'.

2 October: The Herald-Sun - Mr Francis Jee, Accident Research: Those who need not be exempt. Staff and students pay sales tax.

2 October: The Sydney Morning Herald - Dr Alan O'Grady, Economics: Libs' Duty only to the dollar?

2 October: The Age - Professor Gillian Oliver, Economics: Libs' GST proposal need not be all doom and gloom.

2 October: The Australian - Dr Branco Cemil, Medicine: Rural doctors career longevity.

2 October: The Age - Ms Kay Simpson, Mathematics Education: Time series: first find your pattern.

2 October: The Age - Professor John Freeth, Anthropology and Sociology: Chinese distant figures, say academic.

2 October: The Age - Mr John Pearson and Ms Meredith Mubeen, NUCC: How we made our garden.

2 October: The Age - Ms Bronwyn Naylor, Law: Vipers or victims?

2 October: The Sydney Morning Herald - Professor Peter Spencer, National Centre for Australian Studies: Intellectual gains lost in the press.

2 October: The Sydney Morning Herald - Professor John Freeth, Economics: Libs' GST proposal need not be all doom and gloom.

2 October: The Australian - Dr Branko Cemil, Medicine: Rural doctors career longevity.

2 October: The Age - Ms Kay Simpson, Mathematics Education: Time series: first find your pattern.

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2 October: The Age - Mr John Pearson and Ms Meredith Mubeen, NUCC: How we made our garden.

2 October: The Age - Ms Bronwyn Naylor, Law: Vipers or victims?

Notes
Examining one of the collection’s mineral samples are (from left) Mr Ray Price of Friends of Monash, Dean of the Faculty of Science, Professor Ian Rae; Mr Ernest Cripps, the donor of the collection; and Head of the Department of Earth Sciences, Professor Ray Cas.

Cultivating garden lessons

Working in a school garden can teach primary schoolchildren lessons in history, science and the environment.

The Centre for Gippsland Studies at Monash University College Gippsland has produced a unit of work, titled ‘School Gardens’, which has been enthusiastically received by primary school teachers throughout the State. It has been prepared by executive director of the centre, Mr Meredith Fletcher; a lecturer in the School of Education at Gippsland, Mr John Pearson; and Ms Sue Allen, a teacher at Bundalaugh Primary School, near Sale.

The teaching kit contains photographs of children in the school gardens of Gippsland in 1911, children’s writing about their gardens, and a teachers’ booklet covering classroom discussions, establishing a garden, research projects and excursions.

“Generations of children have enjoyed working in the school garden,” Mr Pearson said. The educational benefits of school gardens could be seen in the children’s own accounts of their experiences, written in the 1920s. School gardens and plantations gave children the opportunity to test ideas, such as the conditions under which plants grow, and to observe, discuss and record the results.

Where there has been a relationship between what has been studied in the classroom, and what has been done outside in the garden or grounds, real learning and understanding have developed,” he said.

“In a very concrete way, school gardens have provided children with direct, first-hand experience of some of the concepts and skills which form part of the primary school curriculum.”

“Projects based on the school garden have provided opportunities for children to learn the roles and responsibilities involved in working in a group, and the importance of cooperation in attempting to reach common goals.”

The Centre for Gippsland Studies promotes the study of the region, focusing on local and regional history, the environment, literature, Aborigines and the social sciences.

The research centre’s archive holds more than 2000 books, as well as photographs, maps, newspapers, articles and genealogical records.

Recently it has compiled a kit for secondary schools, ‘Five Gippsland Women’, on the place of women in local history. ‘School Gardens’ costs $14, plus $2 post and packing. Phone ext 72 0390 for more information.

Graduate careers seminar

The Monash Postgraduate Association (MPA) last month held a one-day graduate seminar-workshop, ‘Goodbye academia – alternative career prospects for higher degree holders’.

Business identities spoke on career paths. Subjects including personal skills, identification, job applications and interviews were discussed.

This month, the MPA is running three workshops for postgraduates. The first two covered interview skills and resume review. The hidden job market is the subject of the final workshop on 12 November. For bookings and further information contact the MPA office on ext 75 3197 or 75 3198.

Monash study tours

Next year, the David Syme Management Education Centre, Canberra, is organising four overseas study tours, following its highly successful tour of China for Australian Local Government personnel.

Through university links, the centre organised visits to universities, hospitals, factories, kindergartens and social welfare agencies, which most visitors to China would not see.

The 1992 tours include a trip to the USA for human resources professionals; a second study tour to China for health professionals; a North American study tour for museum professionals; and a tour of Europe for vocational education and training personnel.

Flights, visas, conference registrations, meals, accommodation, organised tours of institutions, and local sightseeing tours are organised by the centre.

For further information, contact the centre, Hewlett Packard Building, Fern Hill Technology Park, Bruce ACT, 2617, or phone (06) 253 2911.
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and as a way of perceiving the world. According to

are irrelevant to the nature of legal education, the

impact which women are likely to have on the theory

thing about law's epistemology—the way in which law

is seen as a set of principles, as a system of knowledge

and as a way of perceiving the world. According to

liberal theory, the legal system is rational and imperi-

tal. Thus lawyers tend to assume that issues of gender

have reassured themselves that the feminisation of

work. The central (and usually the largest) compo-

ment cost of those services in an action for loss of

the ability to work in the home has not yet been

clearly recognised as an economic loss suffered by the

injured person herself. Historically, a husband who was deprived of his

wife's domestic services could recover the replace-

ment cost of those services in an action for loss of

consortium. But wives had no corresponding right to

use for loss of their husbands' services. The action for

loss of consortium has been extended to wives in

some jurisdictions, and completely abolished in

others. Law reforms which enable women to sue for

loss of their husbands' services do not achieve equal-

ity of outcome, since men are rarely responsible for

domestic labour.

In the states where the husbands right to sue has been abolished, it is not clear whether a woman who can no longer provide domestic services are entitled to damages for their own economic loss. A woman who can no longer care for her own family may receive damages for the mental suffering caused by her "loss of enjoyment of life". In other words, she is compensated on the same basis as an amateur foot-

baller who can no longer play sport. The law treats

housework and child rearing as leisure or pleasure

rather than as work.

Like the rules of assessment of damages, the prin-

ciples determining title to property owned by de facto

spouses and unmarried couples reflect assumptions which are unjustified. Nineteenth-

century property reforms gave women the right to

retain their earnings and own property separately

from their husbands. This right was of little value to

women out of the paid workforce because the legal rules
determining title to property only took account of

financial contributions to its acquisition. Women's

work in the home was not counted as a contribution to

the resources of the breadwinner but as a gift.

The Family Law Act now requires the Family

Court to take account of the "homemaker and parent

contribution" in resolving property disputes on

divorce. But except in New South Wales and Victoria,

where legislation now permits the court to reallocate

property between de facto partners, it is doubtful

whether a de facto wife can claim an interest in her

husband's property by virtue of her contributions as

homemaker and child rearer.

Similarly, in a dispute between a wife and a third

party claiming an interest in her husband's property,

falling outside the provisions of the Commonwealth

Family Law Act, the wife's contributions of labour do not

necessarily give rise to any interest in the property. In a recent decision, the High Court of Australia

has opened the way for recognition of the value of
domestic contributions is disputes between de facto

partners. But in that case the woman was in full-time

paid work and her domestic labour was recognised

because she also made a substantial financial contri-

bution. So far there has been no decision in which a
domestic contribution, standing alone, has been suffi-

cient to give a rise to an interest in property.

After marriage breakdown, the Family Law Act

now requires the "homemaker and parent contribu-

tion" to be taken into account in resolving property

disputes between married couples. It is doubtful

whether this provision has resulted in a full recogni-
tion of the economic value of housework and child-

care. Given that the Family Law Act requires financial

and domestic contributions to be compared, it seems

likely that courts are still influenced by traditional

assumptions to provide men with what is essentially

an "economic discount" for divorce because of the

effects of marriage and child bearing on their earning-
capacity.

The current law fails to take account of social and

structural factors which affect the way in which

responsibility for work in the home is divided between

men and women. For example, it disregards the effect of

the sexual division of labour in the same way that more

traditional rules disregarded the value of women's

work in the home.

What is needed are creative social policies which

make it easier for men and women to share domestic

work and child rearing and enable those involved in

the essential work of raising children to do so without

sacrificing their opportunity to participate in paid

work as well. Such a model will require fundamental

changes to the ways in which the legal system sees and

responds to the lives and experiences of women.

Professor Marcia Neave holds a personal chair in the Faculty

of Law.

Apology

The caricature which appeared with last month's

Savant column was not that of the article's author,

Professor Graeme Davison. Montage regrets any em-

barrassment caused.
The past decade has seen several quantum leaps in the field of microscopy, including the scanning tunnelling microscope, which can resolve the surface topography of a material, atom by atom.

It also saw an equally important advance in light microscopy: the laser confocal microscope.

This instrument uses laser light to 'see' beneath the surface of living tissue and certain translucent organic materials. But as often happens in the evolution of scientific instruments, not long after the original idea has been introduced, somebody conceives an equally brilliant refinement that renders it obsolete.

Four years ago, a biologist working at the University of Western Australia who had the laser confocal microscope when it was introduced to the Australian market, three years ago, now eagerly awaits a miniaturised, vastly more flexible successor, conceived in Melbourne and developed jointly by the Small Dandenong company, HBH Technological Industries, and Monash researchers.

If the confocal microscope was a quantum leap in light microscopy, the HBH FibreScan 1000 microscope is a similar advance in light microscopy: the laser by managing director of HBH, Mr Martin Harris, and developers Mr David Mitchell and Mr Peter Delaney.

The invention of the laser confocal microscope allowed the first images from beneath the surface of living tissue. But until now, its potential has been limited by its bulkiness. A miniaturised version being developed at Monash opens new vistas in medical research, industry quality control and virtual reality.

The microscope used optic fibres as light-collecting probes, linked to electrical photodetectors. Later, he investigated confocal techniques of isolating the focal plane to improve the accuracy of the measurements.

With any conventional light microscope, the problem is that the whole object is illuminated, yet only that area can be brought into focus at high magnification. Out of focus structures contribute blur and flare, obscuring details from the focal plane.

The confocal laser microscope is the ultimate solution to these problems. It illuminates the specimen with brilliant light of a single wavelength. The laser is focused to penetrate into the specimen to a specific depth, and is reflected by features in the tissues, or causes the tissues to fluoresce.

The size of the laser 'spot' can be adjusted to provide higher or lower magnification. The important result is that outside the focal point, the laser light is unfocused; light returning from these levels is rejected, so that only detail from the focal plane is observed.

The original laser confocal microscope uses a mirror to steer a beam from a laser, which scans the selected plane point by point, line by line. As it scans, a detector picks up the returning light. The image is digitised by computer to generate a three-dimensional image of the interior of the specimen. The image can be rotated in any direction, or made 'transparent' to allow the researcher to isolate aspects of interest.

However, the original laser confocal microscope's potential has been limited by its bulkiness. The laser and optical components that direct the beam into the specimen, and which gather the returning light, must be kept precisely aligned. Flexibility is limited because specimen must be mounted on a fixed stage, as with a conventional microscope.

Moving the microscope and setting it up elsewhere might involve hours of realigning the optics, so laser confocal microscopes have tended to remain where they were first installed. The HBH microscope, whose development was sponsored under the Generic Programs of the Department of Industry, Technology and Commerce, solves this problem with optical fibres.

The beauty of these fibres is that they make the critical straight-line optical alignments unnecessary, by providing a flexible conduit between the various optical elements, around curves or even over long distances. In the HBH fibre-optic confocal laser microscope, the laser and other bulky optical components can be kept well away from the business end of the system, which, at the end of its flexible-tubing optical fibre, can now be miniaturised and made portable.

Without the elaborate devices needed to align and adjust the optics of the original laser confocal microscope, it is also cheaper. Mr Harris believes it can be marketed at just below the $40,000 cut-off level for large equipment grants, so that specialist laboratories will be able to buy their own dedicated microscopes without having to justify the expenditure by establishing cross-disciplinary projects with other laboratories.

A single laser could be used to operate a number of fibre-optic confocal microscopes in adjacent laboratories, with images being relayed by a central computer back to scientists' offices elsewhere in the building. Mr Harris and Mr Delaney believe that scientists will rapidly develop new applications for the microscope, just as people found myriad applications for the laser when it was invented in the 1960s.

The size and portability of the HBH FibreScan 1000 microscope open up applications forbidden to its bulky predecessor. The most exciting of these, already in the prototype stage, is a fibre optic confocal laser endoscope—a miniature microscope that can be introduced into the body to study living tissues directly.

The endoscope represents a special challenge in design, because there is no way to integrate an oscillating mirror to produce the scanning action of the laser confocal microscope.
Modelling the real world

Economists use mathematics to predict how an economy will react to market forces. The trouble is, most of these models apply to a perfect, closed world while real-world economies are far from this ideal. The challenge for economists is to build better models, simulating world pressures and imperfect competition.

In the perfect world of the economic model, there are no depressions or recessions. In a closed mathematical environment, insulated from the harsh realities of real-world economies, rational companies respond predictably to market forces, and perfect competition smooths out troughs.

But as Australia has found to its cost in the past decade, real companies do not always respond predictably when governments adjust the levers and gears of economic policy. The models have obvious shortcomings because they fail to predict the general behaviour of the national economy.

One deficiency has been that traditional economic models assume perfect competition, when real-world competition is imperfect. Most of these models also operate as closed systems, dealing purely with domestic markets. There are no imports or exports, no capital inflows or outflows. In short, the idealised company operating within this environment never has to grapple with forces imposed by the international marketplace.

"We have difficulty explaining real world problems," said Mr Kaludara Abayasiri-silva, a former senior economist from the Central Bank of Sri Lanka and now a PhD student in the Department of Economics. "How can we introduce imperfect competition to macroeconomic models?"

This question was addressed by Professor Yew-Kwang Ng in the early 1980s by developing a new method of economic analysis called mesoeconomics. He is internationally recognised as the pioneer of modern imperfectly competitive macroeconomic models.

Mesoeconomics is concerned with the microeconomics of an idealised, imperfectly competitive firm, and the way the firm responds to macroeconomic forces such as aggregate demand, aggregate output and the average price level of the economy.

In perfect competitive models that assume large numbers of firms and a large number of consumers, changes in the demand for goods and services may influence prices. In real-world situations, however, the number of firms and consumers is finite, and changes in demand may affect prices.

The question is: in the real world, where domestic firms must compete with foreign products, and firms can sell higher volumes of their products at a lower price level than in the closed-economy model, how do these changes affect the price level?

Any increase in nominal aggregate demand shifts the demand curve upwards and to the right again producing a change in marginal revenue. At given marginal cost, the firm must increase its prices, and must also increase its output. Increasing output requires purcasing more labour, increasing costs.

Mr Abayasiri-silva says that, in such a case, traditional models predict no change in output, only an increase in prices. "In my model, the representative firm is competing with foreign prices," he said. "If the local price increases, but there is no change in foreign prices, then local consumers perceive a fall in the relative price of foreign goods.

"That changes the demand curve, introducing a new situation. Depending on this change, there may be either a fall in output or an increase. I am doing more research to see which case may apply, but it depends ultimately on how consumers respond to the changing relative price of foreign goods."

The outcome is also influenced by consumer preferences: do they prefer local products or foreign products, and what premium will they pay for products if they prefer to buy Australian? This is taking economic modelling into the realm of microeconomics.

"We need empirical observations to determine in which direction change may occur - whether output will increase or decrease," he continued. "My guess is that it will increase, but I can't be certain. Understanding such an outcome is very important in understanding how trends is the market affect business confidence, and in understanding how governments may act to prevent recession or depression."

Mr Abayasiri-silva says the next conference of the American Economic Association in January next year will devote a full session to mesoeconomics and its applications. Monash has been invited to deliver three papers at this session, a measure of its growing intellectual influence in the field.
Although the Neolithic Britons and Irish were eventually overrun or absorbed by later waves of invaders from Europe, important elements of their culture survive - even down to the present day.

Their extraordinary feats of design and engineering reveal a knowledge of mathematical concepts usually credited to civilisations several thousand years younger.

Some 4600 years ago, they had discovered the special properties of right-angled triangles, supposedly defined by students of the Greek philosopher Pythagoras around 550 BC. They also knew about the relationship between a circle's circumference and its diameter (π), approximating it to the fraction 7/4.

They developed a reliable system of measuring distances and angles, and some of these units are still in use, unsuspected, today.

With accurate tools of measurement based on these units, they became skilled surveyors, designing their monuments, aligning their roads and placing settlements according to precise mathematical rules centred around special numbers - notably 3, 9, 11, 22 and 33.

The pre-Celtic Britons and Irish developed a system of symbolic writing that predated the cuneiform script of Sumeria and the hieroglyphs of ancient Egypt by 1500 years. And they established a solar calendar that did their year into a cycle of 16 months - each of four five-day weeks - supplemented by 45 intercalary days to make up a 365 day year.

Research at Monash by Dr Neil Thomas, a chartered engineer turned classical scholar, has confirmed that Stonehenge and other prehistoric stone circles - and their long-decayed wooden counterparts - are sophisticated solar calendars. Some feature subsidiary lunar calendars that could have been used at the time of construction to predict lunar eclipses.

Dr Thomas, who received his PhD in October, developed an interest in the pre-Celtic culture of Britain and Ireland after he decided to investigate his Celtic ancestry - he has Welsh, Scots and Irish ancestors. After 12 years of intensive scholarship, he presented his PhD thesis 'The Proto-Civilisation of Albion and Erin', on the Neolithic culture of Albion (the ancient name for Britain) and Erin (Ireland).

A background in engineering and mathematics gave Dr Thomas new insights into the design and function of the megalithic monuments of Britain and western Europe. He believes the Neolithic culture of Britain and Ireland worshipped the Sun and the Moon, and three gods corresponding to Odin, Thor and Freyr in the later Norse pantheon.

Some stone and wood circles they built were temples of worship, as well as serving both as calendars and primitive astronomical computers which helped them order their lives around the annual solar and lunar cycles, and the annual cycle of the seasons.

Dr Thomas' interest was sparked by a book, Ancient Megalithic Sites in Britain, published in 1967 by the late Professor Alexander Thom, Professor of Engineering at Oxford University and a renowned amateur archaeologist. Professor Thom and his son, Dr Archibald Thom, surveyed many ancient sites in Britain, Ireland and France between the 1930s and 1960s.

Professor Thom advanced a controversial theory that certain stone circles and other sites in Scotland and the adjacent Western Isles indicated that people living in these areas had been using a 16 month calendar as early as 1600 BC. Dr Thomas has not only confirmed this theory, but has shown that the 16 month calendar was widely used in Ireland and Britain as early as 3500 BC.

One of his most important discoveries has been to define when the Neolithic and Celtic years commenced. Most scholars have nominated spring or autumn, but Dr Thomas' interpretation of an 1800 year old Celtic bronze plaque inscribed with a 12 month lunar calendar found at Carnac, in France in 1897, leaves little doubt that the Celtic year pivoted around midsummer - as did the solar and lunar calendars of the pre-Celtic Britons and Irish.

The 16 month solar calendar first appears cut into a kerbstone of the Knowth mound, dated at 3500 BC. Although the calendar's form varies in the later stone and wood circles of Britain and Europe, the basic system of calculation remained essentially unchanged for nearly 4000 years.

The Knowth kerbstone features 10 plain circles, plus an 11th containing a dot, and a 12th marked with a vee lying on its side. The 10 circles may have been counted twice (for the basic 20 day month), with the 11th and 12th circles being counted for months of more than 30 days.

Dr Thomas believes that the zig-zag and wavy-line symbols that appear on many Knowth kerbstones, and elsewhere in Neolithic and Celtic inscriptions and artefacts, were used for counting, with each change of direction being counted as one unit. Thus the V on the 11th circle represents 'one'. The dotted 12th circle probably represents a count of two days. When counted alone or in combination the circles can be used fill out months of 21, 22, 23 or 24 days.

A large clockwise spiral on the right side of the stone represents the 'warm' summer Sun, and a nearby smaller counter-clockwise spiral, the 'cold' winter Sun. (A symbol found on other kerbstones, consisting of two equal spirals formed from a single line, but reversed in direction, is thought to represent the equinox; on two days each year, in spring and autumn, day and night are of equal length.)

Continued overleaf
Almost exactly eight anniversaries in the year, interprets this group as representing Samain, Imbolc and Beltane, plus the curving cluster of eight hoops, with a quarter-day festival of Lugnasad, years after the construction of the year. The basic principles of this calendar are embodied in many other stone circles in Britain.

Stonehenge's fame has tended to obscured the fact that two other wood rings once stood nearby: an egg-shaped circle at Woodhenge about 300 metres to the north-east, and another wood circle at Durrington Walls, 300 metres to the south-west. In 1970, archaeologists discovered the post holes for another large wooden circle near the Dorset coast at Mt. Pleasant and another some distance away. Without a guide craft across the hillside of the Neolithic site is 2.5 and 33 megalithic rods. The number 33 was sacred to the ancient Britons. Dr Thomas calls the megalithic rod. And 2.5 megalithic miles, Dr Thomas believes, may have been the linear measure called the league, whose origins are obscure.

The ancient Britons developed a system for measuring angles, by repeatedly subdividing the basic quartered circle. There were 64 megalithic degrees in a full circle, rather than the 360 degrees of today.

Using modern survey maps, Dr Thomas ran these systems of angular and linear measurement over the distances and alignments between many ancient sites in Britain.

Stonehenge, and the village of Avebury to the north, seem to be focal points for large numbers of megalithic circles, engineering works and a complex network of connecting alignments.

Most of the angles between these alignments are exact multiples of the megalithic degree, and most of the distances are in whole numbers of megalithic miles, except for distances like 2.5 and 7.5 megalithic miles, or the 2.5 mile megalithic league.

One alignment begins at Stonehenge and transects Old Sarum, Salisbury, the Clearbury Ring and Castle Hill Fort, en route to a prehistoric site called Highcliff Castle on Cliff top overlooking the English Channel. The Highcliff Castle site is exactly 22.2 megalithic miles from Stonehenge—22 was another sacred number for the ancient Britons.

Dr Thomas suggests that the Highcliff Castle site would have been a logical site for a beacon to guide craft across the English Channel from Europe and into safe harbours on the mouth of the Avon River.

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Surveying Neolithic measures

Dr Thomas has provided a convincing account of the identity of the so-called Long Man of Wilmington, a massive figure carved into the chalk of a hillside near Eastbourne, Sussex. The Long Man measures 64.4 metres high from head to toe—almost exactly 33 megalithic rods. The number 33 was sacred to the ancient Britons.

Dr Thomas calls the 33 rod measure a dod. In laying out the original circle of Stonehenge 4500 years ago—the so-called Aubrey circle—its designers made it exactly four dod in circumference. The four quadrants forming the perimeter, each of 33 megalithic rods, divided the year into four quarters of four months each.

Some 25 years ago, Professor Alexander Thom (see main article) concluded from his studies of ceremonial circles in Britain and Europe that their designers had employed specific units of linear measurement, including a measure that Dr Thomas now terms a megalithic yard, and less frequently, a unit 2.5 times longer, the megalithic rod.

Dr Thomas suspects the enigmatic Long Man of Wilmington was a surveyor, and that the stones in his hand were his tools of measurement. They were about the same height as the figure, who in real life was probably about 15 metres tall. It is a reasonable assumption that poorer nutrition resulted in average heights being considerably less than today.

He believes the Long Man's sighting hole, the second stave would be hidden by the first. The staves were probably pinned together with a peg inserted through the holes, and lashed with a brace that held them at right angles.

In this configuration, two staves 1.74 metres long (roughly eye-level for a 1.5 metre tall man) subdivide a distance of 2.073 metres—Professor Thom's megalithic rod.

Dr Thomas says the Long Man's height of one dod, or 33 megalithic rods is significant because when multiplied by 33, it yields another recurrent unit of distance that he calls the megalithic mile—a unit somewhat longer than the present English mile.

The ancient British units of measurement are related by the two multipliers 2.5 and 33. There were 2.5 megalithic feet in a megalithic yard, 33 megalithic yards in a dod, and 33 dod in a megalithic mile. And 2.5 megalithic miles, Dr Thomas believes, may have been the linear measure called the league, whose origins are obscure.

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Dr Thomas suggests that the Highcliff Castle site would have been a logical site for a beacon to guide craft across the English Channel from Europe and into safe harbours on the mouth of the Avon River.
For a priest or shaman standing in the centre of the Aubrey circle, the six lines of posts may have been defined alternatively as the rising positions for the midsummer and midwinter full moon during its 19 year cycle.

Alternatively, Dr Thomas says it may have been possible, if difficult, to use the lines of posts to predict lunar eclipses, which occur at intervals of 18.61 years. There is a hint of this possibility in the unexplained choice of 56 stones to make the Aubrey circle. It may be coincidence, but if each stone was counted twice — a common practice with some of the solar calendars — the count of 112 is very close to the figure obtained by multiplying the 18.61 year eclipse cycle by six.

About 1000 years after the Aubrey circle was constructed, the original causeway was shifted to a new alignment 3.5 degrees to the east. Two stones that had marked the entrance of the causeway were shifted to mark a new alignment. The causeway looked straight towards the midsummer sunrise at 49.9 degrees east. Stonehenge was transformed from a lunar to a solar calendar.

At the same time, a massive construction project that must have occupied almost the entire adult population of the region for many years, saw two concentric circles of bluestone megaliths erected inside the Aubrey circle. The stones were quarried some 250 kilometres away at Carn Meini, in the Preseli Mountains near the coast of south-west Wales. Dr Thomas believes the bluestones, weighing up to 40 tonnes, were taken down to the coast and rolled into the surf before being floated on rafts around the coast, and then up the River Avon towards Stonehenge.

Finally, they were brought ashore and transported on sleds to be erected at Stonehenge. Britain 4000 years ago was much colder than today, so a drayman in Neil Thomas speculate that his Neolithic counterparts may have taken advantage of thick morning frosts that allowed the sleds to glide over grass.

The bluestone columns were arranged in 38 pairs. The significance of the number is elusive, but the nearby Woodhenge circle features a circle of 19 solstice posts that may have represented the basic count of 19 days in the British Neolithic month (one day less than the older Irish kerbstone calendar at Knowth).

That the 38 pairs of columns at Stonehenge may have represented 19 days of the month is implied by the placement of three extra pairs inside the bluestone circle, aligned with the midsummer axis. These columns may have been counted as required to add to the basic 19 days of the month, for a maximum of 22 days in any one month.

These stones were reused, but their arrangement has been inferred from the depressions they left in the chalky soil. All of them lay inside the massive group of Sarsen stones that attract modern visitors to Stonehenge.

Around 2500 BC, four massive bluestone sarsens were placed strategically at the perimeter of the Aubrey circle. These so-called Station Stones define a rectangle whose short sides point to the midsummer and midwinter suns, and, in the opposite direction, to midwinter sunset. The placement of these stones appears to have foregrounded a fundamental change in the Neolithic culture of the day: a shift from worshipping the Moon as the primary deity, to worshipping the Sun.

The shift to Sun-worship may be a rare example of a shift from worshipping the Moon as the primary deity in the Neolithic culture of the day: a shift from worshipping the Moon as the primary deity, to worshipping the Sun.

The calendar design and planning at the Sanctuary, south-east of Avebury.
The genetic disease haemophilia, in which the blood fails to clot, almost exclusively affects males. The gene resides on the male's single X-chromosome, inherited via the mother – females are protected against the disorder because their second X-chromosome provides a backup gene that functions normally.

Haemophilia is caused by a defective gene for a blood-clotting factor, Factor VIII. Queen Victoria spread the gene to her male descendants, so vital to the maintenance of life. These genes fail to fulfil their role in normal biochemical events.

The cascade involves many different proteins, enzymes and hormone-like factors that transmit signals between blood cells. Haemostasis – the dynamic process by which blood clots – is equally serious. When the wall of a blood vessel is damaged, platelets (tiny blood cells) adhere to the damaged region of the vessel wall. They release a signal that triggers the release of von Willebrand's protein, which helps blood cells stick to the damaged wall.

The most common haemorrhagic disorder that affects both males and females is von Willebrand's disease. When the wall of a blood vessel is breached, specialised blood cells called platelets rapidly clump together and adhere to the damaged region of the vessel wall, arresting the escape of blood. In individuals who inherit a defective von Willebrand's (VW) factor, the platelets fail to aggregate and uncontrolled bleeding may ensue.

Professor Salem says VW factor triggers platelet aggregation, and also seems to be essential for the platelet 'plug' to adhere to the blood-vessel wall. His team is studying the VW protein's structure to identify which regions are critical to the process of binding to signal-transducing proteins on the surface of the platelets. These cell-surface proteins, which serve as molecular switches, activate enzymes in the platelets that cause them to aggregate and adhere to the damaged vessel wall.

Von Willebrand's disease, like all genetic diseases, is incurable. However, it can be treated with a cocktail of proteins that precipitate out when normal serum is chilled, and this mix can be used to treat victims of von Willebrand's disease who require surgery, or who have suffered injuries that cause bleeding.

VW factor is a very large protein, encoded by a big gene on human chromosome 12. Molecular biologists at the University of Washington in Seattle, who were recently isolated and cloned the von Willebrand's gene, an essential first step for studying its DNA code and later, for producing VW factor in large amounts, and in pure form.

In the Box Hill department, Professor Barry Finkin and Dr Kathy Thomas have been studying a Melbourne von Willebrand's patient who appears to have what molecular geneticists call a point mutation in the gene. A single letter of the DNA code in her gene has been changed, so that a different amino acid 'building block' is inserted at the corresponding point in the protein encoded by the gene. This patient makes normal amounts of von Willebrand's factor, but for some reason, it fails to function.

It became clear during the 1980s that the three-dimensional structure of most proteins is crucial to their biological activity. Signalling protein molecules, for instance, work by a lock-and-key interaction with their cellular receptors; should a mutation subtly change the shape of either key or lock, the signal may not be transmitted, and a biochemical cascade may be halted in midstream.

This is what has seemed to have happened in the Melbourne patient. A point mutation has been tentatively identified in her gene, which causes the VW protein to fold abnormally and interfere with its ability to bind to the appropriate receptor on the surface of her platelet cells. Her platelets do not aggregate, and her blood thus fails to clot.

Professor Salem says the patient's mutation seems to be unique, because if a compound called botrocetin is added to a sample of her blood, the von Willebrand's protein begins to function and induces normal platelet aggregation.

Unfortunately, botrocetin, a derivative of a snake venom, cannot be used to treat the woman's clotting disorder because it is highly toxic.

Botrocetin functions as a cofactor, binding to the mutant von Willebrand's protein and correcting the shape error that prevents it from binding to the cellular receptor. The Box Hill research group's collaborators at Washington University in St Louis have identified the point mutation responsible and, to confirm this, plan to construct versions of the normal von Willebrand's gene in which the DNA at this site is changed in a similar manner.

If these mutant genes also produce defective proteins that can be restored to normal function by botrocetin, it would confirm that this single, subtle mutation is indeed capable of causing von Willebrand's disease.

Professor Salem says that this mutation is almost certainly quite rare, and proof other von Willebrand's patients probably have different mutations, including deletions of critical regions of the gene and so-called 'frameshift' mutations. These cause the gene's code to be read from the wrong starting point, resulting in a 'nonsense' protein that has no biological function.

Blood clotting is rigorously controlled; in addition to factors that induce clotting, like von Willebrand's factor, there are also factors that act as anticoagulants, to halt or prevent clotting.

Professor Salem's research group has been investigating another factor called Protein C, a key anticoagulant which is normally present in an inactive form in the blood. On activation, it plays a direct role in halting the clotting cascade. Recent work suggests that Protein C may have important functions beyond its role as an anticoagulant.

Protein C also appears to play an important role in preventing the rejection of grafted organs after transplant operations. Professor Salem has been working with Dr Wayne Hancock, of Alfred Hospital's Department of Immunology and Pathology, who has found that in kidney transplant patients who have begun to reject the donor organ, serum levels of Protein C fall rapidly and the protein begins to accumulate at the graft site.

In experiments with rats, they have shown that Protein C can even be treated after their new organ has been transplanted, because they imply that if transplant patients who have begun to reject the donor organ, serum levels of Protein C fall rapidly and the protein begins to accumulate at the graft site.

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At present, recipients of transplanted organs must take the antibiotic cyclosporin for the rest of their lives to prevent graft rejection. Cyclosporin has some unwelcome side-effects, because it causes general depression of the immune response, exposing transplant patients to the risk of infection.

Mice, with their rapid life cycle, allow mutant genes to be studied more conveniently than in humans. Dr Bird now plans work with transgenic mice, which have had mutant versions of the mouse thrombomodulin genes introduced into their genetic blueprint, to gain an understanding of how mutations in the human gene may induce potentially lethal thromboses (abnormal blood clots in humans).

Dr Chris Mitchell, a senior lecturer in the Department of Medicine, has studied the blood of another Melbourne patient, a man in his 30s, who died of a massive thrombosis. Dr Mitchell discovered that the man made normal Protein C, but for some reason his immune system synthesized antibodies that inhibited its function, causing his blood to clot spontaneously.
Clearing a cellular pathway

Patients with liver damage are susceptible to the toxic effects of many common drugs and antibiotics, making treatment problematic. The cause has been a long-standing medical mystery, but two Monash researchers have advanced a simple explanation which promises economic and therapeutic benefits worldwide.

"Life," said a sage, "depends on the liver." That statement is literally true for thousands of Australians with chronic liver disease. Their impaired liver function puts them at risk of toxic effects from drugs and antibiotics when they fall ill or contract an infection.

A healthy liver rapidly clears most drugs and toxins from its owner's system; normal drug therapies take this into account, by setting dosages to maintain an effective concentration of a drug over a period long enough to control the infection.

But patients with chronic liver disease and impaired liver function clear drugs more slowly, so that even reduced dosages may be hazardous. If the drug concentration remains elevated for too long, it can damage healthy tissues, particularly the kidneys. In liver-damaged patients, the dosage of certain drugs may need to be reduced to as little as 10 per cent of normal.

The root cause of reduced drug clearance in damaged livers has been a long-standing medical mystery. But now two Monash medical researchers have advanced a simple explanation that could revolutionise the administration of drugs to liver-damaged patients around the world, and cut the social and economic costs of complications from poor liver function or drug toxicity.

The researchers are Dr Allan McLean, Director of Clinical Pharmacology at the Alfred Hospital, and an honorary academic member of the Faculty of Medicine, and Dr Denis Morgan of the Victorian College of Pharmacy, which recently affiliated with Monash.

Dr McLean and Dr Morgan have completed a comprehensive review of experiments into the effect of recently observed changes in the structure of diseased liver cells. These changes, they believe, limit the diffusion of oxygen through liver tissue, inhibiting specialised oxygen-dependent enzymes that clear drugs from the patient's system.

Liver cells form two tube-like vessels, one inside the other. Figure 1 (below) shows that the wall of the inner vessel, the endothelium, is sieve-like in nature. A tiny branch from the hepatic portal vein delivers blood to the top of the central vessel into the sinus formed by the endothelium, and blood drains from lower end of the sinus. The endothelial lining is surrounded by a layer of hepatic cells, punctuated by tiny holes called fenestrae (literally windows). Red cells moving down through the sinus are too large to pass laterally through the fenestrae.

However, oxygen imported by the red blood cells, plus other molecules in the bloodstream, move freely through the fenestrae into a cavity called the space of Disse. Here they mix thoroughly and are consumed by various cellular processes, including the enzyme reactions that clear drugs from the liver.

Dr McLean said that the constant mixing of oxygen and other molecules like albumin proteins in the space of Disse maintains a biochemical gradient that causes oxygen to flow into adjacent liver cells. Cell biologists have noted that in livers affected by cirrhosis or other forms of liver disease, tiny blood vessels grow and block the fenestrae—a process called capillarisation.

The specialised microcirculation serving liver tissue now reverts to the circulation pattern typical of capillaries in other tissues. Larger molecules like proteins are barred from passing through the wall of the sinus, and only water and organic salts can diffuse into the space of Disse.

Other pathological changes may also occur. Fibrous tissues may develop, forming a matrix that further limits the diffusion of gases and biochemical molecules into the space of Disse.

Dr McLean says that the blocked fenestrae and other physical barriers can drastically reduce the supply of oxygen needed by drug-clearing enzymes. "In terms of oxygen access, you have gone from a system with unrestricted oxygen flow in one with a relatively long diffusional pathway," he said.

Something similar happens in diseased lung tissue. Lung and liver tissues actually form from similar tissues, eased lung tissue. Lung and liver tissues are formed from similar tissues, and by similar processes, during embryogenesis. "When people looked very carefully at gas exchange in the lung, at least 50 per cent of diffusional resistance to gas exchange is attributed to the endothelial lining of lung capillaries," Dr McLean said.

"In chronic lung disease, fibrosis develops in lung tissue just as in cirrhotic liver tissue. Fibrosis of the endothelium of the lung can increase resistance to gas diffusion by a factor of three or four. What our study suggests is that even if there is no marked pathological change in liver tissue except for capillarisation, resistance to oxygen diffusion may be significantly increased because there is virtually no resistance in normal liver tissue."

Dr McLean and Dr Morgan came to their conclusions after analysing patterns of change in drug metabolism in people with liver disease. They found that such people fell into two classes.

One group of drugs, initially insoluble in water, is cleared by a process called conjugation, in which enzymes attach the active form of the drug to a carrier molecule, making it water-soluble. The complex is then cleared by excretion in the urine or bile. Drugs in this group work equally well in normal and liver-damaged patients: their activity is spared.

But there is a second clearance pathway, in which enzymes oxidise or reduce the drug molecule. It is these drugs that pose problems in patients with liver damage, because their clearance is affected. One commonly used drug in this class is omeprazole, which suppresses excess secretion of acid in the stomach.

"Omeprazole is severely affected because as soon as oxygen delivery to the liver is reduced, the rate at which the drug is cleared or metabolised is reduced correspondingly," Dr McLean said. "Even the smallest reduction in oxygen produces a change."

There is in fact a fundamental difference that has been observed and published by other researchers. When we looked at all the other drugs that are not cleared by the conjugation route, the only thing they had in common was their sensitivity or resistance to oxygen. No other explanation held up.

Dr Denis Morgan (left) of the Victorian College of Pharmacy, and Dr Allan McLean, Director of Clinical Pharmacology at the Alfred Hospital.

"We had a hypothesis that poor oxygen supply to the liver was responsible for reduced rates of clearance of drugs that are metabolised by oxidation or reduction. We then searched for any published examples where researchers had intervened or made measurements that might confirm or deny our hypothesis. In the examples we came across, one of two things had been done.

"In cells deprived of oxygen, there is an increase in the ratio of lactate to pyruvate, which is consistent with reduced oxidation. Similarly, there is an increase in the ratio betahydroxybutyrate to acetoacetate. It happens because the cells are forced to switch to anaerobic metabolism."

"We also found papers where researchers had measured rates of oxygen consumption in diseased and healthy livers, and these results also supported our hypothesis—the diseased livers were consuming less oxygen."

The examples they found in the medical literature involved experiments on isolated slices of tissue from diseased human livers, and on monkeys and rats with liver fibrosis. Diseased liver tissues supplemented with oxygen displayed increased rates of drug metabolism; so did living animals breathing pure oxygen.

In liver tissue affected by capillarisation, resistance to oxygen diffusion is significantly tripled. The two researchers believe the problem of reduced drug clearance could be substantially overcome if patients breathed pure oxygen. But high concentrations of oxygen can be toxic to healthy tissues if breathed for prolonged periods, and oxygen is not cheap.

Supplementary oxygen may not be a feasible therapy. The alternative is to increase oxygenation of the liver by increasing blood flow. Dr McLean and Dr Morgan say this can be achieved with drugs that dilate blood vessels, decreasing resistance to flow.

They found that when vasodilators were given orally, rather than intravenously, there was a much earlier and more pronounced effect on blood vessels in the liver than in the general circulation.

Continued overleaf
Tracking through tissue

From Research Monash 1

This problem has been neatly solved in the prototype by vibrating the end of the confocal microscope head, guiding it mechanically with a special alloy that alternately expands and contracts very rapidly in response to an applied voltage.

The fibre-optic confocal laser endoscope would have significant advantages over conventional fibre-optic endoscopes, which have already provided stunning video images of living tissues and internal organs at work. The conventional endoscope cannot, however, magnify what it sees.

The confocal endoscope would provide high magnification images of structures in the living body that have never before been seen at the cellular level without removing organs. Mr Delaney says it should be possible to make an endoscope small enough to be left semi-permanently inside the body to study, for example, the growth of cancerous tissue.

"The most exciting applications are its ability to look at living tissues without laborious tissue preparation," Mr Delaney said. In conventional light microscopy, tissues are fixed in formaldehyde and then sliced with a microtome to produce specimens thin enough to focus on at high magnification. But by zigzagging and slicing necessitates killing the tissue.

"With our microscope we can use vital stains to show up compounds in living tissues without microtoming them," he said.

"For example, we can use fluorescent stains to show such things as intracellular calcium, electrical activity of nerves, growth of blood vessels or tumours, or the regrowth of broken bones.

"We can also map the distribution of specific receptors in tissues that are the sites of action for drugs or the body's own neurotransmitters."

For fluorescence microscopy, the tissues are actually emitting light under the stimulus of the laser beam, the light fibre confocal microscope offers twice the resolution of a conventional light microscope.

For reflection microscopy, it is a factor of 1.4 better. Mr Delaney points out that superior magnification and definition are actually bonuses, on top of scanning 'slices' of living tissue to obtain three-dimensional images.

"Medical researchers are very interested in using it for studying the wiring of neurons in animal brains," he said. "It offers the capacity to track down through tissue to see where the synaptic junctions between nerves are located, and in this way, to see how they are organised."

Oxygen aids drug clearance

From previous page

The explanation is simple: the vasodilator is absorbed by the gut and is carried directly to the liver via the portal vein.

Dr McLean recalls that early in his career researchers noted, without being able to explain why, that people with severe lung disease also had reduced liver metabolism of certain drugs. Now the explanation seems clear: impaired liver function reduces oxygenation of the liver, slowing clearance of these drugs.

People with lung disease would tend to be more severely affected if they developed cirrhosis of the liver, suffering what Dr McLean describes as a 'double whammy'. The liver not only clears synthetic drugs from the system, but a range of toxins produced as normal by-products of metabolism. For example, ammonia from degraded proteins may cause lethal encephalopathy. Dr McLean believes that simple measures of increasing oxygen supply to liver-damaged patients could have extensive therapeutic and economic benefits, and expects that if their hypothesis is confirmed by further experiments, such a therapy will be rapidly adopted around the world.

Their analyses of the cause and treatment of liver impairment have recently been published in a leading pharmacological review journal, and a leading international clinical journal on liver disease.

Inherited genes may cause lethal blood diseases

From Research Monash 6

The finding shows that blood disorders can occur even in individuals in which the genes directly involved in haemostasis are perfectly normal.

However, Dr Mitchell says inherited Proteins C defects are well described in the scientific literature. Newborn babies who inherit a defective Protein C gene may develop a condition called purpura fulminans, in which they suffer recurrent thromboses. The condition is lethal unless treated.

A defective Protein C gene may render adults prone to thromboses in their 30s or 40s. Before the advent of anticoagulants like heparin, and clot-dissolving agents like streptokinase, such people would have been at high risk of premature death. Dr Mitchell says the biochemical regulation of haemostasis is extremely complex, and a better understanding of what regulates the regulator? During her post-doctoral research in the US, Dr Mitchell purified an enzyme that converts IP-3 into an inactive form.

She is now studying the way the gene for this new enzyme is regulated. This enzyme is not unique to platelets but is widespread in its distribution. Regulation of IP-3 has a role in the new research of other cell systems, including growth and cell division.

"In a clinical setting, if we could regulate IP-3, we could control platelet aggregation, either to promote it, or to inhibit it," Dr Mitchell said. "But it's long-term work. We may not see any results for a decade or more."