February 1982 Volume 46 No. 1

# chemistry in new zealand

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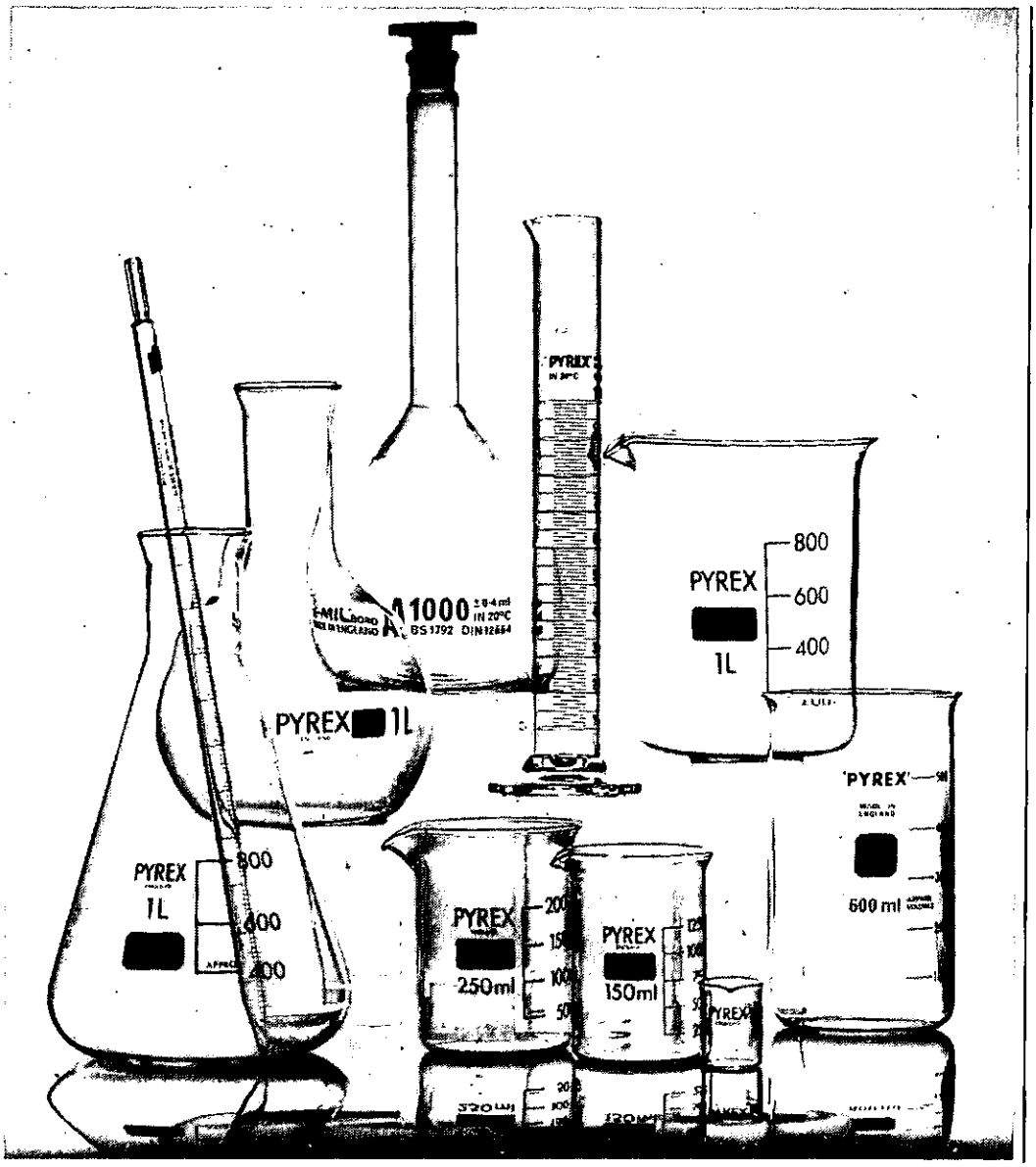


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February 1982 Volume 46 No. 1

# chemistry in new zealand

Official Journal of the New Zealand Institute of Chemistry

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**February 1982**

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## CONTENTS

## NEW EDITOR TAKES OVER

With the December issue of 1981, Stan Brooker[1] retired for the second time from the post of editor of Chemistry in New Zealand. He was editor from 1947 to 1953 and again from the beginning of 1979.

Stan's second term saw a new departure in the publishing of the journal and the past three years included some frustrating moments as publishing companies revealed amazingly short half-lives. He has, however, performed much tedious groundwork towards setting up a viable system, a lot of it invisible to the casual reader whose eye is caught only by the inevitable proof-reading error.

The calibre of a person can be gauged by the people they attract around them and Stan's example and enthusiasm have assembled an editorial committee of talented chemists from diverse employment backgrounds.

The committee and I are grateful to him for the experience of working under his editorship and I am grateful that the committee is prepared to continue to provide ideas and assistance and that Stan, with his wealth of experience and personal contacts, will remain part of it.

I believe the journal has an important role to play in the running of the Institute, perhaps the most important function being to act as a link between chemists thoughout the country.

To fulfil this role, the editor relies heavily on his six branch editors and they in turn must rely on their branch members. Given such a diverse audience as the membership of the NZIC, I know that there is no way that every page in every issue will fascinate every reader, but I would like them to find something of interest in every issue. To this end I would ask your help.

**Tony Herd**

*1* Chemistry in New Zealand, *45*, 31, 1981.

*Retiring editor Stan Brooker hands over the editorial ballpoint to his successor Tony Herd. This literally priceless relic has been part of the Institute's heritage since the middle of December.*

## EXCITING FUTURE FOR CHEMISTS

Our Jubilee year brought many enjoyable moments, but above all the conference must surely rank as an outstanding achievement. Our Auckland conference committee, talented speakers and a splendid turnout by the membership, combined to provide a proper occasion to review, to assess and to look ahead. It was a notable coincidence that both national affairs and an international state of economic turmoil added spice to considerations about where science and technology in general should fit in our future.

The imminent large-scale exploitation of Maui gas commands keen interest among most chemists. Guest speakers Professor John Cadogan of BP and Dr Paul Weisz of Mobil were visible evidence at conference that we will see consipicuous inputs from the multinationals, but our own engineers and chemists will also participate in increasing numbers in the petrochemical industries. Alternative energy sources, metal refining, wood processing and the big agriculture-based industries all involve immediate challenges for a very large segment of the membership.

Chemists themselves have always recognised that abstruse games with chemical symbols and mechanisms may be an end in itself for a few, but more importantly a chemistry education is simply a basis for developing a diverse array of professional talents in the community.

Chemists have traditionally been effective in developing national resources, often in an unobtrusive way. What is new is that the future options are so varied, the penalties for getting it wrong so great and the quality of at least some planning for investment so dubious, one feels the institute must drive even harder towards a higher level of input into national affairs.

Fears about the adequacy of resources for science and technology are felt at all levels. To give a parochial example our three export giants, meat, wool and dairy products earn over four billion dollars annually amid a scene of drastic shifts in markets and product preferences. The state's stake in the research and development efforts of the three research associations concerned is less than five million dollars annually and the immediate prospect is that it may fall still lower in real terms.

In the field of education, the Penfold report, endorsed by council for further aggressive action by institute members, seeks to press home a message of lost opportunities at grass-roots in the secondary schools. Having diagnosed these ills in round terms, the battle for proper presentation of chemistry in schools will be fought, as usual, in Wellington.

In short there is plenty for chemists to be excited about and to strive for. Council too should be in a positive mood. One aspect I would particularly like to advance is a more tangible policy on financial support for conferences, for visiting scientists and publication of reports or educational material.

**W.S. Simpson**
President
N Z I C

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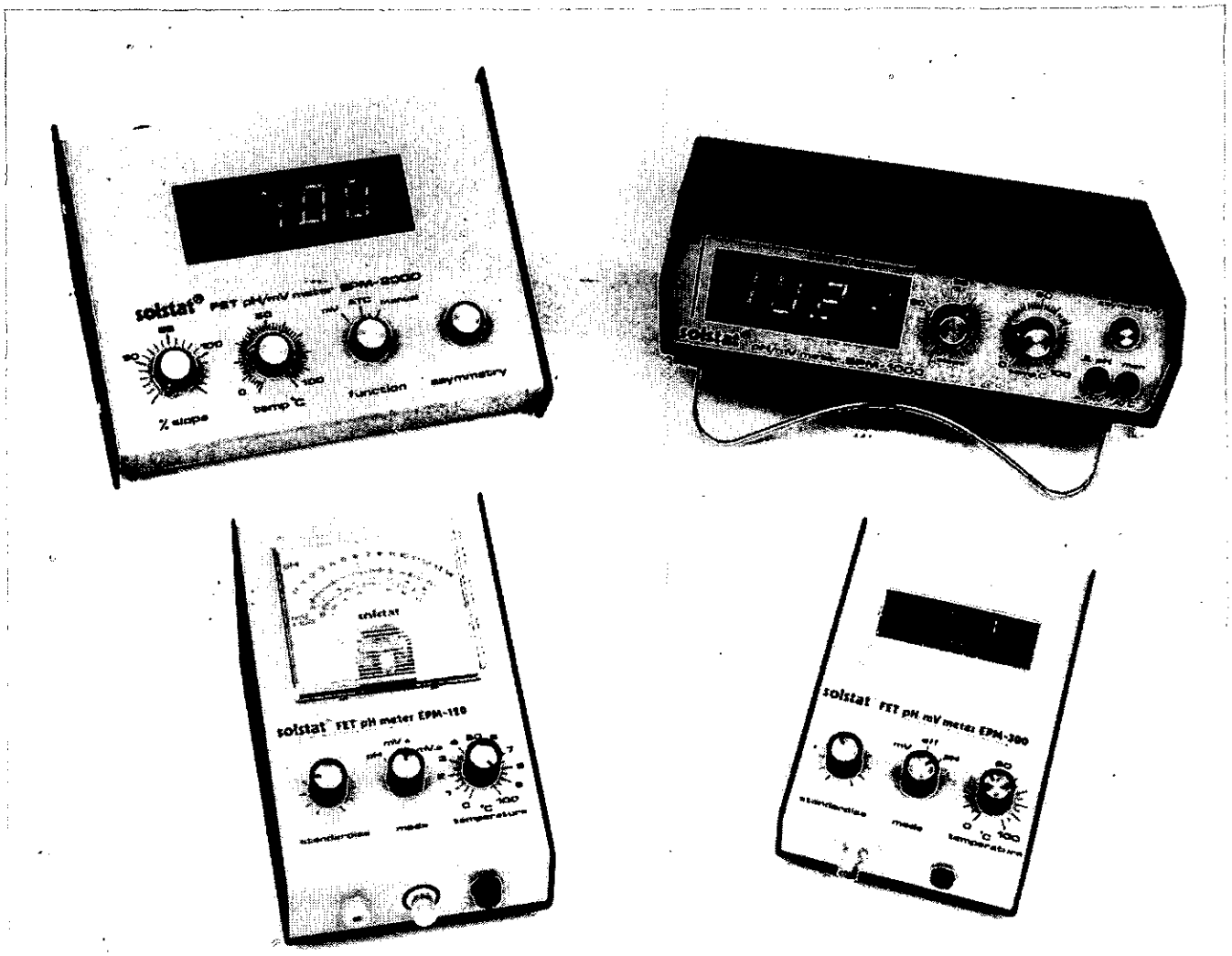


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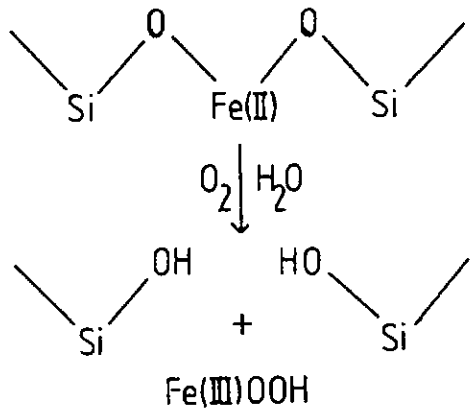
# The Ruddy Earth — Iron Oxides in Soils

**C.W. Childs**
Soil Bureau, DSIR, Lower Hutt

*Adapted from the 1980 Mellor Lecture to the Wellington Branch of the NZIC*

Among the quotations which Mellor used was:
*Let us remember, please, that the search for the constitution of the world is one of the greatest and noblest problems presented by nature. — G. Galilei.*
and it is a view which must be reassuring to all soil scientists. Soils are extremely complex systems and there is much yet to be learned about their consititution and the reactions that occur within them, particularly those involving the iron oxide minerals.

Soils typically contain about 5 percent iron, though the concentration commonly ranges between 1 and 10 percent of whole soil. During the weathering of primary (magmatic) minerals in soil formation, the iron, predominantly bound in silicates as Fe(II) will be released in a reaction of the following type:




The secondary minerals so formed will include the layer silicate clay minerals and iron oxides. (Note that the term oxide is used loosely to include oxyhydroxides.) At least they will as long as conditions are oxidising within the soil. If there is a sufficient lack of oxygen Fe(II), rather than Fe(III), will be the stable form of the released iron:

$$Fe(II) \rightleftharpoons Fe(III) + e$$

This transition occurs readily in soils for iron released from primary minerals, as conditions vary between oxidising and reducing. For example, soil oxygen may become depleted due to excess water and the oxidation of organic matter, leading to reduction of Fe(III). Secondary iron as Fe(II) is generally quite soluble in soils and is able to move under the influence of water flow and diffusion. Migration eventually brings it to zones of oxidation where precipitation again occurs.

In contrast to Fe (II), Fe(III) is relatively very insoluble in soils because of the stability of the Fe(III) oxides. The oxidation/reduction process leads to many of the observable iron oxide features in soils.

But iron in soils can also move in another way and this occurs in soils known as podzols. Podzols usually occur in areas of high rainfall under a vegetation (e.g. kauri or beech forest) which provides an acid litter, high in polyphenols and other chelating agents. Although much has been written and said about the exact mechanism involved in the movement of iron in podzols, there are still many "grey" areas and, perhaps, soil scientists individually have been guilty of, as Mellor noted, a "tendency to remark favourable and forget unfavourable events" on this question.

It is admittedly a very difficult area for precise study because of the length of time which soils take to form and the diversity (some would say perversity as well!) of nature. However it is generally agreed that in these podzols iron is chelated in the topsoil by organic ligands, made soluble and leached down the profile by the downward flow of water. The iron usually redeposits as a reddish brown layer, or pan, in the subsoil. Other elements, notably aluminium, also take part in this downward migration, leaving a silica-rich, often whitish, layer behind. The exact nature of the mobile iron species and the reason for the redeposition as a pan are two of the "grey" areas in our understanding of podzol formation.

Dr Colin Farmer and his colleagues of the Macauley Institute of Soil Research in Aberdeen, have very recently argued that chelation by organic ligands is **not** the primary mechanism for the downward movement of iron and aluminium in podzols. Rather, they suggest, soluble inorganic complexes are the essential species involved. We are currently reviewing information on New Zealand podzols in the light of these suggestions.

## IRON OXIDES AND SOIL COLOUR

Even at low concentrations in soils, as long as they are finely dispersed, iron oxides have high pigmenting power. The colours of many soils are due to the type and distribution of iron oxides within the soil profile. These colours are helpful in understanding how soils have formed. For example, information about drainage patterns, oxidising and reducing conditions and temperature may be inferred. And they are also important in naming and classifying soils.

In New Zealand we use terms such as yellow-brown loam, yellow-grey earth, brown-grey earth, brown loam and red loam to classify soils and similar terms are used in other countries. Organic matter is also a pigmenter of soils - the colour of most topsoils is due primarily to the organic decomposition products of plants. When iron oxides and organic matter are removed chemically from a soil sample, the residue is almost always white or light grey. The colours of iron oxides which occur in soils are shown in Table 1. Red colours in soils are almost always associated with the "true" oxides, hematite ($\alpha$-$Fe_2O_3$) and maghemite ($\gamma$-$Fe_2O_3$), whereas yellowish-brown or brown soils usually contain oxyhydroxides of iron. Hematite has particularly high pigmenting power and even a small concentration in a soil sample can mask the colour of oxyhydroxides which may be present in much greater concentration[2].

## IRON OXIDES AND SOIL CONCRETIONS

Black or brownish-black nodules of various sizes and shapes occur in many soils in New Zealand[3] and other parts of the world. The presence of reducing **and** oxidising conditions in different parts of the soil body are necessary for their formation. These nodules are called concretions and consist of concentrations of iron ox-

**Table 1**
**Iron oxides found in soils**

| Mineral | Formula | Colour | Typical micromorphology[a] |
|---|---|---|---|
| magnetite[b] | $Fe_3O_4$ | black | sand-size grains |
| hematite[b] | $\alpha$-$Fe_2O_3$ | red | dense, hexagonal <100 nm |
| maghemite | $\gamma$-$Fe_2O_3$ | reddish-brown | dense, blocky, <100 nm |
| goethite[b] | $\alpha$-FeOOH | yellowish-brown | needles or laths, 10-20 nm |
| akaganeite[c] | $\beta$-FeOOH | yellowish-brown | laths or cigars, variable |
| lepidocrocite[b] | $\gamma$-FeOOH | orange-brown | serrated plates, 100-700 nm, or laths |
| feroxyhyte | $\delta$-FeOOH | yellowish-brown | rolled plates or needles, <50 nm |
| ferrihydrite[b] | $Fe_2O_3FeOOH$ $2.6H_2O$ | brown | approximately spherical, 5-7 nm |

a, for examples see reference 5.
b, known to occur in New Zealand.
c, occurs as mineral, but presence in soils not yet established. See reference 7 for characteristics.

ides and, to a lesser extent, manganese oxides (which give them their black colour) cementing soil particles. Their presence illustrates the way that iron oxides can bind soil particles and contribute to soil structure on a microscopic scale. Their composition, relative to that of the soil material which surrounds them (Table 2), also shows how iron and manganese oxides can strongly absorb many elements in soils and thereby control their distribution.

In addition to those elements shown in Table 2, barium, molybdenum, vanadium, phosphorus and arsenic also concentrate in concretions.Microprobe and other analyses have shown that the iron and manganese oxides form separate micro-phases in concretions. Cationic species such as cobalt, nickel and lead are absorbed on the manganese oxides, whereas the anionic species, such as phosphate, molybdate, arsenate and vanadate are absorbed by the iron oxides. These preferences can be rationalised in terms of the surface charges of the oxides.[4]

## MINERALOGY OF IRON OXIDES IN SOILS

It is usually difficult to determine the mineralogy of iron oxides in soils for three reasons: (a) they occur dispersed among other soil minerals and separation, without modification, is difficult; (b) individual "crystals" tend to be very small (with the exception of magnetite which occurs as a primary mineral) and sizes of 10-15 nm and smaller are common; (c) substitution of Al and other elements for Fe in the lattices and strong absorption of species like silicate, tend to obscure the mineralogy and make analyses difficult to interpret.

**Table 2**
**Concentrations (by wt) of elements in concretions (c) and in the soil material (s) surrounding the concretions***

| Soil name | Sample | Fe (%) | Mn (%) | Co (ppm) | Cu (ppm) | Ni (ppm) | Pb (ppm) |
|---|---|---|---|---|---|---|---|
| Hamilton clay loam | c | 19 | 1.7 | 220 | 45 | 10 | 90 |
| | s | 5 | 0.35 | 10 | 20 | 5 | 25 |
| Marton silt loam | c | 24 | 1.5 | 180 | 30 | 10 | 18 |
| | s | 4 | 0.10 | 20 | 20 | 8 | 12 |
| Waikiwi silt loam | c | 14 | 1.8 | 220 | 40 | 20 | 60 |
| | s | 4 | 0.07 | 10 | 65 | 15 | 20 |
| Arapohue clay | c | 25 | 13.6 | 1400 | 65 | 130 | 190 |
| | s | 4 | 0.12 | 10 | 35 | 20 | 13 |
| Waimatenui clay | c | 17 | 15.5 | 7800 | 205 | 50 | 2 |
| | s | 19 | 0.43 | 200 | 60 | 45 | <1 |

*for further details see refs. 3,4.

Nevertheless, with care, information can often be obtained from techniques such as x-ray diffraction, infrared spectroscopy, electron microscopy and differential thermal analysis.[5] Moessbauer spectroscopy has only recently been applied to iron minerals in soils, but it is proving useful and has some special advantages (not least in the freedom from interference).[2]

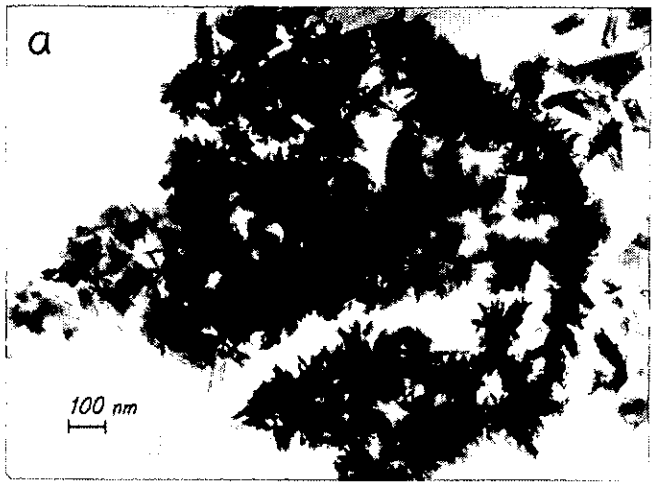
Table 1 lists iron oxide minerals found in soils and some of their properties. Further information may be found in reference five. Figure one gives three examples of the morphology of soil iron oxides as seen by a high resolution electron microscope.

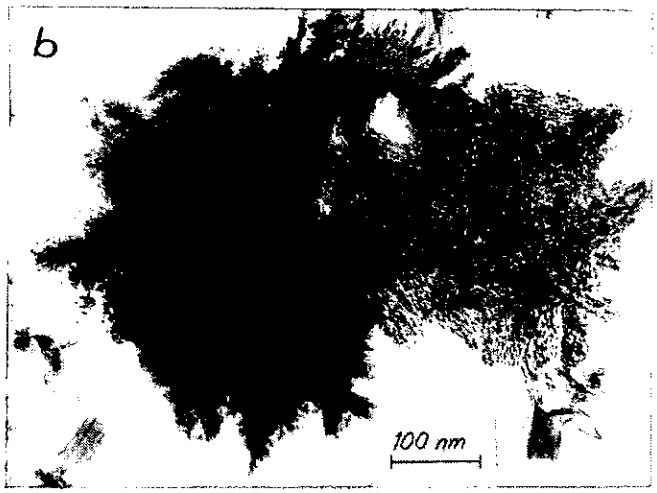
Ferrihydrite (Table 1) has only recently been recognised as a true mineral. It appears to consist of particles, roughly spherical in shape and about 5-7 nm diameter. Thus it can be said to have only short-range structural order and it does not give sharp peaks on x-ray diffractograms (though reproducible broad bands are present). Until recently it has been called, possibly along with other iron oxide minerals (e.g. feroxyhyte), "amorphous iron oxides", as distinct from the other "crystalline iron oxides" shown in Table 1.

However, things only appear amorphous if one cannot get close enough to see their detail. Recently with the use of modern instruments it has been recognised that the so-called "amorphous iron oxides" do have structural order, albeit short-range and that there exists a range of orders from short-range to long-range, rather than the simple dichotomy "amorphous" and "crystalline".

Another form of "amorphous iron oxide", claimed to be different from ferrihydrite and termed feroxyhyte, has been proposed by Professor Chukhrov and his co-workers in Russia.[6] The distinction between these two forms is subtle and unconvincing at this stage. Understanding the nature of these iron oxides with short-range order and their distribution and properties in soils, is currently an active area of research around the world.

Here in New Zealand our volcanoes have done us a favour. On both Mt Egmont and Mt Ruapehu there are springs which have produced deposits of iron oxides with short-range order, similar to those found in soils. These systems provide excellent opportunities to study the mineralogy and propertes of these materials, relatively free from impurities and in relation to the composition of water from which they have precipitated.[8,9]



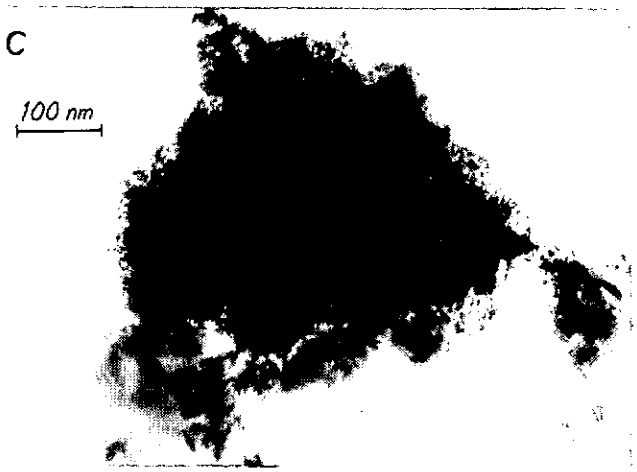




*Figure 1. High resolution electron micrographs of iron oxide particles in soil sampled near Marton. (a) Goethite (denser particles) showing twinning. (b) Microcrystalline geothite showing alignment of particles. (c) Aggregation of small approximately spherical particles believed to be ferrihydrite. In all three micrographs the less dense scrolled flakes are poorly formed halloysite.*

To conclude I want to refer to a quotation by W. Voigt which Mellor used. Voigt compared crystal structures to "200 brilliant violin players" playing in perfect tune and unison. The interesting and important iron oxide minerals in soils are not like that! Rather, each is more like a pop group - a small number of players, a variety of instruments, no conductor and it can be difficult to tell one band from another.

*Acknowledgment: I am grateful to Mervyn Trait, Macauley Institute for Soil Research , Aberdeen, for the electron micrographs in Figure 1.*

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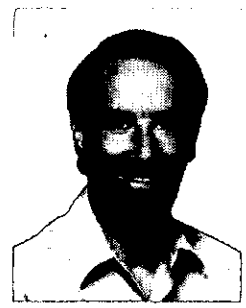

*Cyril Childs was educated at Southland Boys High School and at the University of Otago where he graduated BSc (Hons) in 1964 and PhD in 1967. He had the good fortune to have the late Max Panckhurst as his research supervisor for both degrees. There followed research fellowships in the Department of Medical Chemistry, ANU and in the Canada Centre for Inland Waters, Ontario. Childs joined Soil Bureau, DSIR, in 1971 and much of his work since has centred on the chemistry and mineralogy of iron in soils. In 1977 he was awarded a Commonwealth Bursary to work at the Macauley Institute for Soil Research in Aberdeen. There an interest in Moessbauer spectroscopy applied to soils developed and he has set up a Moessbauer laboratory at the Soil Bureau to enable this technique to be applied in a routine way to New Zealand soils. He was editor of Soil News, newsletter of the New Zealand Society of Soil Science, for several years and is now vice-president of that society. He is a former treasurer of the Wellington Branch, NZIC. He shares a home with a wife, two children, and two cats, and says that attempting to keep up with his children's activities is his major hobby.*

# The Energy Problem -Some Chemical Initiatives

**J.I.G. CADOGAN**
The British Petroleum Co. Ltd.

**Notes from the Plenary Lecture given to the NZIC Conference, August 1981.**

*Not so obvious ways in which the chemist can help in alleviating the energy problem will be outlined. Examples will include aspects of the use of a uniquely stable coal-oil mixture instead of traditional fuel oil (coal-oil dispersion), a novel type of strong, yet light-weight glass reinforced plastic (Mathweb), new silica coatings which will reduce both carbon deposition and oxidation thereby transforming the lifetime of fuel cans in the advanced gas cooler reactor (AGR), a new and enviromentally acceptable method for the combat of oil spills (oil spill solidification) and for the sealing of oil pipeline ruptures.*

## COAL-OIL FUELS

The realisation that future oil supplies will not meet requirements has led to a renewed interest in coal. However, much of the equipment currently in use for power generation (ie, steam raising) can only operate on liquid fuels. Some equipment was designed for coal but is currently operating on fuel oil. It could possibly be converted back to coal but, in many cases, the required coal handling facilities have been removed. Consequently, over the next 20 years there is a significant potential for a coal containing liquid fuel at a cost lower than that of fuel oil.

The BP Research Centre has developed a patented method for preparing uniquely stable dispersions of coal (up to 50 per cent wt) in heavy fuel oil.

The coal-oil dispersion has been designed so that it can be manufactured at a centralised site and distributed through existing oil systems with minimum modification. The development of the dispersion followed from a fundamental study of the physics and chemistry of the interaction between solid surfaces and liquids. From this work a process was developed for suspending finely divided coal in oil in a stable condition so that separation did not occur either in storage or in the conditions encountered in industrial use. One of the most significant quality requirements for the coal-oil dispersion is that is will withstand the wide temperature range encountered in industrial fuel systems without depositing solids in pump lines or metering orifices.

A 100,000 tonnes per annum preproduction test facility is currently under construction and extended handling and combustion trials are being arranged utilising the plant of potential customers.

## MATHWEB LATTICE STRUCTURES

Mathweb lattice structures are a new development in the fully structural use of composite materials. High strength-low weight structures are fabricated from chemical resin coated continuous fibres arranged in an open lattice form.

The important attributes of Mathweb lattice structures are as follows:

(a) Weight saving — often 70 per cent reduction — over equivalent steel structures.
(b) Excellent resistance to corrosion and chemical attack.
(c) Excellent performance under fatigue conditions.
(d) High elastic energy absorption and vibrational self-dampening characteristics.
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Motor Industry Components — in addition to weight reductions, as part of the requirement for greater fuel economy, the motor industry is required to improve safety standards. Lightweight corrosion resistant, energy absorbing Mathweb lattice structures meet these needs. Vehicle side intrusion door beams are being developed and evaluated for a number of vehicle manufacturers and the USA Department of Transportation. Bumper systems and suspension components are under development.

Military and aerospace components where extreme lightweight is critical.

Marine structures which require lightweight and good corrosion resistance.

General engineering structures including masts, towers, booms and walkways.

## PROTECTIVE SILICA COATINGS FOR METALS OPERATING IN AGGRESSIVE ENVIRONMENTS

BP is developing a silica coating treatment for passivating the surfaces of steels and other alloys used in high temperature corrosive environments. Two potential applications are in the ethylene steam crackers and in advanced gas-cooled reactors (AGRs) where coke deposition limits operations and, quite possibly, the lifetime of plant.

The process arose from the work of a fundamental research group using advanced electron spectroscopic techniques to probe the surfaces of coke deposits in steel tubes. These techniques produced evidence for the catalytic activity of the steel, promoting the formation of coke and further, that silica inhibited this effect. An embryonic coating process was then developed, using a decomposition reaction of an organic silicon compound from the vapour phase to produce an impervious silica coating on steel surfaces.

For the AGR application, BP have been collaborating with the UKAEA for four years. In the evaluation of the BP coatings at AERE (Harwell), the silica films applied to AGR steel fuel pin segments have been very successful in reducing coke deposition in the DIDO experimental reactor (by a factor of eight over uncoated specimens).

Following a BP teach-in of nuclear industry scientists, the UKAEA obtained an agreement to mount a coating development and evaluation program. Uranium filled fuel pins

were coated at the Springfields Nuclear Power Development Laboratories and are currently under evaluation in the Windscale AGR.The preliminary results from these trials are encouraging. The collaboration between BP and UKAEA is continuing with the design of larger coating installations and further test programs for up to a quarter charge of coated fuel pins in a commercial AGR (CAGR).

## OIL SPILL SOLIDIFICATION

Scientists at British Petroleum are working on a new way of dealing with oil pollution on water. They are turning the oil into rubber.

The solidifying technique involves treating the oil with liquid rubber, waiting until it hardens, then scooping it up.

The oil slick can be transformed into a hard dry mat, losing its two greatest threats, its ability to contaminate the environment and harm animal life. The treatment will most likely be used on oil that is about to pollute a shoreline.

Small-scale experiments have already proved that all kinds of oil, from light crudes to heavy fuel and even the emulsified 'chocolate mousse' can be successfully dealt with.

Laboratory work on the solidifying treatment is being carried out at BP's Sunbury Research Centre near London. Outdoor trials are being held, including sea trials held in conjunction with the government's Marine Pollution Control Unit and Warren Spring Laboratory.

If these trials are successful, the treatment could begin to be used by the end of 1982. BP is hoping that it will be no more expensive than traditional methods of dealing with pollution.

The chemistry of BP's patented treatment is based on an artificial liquid rubber chemical and curing agent. When sprayed simultaneously they dissolve in the oil and form into a rubber 'sponge' whose microscopic three-dimensional lattice absorbs and holds the oil.

The treatment is versatile so that oil can be transformed in the laboratory into anything from a soft gel to a hard rubber, in setting times ranging from seconds to weeks as desired.

In practice, depending on the type of oil and the local circumstances, the treatment would be adjusted in order to produce a material dry and strong enough to be recovered, for example, by the use of nets.

BP's solidifying treatment will not replace existing methods of tackling oil pollution such as containment booms, skimmers and dispersant spraying. These will continue to be used.

The new treatment could be used to remove the threat from oil that is about to pollute coastlines, particularly beaches, rocks and bird breeding centres. Solidified oil coming ashore will not contaminate beach sand, cling to rocks or harm birds.

The active chemicals are not themselves dangerous to the environment because they do not dissolve in the sea, only in the oil.

## PIPELINE LEAK SEALING TECHNIQUE

Scientists and engineers at BP's Research Centre at Sunbury-on-Thames, Middlesex, are developing a new technique for rapidly sealing leaks in pipelines.

Experience world-wide has shown that leaks from pipelines carrying oil overland normally result from external damage causing punctures of rarely more than three sq cm in area. In long pipelines, valves are normally fitted at approximately 15 km intervals that close automatically when any significant pressure drop occurs.

Consequently, a leaking section can be easily isolated but the dissolved gas would come out of solution, much as one sees it do so in an uncorked champagne bottle and several thousand tonnes of highly inflammable crude oil and gas would continue to escape over a period of 10 to 14 days. This would present a serious problem to engineers attempting to stem the flow particularly if the oil were to catch fire.

Appreciating the difficulties likely to be encountered in attempting to approach such an escape of oil and gas, BP's scientists are developing a procedure for sealing a rupture from the inside. An emergency device comprising a piston injector would be fitted via a 'hot/tap' pipe joint some hundreds of metres from the rupture and well away from any fire. A large number of neutrally buoyant particles of suitable chemical composition would then be injected and transported by the flow towards the rupture where they would conglomerate, throttling down the escaping oil to a small high velocity jet. Immediately, a second injection of much smaller particles would fill the remaining voids, reducing the flow to a mere dribble. In practice, any fire associated with the escaping gas or oil would then be extinguished and the rupture could be approached safely. A clamp-on patch could be fitted over the rupture to provide a permanent high integrity repair.

Further development is required before a fully engineered operational system will be available.

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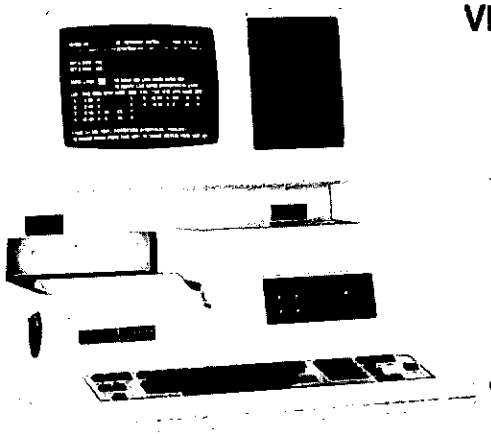

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# Transport Fuels

## The truth, the whole truth, or something less than the truth.

**A.L. Titchener**
Liquid Fuels Trust Board

*Adapted from a talk given at the Auckland Branch annual dinner, September 1981.*

Science generally thinks pretty well of itself and I suppose that is only proper. Respect, like charity, ought to begin at home. One cannot altogether dismiss the achievements of the Galileos, Newtons, Keplers, Gausses, Faradays , Einsteins, Rutherfords, etc. of this world — though it is a little odd and quite against the laws of probability that there seems to be no Brown's Law of Anything Scientific and only one Schmid's.

But let us be clear. The pioneer scientific explorers really do not know where they are heading. The consequences of a new scientific discovery are not always apparent, even to the discoverer. The next direction of major scientific thrust is unpredictable, a kind of random walk, a Brownian motion, in the imperfectly charted, not to say limitless, continent of knowledge. Where are we to go next, we scientists? (You notice I include myself, but that may be merely egotistical, a kind of self-promotion by association.)

Science is founded on the concepts of rational thought and verifiable fact, combined of course with what may perhaps be regarded as the First Commandment of science, which in effect asserts that to search for knowledge is a fundamental right; that if one asks a question one has an entitlement to seek the answer. Some would say that this is a right that transcends all others; George Steiner for example in delivering his First Bronowski Memorial Lecture, "Has Truth a Future?". That commandment is, of course, an article of faith; which places science among all the other religions.

Verifiable fact, I said. Though we discovered, with the help of Karl Popper, that the test of a scientific hypothesis is not its verifiability but its falsifiability. It is hard for a scientist to accept that no empirical "law" can ever be verified as truly universal; but is perennially at risk of being overturned. Hard to accept that disproof is more powerful than proof.

However, I am digressing from a question I want to pursue, namely the right to pursue knowledge. Curiosity in general and scientific curiosity in particular, has always been regarded with suspicion. The early alchemists were feared and sometimes persecuted. Galileo ran into trouble with a Higher Authority because the information he put out disagreed with Its. Galileo's tribulations seem a little remote today, but Darwin is still in difficulties where fundamentalist christianity hold sway.

The educated rationalism that flowered in late Victorian times and perhaps reached its full blooming in the early decades of this century, has lost ground. Mysticism is with us, Dharma is calmer. The yen is for Zen. Vibes, not rational thought. There are more registered astrologers in the USA than registered professional scientists.

For how much of this is science to blame? Many are disillusioned with science. And scientists do keep doing worrisome things like splitting the atom, cracking the genetic code, planning a mohole, messing about with the Van Allen belt and the earth's ozone layer, inventing the microprocessor. Chips with everything, and fewer jobs tomorrow, some say.

It is not so many years back that I sat on a university committee considering whether it would be all right for one of the university departments to embark on research into what is now popularly called genetic engineering; and, if it was, what conditions should the department be called to meet.

That, of course, is interfering with the search for knowledge. Some scientists may still think this kind of interference is unwarranted — but not, I think, many. And outside the scientific community there is widespread belief that there may be some research that should not take place, which implies that there are some questions that should not be asked. Even if you ask the question and even if you find the answer, the consequences may not be apparent. A more difficult problem is that even innocent questions may have profound consequences.

The mohole was never drilled. It was considered too risky to penetrate into the molted magma over which the earth's crust is but a thin skin. Many scientists thought that the MIT experiment to investigate the Van Allen belt should never have taken place. There is still argument about the morality of genetic engineering.

Traditional science thrives on the concept of free interchange of results among its peers, on publication in the open literature. Publication was a means both of giving credit to a discoverer and of setting in place the next brick in the growing edifice of knowledge — in open place so that others could see where another brick might next be laid.

However, as it began to be clear that the discoveries of science could contribute usefully to the paraphernalia of war, some science became secret — government science, official science, public sector science. Especially of course applied science, whose other name is technology. (The same kind of thing happened also in private sector science as it became clear that it would be useful in gaining commercial advancement.) So science has come under control not of conscience, but of institutional self-interest.

In this country state self-interest is controlled at this moment through the Official Sectrets Act. The Official Secrets Act 1951 is about the transmission, or more correctly, the non-transmission of official information. It makes no distinction about the sort of information whether scientific or other. It simply says and I quote from it:

*"If any person, having in his possession or control any .... information .... which he has obtained .... owing to his position as a person who holds or has held (office under His Majesty) .... communicates the .... information to any person other than a person to whom he is authorised to communicate it, .... he commits an offence against the Act."*

I apologise for the English which is presumably the English of the Crown Law draughtsman.

The picture will be complete, more or less at any rate, when I also quote:

*"On a prosecution under this Act, if .... it appears that (the) purpose of (the accused person) was a purpose pre-*

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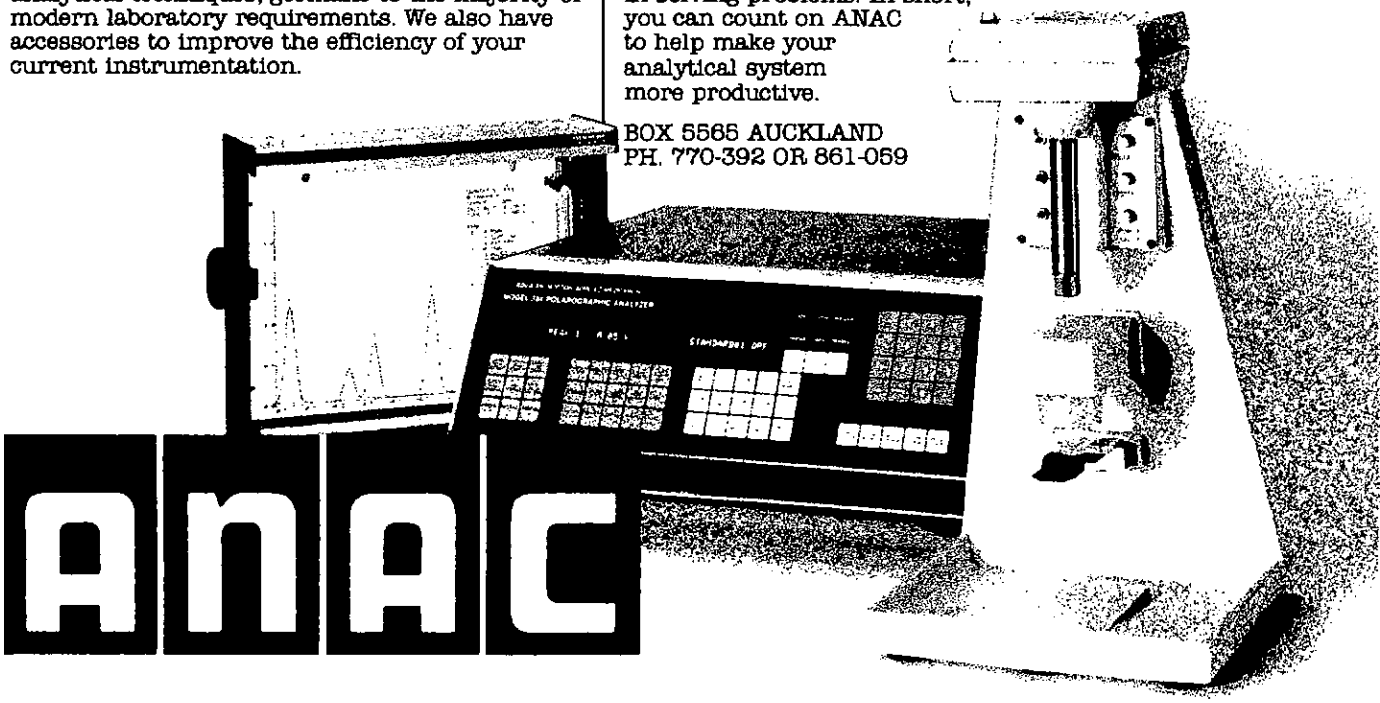

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*judicial to .... interests of the State, it shall be deemed that his purpose was such a purpose unless the contrary is proved .... "*

If you did not understand that, let me add that it means, as I understand it, that you are presumed guilty unless you can prove you are innocent.

This is pretty tough stuff. And of course there are a lot of other things one cannot do either, except with permission. Any scientific or technical information obtained by a person while holding office under Her Majesty cannot speak, write, or make sign language about it unless he has been told he can. That is the present law.

Recently the committee known as the Danks Committee reported to the government about freedom of information. As a result a new bill, called the Official Information Bill, has been drafted and is being considered by a select committee. That is where the Liquid Fuels Trust Board comes in.

Some time ago the board's part-time librarian said to me over morning coffee "Do you know that the Liquid Fuels Trust Board is listed in the new Official Information Bill?" Of course I did not. But we were. In the First Schedule. Along with the Raspberry Marketing Export Authority, and Port Industry Council, the Bank of New Zealand, the Security Intelligence Service and the Universities Entrance Board — and 84 others. Naturally we wondered what was about to be done to us by this bill; this "Bill Intituled an Act to make official information more freely available, to give individuals proper access to information relating to them, to protect official information to the extent required by the public interest and the need to preserve the privacy of the individual, to establish procedures for the achievement of these purposes and to repeal the Official Secrets Act 1951!"

There is certainly no reason to quarrel with the guiding principle of the act. Nor with the notion that some official information needs to remain confidential — for example information about the private affairs of individuals. The difficulty lies not in the principle, but in the practice: in determining what should be told, what kept secret.

Perhaps the saving grace is that the bill, as currently drafted, requires that, if a request for information is declined, a reason must be given; if the applicant asks for them, the grounds must be given in support of the reason; and the response must be made without undue delay.

How, then is the bill to be seen against the role and activities of the Liquid Fuels Trust Board? Perhaps 'against' is the wrong word and reflects a negative preconditioning. Perhaps such preconditioning is inevitable. Whoever has read reports in a newspaper on subjects on which he is closely informed knows how often those reports are wrong.

Information given to a newsman has an almost fore-ordained destiny; either it will be ignored or it will be misreported. Of course the reporter cannot be blamed. He starts with crippling handicaps. He has no special knowledge of the subject he is reporting. He does not take shorthand. Indeed it seems to be almost a matter of principle that he doesn't take notes. And his sub-editor, the reporter will tell you, will not agree to his reading back to you what he has written about what you said. Do not mistake me. In two years of dealing with reporters I have found them well-intentioned, enterprising, polite and generally sympathetic. But not good with facts. Admittedly not all facts are born equal. But a fact is a fact and however small, ought not to have the expectation of being mutilated as soon as it appears in a public place.

A person brought up to respect facts learns to fear for their safety and not merely in the hands of the media. The transfer of information, especially technical information, is a risky business. There is always the danger of unintended error, of misunderstanding. It can often seem easier, safer it is even argued, to clam up, to say nothing, than to say something and put that information at risk.

Government departments and agencies, indeed institutions generally, have usually preferred the comparative safety of silence to the hazards of communication.

Let me re-frame the question I asked earlier: How is the new bill to be seen Alongside the role and activities of the board?

The boards objective, as set out under the act that established it, is to seek ways of reducing New Zealand's dependence on imported transport fuel, that is oil. It makes its recommendations to the government through the minister of energy. It has a good deal of freedom in determining how it operates. It has chosen to act as an investigating agency and to carry out its investigations by contracting them to other agencies. Over the three years of its existence is has, as its detractors have been known to say, maintained a low profile. Put more succinctly, it has not published as much as some might wish. As a matter of fact, it has not published as much as it should have. Only, however, because its small staff has not found the time to do the necessary editorial work. It has published all its recommendations to the government, along with explanatory statements.

However, not all the reports which the board commissions, can be released. Information given to the board's contractors is sometimes supplied on the condition that it is to remain confidential to the board. This is perhaps because it is commercially sensitive, perhaps because it is subject to process licenses, perhaps for some other reason.

The range and number of the board's contracts have grown steadily and about three months ago the board decided that a clear policy on release and publication of its reports was needed. At its last meeting the board adopted a policy, the essence of which is that and I quote from the statement, "If reports are of public interest they should, whenever practicable, be released for publication .... If they contain confidential information they should be appropriately edited. In all cases approval to publish should be cleared with the contractor and, where necessary, suppliers of proprietary information."

To me, one of the interesting aspects of the board's action is that it did not stem from the appearance of the draft of the Official Information Act; but arose spontaneously from a need perceived by the members of the board.

Adopting this policy does not, of course, dispose of the problem to which I have already alluded — the sensitivity of information to distortion, either inadvertent or deliberate. Energy, like rugby football, is an issue where strong convictions lie. And strong convictions indeed have a way of sometimes lying.

Fortunately the board has only one strong conviction about energy. Simply, it is that it should address the main goal set for it by the act, namely to seek means of reducing New Zealand's dependence on imported oil.

It has made a special point of not developing any pre-conceived views on how to do this and has tried to approach its task receptive to the widest range of conceivable possibilities. It has spread its net to include all reasonable resources, all feasible means of propulsion. At first, attentions were directed to Maui gas, since this gas was, in effect, held largely unused at the end of an expensive pipe with its valve almost shut.

You have recently seen the last of the government decisions on the board's three recommendations on the use of Maui gas as a means of providing a significant measure of self-sufficiency in transport fuels. I refer of course to the announcement of the government's agreement to proceed with the synthetic petrol plant based on the "Mobil" process.

What has the board been doing since it made those recommenda-

tions to the government in October 1979? What has it been doing that it has not told anyone about? It has done quite a lot; and in broad terms it has told all — in its annual reports, if nowhere else.

It has completed a major study on low methanol blends and, having found them uneconomic, has recommended against them, for the time being, to the government. It is half-way through a first-phase investigation, costing over $1 million, of the South Island lignites. It is in the second phase of investigating the pyrolysis of Waikato coat to produce char (for power generation or steel manufacture) and liquid fuels. It is in the middle of a three year investigation of fodder beet as a source of fuel ethanol. It has just completed a comparative study of biomass and coal as sources of transport fuel. It is about to embark on a study of forest biomass. It has recently reformulated its high alcohol fuels programe and is in process of letting a series of contracts to investigate these fuels.

Many of these studies will not reach finality for some time. One which will soon be completed is concerned with the so-called natural-gas liquids associated with Maui and Kapuni. These are ethane, propane and butane. The propane and butane constitute LPG and not all of this LPG will necessarily find its way into transport fuel.

The natural gas liquids represent some 20 percent of the energy in Maui. The possible uses of these liquids are many. To determine the best use, one has to address a complex set of questions — the likely demand for LPG as such, what products can be made from the ethane and the remaining LPG, the markets for these products, the technical risks and the economic vaibility of each process route, the impact, if one makes transport fuels from them, of these fuels on the already planned projects (the expanded refinery, the synthetic petrol plant, the CNG programe), and so on.

Given that Murphy's Law fails and that all goes to plan, given that recommedations are made by the board, given that the government accepts the recommendation, let us also not forget the other principle, what I call the Cornford Principle, which seems to affect so much of New Zealand thinking.

F.M. Cornford was a Cambridge don who, about the turn of the century, wrote a small, minute one might say, wholly delightful but now rather rare book called "Microcosmographia Academica", beloved of academics, but little known in the unreal world outside. I am quoting from memory, I hope correctly:

"Any public action", wrote Cornford, "that is not customary is either wrong or right and if it is right it is a dangerous precedent. It follows that nothing should ever be done for the first time."

I first heard this aphorism being quoted by Professor Hugh Parton. It was in a meeting of the Research Committee of the University Grants Committee, which, as was invariable, was being chaired by the chairman of the UGC, Sir Alan Danks. Before Hugh Parton was more than half way through, he was joined by Alan Danks and I can hear them yet, chanting in unison, "Nothing should ever be done for the first time".

It is I think fitting to end here. Hugh Parton was one of this country's distinguished chemists. Alan Danks, besides being, in a figurative sense, the architect of much of the present New Zealand university skyline, chaired the committee from whose work has come the new Official Information Bill, which if passed, will see the end of that detestable document, The Official Secrets Act.

Parton and Danks were good friends, the friendship doubtless going back to the days when they were colleagues at the University of Canterbury, the one a professor of chemistry, the other of economics. Each in his own way contributed greatly to New Zealand.

## BRANCH OFFICERS 1982


J Garside


C Devine


C R Southward


J Coxon


D Buckingham

**Auckland**

*Secretary: Milton Gibson, Auckland Technical Institute, Private Bag, Auckland.*

*Chairman: Dr Jack Garside, Telarc, Box 37042, Parnell, Auckland.*

Dr Garside was born in England and educated at Queen Mary College, University of London, where he graduated B Sc in chemistry in 1956 and completed his PhD in 1960.

He then held a number of research and teaching positions at British technical institutes and universities before emigrating to New Zealand in 1966 to take up an appointment at the Central Institute of Technology in Petone.

In 1969 Dr Garside joined the New Zealand Portland Cement Association as manager of its recently established research division at Porirua. In 1972 the division was separated from the rest of the PCA to form the basis of the new Concrete Research Association. Dr Garside then became the foundation director of the Research Association.

In 1976 he rejoined the New Zealand Portland Cement Association as its general manager, retaining an interest in the affairs of the Concrete Research Association as a member of its board and he was subsequently elected its chairman in 1977.

In 1979 Dr Garside was appointed to his present position as director of the Testing Laboratory Registration Council of New Zealand.

**Waikato**

*Chairman: Dr Carrick Devine, MIRINZ, Box 617, Hamilton.*

Dr Devine is a section head at the Meat Industry Research Institute in Hamilton.

After graduating B Sc in chemistry and zoology in 1961 and a master's degree in zoology in 1963, he joined the Wellcome Medical Research Institute, Department of Medicine, University of Otago Medical School. After obtaining a Ph D in 1968, he went overseas for further research before returning to the Wellcome Institute in 1971.

Since taking up an appointment with MIRINZ in 1973, Carrick has been occupied with basic muscle studies associated with electrical stimulation. His present research is centred upon various aspects of muscle biochemistry and physiology, electrical stimulation, animal stress and exhaustion, preslaughter factors affecting meat quality and the stunning and slaughter of lambs.

His other activities include running, sailing, house modifications and "avoiding bureaucratic constrictions". Dr Devine also contributed on chemistry in the meat industry to the NZIC Jubilee publication Chemistry in a Young Country. He became a member of NZIC in 1965 and has been secretary of the Waikato branch for the past six years.

**Manawatu**

*Secretary: D R Body, Applied Biochemistry Division DSIR, Palmerston North.*

*Chairman: C R Southward, NZ Dairy Research Institute, Private Bag, Palmerston North.*

Ramsey Southward received his secondary education at Northland College, Kaikohe and Auckland Grammar School. He attended Auckland University, gaining an M Sc in Chemistry in 1962. In 1961, he commenced work at the New Zealand Fertilizer Manufacturers' Research Association, being involved primarily in the analysis of DDT in soils and fertilizers.

In 1964, he joined the Chemistry Department of the New Zealand Dairy Research Institute, working in applied casein chemistry. With Dr R M Dolby, he studied the viscosity characteristics of solutions of casein and casein/clay slurries for coating paper and determined the adhesive properties of the casein on the coated paper.

Later, his interests extended to the manufacture of various casein products. In 1970, he was appointed head of the casein and related products section at the institute, which is responsible for applied research in New Zealand on the manufacture, properties and uses of casein and its derivatives. He served as program supervisor for the Dairy Industry Graduate Training Program from 1978 to 1980.

Ramsey was elected to membership of the NZIC in 1962. He served as secretary of the Manawatu Branch from 1974 to 1978 and was treasurer for the 1980 institute conference.

Outside interests include his wife and two sons, Boys' Brigade, Church activities and philately.

**Wellington**

*Secretary: P G Best, NZ Industrial Gases.*
*Chairman: Dr David Bibby, Chemistry Division DSIR*

Dr Bibby was born in Nottingham, England and received a B Tech (Hons) degree in industrial chemistry and a Ph D in nuclear chemistry from the Loughborough University of Technology. In 1977 he moved to the University of Witwatersrand, Johannesburg working in the Nuclear Physics Research Unit on the applications of nuclear techniques to mineral exploration and processing.

David left South Africa in 1975 to join the inorganic materials section of Chemistry Division, DSIR, initially looking at coal ash disposal and oil shale utilisation. Today, most of his research is aimed at studying the synthesis and properties of zeolites, in particular the Mobil MTG catalyst ZSM-5.

He has been a member of the Wellington branch committee for four years, two of them as secretary and one as program officer.

**Canterbury**

*Secretary: Dr John McLaughlin, WRONZ, Private Bag, Christchurch.*
*Chairman: Dr Jim Coxon, Chemistry Department, University of Canterbury, Christchurch.*

Dr Coxon is a product of Greymouth Technical High School and of the University of Canterbury, where he took his degrees. After a post-doctoral year as a British Empire Cancer Campaign post-doctoral fellow at the University of Southampton, he returned to join the staff at Canterbury, where he is now a reader.

In 1972 he spent a sabbatical year at the University of Florida as a Fulbright Fellow and in 1979 to 1980 he was a senior science research council fellow at the University of York.

Dr Coxon's professional interests are centred on alicyclic compounds, unstable intermediates and organic reaction mechanisms in general. In this area he has co-authored over 100 papers and two text books.

**Otago**

*Secretary: Dr Wayne Temple, Pharmacology Dept, University of Otago, Dunedin.*
*Chairman: Professor David Buckingham, Department of Chemistry, University of Otago, Dunedin.*

Prof Buckingham was born in Dunedin in 1936 but lived his early life in Rangiora, North Canterbury. He attended the Rangiora District High School and then the University of Canterbury completing an MSc degree under Prof C J Wilkins in 1958.

He then took up an Australian National University Scholarship under the late Prof Frank Dwyer, graduating with a PhD degree in 1962. He then spent 18 months as a research associate at the University of North Carolina before being appointed to an assistant professorship at Brown University, Rhode Island. In 1965 he returned to Canberra where he and Dr A M Sargeson collaborated in the areas of inorganic and biomimetic chemistry and their investigations received international recognition.

## BRANCH NEWS

*Waikato*

*Dr Rex Gallagher* has returned from a visit to UK laboratories associated with mycotoxin research. He also attended an OECD meeting in Madrid on Rapid Methods for the Detection of Mycotoxins in Agricultural Products.

*Dr Philipp Poole* is on study leave until June, at the chemistry department, Stanford University, California.

*Manawatu*

At the branch AGM *Mr C Ramsey Southward* (NZ Dairy Research Institute) was elected chairman for the coming year. *Denis R Body* (Secretary), *Dr John Shaw* (Treasurer), *Dr EN (Ted) Baker* (council delegate), *Dr Cecil B Johnson* (ex-officio past chairman and branch editor), *EC (Ted) Fletcher* (Hawke's Bay Representative), *Dr O Keith Sewell* (Taranaki representative), *Dr Laurie Creamer, Dr John Kirkman, Dr Julian Lee, Mark W Pritchard* and *Dr Ken Whittle* were also elected to the committee. At the conclusion of formal business, Dr Johnson presented the chairman's address on Tallow: Its Composition and Uses — Present and Potential.

*Dr Max A Turner,* senior lecturer in soil science at Massey University, presented the 1981 lecture to Hawke's Bay sixth and seventh form students at Karamu High School in Hastings. Dr Turner, in discussing Trace Element Problems in Soils, Plants and Animals, highlighted the importance of trace elements and their requirements by plants, animals and humans. He discussed the variability of soils and methods for the analysis of trace elements as well as the correction of soil problems. A lively question time followed Dr Turner's address.

*Prof Max McGlashan* (University College, London) addressed a meeting of the branch in September on the subject: Thermodynamics: What Use is it to Chemistry? He discussed various thermodynamic equations and the use that they could be put, to calculate physical quantities that could not be readily measured directly. Aspects of problems in the teaching of thermodynamics were also considered by Professor McGlashan.

The institute's film, Chemistry in Agriculture, was shown at the third Golden Jubilee public meeting, at the Palmerston North Boys' High School Lecture Theatre in October. At this meeting *Dr John Buchanan* (general manager, BP NZ) discussed his career, from a science degree to his present position, via various interesting appointments within the company in England and in Europe.

Much of his later training has been on the job and in courses organised by BP. As part of his presentation, Dr Buchanan discussed aspects of supply, demand and cost of liquid fuels over recent years and problems in moving these fuels from their source to the refineries and thence to the markets.

*Dr Ted Baker* (Department of Chemistry, Biochemistry and Biophysics, Massey University) then described methods that were developed for the identification of the proteolytic enzyme, Actinidin, from Kiwi Fruit. This team effort included enzyme kinetic studies, amino acid sequence determinations and the determination of the three dimensional structure of the enzyme.

A wide variety of techniques were used in this study, including biochemical studies for the isolation of the enzyme, crystal growth methods, various physical methods (in particular X-ray diffraction) and extensive use of the computer. A lively question time arose at the end of these presentations.

*Tony Gerritson,* a member of the branch committee, has left the Chemistry Department of Fielding Agricultural High School to become an Anglican minister. He was recently accepted for St John's Theological College, Auckland to undertake a three year course of instruction.

The Seventh Manawatu Science Fair was held at the Queen Elizabeth College Hall, Palmerston North in September. This fair is organised by a local committee in association with the Manawatu branch of the Royal Society of NZ and the Kiwanis Club of Palmerston North. This branch presented three prizes ($20 each) to the best exhibits with a chemical theme.

*Dr AJ Sprott* presented the last address to the branch for 1981 on Some Experiences of a Private Forensic and Analytical Chemist. This was a wide ranging address on the law system in New Zealand as it affects forensic chemists, forensic aspects of DSIR work and scientific aspects of various court cases in which Dr Sprott has been involved. A vote of thanks was proposed by *Prof Batt* for this fascinating presentation.

*Wellington*

In November, *Dr RC Lawrence* gave a very interesting talk entitled: Would you let your daughter marry a cheesemaker? which gave the audience of 76 people an informal look at cheesemaking in New Zealand.

Dr Lawrence is assistant director of the New Zealand Dairy Research Institute, Palmerston North and his research interests include most aspects of cheese technology, with a particular interest in cheese flavours. He is also responsible for the starter technology, genetics, biochemistry, protein chemistry and flavour sections of the Dairy Research Institute.

The talk was followed by a very popular wine and cheese function which was a grand finale to the last meeting of the year.

*Canterbury*

At the October AGM of the Canterbury branch, *Dr John Cretney* (Christchurch Polytechnic) spoke on the present teaching of chemistry in polytechnics and possible future developments.

*Dr Jim Coxon* (University of Canterbury) was elected incoming chairman and *Dr John McLaughlin* (Wool Research Organisation) takes over as branch secretary from *Dr Peter Harland* who has gone overseas on leave.

Other members of the 1982 branch committee are *Alex Drysdale, John Mills, Case Mooyman* and *Drs Lewis Pannel, Kip Powell, John Cretney* (branch editor) and *John Adams* (Treasurer).

Also in October, a seminar was held in the Chemistry Department where the speaker was *Prof Marcel Fetizon* from Ecole Polytechnique. His talk entitled Ongoing Research, dealt with two areas of research related to natural product synthesis.

Textile Chemistry was the subject of a joint meeting in November with the Canterbury Textile Society. *Drs Stan Simpson* (NZIC president), *John McKinnon* and *Peter Ingham* from Wool Research Organisation, spoke on different aspects of textile chemistry, processing and marketing and provided some lively practical demonstrations.

*Otago*

Some 50 members of the Otago branches of the NZIC and the NZIE enjoyed a field day visit to the Newvale, Goodwin and Mataura open-cast lignite mines, following a briefing session at the DSIR Grasslands Research Station near Gore.

After the tour, a seminar was held at the Croydon Lodge in Gore, where discussions on various topics related to Southland lignite utilisation were held.

The topics covered included land compensation, environmental planning, chemical processing and metal ion pollution.

## UNIVERSITY NEWS

*Auckland*

The University of Auckland has recently entered into an agreement with the Development Finance Corporation to conclude a contract under which it will undertake research work on thermophilic organisms.

The investigation will be in collaboration with that being undertaken in the University of Waikato and will complement the studies of the institution. The Auckland contribution will be made by the University's Genetics Research Unit under the direction of *Prof PL Bergquist* and will aim to explore ways of improving the production of selected enzymes, such as proteases, by the high temperature organisms and ways of modifying protein structure to suit possible commercial requirements.

Much has been written about the advantage of using heat stable organisms and enzymes in industrial processes — the continuous distillation of ethanol from high temperature fermentation is such an example — and the purpose of the studies in both universities, to which that at Auckland adds the genetic expertise of Prof Bergquist, is to pursue the fundamental investigations necessary for the later assessment of commercial exploitation.

*Dr Al Nielson* has been appointed as a lecturer in the chemistry department. He is an Auckland graduate who did post-doctoral research in organometallic chemistry under *Prof Sir Geoffry Wilkinson* at Imperial College and *Prof DC Bradley* FRS at Queen Mary College, London. Dr Nielson's current research interests include air sensitive preparations of early transition metal complexes.

*Waikato*

Waikato University has purchased a Jeol FX90Q Fourier Transform NMR spectrometer equipped for multinuclear and insensitive nuclear enhancements by polarisation transfer (INEPT) experiments. Both machine and acronym assiduously cared for by *Dr Alistair Wilkins.*

*Dr Lindsay Main* has returned from sabbatical leave spent at the Chemistry Department at Exeter.

*Massey*

The 1981 ICI Prize for excellence in chemical research was awarded to *Dr David A D Parry.* Dr Parry's field of research is the structure and function of fibrous proteins such as collagen, muscle and keratin. In early August, Dr Parry presented an invited address to the Gordon Conference on Epithelial Differentiation and Keratinization held at Tilton School, New Hampshire, USA.

Before returning home, Dr Parry attended the 7th International Biophysics Congress and the Third Pan-American Biochemistry Congress in Mexico City and also represented New Zealand at the Business Meeting of IUPAB.

In September Dr Parry gave a departmental seminar entitled Protein Structure/Function Prediction Methods.

During the past 11 months, *Dr Robert R Brooks* was granted overseas leave to work at the Trace Analysis Research Centre, a part of the Chemistry Department at Dalhousie University, Halifax, Nova Scotia, Canada.

Dr Brooks' research was in the fields of the determination of gold at very low concentrations, arsenic pollution and biogeochemical prospecting for uranium. As part of this work, determinations of elements in samples were accomplished by neutron activation analysis using the centre's reactor facility.

In October, *Dr Keith L Mackie* of the Forest Research Institute, Rotorua, presented a departmental seminar on Wood Hydrolysis and the Production of Ethanol. Various aspects of the acid hydrolysis of wood on a pilot plant scale were discussed. The wood sugars from this process can be used to produce various chemicals, while the lignan residue could have horticultural uses.

A contract, Yields, Costs and Availability of Natural Oils/Fats, by the New Zealand Liquid Fuels Trust Board has been let to the Agronomy Department. The project manager, *Ralph Sims,* will be assisted by other staff from the Agronomy Department *(Drs Nev J Withers* and *Sally D Newton),* Agricultural Economics and Farm Management Department *(Dr Anton D Meister),* Marketing Research Centre *(Mr Phil J Gendall* and *Ron Garland)* and Applied Biochemistry Division, DSIR *(Messrs Keith I Williamson* and *Michael J. Evers* and *Dr CB Johnson).*

They will investigate the use of vegetable and animal fats as potential alternative fuels for diesel engines in New Zealand. Agronomic, production, further processing and engine performance aspects of these glycerides will be studied, with a consideration of potential benefits to the farming community and to the nation. A report will be presented towards the end of March, 1982.

*Victoria*

*Dr Brian Halton* and *Dr Alan Freeman* are on sabbatical leave. Dr Freeman returning in February 1982 and Dr Halton returning at the end of June 1982.

*Mrs Janet Burns* has enrolled for a PhD to study An Evaluation of Senior Chemistry in New Zealand Secondary Schools. The information that arises from this study should be of great value to all chemistry departments in the country.

*Dr Robin Speedy* has recently been in Australia for four weeks studying with *Dr R Mills* of the Diffusion Unit at the Australian National University, Canberra.

*Dr Stuart Smedley* has recently been promoted to reader.

*Dr Gary Burns* has accepted another term as academic dean of the science faculty.

*Dr David Weatherburn* has been running a Chemical Magic Show for intermediate school children, which has been very successful.

*Dr Jim Johnston* has chaired a panel session at the international conference on the Applications of the Mossbauer Effect in Jaipur, India in December 1981 and presented a research paper on Clay Minerals and Iron Oxides. Before arriving in India he visited various research laboratories in the UK to discuss current collaborative research projects.

*Canterbury*

In the Chemistry Department *Dr Alan Happer* has been on leave until this month, working with *Prof Colin Eaborn* at the University of Sussex.

*Dr Kip Powell* is on leave in Sydney, until May. He will spend time at Lucas Heights with *Mark Florence* studying trace element analysis by polarographic techniques and some time with *Prof Lloyd Smythe* at the University of NSW, on ICP spectroscopy..

*Dr Jim Coxon* has been awarded an Erskine Fellowship to visit universities in North America, Europe and England and to attend the second International Kyoto Conference on New Aspects of Organic Chemistry in August 1982.

*Prof Cuth Wilkins* spent November at Stanford University. A Claude McCarthy Fellowship enabled him to continue his West Coast geochemical research by inspecting the Hutton collection of detrital minerals at Stanford and visiting the US Geological Survey facility at Menlo Park.

*Dr Peter Harland* left in December to spend eight months' leave at the Rice Quantum Institute and Chemistry Department, Rice University, Houston, Texas. While there he will be looking at collisions of atoms with spacially oriented beams of symmetric-tip organic molecules in the gas phase using the crossed molecular beam technique.

*Prof O Nor* from the Centre of Founda-

## UNIVERSITY NEWS

tion Studies in Science, University of Malaya, Kuala Lumpur, is spending nine months sabbatical leave in the department working with *Dr Don House.*

In November, *Prof H Schmidbauer,* professor of inorganic and analytical chemistry, Technischen Universitat, Munich, lectured on metal-metal and metal-ligand interactions in some new coordination compounds.

Earlier this year *Professor Miles Kennedy* stepped down as the Head of the Department of Chemical Engineering after holding the position for 16 years. His successor is *Prof Roger Keey.*

Visitors in the department at present are *Mr JD Boyle* from the University of Exeter, who has interests in the field of environmental chemical engineering and *Prof DR Coughanowr* from Drexel University, Pennsylvania who is a recognised authority on automatic process control.

*Otago*

The construction of an analytical 'clean room' in the chemistry department's tower building is now well underway and should be completed early this year. The new laboratory, which uses only filtered air and has no metallic materials used in its construction, is to be used by *Dr Keith Hunter* in his research on the analytical chemistry of the marine environment.

Also of interest to analytical chemists is the development of a new course in analytical chemistry at the fourth year level. This course has been developed under the guidance of *Prof Arthur Campbell* and its introduction in 1982 means that students working for either an honours degree or a post-graduate diploma in chemistry may now take analytical chemistry as one of their four papers in their final year.

An interest in industrial chemistry recently took *Assoc Prof Don Brasch* to Fiordland for a 10 day visit. There is at present some interest in the commercial utilisation of Fiordland seaweeds, especially the giant kelp Durvilleae antarctica, which can be readily extracted to give good yields of alginic acid. Alginic acid and its derivatives are polysaccharides which have many industrial end uses because of their rheological properties in aqueous solutions.

Recent visitors to the Chemistry Department have included *Prof Hubert Schmidbauer* and *Prof Henry (Fritz) Schaefer III* from Berkeley. The latter gave an address entitled The Third Age of Quantum Chemistry.

The Biochemistry Department's chairman, *Prof George Petersen,* returned in December following a year's sabbatical leave, which he spent at the MRC Laboratory, University of Cambridge, working with *Prof Frederick Sanger FRS.* During Prof Petersen's absence from Dunedin, *Assoc Prof Pat Sullivan* has acted as chairman of the department.

*Dr Ian Forrester* has been awarded a Claude McCarthy Fellowship for 1982. This award releases him from university teaching duties for the year, enabling him to devote his time to research work. He will be replaced on the teaching staff by temporary lecturer *Dr Brian Monk* from the University of Cincinatti, who works in the general area of membrane structure and function.

Recent visitors to the department included *Dr D Soll,* Prof of biochemistry at Yale University and *Dr Kurt Steiner* and his wife *Dr Alison Robinson* of the department of physiology University of Tennessee. Dr Robinson is a BSc (Hons) graduate in biochemistry from the University of Otago and is the daughter of *Prof James Robinson* and *Prof Marion Robinson* of the University of Otago.

The Department of Nutrition has just installed a new Waters HPLC which was financed by an MRC grant. The apparatus will be used for a wide range of anaylsis, including the structural investigation of food related polysaccharides.

*Dr Richard Beyer,* a staff member of the nutrition department for two years, who recently completed his PhD in food science at Otago, made a brief visit to Dunedin in December. Dr Beyer now lives in Tasmania where he is assistant director of the Australian armed forces Food Science Research Establishment.

## GOVERNMENT DEPARTMENTS

*Institute of Nuclear Sciences*

*Bill McCabe* attended a week long IAEA workshop in Vienna on the use of radioisotopes in geothermal research. Before returning to INS, Bill spent about four weeks on a short-term consultancy at UKAEA, Harwell, United Kingdom.

Three visitors from the Peoples' Republic of China spent 10 days with INS staff. *Drs Shen Cheng-de, Lin Rui-fen* and *Huang Bao-lin* from the Institute of Geochemistry, Guiyang, were part of a bilateral scientific exchange program. They were of infinite charm but limited English and were particularly interested in INS carbon-14 dating and earth sciences facilities.

*Dr Chris Adams* is presently on a geological expedition in Northern Victoria Land, Antarctica. The rock samples with which he returns will be dated at the institute and form part of further research on Gondwanaland.

*Soil Bureau*

Recent seminars held at the bureau included The 7th International Clay Conference (Italy) by *Dr Benny Theng* and Structure (of clay minerals and soil) — and a year in England by *Dr Jock Churchman.*

*Dairy Board*

*Dr Bruce Sutherland,* quality assurance controller at the board, has recently spent two weeks in Wisconsin, USA on business associated with the board's purchase of butter.

*DSIR — Applied Biochemistry Division*

In August *Dr Ray W Bailey* (director of applied biochemistry division and international secretary of the Royal Society of New Zealand) led a party of seven scientists representing the society to China as guests of the China Association for Science and Technology.

Other members of this party were *Prof R Cambie* (Chemistry Department, Auckland University), *Dr R Ferguson* (Division of Horticulture and Processing, DSIR, Auckland), *Prof D Coombs* (Geology Department, Otago University), *Dr R I Walcott* (Geophysics Division, DSIR), *Dr R A Cooper* (Geological Survey, DSIR), and *Prof K Milne* (Horticulture Department, Massey University).

The purpose of the visit was to investigate the development of contacts within China in the areas of plant sciences, horticulture and the geological sciences. Also discussions were held on ways of furthering exchanges of scientists between New Zealand and the People's Republic of China.

*Dr John Shaw,* recently presented a divisional seminar on 'The Characterisation of two Novel Amino Acids from Lotus tenuis using GC-MS.'

He discussed the various methods that were used for the identification of 2, 4-diamino-3-methyl butanoic acid and 2, 3-diamino butanoic acid. These methods included gas-liquid chromatography, using either conventionally packed columns or a capillary column coated with an optically active liquid phase. Electron impact and chemical ionisation mass spectrometric techniques were also used in this study.

*W Kelly,* on submitting his PhD thesis to Lincoln College, was appointed to the Microbiology and Biochemistry Group to work on the microbial degredation of plant cell walls by anaerobic micro-organisms.

*Mrs K Kelly* has transferred from the Lincoln Substation to work in the Nutrition Group.

*Keith I Williamson* was recently made one of the first life members of the newly formed New Zealand Society for Electron Microscopy.

*Mrs Tina Waugh* recently left the division after working for 6½ years in the Analytical and the Nutrition Groups.

*Dick Stephenson* returned to the DSIR Palmerston North Stores as storekeeper after spending three years in a similar position at the Mt Albert Stores.

A feed evaluation unit building has been started and it is planned to be finished in February 1983.

*Drs V F Larsen* and *I S Maddox* (Biotechnology Department, Massey University) presented a divisional seminar on the topic 'Microbiological Production of *n*-Butanol in New Zealand'. Problems encountered in the scaling-up of production of n-butanol from laboratory bench models and costing of the process at various out-put levels were discussed.

At present the cost of the product would limit its use to that of an industrial solvent, though in time it could become available as an alternative motor fuel.

*DSIR — Plant Physiology Division*

*Dr Tom Spriggs,* recently presented a departmental seminar on Ethanol Production from Farm Crops. After considering advantages and disadvantages of ethanol as a fuel, Dr Spriggs discussed aspects of its production from fodder beet, sugar beet and maize grain. The use of residues from the various processes as animal feeds was also considered.

## GOVERNMENT DEPARTMENTS

*DSIR*

The Palmerston North DSIR divisions held an Open Day during December. Some subjects shown included chemical defenses of plants, anaerobic degradation of plant materials and aspects of food composition (Applied Biochemistry Division), plant breeding, genetics and plant composition analyses (Grasslands Division) the biochemistry of chloroplasts, plant tissue culture and motor fuels from crops (Plant Physiology Division). Substations of Entomology, Plant Diseases, Crop Research Divisions and Soil Bureau also provided informative displays. The Climate Laboratory Systems as well as the main campus computer, electron microscope, inductively coupled argon plasma emission spectrometer and mass spectrometer were also on display.

## CONFERENCES

The NZIC Annual Conference will be held in Dunedin at the University of Otago. The conference will open on Wednesday, August 25, 1982 and scientific sessions will continue until midday on Friday August 27.

The scientific program is expected to include:

- A one day symposium on organic chemistry to mark the retirement of *Prof RE Corbett.*
- A mini-symposium on lignite chemistry.
- A symposium on hybridomas and monoclonal antibodies.
- A technical session on the analysis of herbage and the identification of markers in anaerobic digestion by X-ray diffraction and fluorescence.
- Specialist group sessions on analytical chemistry, chromatography, chemical education, physical chemistry, biochemistry and organic chemistry.

One scientific session will be held at the Invermay Agricultural Research Centre where a wide range of topics in agricultural chemistry will be discussed.

Delegates are invited to offer papers for either oral or poster presentation. No other scientific sessions will be timetabled at the same time as the poster session, which will be held on the evening of Wednesday, August 25 in conjunction with a trades dispay.

The overall theme for the conference is Chemistry in the Life Sciences, but this will not restrict in any way the papers to be presented by delegates and papers on all aspects of chemistry will be welcomed.

It is anticipated that the majority of delegates will prefer to stay in university halls of residence. Accordingly reservations have been made for delegates at University College, one of the university hostels which is within easy walking distance of all conference lecture theatres, trade displays, etc.

Some of the social functions will be held at the University College. Motel accomodation is also available very close to the conference centre. Downtown hotels are situated about two kilometres from the campus. There is ample space for parking cars on the campus.

A post conference symposium on The Regulation of Carbohydrates and Lipid Metabolism will be held immediately following the conference, on Friday August 27 and Saturday August 28. This symposium is being organised by *Dr M Grigor,* and delegates attending will also be accommodated at University College. Several distinguished overseas speakers will be contributed to this symposium.

Further information and registration forms will be available in March from *Dr JM McKenzie,* secretary NZIC conference, Faculty of Home Science, University of Otago, Dunedin.

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Royal Australian Chemical Institute, Seventh National Convention, Canberra, August 23 to 27, 1982. For additional information write to Dr JH Bradbury, Chemistry Department, Australian National University, Canberra ACT 2600.

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Thirteenth Australian Polymer Symposium, August 23 to 27, 1982. This is part of the Seventh National Convention of the RACI. Further information from *Dr DRG Williams* Department of Chemical Engineering, University of Adelaide, GPO Box 498, Adelaide, 5001, South Australia.

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An international symposium on the Use of enzymes in food technology will be held in Versailles, May 5 to 7, 1982. Further information from Symposium Enzymes — AFN, 72 rue de Seures, 75007 Paris, France.

## GAS CHROMATOGRAPHY

During November the NZIC Chromatography Group held a gas chromatography course at the Waikato Technical Institute.

This was the second course of its type, organised by Drs P Judd and P Robinson of the Waikato Technical Institute. Seminars were presented by Drs Robinson and J Zabkiewicz (Rotorua Forestry Research Institute). GC instrumentation for the laboratory sessions was kindly provided by the organisers, as well as Phillips, Varian, Northrop and the University of Waikato.

The four day session covered a comprehensive list of topics, with emphasis on the practicalities of gas chromatographic techniques.

The first day introduced the equipment associated with GC and calculation of system efficiency, selectivity and resolution.

Laboratory sessions provided an impressive demonstration of equipment and instrumentation associated with GC, with a quick run down on maintenance and fault finding.

This was followed by an exercise on preparing column packing, emptying and packing a column and evaluation of column performance.

The next two days presented information on detectors and optimisation of their response, methods of qualitative and quantitative analyses and integration techniques. Details regarding sample preparation, derivitisation, combined GC techniques as well as a guide to the literature were presented. Practical sessions were designed to illustrate differences between several column phases and temperatures and different detectors.

The final day was optional and dealt with capillary columns, their preparation, inlet systems — and their associated advantages and disadvantages.

Members attending the course represented commercial and government laboratories throughout the North Island. All agreed the course was worthwhile both for the relatively inexperienced and those with some familiarity with GC techniques. A further course is proposed for May.

# ON CHARGING

On the entirely appropriate date of April the First 1981, DSIR implemented the government's new policy of charging for scientific services. At first sight, this idea of charging has considerable merit. But New Zealand has a long history of observing overseas disasters before repeating them and the fate of the Rothschild experience in Great Britain leads this sceptical chemist to wonder if this new policy will also turn out to be another "great leap forward".

Some users of science should pay for the service. For example most of the forensic work should be paid for by a vote outside DSIR. The drunkard, the rapist and the murderer must be caught and there are convincing arguments that the justice department and the general public should learn of the true and heavy costs of these services.

But the difficulty of charging is obvious when one tries to price the expense of using services whose use is occasional but whose presence is vital. For example, how do you charge for the service of an expert on X-ray diffraction who may only be needed three times a year but who must be paid all the time?

Another major difficulty in charging is the almost overwhelming temptation for administrators to decide that the utility of a service or group of scientists is directly proportional to their earned income. In this case the scientists degenerate to technicians as no investigations can be made into the use of new techniques and the major effort of a laboratory goes into the use of proven existing techniques.

One of the best illustrations of the dangers in looking to the yearly profit is given in Mitchener's book "Caravans". Here he describes a city which fell because of the collapse of its irrigation system. The irrigation races, which had been built to last, outlasted their builders but did not survive continual neglect by the users.

To compound the problem goats, grazing on hills which had been deforested by a fuel-hungry population, exposed the top soil and the resulting erosion choked the dying irrigation system. In this city the administrators and accountants could easily have justified their actions on the grounds of costs. But by concentrating on the short term profit and by minimizing charges they brought an inevitable disaster on their city.

As a footnote to this tale it is this chemist's sceptical opinion that Rothschild was unfairly blamed for the current problems in the English Scientific Civil Service - he was only the goat that exposed the general barreness and neglect and who allowed the erosion to choke the already clogged channels of scientific utility in Great Britain.

A modern industrial society depends on the three pillars; the mechanic, the engineer and the scientist. The removal of any of the pillars can cause the society to collapse. It is the scientist who advises on new technology and who develops the methods and models to test the new processes. In our industrial world nothing is constant except change and we need the advice of the scientist to make the changes as smoothly as possible.

Rabinow's 17th Law states "when a purchaser who does not know the difference between good technology and garbage orders 'good technology' he will always get garbage". How can this service be charged for on a yearly basis? In fact if our search for recovering the costs of science comes to fruition we may very well succeed in breeding a new type of scientist who will be as useful to his country as were the cavalry of Great Britain during the Napoleonic wars. In the bitter words of their general "They knew how to charge and very little else".

*(This month's Sceptical Chemist was written by L.P. Aldridge of Chemistry Division. Should anyone be interested in contributing to this column anonymously or otherwise please forward their contribution to Dr Mike Kingsford,9 Egremont St, Belmont, Auckland 9.)*

## NEW PRODUCTS

Forest Products has lost no time in going to the factory production stage with the adhesive made from pine bark. A plant to make the new product, dubbed Tannaphen, will soon come on stream and will initially produce 8000 tonnes for use in New Zealand and sale abroad. The research involved has earned NZFP a prestigious award from the US Forest Products Society of St Paul, Minn.

The new product will save overseas exchange on petroleum based adhesives and is said to be more moisture resistant, a big advantage in the particle board it will be used for.

## SOYBEAN PROJECT ON AGAIN?

The scheme to extract soybeans to recover oil and meal from imported beans at Whangarei is being floated again. The capital of Whangarei Oils has been raised from $10,000 to $2.1 million, with all but one of the shares owned by Sunflower Investments, a Liberian company, and the name of *Dr Shrian Oskar* is mentioned in the news item. The $8 million plant is to be established at Port Whangarei, where the Northland Harbour Board has set aside 2.6 hectares for a site for the plant.

## FACS OFFERS CHEMISTRY AWARD

The Federation of Asian Chemical Societies, of which New Zealand is now a member, is offering an award of US $1000 and a travel fellowship for distinctive contributions in chemistry relevant to national development.

The NZIC may make two nominations and the closing date for nominations for the first award to be made in 1984 is December 31 1982.

## MURDER WITH A MINI BLUNT INSTRUMENT?

On September 7 1978, Georgi Markov, a Bulgarian working for the BBC, received a sharp prick in the leg while waiting at a London bus stop.

The next day, he was admitted to hospital in great pain; a day later he died.

The autopsy showed internal bleeding of several organs, but one of the forensic scientists on the job quite accidentally discovered in the leg a metallic sphere 1.53mm in diameter, with two holes .34mm bored in at right angles.

Preliminary analysis showed the ball to be made of platinum and irridium; later bombardment with Harwell's IBIS (Intense Bunched Ion Source) revealed rhodium and palladium,a combination of metals which indicated a Russian source.

It is thought that the minute holes contained ricinine (or ricin) an extremely poisonous alkaloid from the castor oil plant, or possibly abrin an equally dangerous toad poison, although neither of these substances could be traced in the body.

According to The Guardian on November 8, scientists working on the case hope to develop a method by which antibodies binding the ricinine can be radioactively labelled, thus enabling the presence of the toxin to be determined in tissues of Markov's body which have been preserved.

## BIGGEST MERGER IN US HISTORY

In what has been described both as a merger and as a takeover, a meeting of 2000 Du Pont shareholders approved a proposal to buy out Conoco, a company with oil and natural gas interests which nicely complement Du Pont's own activities.

Du Pont is paying US $98 a share in an effort to obtain 90 percent of Conoco's 102 million shares.

The meeting's decision allows Du Pont to increase the number of its shares from 195 million to 300 million. The current value is US $40 a share. At the time of writing Conoco shareholders had yet to approve the move.

## SPANISH VEGETABLE OIL PROBLEM

Up to the time of writing nearly 200 people have died and over 15,000 people hospitalised through consuming rapeseed oil which has been sold as a replacement for olive oil by street vendors in Spain.

The symptoms of the disease are like those of pneumonia, which at first suggested bacterial infection, but it has since been found that, because of the special place of olive oil in the economy of Spain, all other vegetable oils must be denatured with aniline and aniline derivatives which are dangerous.

However. the mechanism of the disease is still not understood because the amounts of these additives are below toxic dose ($LD_{50}$) and it is believed that there must be some reaction between the fatty acids in the oil and the aniline derivatives to give more lethal compounds.

## DOCTORATE FOR DSIR SCIENTIST

Dr Geoff Glasby of the Department of Scientific and Industrial Research Oceanographic Institute in Wellington, has been awarded a DSc by Victoria University of Wellington for his outstanding research in marine geochemistry.

Born in Sheffield, Yorkshire, in 1944 Dr Glasby was educated at High Storrs Grammar School and Magdalen College, Oxford, from which he graduated MA, BSc with first class honours in chemistry.

He then went on to Imperial College, London, to study marine geochemistry. There he gained a post-graduate diploma and in 1970 was awarded a PhD for his thesis on geochemistry of manganese nodules and associated pelagic sediments from the Indian Ocean.

Soon after, he joined the NZ Oceanographic Institute to study marine sediments in such regions as the Bay of Plenty, the Southern Fiords and the Ross Sea. He was scientific leader of three major cruises of the r.v. Tangaroa: Southwestern Pacific in 1974, the Samoan Basin in 1976 and the Lau Basin in 1981.

A fellow of the Royal Institute of Chemistry and the NZ Institute of Chemistry, Dr Glasby has been on the editorial boards of Geochemical Journal and Marine Mining. He has also published more than 80 scientific papers and edited a standard text on marine manganese deposits.

In 1977 he was awarded the ICI Prize of the NZ Institute of Chemistry and the Research Medal of the NZ Association of Scientists.

From 1978 until this year he was Alexander von Humbolt Fellow at the Technische Hochschule, Aachen, West Germany studying manganese nodule distribution and the geochemistry of the equatorial Pacific.

## ATOMIC ENERGY IN BRITAIN

Calder Hall, the world's first nuclear power station to supply electricity to a national grid on a commercial basis, celebrated its 25th anniversary on October 17 last.

In that time it has produced $37 \times 10^9$ units of electricity, enough to supply the lifetime requirements of over 100,000 people. The plant has already outlived its projected useful life and since it was commissioned in 1956, improvements have increased its capacity by 50 percent.

## WORK STARTS ON NEW PLANT

Pine Chemicals NZ — the 50/50 joint venture between Tasman Pulp and Paper and NZ Forest Products — has started work on its $18 million wood chemicals plant at Mt Maunganui, following the signing of two major contracts worth $2.8 million for the supply of technology and engineering.

The plant, which is due to go on stream by late 1983, will process crude tall oil and crude sulphate turpentine, both by-products of the kraft pulping process at the Kawerau and Kinleith mills.

It is expected to earn $7.6 million a year in exports and to save about $4.5 million a year in foreign exchange by replacing a range of imported chemicals used in industrial coatings, paints, detergents and paper making.

On-site engineering work is already under way and construction is due to start by the middle of the year.

The two contracts have been awarded to the Swiss-New Zealand consortium of Luwa AG and Mauri Engineering and to Japan's Arakawa Chemical Industries.

The Luwa-Mauri consortium will provide technolgy, engineering and specialised equipment for tall oil processing.

Mauri will handle detailed engineering and Luwa, which has been involved in most of the tall oil fractionation plants built in the last seven years, is a leading specialist in thin film and thermal separation techniques.

## BOOKS

### Chemistry In A Young Country

*edited by PP Williams*
*(NZ Institute of Chemistry 1981, pp 243)*

Perhaps a better title for this history of chemistry in New Zealand, would be Chemists in a Young Country. Of the more than 600 entries in the index about 90 per cent list names of people who have made contributions to chemistry in New Zealand.

Some of the chapters are short and tersely written, while others are more discursive and manage to impart some additional information in the way of interesting and little-known anecdotes. The reviewer has been interested to note how neatly certain key phrases typical of a well-known chemist have been noted, for example Ken Griffin's criticism that chemistry graduates "couldn't do Kjeldahls". (From my memory he aimed this criticism more specifically at first class honours graduates).

The book is well produced and makes an important contribution to setting down the history of the NZIC. Although it can be criticised for lack of uniformity (understandable given that more than 30 contributors are involved), an inadequate index and the occasional error, all in all I found it to make delightful reading.

The inclusion of quotations (from early articles and even poems), as well as historic photographs, does much to improve its readability. I believe the authors and editor are to be congratulated for the presentation of what will undoubtedly become a collector's item.

*H Bloom*

*H Bloom is Professor of Chemistry at the University of Tasmania.*

This NZIC Jubilee publication is available for $12.50 (including postage) from: The Registrar, NZIC, Box 1926, Christchurch.

### Soviet Scientific Reviews Chemistry Reviews Section B Volume One

*Edited by ME Vol'pin*
*(Harwood: Schweiz, 1979, hardback $46.00 pp 277)*

This volume is part of a series, published under the auspices of the Academy of Sciences of the USSR, motivated by a belief that recent scientific advances in the USSR do not receive the attention they deserve because of the language barrier.

If this particular volume is any guide the 'review' is simply an opportunity for an 'expert' to discuss his own results. The critical scientific assessment expected in a review is lost and there is only a minimal effort to place the Russian work in context of the total scientific effort in the research field. For example, the article Reaction mechanisms of organometallic compounds of 86 pages has only 70 references of which 44 are references to the author's own work (some in journals readily available in the western world). A cheaper means of disseminating this overview of Russian work could be found.

The four articles have been ably translated and are well-written. Two deal with aspects of catalysis. Molecular Basis for Heterogeneous Catalysis by acids through the participation of Bronsted centers (V Kazanskii) and General Principal of Enzymatic Catalysis (IV Berezin, AA Klyosov, K Martinek).

An unusual and interesting research area namely the effect of magnetic fields on chemical reactions, is discussed in some detail, both quantitatively and qualitatively by Molin, Sagdeer and Salikhor. Beletskaya covers new developments in the mechanisms of electrophilic reactions of organometallic compounds.

A volume of general interest to those in the specific research areas mentioned, but not recommended if you have a restricted library budget.

*BH Robinson*

*Dr Robinson is associate professor in chemistry at the University of Otago.*

### The Chemistry of Life

*S Rose and C Sanderson*
*(Penguin Books: Great Britain 1979 — second edition, pp290 $5.95 paperback.)*

The road to conveying "some of the excitment of biochemistry to a lay reader", while avoiding the production of a condensed text book, seems littered with good intent.

Many have trod the road in the past and failed. This book also fails in this, its stated aim, but perhaps to a lesser extent than many.

Some would say that with the recent rapid expansion in our knowledge of biochemistry, the task is now impossible without assuming some degree of scientific background or else trivialising the subject. Professor Rose seems to be inclined towards the former.

However the book is by today's standards very reasonably priced and apart from some misleading statements:- "a catalyst can never catalyse a thermodynamically unfavourable reaction" -should be worthwhile reading for those with an interest in biochemistry and an elementary understanding of general science.

*T Brittain*

*T Brittain is lecturer in biochemistry at the University of Auckland.*

### Biological Magnetic Resonance, Vol. 2

*Edited by LJ Berliner and J Reuben.*
*(Plenum Press, New York, 1980, hardback $39.50, pp351)*

The book continues the policy of Volume I in the series, namely reviews of specialist topics in the field of biological magnetic resonance by leading workers in the field. As such, the series is an indispensible item on the bookshelves of workers in this expanding area of research.

The chapter on $^{31}$P NMR of living systems is an excellent review of a technique which has aroused much interest in recent years and appears to cover all relevant aspects.

Chapters on ESR of molydenum-containing enzymes and iron proteins will be of considerable value to those entering the biological ESR field.

An unexpected chapter is included, on the synthesis and properties of stable imidazoline nitroxide spin labels. Much of this chapter is organic chemistry, though undoubtedly of value to those who would wish to perform ESR with such ligands attached to the macromolecules which they are studying.

The final chapter is concerned with the multinuclear NMR approach to the determination of small peptide conformations and interactions in solution.

In all chapters, references are incuded, up to early 1978, which is probably as up-to-date as can be achieved in a book (as distinct from an annual review). The danger with such specialist publications is that they can become obsolete within a very few years. I can heartily recommend this book at the present. I am by no means certain that I will be able to recommend it in three years time.

*E Chapman*

*E Chapman is biochemist-in-charge of the National Hormone Laboratory and senior lecturer in the Department of Biochemistry, University of Auckland.*

### Thin-Layer Chromatography — a Laboratory Introduction

*P Jenks and P Wall*
*(BDH Chemicals Ltd, Poole, England, 1980).*

### Thin-Layer Chromatography

*W Gotz, A Sacks, H Wimmer*
*(Gustov Fisher Verlag, 1980 and BDH Chemicals Ltd, Poole England, 1980)*

The two booklets provide useful guide books to TLC. The booklet by Jenks and Wall starts with a brief review of the various mechanisms involved in chromatographic separations followed by a discussion of the properties and uses of various common TLC adsorbents.

This is followed by a chapter on the more practical aspects such as choice of developing solvent systems, elutropic series, detection and quantitation. The final section shows the application of theory in practice and details 10 different experiments demonstrating the separation of dyes, amino acids, plant pigments, carbohydrates, etc and the use of two-dimensional TLC.

The material is presented clearly and lucidly and this little book should be of great value to school teachers, technicians and anyone wanting a handy guide to practical TLC.

The second book is essentially similar but the theoretical treatment is somewhat more detailed. This book has a strong clinical bias and much of it is devoted to the medical applications of TLC. For example, there are detailed instructions on sample storage and preparation of clinical samples for analysis of lipids, urinary amino acids porphyrins, etc, together with guidance on the interpretation of results.

There is also a section on the use of TLC for monitoring drug use and abuse! The book is illustrated with several colour plates.

This is definitely a book for the medical laboratory technician to whom it should be invaluable.

Both books are available from BDH Chemicals in Palmerston North.

*JRL Walker*

*JRL Walker is lecturer in botany at the University of Canterbury.*

## CONTAMINATION RISK LESSENED WITH SYSTEM

A new fully automatic dish preparation system is said to enable laboratories to prepare, dispense and store petri dishes without risk of contamination.

Manufactured by Jouan SA, a French company, the system consists of several components which can also be purchased and used separately.

The automatic media preparer turns out five to 10 litres of sterile media in less than one hour. It features a sterilisation range of 80-130 degrees C, and a 35-80 degrees C dispensing range. A programmer and electronic control unit allow selection of sterilisation temperature and time.

The automatic filler allows uniform and bubble-free filling of up to 800 petri dishes per hour at 15 millilitres per dish. It fills from 0 to 70 millilitres per dish with accuracy of half a millilitre. The sterile filling area safeguards against contamination and a buzzer indicates any malfunctions (upside-down dishes for example).

The automatic stacker stores 240 dishes (90-100 ml) in eight stacks. Each stack can take 1 to 20 dishes and the filler and stacker stop automatically when the cycle is over. A buzzer alerts the operator.

The peristaltic pump (choice of manual or automatic model) dispenses liquids and culture media. The pump features adjustable flow and allows filling of petri dishes, tubes or bottles with sterile medias.

The Jouan preparation system is available in New Zealand from Northrop Instruments.

## 680 SERIES RELATED DATA STATION

The IR Data Station is a desk top computer which is a plug in accessory for the 680 series. Standard software provides complete control of all instrument functions and can supervise unattended operation with a multi-sampling accessory, acquiring data and generating analytical results automatically. Routines are initiated with single keys and the display then guides the user through the correct procedure. Principal routines include spectral subtraction via absorbance with automatic scaling to look at individual components in mixtures or to eliminate background features introduced by accessories. Signal averaging or digital smoothing reduce noise levels while baseline flattening and ordinate expansion via absorbance improve the presentation of the final spectrum. The system provides extreme flexibility in the calculation of analytical results and can even choose between alternative methods on the basis of the observed spectra. Continuing software development means that the capabilities are increasing all the time.

The 'Search' package provides a unique capability for structural identification as well as comparison of spectra with library data. The interpretation routine identifies characteristic band patterns and then lists the corresponding possible structural units. This information is used together with a peak-matching procedure to compare an unknown spectrum with a library stored on floppy disc. The standard library of nearly 3000 spectra can be extended by the user to cover materials of special interest. Typical output from the program is shown below with the most closely matching spectra assigned scores up to 9-9, indicating the degree of correspondence for both characteristic band patterns and peak frequencies. Hard copy spectra are supplied with the library for positive identification.

The 680 series of instruments is claimed to have outstanding ordinate accuracy and repeatability, making it suitable for quantitative applications. When repetitive analyses are performed the 'Quant' software package for the I.R. Data Station greatly improves the speed and precision of measurement. Complete analytical methods for single and multicomponent determinations can be developed and stored with calibration data for recall from disc as required. A choice of analytical procedures is available with options such as the use of peak height or area, plus measurements either at fixed frequencies or at automatically located peak maxima. For complete flexibility 'basic' routines can be written to handle unusual problems.

## PEOPLE

NZIC members will have been saddened to hear of the death in Dunedin of *Prof FG Soper* on January 1, 1982. An obituary of the 1946-47 NZIC president will appear in the April issue.

The position of director of the Auckland Cancer Society's research laboratories, which became vacant after the death of *Prof Bruce Cain*, has been filled by molecular biologist *Dr Bruce Baguley*. Active NZIC member and editorial committee member *Dr Bill Denny* has been appointed deputy director.

*Dr RD Guthrie* is the new secretary general of the The Royal Society of Chemistry (RSC). He has returned to the UK after eight years at Griffith University, Brisbane, Australia to join the RSC staff. Well-known to chemists as the co-author (with *J Honeyman*) of the standard undergraduate text, An introduction to the Chemistry of Carbohydrates, he has increasingly turned his attention from science to administration.

As sectretary general, he will be the chief executive of one of the largest professional and qualifying learned societies in the UK. The RSC has a membership of 40,000 and its publishing activities have a turnover of £7 million. It was formed in 1980 by a merger between The Chemical Society and Royal Institute of Chemistry.

*Peter King*, at present a director of ICI Agricultural Division, has been appointed general secretary of the Society of Chemical Industry, London. He succeeds *Dr David Sharp*, who has retired.

Two of the special visitors at the Golden Jubilee Conference are in the news. *Prof JIG Cadogan* president-elect of the Royal Society of Chemistry, has been promoted to research director of the BP group. *Sir Geoffrey Allen*, formerly professor of chemical technology at Imperial College, London and chairman of the Science and Engineering Research Council, has been appointed head of Unilever Research.

*CJ Mackey* has transferred from NZ Farmers' Fertilizer Co, Auckland to Northland Fertilizer Co, Whangarei.

*JG Thompson* has been appointed to the marketing division of Shell Oil, Auckland.

*RN Chipman* has joined NZ Forest Products, Auckland.

*RA Shaw*, formely with DSIR, is now with ICI, Wellington.

*SH Dromgoole*, post-doctoral fellow at Otago, has been appointed adjunct associate professor in the Department of Medicine.

*Brian Breese* has been appointed national sales manager of Wilton Scientific. He was previously Wellington sales manager.

*Roger Voller* has been appointed national service manager for Wiltons from his previous role as Wellington service manager.

*Dennis Clarke* has joined Wiltons in Auckland as a service engineer. He was previously with Forest Products and Watson Victor.

Northrop Instruments has announced the appointments of *Wayne Sprosen*, as NZ sales manager — scientific division (microscopy products) and *Peter Hermans* as sales engineer Auckland area — scientific division (microscopy products).

Sprosen is based at Northrop's head office, in Wellington and is responsible for field sales in the lower North Island and South Island.

Hermans, based at Northrop's Auckland office, in addition to microscopy regional sales, continues to be responsible for regional sales of all Hewlett-Packard Analytical and complementary products.

*Prof P B D de la Mare*

The Department of Chemistry in the University of Auckland has recently farewelled *Prof PBD de la Mare* who retired on January 31 from the University. A New Zealander, educated at Victoria University College, he came to Auckland as head of department after 20 years in Britain, where he had been a member of staff at University College, London and head of department at Bedford College.

Members of the institute will not need to be reminded of his international standing in the field of organic reaction mechanisms and it has been a source of pride and inspiration to all members of his department to have been led by a scholar of such distinction who was still actively working and publishing.

Equally dedicated has been his concern for efficient administration and organisation and his unfailing interest in, and support for, his staff. Those who presumed to criticise the department or its members soon discovered his sense of loyalty and justice.

His leadership will be remembered for many strengths but, above all, for its integrity and he himself will be rembered for his uncompromising honesty, the high standards he displayed in all his actions and for his intolerance of pretension and the second-rate. Chemists throughout New Zealand will join with members of the department in wishing him a happy retirement, doing so in the knowledge that his scholarship will continue to inspire and instruct.

The above paragraphs on Professor de la Mare were contributed by *Prof Neil Waters* who was on January 18 named vice-chancellor of Massey University. An Auckland graduate who was appointed as a lecturer in 1969, Prof Waters has established an international reputation for his research in structural chemistry and its application to biological problems.

Australian design award.

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