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chemistry in new zealand

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Official Journal of the New Zealand Institute of Chemistry

October 1982

Volume 46 No.5
ISSN 0110-5566

Published on behalf of the New Zealand Institute of Chemistry (Inc.), P.O. Box 1926, Christchurch by The Magazine Factory, Box 6994, Auckland. Advertising manager Wendy Brindle telephone Auckland 769-178, 768-475.

Typesetting: Typeset Graphics Ltd.
Printing by Lockley Offset Printing Ltd, Auckland.

A New Zealand registered publication.

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EDITORIAL

The professionals

Over August I had occasion to attend two gatherings of people connected with chemistry, the NZIC council meeting in Dunedin and the NZ Science Teachers Conference in Hamilton. I will probably offend both groups of people if I suggest that they exhibited marked similarities. However, almost all of the individuals were employed by the government and had reached their current position without leaving the set { school, university, training college, research assoication }[1]. The input of industrial chemists into either of these two influential groups is, as might be expected, negligible.

Industrial chemists are being ignored by the educationalists and the "professional chemists" because, in my view, we are subconsciously (or perhaps consciously) defining chemistry in terms of the kind of chemistry that we were taught at university.

This is perhaps inevitable considering the three year plus period of academic brain washing that we have undergone. Although I do not wish to suggest that New Zealand Universities of the recent past embodied the same codes and ideals as Sebastian Flyte's Oxford[2], the suggestion that a function of the universities was to train people for employment, would have met with the same mixture of horror and disgust.

There was more than a hint that the only true vocation for a professional scientist was pure research and in New Zealand pure research has meant a position in a university or a research association.

This very narrow definition of chemistry can lead to some dangerous generalisations as to who qualifies for the title "professional chemist". High resolution nmr, defined by the academia as "the most useful tool of the organic chemist," is not used outside the universities or DSIR, yet it is defined as chemistry and anyone using nmr is therefore a chemist by definition.

A survey (admittedly small and localised) of NZCS students at the Auckland Technical Institute showed that 74 percent used viscosity measurements in their work. Viscosity, however, is rarely included in university chemistry courses and is therefore not chemistry and its users not professional chemists.

Listen to any discussion of chemical education either among NZIC members or secondary teachers, the tactful resonance of "tertiary educational institutes" is rapidly replaced by "universities" as the speaker gets properly underway.

A discussion on "visiting overseas speakers" at a NZIC council meeting degenerates into a discussion on "visiting professors."

These are trivial symptoms of a narrow and biased view of chemistry that can benefit no-one. We should be prepared to look very carefully at our unwritten definitions of chemistry and chemists and to question the assumptions on which they are based.

Tony Herd

1. It can be argued that I am throwing stones from a government financed glasshouse, but the contact with industry is probably greater in the technical institutes than in any other formal educational area.
2. Though perhaps I was just too clean-living and naive to notice.

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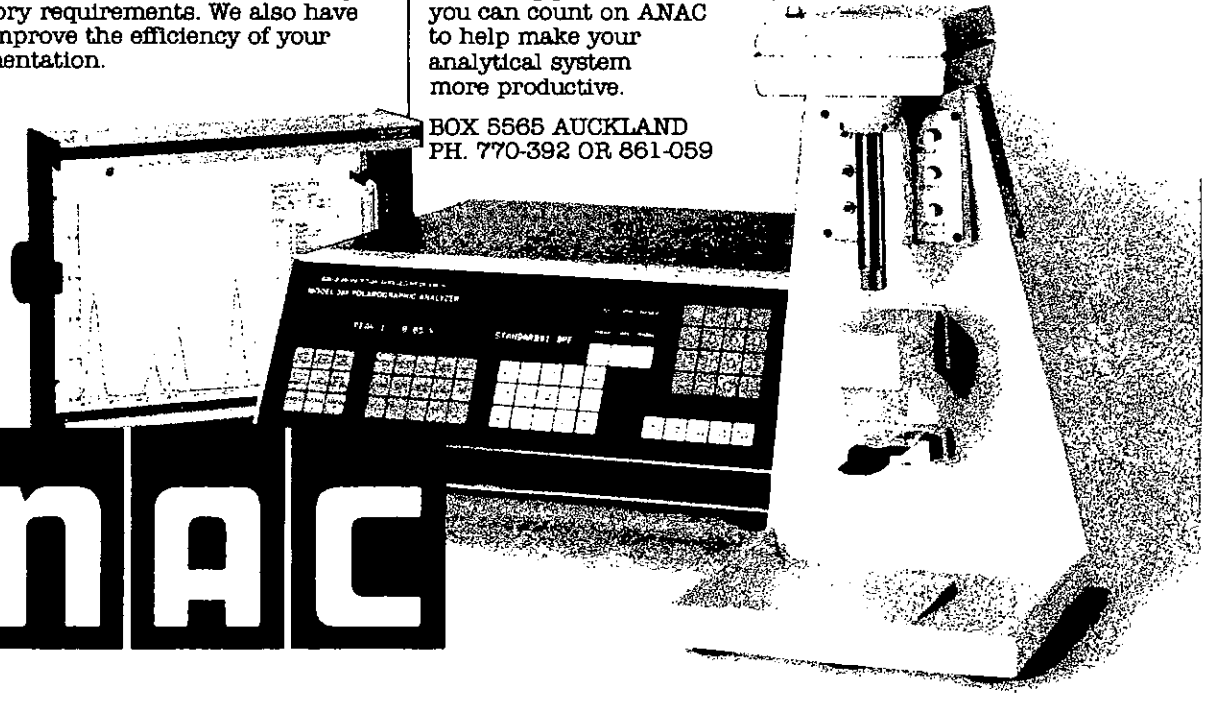


ANAC

Glutathione transferases and resistance to pesticides

A G Clark
Dept of Biochemistry, Victoria University

Resistance to chemical pest control agents constitutes a massive and increasing problem in the fields of agriculture and public health. The number of species of arthropod pests showing pesticide resistance now approaches 400. Many of these show cross-resistance to chemically unrelated pesticides and an increasing number of species show resistance to all major classes of pesticide. Instances of experimentally induced resistance to other new types of control agent such as chemosterilants, hormone analogues and growth regulators have also been observed.

The phenomenon of resistance has spread so fast in recent years that in many instances the mechanism has not yet been characterised. There are many ways in which an organism may become resistant. In animals anatomical or behavioural changes may decrease the risk of contact with a pesticide. Morphological changes may decrease rates of absorption by the organism and/or rates of penetration to the target site. Biochemical changes may decrease the affinity of the receptor site for the toxic molecule or may increase the rate of metabolism of the compound, thereby decreasing its effectiveness.

It is this last type of detoxication reaction that has been under scrutiny for some years at the Biochemistry Department at Victoria University. Work has been carried out on the microsomal oxidation system and on a variety of hydrolytic esterase enzymes which are now well established as being involved in resistance to many types of pesticide. In addition, a particular object of attention lately has been the group of enzymes known as the glutathione S-transferases, which has assumed an increased significance in this area.

L—Glutathione is a tripeptide (γ-glutamylcysteinylglycine) which is found in almost all living organisms in concentrations of up to about 0.01 M. It participates in a wide variety of biological reactions, but its most important roles are perhaps those of maintainence of the redox state of the cell, of transport of amino acids in and out of cells and of rendering harmless a great range of toxic chemicals.

The glutathione S-transferases are widely distributed enzymes, found in plant as well as animal tissues, which catalyse the detoxication of molecules bearing an electrophilic centre by reaction with the thiol group of glutathione. The conjugation of methyl iodide, giving S-methyl-L-glutathione is a simple example of this type of reaction, (Fig. 1) in which the toxic, putative carcinogen is converted into a harmless, highly water-soluble conjugate. A striking feature of these enzymes is their low specificity for the electrophilic substrate. Table 1 shows some of the types of reaction known to be catalysed by these enzymes.

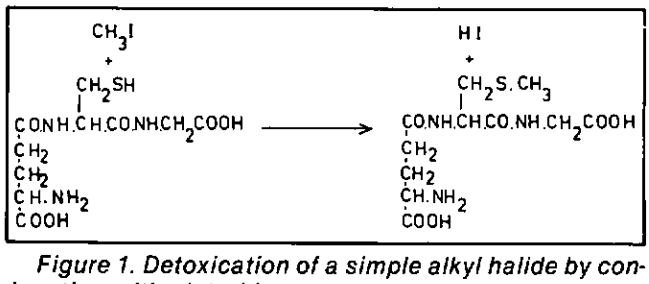


Figure 1. Detoxication of a simple alkyl halide by conjugation with glutathione.

TABLE 1

Glutathione-dependent detoxication reactions.

(a) Formation of conjugates:
Alkyl, aryl, aralkyl and alicyclic halides — substitution of halides.
Aryl nitro compounds — displacement of nitro group.
Alkyl and aryl epoxides — addition to epoxide ring.
Ethylenic compounds — addition to double bond.
Aralkyl suphate esters — displacement of sulphate.
Phosphate triesters — alkyl or aryl transfers.
Diphenyl ethers — aryl thioether formation.
Thiocarbamates — carbamoyl transfer.

(b) Reactions assumed to involve transient glutathione conjugate formation:
Organic nitrate reductase reaction.
Organic thiocyanate degradation.
Degradation of organic peroxides.
DDT dehydrochlorination.

To date, most work on these transferases has been carried out by medical researchers. The reasons for this are clear when one considers the reactions in which they are involved. As well as being concerned in the detoxication of carcinogens, drugs and other foreign compounds or their metabolites, they may also be responsible for the reverse reaction of activation of toxic compounds such as 1,2-dibromoethane or of a cytotoxic drug such as Azathioprine.

Glutathione conjugation appears to be involved in the metabolism of physiologically important compounds such as the prostaglandins, steroid hormones and the leucotrienes. In addition, the enzymes have the ability to bind, quite tightly but reversibly, a diverse range of organic anions and appear to have a role in carrying such compounds within the cell to sites of action or of metabolism or excretion. Compounds bound in this way include endogenous ones such as bile salts, bilirubin, thyroxine and steroid metabolites and foreign compounds such as the azo-dye carcinogens and radio-opaque dyes.

At present it is not clear whether these enzymes play similarly diverse roles in non-mammalian organisms. It is apparent, however, that their involvement in the metabolism of pesticides and in the development of resistance may be of as much significance in the spheres of agriculture and public health as their relation to clinical phenomena in medicine.

Most of the major classes of insecticide appear to act on the nervous system of the target organism. The organophosphate insecticides act, as do the car-

bamates, by covalently modifying the enzyme acetylcholine esterase. This enzyme plays a key role in the transmission of nervous impulses, in particular to the musculature and the effect of the modification is to disrupt completely the neuromuscular system of the insect. The organophosphates are often formulated in a less active, sulfur-containing form, (the phosphorothioate) which may be activated by oxidation, in the insect itself, to the more toxic phosphate triester.

The halogenohydrocarbons act at different sites. Thus DDT, for example, probably interferes with the ionic transmission of the nervous impulse down the axon. The pyrethroid insecticides also appear to act on the nervous system, though the mode of action is not clear: some workers suggest a toxic action related to that of DDT, whereas others propose an action on a neurotransmitter other than acetylcholine.

Whatever the mode of action, all compounds must have a high degree of lipid solubility so that they may penetrate to their site of action within the nerve. One result of the conjugations discussed below is to produce compounds of low lipid solubility which will not

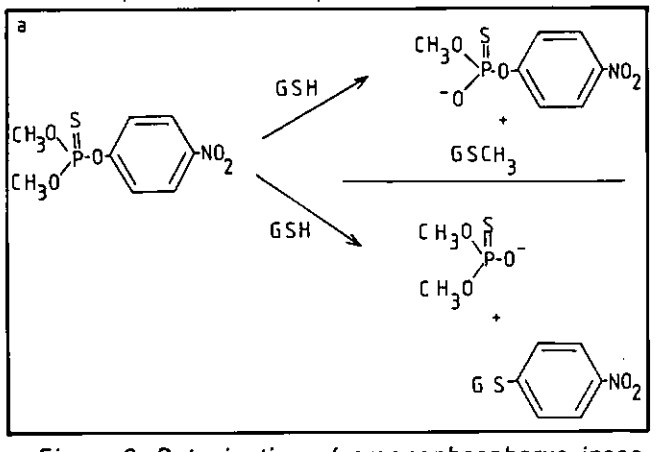
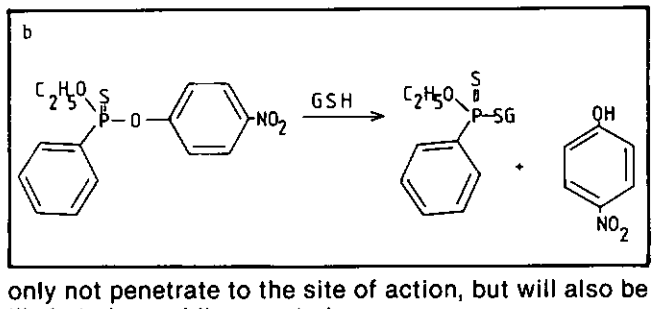


Figure 2. Detoxication of organophosphorus insecticides with glutathione: (a) Conjugation with either alkyl- or aryl- substituents occurs with methyl parathion; (b) An unusual phosphonodithioate is the product of conjugation of EPN with glutathione.



only not penetrate to the site of action, but will also be likely to be rapidly excreted.

One class of pesticide in which glutathione S-transferase activity is important is that of the phosphate triester type of anticholinesterase insecticide. These are frequently detoxified by transfer of one of the substituents to glutathione. As is illustrated in Fig. 2a, with methyl parathion (*O,O*-dimethyl, *O*-(p-nitrophenyl) phosphorothioate) the detoxication may proceed through transfer of either simple alkyl substituents or of more complex, often aromatic substituents. An additional type of transfer has recently been proposed for EPN (*O*-ethyl, *O*-p-nitrophnyl phenylphosphonothionate) in which the GSH conjugate is a phosphonodithioate (Fig 2b).

Increased methyl transfer has been shown to be the dominant factor in a case of massive (1000 x) resistance to tetrachlorvinphos (*O,O*-dimethyl *O*-[2-chloro-1-(2,4,5-trichlorophenyl) vinyl]phosphate), in the housefly and methyl transfer also seems to be important in a recently demonstrated instance of resistance in houseflies to

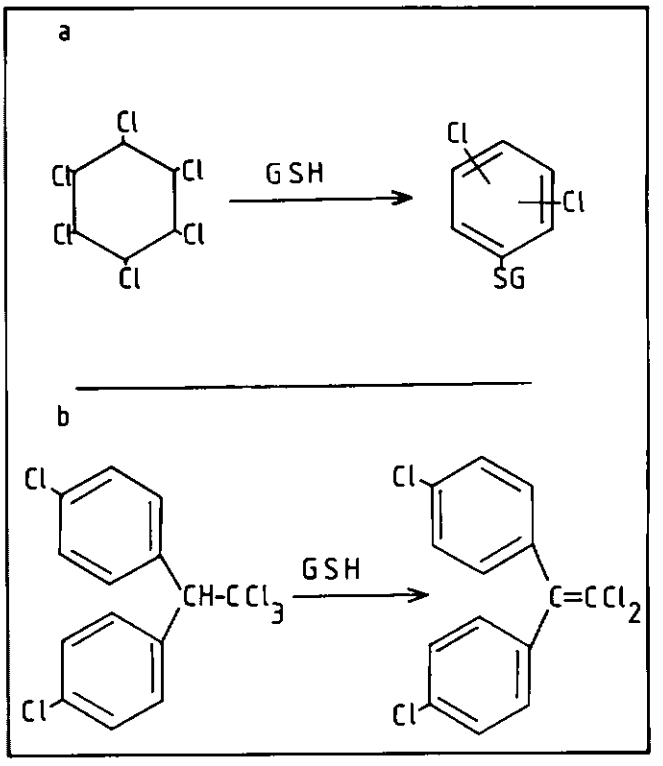


Figure 3. Detoxication of organochlorine insecticides by glutathione-dependent reactions: (a) Lindane is aromatized and conjugated with glutathione; (b) DDT is dehydrochlorinated to DDE in a glutathione-requiring reaction.

malathion (*O,O*-dimethyl, *S*-(1,2,-dicarboethoxy) ethyl phosphorodithioate).

Similar reactions have been invoked as being significant factors in the development of resistance to other organophosphates in predaceous mites and the tobacco budworm. Because of the low specificity of these enzymes, an increase in their levels leading to resistance to one particular organophosphate is likely to lead to cross-resistance to other organophosphates as well.

Insecticides of the organochlorine class are also likely to be metabolised by GSH-dependent reactions. Thus Lindane (γ-hexachlorocyclohexane) and its various isomers are metabolised to a variety of S-aryl glutathiones (Fig. 3). This reaction does not appear to be a dominant cause of Lindane resistance.

On the other hand, another GSH-dependent reaction, the dehydrochlorination of DDT (Fig. 3), is recognised as the major factor in some instances of resistance to DDT. It has not been possible to demonstrate the formation of even a transient conjugate in this reaction, but current work at Victoria indicates a very close association, if not actual identity, between some of the housefly glutathione S-transferases and the proteins catalysing the dehydrochlorination of DDT (Fig. 4). Instances of resistance to this pesticide may thus eventually turn out to be attributed to glutathione transferase activity.

Glutathione-mediated resistance is also of interest in the plant world. Conjugation with glutathione of herbicides such as Atrazine or Fluorodifen may confer resistance on some plants and accounts, at least in part, for the selectivity of these herbicides (Fig. 5). It is with plants that we see most clearly the possibilities of manipulating this type of reaction to confer selectivity on a pesticide. Thiocarbamate herbicides such as EPTC and butylate are detoxified by reaction with glutathione to give S-carbamoylated glutathiones. The 'herbicide safeners', substituted dichloroacetamides, confer resistance on, for example, thiocarbamate-susceptible corn, by increasing both glutathione con-

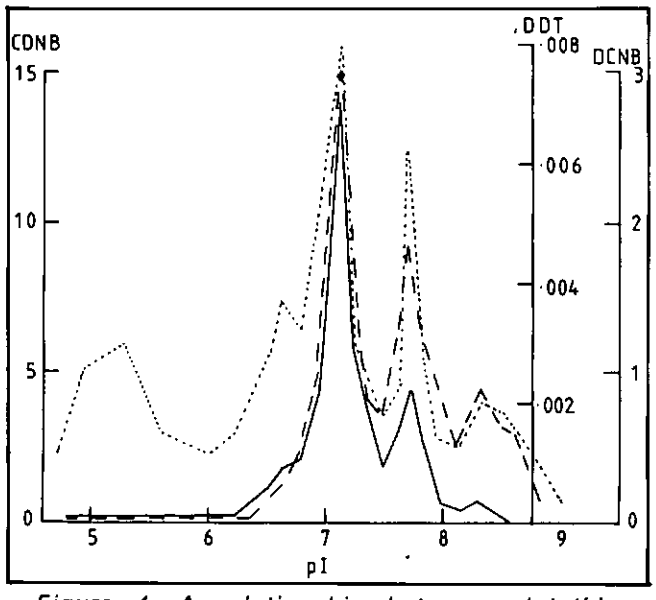


Figure 4. A relationship between glutathione transferase and DDT dehydrochlorination? A highly purified extract from houseflies, containing several glutathione transferases, has been further fractionated by isoelectrofocussing, a process that separates compounds according to their isoelectric point. Fractions obtained were assayed with respect to two glutathione transferase substrates, 1-chloro-2,4-dinitrobenzene (CDNB) (dotted line) and 3,4-dichloronitrobenzene (DCNB) (dashed line) and with respect to DDT-dehydrochlorinating activity (solid line). Enzyme activities are plotted against isoelectric point. DDT dehydrochlorinase activity appears to coincide with one group of glutathione transferases. (A. G. Clark and N. A. Shamaan unpublished data).

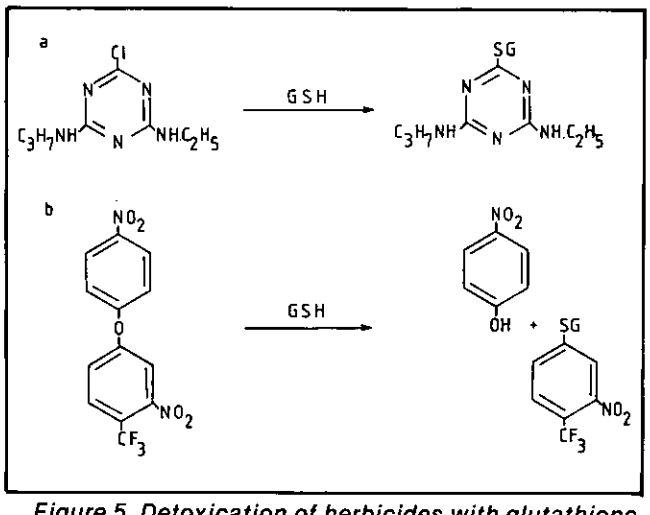


Figure 5. Detoxication of herbicides with glutathione. Atrazine (a) and Fluorodifen (b) form glutathione conjugates in reactions which may confer resistance on some plants.

centrations and glutathione S-transferase levels. Different plants have varying levels of glutathione and the transferase and may also respond to the safener to differing degrees. The selectivity of the thiocarbamates may thus be enhanced by exploiting these differences.

To date there are not any analogous 'safeners' for other types of pesticide and this type of manipulation of resistance does not yet extend beyond plants. The example cited above, however, presents the paradoxical possibility that, although the phenomena of pesticide resistance constitute an alarming problem, a detailed understanding of these phenomena may enable us to use them as a tool in programs of integrated pest control.

Relevant Review Articles

A. G. Clark and J. N. Smith, 'Glutathione S-Aryl transferases as a model for the glutathione S-transferases'. In "*Environmental Quality and Safety*," Suppl. Vol. III. "Pesticides" Eds. Coulston F. and Korte, F. Georg Thieme, Stuttgart, (1975) 346-350.

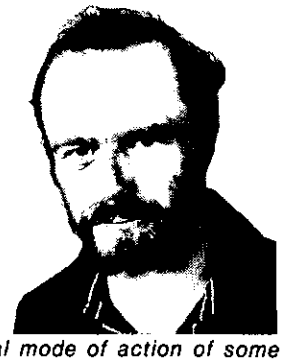
G. P. Georghiou and C. E. Taylor "Pesticide resistance as an evolutionary phenomenon." *Proceedings of the XVth. International Congress of Entomology*, 759-785, (1977).

W. B. Jakoby "The glutathione S-transferases: a group of multifunctional detoxication proteins". *Advances in Enzymology 46*, 383-414, (1978).

J. J. Menn "Contemporary frontiers in chemical pesticide research". *J. Agricultural and Food Chemistry, 28*, 2-8, (1980).

N. Motoyama and W. C. Dauterman "Glutathione S-transferases: their role in the metabolism of organophosphorus insecticides." In "*Reviews in Biochemical Toxicology*" Vol. 2. Eds. E. Hodgson, J. R. Bend and R. M. Philpot. Elsevier North Holland Inc. New York, (1980) 1-48.

A. Meister 'Metabolism and functions of glutathione.' *Trends in Biochemical Science 6*, 231-234, (1981).



Alan Clark received his tertiary education at the Victoria University of Wellington. He majored in chemistry and biochemistry for his BSc and then progressed to MSc and PhD in biochemistry under the supervision of Professor John Smith. He carried out post doctoral work at St. Mary's Hospital Medical School, London and then lectured on the biochemistry of the central nervous system at the Institute of Psychiatry, London, where his research was into the biochemical mode of action of some centrally acting drugs. He returned to Victoria in 1970. His research interests have remained in the area of drug and pesticide metabolism and disposition with a particular emphasis on the processes contributing towards resistance.

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Chemistry and the learning in science project

Roger Osborne, Mark Cosgrove, Brendan Schollum,
Science Education Research Unit, University of Waikato, Hamilton.

This paper considers some recent research into the teaching and learning of chemistry at the intermediate and secondary school levels in New Zealand. The findings from the research are summarized and other outcomes of the research are referred to. Questions about school chemistry are raised for discussion.

INTRODUCTION

There is much debate in New Zealand,[1,2,3,4] Australia,[5,6] United Kingdom,[7,8] and Canada[9] about chemistry syllabuses at the school level. What content and skills should be taught and how should they be taught? Many aspects of learning, (e.g. what ideas the learner brings to the classroom) and societal changes, (e.g. changes in the Form 6 population) need to be taken into account. Unfortunately there is a dearth of sound curriculum research on which to base decisions about the suitability of present and proposed syllabuses. This is unfortunate since curriculum change then becomes susceptible to the winds of fashion.

Some research findings which may be pertinent to the debate have resulted from the recently completed Learning in Science Project based at the University of Waikato. This was a three year government funded research project which was set up to investigate the teaching and learning of science at the Form 1-4 levels in New Zealand schools.

The project consisted of three phases:

Exploratory Phase (1979): to identify key difficulties in the teaching and learning of science.

In-depth Phase (1980): to explore in-detail some aspects of these key difficulties.

Action-research Phase (1981): to find ways to solve some of the identified problems.

The work resulted in some 54 working papers, four videotapes and over 20 articles published in New Zealand and overseas' journals. The papers particularly pertinent to Chemistry are listed in the appendix.

In this paper some of the major findings of the project as they relate to chemistry teaching and learning will be summarized.

CHEMISTRY AND THE EXPLORATORY PHASE

In the exporatory phase of the Project (1979) a wide range of people were interviewed about the teaching and learning of science at the Form 1-4 level. These people included primary teachers, secondary and tertiary science teachers, science advisers, teachers college lecturers, pupils, ex-pupils, principals and science inspectors. As well, a wide variety of science lessons were observed. Many comments made and events observed in classrooms, were related to chemistry topics. In describing these comments and events here we will emphasize the comments of school pupils and recent school leavers, for there are few opportunities normally for such comments to be recorded and reported.

Expectations: to many children entering Form 1 and to some extent Form 3, science is considered to involve test tubes and explosions. It is not surprising therefore that for many children there is an unrealistic expectation of excitement which science, as a school subject, never quite fulfills;

"Science is like cooking . . . you go to cooking to cook but instead we always write up home management and that." [Form 3 pupil]

On the other hand doing the 'exciting' experiments did not turn out to be always fulfilling either;

"We enjoyed the experiments but did not learn much." [ex-pupil]

However, occasionally it all came together;

"In the third form we made hokey-pokey and that was really good because firstly we were having this real big thrill about making something to eat and secondly is that it was really dramatic . . . I mean hokey-pokey making is really dramatic and thirdly is that we were all made to sit down and write up the equation of the basic thing that was happening to make it all puff up, and that was good because as we were sitting there munching away we learned something and it was fun, it was tasty, and it was really interesting . . . We could all go home an say "wow! this is what we did today Mum!" [Form 6 pupil]

Conceptual Difficulties: many children we interviewed consider that they had difficulty with the concepts they were taught in chemistry. Formulae and the mathematical content of chemistry frequently being cited as stumbling blocks. As one pupil expressed it;

"Chemistry and Physics . . . I liked them but I couldn't do it . . . it didn't work out right . . . all those formulae and everything." [ex-pupil]

Relevance: a frequent comment from children was the perceived lack of relevance, particularly of chemistry and physics. For example:

"They related it to things that you would not think of, that do not really come into your life." [ex-pupil]

"If I had seen more of the practical application of it . . . I would probably have enjoyed it more." [ex-pupil]

Here we see relevance used in two ways; relating what is taught to the everyday world and relating what is taught to the ideas learners hold about how and why things behave as they do.

Overview: how representative are these comments? We believe, not only from our interviews but also from our observations in many classrooms, that they are representative of a wide range of pupils. Many of these pupils start at Form 1 with high expectations of "science". To these pupils science consists of explosions and chemicals. While they enjoy doing experiments they frequently have difficulty coping with the theoretical aspects of chemistry and relating it to their own ideas and the world around them.

Teachers and science inspectors support this view, commenting that school children find it very difficult to

relate visible changes such as crystal dissolution to the behaviour of molecules or atoms.

CHEMISTRY AND THE IN-DEPTH PHASE

In the in-depth phase of the project (1980) an attempt was made to investigate in some detail children's ideas in science and to study closely the learning experiences children have in science classrooms. Many ideas investigated and lessons observed, involved topics in chemistry. In brief our aim was to explore the validity of statements like the following.

"(the students) are interested in chemistry because they are playing around with chemicals in test tubes and bunsen burners . . . In that aspect I think chemistry is good . . . (however) it is just a game . . . I do not think they understand the concepts and some of the concepts these kids have grabbed hold of . . . it is incredible." [head of science, secondary school]

The research questions became: (i) what concepts do children hold which relate to ideas in Chemistry?; (ii) how are these ideas influenced by classroom experiences?

In-depth individual interview procedures were used to investigate children's understanding of and ideas about, a range of familiar changes. These include water evaporating and condensing, ice melting, a candle burning, sugar dissolving, water boiling, a nail rusting and a firework type explosion.

Through discussion of these events children's ideas about particles, atoms, molecules and their interactions were also explored. The findings from this work were fully described in three working papers (LISP Working Papers No. 18, 26 adn 27). Detailed studies of what children were actually experiencing in classrooms were also undertaken through classroom observation (see LISP Working Paper No. 47). These studies revealed a number of problems:

The Problem of the Invisible: intermediate and junior secondary school pupils frequently have difficulty accepting that something that is not directly observable can exist or be formed (although air is normally an exception to this rule). We found secondary school pupils who believed that they had no oxygen in a test tube because they could not see anything. Many children believe that when something is burnt, such as gas in a bunsen burner, then it is just "used up" and nothing remains. Frequently it is assumed that air itself is not actively involved in burning although it may be considered to act as a catalyst. Many young children believe that if steam rising above a kettle is no longer visible then it must have changed into air.

The Problem of Taste, Smell and Colour: some aspects of our work indicate that children have, or develop, non-scientific ideas because of confusions about what it is that they taste, smell or see. For example some children consider that, when sugar is dissolved in hot water there is "nothing left but the taste"; when a brightly coloured crystal dissolves in water then "the colour comes out of the crystal"; when camphor is heated at the front of the room it is "just the smell" which travels to the back of the room.

Unfortunately, it is these sort of events which are often used to introduce young pupils to the particulate nature of matter. If children's views of colour, taste and smell are quite different from those of teachers and curriculum developers, it is not surprising that children find that the 'evidence' for particles is unconvincing and confusing.

The Problem of Uninfluenced Ideas: many non-scientific ideas held by children not just in chemistry, appear to be scarcely influenced by science teaching. For example while 37 percent of Form 2 pupils consider than when a nail goes rusty it loses weight, so do 33 percent of Form 6 chemistry pupils. While 30 percent of Form 2 pupils consider that the large bubbles in boiling water are bubbles of air, so do 25 percent of Form 6 chemistry pupils. One of our studies indicated that a majority of pupils from Form 1 to Form 7 chemistry believe that a gas flame does not result in the formation of new gases. This uninfluenced idea is related to the first problem identified; as one Form 6 chemistry student stated:

"There cannot be [anything formed] because you cannot see anything."

The Problem of Ideas Influenced in Unanticipated Ways: some non-scientific ideas held by children appear to be influenced by teaching, but not always in the ways intended by their teachers. Examples can be found, again not just in chemistry, where non-scientific ideas become increasingly popular as children move upward through the school system. The idea that on evaporation water changes into oxygen and hydrogen gas is one that becomes increasingly popular from Form 3 to Form 5 science. It is also a view held by a significant proportion of Form 7 chemistry pupils.

One possible reason for this is that to younger children the water appears to change into air; to become air. These children are likely to learn at school that water consists of oxygen and hydrogen, while air consists of oxygen and other gases. It is therefore not surprising that children support their early idea, which is normally never challenged, with their new knowledge about oxygen and hydrogen.

The Problem of Particles: most young children view matter as being continuous and this view is reinforced by things children commonly observe, e.g. the non-compressibility of liquids. To chemists and physicists the particulate nature of matter is a concept that makes the complex world of chemical and physical changes understandable and intelligible. Yet the teaching of ideas about particles appears to bring no simplicity or elegance of explanation to many children. Many of them incorporate continuous and particulate ideas together; the majority of Form 4 pupils consider that there must be something between particles.

Further, in our interview work we found that Form 1 to 5 pupils, after observing the rapid oxidation of magnesium, produced a variety of non-scientific ideas about particles being "shattered", "burnt up", "expanded", "non-existent", "melted" and "shrunk". We found pupils at the Form 7 level confused about the multiplicity of terms that they had heard, e.g. particles, atoms, molecules, and nuclei — and of their interrelationships. We have found some Form 7 chemistry pupils unsure whether certain substances, e.g. steel, liquids and flames, consist of particles at all.

Overview: the work of the in-depth phase suggested that pupils have a real problem with many concepts in chemistry. Unfortunately in many "chemistry" situations there is no one-to-one correspondence between what is happening and what is detected by the human senses. Yet even young children comprehend the world around them by placing great reliance on the human senses and, by and large, their understandings have been adequate to explain and predict, everyday events. They bring their understandings with them to chemistry lessons — understandings which to them are sensible and logical. We have come to the view that if these ideas are not taken into account and directly challenged when teaching science and in designing curriculum,

children's ideas often remain uninfluenced or are influenced in unanticipated ways.

CHEMISTRY AND THE ACTION-RESEARCH PHASE

In the action-research phase of the project (1981) attempts were made to find suitable teaching and learning approaches that might overcome some of the problems that have been identified. The aim was to produce classroom material for teachers so that they would become:

i) aware of and even familiar with, the problems as they relate to at least one specific topic;
ii) involved in using teaching materials specifically designed to overcome the problems identified in that topic or activity;
iii) sensitized to children's ideas and encouraged to find out these ideas and to find ways to build on and modify them, rather than assuming them to be inconsequential.

Of the four action-research groups in the project, one group specifically investigated chemistry topics, while another group studied how activity-based teaching could be made more effective. Each group consisted of members of the research team and practising teachers.

The chemistry group, as did all groups, attempted to determine what was achievable, in terms of the present syllabus, if children's ideas are known and taken into account. The group worked on topics which they expected would help children understand better their familiar world around them and at the same time understand some basic ideas which underpin learning in chemistry.

The topics chosen were based around those events discussed with children in the in-depth phase of the project. Three reports were produced. The first one (LISP Working Paper No. 38) focussed on easily reversible changes involving heating and cooling, with emphasis on the changing of water into ice and steam. The paper contained teachers' notes, which enabled teachers through a self administered survey to clarify their own ideas about these changes; to appreciate the accepted scientific viewpoint and to appreciate the views children hold.

The final part of the paper suggested activities designed to help children gain some understanding of the changes from a scientific point of view by helping them to modify their earlier non-scientific ideas. Where appropriate a simple particle model was introduced to help children explain what they observed.

The second paper (LISP Working Paper No. 36) focussed on burning, with particular emphasis on investigating a lighted candle. The format and intent of this paper and the final one (LISP Working Paper No. 37) which dealt with rusting nails and other familiar reactions, were similar to the first paper.

Overview: teacher resource material has been produced for particular topics and situations. It is hoped that by using this material teachers will become aware of children's views and the need to take them into account when teaching. Indications are that the material does help teachers reassess their views on teaching. Many teachers who were involved in the action-research phase of the project, as well as others who have been introduced to the material more recently, are now finding out children's views, designing further material and improving what has been produced so far. The Learning in Science Project will have achieved all that can be expected of it, if this work by practising teachers continues and develops.

CONCLUSIONS

The Learning in Science Project did not aim to be evaluative. Rather it set out to find key difficulties in teaching and learning and to set about finding ways to solve these difficulties.

In the light of our work we would argue that junior chemistry teaching needs to help pupils modify their own firmly held and often non-scientific, ideas about how the world behaves in a way which will help them make sense of the familiar world around them.

Our findings raised some important questions. Should the Form 1-4 syllabus chemistry topics and objectives be reconsidered, particularly in terms of conceptual difficulty, of relevance to the familiar world of children and of relevance to the technological society in which children are growing up? Should school chemistry, at the junior levels at least, be more practically oriented, emphasizing things that chemists do (separating, making and modifying substances) rather than emphasizing the more theoretical aspects of the subject? Finally, we need to reflect on the fact that the view of science and its place in society, which will be held by New Zealanders in the future is being moulded in the classrooms of the present.

REFERENCES:

1. T. Hitchings, Chemical Education: How do we compare internationally? *Chemistry in New Zealand, 44*, 229, (1980).
2. J. E. Packer, International Report — corresponding member — New Zealand RSC Education Division, Overseas Newsletter, October (1971).
3. B. R. Penfold, (Chairman) Report of sub-committee on Teaching of Chemistry in Forms 1-7, New Zealand Institute of Chemistry, August (1981).
4. A. Wooff, Letter from New Jersey, *Chem. N.Z., 15*, 2, (1981).
5. P. J. Fensham, Heads, Hearts and Hands — Future Alternatives for Science Education, *Australian Science Teachers Journal. 27*, 53, (1981).
6. C. Power, Trends in Chemical Education in Australia: Problems and Projects, *Australian Science Teachers Journal, 26*, 15, (1980).
7. N. Mott, The training of teachers of science and mathematics, Royal Society of London, Joint Consultative Group on Teacher Training London; Royal Society, (1972).
8. D. J. Waddington, *in* RSC Education Division, Overseas Newsletter, October, 1, (1981)
9. R. J. Gillespie, Chemistry — Fact or Fiction, *Chemistry in New Zealand, 44*, 225 (1980).

APPENDIX:

Papers of LISP Pertinent to the Teaching of Chemistry

Exploratory Phase, Working Papers: No. 2 Focus on Experiments; No. 3 Focus on Knowledge; No. 4 Focus on Topics; No. 6 Focus on Learners; No. 9 Focus on Attitudes.

In-depth Phase, Working Papers: No. 18 Particles; No. 26 Physical change; No. 27 Chemical change.

Action-research Phase, Working Papers: No. 36 Burning; No. 37 Reactions; No. 38 Heating and Cooling; No. 47 Science Activities: The Problem; No. 54 Video: Science Activities (videotape).

Papers

J. K. Gilbert. R. J. Osborne and P. J. Fensham, Children's science and its consequence for teaching, *Science Education, 66*, 623 (1982).

R. J. Osborne. Some Aspects of the students' view of the world, *Research in Science Education, 10*, 11, (1980).

R. J. Osborne. Science Education: where do we start? *Australian Science Teachers Journal, 28*, 21 (1982).

R.J. Osborne and M.M.Cosgrove. Children's Conceptions of the changes of state of water. *Journal of Research in Science Teaching* (in press).

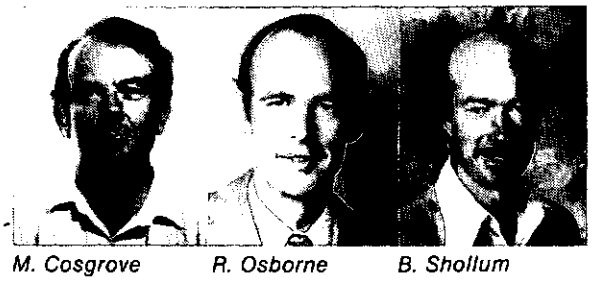
B. W. Schollum. Chemical change, *N.Z. Science Teacher, 33*, 5 (1982).

C. R. Tasker. Some aspects of the students' view of doing science, *Research in Science Education, 10*, 19, (1980).

C. R. Tasker. Children's views and classroom experiences, *Australian Science Teachers Journal, 27*, 33, (1981).

C. R. Tasker, R. J. Osborne and P. S. Freyberg, Learning in Science Project; considerations relating to approaches and methods, *Australian Science Teachers Journal, 26*, 79 (1980).

Note: working papers are available at the cost of reproduction from TOR Centre, Hamilton Teachers College, Private Bag, Hamilton.



M. Cosgrove *R. Osborne* *B. Shollum*

Mark Cosgrove is principal lecturer in science at Hamilton Teachers' College.

Roger Osborne is a senior lecturer in physics and director of the Science Education Research Unit at the University of Waikato. He obtained his MSc in physics from the University of Auckland before teaching at Takapuna Grammar School. In 1970 he joined the Physics Department at the University of Waikato and subsequently gained a doctorate in physics education. He is a fellow of the Institute of Physics (UK) and was co-director of the Learning in Science Project.

Brendan Shollum is a lecturer in science and education at Secondary Teachers College, Auckland. He obtained his BSc in Chemistry at Auckland University and a Dip Ed from Massey University. He has taught at several secondary schools in Auckland and Invercargill before lecturing in the Department of Science Education at North Shore Teachers' College from 1974 to 1979. From Birkdale College in 1980 he gained the position of visiting teaching fellow at the University of Waikato for 1981 to work on the Learning in Science Project.

Tertiary qualification for chemists in safety management

D M Hay
Dept of Business Studies, Massey University

With the advent of the ACC in 1972 and the accompanying body of legislation within which it operates, came a renewed awareness for the safety of the individual both in and outside and workplace. Sections 43-47 of the act deals with safety and prevention and in its broadest sense a responsibility for educational training in the field of safety.

In 1976 the ACC, acting upon a recommendation from the Occupational Safety Advisory Council (a body formed to advise the ACC on matters relating to safety) established a working group with the Department of Business Studies at Massey University which resulted in a postgraduate Diploma in Safety Management being established in 1979.

OBJECTIVES

In establishing any new course, objectives must be established and indentification of the groups of professionals most likely to benefit from such tertiary training. In the past, training in safety has been completely neglected by our tertiary educational institutions, with the National Safety Association being the only body actively promoting safety awareness.

In the past, industry did not place great importance on the position of a safety officer; indeed some of those who were given the task looked upon it as a demotion and were left wondering what they had done to deserve their newly acquired status. The course established at Massey University aims at the education of a safety coordinator who can liase with professional staff from all disciplines, to be responsible for total system safety. The objective is to achieve a more integrated approach to the multi-disciplinary study of industrial safety. In developing course content, it was deemed necessary to develop a program with two distinct objectives in mind:

(i) to establish an additional qualification for those already qualified in Engineering, Science, Medicine and other related disciplines, so as to gain an in-depth appreciation of system safety; and

(ii) to train a more effective safety coodinator who can work competently with other professionals.

COURSE

The safety coordinator to be effective must have a knowledge of:

(a) industrial processes;
(b) mathematical principles — statistics;
(c) chemistry;
(d) engineering;
(e) toxicology;
(f) law-legislation-codes of practice;
(g) psychology; and
(h) erogonomics.

Obviously the safety coordinator cannot hope to be an expert in all these fields. However, he/she must have more than a superficial understanding. The coordinator must be able to measure the environment, recognise unsafe conditions, know chemical properties, gather relevant statistics and obtain other pertinent material which is necessary if he/she is to be effective in promoting safe working conditions.

The diploma comprises five core papers:

(i) Safety Management: Toxicology — ventilation — air pollution — fire — radiation — corrosion — specific hazards (noise, vibration, static electricity, cryogenic liquids, LPG and CNG) — explosive hazards — ergonomics.

(ii) Safety Resources Policy and Control: Statistical methods used in safety analysis — hazard analysis — cost effectiveness studies — safety budget.

(iii) Organisational Behaviour: Motivation theory — work related stess — job satisfaction — quality of working life — future of work — individual differences.

(iv) Industrial Relations: Human behaviour in collective systems — bargaining — industrial conflict — comparative systems — economic and legal factors — New Zealand industrial relations environment.

(v) Project in Safety Management: A project is carried out in the work situation which combines theory with practice. This project provides students with an opportunity to carry out a major analysis in an organisational setting.

To complete the diploma one of the following electives must be selected:

Contemporary and Emergent Practices in Personnel Management;
Training and Development Management;
Communication Management;
Production Management;
Special Topic in Safety Management;
Ergonomic Aspects in Safety Management.

The diploma is a postgraduate qualification and study for it can be pursued either internally or extramurally.

FUTURE

With the development of our newly found energy sources, we can look forward to major developments in our secondary industries. With these developments, bigger and more efficient processes will result which in turn will lead to greater energy transfers, which can lead to potentially hazardous situations if proper design criteria and hazard techniques are not fully understood or practiced.

Techniques such a fault tree analysis, hazard analysis, critical incident recall, emergency planning procedures and a host of others, must be taught to and understood by those whose responsibility it is for the safe design and operation of our indusrial hardware. The Massey Diploma in Safety Management fills a gap which has existed in our traditional training of engineers and scientists.

Douglas Hay is a senior lecturer in safety management at Massey University and holds a BSc (Chemistry); BE (Chemical Engineering); MSc (Industrial Safety) (Imperial College, University of London); D.I.C. The latter two were awarded with distinction.

His industrial experience was with Reid Rubber, Auckland; DSIR — Pottery and Ceramics Research Association as a research engineer; Tasman Vaccine Laboratories as plant chemical engineer; and the Central Institute of Technology as tutor.

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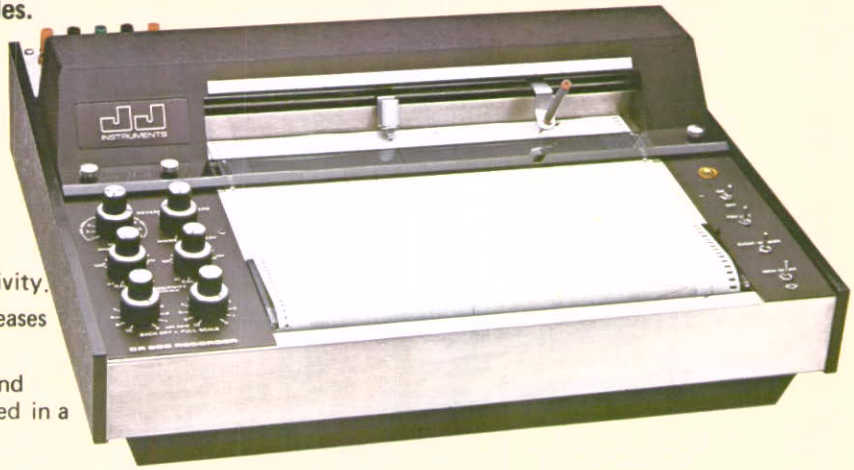

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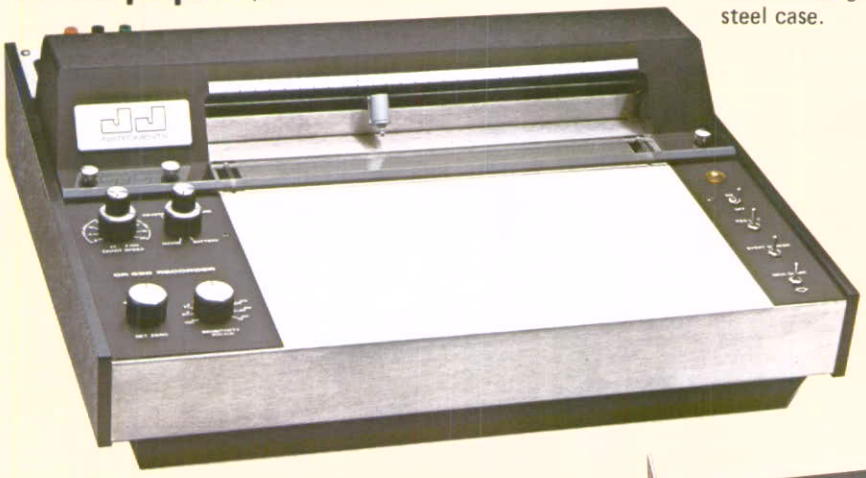

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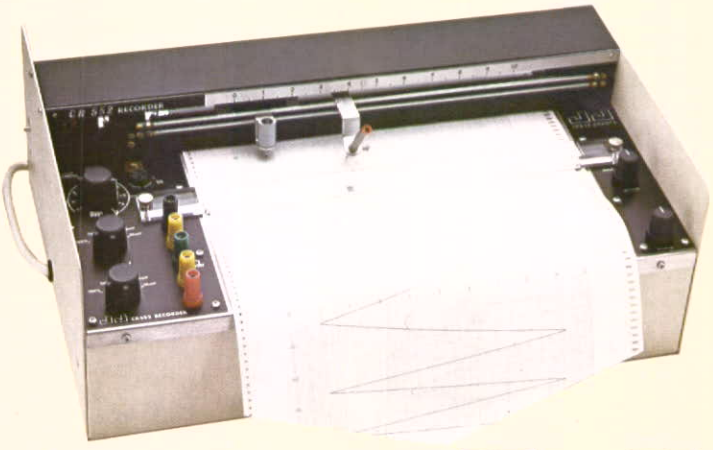

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NEW NZIC PRESIDENT

Dr D E Wright, assistant director of the Agricultural Research Division, Ministry of Agriculture and Fisheries is now president of the Institute.

He was educated at Wellington College and Otago University graduating MSc with 1st class Honours in Chemistry in 1954, PhD in Biochemistry in 1958 and DSc in 1982.

Doug Wright's first position was biochemist at Wallaceville Animal Research Station studying trace element deficiency diseases in sheep. In 1955 he was appointed to the NZ Defence Science Corps and was seconded for PhD studies on microbial biochemistry in the Otago Medical School, followed by two years at the then Plant Chemistry Division, DSIR, Palmerston North.

During 1960-61 he held a US National Science Foundation Fellowship at McGill-Montreal General Hospital Research Institute, Canada studying the biochemistry of herbicides. In 1961 he joined the staff of Lincoln College as senior lecturer in biochemistry.

He was appointed at Ruakura Animal Research Station in 1964, where he was in charge of the Biochemistry Section investigating nutrition and disease problems of livestock. The award of a US Public Health Service International Post-doctoral fellowship in 1965 provided the opportunity to study microbial amino acid metabolism at the University of California, Davis.

In 1972, he worked for the United Nations Development Programme at the Indian National Dairy Research Institute teaching radio-isotope techniques in animal nutrition.

Over a five year period from 1975 he was a member of an International Atomic Energy Agency Panel on water requirements of tropical livestock and became involved with research projects in Asia and Africa.

Doug Wright was appointed in 1978 to his present position in Wellington and is responsible for co-ordinating animal research in the Ministry of Agriculture and Fisheries. He is currently a member of the NRAC Energy and Environment Committee, Council of the Royal Society of NZ, Council of the Nutrition Society of NZ, and the Executive of the Wool Research Organisation of NZ.

Dr Wright and his wife Sue, who is a member of the Secretariat of the NRAC, have five children and share common interests in science, sport, music and gardening. As a student in Otago, he was prominent in national sport representing the province in tennis and table tennis and winning university titles and blues. This interest continues through participation in veterans tennis.

MEMBERSHIP ELECTIONS

The following were elected during the August council meeting:

Fellows: Clark, George Raymond PhD (Auck) Chemistry Dept, University of Auckland (senior lecturer); Jamieson, Robert Graham MSc (NZ) Wool Research Org. of NZ Lincoln (section head, wet processing); Myers, Donald Burton BSc PhD (UCLA) Wellcome Research Institute, Medical School, Dunedin (senior research officer).

Members: Axon, Barry William MSc PhD (Auck) Chemistry Divn. DSIR, Auckland (scientist); Bowden, Danny Newton BSc Meremere Power Station, Meremere (station chemical officer); Buchanan, Mrs. Hilaire BSc (Hons) (Otago) W. Gregg & Co Dunedin (Supervisor, R & D); Choong, Yee Soon MSc PhD (Otago) Dept. of Surgery, Medical School, Dunedin (research biochemist); Cowan, Donald Arthur MSc D Phil (Waikato) School of Science, University of Waikato (post-doctoral fellow); Gibson, Leslie Paul BSc Cadbury Schweppes Hudson Ltd, Dunedin (chemist); Hanton, Lyall Robert BSc (Hons) (Otago) PhD (Cantab) Chemistry Dept. University of Otago (lecturer); Indyk, Harvey PhD (Liverpool) N.Z. Co-op Dairy., Hamilton (research chemist); Low, Seng Chuan MSc DipSci (Otago) The laboratory, TML Group, Nelson (analytical chemist); MacGibbon, Alastair Kenneth John BSc (Hons) PhD (Massey) Dept. of Chem/Biochem/Biophys Massey University (research officer); McKee, Edith Victoria Ann BSc (Hons) PhD (Queens) Chemistry Dept., University of Canterbury (lecturer); Mansfield, Brian Charles BSc (Hons) (Cantuar) Biochemistry Dept. University of Otago. (PhD student); Oliver, Kenneth John MSc (Auck) Auckland Technical Institute (tutor); Palmer, Brian Desmond MSc PhD (Auck) Dept. of Chemistry, Imperial College of London (post-doctoral fellow); Samundsen, Miss Jeannette Aslaug BSc (Hons) (Reading) Faculty of Home Science, University of Otago (lecturer); Vickers, Murray MSc (Well) D Phil (Waikato) Chemistry Dept. University of Otago (scientific officer); Watts, Colin BSc (Hons) PhD (Glasgow) Dept of Clinical Biochemistry, Otago University (assoc. prof).

Graduate Members to Members: Bettany, Bruce Lindsay MSc (Auck) Chemistry Divn. DISR, Auckland (scientist); Carroll, Neil Stephen BSc (Hons) (Well) Dept. of Pharmacy, CIT, Upper Hutt (tutor); Denton, Gerard Martin BSc St John's College, Hamilton (teacher); Jackson, Mrs Janet Mary BE Chem (Hons) Cantuar) NZ Refining Co Ltd, Whangarei (control lab supervisor); Johnson, Mrs Barbara Isobel BSc (Hons) (Otago) Tasman Pulp & Paper Co, Kawerau (process chemist); Morton, James David MSc (Otago) Biochemistry Dept., Lincoln College (PhD student); Petersen, Melvin John MSc (Massey) MAF Dairy Divn. Mt Maunganui (scientist); Provan, William George BSc DipSci (Otago) Ravensdown Fertiliser Co-op Dunedin (production supervisor); Tan Seow Yong MSc (Cantuar) Kenso Corporation, Kuala Lumpur, Malaysia (quality control, R & D chemist); Tree, Philip James BSc (Hons) (Cantuar) Christchurch Teachers' College (student teacher).

Graduate Members: Chittenden, Anne Maree BSc (Hons) (Cantuar) Unilever NZ Ltd, Petone (chemist); Deva, Manher Maxim MSc DipSci (Otago) Chemistry Dept. University of Otago (student); Fokuo, Yaw Dwomo MPharm. (Ghana) Dept. of Pharmacy, University of Otago (PhD student); Hubbard, Michael James BDS Biochemistry Dept, University of Otago (PhD student); Kear, Martin John BSc Ruakura Agric. Research Centre, Hamilton (scientist); Patel, Vinod MSc (Bombay) B.P. Chemicals Ltd Lower Hutt (chemist); Roxburgh, Ulrich BSc Chemistry Dept., University of Auckland (student); Stewart, Miss Georgina Marjorie MSc (Auck) Chemistry Dept, University of Auckland (PhD student); Young, Mrs Margaret Dora BSc (Hons) (Otago) Southland Co-op Phosphate Co Invercargill (technician, quality control); Vintiner, Miss Susan Kathleen BSc (Hons) (Well) Chem Divn DSIR Petone (scientist)

Associate to Member: Ross, Kenneth John NZCS ICI Tasman Ltd Upper Hutt (supervisor, chemical quality control).

Technician Member to Graduate Member: Hawke, David John BSc Zoology Dept. University of Otago (MSc student).

Associate Members: Amarasinghe, Herbert BSc (Sri Lanka) Meremere Power Station, South Auckland (chemical officer); Brabant, Christopher Selwyn NZCS Ciba-Geigy NZ Ltd, Auckland (production chemist); Kistemaker, Anne Christine NZCS Chemistry Divn. DSIR, Auckland (technician); McCarthy, Mrs Kim Elizabeth NZCS Chemical Cleaning Ltd, Mt Maunganui (chemist); Murray, Miss Lyn

COUNCIL NEWS

Vivienne NZCS Chemistry Divn DSIR. Auckland (technician); Stevenson, Leonard Charles NZCS Ruakura ARC Hamilton (technical officer); Thomas, Wayne Ashley NZCS BP Chemicals NZ Ltd Petone (devel chemist).
Technician Member to Associate Member: Thompson, John Christopher NZCS Chemtest Laboratories, Papatoetoe (consultant).

Deaths: J.W. McChesney (Otago), C. Mooyman (Canterbury) D.F. Waters Hon Fellow (Waikato), H.G. Woolman (Auckland).
Life Membership: H. Bloom (overseas) L.W. Bruce (Wellington), D.W. Lockhart (Otago), R.U. Roy (Canterbury), Mrs M.D. Turner (Wellington), Mrs E.M. Simpson (Otago).
Resignations: M.J. Bridgman (Auckland), K.M. Chapmen (Manawatu) B.S. Dawson (Canterbury), B.J. Fergus (Auckland), J. Heron (Auckland), A.N. Jacobson (Otago) D.G. Palmer (Waikato), J.G. Thompson (Auckland), J.M. Thorp (Wellington) M.J. Vuicich (overseas) R.L. Walbridge (Auckland), W.I. Whitton (overseas), P.D. Wilson (Wellington), T.E. Yates (Manawatu) M.S. Reid (overseas), L.P. Gregory (Canterbury).

BRANCH NEWS

Auckland

The president, *Dr Stan Simpson* gave his address to the July meeting of the branch. This was on the topic Modern Transmutation — A Search for the Golden Fleece and has been previously reported in the notes from other branches.

A further luncheon meeting was held in August, at the ATI training restaurant. After the lunch, *Dr Michael Kingsford*, recently appointed government analyst, Auckland, gave an address entitled The Thoughts of Chairman Mike. Given the overall tenor of his presentation, a more ecclesiastical title may have been appropriate. However the audience were treated to an enjoyable talk in which the duties of the government analyst and the work of Chemistry Division were described.

Dr Kingsford also commented on some areas of public responsibility in which the institute might usefully become involved. In particular this included consideration of the rights of expert witnesses in judicial proceedings.

Waikato

The next NZIC Conference will be held in Hamilton, August 22 to 26 1983. Organisation is proceeding with a committee headed by the following: *Dr P T Holland* (chairman), *Dr C Devine* (secretary), *Dr J Watkinson* (treasurer).

Joint sessions will be held with the Soil Science Society and the Biochemical Society. Symposia are being considered in the areas of science education, spectroscopy, science information, fermentation and high quality protein production and quality control in analytical chemistry. Comments and suggestions on these themes and for possible visiting speakers are being gratefully received.

Manawatu

Dr W S (Bill) Hancock (Department of Chemistry, Biochemistry and Biophysics, Massey University) delivered the branch's annual addresses to sixth and seventh form students in Hastings and in Palmerston North. These addresses were entitled Protein Chemistry — an important training for careers in both medicine and agriculture. Three main areas of research that Dr Hancock discussed were: Insulin, its importance in medicine, its chemical structure, differences between insulin from different species and the chemical principles involved in converting porcine insulin to human insulin; the three — dimensional structure of proteins such as myoglobin and ribonuclease showing, by means of a computer graphics film, the active sites and areas of hydrophobic and hydrophilic residues: and the structure of lipoproteins and their role in the deposition of fatty material on the walls of blood vessels which can lead eventually to a stroke or heart attack.

At the Palmerston North meeting the chairman, *Ramsey Southward*, presented book tokens to *Miss R B Gillion* and *Miss L R Gowing*, co-winners of the branch's prize for level 300 biochemistry at Massey University. *I S Bell* of Napier was awarded the corresponding Chemistry prize.

The branch still has for sale a few university entrance and bursary chemistry examination books, described on page 95 of the August issue of this Journal.

Wellington

In July members attended a meeting at NZ Industrial Gases, Wellington, where they heard an address covering aspects of gas applications and special gases business and technology.

The August meeting was addressed by *Dr A G Clark*, reader in biochemistry at Victoria University of Wellington. Dr Clark talked about the glutathione S-transferases, a group of remarkably versatile detoxication enzymes. He discussed the current interest in their role in carcinogenesis, intracellular transport of organic anions, and in the development of selectivity in and resistance to pesticides.

Martin Rothbaum won the Wellington branch prize for his exhibit on carbonates and acids entered in the intermediate physical section at the 1982 Science Fair in Wellington.

Canterbury

The July meeting of the Canterbury branch was addressed by NZIC president *Dr Stan Simpson*. He first outlined the activities of council during the year and discussed issues facing the Institute. He then turned to his own field to talk about developments in wool research aimed at overcoming the obstacles of marketing a natural product in the face of competing synthetic materials.

The speaker at the August meeting was *Dr Richard Garland*, a Canterbury graduate who is now technical manager for NZ Pharmaceuticals in Palmerston North. He discussed the development of an economic laboratory scale operation for the isolation of heparin from intestines and the problems faced and overcome in scaling the operation up for commercial purposes.

Otago

In August the branch was invited by the Institution of Professional Engineers to a lecture by *Prof Gedaliah Shelef* who spoke on the topic of Aspects of Surface Water and Ground Water Resource Technologies.

The branch combined with the same group for a luncheon meeting later in the month, at which the speaker was *B M Birch*, the minister of energy, national development and regional development.

The efforts of the conference committee were rewarded by a most successful conference attended by about 180 delegates. Highlights included a session at the MAF Research Station at Invermay, a monoclonal antibody workshop and a specialist lignite symposium.

A special feature was the R E Corbett Symposium at which 10 of *Prof Ted Corbett's* former students presented a series of papers as a special tribute to mark his impending retirement.

On the social side, the conference dinner was of a high standard and those attending were delightfully entertained by *Prof* Cooper's after-dinner talk.

A novel event was a mayoral reception for all delegates in the new Dunedin Civic Centre.

In addition to the conference, a symposium was held on The Regulation of Carbohydrate and Lipid Metabolism. this attracted 15 overseas visitors and 60 participants for two days following the conference.

Auckland

Dr Steven Reithmuller has arrived to take up an appointment as visiting professor in the Chemistry Department. He is currently assoc prof of chemistry at Virginia Military Institute, Lexington, Virginia (not to be confused with several other Lexingtons in USA — he describes it as a small University town — Population 5000). He will be doing research on vibrational spectra of certain gallium compounds, working with *Assoc Prof Michael Taylor*. One of Steve's most interesting assignments was a period working on plasticers for solid fuels used in rocket propulsion at Edwards Air Force Base, California.

Waikato

Dr Brian Nicholson has returned from sabbatical leave at the University of Adelaide, where he was working on transition metal clusters.

Dr Chris Hendy has returned from six months at CNRS, Gif-sur-Yvette, France, where he studied isotopes of carbon and oxygen in deep sea sediments.

Dr Roy Daniels as winner (with *Dr H W Morgan*) of the BP (NZ) Energy Prize, attended the prize giving ceremony of the BP International Energy Prize in London. The event was won by the UK entrant, *Dr R. P. Howson*. While in Europe, Dr Daniels visited a number of laboratories active in the enzyme/energy from biomass area.

Massey

Dr E Minot, Department of Botany and Zoology, has been awarded a three year research contract from DSIR to study mustelid anal compounds as trapping lures. The contract will support research by *Miss K Clapperton*, a post graduate student, into the behaviour of ferrets when they are exposed to these compounds in both laboratory and field study situations. Both Ecology and Chemistry Divisions of the DSIR are also involved in this area of research.

Dr W Ian Axford, recently appointed vice-chancellor of Victoria University, spoke to a recent meeting of the Goethe Society on Science and Education in Germany — An example to follow or avoid?

Previous positions held by Dr Axford include professor of astronomy at Cornell University, professor of physics, applied physics and information science at the University of California, San Diego and director of the Max Planck Society for Aeronomy in Katlenburg — Lindau, West Germany.

His address, covering a wide range of educational topics from kindergarten to university training, examined the structure of the education system in Germany in both historical and current terms. Dr Axford discussed numerous problems that are present in the education system, examples being the time children spend in the classrooms (half day for six days a week) that can cause problems for working parents together with language/culture differences of foreign children and the difficulties that these people face. Finally he described the Max Planck Institutes and research undertaken in the Institute that he directed.

Canterbury

Prof Keith Morgan, University of Lancaster, is currently in the department as a visiting lecturer. He is an organic chemist with particular interests in heterocyclic chemistry and spectroscopic studies of the carbonyl group.

Dr Don House has spent two months at the Institute of Chemistry University of Neuchatel, Neuchatel, Switzerland. He returned in early September.

Canterbury branch chairman *Dr Jim Coxon* is overseas until October on an Erskine Fellowship. he has been visiting universities in USA, UK and Europe and attended the second International Kyoto Conference on New Aspects of Organic Chemistry in August.

Otago

In addition to the appointment of *Prof A D Campbell* to succeed *Prof R E Corbett* as chairman of the Department of Chemistry, he will also be designated Mellor Professor.

Dr Peter Barber attended the Seventh National Convention of the RACI in Canberra from August 22 to 27. At the convention there was a joint symposium between the Chemical Education and Polymer Divisions on The Teaching of Polymer Chemistry.

Prof D A Buckingham was also in Australia during August.

GOVERNMENT DEPARTMENTS

Ruakura

Dr Phillip Poole has returned from a year's study leave at Stanford University where he researched the latest techniques in laser fluorescence spectroscopy.

Dr Patrick Holland attended the 5th IUPAC Congress on Pesticide Chemistry, Kyoto, Japan in early September.

Applied Biochemistry Division, DSIR

Dr Stephan McCrae of NZ Pharmaceuticals, Linton, spoke on New Zealand production and marketing of fine biochemicals, to a divisional seminar entitled From Source to Sink.

He used examples of biochemicals studied and produced by NZPL to show that although many materials have a high "paper" value, their value diminishes considerably when their detailed composition and extraction are taken into account.

Materials, available from numerous animal and vegetable sources, may be processed by either imported or "home grown" technology in solo or joint venture arrangements.

Dr McCrae discussed advantages and disadvantages of each method of processing and selling. He emphasised that the price received for exporting these materials is that of the market place (not a cost plus situation) which can be highly variable, causing a considerable risk for this type of venture. Careful planning of each stage of development, together with realistic integration of all the stages, is necessary for a successful operation.

Dr Max Turner, senior lecturer in soil science at Massey University, recently spoke to DSIR Divisions here on a possible relationship between the elemental composition of herbage and bloat. He discussed the results of his studies with dairy herds in the Waikato which appear to indicate that low pasture sodium levels and the resulting high pasture potassium: sodium ratios are associated with an increase in the occurence of bloat.

Bloat is an important disorder in cattle which, if not controlled, can result in serious economic losses in terms of lowered milk production and cow deaths. Dr Turner suggested that limiting the use of potassium-containing fertilizers may result in a decrease in bloat on some farms.

Mrs Jennie Burrows has been appointed assistant advisory officer in Applied Biochemistry Division of DSIR. *Peter Vlieg* has been transferred from the position of technician to that of scientist in the division. *Stu Shirriffs* recently resigned from the Stores Section of ABD to join the staff of Glaxo Laboratories as chief purchasing officer.

Soil Bureau

Dr Harry Percival gave a seminar at the bureau entitled Soil Solutions, Minerals, and Equilibria, which described the thermodynamic relationships governing the formation, stability and weathering of soil minerals in contact with aqueous media.

Several of the bureau's NZIC members have gone overseas to attend conferences. *Dr Norman Wells*, leader of the Chemistry and Mineralogy Section, attended the International Horticultural Congress in Hamburg, West Germany. He gave a paper on the conflicts between recreational, industrial and horticultural uses of land in Singapore and displayed a poster on the role of sewage sludge in land reclamation areas. He also took in a pre-congress tour of horticultural areas of southern Germany and a post-congress tour of agriculture in Holland.

Dr Jock Churchman attended the Australian Clay Minerals Conference in Adelaide in August, presenting a paper on the reactivity of halloysite towards certain organic chemicals. He also visited the Waite Institute and CSIRO in Adelaide.

Dr Benny Theng has left for Hawaii to give a paper at the Clay Minerals Society Conference on clay mineral-organic chemical interactions. This will be followed by a trip to Houston, Texas, to talk to NASA about the role of clays in the prebiotic synthesis of organic moelcules and to meet with his co-author (*Edward Edelson*) of a book on Clay Catalysis that is in preparation. The latter trip is being jointly funded by the oil company EXXON and NASA.

Wallaceville Animal Research Station (MAF)

Dr John Liddle has taken up a position with the Trace Element Section at the Wallaceville Animal Research Centre, after recently completing his PhD at Massey University. His doctorate studies looked at some of the effects of geothermal effluent dispersal in the Taupo volcanic zone. He has also completed a bachelor of business studies, majoring in computer science. At Wallaceville, he will be involved in research with *Dr K R Millar* on factors that can affect the availability of trace elements to animals.

Institute of Nuclear Sciences

Dave Lowe returned to INS in July, after completing a PhD at the Geophysics Department of the University of Cologne in West Germany. The practical part of the PhD was carried out at the Kernforschungsanlage (nuclear research centre) in Julich, under a German government scholarship and DSIR long-term study award.

The PhD was in the field of trace gas chemistry and related to the cycles of various hydrocarbon species in the biosphere and troposphere. In particular, he developed a technique for measuring the extremely low concentration of formaldehyde present in the clean atmosphere. In New Zealand, he plans to continue his interest in atmospheric chemistry as well as work on various environmental projects associated with the tandem accelerator at INS.

Chemistry Division, Gracefield

New staff at Chemistry Division include *Mrs H Poulson* who is working in the Drugs and Alcohol Section, and *Ms R Webby*, who has joined the Natural Products Section to work on the chemotaxonomy of New Zealand plants.

Chemistry Division, Christchurch

Peter Henschel recently spent three weeks in Australia visiting forensic laboratories.

Dr Lewis Pannell has returned from a two month combined work/holiday trip which included visits to Japan, Hawaii and USA.

Dr Peter Meredith has recently transferred to Chemistry Division after 17 years as assistant director of the Wheat Research Institute (Christchurch). He intends pursuing studies in a wider range of food plants and would be pleased to hear from anyone who feels that further investigation of starches and amylases could be of interest in understanding the ripening, storage, usage or consumer quality of particular foods or vegetables.

CONFERENCES

PHOSPHATES

NZ Fertiliser Manufacturers' Research Association's seventh research symposium entitled *Superphosphates and other phosphate fertilisers*, will be held in Auckland on November 17 and 18. In a series of invited papers, the symposium will discuss the various types of product likely to be considered as sources of fertiliser phosphate for New Zealand agriculture.

Technical areas covered will include, agronomy, production technology, transport and distribution, and economics. Further information from the Symposium Secretary, NZFMRA, PO Box 23-637, Hunters Corner.

GAS CHROMATOGRAPHY COURSE

Following the success of the last three courses which have been attended by over 50 scientists and technicians from throughout New Zealand, a further course on gas chromatography is to be held at Waikato Technical Institute later this year.

The 3½ day course is jointly organised by WTI, the Chromatography Group of the NZIC and the University of Waikato and will be taught by experts in the field.

Topics to be covered include: basic gas chromatography, theory, column selection and packing, detectors, qualitative and quantitative analysis, sample preparation and derivitization and analytical procedures such as head-space analysis and use of capillary columns.

As well as the lecture sessions, there will be an opportunity for hands-on practical work and small groups using modern instrumentation and informal discussions with the tutors are encouraged.

There are still a few places left for the course from November 16 to 19. For further information please contact: Dr W P Judd, Science Department, WTI, Box 982, Hamilton.

INTERNATIONAL CONFERENCE ON FATS

To be held at the University of Auckland, February 13 to 17 1983.

Copies of the third circular, with a list of the papers offered to August 10 1982 and other details are now available from Stan Brooker, Chemistry Department, University of Auckland. A number of New Zealand chemists have already enrolled for the conference.

Since the third circular was printed, Prof H K Mangold of the H P Kaufmann In-

CONFERENCES

stitute for the Biochemistry and Technology of Fats in Munster, Germany has indicated that he will be coming. This is one of the largest research establishments in the world of fats science.

The International Conference on Fats will also include a session on analytical methods to be held on Thursday, February 17. Many distinguished overseas speakers plus New Zealand practitioners will combine in a session of specific interest to all chromatographers.

A reduced registration fee of $40 has been negotiated for that day's attendance. A trade display of analytical instrumentation is also planned for that and the following day.

Further lectures may be presented on the Friday depending on support and speaker availability. All abstracts of papers and enquiries to Stan Brooker.

Design of Water Quality Surveys.

This conference will be held in Hamilton between November 17 to 18. Further information from: the organiser, water survey symposium, Ministry of Works and Development, Private Bag, Hamilton.

IUPAC SPONSORED

Prof Peter Grant, recently appointed secretary of the National Committee for Chemistry has passed on circulars of the following international meetings.

23rd Colloquium Spectroscopicum Internationale, Amsterdam June 26 to July 1, 1983. Contact Conference secretariat 23 CSI, c/o Organisatie Bureau Amsterdam BV, Europaplein, 1078 GZ Amsterdam, the Netherlands.

Ninth International Congress of Heterocyclic Chemistry, Tokyo, August 21 to 26, 1983. Contact Prof Y. Kanaoka, Faculty of Pharmaceutical Sciences, Hokkaido University, Sapporo 060 Japan.

Organometallic Chemistry Directed Toward Organic Sythesis, Dijon, August 28 to September 1, 1983. Contact Prof J. Tirouflet, Universite de Dijon, Boite Postale 138, 21004 Dijon Cedex, France.

Cationic Polymerisation and Related Processes, Ghent, August 30 to September 2, 1983. Contact Prof E. Goethals, Institute Organic Chemistry, University of Ghent, Krijgslaan 281 (S-4) B-9000 Ghent Belgium.

Phosphorus Chemistry, NICE, September 5 to 9, 1983. Contact Pr. Riess, Universite de Nice, Parc Valrose, 06034, Nice Cedex.

Fourier Transform Spectroscopy, Durham, September 5 to 9, 1983. Contact Dr G.W. Chantry, National Physical Laboratory, Teddington, Middlesex TW II OLW, UK.

MANAGEMENT

Two management courses are being offered in Dunedin in November, *Industrial Relations* November 7 to 12 and an *Executive Management Course* November 14 to 19. Contact Alan Geare, P.O. Box 6088 Dunedin.

OBITUARIES

J W McCHESNEY

John William McChesney, "Jock" to all who knew him, died in Dunedin on May 22, 1982. His memory will live on in the minds of his friends, colleagues and former pupils, as one who made a significant contribution to the community in more ways than most of us undertake.

Jock came to Otago University as a university national scholar, after being dux of Southland Boys High School in 1937, to study for a science degree.

War service interrupted his progress — he was in fact in uniform when "capped" BSc — and five years service with the Army Engineers in the Pacific and in Italy followed before he completed his MSc in 1947.

Although Jock became deputy rector of Otago Boys High School in 1967, retiring from that position in 1978, he became a teacher almost by accident.

He had intended after gaining his MSc, to enter the industrial chemistry field, but was still looking for a position in that area when a vacancy as a relieving teacher became available at OBHS. Jock applied, was appointed, found he liked teaching and became a member of the permanent staff, progressing through head of science department to the deputy rectorship.

In his 31 years at OBHS his most satisfying period was his time as head of science. As he said in his retirement reminiscences: "When I started teaching I found the text-books and the syllabus very much out of date and quite out of touch with modern science. I set about trying to improve on what was taught and trying to introduce modern developments. At the same time I tried to rationalise what was being taught into a logical sequence. It was this that lead me into all my involvement with the development of new syllabus programs for the Department of Education and in the writing of textbooks."

This development work involved Jock in membership of various committees, some departmental, some institute, including, inter alia, the Chemistry Regional Syllabus Committee dealing with university entrance etc., the Institute's Examinations Committee, the committee which drew up the regulations and prescriptions for the Laboratory Technicians Certificate, the Department's School Certificate Revision Committee in General Science, PPTA's Chemistry Curriculum Committee (of which he was chairman) and the Department's General Science Revision Committee, which had the task of planning a new continuous science syllabus to be used from Form I to Form IV

A highlight of this period was the award of a Woolf Fisher Travelling Fellowship to attend the Summer School in Chemistry at the University of New South Wales. Four years later, in 1968, Jock was invited to lecture at the same Summer School, and spoke on Curriculum Reform in New Zealand. Few could have been as well qualified to give an address on this topic.

Jock's interests in sport carried on long after his days of active participation were over.

Youth work in the community took its share of Jock's time. For many years an officer in the Boys' Brigade, he was for eight years president of the Otago Battalion and in a similar field served as a member of the Christian Education Committee of the Presbytery of Dunedin. He was also a foundation member of the executive of the Otago Youth Council.

Jock's upbringing in a liberal family, and his interest in people, lead not unnaturally to his tending to the left in politics, and particularly in recent years he became involved in the work of the Labour Party.

He acted as chairman of the Dunedin Central electorate committee and of the Otago Region and since 1978 was regional delegate to the New Zealand Council.

He devoted much attention to the party's organisation and structure, but also offered valuable judgment in matters of policy. Questions of energy, in particular, were of concern to him.

To quote again from his retirement reminiscences: "There is the fact that real inner contentment comes only as the result of striving for excellence in all we do. Without effort, there is no real satisfaction."

By these and any other criteria, Jock's life was a satisfying one. This thought we leave with his wife, Shirley, his son and three daughters.

DWL.

C MOOYMAN

The death occurred recently of Cornelius (Kees) Mooyman, a member of the Canterbury branch committee.

Kees emigrated with his family from Holland in the early 1950s and attended Otago Boys High School prior to completing his BSc at Otago University.

He then had a varied career as an industrial chemist. After working for Unilever both in Petone and Motueka, he moved to Taubmans Paints. He then became South Island representative for A C Hatricks before setting up as a consultant (ISCAR Laboratories) on his own in 1977.

In 1980 he joined forces with Norman Hornby to form M&H Laboratories where he continued consultancy work handling a range of chemical problems.

Aged 43, Kees is survived by his wife and five children.

LETTERS

Dear Sir,

In a brief article (Chem. N.Z. 46, 95 (1982)) on investigations by Dr Ian Gordon, a plant breeder in the Agronomy Department at Massey University, you stated: "The oil in the meadowfoam seeds is essentially the same as that of the jojoba shrub, . . ."

To a lipids chemist this statement is not quite true. While the fatty acid composition of these two oils are quantitatively similar, meadowfoam oil is a triglyceride (like most common seed oils), whereas jojoba oil is a wax ester. This difference in the alcohol moiety may confer special properties on the oils, affecting their eventual use in industry. Monoenoic acids, the principal components from meadowfoam oil, are unusual in having a high percentage of Δ 5 — unsaturation.

Meadowfoam oil can be converted into a wax ester jojoba-like oil. This process involves the production of long chain alcohols and long chain acids from the oil followed by esterification of these derivatives. The resulting wax ester would most probably be more expensive than that obtained from jojoba. On the other hand, I am informed by Dr Gordon that climatically New Zealand is probably ideal for the cultivation of meadowfoam whereas we do not have the rigorous desert conditions for the widespread cultivation of jojoba plants.

I believe that the search for seed oils to supply industry with wax esters is a most worthwhile project to undertake. Marine alternatives to sperm whale oil, such as the oil from orange roughy and related deep-sea fish, are limited by our ignorance of the ecology of these resources with the resultant potential for their overutilisation. A greater control can probably be exercised over land-based resources of fats and oils than over marine sources.

Dr C B Johnson,
Branch Editor,
Manawatu.

Dear Sir,

I am offering the following journals free to a good home: Biochemical Journal Vol. 98-152 (approx) plus Transactions 1-3; Ann Rev Biochem Vol. 1-7, 13 on. Contact L. Kennedy, Applied Biochemistry Division, DSIR, Palmerston North.

Laurie Kennedy.

Dear Sir

Firstly I had intended to comment on the most perceptive editorial article recently where it was stated that "chemists are bores".

Of course they are bores, or should I say "we are bores". And to anyone other than a chemist, chemistry is a boring subject.

But the same can be said about all the other professions as well, be it law, accountancy, architecture, engineering or what have you. Why single out chemists?

I think the main reason is that technical people spend so much time studying that they do not learn to speak well, nor write fluently. And they do not learn history, or absorb culture generally...the things which make conversation interesting.

The business community and the tradespeople and the housewife marooned at home with a family have long since learnt that no one is interested in their uncomplicated occupations and therefore they do something about it. After all, which grocer of your acquaintence would regale you with his problems about baking powder, or the cost of paper bags? And so on.

You are quite right, respected editor. So how about a bit of culture in the journal... lessons on the Queen's English, or non-technical essays, or a non-chemical crossword?

On another topic...salary surveys, ruling rate surveys and so on can be mischievous things. The late (and so far as I am concerned, respeced) John A Lee once said "a plague on the ruling rate survey". It is at once probably the main cause of inflation in this country.

The problem is that salary surveys are just that. They take no account of merit, or diligence, or honesty or loyalty, or written composition, nor all those vital human attributes. They tend to support the anachronism that a university graduate is superior to a NZCS graduate and that the higher the degree the more the employee should be paid. What about running another survey, to look at performance generally. I have set out the type of questions, though how a statistician would turn the results into histograms I would not know.

But even if we received no answers it would do some good, if we quoted the words of Shakespeare "This above all...to thine own self be true. Thou canst not then be false to any man". *Jim Sprott*
Auckland

Dear Sir,

The August 1982 edition of Chemistry In New Zealand includes an article under the heading "The Sceptical Chemist" from an author who chooses to remain anonymous. This person refers to the new Government Stores Board policy of requiring TELARC endorsed test reports relating to products submitted for government purchase. In particular, he/she refers to the GSB policy relating to the purchase of cleaning compounds and detergents.

Without knowing the identity of your correspondent I can only presume that these comments were made from a viewpoint influenced by his or her commercial affiliations and that he or she is not aware of the wider implications of the new Government Stores Board policy.

The following points may help to clarify the situation.

1) Until recently manufacturers wishing to tender for the supply of products under Government Stores Board purchase contracts were required to submit samples of their product prior to tendering. The GSB then sent the samples to the DSIR laboratories where they were tested to ensure compliance with the relevant product specifications. These tests were carried out at public expense.

2) The DSIR has recently amended its charging policies and now charges other government departments for work carried out on their behalf. Accordingly, the Government Stores Board would have been required to pay for the tests carried out on tender samples. In the final analysis the tests would still have been carried out at public expense.

3) In reviewing its procedures the Government Stores Board concluded that it was appropriate that the cost of testing these products for compliance with specification should be borne by the manufacturer of the product and not by the purchaser. Accordingly, under this policy, manufacturers are required to supply the GSB with test reports certifying that their products comply with the relevant specifications.

4) So that they can have some assurance as to the reliability of the test results with which they are presented the Government Stores Board requires tests to be undertaken by TELARC registered laboratories.

5) Manufacturers wishing to tender for Government Stores Board contracts now have the option of seeking registration for their own test facilities or of making use of independent commercial laboratories holding appropriate registration.

Your anonymous correspondence also suggests that the new GSB policy presents a "splendid opportunity for TELARC to get some business" and is also "suspiciously like a case of empire building". It should be noted however, that TELARC is an independent body established to provide a service to the New Zealand community. It is a voluntary scheme, both from the point of view of laboratories seeking registration and from the point of view of laboratory users who specify that they will only accept results from TELARC registered laboratories. If a new sector of the community chooses to avail itself of this service, on a voluntary basis, this can hardly be described as empire building.

Your correspondent also suggests that "the NZIC might well be offended that laboratories staffed by its members have to subject themselves to yet another form of government interference". TELARC registration of a testing laboratory is an indication that the laboratory is operated in a competent, professional manner, that it is appropriately accommodated and equipped and that its staff are appropriately qualified and experienced. The mere fact that the staff of a laboratory hold particular academic qualifications or hold membership of a particular professional body, is not a guarantee of the reliability or competence of their day to day testing work.

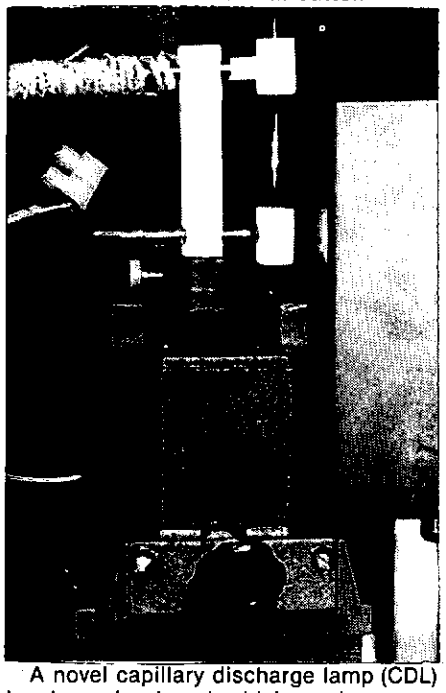
It should be noted that TELARC is not a government department. It is a statutory body, operating under the control of an independent council, which is advised by a series of independent technical committees and serviced by panels of specialist, independent assessors. An assessment of a testing laboratory by Telarc is not a bureaucratic inspection but rather an assessment by the laboratory's peers against criteria defined by its peers. *Malcolm R Bell,*
Deputy Director,
Testing Laboratory,
Registration Council of
New Zealand,
Auckland.

GOLDEN JUBILEE AWARDS

The award winners in the Rocklabs — Prochem 1981 Golden Jubilee competition were announced in the June issue and here the two first prize winning devices are described by their inventors.

Capillary Discharge Lamp for Atomic Absorption Spectroscopy

M D Lowe and M M Sutton



A novel capillary discharge lamp (CDL) has been developed, which can be conveniently used as a spectral source for the determination of relatively volatile elements such as iodine, sulphur, phosphorus, selenium, arsenic and mercury by flame atomic absorption spectroscopy.

Intense spectral lines, with widths suitable for atomic absorption analysis measurements, are produced in an atmospheric pressure helium-element vapour mixture flowing through a quartz capillary discharge tube, containing two niobium wire electrodes connected to a transformer (typical operating conditions 2600 volts, 50 Hz, 22 mA).

The photograph shows the CDL mounted on a transverse and vertical slide assembly. Optimum quantities of element vapour are produced in a heated helium inlet tube containing the element, or a compound of the element (nichrome wire heater, 12 volts, 0-4 amps DC).

The principal atomic resonance lines of the halogens and several non-metallic elements occur at wavelengths less than 200 nm (vacuum ultra-violet region). It is necessary, therefore, to purge the optical path of the whole spectrometer system with argon to exclude air, since molecular oxygen can strongly attenuate spectral readings below 200 nm.

Absorbance-concentration relationships, together with analytical sensitivities and detection limits, have been obtained using the CDL with both unshielded and argon-shielded air-acetylene and nitrous oxide-acetylene flames.

These results indicate that the analytical performance of the simple, inexpensive and versatile CDL compares very favourably with that of both experimental and commercial hollow cathode lamps and electrodeless discharge lamps.

The CDL has been selected for patenting by the Development Finance Corporation.

Gradient Mixer

A G Clark, J Gellen and D Thompson

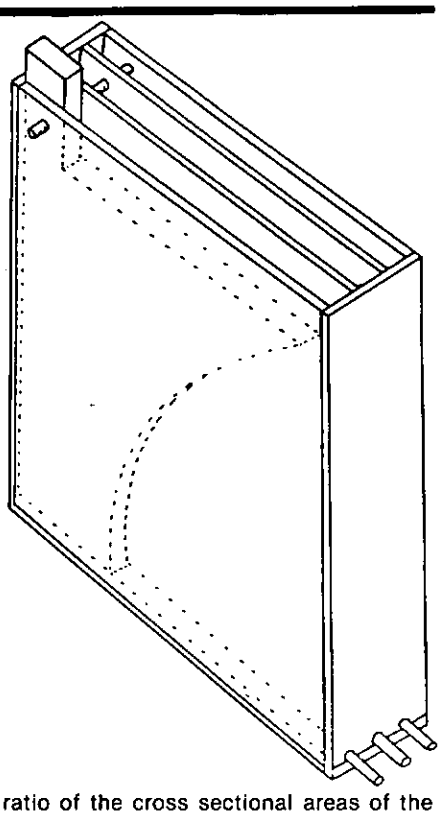
Gradient mixers are types of apparatus which generate a stream of liquid, the composition of which is a specified function of the volume produced. They are commonly used in biochemical laboratories for a variety of purposes including various types of chromatography.

The commonest form involves the production of liquid from a system of reservoirs at hydrostatic equilibrium in such a fashion that a controlled mixing of the liquids from the reservoirs takes place. In the simplest instances, it is difficult to generate gradients of other than linear or exponential types. Furthermore, these simple types of apparatus do not tolerate substantial differences in density in the liquids to be mixed.

The mixer shown represents an attempt to design a simple apparatus that would avoid the defects discussed above. It consists of a number of reservoirs (in this case three) containing the liquids to be mixed. The reservoirs are connected through a mixing manifold and are thus in hydrostatic equilibrium.

Unlike commercially available apparatus, the reservoirs are rectangular rather than circular in cross section and their cross sectional area is modified by the presence of carefully shaped inserts. One insert is shown in place in the illustration.

At any stage, liquid released from the apparatus will consist of a mixture of the solutions from the reservoirs, mixed in the



ratio of the cross sectional areas of the reservoirs at that point.

The gradient generated is thus controlled by the use of suitably shaped inserts, which may be changed as required. A specified shape of gradient may be generated from solutions having marked density differences provided that the inserts used are formed appropriately.

The positive features of this design of mixer are very low cost combined with compactness, generally good reproducibility, the ability to mix several solutions and a degree of flexibility that is realised with only a modest amount of effort. It should also be self-correcting, returning to the desired gradient shape after a temporary disturbance.

The disadvantages are a tendency towards distortion and lowered reproducibility at gradient extremes due to capillary effects. These effects will be less important the greater the dimensions of the apparatus and for gradients of a total volume greater than about two litre, they should not be significant. The fact that the shape of gradient may not be varied instantly at will may also be seen as a disadvantage.

No patent proceedings have been initiated.

GENERAL NEWS

CHEMEX '82 IN DECEMBER

Chemex '82 an exhibition for the chemical industry to promote high technology, will be held between December 7 and 9 this year at the Auckland Showgrounds.

Organisers say exhibitor bookings have been excellent and every effort is being made to ensure that the most up to date equipment and technology will be seen at Chemex '82, the first exhibition of its kind in the country.

Already scheduled for display are raw materials, pumps and valves, laboratory equipment, tanks and containers, water treatement systems, microprocessor controls, electronics and instrumentation, insultation, processing machienry, control and gauging equipment, static displays and other related equipment.

More processing of the country's raw materials and increasing use of chemicals for those processes, has created a demand for better equipment and more technology. The exhibition will offer industry an opportunity to see and evaluate equipment and technology designed to improve production and quality control.

COMPANIES SET UP IN NEW ZEALAND

Two overseas scientific instrument manufacturers have recently decided to establish their own offices in this country.

Both were previously represented in this Country by New Zealand firms, Perkin-Elmer has set up a base in Lower Hutt and Beckman Instruments is now working out of Auckland. Their repective address are: Perkin-Elmer, Box 30651, Lower Hutt and Beckman Instruments, Box 8680, Symonds St, Auckland.

NZFF BUYS INTO AUSTRALIAN FIRM

The New Zealand Farmers' Fertilizer Co expects to win a greater share of the local agricultural chemicals market following its purchase of a 65 per cent interest in Nufarm Chemicals Pty of Australia.

Nufarm is a private company with issued capital of $A400,000. It has its headquarters at Laverton North, Melbourne and distribution outlets and marketing staff in each state. It is the fourth largest manufacturer in Australia of agricultural chemicals.

New Zealand Farmers' Fertilizer paid nearly $6 million in cash for its 65 per cent shareholding. The remaining 35 per cent is held mainly by directors and staff of Nufarm.

Before the New Zealand Farmers' Fertilizer move, 60 per cent of Nufarm was held mainly by directors and staff and 40 per cent by the Shell Company. With Shell's involvement in the Australian agricultural chemicals market this year becoming greatly reduced, it was anxious to shed its interest in Nufarm.

Commenting on the move, New Zealand Farmers' Fertilizer's managing director, Peter Riddell, said that while the company did not expect the New Zealand market in agricultural chemicals to expand greatly, he was confident the company's share would increase. At present, it had about nine per cent of the total New Zealand market worth about $70 million annually.

In Australia, Nufarm has an 11 per cent share of the A$270 million a year agricultural chemicals market. It also markets a fairly extensive range of its own manufactured industrial chemical products. New Zealand Farmers' Fertilizer sees major growth possibilities in the industrial chemicals field.

Benefits to New Zealand Farmers' Fertilizer operations in New Zealand include the marketing of Nufarm products in this country and using the Nufarm marketing system in Australia for New Zealand Farmers' Fertilizer products being manufactured at the company's newly completed $2.6 million complex at Otahuhu. Both companies also expect to benefit by combining their exporting efforts to Pacific basin countries.

The Nufarm name is to be retained and the present general manager is to become managing director. He will report to a six man board of directors comprising three from New Zealand Farmers' Fertilizer and three from Australia.

NEW NZOQA PRESIDENT

A senior executive from the meat industry has for the first time become president of the New Zealand Organisation for Quality Assurance.

He is Graeme Keeley, manager of scientific services for the Canterbury Frozen Meat Co, based in Christchurch. He was elected president at the annual conference in Auckland, Graeme has had wide experience in the fields of meat and by-product processing technology and has a thorough knowledge of the strict overseas quality standards imposed by countries importing New Zealand meat.

A graduate of Canterbury University, Graeme is a fellow of the NZIC, a member of the NZ Institute of Food Science and Technology and has been an active member of NZOQA since 1978.

Some of the key issues with which he will be involved are: the setting up of a quality assurance assessment council; joint manufacturing standards arising out of closer economic relationships with Australia; the ability of New Zealand firms to undertake big engineering projects and the training and selection of skilled staff; continuing assistance for manufacturers and exporters.

The NZOQA is a non profit making incorporate society whose aim is improved "quality awareness" in the design, manufacture, processing and servicing of New Zealand made goods and services for domestic and export markets.

Since its inception in 1977, the organisation has grown to have over 700 companies, organisations and individuals as members, covering a wide spectrum of industry.

NEW DSIR PUBLICATION

The Department of Scientific and industrial Research has produced a serial publication of its bilbiographic database SIRIS.

Its scope is all scientific material published in or about New Zealand and material published overseas by New Zealand scientists. The first volume was published in February 1982.

Initially, New Zealand Science Abstracts will appear annually, but ultimately it will be produced quarterly. The first issue contains only abstracts of documents published in 1980 by DSIR or by DSIR authors, but the department would like to expand this coverage by including the publications of other public and private institutions and societies.

Subscriptions to the Abstracts are now open at $10 per copy, plus postage.

OCCUPATIONAL HYGIENE SPECIALIST GROUP

If sufficient support is forthcoming it is proposed to form a specialist group in occupational hygiene — the science of the recognition, evaluation, and control of health hazards arising out of or during the course of employment.

Prospective members of such a group could be working in the fields of analytical, environmental or clinical chemistry, toxicology, industrial safety and accident prevention, ventilation engineering and possibly occupational medicine, although it is intended that the group has a scientific rather than medical orientation. Members working in industry will be particularly welcome.

The group is intended to be a relatively informal one, to establish and maintain contacts among widely scattered people with related interests.

Planning will be intially directed towards a meeting at the NZIC conference at Hamilton in 1983 and some participation in the program.

Any interested persons (who do not have to be members of the Institute of Chemistry) are asked to contact Dr R. V. Winchester, Northern Regional Occupational Health Unit, Department of Health, P.O. Box 5442, Auckland, Phone 792-900, Ext 832.

INSTITUTE PRIZES

The following prize winners were announced during the August conference.

Easterfield Award: Dr R H Newman, Chemistry Divison DSIR, Petone.

ICI Prize: Assoc Prof D J McLennan, Chemistry Dept, Auckland University.

Shell Industrial Chemistry Prize: Dr D H Buisson, Fish Processing Research Group, DSIR, Auckland.

Chemical Essay Prize: A R Whyte, Chemistry Dept, University of Canterbury.

Student Paper Prize: K R Sharrock, Waikato University.

CATALYST IN DISPUTE

A platinum and rhenium containing catalyst was the cause of a high court dispute between NZ Refining and the Inland Revenue Department.

The catalyst was bought for Marsden Point in 1973 at a cost of $870,272 and NZ Refining claimed an investment allowance, which allowed them to deduct 130 per cent of the cost of the asset.

The catalyst was replaced in mid 1980 because of deactivation by carbon deposits and was sold for nearly $1.2 million.

Inland Revenue claimed that the catalyst cost was not a capital cost and was therefore not eligible for the investment allowance. It was ruled that the catalyst met the requirement of "permanence" and "was held to be plant for tax purposes".

AIDD ANALYTICAL DIRECTORY

The DSIR's Auckland Industrial Development Division has published a 16 page Directory of Analytical Chemistry Facilities aimed mainly at users int he northern region of the North Island.

The directory lists laboratories (including TELARC registered) which are capable of undertaking analysis of a chemical and biochemical nature.

Copies can be obtained from the Industrial Development Division, in Auckland.

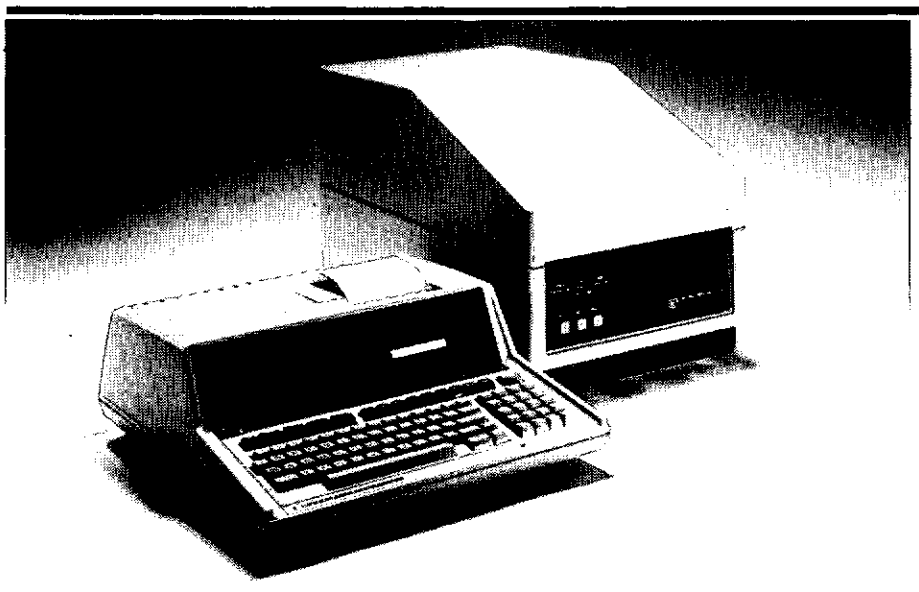
2,4,5-T REPORT

The Royal Society of New Zealand has available a report on the herbicide 2,4,5,-T which it hopes will be comprehensible to a wide public.

The report is a synopsis by the late Prof B F Cain of three presentations to the annual meeting of the Fellows of the Royal Society of NZ in May 1980.

The presenters, experts in the fields of chemistry pharmacology and human genetics were Prof E G McQueen, I R C McDonald and Dr D M O Becroft.

The price of $2 includes postage from the Royal Society of NZ, Private Bag, Wellington.



HIGH SPEED DETECTOR FOR HPLC

The Hewlett-Packard Company has introduced the HP 1040A high-speed spectrophotometric detector system.

This new stand alone detector uses the combined benefits of chromatography and spectroscopy simultaneously for fast peak identification and confirmation.

A linear photodiode array and high-speed computer network provide fast, data-acquisition capability for multiple-signal, chromatographic data output and permit spectral scanning at any time during the analysis run without loss of chromatographic data.

Because of its spectrophotometric characteristics, the HP 1040A detector is useful in chemical separations of components that absorb in the ultraviolet or visible spectrum. Markets for these applications include industrial, pharmaceutical and environmental.

In addition to the detector mainframe that houses the optics, data-acquisition and processing electronics, the HP 1040A includes the HP-85 personal computer as the system controller and user interface.

The system uses a photodiode array made up of a series of light-sensitive cells etched onto a silicon chip. Arranged in a row, these 200 discrete wavelength detectors work in parallel, simultaneously monitoring all wavelengths over a range of 190-600nm.

Spectral data from the photodiode array is processed by the mainframe's two microprocessors and delivered to the HP-85 computer for storage and/or display.

The HP 1040A permits chromatographic analysis at eight independent wavelengths simultaneously. Signals can be configured for the desired wavelength and bandwidth.

Two microprocessors control and monitor the linear photodiode array, providing final data to the HP-85 personal computer. A single data point can be processed by the HP 1040A within 40 microseconds.

The New Zealand distributors is Northrop Instruments & Systems, Wellington.

CAST IRON MOTOR RANGE

Several advanced designs for cast iron motors have evolved from British maker Crompton Parkinson through models developed over many decades in the most demanding process industries.

One is the new Argus with a high integrity specification and high seal enclosure. It is said to run quietly due to a special fan design and efficient electrics.

The Series 7 range which includes a totally enclosed model with hollow rib steel construction for frames 225 and above. Below frame 225, construction is cast iron. These units all maximise output for a given frame size and offer exceptional efficiency.

The durability of cast iron allows maintenance to be planned in advance. Different basic designs cover every need: energy efficiency, high output, versatile mounting and normal. High seal cast iron models are as impervious as any motors made.

In New Zealand, cast iron motors are made by A. & T. Burt up to 45 kW. Normally stocks extend to 132 kW with larger sizes available on indent.

OHMART'S LEVEL MEASUREMENT SYSTEM

The Ohmart Corporation has introduced a new non contact level measurement system designed to provide level data from as many as 16 remote installations simulataneously.

It consists of a series of source detector units available in models with either one radiation beam, or two directed in opposite directions for measurement of adjacent bins, as well as a central processor module that receives and records signal input data from the remote units.

Ohmart's Levelart Multi/1500 System is said to be ideally suited for application to electrostatic precipitator fly ash collection hoppers, either for application to new equipment or for retrofitting to existing hoppers.

It can also be used in such industries as pharmaceuticals, food, steel, chemical processing, power plants generating steam from coal, or wherever several hoppers are used and multiple level measurements are required.

Ohmart is represented in New Zealand by W. Arthur Fisher, Auckland.

NEW SERIES OF CAPILLARY COLUMNS

A new series of cross linked fused silica capillary columns for improved column-to-column reproducibility, resolution and retention characteristics has been introduced by the Hewlett-Packard Company.

Other benefits such as the elimination of spontaneous column breakage, a highly inert inner-column surface, a wide dynamic temperature range and rinsability, are said to increase the operating efficiency of the total chromatographic system.

As a result of using qualified stationary phases and a special cross-linking process, HP's capillary columns provide consistent reproducible qualitative data, column to column and lab to lab.

Both methyl silicone and phenylmethyl silicone columns have retention indices that vary less than ±0.5 units for the following three compounds: methyl caprate, n-dodecanol and acenaphthylene.

Closely controlled silicone film thickness gives a capacity range of ±0.2 units column, which is equivalent to a ±3 per cent maximum variation in thickness. This allows easier duplication of methods on different columns.

Narrowbore columns (0.2mm ID) have a minimum efficiency of 4,600 plates per meter for standard 0.17 μ m film thickness and 4,200 plates per meter for thin 0.11μm film thickness. Widebore columns (0.31mm ID) have a minimum efficiency of 3,000 plates per meter for thick 0.52 μ m film and 2,800 plates per meter for the standard 0.17 μ m film.

To optimize column performance, HP's cross linked columns are prepared from fused-silicone tubing deactivated with polysiloxane at 400°C and tested for adsorption using polar organic compounds.

The cross linking technique extends the subzero range of the silicones and decreases column bleed at high temperatures to give an operating range of -60°C to 350°C. Columns are tested for bleed at 325°C to ensure less drift in temperature-programmed GC runs and less background in GC/MS analyses.

With a basket design and a polyimide exterior coating optimized for each tubing diameter, the loss of columns due to spontaneous breakage is claimed to have been virtually eliminated.

When the quality of the chromatographic analysis deteriorates from column deposits, HP cross linked capillary columns can be rinsed with hydrocarbon or methylene chloride solvents which often restore the original column performance.

Two cross linked phases are available in several lengths, film thicknesses and internal diameters.

Further information through Northrop Instruments and Systems in Wellington.

NICOLET'S COMPLETE FT-IR RANGE

Watson Victor is the New Zealand agent for the Nicolet Fourier Transform infrared spectrophotometers.

Nicolet offers a complete line of FT-IR instruments, ranging from spectrometers for routine analyses to the most sophisticated research systems at prices from the most economical.

The interferometers used throughout the product line involve only a single moving part.

Each instrument is complete with its own computerised data system for spectrometer control and data manipulation.

All systems provide automatic ratio recording and storage of multiple spectra. Full plotting flexibility is supported by each instrument. Spectral subtraction capabilities for solvent elimination and trace contaminant analysis are standard on all systems.

Nicolet also claims the FT-IR cuts down errors on highly absorbing samples because there is no stray light. It possesses constant resolution and there is no tracking error. Nicolet uses a laser reference for wavelength accuracy.

The company also says the FT-IR has a higher energy use: conventional IR loses half its energy due to the double beam nature of the operation and most conventional ones use the optical null principle. The higher the absorption of the sample or solvent, the lower the energy.

Fully developed library-search capabilities provide a quick means of identifying samples.

The photograph shows Nicolet's new 5MX Infrared Spectrophotometer which is said to be within the budget of many quality control laboratories and smaller facilities.

Nicolet says the 5MX provides all the advantages of FT-IR but at a price comparable to dispersive IR.

It provides 4 cm^{-1} resolution over the entire measured range of 4800-400cm^{-1} and can measure a complete scan once every second.

It is said this produces a much faster turnaround and higher analytical productivity.

HEWLETT-PACKARD'S NEW DETECTOR

A new, stand alone gas chromatographic detector for specific and selective sample component identification has been announced by the Hewlett-Packard Company.

Designated the HP 5970A mass selective detector (MSD), this system interfaces with most capillary gas chromatographs. The HP 5970A, which employs advances in analytical instrument technology and methods development, is said to provide practical answers for the gas-chromatograph (GC) user who needs fast, low cost sample indentification.

Used specifically in capillary gas chromatography, the HP 5070A makes chemical analyses in such areas as methods development for confirmation of target compound identity, drug analyses and STAT identification in overdose cases. It also aids in pesticide analyses, where the HP 5090A is said to provide specificity comparable to, or better than, data obtained with nitrogen-phosphorus, flame photometric and electron capture detectors.

Providing the chemist both qualitative and quantitative information about the sample, the HP 5970A adds the capability of mass-selective detection to the GC.

It confirms the presence of an analyte through spectral acquisition when used in qualitative analyses. And with the advantage of its selected-ion-monitoring (SIM) software, it monitors up to six ions with a high degree of specificity.

The HP 5970A MSD system is supplied in two compact modules.

Attachable to either the right or the left side of the GC, the detector module houses the hyperbolic quadrupole mass analyzer, an air-cooled turbo-molecular pump and other related hardware. In addition, the module is easy to maintain and requires no special utilities for operation.

The second, or controller module, includes an HP 9825B computer controller mounted with an HP 2671/G graphics printer.

Standard with the HP 5970A MSD system is software for spectral-data acquisition during a GC analysis, SIM and internal diagnostics, as well as software to allow users to design and input custom programs.

Further information from Northrop Instruments and Systems, Wellington.

HIGH-PRECISION MICRO PIPETTERS

High precision digital (adjustable) micro-pipetters developed by a British firm are claimed to virtually eliminate the problem of inaccurate metering causing by expansion of delicate internal components due to the transfer of heat from the operator's hand.

This problem is particularly acute when pipetters are handled continuously over long periods while measuring/dispensing small quantities of liquids repetively.

Called Volac, the pipetters are available in five sizes accommodating between them, volumes ranging from 5 microlitres to 5 ml. All are designed for one-hand operation and incorporate stainless steel pistons with PTFE seals to ensure efficient lubrication free operation and a long service life with little maintenance. The factory sealed upper body incorporating the handle is of glass-filled polypropylene, a material which offers a low expansion coefficient when exposed to heat, in addition to strength and resistance to chemicals. The lower body is made of polypropylene and nylon.

Providing the main contribution to the instrument's high precision in dispensing the same volume of liquid repeatedly is a steel expansion-compensating cage which is connected to the piston's stroke-governing mechanism.

A three stage push button projecting from the top of each pipetter controls the whole operating cycle, including automatic ejection of the filling tip from the nozzle whenever necessary.

Tests with the complete range of pipetters have shown precision figures varying between ± 1.5 per cent at 5 microlitres and ± 0.4 per cent at 5000 microlitres.

The manufacturer is John Poulten of Barking Essex and the New Zealand agent is Smith Biolab, Auckland.

SOLID STATE DETECTOR

Rapid, accurate and simple analysis of gas/air ratios are said to be able to be achieved with a lightweight, solid state detector available from the Plant and Equipment Company.

The analyser, manufactured by The Analytical Development Co. in England, is designed to measure the concentration of a heteroatomic gas or vapour in mixture of gases. It is thus able to determine the concentrations in air of carbon monoxide, carbon dioxide, sulphur dioxide, the oxides of nitrogen, organic gases and water vapour.

The carbon dioxide (for instance) in the gas absorbs energy from a hot wire source and so reduces the amount reaching an infra-red detector. An optical filter ensures that the detector responds only to carbon dioxide. Solid state detector unit and electronics ensure that readings remain unaffected by vibration. A sampling pump is fitted within the instrument and sample flow through the analysis cell is shown on a 0.2-1.2 l/min flow indicator on the front panel.

The standard range covers from 0 to 10 per cent while five other optional ranges can also be supplied. Nett weight is six kilograms and prices range from $3400 to $4700 depending upon digital or meter readout and single or dual range.

LOW DENSITY POLYETHYLENE

The CDE-Chimie Group is now marketing a linear low density polyethylene under the name of Lotrex, the result of many years of research which is said to constitute a major innovation.

In some applications, CDF Chimie says it is possible to achieve thickness savings of 10 to 30 per cent and thus a saving of raw materials.

Lotrex's applications include: cold stretch film, packaging of deep frozen products, fruit and vegetables, bag linings, agricultural films (tunnels and mulching).

Prof T N M Waters, recently appointed vice-chancellor of Massey University, was born in New Plymouth in 1931 and went to New Plymouth Boys' High School before coming to Auckland to study at the university. He gained his BSc in 1953, MSc 1954, PhD 1958 and DSc in 1969.

He has a most distinguished academic record. He held UK Atomic Energy Authority Fellowships in 1958 and 1959; he was a visiting scientist in the Chemical Crystallography Laboratory at Oxford in 1964-5 and in the Laboratory of Molecular Biophysics at the same university in 1971-2; he was a visiting scholar at Northwestern University, Illinois in 1976.

He was appointed lecturer in chemistry at Auckland in 1961, associate professor in 1966 and to a personal chair in 1970. This was converted to an established chair this year. To date he has published 110 articles, reviews and papers in international journals, mainly in his chosen field of crystallography, his latest researches including the crystallography of coordination complexes of copper.

His interests in crystallography are shared by his wife, *Assoc Prof Joyce Waters* (nee Thorp) who also has an international reputation as a crystallographer. For his researches in cyrstallography, Neil was elected a Fellow of the Royal Society of NZ this year.

As with several chemists, Prof Waters has shown a flair for administrative work. As well as acting on several university committees, he has been deputy vice chancellor of Auckland since 1979 and has been acting vice chancellor on a number of occasions. He is a member of the University Council and was recently appointed to the University Grants Committee for a four-year term. These achievements have paved the way for his selection as vice chancellor of Massey to take effect from the beginning of 1983.

Perhaps scientists will have best recognised his organizing ability when he masterminded the ANZAAS Congress in Auckland in 1979, which proved most successful, with an attendance of over 4000, making it probably the biggest conference held in New Zealand.

Prof Waters was elected an associate of the NZIC in 1956 and a fellow in 1977. With all his other activities, it is not surprising that he has not been very active in the Institute (though this may come — Manawatu Branch please note!). Joyce is currently doing a useful job on the editorial committee of the Chemistry in New Zealand.

Frank Dorofaeff retired in July after 37 years with the MAF. Frank graduated BSc from the Canterbury University College in 1945. At the time, Frank was a young graduate caught up in the man-power regulations and was directed to the then Sydney Street Laboratory and started work in the Soil Laboratory at Fairlie Terrace under *Dr E B Davies*.

Chemistry in those days was not as sophisticated as today. Soil phosphates were determined as Egner phosphate, pH by the quinhydrone electrode and potassium as potassium perchlorate. After four months at Fairlie Terrace, he moved with the laboratory to the Galloway Laboratory in Hamilton into what was a converted CAC munition factory.

Here effort was directed to the selection of a chemical method for soil phosphorus as a guide to fertiliser advice.

The Galloway Laboratory became part of the Rukuhia Soil Research Station under *R E R Grimmett* and Frank worked on radioactive phosphorus for two years. Then followed a period of 2½ years as a Colombo Plan expert at the Department of Industry, Bogor, Indonesia.

On his return to Hamilton he became interested in plant analysis as a diagnostic tool in the nutrient status of plants. In 1967 he transferred with the Galloway Laboratory to the Ruakura campus and the work of the Plant Analysis Laboratory became an integral part of the station. Over 20 years, the number of samples analysed for some 13 essential plant nutrients increased from 2306 in 1961 to 31488 in 1981.

In the early years before Waikato University, Frank served as branch secretary — treasurer and chairman as well as helping to organise conventions held at Hamilton High School. With the growth of Waikato University, such functions have largely been taken over by university personnel and programs have become very university orientated.

Frank has enjoyed his time in chemistry, particularly for what he has been able to do in a scientist-farmer-grower situation and also for the part he has been able to play in the growth of chemical analysis.

Earlier this year *R W (Bob) Cawley* stood down as director of Wheat Research Institute. He first joined the staff in 1950 as a chemist after graduating MSc (Hons) in chemistry from Auckland University. He spent a year studying biochemistry at Otago then in 1956 joined the staff of T J Edmonds. In 1958 he rejoined Wheat Research. In 1963 he spent a year at CSIRO under a research fellowship grant and in 1965 succeeded *E W Hullett* as director of Wheat Research. During his period as director, Wheat Research played a major role in technical advances made in the industry and in 1981 Bob was the recipient of the J C Andrews award for notable contribution to food science made by the NZ Institute of Food Science and Technology.

Bob remains on the staff of Wheat Research and his successor is *Tom Mitchell* who has been with the staff since 1956.

Other staff changes include the appointment of *Arran Wilson*, a recent MSc graduate in chemistry from Canterbury, who is working in the field of near infrared reflectance analysis.

Dr Hugh Baber of BRANZ spent a week in the Hague attending a meeting on aspects of fire research. Following this conference, he attended a subcommittee at Borehamwood, London, dealing with various matters of fire resistance testing of the ISO TC 92. While in England, the opportunity was taken to visit various research and testing laboratories dealing with fire research.

Since March, *Dr C K Lai* (who graduated from Otago in 1979) has been working with *Dr Marcel Gut* at the Worcester Foundation for Experimental Biology. The work involves syntheses of metabolites and hypothetical metabolites (labelled and unlabelled) which are involved in the degradation of cholestrol to the bile acids in the liver, and the elucidation of the normal bile and biosynthetic pathways and those with specific enymatic defects.

Prior to this, Dr Lai had been at MIT as a postdoctoral associate with *Prof Glenn Berchtold*, synthesising the antileukemic agent triptolide.

Norman Thom of the National Environmental Chemistry and Acoustics Laboratory, Department of Health, has been granted a World Health Organisation fellowship to permit him to study laboratory services and research activities relating to environmental monitoring in various parts of the world.

THE SCEPTICAL CHEMIST

On Commissions of Enquiry

The Appeal Court's decision on the Police Association's attempt to upset findings of the Thomas Commission, should send a cold shudder down the spines of those Institute members likely to appear in court proceedings as expert witnesses.

The Appeal Court emphasized that it had no jurisdiction to adjudicate on factual questions, which happen to include the accusations against two police officers of fabricating evidence.

You may have difficulty in reconciling this attitude with the same court's willingness to upset Justice Mahon's findings about the Erebus disaster, but the apparent inconsistency probably indicates the Appeal Court's desire to avoid inconvenient decisions. Also of interest is the solicitor general's decision that the evidence against the officers did not justify proceedings against them.

It seems clear that no witness before a commission can escape the possibility of character assassination on grounds which are too weak to support normal court proceedings.

Furthermore there is little likelihood of redress unless malice can be proved — an almost impossible task even when it exists. Thus the current rules governing conduct of commissions depend on the willingness of the commissioners to avoid such "slander under privilege".

Two recent commissions did not inspire confidence in this and it is time that the rules be changed to give witnesses the same protection they would enjoy in the courts and demand higher standards of proof.

Last year, the council of the Institute was invited to press for such changes and responded with the resolution of a wet stick of spaghetti. Perhaps the Institute's forensic and consultant scientists should withdraw and form an association more concerned with their particular interests.

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