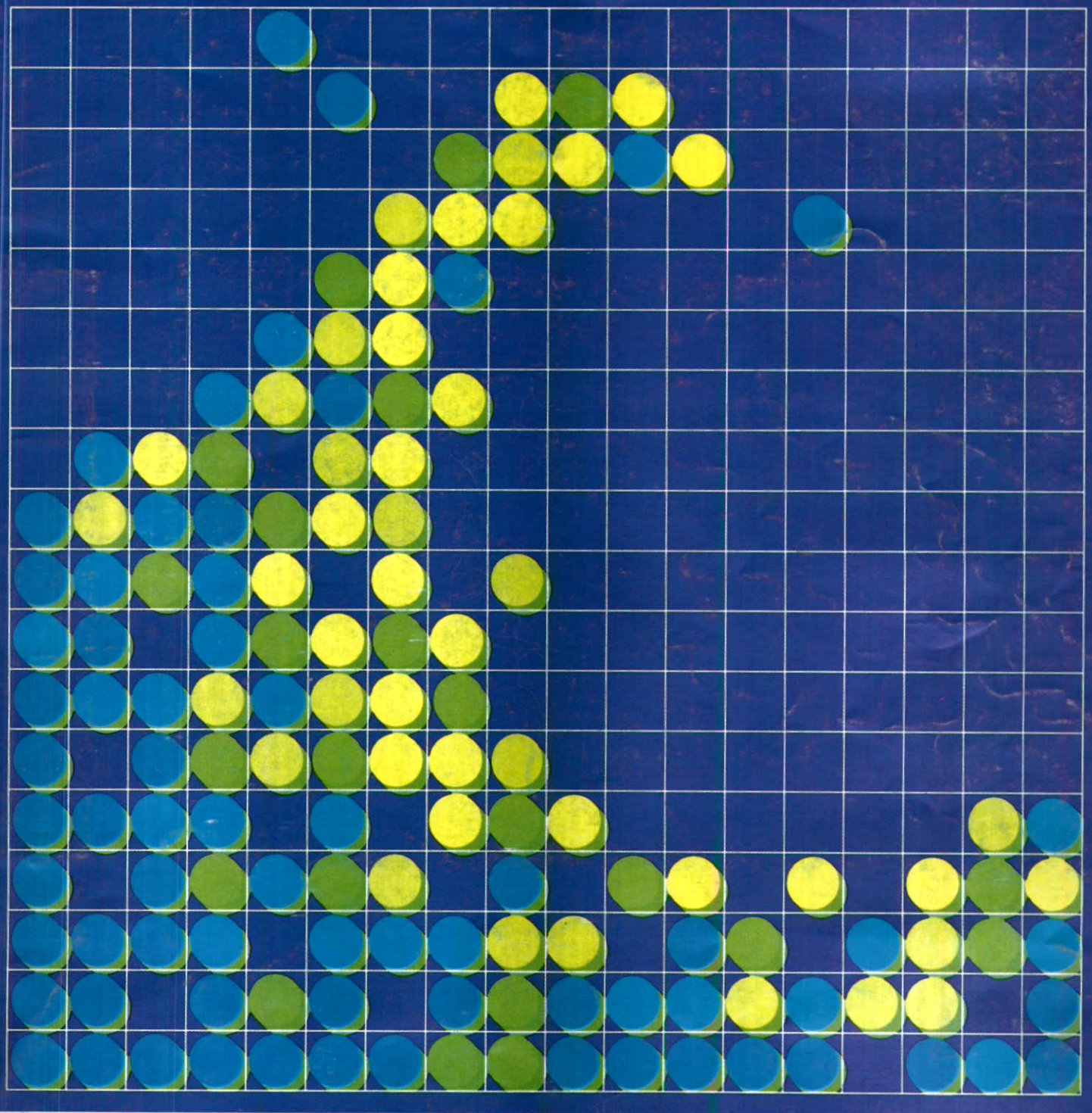
NZIC

chemistry
in new zealand

AUGUST 1985 VOL: 49 NO: 5



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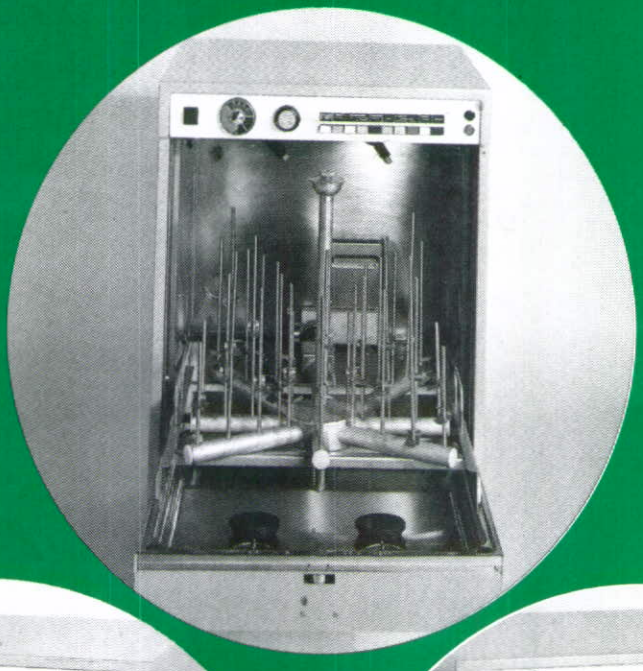

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Chemistry in new zealand

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Outline of the Institute

The New Zealand Institute of Chemistry is the primary professional and learned society for chemists, biochemists, chemical engineers, and chemistry technicians in New Zealand. Membership is open to all with appropriate tertiary qualifications in chemistry, biochemistry, or chemical engineering. There is also a student grade of membership, while those persons with a general interest in chemistry, but without the necessary qualifications, may be local members.

Institute activities are many and varied. At the local level, regular Branch meetings, lectures, and social functions provide opportunities for members to meet informally with their colleagues, as well as to keep abreast of developments within the professsion. Branches are also active in promoting chemistry in schools with various competitions and participation in science fairs. The Annual Conference of the Institute is held at a different venue each year. The programme includes invited plenary lectures, specialist lecture sessions and workshops for the presentation of current research findings, trade displays, and social activities. In the public arena the Institute has a number of committees to present members' views on chemical hazards, the environment, chemical education, and public affairs generally. The Institute also has representatives on bodies such as SANZ, AAVA, and the Royal Society of New Zealand.

To assist its members in their profession, the Institute surveys salaries periodically and publishes a Code of Ethics, and Guidelines to Professional Employment. The professional achievements of individual members are recognised each year by the awarding of a number of Institute prizes.

The NZIC has links with the Royal Society of Chemistry, the American Chemical Society, the Royal Australian Chemical Institute, the Federation of Asian Chemical Societies, and the International Union of Pure and Applied Chemistry. Members may therefore have the opportunity of participating in their activities and meeting chemists who visit this country under the auspices of the Institute. In particular, a visiting speaker scheme is currently operated with the RACI.

Application for membership of the Institute is made on a form available from the Registrar (PO Box 29-183, Christchurch). Current (1985) subscriptions for the main membership grades, including the cost of this Journal, are:

Fellows and Members (less $5 if paid before 31 Aug.)	$60
Associates (less $5 if paid before 31 Aug.)	$50
Graduates and Technicians (less $5 if paid before 1 Aug.)	$35
Students	$10

GUEST EDITORIAL

The Class of '67

During a bout of middle-aged nostalgia with a group of old chemistry classmates we tried to recall the names of all the people who did their final years chemistry exam with us. In the late sixties, science was still popular and the size of the class was approximately 30 — almost half of whom went on to do PhDs, so it was not an easy task. After recalling most of the names, we started to list the present occupations of those classmates that we still had contact with. These occupations included: entrepreneur, sales representative, industrial manager, first secretary in Foreign Affairs, housewife and mother, computer programmer, university lecturer, treasury officer, polytechnic teacher, forensic scientist, industrial chemist, high school teacher and university lecturer.

All this nostalgia raised some interesting questions. Almost all the people whose present day occupations were known had done a PhD., yet after less than 20 years under 20 per cent were doing any benchwork. In hindsight, was there any point in doing a PhD. in the first place and, if so, why? After some reflection (all of us had PhD.), we decided that the training was worthwhile in that it gave the candidate the experience of choosing something to do, carrying out the work and perhaps most important of all finishing it by writing up.

The second question that arose was, why di people who study chemistry end up in such a diverse range of occupations? Is it because of the training that they get or is it because the discipline attracts adaptable people? The general feeling was that the latter explanation was true.

Consideration was then given as to why a PhD training would be useful in the various occupations of our former classmates. On analysis, it was recognised that organising glassware, equipment, chemicals and instruments would be ideal training for any budding entrepreneur, while suriving all the frustrations involved in experimental work in order to produce something of real value at the other end is just the stuff for an aspiring mother. The diplomatic skills involved in persuading your tutor to allow you to write up, before he thought you were ready (what tutor ever thought that any student was ready to write up?) must stand any incipient ambassador in good stead. The application of learned skills in teaching and in forensic science was reasonably obvious. It was considered, however, that forensic science could be rather humbling to a new graduate or even a less than recent one. For instance trained chemists may be left wondering at the experimental skills of people who with no formal training and using only crude apparatus may extract codeine from analgesic tablets and then convert it in quite high yields to morphine. Not always an easy task. The *viva* at the end of a PhD. may be rather pallid compared to a courtroom cross-examination when a scientist may be left wondering whether he got his own name right let alone any of the science.

Many chemists tend to have a strong affinity for compouters although not all the old classmates were particularly impressed with these instruments. Some considered that it was the shock of getting their hands dirty with experimental work that drove certain chemists to the keyboards. A rather harsh judgement perhaps when everyone would admit that computers could be tremendously useful.

The only occupation that couldn't be rationalised was that of treasury official — what a waste of scientific training!

Considering the ability of chemists to metamorphose into a wide range of other professions then it is no wonder that not all of them belong to the NZIC.

However, we hope to entice as many chemists as possible to the 1985 conference and we are sure that they will find the theme "Chemistry Becomes Computerized" both stimulating and timely. In welcoming delegates to this Canterbury chemistry conference, I hope they both enjoy the main event and find time to discover some of the many other attractions of the area.

Bill Swallow
Chairman
1985 NZIC Conference Committee
Christchurch

STRUCTURAL STUDIES ON THE COLLAGEN FIBRILS IN CONNECTIVE TISSUE

by

A.S. Craig and D.A.D. Parry

Applied Biochemistry Divison
DSIR
Private Bag Palmerston North

Department of Physics and Biophysics
Massey University
Palmerston North

Alan S. Craig, Research Scientist at the Applied Biochemistry Division of DSIR in Palmerston North, holds a B.Sc (Botany) and Ph.D (Biophysics) from Massey University. In 1980 he was the recipient of an award from the Federation of Asian and Oceanian Biochemists which enabled him to attend the FAOB Congress in Bangalore, India, and to present an invitation lecture on the structure and function of connective tissues. Alan is the co-editor of "EM News" — the official newsletter of the New Zealand Society for Electron Microscopy.

David A.D. Parry, Professor in the Department of Physics and Biophysics at Massey University, holds a B.Sc (Physics and Mathematics), Ph.D (Biophysics) and D.Sc. from the University of London. In 1981 he was awarded the ICI Prize for excellence in chemical research and in 1983 he became a Fellow of the New Zealand Institute of Chemistry. David is also the Convenor of the National Committee for Biophysics.

Connective tissues are multicomposite biological structures containing collagen, glycosaminoglycans, minerals, elastic fibres, water and cellular material in proportions which vary with the age and origin of the tissue[1] (Table 1). Collagen is the most common and abundant of the proteins found in mammals and occurs in tissues as diverse as tendon, skin, cartilage, bone, teeth, cornea, vitreous humour, lung and aorta. As a biomaterial, therefore, connective tissue must play a variety of very different mechanical roles and it is of great interest to understand how this may be achieved by varying the proportions and types of the components present. Although the discussion in this article will be confined to fibril-forming connective tissue, it must be pointed out that several collagens of the ten genetically distinct types currently characterized do not form fibrillar structures. The best known of these is probably the one found in basement membranes, where the molecules aggregate to form specific net-like lattices designed to prevent movement of cells and migration of high molecular weight macromolecules.

Collagen fibrils are easily recognisable in the electron microscope from their periodic banding structure seen in longitudinal section, the so-called D-period being 67nm (Fig.1). This banding, seen in both positively and negatively stained sections from dehydrated tissue, has also been observed indirectly in the X-ray diffraction patterns of the native hydrated tissue and has been interpreted in terms of the relative axial staggering of collagen molecules in the fibril. However, it is the transverse structure of collagen fibrils that has occupied much of our attention in recent years. In particular we have been interested in the growth and development of collagen fibrils in different tissues and animal species, in the relationship between the collagen fibril diameter distribution and the mechanical attributes of the tissue, and in the possible role of the glycosaminoglycans in influencing the collagen fibril diameter distribution. In this article, we will address ourselves to the former two problems.

Foetal or immature connective tissues, which have high cellular contents, contain bundles of small relatively constant diameter collagen fibrils (Fig. 2). Subsequent development of the tissue,

TABLE 1

COMPONENTS OF CONNECTIVE TISSUES IN MATURE ANIMALS

Tissue	Percentage of Composition *			
	Collagen	Elastin	GAGs **	Water
Tendon/Ligament	30	1.5	0.03-0.3	65
Skin	30	0.2	0.03-0.35	60-72
Fibrocartilage	20	0.1-0.2	0.6	75
Elastic cartilage	16	5-7	3-4	70
Hyaline cartilage	5-18	< 0.1	5-11	75
Bone ***	5-20	—	0.4	30-50
Cornea	12-15	—	0.2-1.0	80
Aorta	5-15	7-15	0.2-2.5	70-75
Elastic ligament	9	35	—	55
Wharton's jelly	12	—	0.3	88
Vitreous humour	0.25	—	0.02	99

* All expressed as percentages wet weight of tissue. Total percentage does not always add up to 100% due to lack of inclusion of cellular components and non-collagenous proteins. No value quoted means that no quantitative data are available.

** Glycosaminoglycans

*** From the ranges of values cited in the literature it would appear that bone contains ~45% mineral.

This Table (reproduced from Parry and Craig, 1984), has been compiled from data from a variety of sources.

however, depends on the kind of animal involved[1,2]. For example, in the *altricial* animals (i.e. those animals which have a low body mass at birth compared to that at maturity, and which require a considerable period of parental supervision and support after birth relative to their natural life span) the collagen fibril diameter distribution remains sharp right through foetal development. At later stages of development, however, the distribution broadens in line with the increased tensile requirements of the tissue. In contrast, in the *precocial* animals (i.e. those animals which have a relatively high body mass at birth compared to that at maturity, and which are able to run and fend for themselves soon after birth) the collagen fibril diameter distribution broadens considerably prior to birth. It is not unexpected, of course, that the development of the fibril diameter distribution should parallel the tensile properties of the tissue.

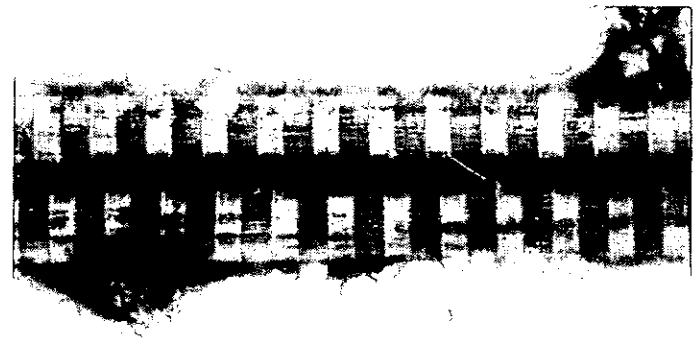

Figure 1. Negatively stained preparation of collagen fibrils showing D-periodic banding consisting of alternate dark (gap) and light (overlap) bands. This pattern is generated by staggering collagen molecules 300 nm long (4.47D) by multiples of D in a direction parallel to the fibril axis. This gives rise to a D-period 67 nm and gap and overlap regions of 0.53D and 0.47D respectively. Magnification: 110 000 X.

With further development the mean fibril diameter increases substantially (except in a few highly specialised tissues such as cornea) and either a unimodal or bimodal distribution of fibril diameters occurs at maturity depending on the mechanical properties required (Fig. 3). Beyond this stage, however, the mean fibril diameter usually decreases, sometimes rather spectacularly, as in horse tendon[3] (Fig. 4). In such senescent tissues fibril morphology can also become markedly altered from normal. These observations, made for many tissues from a variety of animals over the period mid-foetal to old-age have provided the raw data on which

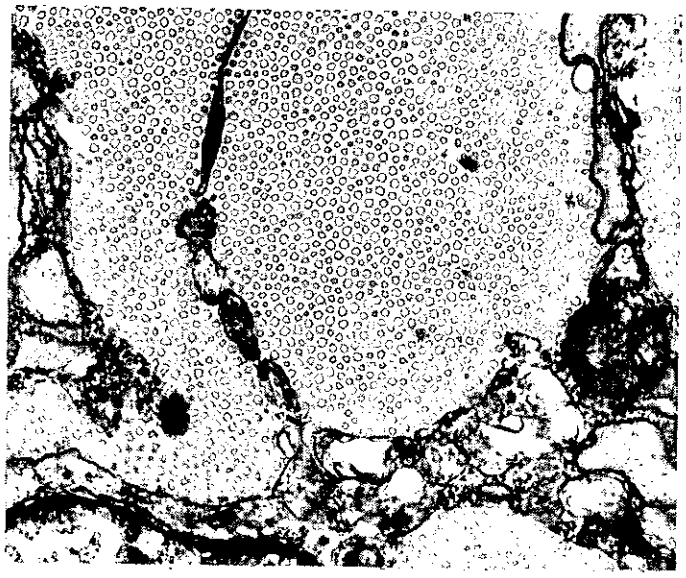

Figure 2. Electron micrograph of 18 day foetal chick metatarsal tendon showing cross sections of immature collagen fibrils organized into fibres which are delineated by the cytoplasmic processes of surrounding fibrocytes. (Compare with mature tendon of low cellular content and larger diameter collagen fibrils; Fig. 3). Magnification: 20 000 X.

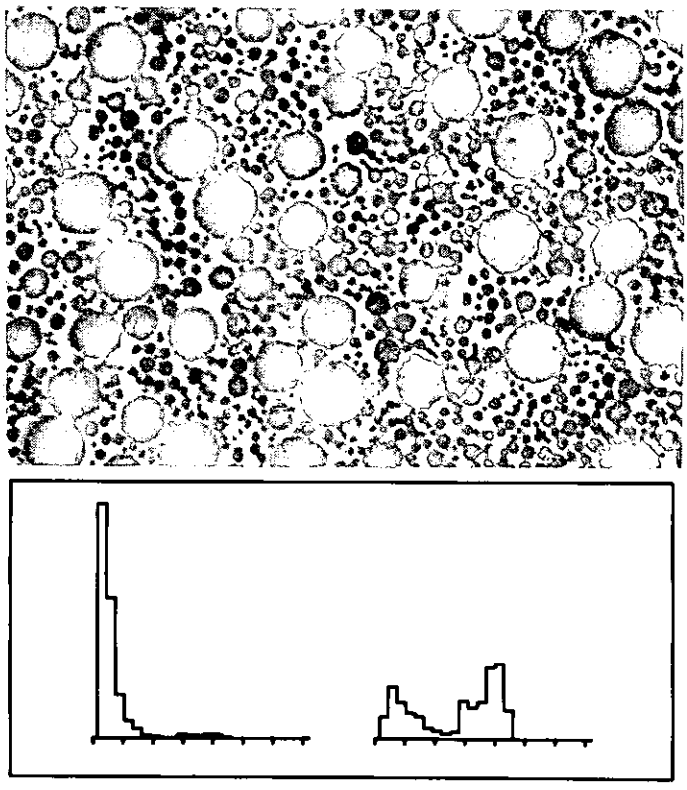

Figure 4. Electron micrograph of a transverse section of the superficial digital flexor tendon from a 19-year-old horse. While the percentage of small diameter collagen fibrils has increased significantly relative to that in the mature animal (see Fig. 3a for a comparative distribution at maturity) the amount of collagen present in these fibrils accounts for only 35% of the total mass. Magnification: 38 000 X.

the growth, development and breakdown of collagen fibrils may be understood in a quantitative manner. Such data are vital if an understanding is to be achieved of the mechanism of fibrillogenesis and of the relationship between fibril dimaeter and mechanical properties. Indeed, in many cases where the collagen fibril diameter distribution broadens, evidence has been presented which shows that the fibril sizes fall into a number of discrete populations whose mean diameters differ from one another by about 7-8 nm[1,4]. These observations suggest that fibril growth occurs discontinuously by the peripheral accretion of a discrete number of layers of molecules.

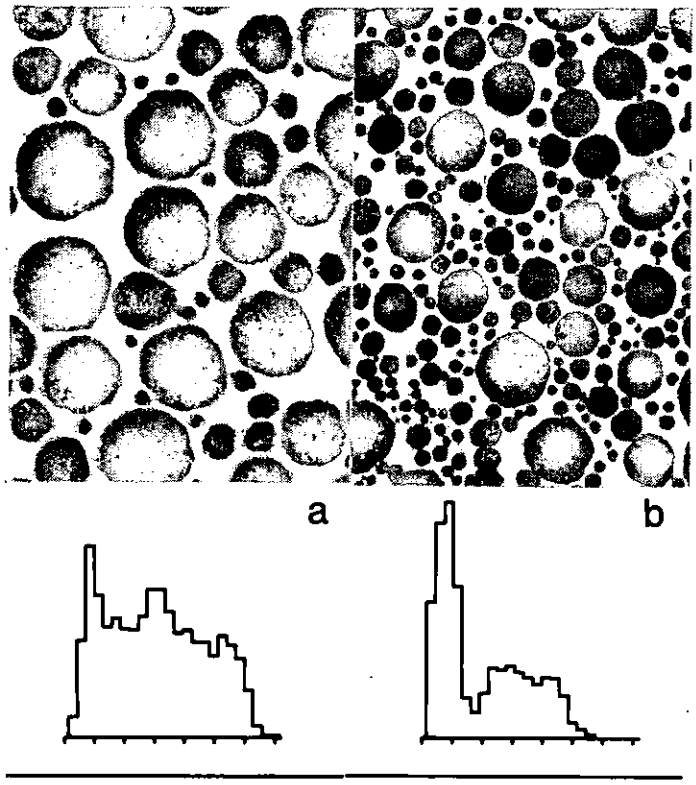

Figure 3. Electron micrographs showing (a) the unimodal distribution of collagen fibril diameters from the common digital extensor tendon and (b) the bimodal distribution of collagen fibril diameters from the suspensory ligament of a 5-year-old horse. The histograms (lower) show the number distributions of the collagen fibrils plotted as a function of diameter. The graduation marks on the horizontal (diameter) axis are 50 nm apart. Magnification: 38 000 X.

A detailed study of one highly specialised connective tissue —cornea — from a wide range of animals has revealed a pattern of fibril diameters not previously suspected. By maintaining as constant an experimental protocol as practicable it was possible for us to show[6] that (i) the diameters of collagen fibrils are constant and do not vary with depth in the corneal stroma (in contrast to those who have "shown" that the fibril diameters increase[8] or decrease[7] below the anterior surface of the cornea; (ii) although the collagen fibrils increase in size between early stages of foetal development and birth their diameters remain unchanged throughout active postnatal life; (iii) the collagen fibrils in mammals, birds, reptiles, amphibians and cartilaginous fish have the same diameter (~25 nm), whereas the bony fish all have collagen fibrils ~17 nm in diameter. Although the absolute values of the diameters revealed by electron microscopy are known to be significantly smaller than occur *in vivo* (~70% of the "hydrated" diameter)[1,8-11], a comparative study such as this remains a valid way of classifying structural featues in different species.

In terms of their function, connective tissues must have some appropriate combinations of two basic attributes — an ability to withstand high tensile or compressional stresses and an ability to recover shape and form when stresses are removed. Clearly, while every fibril in a tissue will contribute something to each of these properties it is possible that the relative contributions could differ with fibril diameter. This idea has been supported by the observations that tissues which sustain long-term high-stress levels have broad bimodal distributions of collagen fibril diameter at maturity, whereas tissues which suffer short term or intermittent low-stress levels have sharper, unimodal distributions of fibril diameter. As a result of many such observations it has been suggested that the larger diameter fibrils in the bimodal distributions are primarily responsible for maintaining the tensile properties of the tissue, whereas the smaller diameter fibrils play an important part in determining the creep-inhibition properties[1,2]. These conclusions were based on two considerations. Firstly, the percentage of covalent crosslinks between collagen molecules is predicted to increase with fibril diameter and hence lead to fibrils of greater strength. Molecules which lie within the peripheral layer of a fibril are unable

to form the full complement of covalent crosslinks, in contrast to those molecules lying within the body of the fibril. Large diameter fibrils which have a smaller peripheral layer per unit mass of collagen will thus have higher crosslink densities than small fibrils where the peripheral layer forms an appreciable portion of the mass. Secondly, since the surface area of fibrils per unit mass of collagen increases as the fibril diameters decrease it follows that the possible number of interactions between the matrix and the fibrils can be maximized by decreasing the diameter (and hence increasing the number) of the fibrils. It is considered that the maximization of fibril-matrix interactions would help to inhibit permanent creep and thus allow a tissue to regain its shape after removal of stress.

As a small fraction of large diameter fibrils can account for a large part of the mass of collagen in a tissue having a bimodal distribution of collagen fibril diameters, it is often useful to consider the mass-average fibril diameter (rather than the mean diameter) as an index of collagen fibril size. This mass-average diameter should be related to the ultimate tensile strength of a tissue and to the change in strength of a tissue measured as a function of age. Indeed good qualitative correlations can be recognised by combining the data presented by Vogel[12,13] and Parry and Craig[1] (Fig. 5). Thus a long-term high-stress tissue has a bimodal distribution of collagen fibril diameters, with the largest fibrils present providing the high tensile strength and the large percentage of smaller diameter fibrils providing the creep-inhibition properties. A narrow distribution of fibril diameters would be unable to provide both the strength and creep-inhibition attributes simultaneously. Further, a polydisperse distribution of fibril sizes, as commonly occurs in tendon, allows better packing of fibrils and gives rise to a greater density of collagen per unit mass of tissue. In contrast, a short-term low-stress tissue has a narrow distribution of fibril diameters — it does not require extreme strength nor does it require stringent creep-resistant attributes. Thus a small range of fibril diameters is sufficient to give this tissue its required mechanical characteristics.

There are many factors other than the collagen fibril diameter distribution which contribute to the mechanical attributes of a tissue. For example the fact that all connective tissues have a fibril-matrix structure is directly related to their mechanical function. Such a texture not only has tensile elements (collagen fibrils) to provide strength and a matrix (hydrated glycosaminoglycans and often minerals) to resist compression, but additionally it provides the tissue with a mechanism to resist crack propagation. This

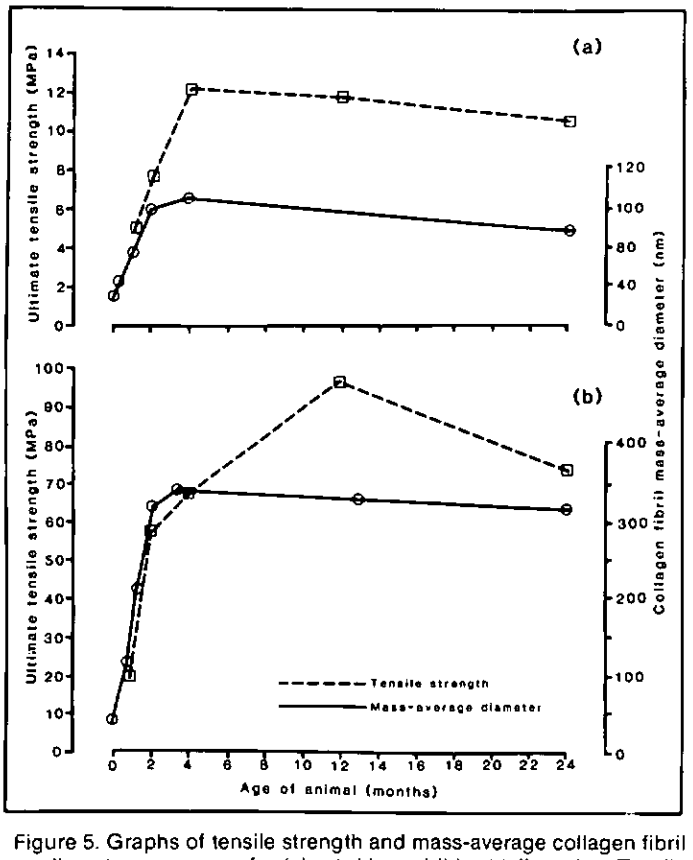

Figure 5. Graphs of tensile strength and mass-average collagen fibril diameter versus age for (a) rat skin and (b) rat tail-tendon. Tensile strength measurements have been taken from Vogel [12,13] and collagen fibril mass-average diameters from Parry and Craig [1].

basic concept of design is paralleled in other biological tissues (e.g. wool fibres) and mimicked by man in his construction of reinforced concrete and fibre composites. The degree and level of orientation of the fibres and fibrils in a tissue is also important mechanically. For instance some tissues have fibrils organised in layers — cornea, tapetum, many skins, some bones; others contain axially aligned fibrils — tendon and ligament; and yet others show little organisation at all — vitreous humour. Certain components in connective tissue, such as the glycosaminoglycans, elastic fibre and minerals play an especially important and indeed dominant role in tissues such as hyaline cartilage, elastic ligaments and elastic cartilage, and bone and teeth respectively. Finally, many connective tissues normally subject to rapid application of high stress levels show a macroscopic crimp structure (crimp length and angle typically 1 —100μm and 5 — 25^0 respectively; Fig. 6). This provides a compliance mechanism enabling the tissue to undergo a small length change prior to the individual molecules being stretched, thus helping to prevent the tissue from sustaining permanent damage[14,15].

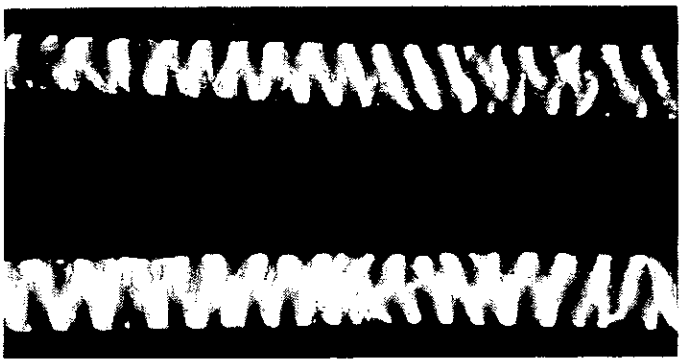

Figure 6. Light micrograph of two collagen fibres from mature rat tail-tendon. The crimp period (~100μm) can readily be seen. Magnification: 50 X.

Coordinated electron microscope and biochemical studies undertaken at the Electron Microscope Unit at Palmerston North and at the University of Auckland Medical School by Drs. M.H. Flint, G.C. Gillard and their colleagues, have yielded new insights into the modes of fibrillogenesis and fibril development[1], of the relationship between the collagen fibril diameter distribution and the mechanical properties of a tissue[1,2], and of the relationship between glycosaminoglycan composition and fibril diameter[16]. Such studies have revealed the variety and complexity of design in the connective tissues of vertebrates — a diversity of structures that have evolved to meet the demands of a wide range of mechanical functions.

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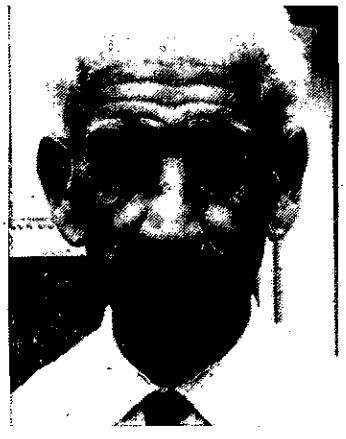
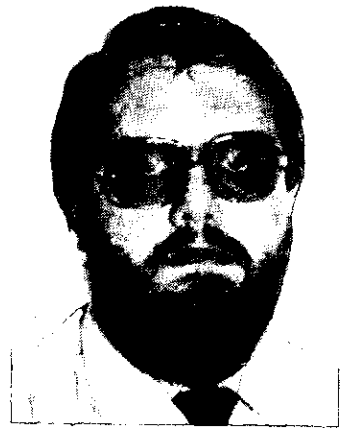
A TELARC DEBATE

PRESENTING THE CASE. . .



In 1981 a profile of ***Len Spackman*** *appeared in Chemistry in NZ. In that article he was described as the doyen of the Institute, having been present at the inaugural meeting fifty years previously. In 1985 Mr Spackman considers himself retired... but still manages an occasional spot of consultancy work, now and then.*

IN DEFENCE:



Malcolm Bell *is a graduate in electrical engineering from the UK. After six years working for ICL in the design of main-frame computers, he emigrated to New Zealand in 1974 and joined TELARC as an inaugural Field Officer the following year. At various times he has coordinated laboratory accreditation programmes in all fields of technology. He was appointed Deputy Director in 1978, and now coordinates TELARC's Q/A programme and Educational/Advisory services.*

L.S. Spackman, Retired

INTRODUCTION

A full year has now passed sinced I finally retired and saw the inside of a chemical laboratory. This saw the end of over 62 years of continuous work at a laboratory bench or in the field. A lifetime collection of journals, proceedings and reports have been dispersed, mostly, unfortunately to the rubbish tip.

There must be few chemists who have clocked up the total number of days actually working at the laboratory bench as I have. Most chemists, after some 20 or 30 years of laboratory experience generally find themselves promoted to an executive position. While they may still retain a tenuous connection with the laboratory, they cease to have this intimate day to day working experience. I have had my offers but to be frank I have not accepted them, partly because I was scared of responsibility. In any case, I doubt if I could have done the job, whereas I have always had confidence that, come what may, I could always pull a sample to pieces and come up with the correct answer (most times anyway).

Over the years I have questioned many aspects of this grand profession of ours, but I have lacked the courage to stand up at a meeting and say so or to put pen to paper. Now that I can no longer be accused of having an ulterior motive I feel that I can justifiably speak. Now is the time to get rid of my pet gripes. . .

With this introduction I would like to voice a few criticisms of TELARC as it is presently administered.

LABORATORY FACILITIES

When the act was first passed I welcomed it. After all, anyone, with or without qualifications or experience could start up in business as a public analyst and compete with us on a price basis. We had a large well equipped laboratory staffed predominantly with professional experienced staff, well supplied with expensive equipment and with all facilities to allow us to handle a variety of work and produce accurate results. Competition from fly by night opposition has always been a problem for the genuine public analyst. We were amongst the first to seek and obtain TELARC registration for all of our more important activities.

At the time only one of our applications was questioned, and I will never forget the circumstances. As a part of our routine work we had to carry out viscometry of lubricating oils to an exceptional degree of accuracy. This called for water baths which would hold their temperature accurately to a fraction of a degree. None of the commercial so-called precision water baths could meet the requirements. As it so happened, the writer had studied precision temperature control for a number of years and had accumulated considerable practical experience. This knowledge was used to enable us to build our own water baths which gave the performance we required. When the assessor saw our water baths he was clearly horrified and no amount of explanation or demonstration would convince him of their quality. When he was asked if such and such a well known brand would be acceptable, he readily agreed. We pointed out that we had had experience with that particular water bath and not only did it fail to meet specifications, the design was clearly faulty. This was sheer heresy. However, somehow we eventually got our registration and continued to use our water baths. Incidentally, to build constant temperature exclosures which will respond to small temperature changes and hold their temperature over long periods is no easy task. One has only to look at the commercially available ovens and water baths to realise how little the designers know about the subject.

To my way of thinking, TELARC do not attach sufficient importance to the qualifications and practical experience of the chemist who is responsible for the laboratory. I say that a good experienced analyst will turn out accurate and reliable results even if the laboratory is a tin shed with a dirt floor. Sure, a nice laboratory with good facilities, nice instruments and such makes it a lot easier. On the other hand one can have the most expensive of laboratories with an array of spectrophotometers, A.A's, GLC's, HPLC's, polarimeters and so forth, complete with computerised readouts and all the bells and whistles, but if the person in charge is no good then the results will be likewise.

Unfortunately, TELARC seem to attach more value to laboratory fixtures and instruments than to personnel. Modern instruments certainly do a good job and their accuracy may be adequate for the purpose. However one cannot help but wonder when one compares their accuracy with the accuracy demanded by TELARC for standard weights, standard cells and reference thermometers.

LABORATORY METHODS

TELARC are now insisting that all registered laboratories keep a folio of methods and that this be available for inspection. This may be appropriate in a small "quality control" laboratory operated by inexperienced staff in a factory controlled by an overseas organisation. In fact, we have regularly carried out such work because it is cheaper to send it out than to maintain a small laboratory. The parent company sends out a method of testing to which we would adhere. In many cases the method is rather unique and not standard. The actual result may well be incorrect but this does not matter. If the sample conforms to the test method, carried out exactly as specified, then it can be assumed that the product will be satisfactory. I would suggest that small laboratories working under these conditions hardly qualify for TELARC registration.

Any laboratory of a standard justifying an application for TELARC registration will normally have a library of standard texts and

reference books, and the head chemist will normally belong to one or more appropriate scientifiic societies and be receiving their journals, plus the usual trade publications, catalogues, etc.

Books of standard methods for every conceivable material fill our bookshelves and files; Standards Associations, ASTM, WHO, AOAC, USPHA and so on almost *ad infinitim*. The laboratory will certainly have all the methods of analysis they require on hand so why go to the trouble of typing them out and assembling them in a file. Most laboratories tend to develop methods of their own and these would normally be properly written up and recorded.

PERSONNEL

Another thing which I find incredulous is the TELARC requirement or recommendation that each method should be reproduced and preferably enclosed in a clear plastic envelope, so that it can be kept on the bench for instant reference.

For comparison let us imagine a professional photographer on an important assignment. He has his camera in his right hand and in his left a card giving instructions for operating his camera. He refers to this as he sets aperture, speed, focus and other settings. One would hardly have any confidence in his results.. No. The photographer must be utterly familiar with his camera. His adjustments must be automatic and carried out without conscious thought. Only then can he devote his whole attention to his subject.

The analyst working at the bench should be in a similar position. He should be completely familiar with the method and should understand what he is doing and why. His procedures should be automatic and carried out unconsciously. Only then can he devote his whole attention to the result. Only then will he detect a slight change in the normal behaviour which will tell him that something is wrong and his result will not be correct.

Assume that there is some interference or for some reason the usual procedure fails to work. He should, of course, be able to modify or substitute another method. But he may like to go to the library and refer to his standard texts; Scott, Sutton, Koltoff, Mellor, etc. As a result he selects an alternative procedure. Does he take the book back to the laboratory? If he does then he should go back to school. No. He shuts the book, puts it back on the shelf, then returns to the bench and proceeds to utilise the method, selecting parameters and modifying the process to suit his particular requirements. In other words, he knows his chemistry; he understands the basic process he is going to use and he sets up the conditions which will give him an accurate result. If he can do this then he is qualified to work in a TELARC registered laboratory. If he cannot, then the laboratory is not good enough for TELARC registration.

(Belonging to an older generation I have generally referred to chemists as male. I do not want to be accused of being a male chauvinist, therefore, in each case substitute the female or neutral gender as you wish. I have the utmost respect for women chemists. I have had the priviledge of working alongside many of them during my working life. If there are any doubts, ask one of them.)

Certainly, if one is analysing a pure drug one follows the pharmacopoeia. Likewise with other stated products it will be essential to follow a specified method. Where payment is based on the result, conformity between laboratories is essential. The method may not give the correct result but consistency is more important than accuracy. But when accuracy is predominant, then it calls for an experienced analyst completely familiar with his subject whose basic chemical knowledge enables him to discard or modify standard methods.

You may not agree with me but this is what I believe and this is how I have worked. My regards to all my friends in the NZIC.

IN REPLY — Malcolm Bell, Deputy Director TELARC

Malcolm Bell, Deputy Director, TELARC

Mr Spackman raises a number of points which I shall attempt to answer. Before doing so, however, I must record my concern that he did not raise these matters during the nine years that he worked in a TELARC registered laboratory. There has clearly been inadequate communication between TELARC and Mr Spackman, leading to some misunderstandings. If his concerns had been made known to us earlier I am sure that we could have resolved them.

I would urge all scientists working in TELARC registered laboratories to discuss any concerns about the TELARC programme with our staff. Feedback of this type is essential if TELARC is to ensure that its accreditation programme reflects currently accepted standards of good laboratory practice.

ACCREDITATION

Before discussing specific points raised by Mr Spackman I would like to make two general observations. Firstly, it should be recognised that the Council's accreditation criteria are defined by six specialist advisory committees and their associated panels of assessors. In the field of chemical testing over 50 professional chemists from academic, industrial, government and consultancy laboratories have contributed to criteria development. In referring, therefore, to TELARC's requirements Mr Spackman is, in fact, referring to requirements that have been defined and monitored by his professional colleagues.

The second point to note is that the TELARC accreditation programme does not seek to identify elitist laboratories; so-called centres of excellence operated by the creme-de-la-creme of New Zealand scientists. Instead TELARC grants registration to laboratories that provide competent, reliable testing services at a standard commensurate with their testing function. Each different testing situation places its own demands on the nature of the organisation, test methods, staffing, equipment, accommodation, operational procedures and quality assurance systems needed by the laboratory to fulfil its intended function.

In its approach to the accreditation of laboratories TELARC is always careful to relate its requirements to the real needs of the testing situation in each laboratory. TELARC does not ask any laboratory to maintain a standard of operation higher than that needed to achieve the reliability of results required in its particular circumstances.

EQUIPMENT

Turning now to Mr Spackman's specific comments I hope that I can resolve the obvious misunderstandings that have arisen. At the initial assessment of the laboratory in which Mr Spackman was working the assessment team quite rightly sought assurance that a home-made water bath could meet the temperature stability requirements of the test method in use. Once evidence of such stability was presented the bath was accepted for use under the terms of the laboratory's registration. TELARC has no requirements relating to the source or manufacture of test equipment. The Council's only requirement is that any equipment, commercial or home-made, must meet the performance requirements of the test method in use.

FACILITIES AND PERSONNEL

On the subject of staff qualifications and experience I am in complete agreement with Mr Spackman. Staff are a laboratory's most important resource. I never cease to be surprised at the excellent work undertaken by some New Zealand scientists working in very poor conditions. Unfortunately, however, the reverse also applies and TELARC occasionally meets excellently housed and equipped laboratories which do not live up to expectations due to staff shortcomings.

TELARC does not require laboratories to have modern, air-conditioned, spacious accommodation or the latest instrumentation. All that is required for TELARC registration is that the laboratory accommodation should not detract from the technical validity of the laboratory's work and that equipment should comply with the requirements of the test method that is in use.

METHODS

In many laboratories today staff are engaged in what might be termed "production line" science. An extensive repertoire of test methods may be performed and at any one time large numbers of samples may be passing through the laboratory at various stages of processing. In these circumstances staff who rely entirely on their memories for the details of a test procedure present a risk to the laboratory's quality assurance system.

TELARC believes that, wherever possible, laboratory staff should have a copy of the test method close at hand when performing testing work. If the method is contained in a text book or reference manual which is difficult to use at the bench or which might be required by other staff, then an appropriate version of the method may be prepared for use at the bench. Such bench methods manuals may be just index cards with a "short-form" version of the method to be used as an aide-memoire. Other laboratories photocopy the original method from the reference text and place the copy in a plastic sleeve for use at the bench.

The written test method can be regarded as the scientist's work instructions. Surveys show that the largest single cause of quality problems in organisations of all types, including testing laboratories, is a lack of adequate work instructions. The second largest cause of quality problems is a failure to follow work instructions. This comes about when a technician starts off by following the standard test method but gradually begins to rely on memory and begins to introduce short-cuts and variations. Before long it's no longer the referenced method that is being performed but Fred's method, loosely based on the standard method.

NZIC ANNUAL REPORT 1984-85

On behalf of the Council I have pleasure in presenting the Annual Report for 1984-85.

In looking back over recent Annual Reports it is alarming to find repetition of one central theme. This is the problem of promoting the Institute and attracting more members (particularly students and new graduates) with the objective of ensuring that the Institute is truly representative of the profession. The year just approaching completion has been little different from the previous four insofar as the branches have maintained their efforts in respect of recruitment, but the end result has been disappointing. Less than 20 per cent of those completing NZCS and BSc qualifications in chemistry each year apply for membership of NZIC and the total gain in membership for the last year to April 30 1985 was only 27. This matter is developed further under the appropriate heading later in this report.

Awards & Prizes

Institute prizes were awarded as follows:

Easterfield Award:
Dr Tom Brittain, Senior Lecturer, Department of Biochemistry, Universtiy of Auckland (Dr Brittain will deliver the Easterfield Address to the NZIC Conference in Christchurch at the end of August.)

ICI Prize:
Prof. Warren R. Roper, Auckland University

Shell Industrial Chemistry Prize:
Dr J.S. Ayers, Reader, Department of Biochemistry, Massey University.

Chemical Essay Prizes:
Mr U. Roxburgh, University of Auckland

Student Paper Prize:
Mr J.D. McCombs, University of Canterbury.

Chemistry V, AAVA Prize:
Mr Martin B. Hunt, Palmerston North.

A.C. Kennett Memorial Award:
Mr Tony Eaton, Chemistry Division, Auckland, DSIR (This award is co-sponsored by the Australasian Corrosion Association.)

Conference — 1984

The Institute thanks Dr. Gordon Leary (Chairman), Dr Graeme Gainsford (Secretary) and their committee for a highly successful Conference held in association with the N.Z. Biochemical Society. On this occasion reciprocal arrangements were made with the Science Teachers' Conference to allow NZIC delegates to attend sessions and field trips organised by STC.

Plenary addresses covering a wide range of subjects were given by Professor Sir George Porter FRS, Director of the Royal Institution, London, Dr J.M. Guss, Department of Inorganic Chemistry, University of Sydney, Dr R.B. Saint, The Walter and Eliza Hall Institute of Medical Research, Melbourne, Dr J.H. Johnston, Chemistry Department, Victoria University, and Professor David L. Trimm, School of Chemical Engineering, University of New South Wales. In addition there was a Quality Assurance Symposium organised by Telarc and seminars on liquid fuels and forensic science.

There was an attendance of 275 NZIC members and a profit of $3,386 resulted. The associated symposia on quality control and forensic science drew additional attendances of 32 and 80 respectively.

Conference — 1988

A firm proposal has been received from RACI for a joint RACI-NZIC Bicentenary Conference to be held in Hobart during the week 19-25 January 1988. Council has been asked to appoint a liaison secretary to work with the President of the Tasmanian Branch of the RACI regarding organisation and development.

NZIC-RACI Award

Professor R.D. Batt accepted the NZIC-RACI visiting speaker award for 1984 and gave an address, which was enthusiastically received, to all the main branches of RACI.

The award for 1985 was accepted by Dr Charles Barnes who is the Technical Services Manager of Biotechnology Australia Pty Ltd. His visit during June included all branches plus Invercargill. He lectured on the subject "Chemical Adventures in Biotechnology."

This exchange of speakers between the two countries has now been regularised on the basis of a visit to each country in alternate years. Steps have been taken to ensure that the selection for the award is made in August in order to allow the visiting Australian speaker to be included in programmes for the following year.

NZIC-ACS Visits

In June 1983 Professor Fred Basolo, President of the American Chemical Society, visited New Zealand and spoke to most branches. Last year Dr D.E. Wright, Past-President of NZIC undertook a speaking tour in USA and included several visits in Canada.

Following this very successful exchange of speakers attempts are being made to place such visits on a regular basis of alternate years on much the same lines as the arrangement with Australia. This was discussed on an informal basis during PAC CHEM 84 and the opportunity was taken to bring the Chemical Institute of Canada into the picture. A proposal has now been put to the ACS for a speaker from that country to visit New Zealand every second year. NZIC will make every endeavour to reciprocate but must rely on the availability of scientists visiting USA for other reasons.

PAC CHEM 84

The 1984 International Chemical Congress of Pacific Basin Societies was held in Honolulu in December 1984. It was sponsored by the ACS, the Chemical Institute of Canada and the Chemical Society of Japan. Representatives were present from 22 chemical societies and the Asian and Latin American federations of chemical societies. As is frequently the case with such large gatherings the main value appears to have come through the opportunity for personal contacts and discussions. In particular the proposed ACS/CIC/NZIC exhange of visiting speakers was thoroughly explored.

It is interesting to note that this Conference was very well attended and in contrast to its predecessor which was also held in Hawaii, it was financially successful.

Publications

Dr B.W.L. Graham has continued as Editor of "Chemistry in New Zealand" and has maintained the high standard of previous editors. A small group consisting of the Editor, President, Secretary and Chairman of the Auckland Branch has met with the publisher on two occasions to discuss means of further improving the standard and controlling costs. The ultimate objective is to have a monthly publication.

The valuable Yearbook was published as number 2 in the 1984 series and includes a full list of members both on an alphabetical and occupational basis. It also has details of NZIC officers and prizes. The Yearbook has been published again this year and includes a reprinting of the "Code of Ethics and Rules" and the "Commentary on Rules of Admission".

Dr Andrew Brodie and his team in Palmerston North have again produced four issues of Chem NZ during the period under review.

Overseas Visitors

Dr G. Dodson, University of York (July 1984).
Dr Anne Dell, Lecturer, Department of Biochemistry, Imperial College, London (Sept. 1984).
Professor R.E. Hester, University of York. (March, 1985).

Federation of Asian Chemical Societies

The 3rd Biennial Assembly of FACS was held in Singapore during the Asian Chemical Congress from 8 to 11 April 1985. Dr H.K.J. Powell of the Chemistry Department, University of Canterbury, represented Council at this Assembly.

Professor H.H. Huang of Singapore was elected President of the Executive Committee of FACS which now has 20 members.

THE NEW ZEALAND INSTITUTE OF CHEMISTRY (INC.)

BALANCE SHEET AS AT 30TH APRIL 1985

1983/4 $			1984/5 $
	CURRENT ASSETS		
9,287	Bank of New Zealand	3,026	
395	Prepaid Travel Account	1,393	
2,970	Subscriptions in Arrears	2.808	
1,300	Prepayments: re Future Conference	100	
174	Sundry Debtors	3,148	
0	Stock on Hand — Ties & Scarves	4,014	
14,126			**14,489**
	INVESTMENTS		
0	Equiticorp 17.5%, 8.5.86	24,623	
3,000	Fletcher Challenge 18% 30.4.86	3,000	
500	Lyttelton Harbour Board Stock — 6.25% 1.7.98	500	
3,604	Marac Holdings Ltd	0	
17,001	Marac Holdings Ltd	0	
1,000	Nth Canty. Hospital Bd Stock	0	
1,000	Royal Society of NZ — 15%, 30.11.85	1,000	
3,058	U.D.C. Group Holdings Ltd — 16.75% 19.8.86	3,551	
29,163			32,674
	FIXED ASSETS: At Cost		
	Office Equipment	2,300	
	Less Accumulated Depreciation	1,235	
		1,095	
	Films	822	
	Less Accumulated Depreciation	580	
		242	
	Presidential Chain	267	
1,295			1,604
$44,584			$48,767

1983/4 $			1984/5 $
	CURRENT LIABILITIES		
3,643	Sundry Creditors	5,508	
562	Subscriptions in Advance	466	
4,205			5,974
	SPECIAL ACCOUNT		
567	Easterfield		567
	ACCUMULATED FUNDS		
38,022	Balance, 1.5.84	39,811	
1,790	Add: Excess of Income over Expenditure for year	2,415	
39,812	Balance 30.4.85		42,226
$44,584			$48,767

AUDITOR'S REPORT

We have audited the financial statements of the New Zealand Institute of Chemistry (Inc.) in accordance with accepted auditing standards, and have carried out such procedures as we considered necessary. In our opinion, the financial statements give a true and fair view of the financial position of as at 30th April, 1985.

SHANAHAN, WINDER, TOMLIN & CO.
Chartered Accountants

CHRISTCHURCH
27th June, 1985.

These accounts must be read subject to the attached notes

ANNUAL REPORT CONT.

Professor Arthur Campbell of Otago University and Dr H.K.J. Powell of University of Canterbury have accepted nomination as representatives of NZIC on the Asian Network on Analytical and Inorganic Chemistry which is sponsored by FACS and supported by UNESCO.

Membership

During the year Council was pleased to confer Honorary Fellowship on Dr D.R. Llewellyn and Emeritus Professor C.J. Wilkins.

The President of the Royal Australian Chemical Institute, Professor A.L. Beckwith, was elected an Honorary Fellow during his term of office.

I was pleased to receive a similar honour from the RACI and also the CIC.

Proposals for simplification of the non-corporate categories of membership and for clarification of the progression from non-corporate to corporate membership were prepared by the President and Secretary and considered by the branches. The result was that five of the six branches voted to retain the status quo and there has, therefore, been no change in the membership rules which have now been edited and reprinted in the Yearbook.

The real reason for concern in regard to membership lies in the indication that the Institute has little appeal to chemists in industry and seems to be losing the interest of many such members. I drew attention to this aspect of membership during my tour of branches and voiced the personal view that the technician grade appears to be regarded as inferior, yet it is the only grade open to the holders of Certificate of Science, who form the backbone of much of industrial chemistry.

This feeling was very clearly supported in discussions at the "outposts" which are not associated with the Universities. In spite of the rejection of the proposed changes, I feel that there should be further consideration of the non-corporate status of the holders of the New Zealand Certificate of Science, but, at the same time, stress there should be no lowering of the professional requirement for admission to corporate membership.

During the year a proposal was developed by the Canterbury branch to bring the advantages of membership of the Institute to all students, and recent graduates. This has involved a carefuly prepared package of information, which has been made available to all branches. At the same time individual branches have taken their own steps to promote recruitment. A career orientated wall poster for display in foyers, school laboratories etc has also been prepared by the publications committee.

INCOME AND EXPENDITURE ACCOUNT FOR YEAR ENDED 30TH APRIL 1985

1983/4 $			1984/5 $
	EXPENDITURE		
	ADMINISTRATIVE & SUNDRY EXPENSES		
980	Accountancy/Aduit Fees	1,260	
	Branch Expense Grants:-		
9,180	— Re Capitation Fees	9,390	
3,000	— Re Student Travel	3,000	
446	Computing, Address Labels etc	872	
0	Conference Registrations — Council	352	
	Donations: —		
2,000	— Prince & Princess of Wales Science Awards Scheme	0	
1,000	— A.C. Kennett — Memorial Fund	0	
7,686	Honoraria and Allowances	8,128	
0	I.U.P.A.C. Conference Contribution	600	
1,938	Overseas Visitors Expenses	1,141	
0	Overseas Travel	1,118	
6,069	Printing, Stationery, Postages Tolls etc.	4,218	
100	Prizes	150	
34	Specialist Group Expenses	0	
	Subscriptions:-		
346	— Royal Society of NZ	382	
125	— S.A.N.Z.	125	
50	— N.Z.C.W.P.R.	50	
0	— F.A.C.S. (2 years)	683	
50	— N.Z. Futures Trust	50	
—	Ties & Scarves (Net cost)	247	
6,733	Travelling Expenses	8,163	
331	Depreciation	491	
40,068			40,420
	PUBLICATIONS		
16,123	Journal — Publisher	18,804	
1,200	— Editor	1,500	
322	Chem. N.Z.	485	
0	List of Members	1,000	
1,711	Sundry Publications	1,339	
1,048	Stock of 'Chem. in a Young Country	0	
20,404		23,128	
1,777	Less: Publication Sales 1,613		
176	Sales 'Chem. in a Young Country' 0		
1,953		1,613	
18,451		21,515	
58,519	**TOTAL EXPENSES**		61,935
1,790	**EXCESS OF INCOME OVER EXPENDITURE FOR YEAR**		2,415
$60,309			$64,350

1983/4 $			1984/5 $
	INCOME		
52,576	Subscriptions		55,612
	Interest Received:-		
461	— Bank of New Zealand	1,173	
0	— Equiticorp Ltd	1,623	
540	— Fletcher Challenge Ltd	540	
84	— Local Body Stock	84	
2,352	— Marac Holdings Ltd	1,289	
142	— Royal Society of NZ	150	
520	— U.D.C. Group Holdings Ltd	493	
4,099			5,352
	Conference Surplus		
55	— Otago (additional)	0	
2,412	— Waikato	0	
0	— Wellington	3,386	
1,167	— Adhesives Symposium	0	
3,634			3,386
$60,309			$64,350

These accounts must be read subject to the attached notes

THE NEW ZEALAND INSTITUTE OF CHEMISTY (INC) NOTES TO FINANCIAL STATEMENTS

STATEMENT OF ACCOUNTING POLICIES:

General Accounting Policies

The measurement base adopted is that of historical cost. Reliance is placed on the fact that the Institute is a going concern.

Accrual Accounting is used to match expenses and reveneus.

Particular Accounting Policies

Subscriptions in Arrears and Sundry Debtors are stated at expected realisable value.

Depreciation has been charged using the straight-line method based on the estimated 5 year economic life of the assets concerned.

Investments are stated at cost or, where applicable, with the addition of interest compounded to date.

It is hoped that during the coming year Council will see its way clear to provide more funds to stimulate student interest, including more support for attendance at Conferences.

Public Affairs

The Environmental Committee of the Institute chaired by Dr R. Laverty has examined the report by the New Zealand Ecological Society on "The Environmental Consequences to New Zealand of Nuclear Warfare in the Northern Hemisphere" and has issued a statement which is broadly supportive.

The Environmental Committee in association with the Hazardous Chemicals Committee (Chairman Dr W.A. Temple) has provided comments on the consequence of the ICI fire to the Commissioner for the Environment.

Finance

The Balance Sheet shows a healthy excess of income over expenditure of and $2,415 accumulated funds amounting to $39,811. This result was achieved in the face of a predicted deficit and results from the adoption of some quite tough economies.

At the Council meeting in February it was decided to increase subscriptions by $10 per year in order to keep ahead of predicted inflation and to permit the freeing up of funds for branches. As indicated above, it would be desirable for some additional spending on recruitment and for broadening of the international involvement of the Institute.

During the year the first steps were taken to invite the interest of major New Zealand companies in the Institute. This was based on the surging growth in manufacturing and the fear that the industry need for chemists might be difficult to fill.

Acknowledgement

This report was prepared in the absence of the Honorary General Secretary, Dr John Rogers, who was overseas at the time. His continuing dedicated work throughout the year is acknowledged. Most of the statistical information was supplied by the Registrar, Denis Hogan, whose help is also acknowledged.

A.W. Mackney PRESIDENT

NZIC OFFICERS AND MEMBERSHIP 1984/85

NZIC Elected Officers:

President:	Mr A.W. Mackney
1st Vice-President:	Prof G.B. Petersen
2nd Vice-President:	Dr B. Halton
Hon. General Secretary:	Dr J. Rogers

Branch Delegates to Council:

Auckland — Dr W.A. Denny, Waikato — Prof R.M. Daniel, Manawatu —Dr K.R. Whittle, Wellington — P.G. Best, Canterbury — Dr J.R. Cretney, Otago — Dr R.A.J. Smith.

Officers Appointed by Council:

Registrar — D.J. Hogan, (31/12/87),
Administrative Secretary — Mrs N.E. Wignall, (31/12/87),
Journal Editor — Dr B.W.L. Graham,
Hon. Librarian — Dr L. Eyres
Archives Officer — Dr R.F.C. Claridge, (31/12/85).

Obituary:

We record with regret the deaths of the following members: J.F Barnes (Otago); H.W. Crozier Hon. Fellow (Canty.); W.A. Joiner Hon. Fellow (Wgtn.); O.H. Keys Hon. Fellow (Auckland); G.C. Martin (Canty.); D.J. Spedding (Auckland); S.H. Wilson Hon. Fellow (Wellington).

Membership:

During the year the following changes in membership have taken place:

Honorary Fellows elected	2
New Fellows	2
Members elected to Fellowship	13
Members re-instated	2
New Members	31
Associate elected to Membership	1
Graduates elected to Membership	21
New Associates	5
Technicians elected to Associate	4
New Graduates	26
Student elected to Graduate	11
Student elected to Technician	1
New Technicians	6
New Students	12
Deaths	7
Resignations	33
Off	17

Nett Gain — 27.

COUNCIL COMMITTEES

Standing: President (A.W. Mackney); Delegate from President's Branch (Dr W.A. Denny); General Secretary (Dr J. Rogers); Registrar (ex-officio).

Honours: President; 1st President (Prof G.B. Petersen); 2nd Vice-President (Dr B. Halton); General Secretary

Membership: Dr H.K.J. Powell (Until 31/12/85); Dr J.H. Garside (Until 31/12/86); R.H. Hopgood (Until 31/12/87).

Publications: Dr J.R. Cretney; Dr H.K. J Powell.

Editorial: Editor (Dr B.W. Graham); Dr A.C. Herd; Dr W.A. Denny; Dr J.H. Garside; Dr P.E. Nelson; Dr R. Whiting; C.L.H. Stonyer; Miss D.M. Fenton.

Public Affairs and Science Policy: Dr B. Halton (Until 31/8/87); A.A. Turner (Until 31/3/88); Dr D.E. Wright; The President — ex officio.

Chemical Syllabus: G.W. Valpy; P.G. Best (Council Representative); W Freitag; Dr W.R. Sharman; Dr W.C. Tennant.

Environmental: Prof R. Laverty; Dr R.A. Smith; Dr G.F. Laws; Prof A.D. Campbell; Dr W.A. Temple; Dr K.A. Hunter; D.A. Cowan, Waikato; (corresponding member) I.A. Rowland, Canterbury; (corresponding member)

Hazardous Chemicals: Dr W.A. Temple; Prof A.D. Campbell; Prof G.B. Petersen; Assoc Prof M.R. Grimmett; A.N. Scrymgeour; R.H. Hopgood, Auckland (corresponding member)

REPRESENTATIVES TO OTHER BODIES

AAVA: W. Freitag (Until 31/3/86). N.R. Edmonds, Deputy (Until 31/3/86).

SANZ: Dr H.J. Percival (Until 31/3/86)

RSNZ Member Bodies Management Committee: Dr H.J. Percival.

NZIC ANNUAL GENERAL MEETING

The Annual General Meeting of the New Zealand Institute of Chemistry will be held at 3.45pm on Monday 26 August 1985 at the University of Canterbury.

AGENDA

1. Welcome by the President, Mr A.W. Mackney.
2. Presentation of the 1984 Easterfield Medal to Dr Tom Brittain.
3. Easterfield Address.
4. Apologies.
5. Minutes of 1984 AGM to be confirmed.
6. Matters Arising.
7. Annual Report: see this Journal.
8. Finance — 1984/85 Statement of Income and Expenditure
   1984/85 Balance Sheet — see this Journal.
9. Election of Officers: President, First Vice-President, Second Vice-President, General Secretary.
10. Awards and Prizes: ICI Prize, Shell Industrial Chemistry Prize, Essay Prize.
11. General Business.

J. Rogers
Honorary General Secretary

MEMBERSHIP STATISTICS — April 30 1985

BRANCH	Hon. Fellow	Fellow	Member	Associate	Graduate	Technician	Student	Total Members
AUCKLAND	7	65	263	31	22	10	8	406
WAIKATO	4	18	93	9	17	0	7	148
MANAWATU	0	30	99	10	5	1	3	148
WELLINGTON	5	73	236	3	24	2	1	344
CANTERBURY	7	69	98	4	24	1	11	214
OTAGO	1	43	67	3	11	4	4	133
OVERSEAS	4	27	145	2	17	0	0	195
TOTAL	28	325	1001	62	120	18	34	1588

SPECIALIST GROUPS:

GROUP	SECRETARY	NIZC	non-NZIC	Total
Analytical:	D J. Hogan	47	4	51
Chemical Education	D T. Howarth	167	320	487
Chromatography	Dr P.G. Robinson	126	167	293
Electrochemistry	Dr A.J. Easteal	36	27	63
Geochemistry	Dr K.L. Brown	37	100	137
Organic Chemistry	Dr P.J. Steel	84	5	89
Polymer Chemistry	R.J. Norris	55	29	94
Thermodynamics	Dr G.R. Hedwig	19	3	22
Inorg & organometallic	Prof K.M. Mackay	61	21	82
Fats & Oils	Dr S.F. Hobbs	not available		
X-Ray Crystallography	Dr G.J. Gainsford	23	2	25

*(some bulk mailings not recorded)

BRANCH MEMBERSHIP: April 30	1982	1983	1984	1985
Auckland:	397	401	404	406
Waikato:	123	122	138	148
Manawatu:	148	138	143	148
Wellington:	334	345	338	344
Canterbury:	201	199	215	214
Otago:	119	131	128	133
Overseas:	193	191	195	195
Total:	1515	1527	1561	1588

OBITUARIES

WILLIAM ALEXANDER JOINER: 1902 — 1985

William Joiner, MSc, FIChemE, FRSC, FNZIC, was one of those active in formation of the NZ Institute of Chemistry in 1930. At the inaugural Council meeting of February 1931, he was elected first Secretary-Treasurer, and served in this capacity for two years. He played a major role in Institute affairs, and was elected President in 1957. With his death, members of the Institute have lost a good friend.

Bill Joiner was active not only in the NZ Institute of Chemistry, but was one of the main architects of the structure of modern chemical research in this country, and of its application to the problems of industry. He was particularly enthusiastic over export industries, or industries that could substitute for imports, to aid in our long-continuing problem over "balance-of-payments". To this end he worked tirelessly to see that all the resources of physics, chemistry and geology were harnessed in developing new export products, and in assisting research being done to this same end in the agricultural and biological sciences. His personal research interests were in fuel research, where his colleagues remember his fertile imagination, sound engineering and scientific skills, and flair for producing an elegant and efficacious solution to any design problem. He was adept at planning an experiment to test an hypothesis, and could either carry it out himself, or provide effective and inspired leadership to a team. His charismatic and effective leadership will always be remembered by those who worked with him on technical problems. He was personally optimistic, and could revive the flagging spirits of scientists facing unexpected difficulties with his cheerful remarks, and pertinent technical suggestions.

Bill Joiner studied chemistry under Professor Easterfield at Victoria University, where he held a National Research Fellowship. He graduated MSc with first class honours in 1923, and joined the staff of Dominion Laboratory (now Chemistry Division of DSIR) in January 1924, some years before the inception of DSIR . He then worked on various fuels — petroleum products and coal. In company with Mick Hughson and Keith McDowell, he carried out research on the low-temperature carbonisation of coal, first on a laboratory scale, and then on a pilot scale.

In 1934-35, he studied chemical engineering at Imperial College in London, qualifying AMI Chem E, and returned to establish a specialised chemical engineering group in Chemistry Division. This group studied flax fibre; seed, food, hops, and tobacco drying; fruit storage; and gas producers for motor vehicles. In this last project, Joiner's design flair was well illustrated. The problem is not to make producer gas — this is relatively simple. But rather to design a grit-filter to prevent rapid engine wear, without causing an excessive pressure drop (which would further diminish the already low engine power). Under Joiner's guidance, the group produced a novel and effective solution.

In 1946, Joiner was appointed as Director of Chemistry Division; but he was not left long in this position. When Sir Ernest Marsden resigned as head of DSIR in 1948, Joiner was reluctantly persuaded to go to Head Office, where he served as Deputy Director-General until his retirement in 1964. From this position he initiated an "agonising reappraisal" of the role of Chemistry Division in New Zealand science, forcing it away from the dominating interest in analysis that had served it so well until then. It is no disparagement of Mr Grigg's role in carrying out this policy, to say that much of the drive and initiative for these changes came from Joiner. After retirement in 1964, Mr Joiner served as secretary to the newly established National Research Advisory Council.

His staff remember Bill Joiner more as a friend than a boss. His colleagues' dominant memories will always remain his absolute honesty, his even temper, and his manual dexterity. He was a skilled glass-blower; and he could fashion metal or wood with equal ease. His skill at the drawing board was superb, and until his retirement, he personally inscribed all membership certificates for the Institute. He designed the present Institute seal, to illustrate the motto "Per Libram et Librum".

His colleagues' confidence in Mr Joiner was well summed up by a Minister of the Crown, speaking at his retirement ceremony in 1964. The Hon. Mr Shand then said "We trust Bill Joiner".

I. K. Walker

JOSEPH IVON GRAHAM: 1888 — 1983

In experiments that will probably never be repeated, Ivon Graham and his co-workers established knowledge of the effects of breathing poisonous atmospheres while undertaking hard physical work. Modern mine rescue operations are based on this knowledge of the effects of breathing atmospheres containing CO_2 AND CO; and on methods of detection of these gases, which he developed and helped stimulate. His passing marks a milestone in chemical research to protect the health and welfare of miners.

Professor Graham was born and educated in Ireland, winning an 1851 Exhibition Research Scholarship to Cambridge where he graduated MA, MSc in 1912. He then worked under the guidance of Professor John Scott Haldane in the Doncaster Coal Owners Laboratory, in a career that was to span 54 years of active research into the effects of toxic and explosive gases, and the hazards of spontaneous ignition of coal; and culminated in his service on the Royal Commission of Enquiry into the explosion which devasted the Masterton factory of General Plastics (NZ) Ltd on 13 April 1964. His work thus spanned the three disciplines of chemistry, engineering and physiology, and he was responsible for notable advances in all three fields.

Graham carried out research on health aspects of environmental conditions in coal mining, with special emphasis on problems of illumination, ventilation, dust suppression, nitrous fumes, methane, carbon monoxide, sulphur dioxide, etc. He pioneered scientific investigation of the spontaneous ignition of coal dust, that was a particular problem in the Doncaster seam. In a brilliant sequence of experiments, he and his co-workers quantified the exothermic aerial oxidation of coal at low temperatures, and laid the foundation of modern knowledge of this still unelucidated subject.

The hazardous Doncaster seam was the cause of several disasters, and Ivon Graham accompanied rescue teams underground in the aftermath of explosions, fires, and anaerobic atmospheres. He developed methods for analysis of atmospheres, measurement of humidity, and assessment of atmospheric safety. His experiences underground taught him the need for field chemical methods, and led him to develop better rescue apparatus. In experiments above ground, the team would run until they collapsed wearing full rescue equipment and bent double, while breathing hot humid atmospheres containing ever increasing contents of carbon dioxide, and then repeated the experience with carbon monoxide. Not only does mine rescue owe a lot to these experiments, but modern hospital anaesthesia still leans on this knowledge of the effects of CO^2.

In World War I, Ivon Graham served in Flanders as stretcher bearer and pharmacist, until recalled to England for urgent research on gas poisoning. He then resumed his collaboration with Professor Haldane, resulting in a long sequence of published papers. Although mostly chemical in subject matter, these papers were unfortunately published in journals (e.g. *Trans.Inst.Mining Eng.)* that were not covered by *Chem.Abs.*, and are thus difficult of access by a chemist. After Haldane's death, Ivon Graham was appointed Director of the British Coal Owners Research Association Laboratories, until nationalisation of the industry in 1946, when he became Scientific Advisor to the National Coal Board.

In 1949, Professor Graham was appointed to the newly created Chair of Coal Mining at University of Otago, and continued until 1958. In this position he was able to renew his close personal contact with underground mining, and his colleagues still remember his enormous physical energy and endurance, out-pacing men much younger than himself. His great enthusiasm was always the health and welfare of miners, and he was able to apply his extensive experience to New Zealand conditions. In particular, he investigated the spontaneous ignition to which many N.Z. coals are prone.

IN 1965, he was appointed to the Commission of Enquiry into the Masterton explosion, in the expectation that his profound knowledge of dust explosions would be relevant. To many people's surprise, his knowledge of coal mining proved even more relevant, and he was instrumental in diverting the Commission away from a concentration on the cause of ignition, to ensuring that hazardous conditions do not arise in industry in the future. It is mostly due to his initiative that New Zealand factories are regularly inspected for potentially explosive dusts —and indeed these are still tested in this country by methods developed in the coal industry, rather than by more conventional tests.

Ivon Graham's colleagues remember him as a gentleman, of strong Christian principles, outwardly meek and humble, but with a strong tenacity of purpose. He studied mining problems at first hand, and returned to the laboratory to apply his chemical research to alleviate the problems of miners, to whose welfare his life was devoted.

I. K. Walker

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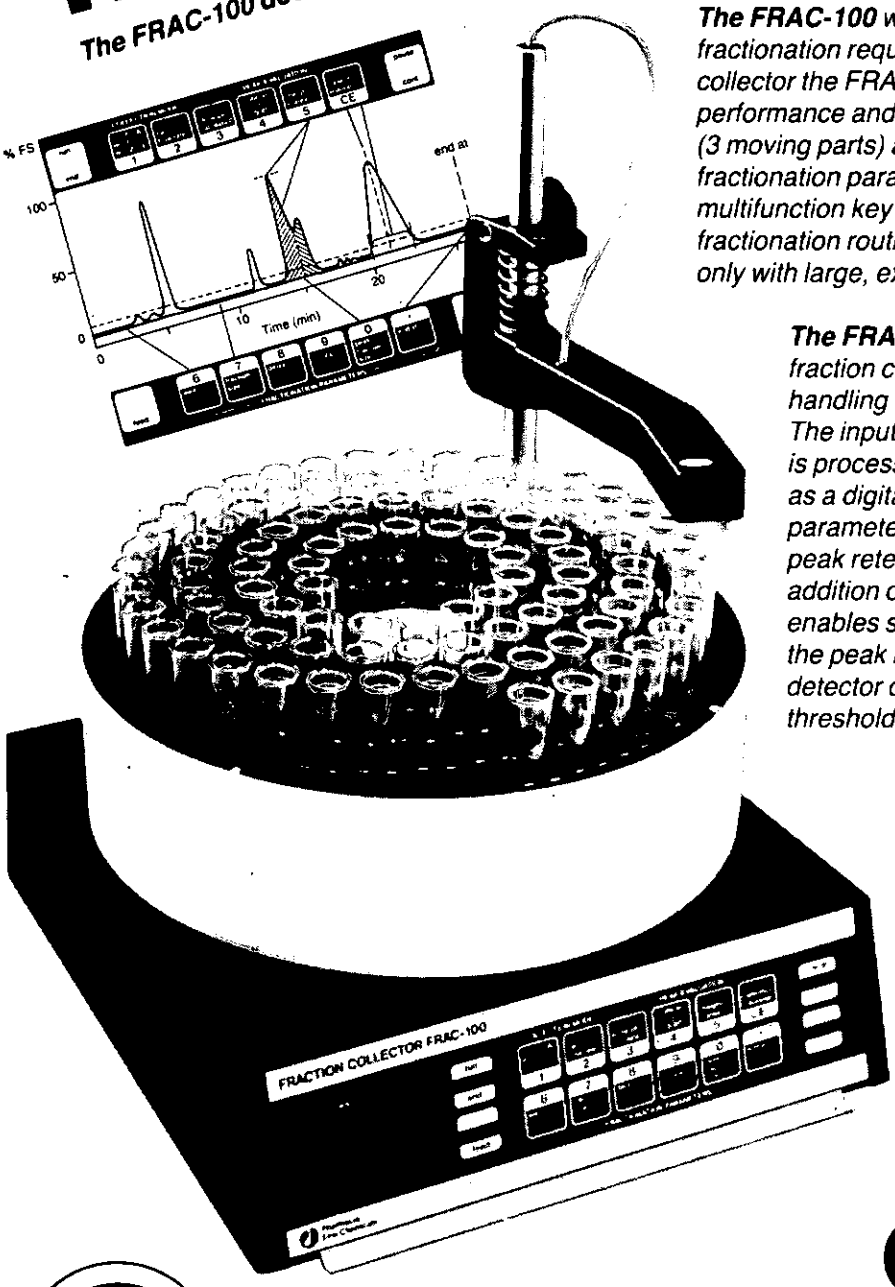

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1715

BRANCH NEWS

Auckland

Dr C.S. Barnes gave a talk entitled Chemical Adventures in Biotechnology to a small but enthusiastic group of members during June. The talk covered a wide range of topics in the biotechnology field. In particular, the cloning of genes and their insertion into organisms, the production of antibodies, and the microbiological extraction of ores. He indicated that large sums of money are being invested in this area in Australia, and even more so in Europe and the USA.

On June 27 a large group of members took part in a visit to the Glenbrook Steel mill. The group of 70 were shown around the company's Telarc registered laboratories by Environmental Chemist **Dr Ian Johnson,** where they saw some of the advanced equipment installed. The tour also included the zinc coating plant, the coil coating plant, and the site expansion project. The visit ended with an excellent meal in the company cafeteria.

Waikato

Dr James McIntosh, Ruakura Animal Research Station, Hamilton, gave a very well presented talk on "Monoclonal Antibodies; Their Production and Use" at the May branch meeting. After explaining the difference between poly and monoclonal antibodies, Dr McIntosh outlined the historical developments leading to the production of monoclonal antibodies by Kohler and Milstein. This was followed by a description of production and selection methods for monoclonal antibodies, and finally Dr McIntosh discussed current and future uses of the antibodies and their commercial production.

Dr John Ayres, Department of Chemistry, Biochemistry and Biophysics, Massey University, gave a most interesting address entitled "From Failure to Success — A 16 year History of Cellulosic Ion-Exchangers in New Zealand" at the June branch meeting. He covered the early successes and setbacks in the development of cellulosic ion-exchangers and described the chemistry that led to their eventual adoption on a large scale in the dairy industry for the recovery of protein from whey.

Wellington

During May the Wellington Branch combined with the NZ Forensic Science Society for an address by **Professor S.S. Kind,** President of the Tenth Meeting of the International Association of Forensic Sciences.

Professor Kind described his involvement as part of a team reviewing the evidence which was available in the Yorkshire Ripper murders. They produced a profile of the suspect which indicated the Ripper lived near one or two towns in the Bradford area and used a fairly old motor car. Although Peter Sutcliffe was arrested as a result of fortuitous circumstances unrelated to this review, the profile that had been built up from the evidence in seventeen cases was an accurate picture of the suspect.

This address illustrated the application of a scientific approach to criminal investigation, and high-lighted the need for a coordinated approach to ensure the maximum information was available to the investigators.

A small number of Branch members, mainly from the industrial sector, attended the talk in June by **Dr J. Kee Woo** of NZ Forest Products Technical Centre. Dr Woo outlined the development of pine bark based plywood and particle-board 'tannaphen' adhesives. This lecture traced the work from the 1950's to the present. He described the current technical difficulties which closed the Kinleith bark extraction plant following its opening fanfare in 1981. Hopefuly these difficulties have been overcome, and the plant is expected to restart in 1986. This would be most desirable from New Zealand's point of view as the product has very solid export potential.

An interesting side development of this work is the fate of the extracted bark particles which were sold as a waste product. This material is now very much in demand for the expanding horticultural industry where it is used in the export of plants.

Canterbury

Following on the tradition of last year we held a graduands dinner in May. The meeting was addressed by **Dr Lionel Sharman,** of Chemistry Division in Wellington, who spoke of the past and present role of the Forensic Scientist and future trends. He then went on to develop the theme of the philosophy of Forensic Science with the wider implications of the philosophy of science in general.

In May **Professor Kind** gave a seminar to the Branch and Chemistry Division Staff at IRC. He spoke of his involvement in the Yorkshire Ripper case and may have cause to regret his visit south when, in the question and answer period, one member of the audience suggested another possible tie-up in the case.

The Chemical Education Group Meeting was held in June at Chemistry Division and took the form of a series of demonstrations to teachers of experiments suitable for use in school laboratories.

The second meeting of the Student Chemical Society was held in June at Christchurch Girls High School. **Selwyn Maister** gave an illustrated talk on "Careers in Chemistry" assisted by two part-time polytechnic students. The talk was followed by a video on the Motonui gas to gasoline project entitled "The Synfuel Option".

Otago

The Annual Dinner of the Branch was held in the Common Room of the University of Otago Medical School on 15th May. Following a most enjoyable meal, the gathering was addressed by **Dr Michael Cullen,** MP for St. Kilda. The second R.E. Corbett lecture was the subject of the Branch's June meeting. **Dr Robin Mitchell,** a natural products chemist whose research project, while still an undergraduate, was supervised by Prof. Corbett, lectured on this occasion. Dr. Mitchell, now with the DSIR's Division of Horticulture and Processing in Auckland, entitled his lecture, "What's exciting about studies on toxins from bacterial phytopathogens?"

SCIENCE & TECHNOLOGY FOR DEVELOPMENT WELLINGTON 7-9 MAY

This Conference had the following objectives:

To achieve improved economic development through the better application of science and technology in two principal ways —

- By making the groups of management, marketing and technology more aware of the benefits possible from co-ordinated efforts between them.
- By identifying ways of improving the match of technological effort, both private and public sector, to New Zealand needs.

Attendance was by personal invitation and was restricted to 100 participants from a wide range of senior executives from fields such as manufacturing and processing, marketing, investment, science and technology, education and labour unions. It was not representational and was not a conference of scientists for scientists.

The discussions were based on four papers prepared beforehand by working groups, the subjects being:

1. Human resources for science and technology.
2. Investment
3. The information base
4. Putting science and technology to work for New Zealand.

These preparatory papers were the subject of discussion by small working parties of about twelve and the comments and conclusions of the working parties were included in a modified presentation which was put before a final plenary session. There was also an opportunity for participants to make brief personal contributions on aspects of the subjects which they considered had not been otherwise covered. The final versions of the four working papers plus the additional individual contributions have been incorporated in a full conference report. A short eight page paper was distributed very soon after the Conference to provide a summary of the main findings and to ensure that the interest generated by the Conference was not lost.

In addition to the discussions on the four topics mentioned above, keynote addresses were presented to plenary sessions on subjects of broad general interest. These were, in order of presentation:

Technology & Management by Mr Charles Martin.

(What will happen if management does not respond to the drive of technology.)

The Social & Human Dimensions by Professor G.S. Fraser.

(The need for study of human resources, the impact of science and technology on humans.)

Economic & Policy Framework for Science & Technology in New Zealand by Dr J.H. Troughton.

(A broad view of the process of development of a framework for science and technology for New Zealand.)

The Evidence that We Achieve by Mr A.M. McConnell.

(Given the challenges of tomorrow and the confidence of past achievements we must create the environment to motivate our national talent.)

The Conference was opened by the Prime Minister, Mr Lange, and chaired by the Minister of Science & Technology, Mr Tizard. The deputy chairman was Mr Peter Shirtcliffe (managing director of the Goodman Group) who was also chairman of the organising committee. The remaining members of the organising committee were W.J. Knox, A.W. Mackney and D.H. Tudhope. The hard work was done by Dr Peter Foster of BRANZ who was designated as organiser and was ably assisted by the full secretariat of National Research Advisory Council and some generous help from DSIR.

The above mentioned four keynote addresses plus the speeches by the Prime Minister, the Minister of Science & Technology and Mr Shirtcliffe have been put together in a single volume and are available from NRAC.

A.W. Mackney

GOVERNMENT DEPARTMENTS & RESEARCH INSTITUTES

WOOL RESEARCH ORGANISATION

Dr Stan Simpson, Director of WRONZ, recently returned from his annual IWS R&D Committee meeting in U.K. While in U.K. he attended the 75th Jubilee World Conference of the Textile Institute. **Dr John McKinnon,** Leader of the Textile Chemistry Group, spent three weeks in U.S.A. in May, participating in carpet-production trials using yarn processed in N.Z. with the WRONZ Chemset technology. Three N.Z. firms have now confirmed orders for commercial Chemset plants which continuously scour and set carpet yarns as a package-to-package operation.

NZ METEOROLOGICAL SERVICE

In May of this year a highly successful 2-day workshop on Atmospheric Chemistry was held at the Met. Office in Wellington. Organised by **Dr Tom Clarkson,** the meeting brought together more than 60 chemists, physicists and meteorologists to discuss aspects of current research. The scope of the meeting was wide-ranging with sessions on the troposphere, the stratosphere, urban and industrial effects, aerosols and clouds, carbon dioxide and the greenhouse effect, and special topics of importance in the Southern Hemisphere and the Antarctic. The format of the meeting was quite informal, with one or two 15-minute review papers in each session, followed by short presentations from the floor and lengthy discussion periods. More than 20 posters were also displayed in the tea areas, and these also contributed significantly to make the meeting a highly interactive and stimulating event.

MAF, INVERMAY

Dr Grant Montgomery, after spending two years gaining experience in radio immunoassay techniques at the INRA Institute in Nouzilly, France, has returned to the M.A.F.'s Invermay Agricultural Research Centre, Mosgiel, and is now setting up computerised RIA equipment incorporating a high-throughput gamma counter.

DSIR

Chemistry Division, Wellington

Dr R.A. Palmer has resigned from Chemistry Division and will be joining an international Computer firm.

The Dominion Analyst recently visited several Forensic Science laboratories in Britain and the United States.

With the completion of the Gracefield Library building the DSIR central library is moving from Wellington and will combine with the Chemistry Division and the PEL libraries as a single DSIR Library Service located on the Gracefield campus.

Dr T.M. Seward head of the Geochemistry Section at Chemistry Division, has been invited to present a Plenary lecture at an International Symposium on Hydrothermal Reactions at Pennsylvania State University. **Mr D. Grant-Taylor** and **Dr A.J. Read** from the Geochemistry Section will also be presenting papers at this meeting. Dr Seward will then be travelling to the Gordon Research Conference on Inorganic Geochemistry in Andover New Hampshire to deliver a Plenary lecture. This meeting will also be attended by **Dr K.R. Brown** from Chemistry Division in Wairakei.

Dr R. Glover is now the Officer in Charge of the Chemistry Division Wairakei. This position, previously held by **Dr R. Henley,** is reallocated among the senior staff every three years.

Dr P. Dawson has joined the Applied Chemistry Section at Chemistry Division. Dr Dawson graduated with a Ph.D from the University of Otago in 1978, and spent the next two years on Post Doctoral fellowships in Great Britain. He returned to New Zealand in 1981 where he worked for ICI in the Corporate Research Department.

BUILDING RESEARCH ASSOCIATION

A conference on "Building Materials Durability in the Food Industry" organised by the Association was held at the Angus Inn, Lower Hutt on June 17-19. The opening speech by **Mr J.T. Graham** struck a provocative note for the nearly 100 delegates from a wide range of backgrounds. Papers on all aspects of durability were presented by food industry design and maintenance personnel, design consultants, materials suppliers, DSIR, DRI and BRANZ. Copies of the proceedings are available from BRANZ.

Dr H.L. Baber has been made an assistant director with responsibility for external services. Dr Baber was previously head of Fire Division. **Dr M.L. Jansen** has left Materials Division to join Applied Geology Associates. **Mr A.F. Bennett** will be in Chicago in October to present a paper at a symposium on polymers in concrete at an American Concrete Institute convention. **Dr R.S. Whitney** presented a paper on the development of a computerised building technology information resource to a conference at Victoria University in May.

Peter Foster recently returned from Europe through China and spent some days at the China Building Research Academy. The Academy was very interested in a cooperative programme because of a recent decision to set up a Fire Research Institute within the Academy. Some ongoing assistance to the Academy from BRANZ looks likely in the future.

DSIR Applied Biochemistry Division

Dr John Shaw has been appointed leader of the Organic Chemistry Group.

CONFERENCES

DUNEDIN — 1986:

In addition to the Annual Conference of the NZIC/NZBS and the 10th Conference of the A & NZ Society for Mass Spectrometry listed in the June issue, two symposia have now been announced.

August 25: Symposium on **Applications of Nuclear Magnetic Resource Spectroscopy**

August 27: **Symposium on Applications of Mass Spectrometry.**

Further details are available from Dr J.F. Cutfield, Dept of Biochemistry, University of Otago, Dunedin.

1986 NZ Science Teachers' Conference ("SCICON '86") will also be in Dunedin, August 25-29. Further enquiries: Otago University Extension, P.O. Box 56, Dunedin.

OVERSEAS:

Chemistry in Occupational Hygiene and the Environment, 7-11 July, 1986, Darwin, Australia.

Metabolism of Minerals and Trace Elements in Human Liver and Kidney Diseases, Sept-Oct, 1986, Nepal/India/ and Pakistan.

7th World Congress of Food Science and Technology, 26 Sept-2 Oct, 1987, Singapore.

INDUSTRIAL NEWS

Mr Bill Thomson, Chief Chemist with soap manufacturers McLeod Bros. in Dunedin, reports that following the recent substantial increase in sales of their products, two new soap pans, each of 15 tons capacity, have now been installed to treble the total capacity of the plant. Also **Mr Phillip Love,** a graduate of the University of Otago, has now been promoted to Technical Manager at the factory.

WARNING

ELECTRICAL REGISTRATION ACT

Walter Freitag requests that it be brought to the attention of members that the current regulations regarding the fitting/replacing of plugs, fuses and the like on electrical appliances, may not be as liberal as at first seems. The exemptions from the regulations for these apply to private activities only. If you are required to carry out such operations in the course of paid employment, special dispensation is required from the Electrical Registration Board (PO Box 12211, Wellington).

This matter has aroused some concern in AAVA with regard to the training of technicians in physics, and chemistry-related courses such as Lab Technology. Clarification and/or changes are being "pursued".

MEMBERSHIP

The following applications and changes in status were approved at the meeting of Standing Committee in May. These are additional to those already published in the previous issue:

Fellowship:
PEDDIE, William Stewart, BSc, DipEd, MPhil (Auck). Mangere College, Auckland (H.O.D. Science).

Membership:
NICHOLSON, David James, MRSC. Electricity Divn. Ministry of Energy, Wellington (Supt., Chemical Standards).

Technician to Associate:
HUBER, Rolf, (Swiss Fed. Dip. as Indust. Chem.). Quikstik International Ltd, Manukau (EDP Consultant).

UNIVERSITIES AND TECHNICAL INSTITUTES

Auckland

Associate Professor Charmian J O'Connor attended a Gordon Conference in June/July, as well as visiting various research institutions and universities in the U.S.

Professor Warren Roper attended a Gordon Conference in New Hampshire in July followed by visits to research establishments in England, France, Switzerland and Italy. While in Italy he will attend the 12th International Organometallic Conference in Vienna.

Associate Professor Graham Wright recently toured Canada and parts of USA on a Senior Travelling Fellowship awarded by the Association of Commonwealth Universities. He visited 20 universities and a number of research institutions. He comments that the scale and vitality of North American science are very impressive, although the size of some conferences seems to have got out of hand.

Waikato

The Chemistry Department has recently produced a 30-page booklet on "Chemistry at the University of Waikato". This presents a 5-year report on staffing, teaching and research over the period 1980-84, and is an up-date of a previous publication (Chemistry at the University of Waikato, 1970-79, The First Ten Years). Both reports provide details on staff, their research interests and publications, research students, their thesis topics and subsequent employment histories, as well as lists of students majoring in chemistry in each year.

Victoria University of Wellington

Dr B. Halton visited Israel during June to work with **Professor Rubin** at the Israel Institute of Technology at Haifa. During July he attended the 5th International Symposium on Novel Aromatic Compounds held at St Andrews University in Scotland.

Christchurch Polytechnic

Dr Selwyn Malster, Canterbury Branch Treasurer, has been recently appointed to the position of second HOD in the Department of Applied Sciences. Selwyn joined the staff of Christchurch Polytechnic in 1973 and held the position of Senior Tutor in Chemistry in the Department. He joins present Head of Department **Dr John Cretney** who is also a chemist. The need for a second Head is a consequence of growth the Department has experienced in recent years particularly in nursing sciences and computing.

Canterbury

Professor Jack Vaughan who retired in May, has been appointed Emeritus Professor by the University Council.

Drs Don House, Graeme Wright, and **Robert Maclagan,** have returned from study leave. Dr Don House spent six months leave in Basel, Switzerland on a Claude-McCarthy Fellowship, Dr Robert Maclagan worked with **Dr H.F. Schaeger** at Berkeley University, California, for twelve months and **Dr Graeme Wright** spent twelve months study leave with DSIR (Chemistry Division) at the Ilam Research Centre.

Dr Jim Coxon spent six weeks at the University of Florida, Gainesville, working with **Professor M.A. Battiste.**

Otago

Prof. George B. Petersen, Head of the Department of Biochemistry, was recently elected Fellow of the Royal Society of N.Z. in recognition of his work on the determination of the sequence of bases in DNA. Staff and students of the Biochemistry Department celebrated with a "surprise" party disguised as a visit from an East European scientist, Dr Loyar Yteicos (Royal Society spelt backwards). Prof. Petersen was fooled at the most for 30 seconds. Also from Biochemistry, **Dr Murray Grigor** is currently in the U.S.A. visiting laboratories interested in lactation, continuing his collaboration with the Lipids Group at Duke University, North Carolina, and attending Gordon conferences.

From the Department of Pharmacy, **Prof. D.G. Perrier** attended the Pan Pacific 3 Pharmacy Conference in Hong Kong during his travels in February. Recently, the Department has been re-equipped following their recent move from the Faculty of Science to the Medical School. Approximately $280,000 has been spent largely on HPLC, atomic absorption systems and other equipment required primarily for teaching.

From the Chemistry Department, **Prof. P.K. Grant** spent two weeks at the Chemistry Department of the University Pertanian Malaysia in Serdang, near Kuala Lumpur. During that time, he assessed theses and examined six candidates for Ph.D degrees.

From the Department of Pharmacology, **Assoc. Prof. Ralph Edwards** attended a meeting of the W.H.O. Drugs Advisory Committee at Uppsala, Sweden, in June.

Prof A.M. Breckenridge will be arriving in August from the Department of Pharmacology and Therapeutics, University of Liverpool. He will be Otago Savings Bank Professor for 1985.

SAFETY

Guidelines for the Use of Formaldehyde and Similar Products at Work

The Department of Health recently released the above document, number 6 in its Occupational Health Guideline Series. Previous issues in the series have covered Asthmatic Syndrome in Aluminium Potroom Workers, Spray Painting in Ships, The Control of Lead at Work, Biological Monitoring in Organophosphate Pesticide Exposure, and Health and Safety in the Electroplating Industry (1-5, respectively). The guidelines are prepared in consultation with other government departments (ACC, Labour), employer and employee organisations, and professional bodies, as appropriate (but to date, not the NZIC). The guidelines are designed to provide practical guidelines to ensure the health of workers is safeguarded.

Formaldehyde is one of the most widely used chemicals in industry today. Direct uses include as a preservative, soil sterilant, in fumigation, and in the tanning of leather. It is also used in the manufacture of a variety of resins, and the uses of these include the manufacture of particleboard, fibreboard, adhesives (esp. wood glues), surface coatings, fibreglass and foamed insulation materials, abrasives, in papermaking and as a binder for foundry moulding materials. (ref. Maylor, Chem. in NZ *46*, 92, 1982). The guidelines also cover glutaraldehyde which may be used as an alternative to formaldehyde, particularly in enbalming, printing and tanning, and is also present in some photographic chemicals.

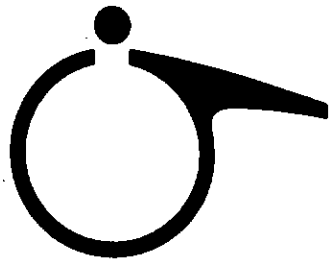
Formaldehyde is ubiquitous at low concentrations in the environment. As an aqueous solution it causes burns on contact with the skin and eyes, and the vapour is irritating to the eyes and respiratory system. It is a sensitizing agent and may affect susceptible individuals at very low levels. Dermatitis can be a frequent problem in industry, mostly from skin contact with formaldehyde-based resins or formalin.

The health hazards of formaldehyde came in for intensive review in 1979, when a study conducted by the Chemical Industry Institute of Toxicology found that almost 50% of a group of rats exposed to 14.3 ppm of formaldehyde, 6 hours a day for 24 months, developed nasal tumours. These findings were later supported by an independent study at New York University, with the result that by the end of 1980, formaldehyde was officially labelled a suspected carcinogen in the USA. Not surprisingly this action aroused world-wide concern, and the initial studies came in for intense scrutiny. The main criticism raised was the extreme conditions under which the tests had been carried out. Concentrations of formaldehyde in air are unbearable at 10ppm and generally unpleasant at 5 ppm.

Following this initial alarm numerous studies have been carried out, both in the laboratory and on occupationally exposed groups. Two recent reviews described progress to date (G.A. Wartew, J. Applied Toxicol. *3*, 121, 1983 and R.S. Bernstein *et al*, Am. Ind. Hygiene Assoc. J. *45*, 778, 1984). Generally the epidemiological studies do not support a cancer link. Studies of professional groups such as pathologists, anatomists, and

FROM THE RETORT

(a distillation of topical items from the world of chemistry)



Testing For AIDS

The Health Department has recently called tenders for the supply of test kits for the detection of AIDS antibodies in donated blood. Chemical entrepreneurs, this is your opportunity — the market potential is enormous.

Progress in the development of an AIDS antibody screening test was recently described in an article in Analytical Chemistry (57, 773A, 1985). In the United States the FDA granted licenses to three companies in March and April of this year, for the sale of HTLV-III antibody screening test kits. HTLV-III is the virus suspected of causing AIDS, and the tests are for the antibodies produced in the blood as the result of exposure to the virus. All donated blood in the USA will be screened using the tests, in the hope of reducing the chances of transmittance of the disease through contaminated supplies.

All of the licensed tests are based on enzyme-linked immunosorbent assays (ELISA), the same type of test currently used to screen blood for hepatitis B. (For a detailed description of ELISA and related immunoassay systems see Anal. Chem. 56, 920A, 1984). In the HTLV-III antibody test a solid phase coated with disrupted, inactivated HTLV-III virus is incubated with the serum sample causing attachment of the antibody to the virus/solid phase system. An enzyme-labelled antibody specific to human immunoglobulins is then added, and this in turn attaches itself to the bound antibody. Finally an enzyme substrate is added for colour development, which gives an indirect measure of the amount of HTLV-III antibody in the serum sample.

The currently available tests are not without their problems. In clinical trials all have shown small percentages of both "false positives" and "false negatives", i.e. detection of the antibody in healthy blood donors, and failure to detect it in contaminated blood. Alternative procedures are available to eliminate most of the false positives, but these are much more complicated and expensive to run. False negatives render the screening programme ineffective. Thus development of the screening tests is by no means completed and trials are continuing in the USA and elsewhere.

The difficulties with existing tests also raise the need for informed debate of some important social issues. In the event of a positive result, should an otherwise healthy donor be advised of the result? Given the current alarm over the disease, confidentiality of results is essential. And yet, it is surely in the best interests of society and the individual to be forewarned of an increased risk factor. There is also the possibility that individuals in at-risk groups will deliberately donate blood in order to learn whether or not they have been exposed to the virus. If the screening tests are not totally reliable in detecting contaminated blood, this will increase further the possibility of the spread of the disease.

Despite these problems one can be sure that the search for a reliable screening system will continue unabated. Apart from the need to protect public health, the financial incentive is substantial. The world market is estimated at $(US) 175 million per year.

Lead Pollution

Hopefully most of you will be aware by now that at the request of the Minister of Science, The Royal Society of New Zealand is undertaking a review of "lead in the environment". The committee appointed by the RSNZ to conduct the review is chaired by **Professor R.J. Ferrier** of the Chemistry Dept, Victoria University. Other Institute members on the committee are **Dr R.D. Reeves,** Reader, Chemistry, Biochemistry and Biophysics, Massey University, and **Dr C.D. Stevenson,** Dominion Analyst, DSIR, Petone. Submissions were called for by 26 July 1985, so if you feel you have an input on the subject and have not yet made it, *extractus digitalis.*

ICI Fire

Non-news item of the month! Tests carried out in Sweden have confirmed that firemen involved in controlling the ICI fire last December were not exposed to Dioxin. Readers could be forgiven for having missed this information when it appeared in mid-June. Obviously the media had other things on their minds.

Mendeleyev, Where Are You Now?

Last year was the 150th anniversay of the birth of Dimitri Ivanovich Mendeleyev, and it is now 116 years since he produced his periodic table of the elements. Mendeleyev's table was not the first attempt at arranging the elements in a systematic order, but it was undoubtedly the most successful. There have been numerous additions and small modifications to the layout, but the general principles remain with us to this day.

The development of the periodic table, and a number of unusual alternatives were recently described by John Emsley, writing for New Scientist (7 March 1985, p32): A year previously Emsley had solicited readers' views on current approaches to the arrangement and labelling of the table, and the result is yet another version: New Scientist's Periodic Table.

One aspect that has caused difficulties in recent years is the system used in the table for numbering of the groups. In the US the common practice has been to number the main group elements IA, IIA etc, and the transition elements IB, IIB etc. In Europe the system was to number IA to VIIA sequentially across the table (eg K to Mn), followed by group VIII, then IB to VIIB (Cu to Br), and group O (Kr). Definitely confusing, although this writer has never found it a major stumbling block in life.

Now enter IUPAC in the role of mediator. In Chemistry International, 7, 26, (1985), G.J. Leigh describes the efforts of the Commission on the Nomenclature of Inorganic Chemistry to resolve this much vexed issue. In a provisional recommendation, groups are to be numbered from 1 to 18 across the table. The American Chemical Society have made a similar recommendation, but in addition groups 3 to 12 carry a designator 'd', and the rare earths and actinides are designated '3f'. IUPAC considers these additions to be "permissable", but "not recommended".

Whether or not the IUPAC approach finds acceptance in the chemical community remains to be seen. If the response of one iriate American is anything to go by (Chem. & Eng. News 2, March 18, 1985) it hasn't got a show!

Incidentally, the influence of IUPAC may also be apparent in the non-de-plume with which this column is presented...

Unniloctium

(This column is to be a regular feature in the Journal. Readers are invited to draw attention to what they feel are interesting articles of topical interest — Ed).

SAFETY

Continued from p.103

enbalmers show excess incidences of brain cancer and leukemia, but these are not supported by the findings for industrial workers, for whom the incidences of these diseases are less than expected. No occupationally related cases of nasal cancer have been found although this is such a rare form of cancer any increases in incidence may only show up in large groups. Thus to date there is no strong evidence to support the suggestion that formaldehyde is a human carcinogen. The case is by no means closed however, and this is likely to remain a controversial matter for some time, as evidenced by a recent report of a symposium organised by the ACS (Chem. & Eng. News 17, April 30, 1984).

In New Zealand the Health Department has adopted the approach that formaldehyde does not cause cancer in humans, and the guidelines are directed at preventing or controlling the acute effects. Topics covered include assessment of hazards in the workplace, safe design and operation for specific industries, safe work practices, emergencies, first aid, health surveillance, and storage requirements.

The use of formaldehyde in laboratories is also covered in the guidelines. Suggested design requirements include a separate well-ventilated room for the use of large volumes. Work surfaces should be impervious to liquid, designed for easy cleaning, and fitted with bench level air extraction vents. The provision of a safety shower is recommended. Protective clothing including impervious gloves and eye protection should be worn, as well as respiratory protection if required. Formalin solutions are moderately flammable, particularly so when methanol is also present as a stabiliser, so appropriate fire precautions should also be observed.

Copies of this and other Guideline documents are available free of charge from District Offices or the Head Office of the Health Department (PO Box 5013, Wellington).

Bruce Graham.

DSIR OPEN DAY FOR CHEMISTS

DSIR OPEN DAY FOR CHEMISTS

About 100 scientists whose work involves consulting in chemistry attended an open day especially for them at the DSIR's Chemistry Division at Gracefield. They came from private chemistry labs, research institutes and universities around the country.

"This new type of targeted open day is the starting point for better communication and co-operation between consulting chemists and the DSIR," said Dr Leary, Director of Chemistry Division.

"It will set the scene for being able to transfer our technology to industry," he said.

These targeted open days are aimed at specific groups of scientists and technologists to enable them to see the facilities at Chemistry Division and to get to know the staff.

During the day visitors discussed techniques and topics of mutual interest with Chemistry Division staff completely informally.

Besides this, 5 seminars were arranged on topics the visitors had indicated an interest in.

Some areas of interest were: research into the catalysts used to convert methanol to petrol; methods of testing foods to ensure they comply with the Food and Drug regulations; methods used in forensic work and general techniques of analysis.

Dr Leary believes this type of open day to be very valuable to both DSIR scientists and those in private laboratories, and hopes they will become a regular event.

"They may lead to further joint research projects, and perhaps the joint purchase of expensive equipment that no one organisation could fully use", said Dr Leary.

He also hoped that they can be extended to cater solely for specific areas of work.

For example, in April a successful seminar on cement and related materials was held, and later this year, Dr Leary plans to invite all parties involved in forensic testing — hospital laboratory staff, the police, coroners — to a similar type of open day.

Dr Terry Seward explains how the gold bag is used to study reactions involving sulphur at high temperatures and pressures. Terry Fullerton and Mervyn Uprichards from the Forestry Research Institute in Rotorua are interested in how this can be applied to high temperature processes used in the pulp and paper industry.

GAS CHROMATOGRAPHY COURSES

Further courses in this joint venture of the New Zealand Chromatography Group and Waikato Technical Institute are planned for later this year. Dates of the courses are:

Basic GC Courses: 19-22 November 1985
Course fee: $150.00
Capillary Course: 26-28 November 1985
Course fee: $150.00

Attendance at the Capillary Course is restricted to those who have already attended a Basic Course or who are experienced in GC use.

So far, over 150 scientists and technicians from Whangarei to Bluff have attended these courses and we have had a very favourable response. In fact some places on this year's courses are already booked!

The courses are well supported by the trade who loan modern instrumentation for students to use, generally three students/instrument so the courses are very practically orientated.

Enquiries or bookings to:
Dr P. Robinson
Waikato Technical Institute
Private Bag
HAMILTON

35th ANNUAL CEREAL CHEMISTRY CONFERENCE

The 1985 Cereal Chemistry Conference will be held in Sydney from Monday, September 30 till Thursday, October 3. The conference will start with a one-day symposium on extruded foods while later sessions will include papers on wheat, rice, carbohydrates, laboratory computerization, and the effect of storage on cereals. In addition, there will be comprehensive trade and poster displays. Overseas speakers will include Dr Christiane Mercier from the National de la Recherche Agronomique (INRA) at Nantes, France and Dr Ben Juliano from the International Rice Research Institute, Los Banos, Philippines.

Further information may be obtained from the conference Secretary, Dr Bill Campbell, CSIRO Wheat Research Unit, P.O. Box 7, NORTH RYDE, N.S.W. (Telephone 02-88-0211 extension 17).

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This is an excellent career opportunity which offers involvement in many aspects of a manufacturing company's operation. We would welcome applications from people with a sound analytical knowledge and relevant laboratory experience who are motivated by variety and challenge.

If you feel you meet the requirements of this interesting position, please write, enclosing full details, to

The QA Manager

WELLCOME NZ LIMITED
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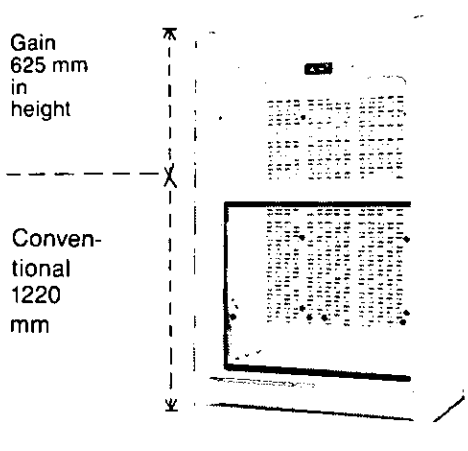

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PO Box 25038 Phone: 882092

RESEARCH CHEMIST

The New Zealand Fertiliser Manufacturers' Research Association has a vacancy for a chemist (inorganic, analytical or physical). The Association has laboratories in congenial surroundings and is funded by the major fertiliser producers in NZ and also by government subsidy through DSIR. Research is in progress on raw materials, process improvements for current materials and projects in the rapidly developing area of alternative fertilisers from laboratory via pilot plant to full scale production.

The successful applicant will possess a good degree (Ph.D or M.Sc) preferably with several years experience in industry or research and development. A competitive salary, reviewed annually, commensurate with these qualifications and experience will be offered. A superannuation scheme is operated and other conditions of employment, leave etc are generally in line with those in the State Services.

Written applications giving personal details, qualifications, experience and interests should be sent to:

Dr K. R. Laing
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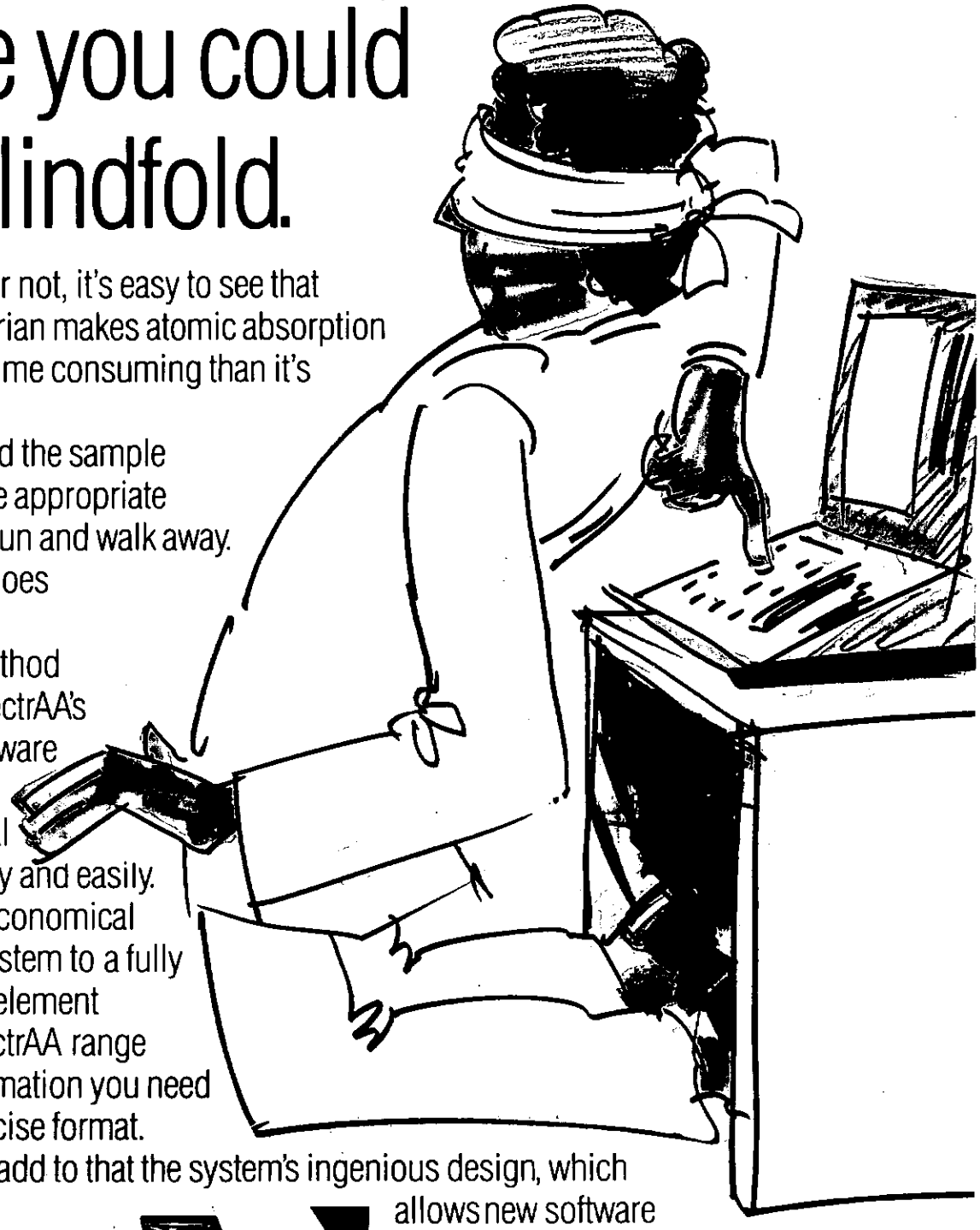


Blindfold or not, it's easy to see that SpectrAA from Varian makes atomic absorption simpler and less time consuming than it's ever been before.

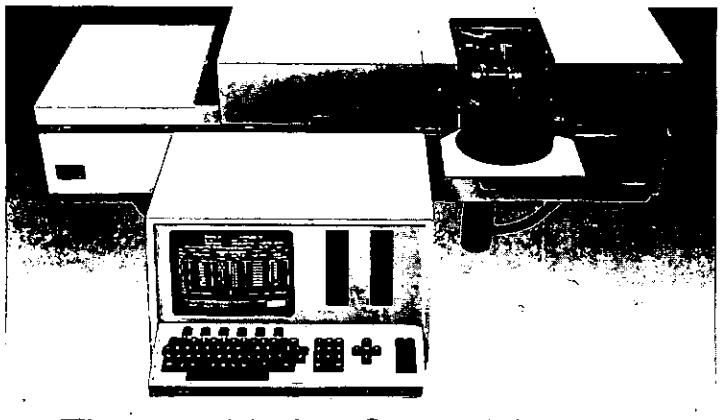
Simply load the sample carousel, recall the appropriate method, start the run and walk away.

SpectrAA does the rest.

Even in method development, SpectrAA's sophisticated software allows you to optimise analytical parameters quickly and easily.

From the economical single-element system to a fully automated multi-element analyser, the SpectrAA range presents the information you need in a clear and concise format.

When you add to that the system's ingenious design, which allows new software and accessories to be incorporated, SpectrAA will keep your AA capabilities ahead of the field for years to come.



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WN50

PRODUCT NEWS

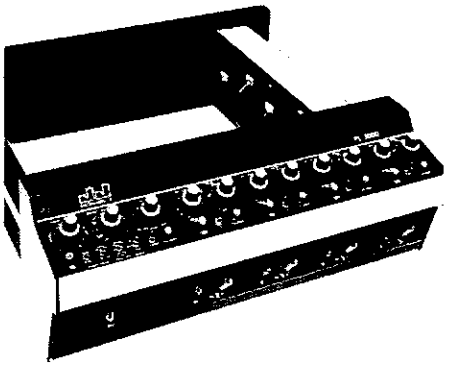
RECORDERS FROM J J LLOYD

Wiltons have information on the J J Lloyd range of recorders, two of which are pictured below. The CR650S MkII is a mains/battery recorder.

The standard specification for these recorders includes battery/mains operation, local/remote pen lift, 100% zero suppression, event marker, an electronically controlled chart drive which may be reversed or remotely controlled and which has 18 speeds from 0.02mm/min to 20mm/s.

The writing speed is in excess of 500mm/s and the servo drive is protected by electronic limit switches. 19 calibrated ranges are provided each with an accuracy of 0.25% and a maximum sensitivity of only 2.5uV/mm. Optional features include a retransmitting potentiometer, 19" rack mounting panel for vertical use and an executive carrying case.

Top of the range is the three pen XY/t recorder the PL3000.



On all four axes (X, Y1, Y2, Y3) of the PL3000, the inputs can be switched to record DC or AC signal levels at any sensitivity between 5uV/mm and 0.5V/mm, the high accuracy (0.1%) and fast writing speed (1000mm/s) ensure faithful recordings for a wide range of applications. Precise calibration at any vernier span setting can be achieved by the use of a 'calibrate' button which injects an accurate reference voltage. Zero setting controls incorporate a zero check button and also a precision calibrated back-off switch providing up to 1000% zero suppression in ten steps, each of one full scale.

The X axis may also be switched to the internal timebase to give sweep times from 1 second to 1 hour, or to a built-in frequency-to-voltage converter. This gives X axis deflection proportional to input frequency, over the range 10Hz to 100Hz, on either a linear or logarithmic scale. In conjunction with the a.c. inputs, this converter makes the recorder ideal for frequency response plots, even without a sweep oscillator, in the fields of audio equipment, telephone transmission systems and vibration testing.

The 11-speed chart drive provides crystal-controlled speeds from 0.2mm/min. to 20mm/s and allows the instrument to function both as a high performance 3-channel X/Y and Y/t chart recorder. The chart drive may be remotely controlled and facilitates a wide range of automatic features. At the touch of a switch, or by a remote trigger, the paper may be advanced by a full frame (or half frame) ready for the next plot. Interfacing with computer-controlled systems is simplified by the busy/ready output signal and by the comprehensive logic system which enables the chart advance to be coupled with the timebase sweep and automatic pen lift to allow unattended or remote-controlled repetitive plotting.

The local or remote electric pen lift raises all three disposable fibre-tip pens, but pens which are not in use may be raised independently. Roll paper is available either as conventional continuously printed charts or conveniently printed with individual A3 format graphs.

Further information on the J J Lloyd range is available from Wiltons or by circling **10** on the reader reply card.

CAPILLARY ISOTACHOPHORESIS

In most conventional separation techniques, it is necessary to hold samples on a support or packing. By contract, in capillary isotachophoresis, no packing or support is used. The sample is introduced between two electrolytes, leading and terminal, to perform electrophoresis in the capillary tube. This results in the saving of column costs, a significant running cost in HPLC analysis.

Other advantages of the technique are that it can analyse proteins without denaturation, or deposition; that analyses may be performed at any pH value, and that even salt samples can be analysed without derivatisation.

Two detection methods are used: potential gradient (PG) detection and/or UV detection.

The manufacturer of this instrumentation is Shimadzu Corporation who supply both the hardware and also a wealth of applications literature.

Some typical application areas:

Food Industry: Analysis of constituents and additives, such as, organic acids, amino acids and proteins.

Pharmaceutical Industry: Determination of effective components and impurities in drugs such as antibiotics, crude drugs and electrolytes.

Chemical Industry: Quality control of industrial chemicals such as organic and inorganic acids, metallic ions and surfactants. Used to monitor industrial waste water.

Medical and Biochemical Fields: Analysis of body fluids and metabolites such as organic acids, amino acids, polyamines, nucleotides, peptides and proteins for clinical and diagnostic purposes.

For further information on how this technique could apply to your analytical requirement, contact Sci-Med (NZ) Ltd, or circle **11** on the reader reply card.

LABSUPPLY PIERCE EXPANDS

Labsupply Pierce (NZ) Ltd have announced that they have taken over the complete operation of Winstone Scientific as from 1st May 1985. This will enable them to offer a more comprehensive range of laboratory products and equipment.

NEW HEWLETT PACKARD SOFTWARE TURNS UV/VIS SPECTROPHOTOMETER INTO LC DETECTOR

The new Hewlett Packard 89082A software package from Northrop Instruments & Systems Limited turns the Hewlett Packard 8451A UV/Vis diode-array spectrophotometer into a multi-wavelength UV/Vis detector for any HPLC system.

For laboratories that have the general purpose Hewlett Packard 8451A UV/Vis spectrophotometer, this software adds the powerful detection capabilities of HPLC. Hewlett Packard expects the product to find applications in many areas including life-science research, pharmaceuticals and the chemical industry.

The new software delivers two HPLC detection packages: LCQUANT for quantitative analysis of characterized samples for which the analytes are known and standards are available.

Quantitative HPLC

The quantitative module of the software, LCQUANT provides accurate routine quantitative analysis of characterized samples for which the analytes are known and standards are available.

An advanced multi-wavelength, multi-component software routine developed by Hewlett Packard provides quantitation of resolved, merged or coeluting peaks. Up to 10 unresolved components may be quantitated per peak or peak group.

Multi-component analysis reduces the need for complete chromatographic separation of a sample in order to achieve total quantitative accuracy. Many samples that previously required gradient elution for separation now may be analyzed using isocratic elution. Similarly, many of those that formerly required long chromatographic runs to allow separation of early eluting peaks may be analyzed in a much shorter time.

Qualitative HPLC

The LCSURVEY module of the software delivers qualitative and semi-quantitative analysis of new and uncharacterized samples.

Simultaneous monitoring of multiple wavelengths of HPLC effluent aids in the identification of uncharacterized samples and decreases the possibility of failing to detect eluting components.

The systems locates overlapping peaks replotting specific wavelengths versus time at any point within the 200mm scanning range chosen by the user. The wavelength range of the Hewlett Packard 8451 UV/Vis spectrophotometer is 190 to 820 nm.

Three features of the software allow the user to test peak purity: comparison with standard spectra, normalized spectra matching and wavelength ratio derivation.

Automatic comparison of unknown spectra with standard spectra provides confirmation of peak identity and alerts the user to the presence of impurities.

Spectra, which may be acquired manually or automatically, are collected at a rate of up to one per second during the elution of a peak. The system stores the spectra and makes them available for post-run processing. Peak purity can be evaluated by matching normalized spectra stored throughout the peak.

The system further confirms peak purity by deriving the ratio of absorbances of any wavelength pair or the average ratio of a pair of wavelength ranges for any or all LC peaks.

For further information contact Northrop Instruments & Systems Ltd, or circle **12** on the reader reply card.

Who Says It's an Ivory Tower?

Today's academic laboratory is a modern facility that trains students for careers in the high technology job market. Such a laboratory needs equipment and supplies that are as sophisticated at the laboratories that will one day employ these students. NZIG has a complete selection of Matheson gases and equipment for the modern laboratory. We have more than 80 different gases and prepare gas mixtures to your specifications. No matter which gas or mixture you use, NZIG has the Matheson regulators, flowmeters, and other equipment to control them properly. Safety in the laboratory is important. To aid you in the safe handling and storage of gases, we have flashback arrestors, toxic gas detector systems, hand trucks and cylinder stands. Keep your students in the fore-front of technology.

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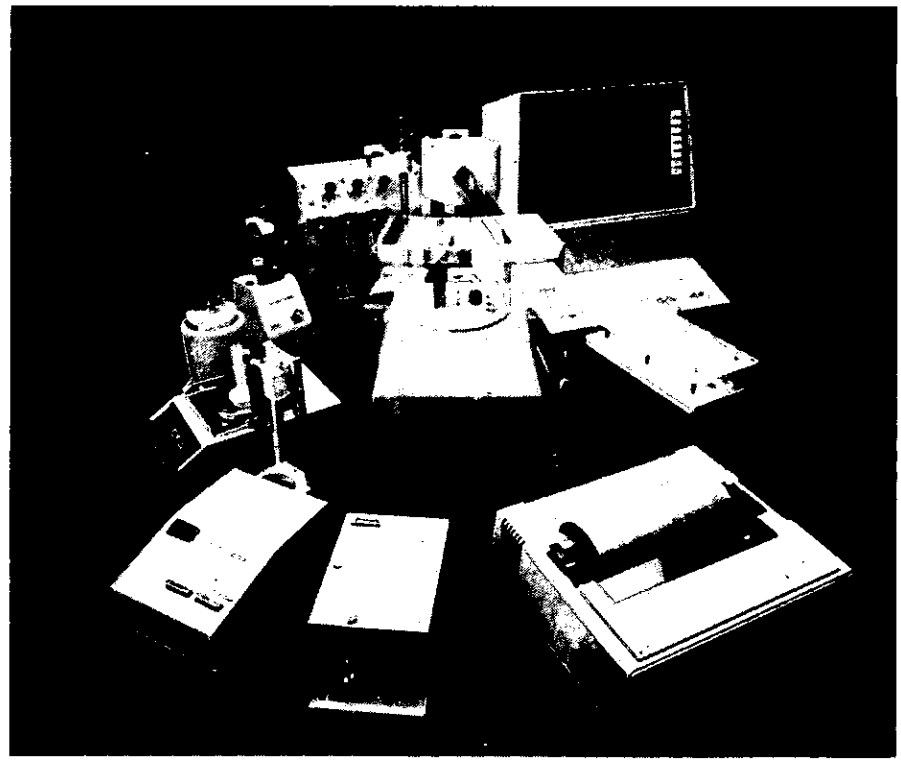


The Next Step in Laboratory Automation

This is the text of a paper presented to the 1984 International Symposium on Laboratory Automation, Boston, MA USA.

Robotics, combined with programmable computers, are used in many applications to improve laboratory productivity. The first such system, the Zymate laboratory automation system, was introduced in the spring of 1982. There is great enthusiasm for this technology but, initially, there was some concern that it might not be a practical laboratory tool.

With several hundred Zymate systems installed around the world, this is a good time to reflect on the trends in laboratory automation and the impact of laboratory robotics.

Laboratory automation is often thought of as computerized data reduction and documentation. Laboratory automation planning must now be expanded to include sample handling and sample preparation, wet chemistry procedures, laboratory processes and instrumental analysis as well as data processing.

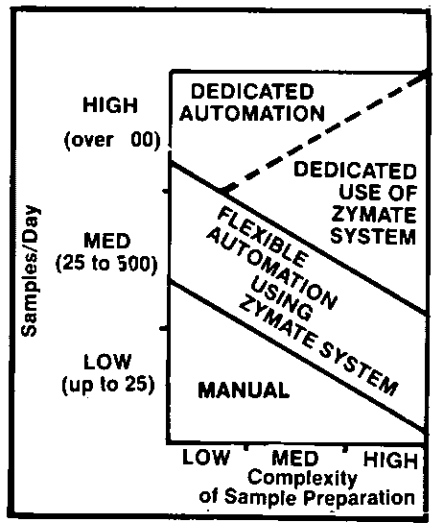
Until recently, automation required a large quantity of identical, repetitive operations to justify the investment in capital and time. Rapidly improving computer technology, particularly the microprocessor revolution, has made available easy to use and low cost programmable computers. Robotics is the extension of programmable computers which allows computers to do physical work as well as process data.

Flexible versus fixed automation

Laboratory robotics provides the flexible automation required to meet the changing needs typical of industrial and research laboratories.

Fixed or dedicated automation, on the other hand, is utilized for large quantities of standard procedures such as those found in hospital and clinical laboratories. Fixed automation follows a predetermined sequence of steps to perform a defined procedure. It is efficient, but programmed to perform only one repetitive procedure.

Flexible automation is programmed by the user to perform multiple procedures. It can be quickly reprogrammed to accommodate new or revised procedures.



In the chart above, the sample quantity refers to the number of analyses using similar procedures and the complexity increases with the required precision, number of steps and critical timing requirements of the analytical procedure.

Flexible laboratory automation fits into the region above manual techniques but below specialized, dedicated automation. In some cases, flexible automation techniques are well suited for dedicated use.

Justifying laboratory automation

Improving productivity has become a priority need in most laboratories. Trained technicians, and even scientists, often perform repetitive tasks rather than delegate them to less skilled personnel. The Zymate laboratory automation system can automate a wide range of laboratory procedures — with more precision and lower cost than manual techniques.

The January 16, 1984 issue of Chemical and Engineering News reported that R & D funding by major US chemical firms will increase about 7% in 1984 over 1983 but that professional R & D staffing will increase at less than 2% during the same period.

This illustrates the chemical industry's commitment to increased R & D while encouraging and forcing the more effective use of their profesionally trained personnel.

Most laboratories have more work than they have time or people to carry out the work. The Zymate approach to laboratory automation can free people from repetitive, tedious, step-by-step laboratory operations.

The ZYMATE System combines robotics with state-of-the-art microprocessor technology to perform common laboratory operations — filtering, shaking, extracting, pipetting, weighing, and separations — even in hazardous areas.

A ZYMATE System will:

- Weigh, dilute, mix, and transfer samples for any sample preparation procedure.
- Pipet, filter, and concentrate samples for chromatographic or spectroscopic analysis.
- Homogenize, centrifuge, and extract samples for biological testing.
- Receive inputs from laboratory instruments or apparatus, make decisions, and take actions as a result.

For any operation you do in your laboratory, the **Zymate System** can help you do it better, safer, more economically, and with less chance of error. The System is well suited for **research and methods development, multiple analyses using several methods,** and **dedicated routine analyses.**

For more information on Laboratory Automation, visit Alphatech's stand at the NZIC conference in Christchurch to view the robot working or circle — on the reader reply card.

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ROBOTICS
The Zymark Robot System can automate many laboratory operations.

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ELEMENTAL ANALYSIS
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PRODUCT NEWS

NEWGUARD CARTRIDGES FROM BROWNLEE LABS

Sci-Med announce the availability of Brownlee NewGuard cartridges.

Offer superior performance through optimised length (1.5 cm), diameter (3.2 mm ID) and support material (7nm 300 LA wide pore silica). Easy in-line installation, allows you to seal New Guards finger tight to 7000 psi. Eleven stationary phases are available to match your analytical sorbent. New Guard cartridges supplied in a pack of 3 of equivalent price to the pack of 23cm cartridges — thus excellent value.

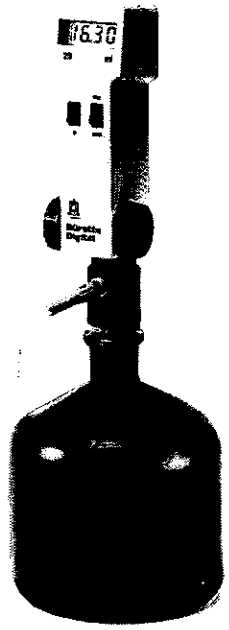
Contact Sci-Med (NZ) Ltd for your New Guard cartridge and holder or a New Guard reverse phase starter kit or circle — on the reader reply card.

Brownlee MPLC Prep-10 cartridge systems (circle **6**) and Brownlee Labs microbore columns (circle **7**) are also available from Sci-Med.

BRAND DIGITAL BURETTE

At first sight, only the label shows that it is a burette. There is no meniscus. Instead, a digital display presents the titrated volume in the form of large figues. Electronically to two decimal places, no waiting time. For the next titration: Press the button — zeroed. Titration is made by means of two handy wheels — quickly or drop by drop.

If one filling is not sufficient, the attained value is stored. After re-filling, just keep titrating — the volume is added electronically. Routine errors, e.g. in reading or adding, are now a thing of the past.



Installation is simple: mount the Brand Digital Burette on the reagent bottle — ready! To make it fit onto almost any reagent bottle, different adapters are supplied as standard. No costly special containers are required. The build-in rechargeable battery means mains independent operation — important for analyses in the field. There are two sizes available with a rated volume of 25 and 50 ml.

Contact Watson Victor for further information and demonstration or circle **8** on the reader reply card.

INDICATOR MODULE TO UPGRADE AA5 OR AA6

The A/M DS2000 Indicator Module is designed to upgrade the Varian Techtron AA5 and AA6 series of atomic absorption spectrophotometers with microprocessor based electronics. The DS2000 Indicator Module replaces (and is plug compatible with) the existing indicator module (M5 and/or IM6).

The DS2000 Indicator Module will enhance the operation of the atomic absorption spectrophotometer with the following features:—

5 point standard calibration plus zero
Integrate hold, integrate repeat and peak hold with programmable integrate and peak hold times
4 digit numeric display
20 character alphanumeric display for error messages and prompts
Chemical resistant membrane keyboard
Single Centronics parallel printer port
Dual serial ports for interfacing the DS2000 Indicator Module to laboratory computers and/or control of the AIM 101 Intelligent Large Volume Autosampler
Optional inbuilt automatic background corrector

It is plug compatible with AA6 accessories such as carbon rod units, automatic samplers and background correctors. It is also the same width and depth as the IM5 and IM6.

For further information contact Advanced Electronics Ltd or circle **9** on the reader reply card.

PRODUCT NEWS

AUTO-SAMPLERS FOR PREPARATION & TRANSFER OF LIQUID ANALYTES

These Gilson automatic samplers combine a sample-changer — Model 221 single rack or Model 222 multiple rack — with one Model 40 diluator. Controlled from the same keypad or from a microcomputer, the system offers maximum flexibility. Gilson auto-samplers can be programmed to:

— dispense fixed or variable volumes of reagent(s) in all or some of the vials
— dilute
— perform sequential dilutions along rows or columns of the rack
— mix by aspiration-delivery
— feed an on-line analyser, spectrophotometer or radioactivity detector.

A choice of over ten different Gilson racks permits a wide variety of applications. In the event of special sizes, these samplers will also directly accept tubes of any manufacture. For complex sample preparation, several dilutors may be used simultaneously.

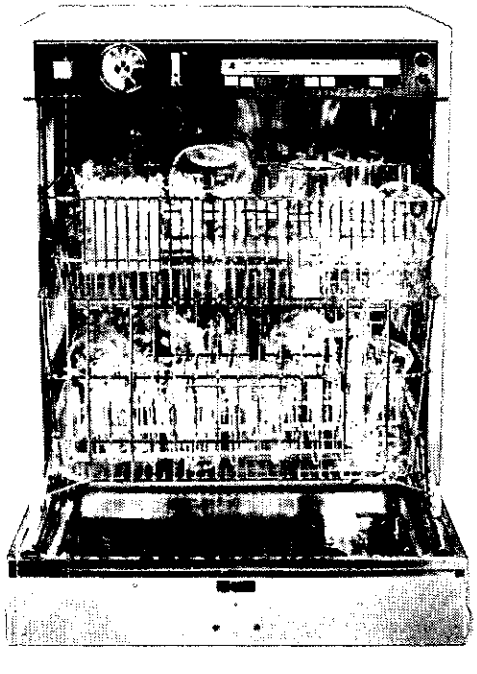
For further details contact John Morris Scientific Ltd or circle **1** on the reader reply card.

GALLAY LABORATORY WASHING MACHINES

Specialist automatic laboratory washing manufacturers for over 20 years Jean Gallay S. A. of Geneva have developed a range of washing machines and accessories to suit the differing requirements of medical, industrial and academic laboratories.

The LAB 900 series of automatic laboratory glassware washing machines has been specifically developed to provide a cost of effective method of satisfying a wide range of washing requirements from the simple and straightforward washing of glassware to sophisticated levels of cleanliness and drying that includes babies feeding bottlers, surgical instruments, syringes and anaesthetic equipment.

Programme selection is by means of push button control eliminating the need for especially prepared and stored punch-cards. With no alteration to the basic programme (all buttons out) the LAB 901 will automatically:—



— prewash
— wash at a selected temperature
— three rinses
— the last rinse heated to a preselected temperature

Push button selection will give:—

— a range of washing temperatures up to 95°C
— hot or cold water refill
— a hot pre-wash
— continuous flushing on pre-wash and first rinse
— an extended wash cycle
— five rinses
— distilled or de-ionised water rinses on the penultimate and/or ultimate rinse
— hot air drying

The wash programme of the LAB 901 is infinitely variable and the machines can be swiftly and easily adapted to wash:—

— pipettes
— calibrated flasks
— maternity bottles
— operating equipment
— anaesthetic equipment

Accessories are complementary and interchangeable and excluding periodic cleaning of the tub and filters the series requires no particular attention though after the expiry of 12 months guarantee a preventative maintenance contract is recommended.

Specifically designed for Laboratory use the LAB 900 Series of automatic glassware washing machines will give years of trouble-free and constant service.

For further information contact the New Zealand agents, Kempthorne Medical Supplies Ltd, or circle **2** on the Reader Reply Card.

LOW COST 3x3 HPLC COLUMN FROM PERKIN-ELMER INSTRUMENTS

The Perkin-Elmer 3x3 HPLC column represents a significant advance in liquid chromatography column technology. The 3x3 columns offer substantially reduced analysis times, solvent consumption and cost while providing excellent chromatographic efficiency.

The low void volumes of the 3x3 columns, so called because they are 3 cm long and use 3 micron packing materials, yield higher efficiency and increased mass sensitivity compared with conventional HPLC columns. The short column length eliminates the high back-pressures and shorter column life sometimes found with other microparticulate columns.

With optimized instrumentation (such as the Perkin-Elmer LC-85B UV detector with 1.4 µl flowcell), 3x3 columns can reduce analysis times and solvent consumption by a factor of 10 or more for many analysis in comparison with standard 25 cm columns. Significant savings in analysis time and solvent savings are provided even with conventional LC instrumentation. And the 3x3 columns cost is significantly less than that of standard columns.

For typical applications data, or other information, contact: John Morris Scientific Ltd or circle **3** on the reader reply card.

NEW PREMISES FOR JOHN MORRIS

John Morris Scientific Ltd. will be moving in August to larger premises at 3/101 Diana Drive, Glenfield, Auckland 10.

Our phone and box number remain the same for customer convenience, plus a large display/showroom will be open for visitors to see first hand our growing range of stock.

We believe the above will be to the benefit of all concerned, and invite our customers to visit us at the above, and enjoy a cup of tea or coffee and a chat with our staff.

COVER STORY

BASF

BASF is a major company in the worldwide chemical industry, and as a supplier of high quality raw materials and technology it contributes to the production of New Zealand's exports.

To detail the length and breadth of BASF's diverse range of chemical products from industrial chemicals through to intermediate compounds down to such delicate expressions of the modern Alchemist's art as vitamins, synthetic flavourants and fragrances is not easy in a few short words and some of the products which fall into these categories can sometimes hardly be called exciting, but the scope and variety of applications are wide and interesting, representing both traditional and new outlets.

From its earliest days BASF set out to produce not only end products such as synthetic dye stuffs but also the principle raw materials required for their production. These included aniline and soda — the A and S of BASF.

It has now a comprehensive range of in-house feedstocks available to New Zealand Industry, imported from highly integrated plants at Ludwigshafen in West Germany as well as its other subsidiary companies throughout the world. These put BASF in a position to produce an extensive and flexible range of raw materials, semifinished products and finished products, produced by tried and trusted methods as well as from the latest technological and process know-how. Some of course are relatively simple, others are complex and multi stage, particularly high pressure reactions in which the company has long specialised.

The industrial chemicals range spans not only organic and inorganic intermediates, but includes such things as solvents, dispersing agents, coalescents and binders for surface coatings of all types. Acids, acrylates and other intermediates for custom resin production both for decorative retail paints and highly sophisticated industrial, automotive and aeronautical coatings and many other application areas in between.

Plasticisers for PVC, specialty products for oil exploration, recovery and refining, chemicals for water treatment, effluent treatment and rubber production. Simple and complex resins for adhesives. These are to name but a few of the products available from the continuous research and development by BASF from its nerve centre in Ludwigshafen in West Germany and its associate companies in other countries who all contribute to ensure that our products meet the needs of modern industry while keeping pace with developments in traditional sectors.

Raw materials from BASF's fine chemicals range are used in the preparation of pharmaceuticals and cosmetics including skin and hair care products, synthetic fragances and flavours which are used in products known to us all around the home and the work place including soaps, detergents and toiletries.

BASF has one of the most comprehensive ranges of synthetic vitamins available with the range being expanded all the time. Their manufacture involves a complicated series of processes, and intermediates also developed by the company. These vitamins are sold not only for incorporation in multi vitamin preparations for human consumption, but also for food processing. Another major use for BASF vitamins is the formulation of animal feed supplements and compound feedstuffs being yet another significant contribution from BASF to modern agriculture in New Zealand and its export partners.

Finally we look into the future to the exciting new horizons being opened up to advances in biotechnology, a field where the chemist enlists the aid of micro-organisms to achieve undreamt of syntheses. BASF is in the forefront of this development by co-operating with the university of Heidelberg to establish a centre for research into molecular biology and already this development, of fundamental advances in biochemical methods, is generating original scientific discoveries in molecular biology. Medicine and chemistry will both benefit from these advances as well as from the use of genetic engineering to improve the performance of micro-organisms in many areas of syntheses.

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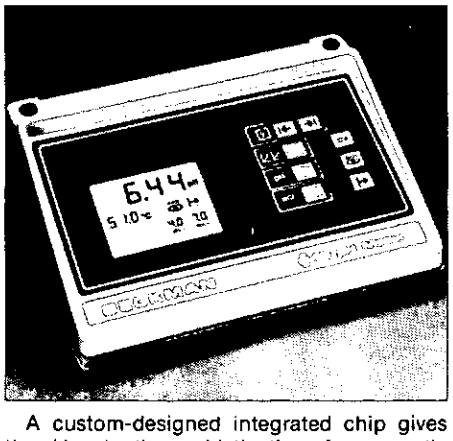
PRODUCT NEWS

BECKMAN BENCH MODEL pH METER

Beckman's pHI™ 45 pH Meter provides simplicity, accuracy, reliability and convenience, plus the versatility of easy hookup to chart recorders and printers. The low-cost bench model pH meter is used in quality control, environmental and research laboratories.



A custom-designed integrated chip gives the pH meter the sophistication of more costly models while making it easy to use. The pH meter automates most measurement steps to provide nearly unattended measurement and simple operation. It has error and out-of-temperature-range warnings; always displays temperature; and does temperature computation with or without an automatic temperature compensator (ATC).

The pHI 45 alerts the user visually and audibly when each reading is completed. At the press of one key the instrument identifies the buffer, takes the temperature and determines the temperature-corrected buffer value, determines when the reading is sufficiently stable, automatically adjusts to the proper value and holds that number on the display, checks the electrode response and alerts the user to problems.

In addition, the pHI 45 communicates with chart recorders and printers. The chart recorder range can be set (in increments of 0.1 pH to 10mV) by merely pressing a key for each margin. The printer output (Serial ASCII) can accommodate two communications speeds. A special print format showing buffer values and their temperatures, as well as sample pH and temperature, also can be selected. Each of these printing options can be chosen by flipping one switch.

As on other pHI meters, the pHI 45 features ATC, slope computation, automatic standardization, two ranges of automatic stability detection, automatic calibration and automatic recognition of nine buffers. A clear, universal-language keyboard further simplifies operation.

The instrument measures pH in the 0-14 range with resolution to 0.01 pH and temperature in the range of 0-99.0°C with resolution to 0.1°C. The pHI 45 measures mV with resolution to 1.0mV.

The pHI 45 operates on 95-250 volt, 49-61 hertz power. A complete line of electrodes, buffers and other accessories is available.

Beckman offers an extensive service and support network. If a properly used pH meter requires service when it is less than 90 days old, it will be replaced with a new pH meter. If the instrument requires service when it is between 90 days and 1 year old, it will be replaced with either a rebuilt or a new pH meter.

New Zealand agents Alphatech Systems Ltd, circle **15** on the reader reply card.

MODEL 309 AUTOMATIC VOLTAMMETRIC ELECTRODE (AVE)

EG&G Princeton Applied Research has introduced the model 309 Automatic Voltammetric Electrode (AVE), a unique instrument that can appreciably shorten the time required for voltammetric analyses. For reductive electrochemical studies, samples must be deoxygenated to avoid oxygen interferences. The removal of oxygen by conventional techniques often requires four to fifteen minutes. The AVE accomplishes this task in thirty to sixty seconds.

The AVE nebulizes the sample solution in a nitrogen atmosphere to rapidly degas and transfer the sample to the electrochemical cell. The Model 309 incorporates a Static Mercury Drop Electrode and can also be used with a glassy carbon electrode. The model 309 AVE is compatible with all of EG&G PARC's Polarographic Analyzers for manual operation. It can also be used with the Models 384B Polarographic Analyzer and 319 Sample Changer for automatic, high through-put analyses.

Enquiries to Systems Ltd or circle **16** on the reader reply card.

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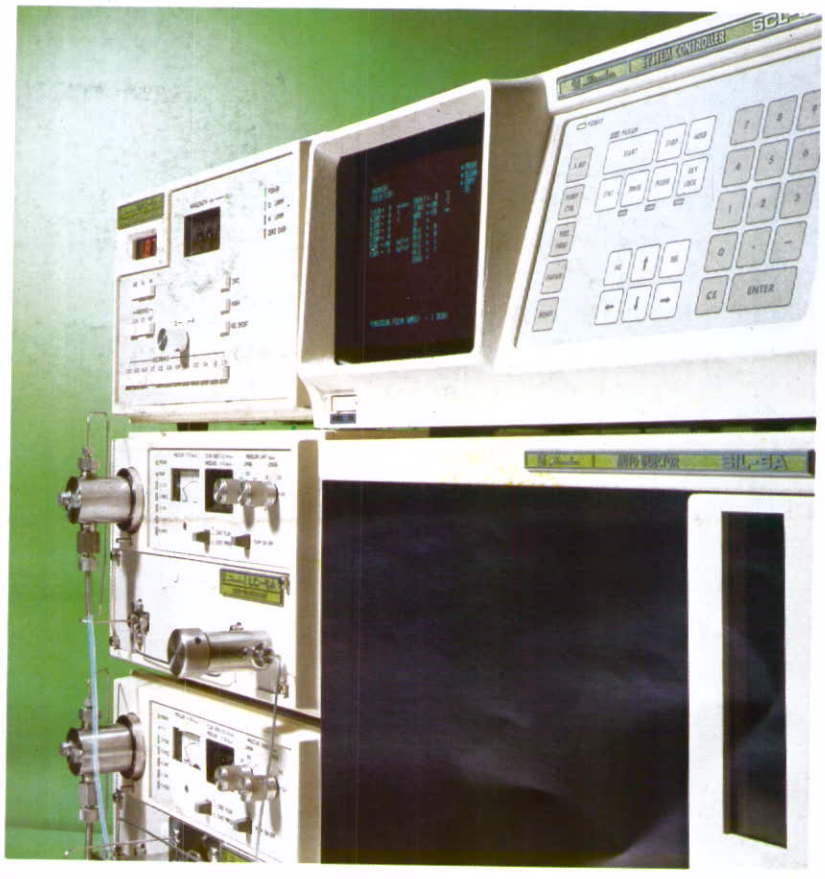

SCI MED

For more information or a demonstration, contact your Sci-Med Branch:

AUCKLAND	P.O. Box 47-309	PH: 793-993
WELLINGTON	P.O. Box 37-070	PH: 282-526
CHRISTCHURCH	P.O. Box 5221	PH: 831-146
DUNEDIN	P.O. Box 321	PH: 775-531

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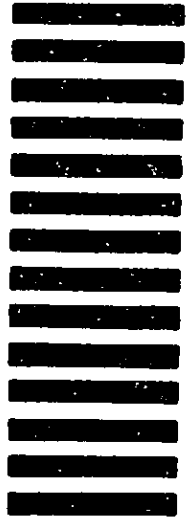

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