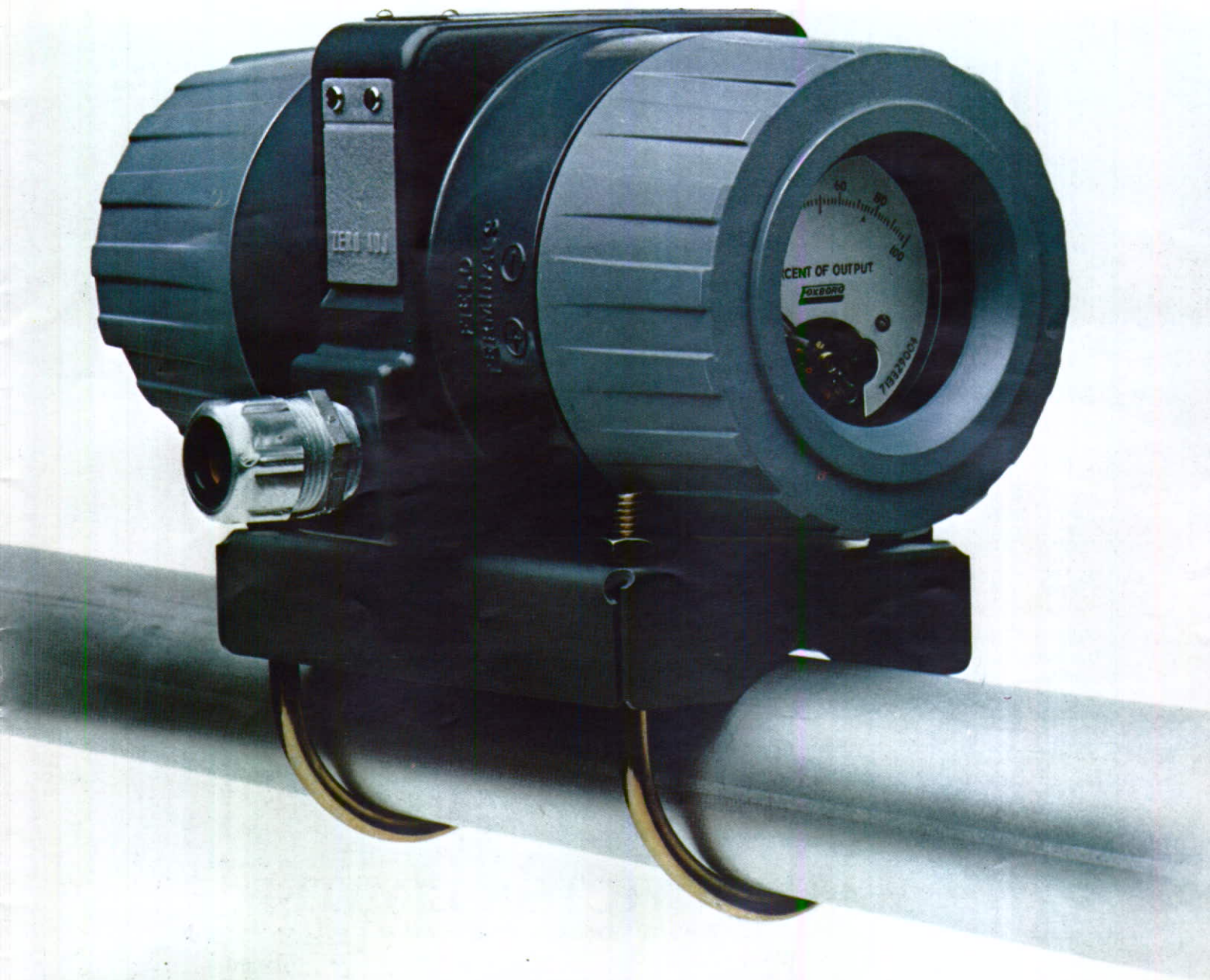


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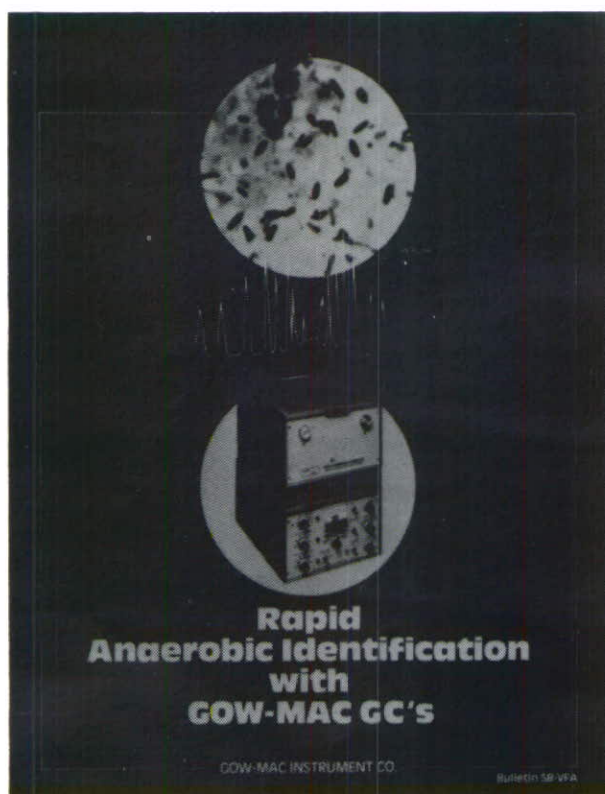


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Front cover: Foxboro Analytical has introduced the 870 electrochemical two wire transmitters and 871 sensors. Foxboro says the two wire transmitters offer the widest and most comprehensive choice of ranges and together with the extensive selection of sensors, the new system meets virtually all process measurement needs.

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GUEST EDITORIAL

From the president

Late in October, the president of the American Chemical Society Prof Bob Parry, and his executive director, Dr Ray Mariella, visited New Zealand and discussed with council members how increased cooperation could be achieved between the ACS and our Institute.

A highlight was a meeting with the minister of science and technology Dr Ian Shearer, on the exchange of chemists between USA and New Zealand and the role of the ACS in influencing US government science policy. The ACS is active in lobbying Washington to influence decisions important to chemical education, research and industry.

Similarly, the Royal Institute of Chemistry in the UK has established a pairing system to provide communication between chemists and members of parliament. One objective is to assist M.P.s with technical questions when they arise.

The August 1982 issue of *Chemistry in Australia* lists recommendations accepted by the council of the Royal Australian Chemical Institute. One of these recommends the RACI to "Strive for government policies which facilitate the development and use of chemical knowledge". Strong support is given for the RACI to be more active in public affairs and government decision making. Regular meetings with senior government officials are proposed.

The NZIC has recognised a responsibility in promoting chemistry in New Zealand. Its organisation of committees have periodically reported on im-

portant chemical issues. How influential we have been in government decision making is open to question.

One result of the meeting with Dr Shearer is an invitation for the NZIC to have meetings with him whenever relevant issues deserve consideration at government level. Do we as the largest science institute in New Zealand have a larger role in developing national policy?

For example, a national plan for science and technology is being prepared by the National Research Advisory Council. While many members of the NZIC in their official capacities do have the opportunity to contribute, there appears to be no clear mechanism for our Institute to provide a corporate viewpoint.

The Official Information Bill currently before parliament is another issue of importance to the Institute. This bill provides for greater availability of official information and affects many members either as generators and custodians or seekers of such information. Those of us described variously as public and/or government servants, are well aware of dilemmas in providing open access to information with different degrees of importance and sensitivity.

I believe our Institute needs to increase its role in national affairs. Acceptance of the minister's invitation for regular meetings and opportunities to consider and comment on issues of importance to science and chemistry in New Zealand are challenges to our initiative and energy.

Doug Wright
President NZIC.

Caldolysin, a highly active protease from an extremely Thermophilic Bacterium

D.A. Cowan, R.M. Daniel and H.W. Morgan
School of Science, University of Waikato

Proteases comprise a significant proportion of those proteins which have been subject to detailed characterisation (amino acid sequence and high resolution crystallographic analysis). The extent of research interest in proteolytic enzymes reflects both their historical status, and the practical advantages of proteases as research subjects (available in quantity, extracellular etc.) widely occurring.

Since 1952, a variety of proteases from thermophilic organisms have been isolated and characterised. In particular, the extracellular protease (Thermolysin) from *Bacillus thermoproteolyticus* has been subjected to numerous detailed kinetic¹ and structural studies². However, to date, there have been no extensive studies on proteolytic enzymes from extreme thermophiles, although a number of reports of their existence have appeared^{3,4}. The work reported here on Caldolysin, the extracellular protease from the extreme thermophile, *Thermus aquaticus* strain T-351^{5,6}, thus appears to be the first detailed characterisation of a protease from an extremely thermophilic (caldoactive) bacterium.

OCCURRENCE AND PURIFICATION

Thermus aquaticus strain T-351, an aerobic, non-motile, non-sporulating, gram-negative rod, was initially isolated from hot alkaline pools in the Rotorua thermal area and has since been shown to actively grow *in vivo* at temperatures up to 100°C. Caldolysin is present at a concentration of up to 2 mg l⁻¹ in the supernatant of cultures grown at 75°C.

Purification of Caldolysin is carried out by a sequence involving ammonium sulphate precipitation, DEAE-cellulose ion exchange, Sephadex SP-C25 ion exchange, affinity chromatography on carbobenzoxy-D-phenylalanine-tetraethylenetetramine-Sepharose 4B, and gel filtration chromatography with Sephadex G75. The yield of fully purified enzyme is routinely of the order of 50 per cent.

With a specific activity of 21,000 Proteolytic Units per mg (PU mg⁻¹) at 75°C (using casein as substrate), purified Caldolysin is one of the most active protease known (Table 1). This is probably due in part to denaturation of protein substrates at high temperatures

Table 1. The specific activities of thermophilic and mesophilic proteases.

| Protease | Temperature (°C) | Specific Activity (PU mg ⁻¹) ^a | Reference |
|-------------------------------------|------------------|---|-----------|
| Caldolysin | 75 | 21,000 | - |
| Tok 3 Protease | 75 | 38,450 | -b |
| Thermolysin | 35 | 12,930 | -c |
| <i>B. subtilis</i> neutral protease | 30 | 13,600 | 10 |
| Papain | 30 | 2,550 | 10 |
| Chymotrypsin | 30 | 1,813 | 10 |
| Trypsin | 30 | 1,653 | 10 |
| Pronase | 40 | 1,250 | 11 |

a. 1 PU = 1 µg tyrosine released per minute from casein under specified assay conditions.

b. Saravani, Cowan, Daniel and Morgan, unpublished results.

c. Calculated from data provided in Matsubara⁹.

and a resulting increase in their susceptibility to proteolytic attack. Highly active mesophilic proteases such as *Bacillus subtilis* neutral protease¹⁰ denature when heated above about 60°C, thus precluding the attainment of as high an activity as Caldolysin.

PROPERTIES

Proteases can normally be designated as being Acid, Serine, Thiol, or Metal-chelator-sensitive types¹². Inhibitor sensitivity is one of the primary classification tools (Table 2). Further sub-classification is determined by pH optimum and other characteristics.

Since treatment with 25mM o-phenanthroline (two hours, 75°C) did not significantly reduce the activity of Caldolysin (Table 2), it appeared that no zinc ion was present in the molecule (c.f., in Thermolysin, a catalytic zinc ion was rapidly chelated by 0.2mM o-phenanthroline at 25°C¹³). However, analysis of purified Caldolysin by atomic absorption spectroscopy indicated that both before and after dialysis against the chelating agent EDTA zinc was present in a stoichiometry of approximately one atom per protein molecule. Furthermore, the zinc was retained against EDTA dialysis even after Caldolysin was inactivated by autoclaving, suggesting an inaccessible location for the zinc ion within the protease. It is not yet known whether the zinc has either a stabilising or activity-related role.

The response of Caldolysin to EDTA and EGTA (Table 2) suggested that calcium was implicated in either the activity or stability of the enzyme. However pretreatment of Caldolysin with EDTA did not impair catalytic function, but activity was then rapidly and irreversibly lost after heating to 75°C. Calcium is thus present as a molecular stabilising agent.

The specificity of metal ion binding to Caldolysin was investigated by reconstitution of the apoenzyme (calcium removed by dialysis against EDTA) with solutions of calcium, zinc, strontium, magnesium, cobalt, barium, vanadyl and copper salts. With the exception of the vanadyl ion, (Khuo, Daniel, Cowan and Morgan, unpublished results), in no case was more than 40 per cent of the calcium-conferred stability regenerated, suggesting that none of the other metal ions could fully satisfy the structural requirements of the calcium binding sites. VO²⁺, however, was able to provide almost 100 per cent of the calcium-conferred stability. Reconstitution of solutions of the apoenzyme with 10mM calcium, 10mM, zinc and a mixture of both calcium and zinc (each 10mM) yielded half-lives at 90°C of 59 min, 6 min and 24 min respectively. These results indicate that zinc is capable of competing for the calcium sites (N.B. crystal ionic radii: Ca - 0.99Å⁰; Zn - 0.74Å⁰), but in doing so, provides little molecular stabilisation.

The lack of response of Caldolysin to the specific inhibitors of the serine, thiol and acid protease classes (Table 2) implies that it cannot be assigned to these groups.

The classification of Caldolysin as a metal-chelator-sensitive lytic protease¹² was established by the discovery that the enzyme was capable of lysing bacterial cells. Caldolysin was shown to lyse 16 of the 18 strains of Gram-negative bacteria tested, but was unable to completely lyse any of 12 strains of Gram-

Table 2. The effect of inhibitors on the activity of Caldolysin.

| Class | Inhibitor | Concentration | % Inhibition of protease activity |
|---------------------------|--------------------------------|-------------------------|-----------------------------------|
| Serine-protease inhibitor | Phenylmethylsulphonyl fluoride | 2.0mM | 14% |
| | | 0.5mM | 0 |
| Thiol-enzyme inhibitor | p-Chloro mercuribenzoate | 5.0mM | 0 |
| Acid-protease inhibitor | Diazonorleucine methyl ester | 0.015mM | 0 |
| Trypsin inhibitor | Soybean trypsin inhibitor | 1.0 mg ml ⁻¹ | 0 |
| Metal chelator | EDTA | 10.0mM | 68% |
| | | 1.0mM | 40% |
| | | 0.1mM | 0 |
| Calcium-specific chelator | EGTA ^a | 10.0mM | 45% |
| | | 1.0mM | 18% |
| Zinc-specific chelator | o-phenanthroline | 25.0mM | 0 |

a. Ethylene glycol-bis-(β -amino ethyl ether) N, N'-tetra acetic acid.

positive bacteria, (four Gram-positive strains were partially lysed). This marked specificity for Gram-negative organisms is uncharacteristic of most lytic enzymes since the outer layers of lipoprotein and lipopolysaccharide of Gram-negative cell walls normally prevents access of lytic enzymes to the underlying peptidoglycan¹⁴.

In a comparison (Table 3) of some of the physical and biochemical characteristics of Caldolysin with those of Thermolysin and the lytic proteases from *Sorangium* and *Myxobacter* (the proteases which most closely resemble Caldolysin), it is evident that no general similarity exists. However, there are some points of equivalence:

* the lytic and proteolytic specificities of Caldolysin and α -lytic protease are comparable;

* both Caldolysin and *Myxobacter* AL-1 lytic protease possess the unusual characteristic of a minimum substrate size limit (both will hydrolyse pentaglycine and tetraglycine but not triglycine or diglycine);

* the metal ion requirements and inhibitor responses of Caldolysin and *Myxobacter* AL-1 lytic protease are similar.

Neither the lytic proteases nor Thermolysin possess the degree of thermostability shown by Caldolysin (see below). Furthermore, Caldolysin demonstrates an unusually high carbohydrate content.

THERMOSTABILITY

Thermostability data for Caldolysin, apocaldolysin and a variety of proteases from thermophilic and mesophilic sources are presented in Table 4. Not only does Caldolysin possess a greater degree of thermal stability than any other characterised protease from a thermophilic organism, but the stability of the apoenzyme, although greatly reduced, is still of the same order as that of many proteases from mesophilic organisms. Calcium stabilisation, such as observed in Caldolysin, is a feature of many of the enzymes listed in Table 4.

In Caldolysin, a large proportion of the total energy of stabilisation of the molecule (about 50 per cent) is derived from the presence of calcium ions⁵. These are presumably located as linking agents in crucial salt-bridges on the molecule surface.

In solution, proteolytic enzymes can lose activity from autolysis, thermal denaturation, or a combination of the two, depending on the incubation temperature. An analysis of the kinetics of activity loss in solutions of Caldolysin has shown that at 90°C and above, thermal denaturation is the major factor, while at lower temperatures, autolysis is responsible. This conclusion is confirmed by the presence of a major discontinuity at about 90°C in the Arrhenius plot for Caldolysin, suggesting that significant structural changes occur at this temperature.

STABILITY TO OTHER REAGENTS

Caldolysin is very stable in the presence of detergents and other denaturing agents (Table 5). Hydrogen-bonding disrupting agents (urea and guanidine hydrochloride) and cystine cleavage reagents (dithiothreitol and mercaptoethanol) result in a substantial destabilisation at 75°C, whereas sodium dodecylsulphate (SDS; an anionic detergent known to dissociate hydrophobic bonds²⁵) is less effective. The contribution of disulphide bonds (ca. 6) to the total energy of stabilisation of Caldolysin at 75°C has been calculated to be approximately 30 per cent, a value consistent with the results in Table 5.

Table 3. A comparison of the properties of some proteases.

| Property | <i>Myxobacter</i> AL-1 protease ^{1,15,16} | <i>Sorangium</i> proteases α ^{1,17} β ¹ | Thermolysin ^{9,12} | Caldolysin | |
|---------------------------|--|--|---|--|--|
| Molecular weight | 13,500 | 19,778 | 19,000 | 37,500 | 20,500 |
| Carbohydrate content | 1.3% | ? | ? | 0 | 12% |
| Cystine residues | 2 | 3 | 2 | 0 | 4-6 |
| Esterase activity | No | Yes | ? | No | No |
| Lytic activity | Predominantly Gram-positive | Gram-Negative | Yes, specificity unknown | No | Gram-negative |
| Elastase activity | ? | Yes | ? | Yes | Yes |
| Specificity | Small a.a. on either side of splitting point | Small aliphatic a.a. on C side of splitting point | Lysine on amino side of splitting point | Hydrophobic or bulky a.a. on amino side of splitting point | Small aliphatic a.a. on either side of splitting point |
| Size limit in active site | 4 residues | No | ? | No | 4 residues |
| Metal ion cofactors | possibly Zn | None | 1 Zn | 1 Zn, 4 Ca | 1 Zn, Ca |
| Inhibitors | EDTA, citrate, phosphate (10 ⁻² M) | DIFP | ? | EDTA, o-phenanthroline | EDTA, EGTA |

Properties similar in all of the above proteases: pI values, 8-10, pH optima, 7.5-9.0.

Table 4. The thermostability of Proteases from Thermophilic and Mesophilic organisms.

| Enzyme name | Source ^a | Half-life (hours) | at: T (°C) | Ref |
|-------------------|-----------------------------|-------------------|------------|-----|
| Caldolysin | Thermus T-351 (E) | 0.5 | 95 | |
| | | 30 | 80 | |
| | | 193 | 75 | |
| Protease | Bacillus caldolyticus (E) | 8 | 80 | 3 |
| Thermolysin | B. thermo-proteolyticus (T) | 1.0 | 80 | 9 |
| Lytic protease | Micromonospora vulgaris (T) | 0.5-0.75 | 80 | 18 |
| Thermomycolase | Malbranchea pulchella (T) | 2 | 73 | 19 |
| Neutral protease | B. stearothermophilus (T) | 5 | 65 | 20 |
| Alkaline protease | Aspergillus sydowi (M) | 0.1 | 55 | 21 |
| Bromelain | Ananas comosus (M) | 0.3 | 55 | 22 |
| Neutral protease | B. subtilis (M) | 0.25 | 61 | 23 |
| Lytic protease | Myxobacter AL-1 (M) | 5.7 | 50 | 15 |
| Pepsin C | Porcine (M) | 1.2 | 25 | 24 |
| Apocaldolysin | Thermus T-351 (E) | 1.0 | 50 | |
| | | 5.5 | 35 | |

a. (E) - extreme thermophile; (T) - thermophile; (M) - mesophile. Conditions of incubation (pH, ionic strength, etc) vary between the examples. However, conditions are normally chosen to maximise thermostability. Calcium is present, where required, in all cases except apocaldolysin.

Table 5. The effect of denaturing agents on the stability of Caldolysin.

| Denaturing agent added | Activity loss at 18°C | Half-life at 75°C |
|---------------------------------|-----------------------|-------------------|
| None | 40% after 30 weeks | 193 hours |
| 1% SDS | none after 18 hours | 5 hours |
| 6M guanidine HCl | 25% after 31 hours | 59 min |
| 8M urea | none after 67 hours | 53 min |
| 8M urea + 120mM mercaptoethanol | none after 72 hours | 26 min |
| 10mM dithiothreitol | 16% after 8 hours | 5.3 hours |

It has been suggested²⁶ that the acceleration of oxidative processes in the high temperature environments of thermophilic organisms should provide selective pressures to decrease the level of sulphur amino acids and hence cystine residues within the proteins of these organisms. This proposal is not supported by the results presented.

We are currently investigating several other proteases from extreme thermophiles. These differ considerably from one another and the only common features we have been able to distinguish so far are high specific activity and thermostability. It seems like-

ly that the proteases from extremely thermophilic bacteria will display the same variation as proteases from mesophiles, both in enzyme characteristics and in the mechanisms responsible for thermostability. The stabilisation of thermophilic proteins has been investigated in some detail in recent years²⁷ and it has been shown that no one single mechanism is responsible.

The major contributing factors to the thermostability of Caldolysin are calcium binding and disulphide bonding. However, these mechanisms are by no means characteristic of all thermophilic enzymes^{27,28}.

The thermostability, detergent stability and high activity of Caldolysin may render this enzyme potentially valuable in industrial applications. The advantages of operating enzymatic hydrolysis processes at high temperatures have been previously outlined²⁹.

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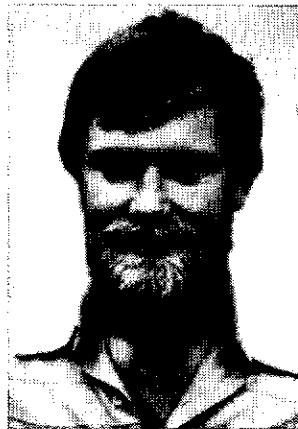
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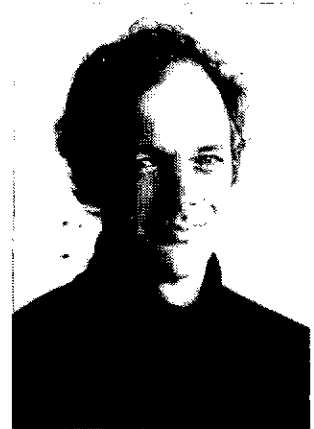
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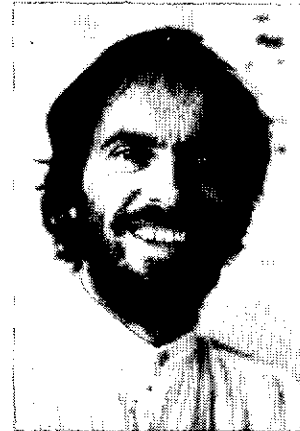
Hugh Morgan is senior lecturer in biological sciences at the University of Waikato. After graduating BSc (Hons) in agricultural botany at the University of Wales, Aberystwyth in 1965, he completed his PhD in soil microbiology at the University of Guelph, Canada in 1970. He was awarded an ICI post doctoral fellowship to work at the Macaulay Institute for Soil Research, Aberdeen prior to taking up the lectureship at Waikato in 1972.



D. Cowan



R. Daniel



H. Morgan

Enzymatic production of specialised sugar syrups from New Zealand grown maize and wheat

J.W. Beishuizen
NZ Starch Products Ltd

INTRODUCTION

NZ Starch Products Ltd, situated in Onehunga, Auckland, has since 1958 manufactured wheat starch from locally grown wheat and in 1976 commenced the manufacture of maize starch from yellow dent maize grown in the Waikato and Bay of Plenty areas.

In 1970 the company commissioned a glucose refinery to produce a syrup particularly suited for the confectionery industry and in 1980 this operation was extended with the manufacture of sugar syrups with a high degree of specificity using enzyme catalysts.

Processing the equivalent of 35000 tonnes of cereals, the company produces 20000 tonnes of starches servicing a diverse market, ranging from industrial applications, such as paper additives and corrugated board adhesives, to a variety of food applications. Brand names such as Fielders and Brown & Polson Cornflour are well established in New Zealand. Food starches are also modified to meet specific needs for meat and fruit pie fillings, UHT dairy products, salad dressings etc.

Approximately 50 per cent of all starch produced is converted into a range of specialised sugar syrups.

THE PROCESSES

With reference to Figure 1, maize is processed as whole grain and after initial dressing to remove foreign materials, the grain is steeped for 36 hours in a solution of sulphurous acid to soften the kernel and help

separate proteins and starch. Soluble solids are leached from the grain and after evaporation, are sold as a high protein concentrate, to feed compounders.

During a series of grinding and screening steps, the major components of the maize kernel are separated producing a number of by-products, i.e. germ which is pressed to yield the valuable maize oil, fibre and finally protein or gluten. These last two are recombined during drying to be sold as maize gluten feed.

The starch is further refined by washing through hydroclones to 0.4 per cent protein and concentrated to 40 per cent solids. This process is called wet milling and in contrast with the wheat starch process, where initially the wheat is dry milled to produce a 78 per cent extraction flour, this is transported in bulk to the starch factory. Here the flour is mixed with water to form a dough, which under a gentle washing action releases the starch, while the valuable by-product gluten (protein fraction) is separated and dried.

Bran is removed from the starch stream by screening and after washing to 0.3 per cent protein and concentration to 40 per cent solids, the starch slurry is also ready for processing in three ways:

- (i) dewatering and drying as an unmodified starch;
- (ii) chemical modification to introduce physical properties to the starch for special applications;
- (iii) conversion in the glucose refinery into a range of syrups.

STARCH EXTRACTION.

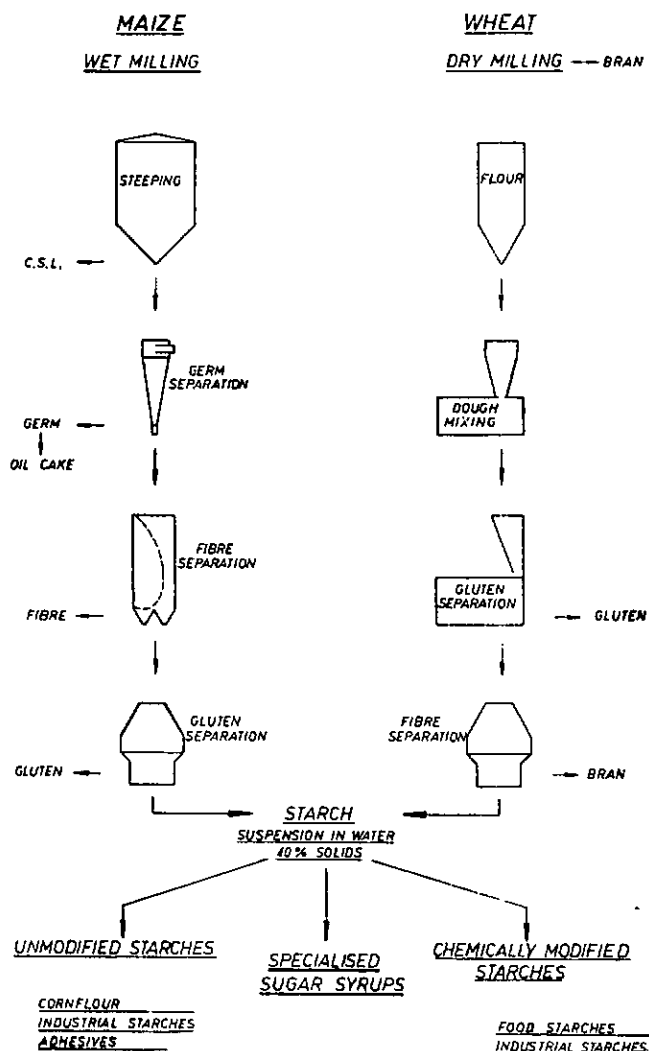


FIGURE 1 Principal stages in the manufacture of maize and wheat starch.

STARCH CHEMISTRY

Before discussing the various syrups, it is helpful to run over the basic starch chemistry.

Starch, as a naturally occurring energy source in seeds, roots and tubers, contains large polymers of anhydro glucose units. Two fractions can be found in starch, amylose and amylopectin, in which these units are combined in a different way.¹

Amylose is a linear fraction in which up to 2000 units are linked in the alpha 1-4 position only.

Amylopectin on the other hand contains units linked in the alpha 1-6 position, as well as in the 1-4 position and this results in a branched structure. The amylopectin can contain up to several hundred thousand glucose units, depending on the starch source and represents between 71 to 85 per cent of the starch.

During heating of a starch suspension in water, the polymers unwind and become fully hydrated, thus more readily allowing chemical or enzymatic reactions to take place.

SPECIALISED SUGAR SYRUPS

Traditionally starch based sugar syrups have been manufactured commercially by adding small amounts of hydrochloric acid to a 40 per cent starch slurry. Under controlled conditions of concentration, acidity, temperature/pressure and time, the starch is partially hydrolysed into a mixture of anhydro glucose polymer

SPECIALISED SUGAR SYRUPS.

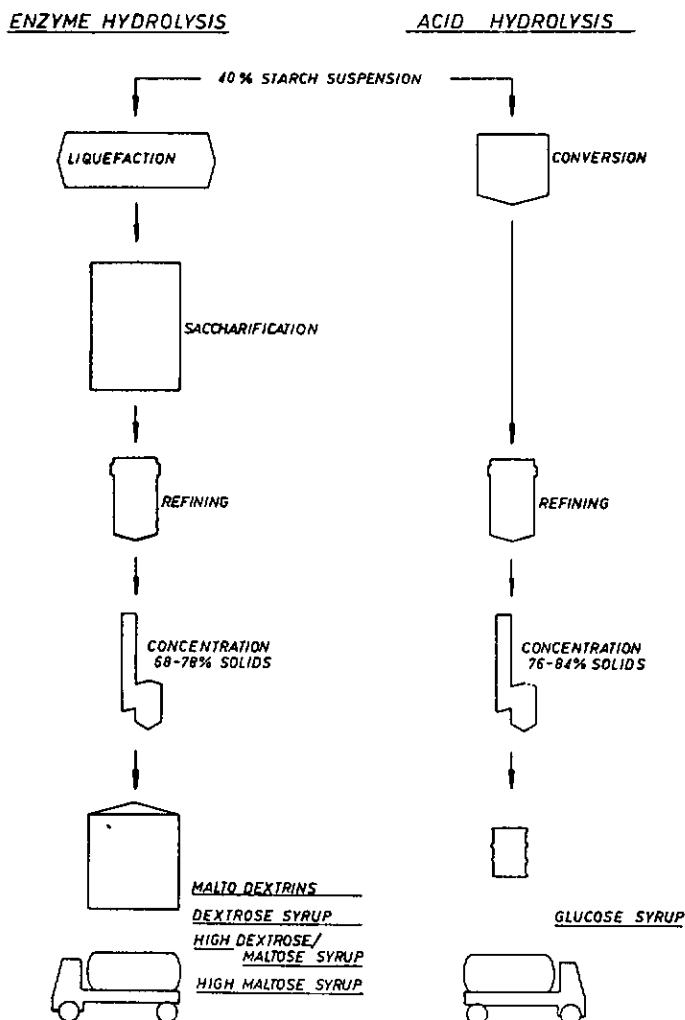


FIGURE 2 Principal stages in the enzyme and acid starch hydrolysis process.

fragments. The extent of the conversion depends on the reaction conditions and is measured by the reducing sugar content of the syrup solids, calculated as dextrose and expressed as a percentage of the total dry substance. Typically, acid converted glucose syrups have a dextrose equivalent of 40.

Acid converted syrups find a ready market in the pharmaceutical and confectionery industries, supplied in bulk or drums, at 80 per cent solids concentration.

ENZYMATIC CONVERSION

Using enzyme catalysts in place of acid hydrolysis allows the manufacturer to control more precisely the extent of the reaction and the sugar spectrum in the finished product.

The conversion step in the process consists of two stages: liquefaction and saccharification, followed by refining and concentration, as illustrated in Figure 2.

(i) During liquefaction a heat stable alpha-amylase enzyme hydrolyses the alpha 1-4 glucosidic links in amylose and amylopectin at random. The starch is rapidly broken down to soluble dextrans and oligosaccharides.

In the commercial process the starch slurry at 40 per cent solids is adjusted to pH 6.0-6.5. Calcium salt is added to 50 ppm calcium, so stabilising the enzyme, which is also added to the starch preparation tank (Figure 3).

The slurry is pumped through the jet cooker, where

the temperature is raised to 105°C with live steam.

The starch hydrates and is broken down by the enzyme action and shearing forces in the jet cooker, to avoid the peak viscosities that would otherwise occur. Holding the starch paste at this temperature for seven minutes ensures sufficient viscosity breakdown before cooling to 97°C and transfer to the multichamber reactor, where the solution is held for 90 minutes to reach a dextrose equivalent of 10-12.

Close control of the reaction conditions will ensure maximum enzyme activity, which is influenced by temperature and pH.

(ii) During saccharification a second dose of specialised enzymes is added, either amyloglucosidase to produce dextrose or a fungal alpha-amylase to produce up to 50 per cent maltose and some maltotriose.

Combinations of these two enzymes can produce the desired level of dextrose and maltose in one syrup.

After liquefaction the pH is lowered to between 4-5 and the liquid cooled to around 60°C, depending on the optimum conditions for the enzyme used. The pH reduction will also inactivate the liquefaction enzyme, an important factor in the stability of the end product.

Conversion proceeds for 35 hours in four batch saccharification tanks to obtain the desired sugar spectrum.

The raw sugar syrup requires refining involving protein and fat removal on a rotating vacuum filter and decolourisation with activated carbon. Finally the product is concentrated to between 68 to 70 per cent solids and transported in bulk to our customers.

PRODUCTS

The desired sugar spectrum of the product is primarily determined by the end product application

Our company manufactures two products at this stage:

A high fermentable syrup (96 per cent) high in dextrose, which can be used in many fermentation applications such as brewing, alcohol production vinegar and yeast manufacture; and a maltose/dextrose syrup for applications where sweetness and crystallisation control is desirable, together with a bodying or viscosity effect. These applications are found in fruit canning, preserves and icecream.

Trials have also been carried out with a very low dextrose equivalent product (28), Maltodextrin, which is a spray dried syrup without the saccharification step. This water soluble product has a relatively high viscosity and acts as a diluent and bodying agent in many food applications, e.g. baby foods.

HIGH PRESSURE LIQUID CHROMATOGRAPH

An essential tool in the product design and development has been the HPLC (High Pressure Liquid Chromatograph).

This instrument has allowed us to monitor from batch to batch the exact sugar composition, ensuring product consistency from the start.^{2,3}

When analysing the conversion of the high fermentable product, Avonwort, during the batch conversion, it can be noted that 80 per cent of the dextrose is formed in the first 15 hours and at the reaction conditions in our plant, the dextrose content reaches a peak after 32 hours conversion. At that point certain side reactions will reduce the dextrose equivalent (DE) and dextrose content, i.e. reversion of dextrose into iso-maltose, (Figure 4).

When monitoring the maltose/dextrose syrup, Avonsweet, using the amyloglucosidase and fungal alpha-amylase enzymes, it is noted that the DE levels off at 65 after 35 hours conversion, while the initially formed maltotriose (DP3) tends to be converted by amyloglucosidase to dextrose (DP1), and the maltose

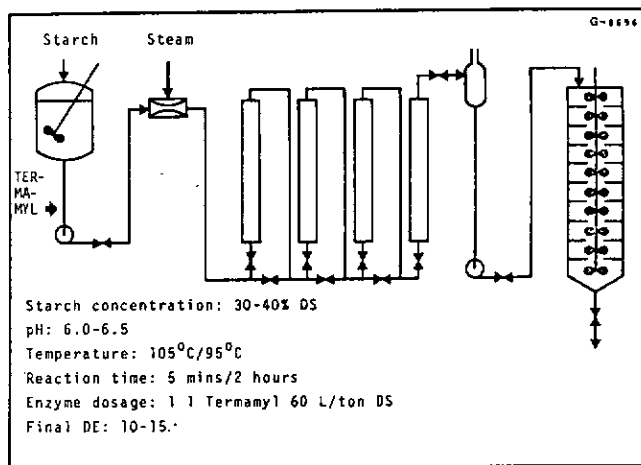


FIGURE 3 The starch liquefaction process.

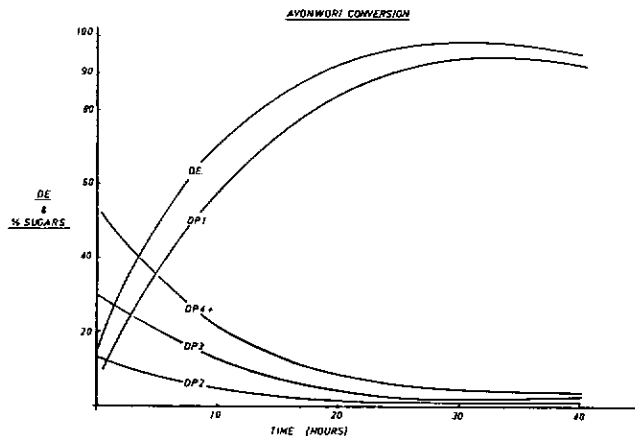


FIGURE 4 Graphical illustration of the changing Dextrose Equivalent (DE) and sugar distribution during saccharification to a high fermentable syrup using amylo-glucosidase enzyme.

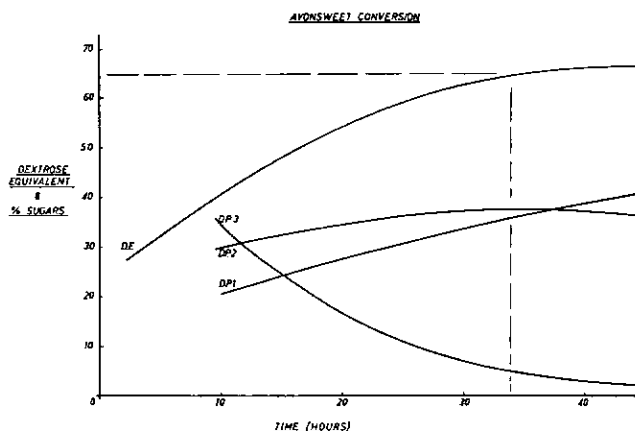


FIGURE 5 Graphical illustration of the changing Dextrose Equivalent (DE) and sugar distribution during saccharification to a Maltose/Dextrose Syrup using a combination of amylo-glucosidase and fungal alpha-amylase enzymes.

(DP2) content reduces after 33 hours conversion.

These are important factors in helping to determine the optimum conversion time (Figure 5)

SPECIALISED SUGARS

The specificity of each syrup can best be illustrated with a series of chromatograms. Analysing the conventional acid converted syrup, one can note the random distribution of mono, di, tri and higher saccharides (Figure 6).

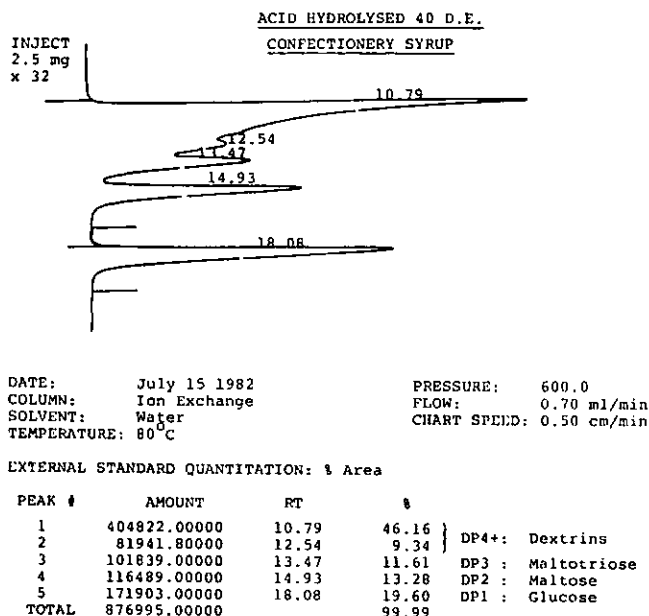


FIGURE 6 Chromatogram of 40 DE acid hydrolysed syrup for confectionery applications.

With the enzyme catalysed conversions, the manufacturer can more specifically control the sugar spectrum and thereby the functionality of the product in the customers application:

Avonwort, the higher fermentable product, shows a very large peak for DP1, dextrose (Figure 7).

Avonsweet, shows the two main peaks for maltose and dextrose (Figure 8).

Quantifying the areas under the curves determines the amount of each sugar present in the syrup.

With the development of this process over the last two years, our company has been able to increase its business in the sugar syrup market substantially.

The main aim now is to increase the volume of each product rather than adding to the range. Our success will depend on the cost of alternative products available to our customers and the potential competition from across the Tasman.

ACKNOWLEDGEMENT

Some of the illustrations presented in this paper have been made available by Novo Industri A/S — Enzymes Division — Denmark.⁴

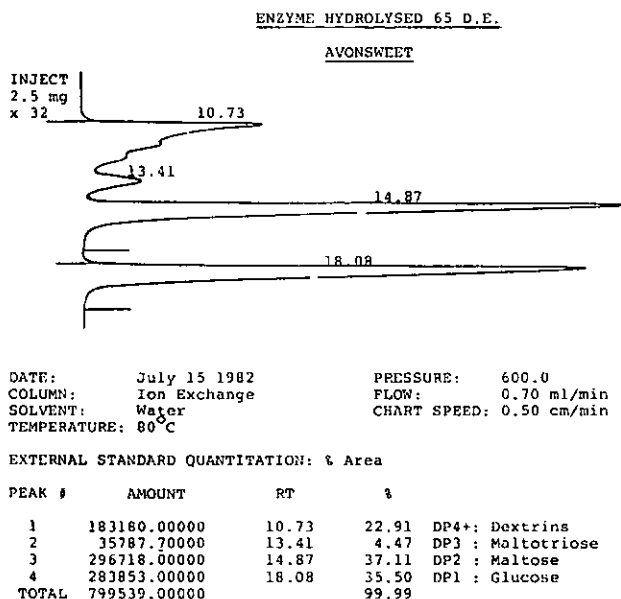


FIGURE 8 Chromatogram of 65 DE enzymes hydrolysed syrup for general food applications.

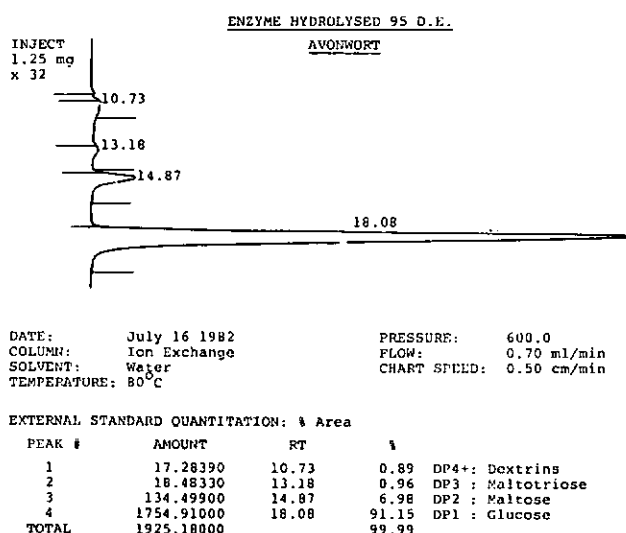


FIGURE 7 Chromatogram of 95 DE enzyme hydrolysed syrup for fermentation applications.

REFERENCES

- (1) R.L. Whistler and E.F. Paschall; Starch Chemistry and Technology Volume I 1965 "Chemical Evidence for the Structure of Starch" Chapter X Academic Press, New York and London.
- (2) CPC International Standard Methods of Analysis — internal publication.
- (3) Fitt, Hassler & Just, "A Rapid and High-Resolution Method to Determine the Composition of Corn Syrups by Liquid Chromatography".
- (4) P. Rosendal, Novo Industri A/S, "Enzymatic Production of Glucose and Fructose Syrups from Starch". Paper presented during workshop on "Biochemical, Nutritional and Industrial Aspects of Starch and other Cereal Carbohydrates" Melbourne July 1980.



John W. Beishuizen is the technical manager at N.Z. Starch Products, Auckland.

After obtaining his diploma from the School of Sugar Technology in Amsterdam, he emigrated to New Zealand, joining the starch industry in 1962.

Since then he has graduated BSc in chemistry/biochemistry from Auckland University.

During the last 20 years he has been responsible for the quality assurance and product development of the company's product range, being also actively involved in the customer service function and the technical administration of the company's expansion program.

COUNCIL NEWS

Dr W S Simpson presided over meetings of Council on Monday afternoon and Tuesday, August 23 and 24 1982 in Dunedin before the annual conference. A telephone meeting of standing committee linking Auckland, Wellington and Christchurch was held on October 27.

Membership elections: the following were elected at the August council meeting and October standing committee meeting:

Members: *Beaumont, Mrs Helen Mary*, BSc (Hons) Massey, Chemistry Division, DSIR, Petone (scientist). *Tunnickliff, Miss Judith Clair*, BSc (Hons), PhD. (Otago), Chemistry Division, DSIR, Petone (scientist).

Associate Member: *Goodall, Mrs Linley Gael*, Ruakura ARS, Hamilton (technical officer).

Technician Member to Associate Member: *Cross, Charles Raymond*, NZCS, UEB Industries Technical Centre, Auckland (laboratory technician).

Technician Member: *Baxter, Kenneth John*, NZCS, BSc, North Canterbury Catchment Board, Christchurch (chemist).

Life Members: *G.W. Broughton* (Otago), *Mrs DR Perrin* (Overseas), *GR Scott* (Canterbury), *RH Shepherd* (Wellington), *EW Wright* (Wellington).

Resignations: *Mrs RC Atkinson* (Auckland), *CD Skelton* (Auckland), *DH Taylor* (Wellington), *GJ Mills* (Manawatu).
Death: *Dr HC Holland*, Honorary Fellow.

Election of officers: in August *Dr DE Wright* was elected president, *Prof RD Batt* first vice president and *AW Mackney* second vice president. *Dr J Rogers* was re-elected honorary general secretary. All these appointments date from September 1, 1982.

Finance: the audited balance sheet for 1981-82 approved by council showed income exceeded expenditure by more than \$12,000 from the \$5650 Jubilee Conference surplus, instead of a budgeted \$5000 expense and \$1650 higher interest.

Subscription income — \$11,000 higher than in 1980/81 — was offset by \$5000 more for administrative expenses and higher publication costs. The 1981 list of members was an additional expense (\$1500) and Chemistry in New Zealand rose from \$1 to \$1.50 a copy (\$5000 in total).

Branch treasurers have received the \$6 per member uniform branch subscription from the registrar. To meet the effect of inflation on NZIC activities, it is proposed again to raise subscriptions in 1983/84: \$45 (\$40) for fellows and members, \$35 (\$30) for associate and local members and \$25 (\$22) for graduate and technician members will be the new rates with a \$4 surcharge applying to payments after August 31. Student membership is to remain at \$10. The uniform branch subscription will increase to \$7.50 per member.

NZIC subscriptions are considerably less than the RACI A\$70 for fellows and members and A\$40 for graduate members, which it is proposed rise to A\$85 and A\$50 in 1983 and 1984. Membership of the American Chemical Society is currently US\$58.

Council resolved that the overseas travel account be incorporated in the general accounts and that \$2500 be

allocated in 1982/83 for overseas visitors.

Overseas visitors: the president, *Dr Robert W Parry* and executive secretary, *Dr Raymond P Mariella* of the American Chemical Society, visited Christchurch and Wellington in October after attending the Golden Jubilee of the Chinese Chemical Society in Nanjing.

Prof M Kasha, University of Florida, visited Auckland, Wellington and Christchurch to discuss research on large molecule spectroscopy and photochemistry in November.

Prof RU Lemieux FRS, University of Alberta, Edmonton, who will be in New Zealand for about four months from mid November based at Victoria University of Wellington, is a leader in carbohydrate chemistry. He is president-elect of the Canadian Institute of Chemistry.

Prof JW Robinson, Louisiana State University, will be in New Zealand from January 25 1983 until February 9 to meet colleagues studying atomic absorption spectroscopy in Auckland, Hamilton, Palmerston North, Wellington, Dunedin and Christchurch.

Prof MB Rubin, Technion, Haifa, an organic chemist, will visit Auckland, Hamilton, Palmerston North, Wellington, Christchurch and Dunedin between February 20 and March 5.

Chemex '82: the Auckland branch undertook to prepare a display and man it at Chemex '82 December 6 to 9. Council allocated \$1000 for expenses. *Dr Ian Shearer* was to officially open the exhibition, which was said to be the first of its kind.

1982 List of Members: council decided to proceed with publication of a 1982 list of members although insufficient advertisements have been obtained to cover cost. It was not considered possible to include telephone numbers of members. However, a list of telephone numbers of relevant organisations is to be added as a move in this direction.

Life Membership: council at the request of the Otago branch, re-examined rule 13.2.1, which states that a member of any grade who has attained the age of 65 years and has paid subscriptions for not less than 10 years immediately prior to reaching that age, shall automatically become a life member. Council appreciated the point made by the Otago branch about the current trend to earlier retirement. However it considered that under rule 13.2.2 it had the ability to elect, in consultation with branches, members of 10 years or more standing who retired before reaching the age of 65, to life membership.

Branch secretaries are to be advised of this decision and the conditions governing joint subscriptions of members who are married, by the administrative secretary.

Standing Committee: council resolved that the registrar be a member of the committee, to consist of the president, honorary general secretary, delegate from the president's branch and registrar.

Careers in Chemistry: it was resolved to reprint *Careers in Chemistry*. *Dr Powell*, chairman of the publications committee,

has been asked to consider if it requires revision and the possibility of including advertisements to reduce its cost to the Institute.

Assistance to Graduate and Unemployed Members: council resolved that graduate and unemployed members be permitted to advertise free of charge in Chemistry in New Zealand for work.

Council also resolved that graduate members studying for a higher degree could apply to council for an extension of this status. During a period of unemployment any member may obtain relief of subscription while retaining full membership rights. The administrative secretary will advise branch secretaries of these decisions.

Council Committees: *Dr A Metcalfe*, convenor of the Energy and Chemical Resources Committee sought council's guidance on the role it wishes the Energy and its other committees (public affairs, environment, hazardous chemicals et al) to play. Council accepts responsibility for its interaction with its committees. *Dr Simpson* agreed to prepare an article on this subject for Chemistry in New Zealand and *Dr D E Wright* is to prepare a discussion paper for the February 17/18 1983 Council meeting. The editor asked that the council's committees consider writing to Chemistry in New Zealand about their work.

The public affairs committee has requested more interaction with NZIC branches, possibly through a committee member with responsibility for local public relations.

1984 International Chemical Congress of Pacific Basin Societies: *Dr D E Wright* has undertaken to attend a meeting of the planning committee for this congress in Japan, May 16/18, 1983. The congress is to be held in Honolulu December 16/21, 1984.

Members wishing to suggest topics for inclusion in the scientific program are asked to write to *Dr Wright* forthwith.

Title "Chemist": correspondence received from *Mr W Freitag* and the public affairs committee referred to examples of the non-professional use of the word "chemist" in advertisements for staff. It has been suggested that the grass roots feeling of Institute members on this subject should be assessed. Will you assist by writing or phoning your branch chairman or other officers and committee?

RSNZ Travel Awards: the AGM of the Institute in Dunedin on August 24 unanimously agreed to support in principle the concept of the travel awards which the Royal Society of New Zealand is hoping to establish. When it is available *Dr Wright* will supply further information about the scope and conditions for these grants.

President RACI: standing committee agreed to continue the practice established in our Golden Jubilee year by electing *Dr D E Weiss* of CSIRO, who became president of the Royal Australian Chemical Institute in November, as an honorary fellow of the NZIC during his term of office.

Directory of Scientific Instrument Agencies

Compiled by **Editor A C Herd** Auckland Technical Institute

This directory lists the local agents for a selected range of laboratory instruments and it is hoped that it will be of use to a majority of NZIC members. The editor would appreciate feed-back from members, suggestions for further directories of this type and preferably offers to compile future surveys. Chromatographic accessories have been suggested as a possible future topic. If you use this listing, it would benefit Chemistry in New Zealand if you mentioned the source of your information.

The scientific supply houses covered in the directory are listed in alphabetical order and given a reference number. The instruments surveyed are then listed in 11 categories in alphabetical order of brand names, the reference numbers then refer back to the local agent list.

Scientific supply houses

- | | | | |
|---|-------------|---|-------------|
| 1. Advanced Electronics Ltd P.O. Box 32-076 Auckland, 9 | ph. 451-305 | P.O. Box 10036 Wellington | ph. 724-824 |
| 2. Alltech Associates Pty Ltd P.O. Box 33-527 Takapuna, AK 9 | ph. 459-057 | P.O. Box 4275 Christchurch | ph. 67547 |
| 3. Anac Ltd P.O. Box 5565 Wellesley St. Auckland | ph. 770-392 | P.O. Box 1315 Dunedin | ph. 779-172 |
| | ph. 861-059 | 15. Northrop Instruments and Systems Ltd P.O. Box 2406 Wellington | ph. 850-091 |
| 4. Auckland Valve and Fitting Ltd P.O. Box 687 Manurewa | ph. 2786164 | P.O. Box 8602 Auckland | ph. 794-091 |
| 5. Beckman Instruments NZ P.O. Box 8680 Symonds St. Auckland | ph. 398-514 | P.O. Box 8388 Christchurch | ph. 488-873 |
| 6. Biotek Supplies P.O. Box 14-323 Panmure | ph. 576-413 | 16. Perkin-Elmer Instruments (NZ) P.O. Box 6348 Auckland | ph. |
| 7. Christchurch Valve and Fitting Ltd P.O. Box 8184 Riccarton | ph. 43146 | 17. Philips Electrical Industries Ltd S. and I. Division P.O. Box 41021 Auckland | ph. 894-160 |
| 8. W Arthur Fisher Ltd P.O. Box 12747 Penrose | ph. 592-629 | P.O. Box 2097 Wellington | ph. 735-735 |
| | ph. 694-702 | P.O. Box 1488 Christchurch | ph. 798-030 |
| | ph. 67692 | 18. Roche Products NZ Ltd P.O. Box 12-492 Penrose Auckland | ph. 660-029 |
| | ph. 88128 | 19. Sci-Med (NZ) Ltd P.O. Box 321 Dunedin | ph. 775-531 |
| 9. Thomas Hyde Ltd P.O. Box 9531 Newmarket, Auckland | ph. 761-508 | P.O. Box 5221 Christchurch | ph. 831-146 |
| | ph. 683-140 | P.O. Box 37070 Wellington | ph. 282-526 |
| | ph. 65986 | P.O. Box 6004 Palmerston North | ph. 79802 |
| 10. Kemphorne Medical Supplies Ltd P.O. Box 1234 Auckland | ph. 775-289 | P.O. Box 47309 Auckland | ph. 793-993 |
| | ph. 75073 | 20. Smith Bio-lab Ltd Scientific Products Division Private Bag Northcote Auckland | ph. 483-039 |
| | ph. 850-299 | 410 Hutt Rd, Wellington | ph. 697-099 |
| | ph. 792-050 | 68 Orbell St, Christchurch | ph. 63-661 |
| | ph. 771-065 | 80 Carrol St, Dunedin | ph. 773-235 |
| 11. Kent Instruments (NZ) Ltd. P.O. Box 11-264 Ellerslie | ph. 592-133 | 21. Warburton Franki Ltd P.O. Box 30651 Lower Hutt | ph. 693-016 |
| | ph. 698-413 | P.O. Box 9301 Auckland | ph. 504-458 |
| | ph. 489-873 | 22. Watson Victor Ltd P.O. Box 1180 Wellington | ph. 857-699 |
| | ph. 51-039 | P.O. Box 1216 Auckland | ph. 593-039 |
| | ph. 438-833 | P.O. Box 706 Christchurch | ph. 69-282 |
| 12. S D Mandeno Electronic Equipment Co 10 Woodhall Rd, Epsom Auckland, 3 | ph. 600-008 | P.O. Box 921 Dunedin | ph. 777-291 |
| 13. McGaw Ethicals Ltd P.O. Box 18-069 Glen Innes, Auckland | ph. 588-036 | 23. Wilton Instruments Division of Smith Biolab Ltd. Private Bag Northcote Auckland | ph. 483-039 |
| 14. Neill Cropper and Co. Ltd. P.O. Box 9 Auckland | ph. 31049 | P.O. Box 31-044 Lower Hutt | ph. 697-099 |
| | | P.O. Box 1813 Christchurch | ph. 63-661 |
| | | P.O. Box 1424 Dunedin | ph. 773-235 |

Instrument brand names

Analytical Balances

| | |
|--------------|-------|
| Chyo | 15,21 |
| Mettler | 22 |
| Perkin-Elmer | 16 |
| Precisa | 10 |
| Sartorius | 23 |
| Shimadzu | 19 |

Top-pan Balances

| | |
|-----------|-------|
| Chyo | 15,21 |
| Mettler | 22 |
| Ohaus | 10,20 |
| Precisa | 10 |
| Sartorius | 23 |
| Sauter | 22 |
| Scientech | 6 |
| Shimadzu | 19 |

mV Recorders

| | |
|-----------------|--------|
| Du Pont | 14 |
| Hewlett-Packard | 15 |
| Houston | 12, 20 |
| J J Lloyd | 23 |
| Linseis | 19 |
| Philips | 17 |
| Shimadzu | 19 |
| Vitatron | 20 |
| YEW | 8 |

pH/mV Meters

| | |
|--------------------|----|
| Beckman | 5 |
| Cole Parmer | 20 |
| Corning | 9 |
| EIL | 11 |
| Eirlec | 15 |
| Fisher Scientific | 19 |
| Foxboro Analytical | 8 |
| Horiba | 21 |
| Metrohm | 23 |
| Orion | 22 |
| Philips | 17 |
| Prestotek | 15 |
| Radiometer | 22 |
| Schott | 15 |
| Seibold | 15 |
| Solstat | 10 |
| Triac | 20 |
| YEW | 8 |

Visible Spectrophotometers

| | |
|--------------------|----|
| Bausch Lomb | 20 |
| Beckman | 5 |
| Cecil | 23 |
| Digispec | 20 |
| Jasco | 15 |
| Jobin-Yvon | 3 |
| Perkin-Elmer | 16 |
| Pye Unicam-Philips | 17 |
| Sequoia-Turner | 6 |
| Shimadzu | 19 |
| Varian | 23 |

UV - visible Spectrophotometers

| | |
|-----------------|----|
| Aminco | 22 |
| Bausch Lomb | 20 |
| Beckman | 5 |
| Cecil | 23 |
| Hewlett-Packard | 15 |

| | |
|--------------------|----|
| Jasco | 9 |
| Jobin-Yvon | 3 |
| Kontron | 18 |
| Perkin-Elmer | 16 |
| Pye Unicam-Philips | 17 |
| Sequoia-Turner | 6 |
| Shimadzu | 19 |
| Varian | 23 |

Infrared Spectrophotometers

| | |
|--------------------|----|
| Beckman | 5 |
| Jasco | 9 |
| Nicolet | 22 |
| Perkin-Elmer | 16 |
| Pye Unicam-Philips | 17 |
| Shimadzu | 19 |

Atomic Absorption Spectrophotometers

| | |
|--------------------|----|
| GBC | 1 |
| IL | 19 |
| Labtest | 1 |
| Perkin-Elmer | 16 |
| Pye Unicam-Philips | 17 |
| Scintrex | 15 |
| SpectraMetrics | 2 |
| Varian | 23 |

Flame Photometers

| | |
|--------------|----|
| Beckman | 5 |
| Corning | 9 |
| Gallenkamp | 20 |
| IL | 19 |
| Perkin-Elmer | 16 |
| Petracourt | 23 |
| Radiometer | 22 |
| Seac | 6 |

Gas Chromatographs

| | |
|--------------------|------|
| Carle | 4,7 |
| Dani | 1 |
| Foxboro Analytical | 8 |
| Gow-Mac | 2,22 |
| Hewlett-Packard | 15 |
| Perkin-Elmer | 16 |
| Photovac | 2 |
| Pye Unicam-Philips | 17 |
| Shimadzu | 19 |
| Tracor | 1 |
| Varian | 23 |

High Pressure Liquid Chromatographs

| | |
|--------------------|----|
| Analabs | 8 |
| Beckman | 5 |
| Biorad | 20 |
| Dionex | 9 |
| Du Pont | 14 |
| Gilson | 13 |
| Gow-Mac | 2 |
| Hewlett-Packard | 15 |
| Kontron | 18 |
| LKB | 19 |
| Micromeritics | 2 |
| Perkin-Elmer | 16 |
| Pye Unicam-Philips | 17 |
| Shimadzu | 19 |
| Spectra Physics | 22 |
| Tracor | 1 |
| Varian | 23 |
| Waters | 3 |

BRANCH NEWS

Auckland

Following the success of the Jubilee Scholar competition in 1981, a similar competition was run this year. Fifty competitors from seventh forms around the region took part, the University Chemistry Department providing the venue.

The format was similar to last year, the students being required to perform three activities. *John Packer* supervised and marked the first practical session dealing with simple test-tube inorganic reactions and the separation of three organic substances. *David Wilkins* (ATI), marked and supervised the second practical session dealing with a redox titration and the iodine clock reaction. The third session, organised by *Graham White*, required students to answer a multiple choice test and some short answer questions.

After marking and collation the best four students took part in a mastermind quiz. This provided an exciting finish as the margin between all four finalists was only four marks.

The final winner was *David Holmes-Kinsella* from *Pompallier College (Whangarei)* closely followed by *John Shanly* (Pompallier College) and *H. Wong-To* and *John Mathias* (both Auckland Grammar School). Sincere thanks are extended to the NZ Farmers' Fertilizer Company for providing lunch for the competitors and to the chemistry department technicians for ensuring the practical sessions ran smoothly and efficiently.

Manawatu

At the branch AGM in October, *Dr Ted Baker* was elected chairman for the com-

ing year. A full listing of the new committee will appear in the February issue.

The chairman's address was given by *Ramsey Southward* (N.Z. Dairy Research Institute) on Casein — This Most Versatile Derivative of Milk. He described methods for producing casein and uses to which it has and is, being applied. Examples of products that contain casein were displayed. These included buttons, coffee whiteners, hair shampoos, soups, diet formulae and, even, imitation cheese.

Ramsay presented a similar entertaining and informative lecture to a meeting of the Taranaki Group at Ivon Watkins-Dow, New Plymouth in September. A new event on the Taranaki calendar this year was the Presidential Address given by *Dr Stan Simpson* at NZ Farmers' Fertilizer Co, in New Plymouth. Further meetings organised by the group are being planned for next year.

The 8th Manawatu Science Fair was held from September 9 to 12 at the Queen Elizabeth College Hall in Palmerston North. Branch prizes for the best exhibits with a chemical theme were awarded to *Martin Reeves* of Palmerston North Intermediate Normal School for Dyes from Plants (intermediate physical sciences) and *Elizabeth Oliver* of Palmerston Girls' High School for Invisible Inks (senior physical sciences). These exhibits were also shown at the branch annual general meeting. The branch committee decided to extend financial support by offering prizes for the best exhibits in chemistry at both the Manawatu and Hawke's Bay Science Fairs in 1983 and in subsequent years. The committee is also keen to offer a similar prize to be awarded in the Taranaki region when a Science Fair is held there.

The ICI NZ National Science Fair was held in the Centennial Convention Centre from October 6 to 10. *Prof R.D. Batt* led the executive committee for this event. First prize was awarded to *Stephen Robertson* (St. Thomas of Canterbury College, Christchurch) for Light and Leaf Pigments and second prize to *Stephen McNallay* (James Cook High School, Auckland) for Mechanical Efficiency. Third equal prize was awarded to *Craig Lineham*, *Tom Matheson* and *Dean Carrol* (Nayland College, Nelson) for The Ecology of the Mud Snail and *David Palmer* and *Phillip Matsis* (Wanganui Collegiate School) for Linkage in Neurospora.

Wellington

At the September meeting, *Dr D.M. Bibby* of Chemistry Division, 1981/82 chairman, spoke on his research interest in zeolites. He discussed the structure and composition of zeolites and how these lead to their characteristic properties. Existing and projected major uses of zeolites were covered, with particular attention being given to the role of zeolite catalysts in the new hydrocracker being built at the Whangarei refinery and in the Mobil MTG process. *Dr Bibby* also addressed Nelson members on the same topic at the Cawthron Institute, Nelson in September.

Dr D.W. Smith, reader at the University of Waikato, delivered the Mellor lecture to the branch in October. In his talk entitled Chemical Periodicity a personal view, he discussed some "anomalies" of the

periodic table, in particular the "middle element anomaly" which allegedly afflicts Ga, Ge, As, Se, and Br.

Canterbury

In September, the Canterbury branch was addressed by the chief director with Chemistry Division DSIR *Ian McDonald*. In a talk entitled Legal Certainty in an Uncertain World, he discussed the evidence at the centre of controversy in the Arthur Allan Thomas case and the difficulties facing scientists in providing answers with certainty on the evidence available.

At the annual general meeting of the branch in November, outgoing chairman *Dr. Jim Coxon* discussed his impressions of research trends in organic chemistry overseas gained on a recent Erskine Fellowship to Japan, USA and the United Kingdom. He then spoke on work being done in the Chemistry Department at Canterbury on the stereochemistry of elimination reactions of bicyclic tertiary alcohols under acidic conditions.

At the meeting, *Dr John McKinnon* was elected chairman for the forthcoming year.

Two joint meetings with other bodies were held in November. On November 3, at a joint meeting with the Royal Society and the Science Teachers Association, *John Pollard* ex chemist with the Christchurch Gas Company entertained a large audience with a talk entitled Requiem for a Gas Works.

On November 29, the branch joined with the NZ Institute of Food Technologists and were addressed by *Nick Jarman*. He discussed the fishing industry and its future.

In December a seminar is being held at the University Staff Club on the role of computers in laboratory chemistry.

The branch is also sponsoring a publication entitled Who Needs Chemistry, which is to be circulated to all Canterbury secondary schools aimed at fifth formers deciding what subjects to take at Form 6 level. If successful the publications committee will adopt the format for a publication available for wider distribution.

Otago

At the September meeting the president, *Dr Stan Simpson*, spoke on the subject of Future Options and Opportunities for Wool Chemistry and Wool Grease Research. He also visited Southland members and gave a well attended address at the Southland Phosphate Co., Awarua. This meeting was much appreciated and future NZIC presidents will be encouraged to continue these visits on an annual basis.

At the annual general meeting in October, *Assoc Prof Merv Smith* spoke on the topic of Modern Biologists — Heirs of Frankenstein or Pasteur.

In the secondary schools program of lectures *Assoc Prof Grimmer* gave a performance of Chemical Magic on October 29.

The Branch has increased the value of the prizes awarded to students in the undergraduate chemistry courses to compensate for the effects of inflation on book prices.

It has been gratifying to note an increase in branch membership from 111 in 1980, 119 in 1981 to 130 in 1982.

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UNIVERSITY NEWS

Auckland

Drs *George Clark* and *Paul Woodgate* have been promoted to associate professor, and *Prof REF Mathews* has been appointed head of the department of cell biology.

Waikato

Seminars in September were given by *Prof FGA Stone* (University of Bristol) who spoke on Isolobal Relationships — a bridge between organic and inorganic chemistry; and *Prof G Dutton* (University of Dundee) who spoke on Some Faults in the Metabolism of Xenobiotics.

Dr Malcolm Carr attended a residential course at Lopdell House in Titirangi, to rewrite the UE Chemistry Prescription.

Dr Derek Smith attended the Australian Spectroscopy Conference at LaTrobe University and the RAIC Convention at ANU, delivering papers on metal field theory.

Massey

Drs *David Parry* and *Andrew Brodie* of the Department of Chemistry, Biochemistry and Biophysics, were recently promoted to readers in the Department. *Dr Parry* has been awarded an Australian Wool Corporation Travelling Fellowship to visit the CSIRO Division of

Protein Chemistry, Melbourne, for two weeks in December, 1982.

Prof M Loncin, professor of food engineering at the University of Karlsruhe, German Federal Republic, well known for his participation in a wide range of scientific activities including fractionation of palm oil and water — oil emulsions studies; will spend the first term of 1983 in the Biotechnology Department.

Canterbury

Drs *Murray McEwan* and *Peter Harland* are presenting papers at the 8th Conference of the Australian and New Zealand Society of Mass Spectrometry to be held in Australia in February.

Prof Jim Trotter from University of British Columbia is in the Chemistry Department until the end of the year. His field is X-ray crystallography.

Other visitors have included *Dr Mike Snow* from University of Adelaide, who spent two weeks in the Department in late October and *Dr M Kafha* who addressed a seminar on the subject Proton Transfer Spectroscopy in Chromones.

Visitors next year will include *Prof KL Rinehart* (University of Illinois) who will be visiting as an Erskine Fellow between June and August 1983. He has interests in natural products chemistry.

Otago

Visitors to the Chemistry Department have included *Prof Charles Kemball* FRS, of the University of Edinburgh, who lectured on Catalytic Properties of Metal Oxides in Hydrocarbon Reactions. Following the RACI conference in Melbourne, two visitors were *Prof Helmut Werner* from the University of Wurzburg who gave a talk entitled From Metal Basicity to C-H Activation; and *Prof FGA Stone* FRS of Bristol University who spoke on Isolobal Relationships. A Bridge Between Inorganic and Organic Chemistry. Other visitors were *Dr Barry Hart* from the Chisholm Institute in Melbourne, *Dr GW Simpson* of Imperial College, London and *Stan Winter* of the Southland Co-op. Fertilizer Co.

A small group in the Chemistry Department has formed a discussion group with the aim of identifying chemically feasible projects which might be taken up by locally based industries or concerns for further evaluation and implementation.

In the foods Department, *Jeanette Samundsen* has obtained a grant from the Central Otago Stone Fruit Growers Advisory Committee to investigate aspects of stone fruit storage. Another study which is being undertaken is directed towards the determination of phytanic acid levels in New Zealand foodstuffs.

GOVERNMENT DEPARTMENTS

Ruakura

Dr Ron Henzell returned from a year's study leave with CSIRO, Biological Chemistry Division, Canberra. He was investigating the effects of xenobiotics on seed germination with particular emphasis on nodding thistle and ragwort.

Chemistry Division (Gracefield)

Sam Lister recently retired from the Applied Chemistry Section.

Frank Hurst retired as head of the Forensic Section on November 5. *Lionel Sharman* has been appointed his successor.

Dr Richard Meinhold has transferred from Chemistry Division, Auckland to Gracefield where he is working on NMR studies.

Dr Graeme Gainsford and *Dr AD (Tony) Woolhouse* have recently returned to Gracefield from overseas study leave.

John Hughes of the Food Section recently completed a visit to Fiji and the USA. While in the USA he visited Wright State University and discussed the problem of TCD — Dioxin analysis in meat fat.

Dr Allen Stowell has been appointed to

the Drugs and Alcohol Section. *Dr Stowell* completed his PhD degree with *Prof RD Batt* at Massey University and for the last four years has been working in various forensic toxicology institutes in Finland and Norway.

The director of Chemistry Division, *Dr GJ Leary*, with *Drs AD Woolhouse*, *DM Bibby*, *LP Aldridge* and *NB Milestone* from Chemistry Division, *Dr CNS McLachlan* and *JPR O'Malley* from Industrial Processing Division of DSIR and two members of NZ Synfuels corporation, attended a joint DSIR/CSIRO seminar on zeolite catalysts at the University of Melbourne in October. While in Melbourne, they also visited ICI Central Research Laboratory and BHP Laboratory.

Institute of Nuclear Sciences

Dr John Hulston has returned from a brief visit to Japan and the Philippines. In Japan he attended the Fifth International Conference on Geochronology, cosmochronology and Isotope Geology held at Nikko National Park. At the Tongonan geothermal project in Tonganan, Leyte, Philippines he gave a series of lectures on the use of stable and

radioactive isotopes in geothermal work under the New Zealand government aid program. These lectures were attended by a total of 21, mainly from Philippine oil company geothermal groups. In February 1983 *Dr Hulston* will be a plenary lecturer at the Eighth Conference of the ANZ Society for Mass Spectrometry to be held at Monash University in Melbourne.

Dr Mike Stewart is currently working for three months on high sensitivity stable isotope measurements at the US Geological Survey in Denver, Colorado.

Dr Chris Adams has been awarded a Humboldt fellowship and will work in Germany on isotope geochronology for the next 15 months.

Chemistry Division (Christchurch)

Dr Bill Swallow has returned to Chemistry Division after spending 14 months at the Chester Beatty Research Institute in London, studying the metabolism of carcinogenic polycyclic aromatic hydrocarbons. During his stay overseas he also visited several forensic laboratories and two other laboratories involved in the study of carcinogens.

RESEARCH INSTITUTES

NZ Dairy Research Institute

Dr Kevin Marshall, an assistant director, has been seconded to the New Zealand Dairy Board for a period of three years and will be full time in Wellington from January 1 1983.

Dr Bob Lawrence, *Dr Chris Bloore* and *Max Parkin* attended the Australian Dairy Technology Review Conference at Glenormiston, Victoria, in mid September.

Prof Edmund Renner from Justus Liebig

University, Giessen, was brought to New Zealand by Tetra Pak (NZ) to address a seminar in Auckland on aseptic processing. (These processes are used for products such as Just Juice, Fresh Up, Prime, Zap and Moove.) He subsequently gave public seminars in Wellington and Palmerston North on Consumer Aspects of UHT Milk products and The Nutritional Value of Fermented Milk Products respectively.

BRANZ

Dr Hugh Baber has been appointed as head of Fire Division. Hugh has been a scientist in the Division for seven years.

Dr Rob Whitney has been accepted as a member of ASTM committee G3 Durability of Non-Metallic building Materials, and *Dr Wayne Sharman* has been accepted as a member of ASTM committee C17 Fibre-Cement Products.

Dr John Duncan has been re-elected as

RESEARCH INSTITUTES

New Zealand member of the International corrosion Council.

Wool Research Organisation

Dr MJ Palin, International Wool

Secretariat, Technical Centre, Ilkley*UK is spending a period at WRONZ. During his stay he will be working on studies related to wool surfaces.

Wellcome Research Institute

Lin Phelan of the Wellcome Research Institute at Otago has completed his PhD Studies on genetic hypertension in rats.

CONFERENCES



Prof Bergstrom

NOBEL LAUREATE FOR FATS CONFERENCE

Prof Sune Bergstrom, head of the famous Karolinska Institute in Stockholm, will be a featured speaker at the International Conference on Oils Fats and Waxes to be held at the University of Auckland on February 13 to 17 1983.

His subject will be prostaglandins; for his work on these substances, he was this year awarded the Nobel Prize jointly with Prof B Samuelsson, also of the Karolinska Institute and Prof John Vane of the Wellcome Research Laboratories, London. Compounds of this group were first isolated and characterised by Bergstrom and Samuelsson in the 1960s, and are now of great interest.

Several members of the group are commercially available for the treatment of such varied disorders as heart disease, circulatory problems, bronchial troubles, ulcers, painful urination, as well as being used to control and induce abortion, to bring on menstruation, and to assist with labour in childbirth. Besides these medical aspects, their chemistry is fascinating and involves some unusual problems, including their rapid decomposition, which has led to much research into the synthesis of more stable analogues.

Another specially invited plenary speaker will be Prof RG Ackman of Nova Scotia, who is not only a world leader in the chemistry of marine lipids, but has also an international reputation in chromatographic techniques.

He will speak to the conference on capillary chromatography and will be the featured speaker at the official dinner. Other notable visitors will be Prof Ralph

Holman of Minnesota, who speaks on polyunsaturated fatty acids (from which prostaglandins are derived in the body); Prof Mark Hegsted of Harvard on fats in nutrition; Dr Ralph Timms of Malaysia, an authority on the physical chemistry of fats; Dr Michael Gurr of the National Institute for Research in Dairying at Reading, England and a number of others.

There will be a strong section of speakers on chromatographic techniques, led by Dr J Craske of Sydney and Prof Ackman. The chromatography Group of the NZIC has taken advantage of this and will hold a two day session in Auckland on February 17 and 18 in which the group will hear conference speakers on the first day and arrange its own program on the second.

It is emphasised that anyone wishing to take advantage of this opportunity should communicate with Dr George Zabkiewicz, of the Forest Research Institute, Rotorua, and not with the conference organisers.

Another interesting speaker will be Dr Brandini of Brazil, who will speak on the use of vegetable oils and their derivatives as energy sources.

On a different note Prof AA Benson of the Scripps Institute, California, will speak on arseno-lipids in marine algae. Altogether the conference promises to be a very exciting event. It is pleasing to note, in view of the fact that the NZIC is acting as a guarantor for the conference, that many New Zealand chemists and biochemists have already registered for the event. Full details from Stan Brooker, Chemistry Dept. University of Auckland.

1983 NZIC CONFERENCE

The organisation for next year's conference which will be in Hamilton, August 22 to 26, is proceeding under a committee headed by Dr Pat Holland (Chairman), Dr Carrick Devine (Secretary) and Dr John Watkinson (Treasurer).

Joint sessions will be held with the NZ Soil Science Society and the NZ Biochemical Society. Symposia are being considered in the areas of science education, advances in spectroscopy, science information, fermentation technology, and high quality protein production.

Suggestions for speakers on these or other possible topics are being gratefully received. In particular, please advise the secretary of visiting chemists who will be in New Zealand around conference time. NZIC Conference, c/o Dr C Devine MIRINZ, Box 617, Hamilton.

SEVENTH AUSTRALIAN SYMPOSIUM ON ANALYTICAL CHEMISTRY

The seventh Australian Symposium on Analytical Chemistry is to be held in Adelaide from 22 to 26 August 1983.

The following international plenary speakers have been invited.

Dr AC Moffat, CRE Aldermaston, (forensic toxicology), Prof H Poppe, University of Amsterdam (gas chromatography), Dr J Ottaway, University of Strathclyde,

(atomic spectrometry), Dr B Afghan, National Water Research Institute, Ontario (environmental pollutants), Dr R Barnes, University of Massachusetts, (inductively coupled plasma), Prof D Crosby, University of California, (pesticides in food), Assoc Prof Ni Zhe-Ming Academy of Science, Peking (analytical chemistry in China).

Prominent Australian speakers will present review papers on: Ion chromatography; HPLC; GC/MS; Laboratory automation and computerisation; Analytical quality assurance; XRF; Wine analysis; Environmental analysis.

Workshop sessions are also planned and topics will include mycotoxins, petrochemicals, agricultural and veterinary chemistry, clinical chemistry.

Paper and poster presentations are invited on all areas of analytical chemistry and in particular geochemical, petrochemical, forensic, food and drugs, pesticides and environmental analysis will be covered, together with education and new developments in analytical instrumentation. The theme for the Symposium will be Quality Through Chemistry.

Titles of proposed papers with a summary of the paper of approximately 200 words should be sent to the Secretary Don Patterson, c/o AMDEL, PO Box 114, Eastwood South Australia, 5063 by late April 1983.

53rd Anzaas Congress, Perth, May 16 to 20, 1983. Contact WS Cooper, School of Social Sciences, Western Australian Institute of Technology, Bentley, Western Australia 6102.

Lactic Acid Bateria in Foods, Wageningen, The Netherlands, Sept. 7 to 9, 1983. Contact Dr PM Klapwijk c/o Unilever Research Laboratory, PO Box 114, 3130 AC, Vlaardingen, The Netherlands.

9th International Conference on Alcohol and Drugs Puerto Rico, Nov 13 to 18, 1983. Contact T83 Secretariat, GPO Box 5067, Medical Sciences Campus, San Juan, Puerto Rico.

IUPAC SPONSORED

29th International Congress of Pure and Applied Chemistry, Cologne, June 5 to 10, 1983. Contact Congress Secretariat, PO Box 900440, D-6000 Frankfurt/Main 90, Federal Republic of Germany.

5th International Symposium on Boron Chemistry, Swansea, July 11 to 15, 1983. Contact JC James Dept of Chemistry, University College of Swansea, West Glamorgan SA2 8PP.

Analytical Chemistry, Edinburgh, July 17 to 23, 1983. Contact Dr AM Ure, c/o Analytical Division, Royal Society of Chemistry, Burlington House, London W1V 0BN.

Clinical Chemistry and Chemical Toxicology of Metals, Montreal, July 19 to 22, 1983. Contact Secretariat COMTOX 83, 340 MacLaren St, Ottawa, Canada K2P 0M6.



HC HOLLAND, OBE

Few New Zealand chemists have succeeded so well in the commercial field as Dr HC Holland who died at Taupo on June 7, 1982. As well as being general manager and managing director of W Sutherland and Co, Ltd, tanners and merchants in Onehunga, he was deputy chairman of Ivon Watkins-Dow and chairman of Parkinson Cowan (NZ) Ltd. He was a past-president of the NZ Manufacturers'

Federation, as well as of the Auckland branch. He was a member of the Broadcasting Authority, the National Research Council and of the commission which planned the NZ pavillion at Expo 70 in Osaka, Japan.

Harold Holland was born in Canterbury in 1906 and educated at Christchurch Boys' High School and at Canterbury College, before going to the University of Leeds where he gained his PhD. He lectured for a year at Canterbury before joining the Woolston Tanneries as a chemist.

In 1945 he went to Sutherlands and was with them until he retired in 1971, but continued his other business interests.

He was also active in civic affairs as president of the Auckland Institute and Museum between 1967 and 70 and served on the council for many years. His business experience proved valuable in funding the auditorium and starting the shop, both projects coming to fruition while he was president.

In 1965 he was chairman of the committee which successfully ran the Eleventh NZ Science Congress. In his later years he retired to live in Taupo, where he was involved in establishing the museum there.

In 1970, he was honoured with the OBE and in 1974 was awarded an honorary DSc by the University of Canterbury for his services to the community.

In 1934 Harold Holland married Miss Dorothy Burns, a fellow student at Canterbury, by whom he had two sons and a

daughter. Mrs Holland died in 1966. Two years later he married Mrs W Horton, widow of the late Mr MH Horton of the well known Auckland publishing house and who now survives him. To her and the other members of his family, we extend our sympathy.

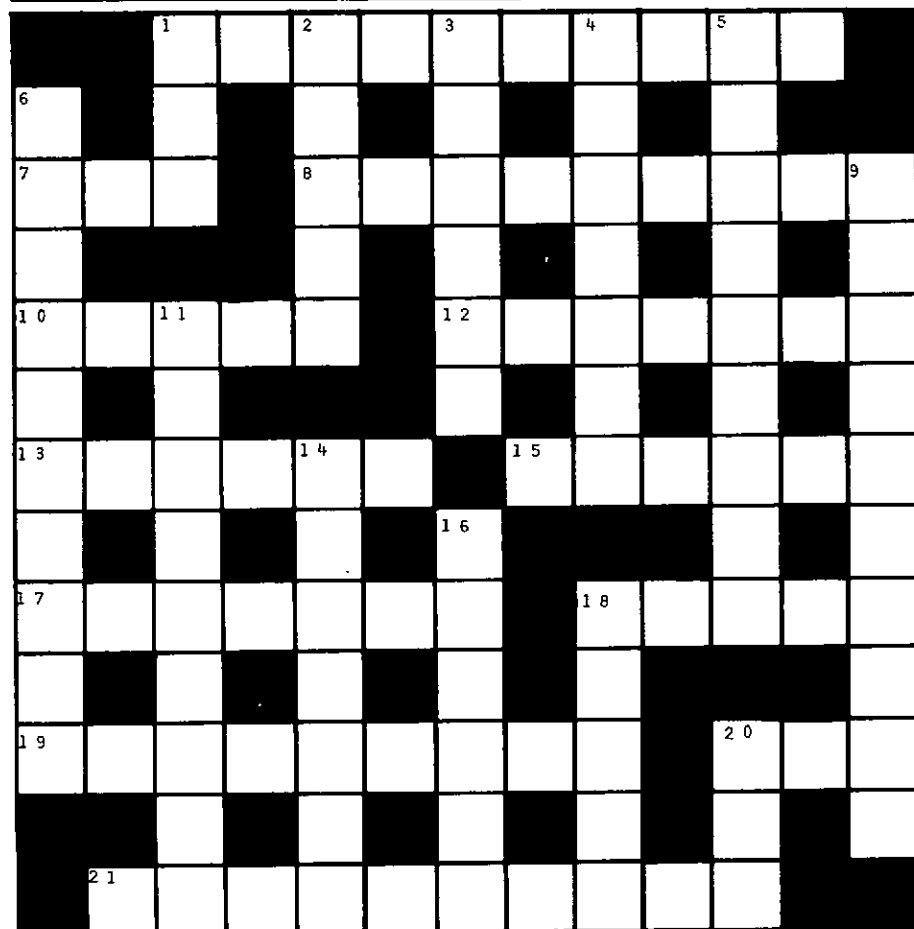
THE SCEPTICAL CHEMIST

A recent article in the British Medical Journal drew attention to a depot contraceptive. The Commission on Safety of Medicines had recommended approval for marketing this product in the United Kingdom but the Minister of Health declined to accept the recommendation. The BMJ considers that he should give a detailed and convincing justification for his decision.

In New Zealand we have a government which is becoming increasingly authoritarian and prone to change the rules retrospectively whenever it loses the game.

The Institute must be prepared to emulate the British Medical Journal whenever parallel circumstances arise and press the government for adequate explanations. Nothing less should be expected of a responsible scientific body.

Should anyone be interested in contributing to this column anonymously or otherwise, please forward their contribution to Dr Mike Kingsford, 9 Egremont St, Belmont, Auckland 9.



CLUES

ACROSS

1. Gaseous princely rule? (7,3)
7. Deserve a vase? (3)
8. Pre-birth antagonist towards South African province? (9)
10. Pump confused the Egyptian sun god. (5)
12. Pointed objects almost require smaller amount (7)
13. Putrid bike race is surrounded by confused Roman emperor. (6)
15. Key holder has kinetic energy and a bewildered nobleman. (6)
17. Plain old boy pursued by five credit notes. (7)
18. Rush about 18 down. (5)
19. Surfactant may discourage a chap. (9)
20. Total thinking sound after Pole. (3)
21. Male child by law, not birth. (7,3)

DOWN

1. Study part of the congregation. (3)
2. Modern times apt to change. (5)
3. Hidden in the French nomad's residence. (6)
4. Honest papist bathes in turbid French river. (7)
5. They play with expensive animals we hear. (9)
6. Physicist mixes erbium, ruthenium and thorium to cross a river. (10)
9. Bright lights upset bees alarms. (5,5)
11. Carbon made absorbant by reaction of tellurium in acid vat. (9)
14. Pride-boosting journey? (3,4)
16. Point added to detailed essential ancient religious order. (6)
18. Detests product of astatine, sulphur and helium. (5)
20. Short trig function is wrong. (3)

Something for cryptic crossword addicts to while away those long summer months. You should be warned that not all the items are strictly chemical, reflecting the contributor's rather unique mixture of in-

terests. Although, he has pleaded for anonymity, I think it only fair to give a clue to his identity. Initially a winner, understanding is followed by a twist (3, 6). Answers appear on p138 of this issue.



Dr Bob Parry

VISITORS FROM THE USA

American Chemical Society president Dr Bob Parry and executive officer Dr Ray Mariella visited New Zealand in October. They represent one of the largest scientific bodies in the world, the ACS having 126,000 members and Dr Mariella has a staff of 1600 and a budget of US\$100 million.

As well as differences in size, the ACS is built on a rather different base than the NZIC, Dr Parry said that 60 per cent of American scientists are employed by private industry, in New Zealand 80 per cent are employed by government.

Accompanied by NZIC members Drs Percival, Rogers and Wright, the visitors met the minister of science and technology Dr Ian Shearer at his office in the Beehive. One idea discussed was of

increased cooperation between the ACS and NZIC in the form of an exchange of chemists. Dr Parry thinks that American industry may be willing to fund the American end, but it may not be easy for New Zealand to match this, particularly as the RSNZ is seeking to set up a travel award scheme between the UK and NZ. The idea requires further development and Dr Parry will be writing to the NZIC on his return.

The meeting spun-off some ministerial publicity for the NZIC. Dr Shearer had not appreciated the size of our Institute and thought it smaller than the NZ Institute of Agricultural Science.

The contribution of industrial chemists to the NZIC was also pointed out to the minister and contrasted with the RSNZ which has no fellows with an industrial background.

Dr Parry also spoke in the chemistry departments of Canterbury, Victoria and Auckland Universities on Chemistry — Hope for the '80s.

The ACS also indicated that it was keen to recruit New Zealand members and application forms and subscription rates are available from the NZIC Registrar at PO Box 1926, Christchurch.

INSTITUTE TIE AND SCARF

A suggestion that our Institute should have an official tie for men and scarf for women members has been supported by council and by members of the Wellington branch.

The first requirement is to design a logo. Ideas are now sought from members. As chemists we see ourselves as innovators, so let us see whether our creativity extends to a simple yet distinctive logo.

Ideas should be forwarded to the president. The Council at its February meeting will choose the best design, the winner being awarded with an appropriate prize — a tie or scarf. Get cracking and leave your mark on our Institute.

DISCOUNT ON ANNUAL REVIEWS

The Institute has been invited by Annual Reviews (Inc) of Palo Alto, California, to act as NZ agent for its publications. Members will be able to order any of the annual reviews at a 20 per cent discount and pay through the Institute in NZ currency. The books will be posted to them direct.

Below is the list of titles available, the 1983 publication date and the price in New Zealand dollars after discount. Interested members should write to the Registrar, PO Box 1926, Christchurch, as soon as convenient but not later than eight weeks before publication.

Annual Reviews of Biochemistry are already distributed in New Zealand by the NZ Biochemical Society.

Annual Review of Biochemistry, July, \$35.60; Annual Review of Material Science, August, \$74.50; Annual Review of Pharmacology and Toxicology, April, \$33.40; Annual Review of Physical Chemistry, November, \$34.50.

ALLTECH OPENS IN NEW ZEALAND

Alltech Associates Pty Ltd has recently opened a New Zealand branch office. The company is involved in chromatography instruments and accessories, safety products and particle technology. Its address appears in the Scientific Instrument Directory in this issue.

EMPLOYMENT WANTED

AS van Brakel, a Dutch laboratory technician, is seeking employment in New Zealand.

Aged 41, he has had experience in the production of high purity metals, molecular structure analysis, characterisation of organic coatings and flame retardant chemistry. Write to De Olmen 66, 6903 BP Zevenaar, The Netherlands.

HAZARDOUS CHEMICALS

An important duty in which the NZIC is involved is in giving advice on the properties, storage and handling of hazardous chemicals. This involvement commenced in earnest with the formation of the hazardous chemicals sub committee of the Institute's branch in Auckland in 1974 and its appointment as a full committee of the Institute in 1978.

NZIC representation on two committees formed by the Standards Association of New Zealand dealing with hazardous substances commenced in 1978. The SANZ committees working under the transportation and merchandise sectional committee, were faced with a need for the urgent preparation of standard and codes of practice dealing with hazardous substances.

To some extent the sub committee working on Transportation Labels for Hazardous Substances was successful in its urgency because the New Zealand Standard Specification was published in 1980 as NZS 5417, three years after the formation of the committee.

The other committees were faced with the more daunting task of producing a code of practice for the transportation of hazardous substances by land and a standard (at present DZ 5433) and a standard specification for the containment of substances. They are still at the draft stage albeit an advanced level.

For convenience the standard specification for The Containment of Hazardous Substances for Multi Modal Transport (at present DZ 5418) was divided into two parts: Part 1 Large Containers and Part 2 Small Containers. Part 2 may be of more interest to chemists because it has an extensive list of tank requirements for the containment of about 530 potentially hazardous chemicals.

It is hoped that these standards will be cited in regulations, but it must be of some concern that legislation on the subject of hazardous chemicals appears to be lagging even well behind the standards and the eagerly awaited 'new' Dangerous Goods Regulations have yet to appear on the New Zealand scene.

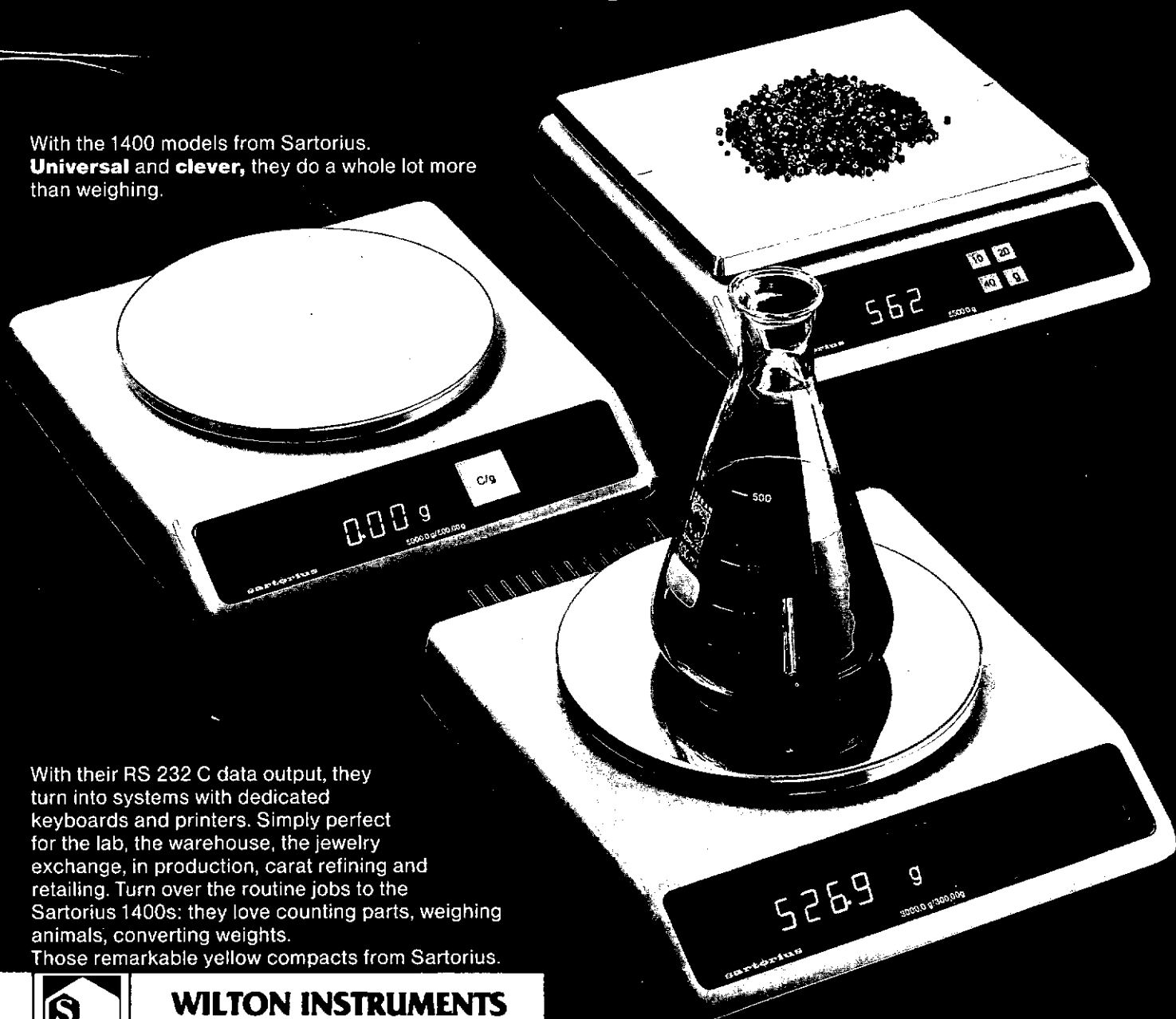
More recently the hazardous chemicals committee had the opportunity to comment on a proposal by the Auckland Regional Authority to build up its awareness of hazardous activities in the region. The authority states that the guidelines will deal not only with existing materials but also with new or novel developments. The intention is commendable but it is unlikely that the ARA will have the necessary information or 'teeth' to supervise an operation of both the awareness and control of all hazards in the area.

Nevertheless, NZIC has offered its services to assist in the development of the scheme and believes that it may well be a useful route to bringing attention to the lack of suitable Dangerous Goods Regulations and sites and equipment for the efficient disposal of hazardous wastes in the region.

A.C. Kennett.

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WILTONS
WN 13

LETTERS

Dear Sir,

I cannot agree with the views of The Sceptical Chemist regarding Commissions of Enquiry (October issue). Indeed, I have very great faith in the fairness and determination to arrive at the truth, which were so evident in the two commissions referred to.

Commissions are inquisitorial in nature and as such are far more effective in seeking out truth than are the so-called "adversary system" courts.

If ever a tribunal sought and found the truth it was the Royal Commission into the Thomas Affair. Any criticism levelled by this commission, I believe, was fully justified.

Few people have appeared in the witness box more than I have. Never have I had anything to fear, nor ever shall I, for when I take the oath to tell the truth it means just that. Cold shivers appear in the spines only of those who take the oath, but then do not abide by it.

I will tell you what does give me cold shivers though...it is the thought of having to explain from the witness box, in an adversary court, niceties of forensic or other science in an endeavour to resolve a difference with another scientific witness.

I can think of no worse locale wherein to solve a scientific matter than by examination and cross-examination, by lawyers, before a jury.

However, this is another aspect. I see no need for any other association, but I do agree that the Institute has not been renowned for any positive action with regard to certain recent forensic debacles.

T.J. Sprott,

T.J. Sprott and Assocs,
Auckland.

NOTE: correspondence on this issue is now closed. Ed.

Dear Sir,

"Three cheers for Jim! For him? For Jim!"

I refer to Jim Sprott's letter in last month's journal. I am filled with enthusiasm with his plans to enliven and enlarge this journal.

More seriously, of course the subjects must be of interest to chemists, however loosely. For instance, the very next letter following Dr Sprott's should cause comment. The relationship between NZIC members' professional integrity and TELARC registration should be questioned. In the penultimate paragraph of that letter, doubt is cast on "the guarantee of the reliability or competence" of qualified chemists.

Generally, chemists like other humans need debunking, from time to time.

I apologise for a deliberate misquote from A.A. Milne. By the way, where did Dr Sprott find his Shakespeare quotation? I have been looking for it for years.

Michel Joerin
Hamilton

Dear Sir,

As one of those responsible for the chemistry sections of the form 1 to 4 draft syllabus, I feel I must comment on the conclusions reached in the Chemistry and the learning in science project article in the October issue.

Let me first state, however, how impressed I have been by the research carried out by this project team. I had the

privilege of studying the research at Dr Osborne's course at Lopdell House earlier this year. If I had still been a practising teacher I know that it would have had a more profound effect on my teaching style than Chem Study or Piaget or any of the earlier major forces in chemical education. As it is I know that the project has greatly influenced the way I observe the chemistry courses of teachers in schools, in my capacity as a school inspector.

However, I do not give the same priority to reconsideration of the chemistry topics and objectives in the form 1 to 4 draft syllabus as do your writers. The fact is that these topics and objectives represented a significant step towards simplification of chemistry in comparison with the 1967 syllabus.

This latter syllabus mentions such things as particle nature, diffusion and change of state at form 1 level and cloud model, stability of electron zone and polar bonds at form 3. I well remember the outcry from practising teachers at the time when the 1978 draft appeared when these concepts were moved up two years. In particular, I remember bitter arguments about Section 11 2c which required fourth form students to be capable only of writing simple word equations to represent observed changes. This lowering of standards was seen to be the final nail in the coffin of traditional chemistry teaching.

The problem lies less in the difficulty of the syllabus concept, than in the inability of the teaching to limit itself to simple ideas. I visit many classrooms in which the teacher will claim to be following the 1978 draft syllabus, but the words and ideas being expressed are far in excess of those required by the draft, or by the abilities of 95 per cent of the students.

Such teachers must realise that the idea they are explaining to the able 5 per cent may well excite them to do greater things in sciences, but the majority of the class switch off with no guarantee of switching on again when topics of suitable level are later discussed.

The answer lies in the pre-training and continued training of our science teachers. We are still producing far too many specialist teachers of physics, chemistry and biology, who have limited skills in the teaching of form 1 to 4 science. The latter generally fills up to two thirds of the teaching time and deserves better preparation of the teacher. If schools make use of the learning in science resource material available through science inspectors, teachers colleges and science advisers, then a major improvement in teaching styles could be achieved. This resource material should be the basis of school based in-service training in the next few years.

Another major concern of mine lies in the fact that with the introduction in 1983 of a form 5 School Certificate science which will be examined on the basis of the form 5 year only, there is really no guarantee of the nature and content of form 1 to 4 science. It gives the schools a new freedom which I hope they will use wisely. The majority of schools are moving towards a science scheme based on the form 1 to 4 draft, but there is no com-

pulsion for them to do so. If the draft syllabus were to become the official one, then perhaps we might see significant changes in teaching styles, more relevant practical work and consideration given to the pupils' ideas.

R.H. Hickford
Senior Inspector of
Secondary Schools
Christchurch

Dear Sir,

Your editorials seem to be stirring me into action in writing back supporting your views. (Someone suggested that this was only because I have purchased a new, typewriter for use at home, but this is not the case, I assure you!)

I owe the university a debt which could never be repaid, because it taught me chemistry in the chemistry classes, physics in the physics classes and mathematics in the mathematics classes. I only wish I had also attended the English classes, for if so I would be able to write far more eloquently.

But today, so far as I can see, chemistry is not taught in the Chemistry Department. We are turning out physicists. In my business (motivated by that vile concept of profit and serving mainly the base tradesmen of commerce) our whole life is chemistry.

But you should hear the groans when I employ a fresh university graduate and hand him/(not so much her) over to a departmental head for breaking in. Actually, after a period, we (and the candidate) succeed, but I believe that this is due to the calibre of the candidate who succeeds despite the university teaching.

Contrast this with the NZCS "technician". If ever I heard utter snobbishness it is the distinction that university graduates are scientists, while the technical institute graduates are technicians! This distinction is wrong, unjustified and unjust.

The development of the technical institute system has been a success story of the first calibre, turning out hundreds of such people. They are scientists, professionals, contributors, never bludgers and they work. They deserve to be graduates of our tertiary educational system ranking pari passu with the graduates of the university. The old class distinction is as out of date as the colour bar.

Incidentally, profits produce taxes and taxes pay for education. If ever a country needed all three, it is New Zealand NOW.

T.J. Sprott
T.J. Sprott and Assocs,
Auckland.

| | | |
|-----------------|------|--------|
| 21. Adopted son | DOWN | ACROSS |
| 20. Sum | | |
| 19. Detergent | | |
| 18. Haste | | |
| 17. Obvious | | |
| 16. Essence | | |
| 15. Keeper | | |
| 14. Ego trip | | |
| 13. Rotten | | |
| 12. Needles | | |
| 11. Activated | | |
| 10. Heart | | |
| 9. Laser beams | | |
| 8. Antelopes | | |
| 7. Um | | |
| 6. Ruthenford | | |
| 5. Antelope | | |
| 4. Sincere | | |
| 3. Latent | | |
| 2. Adapt | | |
| 1. Con | | |
| 1. Charles law | | |

CROSSWORD ANSWERS

NEW PRODUCTS



NEW HEWLETT-PACKARD GC/MASS SPECTROMETER

Combining complex sample identification with multi-task, data handling capability, Hewlett-Packard's new HP 5987A gas chromatograph/mass-spectrometer system (GC/MS) is believed to be the first to provide real-time component identification and probable structure analysis.

The latter capability can be applied for compounds not found in the existing database.

Designed primarily for research quality applications and ancillary techniques, the HP 5987A is said to be useful in biomedical, biochemical and pharmaceutical sciences and applications that require methods development. Its hardware reliability increases its cost effectiveness in high sample volume applications, Hewlett-Packard said.

The HP 5987A is optimized for capillary chromatography and uses the advanced HP 5880A multi column, multi detector gas chromatograph as an integral part of the GC/MS system. Scan speeds of up to 2,000 atomic mass units (amu) per second permit the system to accommodate most high resolution, capillary sample analyses.

Standard with the HP 5987A is an RTE-6/VM based data system which has been designed specifically for GC/MS applications. With a memory capacity of 512 Kbytes, this system offers more programming flexibility than any other HP GC/MS system currently available.

New Zealand agent is Northrop Instruments & Systems, Wellington.

'NO RISK' — SUN TAN

A new concept in sun tanning was introduced to New Zealand recently with the launching of a sun tanning pill, which is said to enable anyone to tan all year round, without any sun, side effects or the risk of skin cancer.

Developed in France by Applipharm Laboratories, the capsules are currently being marketed in Europe, Canada, Australia and the UK.

Known as Orobronze, the capsules contain canthaxanthine, a synthesised carotenoid. Carotenoids are a natural colourant to be found almost anywhere in nature, in fruits, vegetables and flowers and are commonly used as a colouring agent in foods.

During the course of Orobronze, the canthaxanthine finds its way to the

adipose (fat) tissue just below the skin. Its colouring effect shines through the skin allowing a tan to develop.

The WHO (World Health Organisation) and the FAO (Food and Agricultural Organisation) have authorised the use of canthaxanthine which has no side effects.

IMPROVEMENTS TO MICRO-84 CONTROLLER

US Manufacturer Gould Incorporated has improved its Micro-84 programmable controller, first introduced late last year.

The low cost unit is designed to replace relay, timer, counter and drum sequencer applications. Gould has now added eight terminal 24 VDC input and output modules and 220 VAC input and output modules.

The Micro-84 features a removable program pack with electrically alterable read only memory (EAROM). The memory combines the advantages of CMOS and non volatility of CORE memories to store the user's program without line power or battery back up. In the unit this memory performs the same function as more costly devices such as magnetic tape transports and floppy disc units.

Gould's refinements include a sturdier program pack and the button areas has been recessed to minimise false loading into the mainframe. To assist the operator, all loading instructions are printed on the back of the program pack.

Other accessories added are a mounting rack that permits the Micro-84 to be mounted into a standard 19 inch panel and optional "fanning strips", which are quick disconnects of input/output module wiring to speed installation and reduce service downtime.

The system features power flow, search functions, disable/enable force functions, user-defined keys, supervisory functions for start/stop, load/dump memory and clear memory and error code display.

The Micro-84 is a solid state unit, which is said to make it much smaller, lower in cost and more reliable due to the lack of moving or sparking parts.

The New Zealand representative is W Arthur Fisher.

Arthur Fisher is also the agent for a new microprocessor based hybrid recorder produced by Yokogawa Electric Works, Japan, called the YEW Model 4088.

The model can handle DC voltage (3mV to 50V span) and five types of thermocouples or resistance bulbs of up to 30 channels. These analog signals converted at high-speed into digital signals and printed out as dot traces on a 250 millimeter wide chart in six colours. Digital printout of measured data and channel numbers are also available in the left margin of the chart. Printing rate is 30 channels every eight seconds.

Standard functions include programmable full-scale range, chart speed, printout skip and clock via keyboard on the front panel, program list printout, channel identification numbering, chart END alarm. As an option, high and low alarm points are also programmable.

New standard functions include differential temperature measurement (Δt) and scaling.

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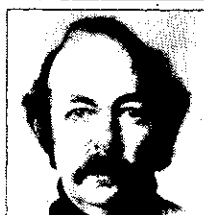
R.E. Corbett



G. Sutherland



C.B. Johnson



D.J. McLennan



D.H. Buisson



J.R. Cretney

At the end of this year, Otago University's Prof. R.E. (Ted) Corbett retires from his positions as chairman of the Chemistry Department and Mellor Professor.

Ted graduated MSc. with first class honours from Otago University in 1944 and was appointed to the staff as an assistant lecturer in 1945. Scholarships to Cambridge resulted in a PhD in 1949. Successive promotions at Otago followed, to lecturer (1950), senior lecturer (1955), reader (1960) and professor (1966). Ted has held his current positions since Prof H.N. Parton's retirement in 1970.

Ted Corbett's lectures were always lucid, detailed and methodical and his ability to make organic chemistry clear and systematic was one of the reasons for the strength of this branch of chemistry at Otago. His enthusiasm and organisational ability ensured a strong research school continuing the department's tradition of natural products research.

A strong supporter of the NZIC, Ted has been a fellow since 1960, served on the branch committee and in 1973 was national chairman.

We wish Ted well in his retirement and good luck with his trout fishing.

The winner of the ICI Prize for 1982, Duncan McLennan, is a physical organic chemist whose interests lie in the area of mechanisms of simple heterolytic organic reactions. His attention has been concentrated on intermediates and transition states in nucleophilic substitution and elimination reactions.

Complementary to experimental studies are his theoretical studies in which kinetic isotope effects are computed for model transition states.

This work commenced with his PhD. studies at Victoria University, was continued during a postdoctoral period at the University of California, Santa Cruz and continues at the University of Auckland where he is an associate professor. It has resulted in some 50 papers and the award of a DSc. degree in 1979.

Dave Buisson, winner of the 1982 Shell Industrial Chemistry Prize, was born in Auckland and went to the University of Auckland, where he took his PhD in Chemistry in 1971. In 1972 he was a postdoctoral fellow at the Institute of Inorganic Chemistry, Basel, Switzerland, in 1973 the Leverhulme Fellow at the University of Surrey, Guildford, UK, and in 1974/5 a visiting lecturer at the same university.

In 1975 he joined the then Chemistry Division in Gracefield and subsequently split off with the formation of the Industrial Processing Division. In 1979 he transferred to the Division of Horticulture and Processing, DSIR in Auckland to set

up the fish processing research group.

Dr Buisson has published papers in areas of bioinorganic chemistry, waste treatment, geothermal chemistry, crop processing and in fish processing technology and is currently heavily involved in research into processing and utilisation of orange roughy and other new New Zealand fish species and in the development of an orange roughy oil industry.

Keith Sharrock, a DPhil student of Waikato University and winner of the 1982 Student Paper Prize is studying the biochemistry of cellulases from extremely thermophilic bacteria. He graduated BSc. from Waikato in 1976 and MSc (Hons) in 1979 at the same university. His MSc research involved a study of nitrogen fixation and translocation in *Coriaria arborea* (tutu). During 1980 he was a teaching fellow in the Botany Department, Canterbury University and completed his LTCL (Performers) on the violin. In 1981 he returned to Waikato University to join the thermophile research group.

Dr P. Grattan Roughan, well known for his work in plant lipid metabolism, will be transferring from DSIR Plant Physiology Division (Palmerston North) to the Division of Horticulture and Processing (Mt Albert, Auckland) in December.

AHI Technical Centre and Scientific Services manager, Dr David Bryant has been elected a fellow of the Royal Society of Chemistry.

He is one of just a few New Zealanders to be admitted to this prestigious body

In this last issue for 1982, the editor would like to thank the branch editors who have so ably assisted over the last twelve months.

Ian Weatherall, Otago branch editor (1980-82), graduated MSc (Hons) from Otago in 1962. A period of research with the CSIRO Division of Protein Chemistry was followed by PhD studies in Cambridge. After two years as a research fellow at Harvard he became a research scientist with the Wool Research Organisation of NZ at Lincoln. While in Canterbury, he served on the branch and conference committee, including a period as branch editor. In 1976 he was appointed senior lecturer in textile chemistry at Otago University.

John Cretney completed his BSc (Hons) at Canterbury in 1969 and a PhD in organic chemistry also at Canterbury in 1973. Since then he has been a tutor in chemistry at Christchurch Polytechnic. He spent a year as visiting teacher in the Chemistry Department, University of Canterbury in 1979 and at present is standing in as acting head of the Department of Applied Sciences at Christchurch Polytechnic and being exposed to the rigours of administration. He spent

several years as Canterbury branch treasurer and was branch chairman in 1981.

After graduating with an MSc in chemistry from Victoria University in 1972, Mrs Gillian Sutherland, Wellington branch editor, joined the New Zealand Dairy Research Institute in the Palmerston North as a research officer in the Protein Chemistry Laboratory. Under the supervision of Dr Laurie Creamer, she studied casein micelle structure and protein-protein interactions for five years before moving to Te Puke in the Bay of Plenty when she married. She worked for two years at the Mt. Maunganui Regional Dairy Laboratory of the Ministry of Agriculture and Fisheries, where she was involved in the quality control of dairy products, before shifting to Wellington in 1979 when her husband, Dr Bruce Sutherland, joined the New Zealand Dairy Board.

After a year's maternity leave, she joined Science Information Division of the DSIR in 1980 where she is science editor for the New Zealand Journal of Agricultural Research.

Cecil Johnson has been a Manawatu branch committee member from 1976 and branch editor since 1978.

Currently Cecil is the Manawatu branch representative on the committee for the forthcoming Conference on Oils, Fats and Waxes.

Cecil's research area encompasses the analysis of complex fatty acid mixtures, particularly ruminant fats. He is developing liquid and gas chromatographic methods as well as mass spectrometric methods for the structural analysis of fatty esters.

Dr Pat Holland from Ruakura has been Waikato branch editor and next year will be chairman for the NZIC conference committee.

Dr Bruce Graham, Auckland branch editor, is a chemist with the Health Department's Environmental Laboratory. After an MSc at Auckland and a PhD from Waikato, he worked on aspects of natural gas utilisation at Chemistry Div. Gracefield. Since 1977 he has been in his present position, investigating aspects of air pollution and is also involved in industrial hygiene and chemical hazards.

The editorial committee loses the valued services of Assoc Prof Joyce Waters as of the end of 1982 when she moves to Massey where her husband Neil has been appointed vice-chancellor. Joyce (nee Partridge and we apologise for the slip in the October issue) graduated MSc (1st class honours) and PhD from Auckland and then worked for ICI and the UK Atomic Energy Commission before joining the staff of Auckland University in 1961.

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NEWS

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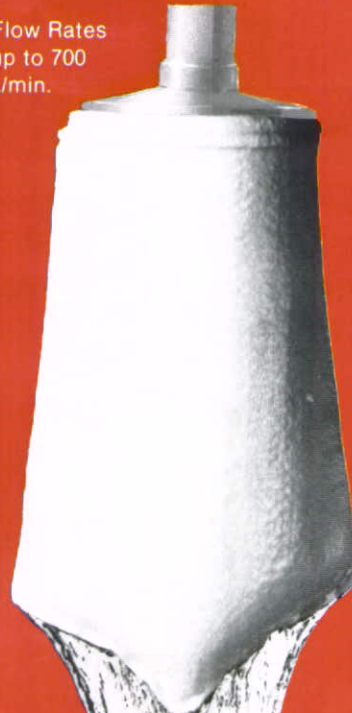
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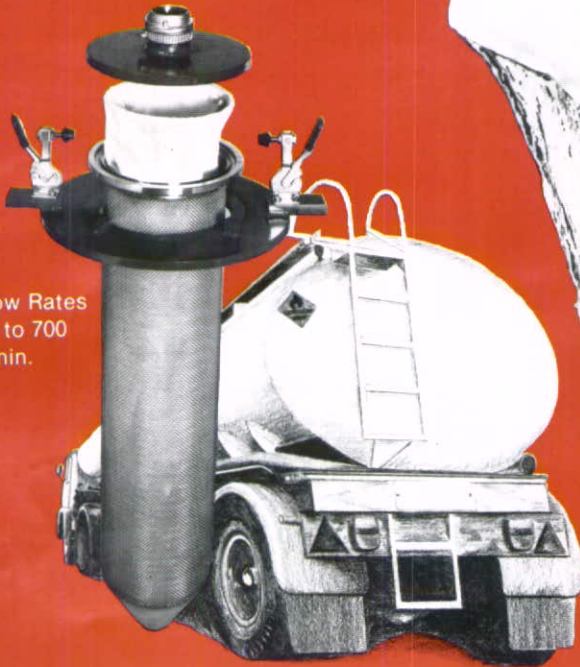


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