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April 1975

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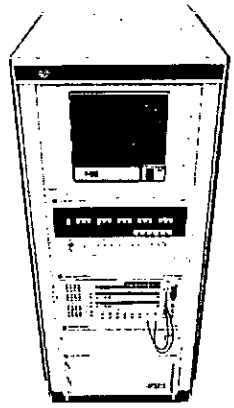

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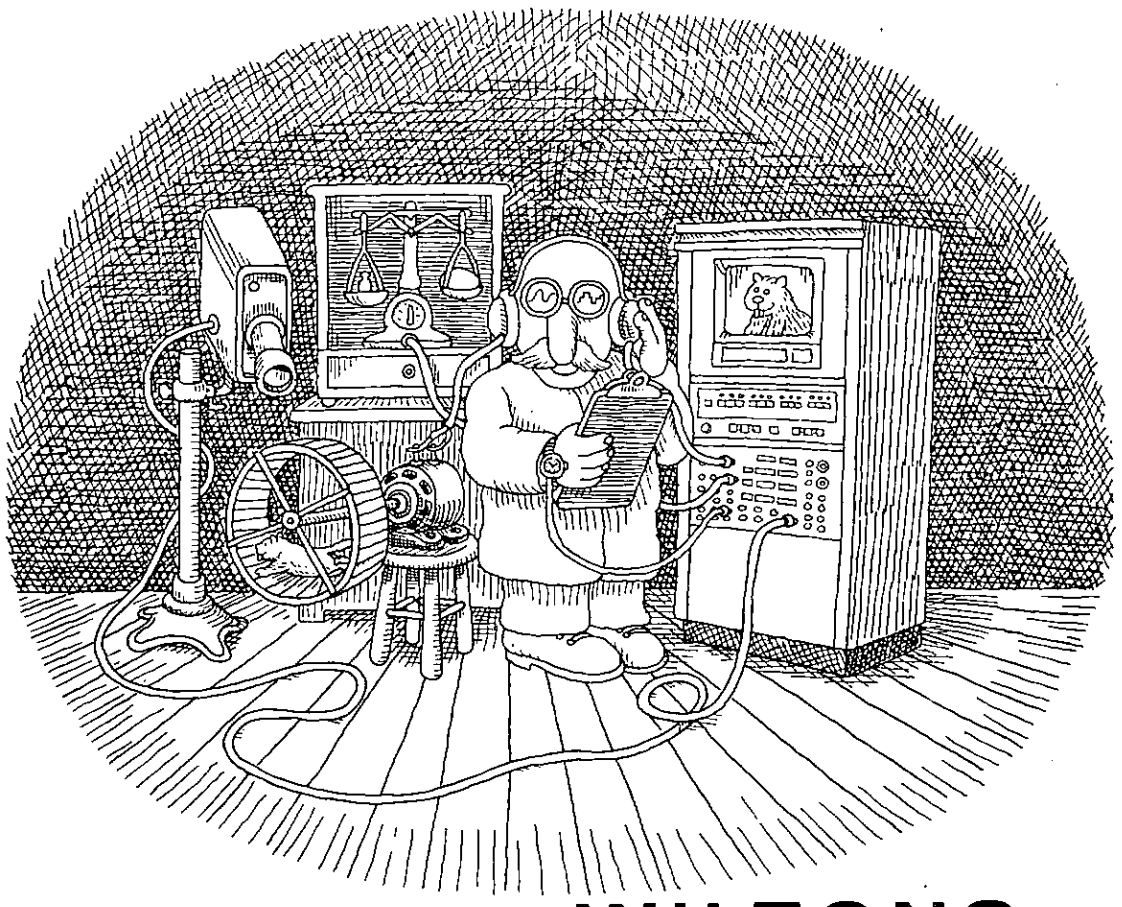

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Cover Worker involvement in chemical hazards. Police, Fire officers and Post Office workers discuss petrol seepage in a water drain.
—Photo courtesy "N.Z. Newspaper".

Text of a press release on April 8 1975 by the President:

The Law and Scientific Evidence

The Law Society has been holding its triennial conference. As if to reaffirm the country's allegiance to British justice in these times of changing national groupings, the conference has been graced with the presence of the Lord Chancellor of England. The emphasis of the conference is on law reform, and we are told that the wishes and instincts of a whole people must participate in its formulation.

Curiously, it comes at a time when the country is once more putting aside the harrowing experience of the Thomas trial and its various appeals. There has probably been no case in our history that has prodded the people more to an understanding of aspects of our law, and certainly of its seeming shortcomings.

Science and the law share a laudable aim in their unstinting search for truth. It must therefore be a matter of considerable concern to New Zealanders to discover that decisions taken in law can so often be based on complex scientific evidence that brings the specialists themselves into conflict as to its meaning. While the Thomas case has been a stark example of this, it is a pattern pervading many proceedings in both common and criminal law. The spectacle of the opposing specialists can only damage the reputation of their respective professions, whether these be Chemistry, Town Planning, Engineering, Medecine, or the like.

It surely is a weakness of our system if specialist evidence purportedly introduced to clarify, in fact ends in obscuring truth.

The Jury is the foundation of our courts and to those of the English-speaking world is sacred. It is healthy indeed that the system is held in such universal regard.

However, the question must be asked: Can a group of lay people in fact resolve the complex and conflicting technical evidence with which they are so often confronted?

While it is heresay to suggest that our jury system is outdated, there is a case for its modification. It is not beyond our inventiveness to develop a procedure whereby a jury could seek adjournment to obtain an objective assessment from a formally recognised specialist group outside the court on the significance of conflicting technical evidence.

Objectivity is also a common element of Science and the Law, and its quest in the courtroom must surely be our unerring aim. The wishes and instincts of the people would appear to be more satisfied if the destiny of the accused was determined by truth rather than an obscuring scientific doubt.

Dr C. L. Davey,
President.

Editorial

Hazardous Chemicals in the Community

Concern over the events of the 'Parnell incident' is still being expressed and has repercussions, not only in the reports made to the Commission of Inquiry, but in comments by Government and Opposition members; by the Auckland Branch NZIC organising an April symposium on Chemical Hazards; by articles such as that of I. R. C. McDonald in the March issue of *Chemistry and Industry in New Zealand*. Adequate labelling of containers seems to be one of the major points raised. But is this the only basic issue?

Recently within a short space of several weeks, reports of other incidents involving hazardous chemicals have appeared in newspapers — a drum of acid fell off a truck and broke in a city street (Wellington); a petrol seepage (Featherston); acid leaking from packages in a railway wagon (Owhango); propane gas leak from a cylinder in a railway wagon (Eltham). These, added to recent disastrous fires and explosions in factory and workshop remind us not only that the technological age has its hazards, but that a number of people are apparently ignorant of dangers.

Labelling of chemicals is not enough. Whose responsibility is adequate packaging? Why are acids packed so often in plastic containers whose bottoms are so readily pierced by nails or broken glass? Whose responsibility is it to ensure that gas cylinders and petrol containers are adequate, effectively sealed, and not defective?

Just as important, do all loaders, lorry drivers and similar workers understand the nature of the goods they load and transport — not so as to be afraid of handling these substances and making sure of extra recompense, but rather to understand and appreciate the responsibility to the community of safe loading and transport? Do trade unions make it their business to see that courses of instruction regarding such problems are given their members? Is having a lorry drivers' licence enough? The NZIC believes not only in salary investigations but also in continuing education for its members long after they have their basic 'ticket'. Should trade unions and/or employers organisations be similarly concerned with continuing education of their members, as well as concern for pay and working conditions?

But everyone in the community is involved in handling potentially dangerous chemicals, from children, housewives, factory workers, professional scientists—fireworks, household cleaners, medicine cupboard contents, petrol, gas, and chemicals in factories.

Does our school education system include the effective teaching of safety in handling such common, but dangerous commodities—teaching to all pupils before school-leaving age, so that the whole community may be aware. To be aware is to act with care, concern and responsibility.

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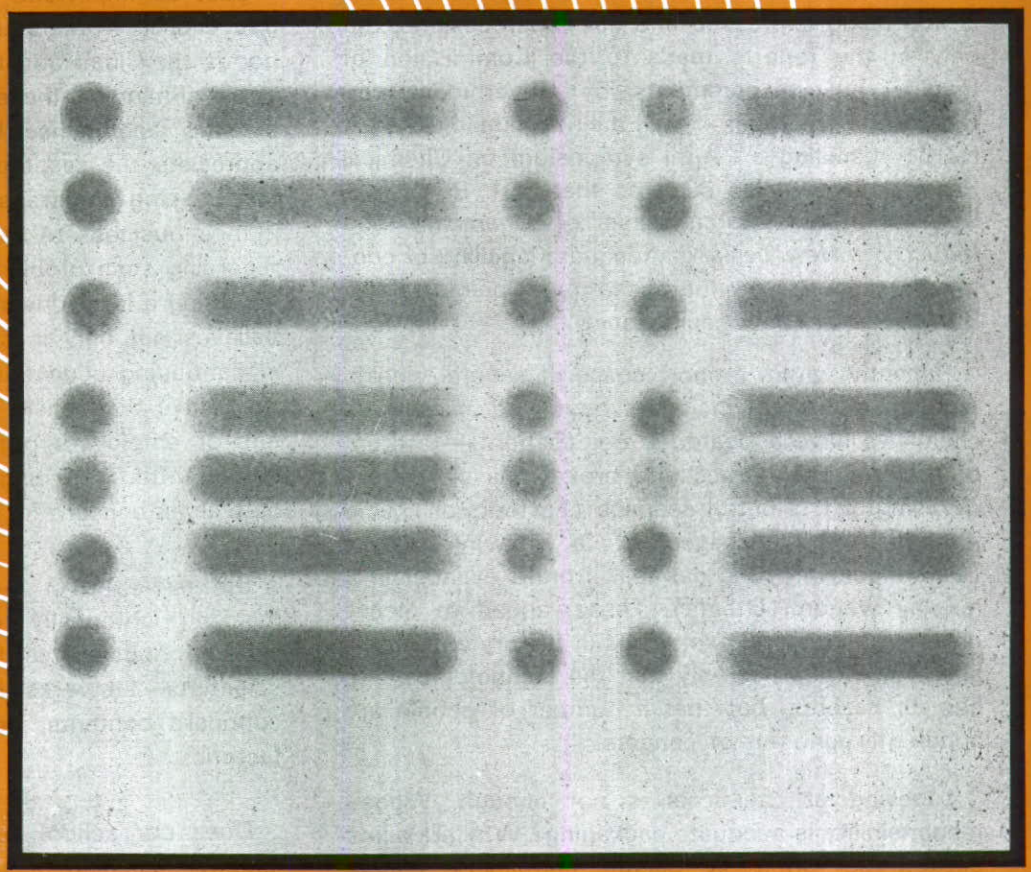

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"Management in Production and Research"

P. K. Foster

It is traditional for the Presidential Address to Branches to be concerned with one's scientific activities; I naturally first thought about the technical aspects of ceramics in which you might be interested. I decided that all who are professionally interested already know about PACRA's activities, and therefore choose to speak instead about what I am personally paid to do for most of my time, and what I am therefore obviously more interested in anyway. What I propose to do is look briefly at some aspects of management of production, and then at research management. It is easy to highlight the differences in outlook between various sections of our Institute membership—industrial production; industrial development and control; applied research in Government, academic and applied research in Universities. I think it is more constructive to examine the similarities, than the differences. I think the various groups mentioned have more in common than is generally realised.

INDUSTRIAL PRODUCTION

In considering various aspects of industrial production and its management, I lean heavily on Drucker's books: *"The Practice of Management"* and *"Managing for Results"*. I have never managed industrial production, and do not claim to be an expert, except to say that close observation of industrial management over the last 10 years bears out his tenets thoroughly.

The Product

There are three dimensions to a product—its own qualities, the method of its distribution, and its market situation. For success, all three must be successfully matched. As a market changes, the product or method of distribution or both will need to be changed if the market position is to be retained.

Products can be categorised according to the stage in their life-cycle and to their success. Drucker gives 11 categories. There are the easy classifications leading to obvious courses of action, e.g. today's breadwinners, tomorrow's breadwinners, and failure. These are where maintained effort, accelerated effort and removal of all effort are respectively the obvious procedures to follow. Less easy to diagnose and cure are the problems categorised as "yesterday's breadwinner"—the product that has outlived its market—and the self-explanatory "investment in management ego". Where do you get the courage to try, and how do you succeed in convincing your boss that his pet product isn't any good and never will be any good, in spite of the effort he pours into supporting it?

The category—"yesterday's breadwinner"—draws attention to the fact that all products have a finite life-cycle; that if any business sticks to the traditional, change will destroy it. The effort required to search for changes in products and product ranges, and to take advantage of changes in the market, has to be sufficient to overcome significant psychological barriers. Finding the best future directions for a business means asking people to do a number of things. You are asking them to give up old habits, to give up the skills they are proudest of, and to give up the considerable satisfactions that can be derived from fighting market threats and from being efficient in spite of inherent weaknesses. It is hardly surprising that a search for limitations and weaknesses in a production system can be easily resented. If, however, you don't face up to looking for your future, your business dies. Survival is too important to leave to chance.

It is in new products and new markets that many businesses have succeeded with powerful ideas that are brilliant in their simplicity. The Sears, Roebuck success in creating the mail order business followed logically from the simple idea that farmers could become a market even if they couldn't come to town to shop. The Bata story started with the realisation that the poor Rumanian peasants were barefoot, not because they couldn't afford footwear, as everyone had supposed was the reason, but because there had been no shoes for them to buy! Bata made the shoes and away he went. Such ideas lead to logical and immediate action, and produce economic results.

Dr Foster was President NZIC 1973-74; formerly Director, Pottery and Ceramics Research Association; now Director, Building Research Association.

The Market

The customer is the business—without him the business cannot exist. It is therefore important to summarise some of his characteristics.

The producer's view of the customer is often wrong or mistaken, and an "outside" view of the customer is essential. He can often appear irrational, but this is merely an indication that you have yet to understand his point of view. For example features of a product of most importance and interest to a producer are often, if not usually, quite irrelevant to the customer. For example, take the motor-car. The engineering staff will be deeply concerned with, say, automatic transmission systems, their design and operation. This can include complex mathematics and engineering. As a customer I am quite unconcerned about this, unless the transmission breaks down, and then I am interested only in the cost and speed of repairs.

This difference in attitude is simple and obvious, but is easily overlooked; the research engineer would not be good at his job if he were not deeply interested in his subject and did not derive satisfaction from solving the problems posed in his field. The customer, however, is not buying an assembly of components, or even a car, but a method of individual transport. Customers don't pay for products, they pay for satisfaction.

Principles of Production

There are three systems of production, each with its own principles, organisation requirements and management requirements. Those responsible for production should know which system is appropriate and apply its principles.

System (a), Unique product production. Each product is self-contained. A bridge, ship, a house, can each be almost unique. Under this system the organisation is one of homogeneous stages, each complete in itself. Note that the organisation is not one of craft or functional organisation. Within each stage, the work force, be he an individual or a team, must be able to complete everything required within that stage. It was not mass production (see later) but recognition of the need for, and benefits of, organisation by stages which led to rapid ship building techniques in the U.S. during the war. Each ship was still built separately, as a unique product.

System (b), Mass production. This heading conjures up pictures of Henry Ford producing large numbers of the same standardised product or Charlie Chaplin on a production line in "Modern Times" tightening up the same two bolts time after time. Both pictures of a standard product are equally wrong as representing modern mass production, which consists of the production of standardised components which are assembled into a wide variety of products. This is the principle, for example, of the modern Detroit production lines.

System (c), Process production. This third system comprises identity of process and product—the product is pre-determined by the selection of the process. It is common in the chemical industry, e.g. oil refineries. To change the product requires changes in the process, usually very expensive changes.

These three systems have their own characteristics. In the sequence given, unique product, mass production, process production, there is markedly decreasing flexibility, and increasing capital investment, in the producing organisations. The time scale for the effects of decisions made is short for unique products, but once made for an expensive process, will have to stand for a long time. The correlation with capital expense is obvious.

To the manager each presents different priorities. For unique product production, an order is of paramount importance, because the product cannot be started without it. For mass production, efficient distribution and education of the market in the products available are prime requirements. For process production, an expanding market and new markets are vital.

The Purpose of Production

Finally, we can consider the purpose of the business of production. It is, as with any other business, survival—the aim is to stay in business.

It is not "maximisation of profit" which is, a meaningless term, ignoring as it does, any indication of time. Profit is essential for several reasons. It is the only test of performance, it covers business risk and it provides future capital. Note however, that these are all minimum concepts; you have to have a minimum to attain your objective of survival. To this extent profit can be regarded as just another cost of staying in business.

RESEARCH AS A PRODUCTION ANALOGUE

After the treatment given on aspects of production, and the hint in the introduction, it may be no surprise that it is my intention to consider research as an analogue of production. In any job, it is not the finding of answers that is important, but the finding of the right questions which should be asked. To the extent that the analogy is sound, the questions which are important to the management of research are readily available in the literature on the management of production, and to the same extent will cover all fields of planning, organisation and application.

The point that the analogy is in fact sound is illustrated, with an analysis of PACRAs research functions as they were several years ago.

By way of preliminary examination of the analogy, the main points covered earlier can be summarised. Research is a product with a market. The distribution is the method of reporting and is highly dependent on the market. The same scientific work can and does require different treatment for the user from that for publication in research journals. Work reported in the wrong way in the wrong place is just as useless as a marketing exercise for refrigerators for eskimos.

The research "product" must fill a genuine want. This can be in filling a gap in intellectual understanding, or in contributing to manufacturing profit. As described elsewhere, work sponsored at V.U.W. on

kinetics of high temperature clay mineral reactions was producing unusable results. PACRA was pushing a product for which there was no real demand.

The same useful classifications of research projects can be made as for industrial products, e.g. yesterday's, today's and tomorrow's breadwinners. The classification of "investments in managerial ego" is again a favourite with me. The use of one's authority to maintain projects of interest to one's self, instead of applying normal objective yardsticks, is indeed a real possibility and danger.

Research projects have a finite productive lifecycle, just as industrial products do. The difficulties in cutting projects and in seeing that the future lies elsewhere raise the same problems in research and with research workers as occur in industrial production.

I will examine the research processes as production processes in a little more detail. There are again three groups:

"Unique product" production. A harbour bridge or a large building is a "oncer". Once built, the market for that product has been filled, and the product stands for a long time (if soundly constructed). So it is with research aimed at understanding something. The results, if soundly based, will stand for a long time. Reassessment in the light of subsequent experience may be required, but no fundamental change should be necessary. A development of the pyroplastic index concept was carried out in 1963 to investigate refinements such as allowance for temperature gradients in articles being fired, much as the Auckland harbour bridge was widened to accommodate new demands, without any basic change.

The organisation of this type of research should also be in terms of homogeneous stages, requiring a multi-discipline approach to each stage for multi-discipline problems. The stages for such research projects might comprise consecutively:

literature survey
experimental planning
experiments
analysis of results.

If the literature of only one of the disciplines is studied for a multidiscipline problem, lesser performance can be expected. (Almost all practical problems are of this kind). Purely physical treatments of the fast firing of clays have suffered badly from ignoring the effects of the chemical reactions which occur during firing. Predicted temperature gradients in clay materials have been in error by an order of magnitude through incomplete consideration at the literature survey stage.

How often does research suffer through considering statistical analysis only at the "analysis of results" stage, rather than at the experimental planning stage, and then incorporating analytical requirements in the design.

Mass production. In the automobile industry, a wide variety of products is achieved by different combinations of the same or similar components. In the application of research top articular problems—raw material evaluation, process control, trouble shooting, ceramic body development, product development—a wide variety of questions is answered at PACRA every year by assembling different combinations from the stock list of tests resulting from the research programme.

Process production. This may be stretching the analogy slightly, but I include under this heading the operation of an instrument, usually centralised and expensive, as a service to groups concerned with particular problems. It is certainly "process production" in that the instrument can produce only the type of data it was designed and built to do, and it is expensive to make it do anything else.

Finally, the research business also has the aim of staying in business, towards which end, profit is a means, but profit is not the end itself. As with industrial production, profit is a test of performance, covers the high risk associated with research, and engenders confidence for capital investment for further research.

Thus it can be seen that there is a strong case for investigating research—its organisation and prosecution in the same way as a production process; thereby making all the thinking that has gone into management of production directly available to research management.

ANALYSIS OF PACRA OPERATIONS

Several years ago it was clear that the type of work which PACRA had done for about 20 years was becoming increasingly out of step with the industry's needs. The type of work requested under the consultant services indicated a change in demand—a decrease in work on the manufacture of the product, and an increase in work on the application of the product. To carry out the analysis required by this change the analogy was invoked.

This immediately emphasised to the Director and Staff, how the customers (or manufacturers) view of the product was different from theirs. Table 1 lists a sample of research results representative of the type of work produced over 20 years in connection with manufacturing, from raw material throug forming, drying and firing.

Table 1

Typical Research Results

Miniature test methods.
Pyroplastic index
Firing index
Penetrometer/moisture content relationships
Microvane shear strength instrument
Kiln Atmosphere, coring knowledge
Survey of properties of industry materials.

Such research results, however, are not products in the eyes of the manufacturers who are PACRA's market. *They only become products when assembled in a form which provides the satisfaction the customer wants.*

In Table 2 the research results are called components, and alongside them are the products they can be assembled to produce. In these terms the

high temperature kinetic studies referred to earlier were components which could not be assembled or incorporated into any useful product which would give customer satisfaction.

Table 2

Typical "Components"	PACRA "Products"
Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge.	I(a) Technical efficiency In production (e.g. reduced loss).
Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge.	I(b) Trouble shooting assistance in production.
Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge. Survey of members' clays Moisture content at known R.H.	I(c) Raw material evaluation body development services.

It is inherent in this approach that the distribution and the market are equally important. Table 3 extends the treatment of the first product, production efficiency, across the board from the process to the market. This highlights the further fact that the distribution must be geared to get the product to the market. PACRA therefore has:

Conferences to review "products" for industry management,

Conferences with industry's technical staffs,

Visits to individual manufacturers,

Technical and non-technical summary reports,

as a means of getting its products sold—as means of staying in business.

Let us turn attention to the complete range of products which PACRA produces. These are in Table 4 and again are products from the point of view of the market.

If we put the whole lot together, then we get Table 5 which gives a complete breakdown of the activities. The extent to which the manufacturing process has been the market is readily apparent. The important point, perhaps, is getting onto one sheet

Table 4

PACRA "Products"
I(a) Technical efficiency in production (e.g. reduced loss)
I(b) Trouble shooting assistance in production.
I(c) Raw material evaluation body development services.
II Product development assistance.
III Product application and marketing information.
IV Information.
V Public relations.
VI Technician training services.

of paper a summary of the operations, a summary which concentrates attention on the overall sequence and the objectives from the point of view of the customer.

Before considering the extent to which this system had become outdated two years ago, we will consider the classification of the research processes. The processes are almost entirely of the mass production kind, i.e. a wide variety of "products" suitable for the markets of brick, pipe, insulator, sanitaryware, tableware and refractory manufacturing are assembled as required from the stock components. An important difference, compared with industrial production, is that the components, being in the form of knowledge and techniques, are infinitely re-usable. The components are of the unique product kind. Thus a continuing market for the products in Table 5 does NOT necessarily mean a continuing demand for the manufacture of components.

There are in fact a number of characteristics of the industry, as PACRA's market, which have led to substantially decreased need for further understanding of the manufacturing process.

The industry produces a largely stable range of traditional products. Changes in the industry such as the introduction of Ceracrete, reinforcible blocks, Stahlton flooring, vitrified sanitaryware, transmission line insulators, flexible joints in pipes, tunnel kilns, are developments of existing products and methods rather than innovations. There have been no innovations in production methods, and the N.Z. market is not large enough to justify the capital requirements

Table 3

"Processes"	Typical "Components"	PACRA "Products"	Distribution to Market	Market
Research • Statistical works studies	Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge	I(a) Technical efficiency in production (e.g. reduced loss)	PACA Committees PACRA liaison) Testing service Members' demand) and/or works trials	Ceramic manufacturing

TABLE 5

"Processes"	Typical "Components"	PACRA "Products"	Distribution to Market	Market
Research Statistical works studies	Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge	I(b) Trouble shooting assistance in production	PACRA liaison) Testing service Members' demand) and/or works trials	Ceramic manufacturing
Research	Miniature testing, PPI, FI, Penetrometer/Moisture content Microvane, Chemical Analysis Kiln atmosphere and coring knowledge Survey of members' clays Moisture content at known R.H.	I(c) Raw material evaluation body development services	PACRA liaison) Testing service Members' demand)	Ceramic manufacturing
Research Statistical works studies Application of published knowledge	Refractory, sands, mortar, glaze and masonry tests Statistical analysis	II Product development assistance	PACRA liaison) Testing service Members' demand) and/or works trials.	Ceramic manufacturing
Research	Masonry wall and prism results sands and mortars behaviour Rubber ring performance Pipeline properties	III Product application and marketing information	Masonry codes and Standard Committees Publication Distribution of PACRA reports Conferences	Ceramic manufacturing Engineers and architects Government Departments
Indexing and cataloguing Literature searching	Library	IV Information	PACRA liaison Members' demand Information reports Technical Conferences	Ceramic manufacturing Government Departments
Professional quality of research	Professional reputation Contacts with Government and Local Bodies Technical knowledge	V Public relations	Members' demand) Government and) Consultation Local Bodies demand)	Ceramic manufacturing Government Departments Local Bodies
Instruction Supervision	Technological knowledge	VI Technical training services	PACRA liaison Members' demand	Ceramic manufacturing

of radical departures in processing. Accordingly research into processing can be expected to obey the law of diminishing returns. With one major exception the results of research into a process where minerals are mined, wetted, formed, dried, fired and, in the case of engineering products assembled, have reached an economic limit.

It is important to note that while the members of PACRA can be conveniently classed under the umbrella of "clayworkers", this is a temptation which must be resisted in assessing the members' and PACRA's future directions. It is an inward way of looking, just as it is to talk about "the ceramics industry". Developments will come from the way the industry appears from outside it, from its own markets. PACRA members are suppliers to

industrial processes involving heat and/or acid —refractories;

householders—tableware and sanitaryware;

the electrical distribution industry—insulators;

water and waste disposal—pipes and field tiles;

the building industry—bricks, etc.

PACRA's aims and objectives have therefore changed in emphasis. In future far more regard will be had to the five markets with which ceramic manufacturers are associated, rather than to the processing system which all ceramic manufacturers have in common.

This section can be concluded by emphasising two ways in which the analogy with production is supported. N.Z. ceramic manufacturers make considerable investments in technology by world standards, and this leads to a proportionate interest by manufacturers in the return on their investment. A dynamic approach to the industry's requirements was motivated by the purpose of staying in business.

Secondly, the difficulties in making changes of this nature were mentioned in relation to production —the breaking of old habits, giving up proud skills, giving up the satisfaction of using old skills to achieve marginal increases in the fact of difficulties. The analysis given here was sufficiently objective for us to be able to convince ourselves of the actions that had to be taken—actions made on our own recommendations and not thrust on us from outside, and therefore correspondingly more likely to be successful.

CONCLUSIONS

There are other areas which could be pursued. I have said nothing about academic research and implicitly have dealt with applied research. I would be surprised if the profit being intellectual rather than financial makes much difference to the research process and its efficient operation. One reason for not dealing with this aspect is my lack of contact with academic research, and the consequent danger of the baby being thrown out with the bath water if I were to make false assumptions.

There is a large and important field which I have touched on only incidentally. This is the compromise between organisation by discipline or function (e.g. the DSIR Divisional structure, the Chemistry Division structure) and organisation by objective (e.g. the Geothermal Coordinating Committee; the Mineral Resources Council both of which specifically cross discipline barriers). This latter is what the production management people call "federal decentralisation". The history, and study of production industries has much to offer on this subject.

A further advantage of the analogue approach which I have found, is that because one is used to being a customer of manufacturing industry, it is much easier to adopt the outside or customer viewpoint.

As far as the Institute is concerned, I claim that the similarities are much greater and more important than the apparent differences between our members in the various fields of production management, product development, and industrial, government and academic research.

Whether one is planning one's own specific project, or the activities of a small section, or of a large laboratory, I believe the same principles apply in much the same way. One of the fundamentals of our training is to first study the literature related to a problem. I submit that the documented history, development and management of industrial production are a major source of experience and knowledge directly applicable to scientific effort.

The Quality of Scientific Evidence

By T. J. Sprott

This paper is about "Quality", at first sight a clear-cut, almost innocuous word, but in truth one with many connotations. Literally of course we are in no doubt, but in terms of evidence how is quality to be measured.

The first and in fact only formal lecture I ever received on the subject of evidence came from the late Professor Emeritus F. P. Worley under whom I had the honour and pleasure to study. He announced at the conclusion of one lecture that the next would be on scientific evidence, and we all looked forward to this as a pleasant change from a study of inorganic chemistry. The appointed day duly came and we all sat back to listen to his golden voice. He then said: "I will now deliver the lecture on evidence as I promised. *Tell the truth.* We shall now continue with the study of the rare earths!"

Needless to say, there was a howl of protest and so he went back to elaborate with a masterly dissertation on truth and how important the literal truth is in giving evidence.

All self evident, you might say, but is it? Remember that this "truth" is usually of a chemical nature, and must be explained to legal or lay minds, to people who probably do not know even what the words mean. We have all probably had the experience of trying to read a legal document with all its "wherefores" and "hereby's" and "provided's" and "here-in-after's", and the seemingly endless sentences and have had to give up attempting to understand. Yet to the lawyer it is as clear as day.

But what of the lawyer, to say nothing of a jury, who are asked to understand and pass judgement on such concepts as the difference between accuracy and precision, the niceties of chromatography, the relative merits of different methods of analysis, etc. A chemist might say 'I found no difference between A and B". He can of course never say A is the same as B, yet what *meaning* was conveyed to his lay listeners. The witness spoke the literal truth but how could he be sure that the listener interpreted it properly. It might be argued that this is what the opposing lawyer is for—so to question the witness that the exact meaning of his statement is understood. But this is a terrible indictment on the witness, a scientist, that he must be assisted in his explanation by a lawyer.

From the above simple example spring a lot of further prepositions.

The term "opposing" crept in. There should be no such concept in the vocabulary or thoughts of a scientific witness, yet the system generates opposition. It even has a name, the "adversary system". Legal actions are almost invariably headed by two lawyers taking opposing sides, each out to prove his case. The lawyer gathers his witnesses and these may include scientists. Lawyer A "briefs" his scientist, Lawyer B "briefs" his, each attempting to anticipate the other. And then, by question and answer, according to the strict rules of evidence, the trial goes forward.

This is no way to get at scientific truth, particularly if there are opposing views or opinions amongst the experts. How then do we feel about Quality, when an expert is questioned by a lawyer who probably has only just heard of this subject in front of a judge, jury or magistrate?

How is the jury to judge the quality of evidence in such a case? The lawyers' answer to the dilemma is to attack the opposing scientist, seeking to discredit him, and, ipso facto, his evidence. The scientist is then forced to defend himself, and whether he is discredited or not depends upon how glibly he can fend the questions. One highly capable mechanical engineer once told me of his experience in such a case. He had given his evidence, as faithfully as he could and its import was clear. Then came cross-examination. The first question was "Please describe a screw". Now my friend was an engineer, not used to painting word pictures. To him, the drawing board was the answer to describing material things, and so he stammered. After all, it is not so easy to describe a screw without recourse to a drawing. And so he was flustered, and the lawyer hectored him and so he was discredited and so his mana disappeared and with it the force of his evidence.

(This paper was delivered at the Social Responsibility Symposium at the N.Z.I.C. Conference, August 1974). Dr T. J. Sprott and Associates, Consultant Chemists, Auckland.

His client lost his case. The opposing lawyer had a brilliant victory. So much for quality of evidence.

The next point is the "rules of evidence". If a scientific point is to be conveyed to another, or argued, I can think of no more inefficient way of imparting knowledge than the question and answer system. The atmosphere and layout of a court is not conductive to ready description and explanation.

For example, a question which has been put to me several times is: "Describe a gas chromatograph". No blackboard is provided and the answer is surely meaningless to people who have not done any chemistry since school, perhaps twenty years before. And even if the answer is meaningful, so far as it goes, the tribunal can clearly get no depth of knowledge, particularly if that tribunal is a jury. Yet this same tribunal is expected to judge the quality of scientific evidence!

Then comes another, very practical matter on the subject of quality . . . MONEY.

Quality costs money—this is a fact of life. Also, every accused person has the right of a defence. This is another fact of life. Yet he must be prepared to pay for that right! And what individual can meet the costs of good quality scientific evidence with any hope of matching the resources of the Crown.

I can say that if, instead of becoming involved in criminal cases, I had devoted the same time to labouring at award rates, I would probably be better off financially. Yet where can an accused person turn for scientific help if not to independent scientists?

The answer of course, is that he should not have to. Likewise, in a civil case, there should be no conflict of scientific fact or opinion between opposing expert witnesses. The quality of the evidence put forward by a scientist should be such that it simply can not be challenged. In fact, in practically all cases in my experience, this has been the situation. But consider a hypothetical case where there is a basic conflict between two competent and well respected scientists. How is a lay jury or even a judge or magistrate to decide which is right? I see no answer to this dilemma under the present system. The two scientists should have the opportunity to resolve their differences directly, by discussion between themselves and if they still can not agree, a scientifically trained arbitor should decide, so that there is only one opinion on the relevant matter.

I believe that, in fact, there is provision under the law for the court to call for such help, but I do not know of any instance when this provision has been involved. It thus behoves any expert to be absolutely sure of his facts, to question himself on all possible errors or divergent views. Again, I believe that this is usually done.

Another matter relating to quality of evidence is a recent trend whereby exhibits which have been the subject of scientific evidence are not readily accessible to the defence. Also the defence scientist must do his tests under surveillance by an officer of the Crown. This is unnerving to say the least, exasperating in the extreme, and totally unnecessary. It certainly does not lead to good quality work. And why should it be? As I said before, both sides should be searching for the truth, not behaving as adversaries.

As forensic science becomes more complex, the situation will get worse. And in my view we need to tackle the matter of evaluating scientific evidence. Perhaps some old rules and precedents will have to be discarded. Perhaps we need the machinery for scientific discussion prior to a trial. Quality of evidence is actually to be measured by the use which can be made of that evidence, not by adversaries but by scientists in concert.

Professor S. Slater Retires

Professor Stanley N. Slater, Head of Victoria University's Chemistry Department from 1950 to 1968, and Assistant Vice-Chancellor for the last ten years, retired recently.

Born in Ngaruawahia and educated at Wanganui Technical College, Professor Slater took his bachelor's and master's degrees at Otago University in Chemistry and went to Oxford under a New Zealand post-graduate scholarship in science to study for his Ph.D. At Oxford he studied in the Dyson Perrins Laboratory under Sir Robert Robertson, attempting to synthesize sex hormones.

Professor Slater returned to New Zealand in 1938 and was successively until 1950 an assistant lecturer, lecturer and senior lecturer before taking up the Chair of Chemistry at Victoria University. Arriving in Wellington as a 35-year-old career academic, he found himself allocated almost immediately a major planning and administrative job for the University.

He arrived on a campus that was littered with prefabricated buildings, and accepted the responsibility for initiating and overseeing the planning of the first major new university building to be built there in a generation of New Zealand university teachers.

He negotiated with the Department of Education all the necessary authorities; he coordinated the day to day work with the architects; and he carefully assessed the needs of the university departments which were to occupy the building. This building, completed during 1958, now known as the Easterfield Building, houses a number of the university's science departments. It contains the Slater Laboratory, so named in 1969 as a tribute to Professor Slater's contributions to the University.

Professor Slater initiated in his early years at Victoria a research programme into what are called the 'bitter principles''. These are associated with naturally occurring non-alkaloid substances which frequently possess powerful physiological properties—one of the better known in New Zealand is tutin, derived from the Tutu plant.

A source of particular satisfaction to Professor Slater was his facilitation of the appointment of Mr W. (Bill) R. B. Martin as an ICI Research Fellow to undertake research into the use of New Zealand iron sands in the 1950s. The initial work, encouraged by Professor Slater, was undertaken in an atmosphere of pessimism on the part of government and others. But it was Martin's work on the analysis of

Professor Slater

iron sand samples and his technical and economic feasibility surveys which stimulated a wave of industrial and government interest, and led to the setting up of the New Zealand steel industry.

Within the University itself, Professor Slater has served as Dean of the Science Faculty; as chairman of the committee that approves applications from staff for leave to attend conferences or to undertake overseas study; as chairman of the Academic Committee with its wideranging responsibilities for overseeing the courses and entrance qualifications of students; and has been closely associated with the Halls of Residence Foundation. On behalf of the University he has served on the council of the Central Institute of Technology since it was established, and currently serves as the Council's Deputy Chairman.

After twenty-five years a University Professor and ten years as a top university administrator, Professor Slater is retiring to build a few more yachts. Over the last three or four years he has built three yachts including a Tiger Cub racing catamaran and a 17-foot day sailing catamaran. His aim now is to build a 23-foot and a 28-foot catamaran and a 24-foot trimaran.

From Wellington Harbour he should be able to catch glimpses of the Easterfield Building, to which he made such a major contribution.

Professor Slater became a Member of the Institute in 1938, Fellow in 1949. He has been a member of several committees of the Institute, convener of the Professional Status Committee, and was President of the Institute 1952-53.

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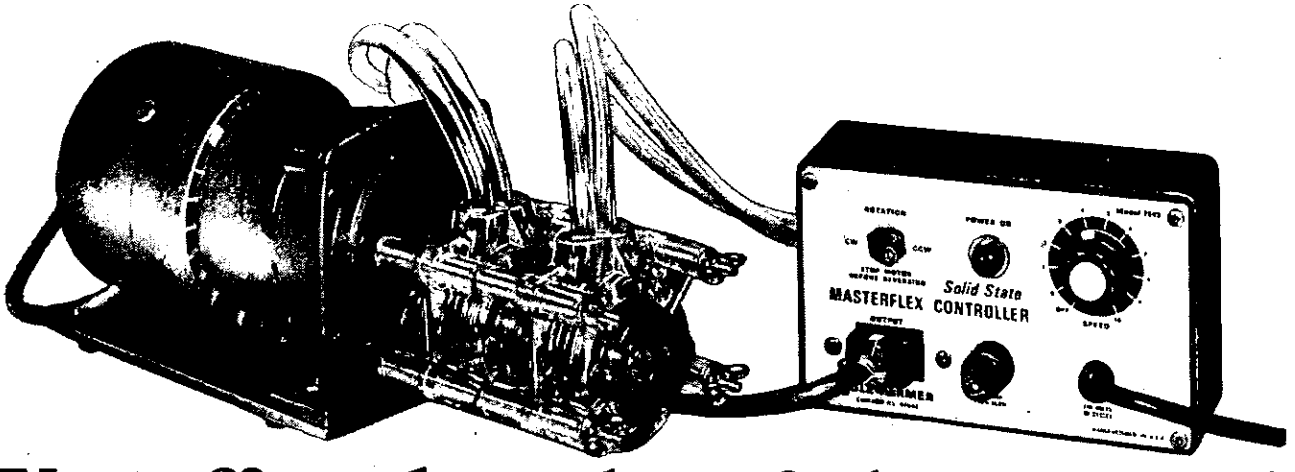

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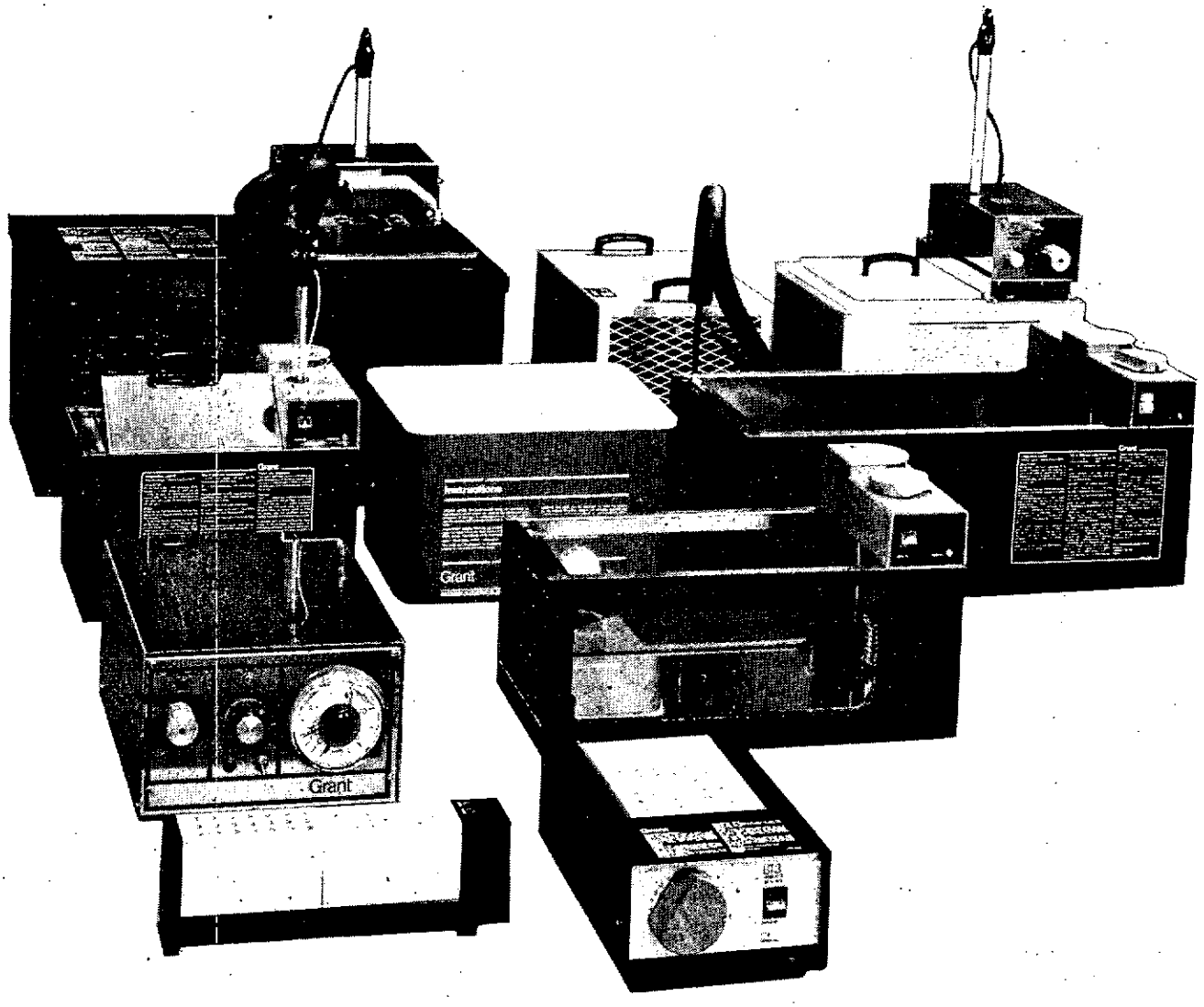

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Analytical Chemistry for 1st Year Students

By R. T. Baker

The course described here has been designed for students taking degrees in agriculture and horticulture at Lincoln College, University College of Agriculture. Students taking these degrees spend their first year doing pure science subjects—one semester each of botany, chemistry, physics and zoology. The laboratory section of the Chemistry course is mainly devoted to analytical chemistry.

One of the problems associated with 1st year analytical courses is the need to instil sound practical techniques, but at the same time to make the course interesting and, dare one say it, relevant. Traditionally analytical courses have included various exercises which, while being invaluable for giving sound, practical instruction, have failed to excite the student's interest. For example, simple titration of acids and bases can be made more challenging if the student is given, say, four different brands of vinegar to compare. The fact that various problems other than the actual titration occur (e.g. colour interfering with indicators, frothing of the samples during pipetting, working out dilution factors, etc.) adds to the interest and gives a more realistic awareness of an analyst's "real life" problems.

The traditional technique-teaching experiments can be retained in a course provided that the students are able to see good applications for the methods. This approach has been developed in the analytical course at Lincoln College. Sixty laboratory hours are available for this course and the first 36 of these are used in experiments which give the students practice in various analytical techniques. Following this there is a 3-hour laboratory test which assesses the student's accuracy in carrying out an analysis. The remaining 21 hours of the course are available for a project in an area of agricultural interest in which techniques learned during the early part of the course are used. Experience has shown that while a certain experiment may be a bore when done simply as an exercise, it will be cheerfully performed if the student is going to use the technique for his project.

Lincoln College, Canterbury, New Zealand

Analytical Exercises

This area, occupying the first 36 hours of the course, is divided into 4 sections, (i) chromatography (column and ion exchange), (ii) chromatography (paper and TLC), (iii) colorimetry and (iv) volumetric analysis. Students may spend a maximum of 9 hours with each section. A total of 28 experiments are available at the moment and the only compulsion placed on the student is that he hands in one experiment from each section for assessment. (Experiments marked with an asterisk in the list below are those for assessment.)

Each student is given a brief laboratory manual containing notes on the theory of chromatography, colorimetry and volumetric analysis and a list of experiments available. The experiments listed for 1974 were as follows:

Section 1. Chromatography (column and ion exchange)

1. Separation of dyes by column chromatography on alumina. (Preparation of an adsorption column. A simple example of stepwise elution).

2. Separation of cations on an alumina column. (Preparation and use of an adsorption column for the qualitative analysis of a mixture of cations).

3.* Estimation of Fe^{3+} impurities in conc. acids. (Microgram quantities of Fe^{3+} can be detected using "mini" silica gel columns).

4. Comparison of batch and column techniques. (Preparation and use of an ion exchange column. Comparison between this technique and the batch technique).

5. Separation of cations from aqueous solutions by ion exchange chromatography. (Illustrating the use of ion exchange chromatography in qualitative analysis).

6.* Determination of SO_4^{2-} using an ion exchange column.[1] (SO_4^{2-} is exchanged with the OH^- of an anion exchange resin. Titration of OH^- with standard acid).

7.* Determination of Cu^{2+} using an ion exchange column (Cu^{2+} is exchanged with the H^+ of a cation exchange resin. The H^+ released is titrated with standard alkali).

8.* Determination of As content of a pesticide.[2] (Metal ions (Pb, Ca, Zn, Mg etc.) of arsenic-containing pesticide removed by ion exchange. Reaction with KI, titration with $Na_2S_2O_3$, enable As content to be determined).

Section 2. Chromatography (paper and tlc).

9. Separation of ink pigments.

10.* Qualitative analysis: separation of cations (Traditional schemes of qualitative analysis can be partly or wholly replaced by paper chromatography).

11.* Qualitative analysis: separation of anions.

12. Determination of molecular weight of fatty acids.[3] (TLC experiment. Plotting R_f against molecular weights gives a straight line).

13. Identification of trace elements in a fertilizer. (An example of cation analysis using TLC).

Section 3. Colorimetry.

14. Verification of Beer's law. (Introductory experiment illustrating the use of the 'Spectronic 20').

15. Determination of Na^+ in sea water. (Flame photometry).

16.* Determination of % Cu in a fungicide.

17.* Determination of % Mn in a fertilizer.

18.* Determination of phosphate in water samples.[4] (Comparison of polluted and non-polluted water).

Section 4. Volumetric analysis.

19. Standardisation of solutions of H_2SO_4 and NaOH. (Use of primary standards).

20. Acetic acid content of commercial vinegar samples.

21.* Preservative in soft drink. (Extraction and quantitative determination of sodium benzoate).

22.* Determination of urea in a fertilizer. (Hydrolysis with urease, titration with standard acid).

23. Standardisation and use of $KMnO_4$. (Standardisation with Fe^{2+}. Use of $KMnO_4$ to determine oxalate).

24.* Determination of Ca in limestone. (Limestone dissolved in acid and Ca precipitated as oxalate. Oxalate dissolved in acid and titrated with standard $KMnO_4$).

25. Standardisation and use of $Na_2S_2O_3$. (Standardisation with I_2; use of $Na_2S_2O_3$ to determine I in iodized salt[5]).

26.* Determination of Cu in a fertilizer. (Reaction with KI, liberated I_2 titrated with standard $Na_2S_2O_3$).

27.* Determination of Ca and Mg in water samples. (Comparisons of Ca and Mg in fresh and salt water using EDTA).

28.* Determination of Cl in cheese.[6] (Reaction with excess $AgNO_3$; titration with KSCN).

Details of the experimental procedures and references are held by staff members and are available to students as required. The total class size is currently about 80-90. This is divided into two sections so that 40-45 students are in the laboratory at any one time. The class is further divided into 4 groups, each with 10-12 students and 1 staff member. This has proved to be a happy arrangement. It enables staff members to get to know their students well and gives students ample opportunity for personal instruction where necessary.

Projects

Four projects topics are currently available and students may choose which one they wish to do, provided that there are at least eight students in each project group. Thus in any laboratory class during this part of the course there are four groups of students (8-12 per group), each with a leader. The leader's job is to organise the work load within the group, ensuring for example that there is adequate replication of analyses. In writing a project report a student will give full details of the analyses he himself has performed (these are marked for accuracy) as well as a table showing the results of the whole group. The written report will discuss the implications of the group results. Analytical accuracy is stressed as there is no point in drawing conclusions from faulty data. The assessment of the project therefore gives equal weight to the accuracy of a student's analyses and to the ideas and conclusions presented in the report. Students are encouraged to use the library and to check references given them and to find their own information. Some are stimulated to go further—for instance one group organised a trip for themselves to a local dairy factory. Results to date have been most encouraging both in the quality and quantity of work performed. Three projects which have been successful in the past are described below.

1. *A Water Pollution Study*

Effluent from the Lincoln Sewage Plant (a small one serving a community of about 1200) flows along a drain, passing through Lincoln College property.

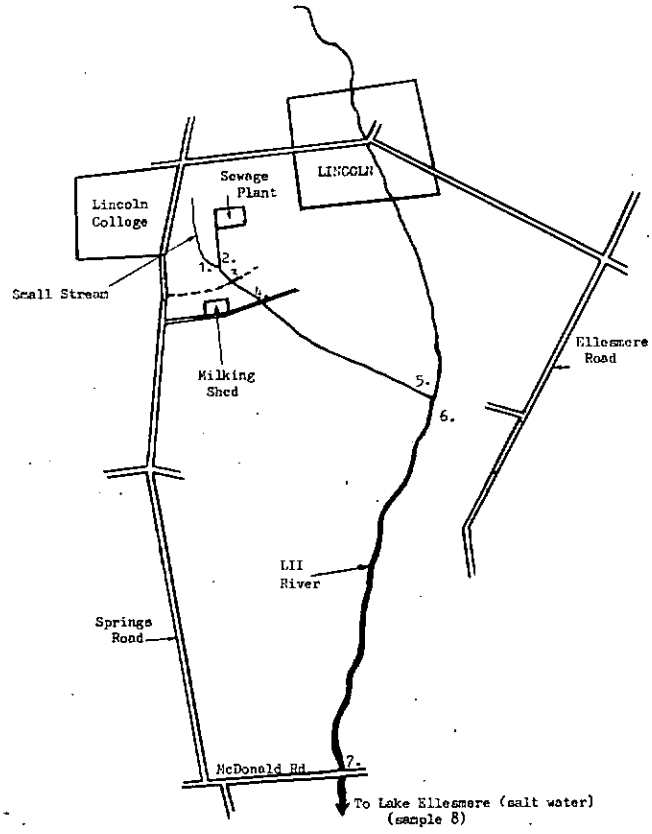

Fig. 1. Water Pollution Project: Sampling points numbered 1-8.

The effluent is diluted, firstly by a small stream and secondly by the LII river which eventually reaches the sea at Lake Ellesmere. Students collect samples at the sites shown on the map (fig. 1), and are encouraged to make notes in the field on the condition of the water (e.g. appearance, smell, signs of plant or animal life, weather conditions etc.). Samples are brought back to the laboratory and determinations of pH, conductivity dissolved oxygen and biochemical oxygen demand[7] (iodometric method), ammonia (colorimetry—direct Nesslerization method), phosphate (colorimetry[4]—molybdenum blue method), chloride (titration with $AgNO_3$ after separation by ion exchange), Ca^{2+} & Mg^{2+} (EDTA titration) Na^+ & K^+ (flame photometer), are carried out. Analyses for detergent concentration by the methylene blue procedure have been discontinued as the levels were too low and variable. Some typical results are shown in tables 1 and 2.

2. *Foliar Fertilizers*

This is a "consumer-protection" project. Four commercially available fertilizer products of the type sold to home gardeners are analyzed. The student's task is to compare the products, suggest a "best buy" and indicate improvements, if any, which could be incorporated in them. Since solid samples are based on urea the samples are initially dissolved in dilute acid to avoid the problems of weighing small quantities of hygroscopic material. The preliminary treatment of the fertilizer to produce three solutions labelled O (original), C (cations) and A (anions) is shown in fig. 2.

Solution O is used to determine Cu (iodometric method), Mn (colorimetry[8]), urea (hydrolysis with urease, followed by titration with HCl), NH_4^+ (reaction with excess NaOH, back titration with HCl) and K (flame photometry). Solution A is used for the detection of B and Mo (spot tests),[9] P (colorimetry) and S (gravimetric method[10]). Solution C is used for the determination of Mg (EDTA titration) and for qualitative analysis.[11] (Fe, Zn and Ca may be present in addition to the elements already determined). Some student results are given in table 3.

3. *Dairy Products*

This project gives students an opportunity to study the chemical composition and food value of products derived from milk. Samples used successfully so far in this project are milk, condensed milk, cream, ice cream and yoghurt. The analytical scheme is shown in fig. 3.

Protein is determined by the rapid "formol" titration technique.[12] Carbohydrates are analysed by reaction with Fehling's solution and subsequent colorimetric determination of Cu. Acid hydrolysed samples are used to give the total carbohydrate content (sucrose and lactose) and unhydrolysed samples are used for the lactose content. Other analyses used are for K (flame photometry), Ca (EDTA titration), Cl ($AgNO_3$ titration) and P (colorimetry). Students are also encouraged to look for trace minerals by chromatography. Some results are given in table 4.

4. *Other Projects*

A fourth project being developed for the 1975 course examines the extraction, purification and determination of caffeine in a number of products (tea, coffee, cocoa, cola drinks).

Possibilities for further projects appear almost limitless. Problems of desalination of sea water; preparation, formulation and use of 2,4-D; air pollution; comparison of butter and margarine are a few ideas which could be explored.

Conclusion

The course described here has gone a long way towards meeting the students' need for satisfying and challenging laboratory classes. Although introduced for students of agriculture, there is no reason why the applied chemistry approach should not be adopted by other disciplines using chemistry, or even by pure chemistry.

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Table 1

Water pollution project: Some class results 1973

	Sampling point					
	1	2	3	4	7	8
Dissolved oxygen	7.9	0.0	2.1	3.1	11.8	9.8
Phosphorus	0.2	3.0	1.0	0.5	0.06	0.07
Nitrogen	1.0	17	4.6	4.3	2.0	1.3
Sodium	12	36	19	19	11	370
Potassium	2.2	12	4.5	3.1	1.0	15
Calcium	16	21	18	19	19	38
Magnesium	4.0	4.0	3.9	4.0	3.7	100

N.b. figures are mg dm^{-3}.

Table 2

Water pollution project: Variations in dissolved oxygen content

Sampling point	Date sampled 18/9/73	20/9/73	25/9/73	27/9/73	2/10/73
1	8.5	5.2	7.9	8.5	8.6
2	0.0	0.0	0.0	0.0	0.0
3	3.1	2.3	2.1	5.6	1.0
4	4.9	4.9	3.1	5.8	1.8
7	11.8	10.0	11.8	11.6	10.5
8	6.6	8.1	9.8	9.8	8.2

Table 3

Foliar fertilizer project: Some class results 1971

	Sample B	H	L	Z
Copper	0.69	0.022	0.066	0.011
Magnesium	2.4	0.10	0.082	0.27
Manganese	2.8	0.019	0.18	0.00
Nitrogen (NH_4^+)	1.00	0.00	1.58	1.35
,, (urea)	46.0	8.9	62.2	51.3
Phosphorus	2.8	6.7	4.2	4.1
Potassium	4.5	5.3	7.9	8.1
Sulphur	8.9	2.2	0.84	0.48

N.b. figures are percentages.

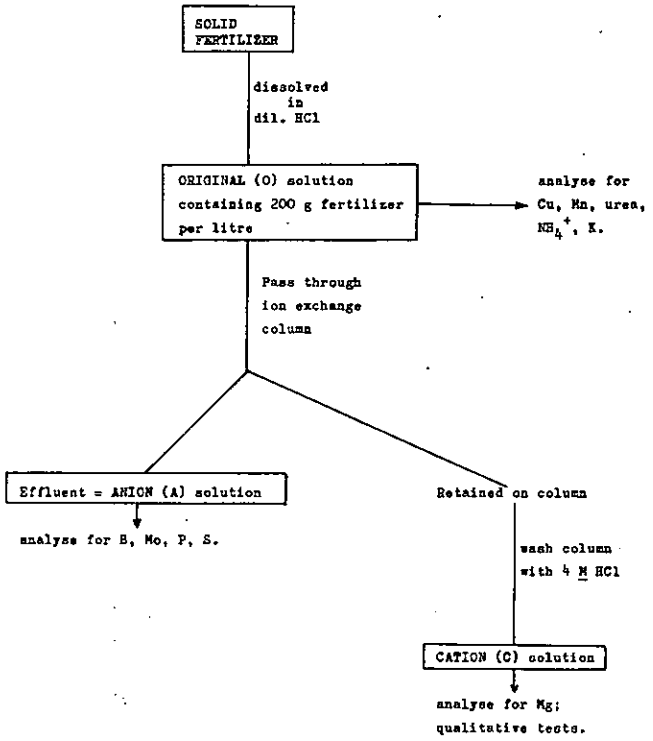


Fig. 2. Foliar fertilizer project: Preliminary treatment.

Table 4

Dairy Products project: some class results 1970 and 1971

	Milk	Cream	Condensed Milk	Ice Cream	Yoghurt
Water	85.7	54.6	67.0	55.4	85.3
Solids	14.3	45.4	33.0	44.6	14.7
Protein	2.2	0.7	4.3	1.5	4.0
Fat	3.6	39.5	8.3	11.2	6.8
Carbohydrate					
—Lactose	5.2	3.1	9.0	7.8	4.5
—Sucrose	0.0	1.1	1.1	11.2	6.8
Minerals (Ash)	0.75	0.41	2.2	1.2	1.0
Lactic acid	0.11	0.14	0.45	0.26	1.8

N.b. figures are percentages.

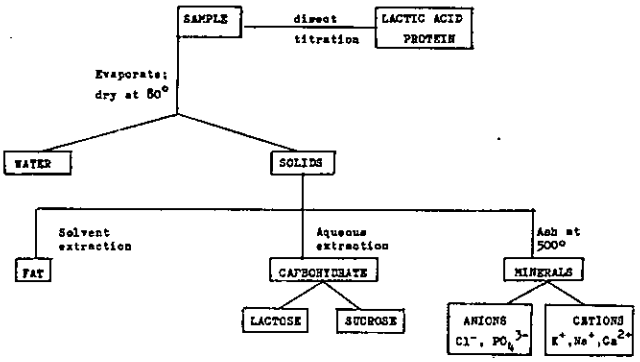


Fig. 3. Dairy products project: Analytical Scheme.

OBITUARIES

LINDSAY HEATHCOTE BRIGGS (1905-1975)
D.Phil.(Oxon.), D.Sc.(N.Z.), F.R.S.N.Z., F.N.Z.I.C., F.A.N.Z.A.A.S.

Professor L. H. Briggs died in Auckland Hospital on 16 January 1975, a few days after his seventieth birthday. Although for some years he had been a diabetic (which he monitored by testing himself) and also had a heart condition, his death was comparatively sudden and a shock to his many friends.

It is not possible in one memoir to detail all the achievements and honours which came to him in his lifetime. A fuller account of his scientific work, including a list of his 166 papers, is being prepared by one of his most brilliant students and closest colleagues, Prof. R. C. Cambie, for the *Proceedings* of the Royal Society of New Zealand, of which Prof. Briggs was a Council member for many years, a Past-President, and the recipient of one of its highest honours, the Hector medal.

Lindsay Heathcote Briggs was born in Hastings and had his early education there. He transferred from Hastings District High School to Auckland Grammar in 1921, and entered Auckland University College in 1924, graduating B.Sc. in 1927. He did particularly well in geology, but the late Dr W. F. Short channelled his interest into organic chemistry, in which he took honours in 1928. The following year he took up the James Gunson Scholarship for research in dairy science, and became the first research scholar in the newly opened Massey Agricultural College. He was awarded an Oxford Exhibition of the British Association in 1932, and studied under Prof. (later Sir) Robert Robinson, F.R.S., O.M., to gain his D.Phil. in 1933. He was awarded the D.Sc. of the University of New Zealand in 1941.

Briggs returned to New Zealand in 1933 to take up an appointment as lecturer in organic chemistry at Auckland and continued there for the rest of his life. He was appointed to a chair of chemistry in 1956, and though he officially retired in 1970 with the status of Professor Emeritus, he continued his association with the University as a part-time lecturer and doing research work on essential oils and the colouring matters of fungi. His earlier scientific work was likewise on natural products—diterpenes, flavonoids, quinones and related pigments, alkaloids, peptides and other natural products in this area. Some of his work had commercial significance: he broke new ground with the isolation and characterisation of solasodine from the poroporo (*Solanum aviculare*). Solasodine has been used as the starting point for the manufacture of oral contraceptives and for this purpose, a related species, *S. laciniatum* has been cultivated on a large scale in the Soviet Union, and has even been depicted on a Russian postage stamp. His work in this field was recognised by his election as one of the few non-American Honorary Fellows of the American Academy of Pharmaceutical Sciences.

Prof. Briggs filled many positions with scientific and other bodies. He joined the N.Z.I.C. as an Associate on his return from England in 1933, became a Fellow in 1938, Chairman of the Auckland Branch in 1941-2, President in 1959 and Honorary Fellow in 1970. He was the first recipient of the I.C.I. medal in 1949 and maintained his interest in the Institute to the end, regularly attending Branch Meetings and Conferences. He was a judge of the student papers at the 1974 Conference, and our photograph shows him in a typical pose at an earlier Conference.

He was the first Chairman of the Royal Society's Sectional Committee on Chemistry, and continued when it became the National Committee with the inclusion of N.Z.I.C. representatives. In this capacity he went to Prague in 1967 as the first New Zealand representative to the Council of the International Union of Pure and Applied Chemistry (IUPAC). He was in demand overseas because of his international reputation and spoke at 65 different institutions abroad: a number of other invitations had to be declined for various reasons. He was Visiting Professor at the University of Aberdeen in 1961-2, and at the University of North Carolina in 1968-9.

Among his other interests Prof. Briggs served on the Council of the Auckland Institute and Museum from 1946 until his death. He was President from 1952 to 1955 and was made an Honorary Life Merber ten years later. In his capacity as President he undertook the chairmanship of the organising committee of the Eighth N.Z. Science Congress in 1954. (It was here that the writer first became closely

associated with him, an association which continued until the Professor's death.) He inaugurated the School Science Exhibition at the Museum in 1960; this has grown in strength so that both the Museum and secondary school science have benefitted. Also typical of his interest in young people was the establishment of the Archey Lecture delivered each year at the Museum to selected science students from Auckland secondary schools by a distinguished scientist. During his period on the Council he also shouldered a heavy load of deputations to various local bodies in connection with the financial support of the Museum.

At Auckland Grammar, Briggs played rugby for the first XV, but further progress in the game was halted by a knee injury, so he turned to other sports in which he did well enough to be nominated for a Rhodes Scholarship in 1927. He was for thirty years an active rugby referee; he was a Past-President and Life Member of the Auckland Rugby Referees Association, honours which gave him great pleasure. He was an active Christian and served as an elder of Knox Presbyterian Church, Parnell, for 37 years. In 1953 he was awarded the Coronation Medal for services to the community.

In 1935 he married Miss Sheila Mary Coshall of Oxford, who survives him. Their married life was a very happy one, and without Mrs Briggs' active support, the Professor could not have achieved all that he did. They kept open house for scientific colleagues and other friends, and many committee meetings were held at their house in Brighton Road. The Briggs had two sons and two daughters and six grandchildren. The death of their elder son Terry as the result of a mountaineering mishap was a sad break in an otherwise very happy family life.

Despite all his achievements, Lindsay Heathcote Briggs was a very humble man. It was typical that despite his elegant given names, he was known to all, including his students, as "Bob", and it is under this name that he will be affectionately remembered.

During his student days, Bob Briggs trained himself to write in an unusually neat and very small hand, so that he could get more of the lecturer's words down and cram more into a page. In any tribute to him, one cannot but be amazed at what he crammed into seventy years while maintaining a normality, sense of humour and friendliness that made him so delightful to know and esteem.

S.G.B.

DAVID PORTMAN HUBBARD, B.Sc. (Hons.), Ph.D. (Sheffield)

Friends of David Portman Hubbard will be greatly saddened to learn of his death by drowning on 4.1.75. He went to the aid of the son of a colleague who was in difficulties in the surf, and although he successfully returned the boy to where a rescue could be effected David was subsequently swept out to sea.

David Hubbard was born at Chapeltown near Sheffield in 1942 and educated at Ecclesfield Grammar School and Ashton Grammar School, Ashton under Lyne, Lancashire, England. He entered the University of Sheffield in 1960, graduated B.Sc. (Hons.) in Chemistry in 1963 and Ph.D. in 1966 and was elected to the Associateship of the Royal Institute of Chemistry in 1965. His initial research involved the application of polarography to inorganic and organic systems but he later became interested in the use of the nitrous oxide-acetylene flame for the determination of elements having refractory oxides by atomic absorption spectroscopy. During part of this time he worked in the laboratories of Hilger and Watt Ltd.

David made a considerable contribution to his profession. In 1966 he was appointed Assistant Lecturer in Analytical Chemistry at Hatfield Polytechnic, Hertfordshire, but returned to Sheffield the following year as Lecturer and later Senior Lecturer in Analytical Chemistry in the Polytechnic. He accepted the position of lecturer in Analytical and Physical Chemistry at the University of Otago in 1973, and was actively involved in setting up research programmes involving the application of the techniques of analytical chemistry to a variety of problems related to aspects of pollution monitoring. He also participated with many other staff in joint research projects. He has about 20 publications mainly in the fields of polarography, atomic absorption and atomic fluorescence and several in the press or in the course of preparation. He was editor for the first two volumes of Annual Reports on Analytical Atomic Spectroscopy and Regional Advisory Editor in Australasia for "The Analyst".

Outside the laboratory David was a keen sportsman. He represented his University at cricket, played a good game of football and more recently enjoyed a game of badminton or golf with his colleagues. A wide circle of friends joined his wife Susan, their children Kathryn and Christopher, and his parents at a memorial service on 10.1.75. He will be long remembered and deeply missed.

A. D. Campbell.

DR F. H. McDOWALL, O.B.E., M.Sc.(N.Z.), D.Sc.(Lond.) FRSNZ

Dr F. H. McDowell died on 27 December 1974 in his 75th year. He was born in Southland, graduated in chemistry from the University of Otago and then took his doctorate at University College, London, in 1927.

He spent the rest of his professional career at the New Zealand Dairy Research Institute, where he was Chief Chemist from 1928, finally becoming Director before his retirement in 1965.

Dr McDowall played a major part in laying the foundations of the Institute at a time when few practical dairy men had any faith in the value of scientific work, and his dedication and energy helped to overcome the multitude of obstacles which faced the fledgling Institute. His interests ranged widely over the field of dairy science, and he published about 130 scientific papers. He shed new light on every subject which he undertook to investigate, and above all he showed how the scientific method could be applied to practical problems.

A major achievement was the Buttermaker's Manual, a monumental work still in use, which gained him great acclaim in the dairy world. This work was recognized by the award in 1957 of the Imperial Chemical Industries Ltd. prize.

Dr McDowall's services to science and the dairy industry received wide recognition. He was awarded the Gold Medal of the Australian Society for Dairy Technology in 1958; in 1959 he received the OBE; in 1962 he was elected a Fellow of the Royal Society of New Zealand; and in 1967 he received the Distinguished Service Award of the New Zealand Society of Dairy Technology. In November 1974 the chemistry laboratories of the New Zealand Dairy Research Institute were named the McDowall Wing in his honour.

Dr McDowall was elected to Fellowship of the Institute of Chemistry in 1945 and was a founding member of the Manawatu Branch. He was Branch Chairman and Council Delegate in 1954/55, as well as Conference Chairman in 1955.

In his private life Fred McDowall had a diversity of interests. He was a great lover of classical music and served as President and then as Patron of the British Music Society in Palmerston North. In earlier years he also took an active part in the Repertory Society. He collected prints and paintings with a discerning eye, and he read widely, being particularly fond of poetry. He was a member of St Andrews Presbyterian Church, and for a period served as office bearer.

Outdoors he was a keen gardener and, particularly after his retirement, an enthusiastic duck shooter and trout fisherman. He and his wife Gay spent much time in the Taupo area, where they had a caravan on the shores of the lake.

Fred was a great family man and leaves five children, all married, and many grandchildren.

AUTOMATION '75

Preparations for the Conference being held at the University of Canterbury during 21 May to 23 May are well in hand. Mr Brian Talboys, Deputy Leader of the Opposition, will be presenting the opening address, Mr C. W. Mace, the theme address. Other well known speakers include Mr Ron Walton and Mr Charles Martin.

The programmed 30 papers are intended to provide more emphasis on the user level.

Three subject paper sources are arranged, namely academic and research, practical and commercial with the electrical, fluid power and instrumentation fields being covered.

The conference and exhibition has been approved in principle by the State Services Commission.

NOTICES

N.Z.I.C. CONFERENCE 1975

At this year's conference to be held at Massey University emphasis will be on Specialist Group activities, and plans are being made for the Groups to meet throughout the Conference. The traditional student papers will be included in the Specialist sessions. A number of guest speakers from overseas will feature in some of the Specialist Group meetings. In addition it is planned to hold a Symposium on Chemical Education. Although the Conference will be officially opened on Wednesday, 20 August, it is expected that Tuesday, 19 August will be largely filled with Specialist contributions.

In addition there will be Guest Lecturers in Biochemistry (Professor B. A. Stone, Latrobe University) and Chemistry, the Presidential Address and review lectures by Professor Parton and Professor Soper. The Social programme will include a visit to Centrepoint (intimate theatre), a Buffet Evening, Social Hours and the Conference Dinner.

This year abstracts will not be published in "Chemistry in New Zealand" but in the Conference Booklet. Material will be reproduced directly from authors manuscripts thus making it possible to include structural formulae and diagrams.

Other Scientific Activities during Conference Week

A one-day Symposium concerned with "The Biological Role of Metal Ions" is to be held at Massey University on Monday, 18 August, 1975. Further information was published in the February issue of "Chemistry in New Zealand'.

The New Zealand Association of Clinical Biochemists will hold a Conference at Massey on Monday, 18 August and Tuesday, 19 August, 1975. Further information can be obtained from Vivienne Sampson, Epidemiology Unit, Wellington Hospital, Private Bag, Wellington.

The New Zealand Microbiological Society will be holding its Annual Conference at Massey University from August 19 to 21. The New Zealand Institute of Medical Laboratory Technology Conference will be at Palmerston North Teachers' College from 21 to 23 August.

MANAGEMENT FOR CHEMISTS

a Short Course in Management Appreciation

The Auckland Branch together with the School of Commerce, Auckland Technical Institute, will again offer this highly successful course from May to August this year. This course, first devised for Chemists, has been adapted for other specialist groups. Now firmly established it covers all important aspects of management principles and accounting techniques relying heavily on case studies. It also includes a business management game to reinforce what is learnt in the theory sessions. Details are given in a special pamphlet available from Mr. J. G. Fletcher, Auckland Technical Institute, Private Bag, Auckland.

RACI SYMPOSIUM

The Analytical Chemistry Division of the Royal Australian Chemical Institute will conduct the Third Australian Symposium on Analytical Chemistry in Melbourne during 27-30th May, 1975. The venue will be the Chemistry Department, Melbourne University.

The following plenary papers will be presented:

Professor K. W. Gardiner, Chairman, Applied Science Program, University of California, Riverside, U.S.A., "Education for Process Analytical Instrumentation".

Dr. R. H. Hagstrom, Director Product Research and Development, Olin Corporation, U.S.A., "Current Trends in On-Stream Analytical Techniques".

Dr. P. D. Le Fleur, Chief, Analytical Chemistry Division, National Bureau of Standards, U.S.A., "Standard Reference Materials in Trace Analysis".

Professor H. V. Malmstadt, University of Illinois at Urbana-Champaign, U.S.A., "A New Generation of Laboratory Instrumentation".

Professor W. F. Pickering, University of Newcastle, N.S.W., "Analytical Chemists: Number Provisioners or Professional Advisors".

Approximately seventy contributed papers will be presented on most aspects of analytical chemistry including: trace and ultra-trace analysis, electroanalytical techniques, atomic absorption spectroscopy, X-ray fluorescence and environmental control standards. A comprehensive exhibition of scientific instruments and books will be held in conjunction with the Symposium. A varied social programme has been planned.

Mr. J. T. van Gemert, Honorary Secretary, Analytical Chemistry Division, Royal Australian Chemical Institute, Kodak (Australasia) Pty. Ltd., P.O. Box 90, Coburg, Victoria, 3058 Australia.

BRANCH NEWS

Auckland

Three meetings were held in February. The President, Dr C. L. Davey of the Meat Industry Research Institute delivered his presidential address at a luncheon meeting on 13 February.

Dr A. Miller, Head of the European Molecular Biology Laboratory at Grenoble, delivered a lecture on "Structural Studies on Collagen" on 17 February at a joint meeting with the Chemistry Department, University of Auckland.

Mr P. J. Bryer of B. F. Goodrich N.Z. Ltd., and Mr S. Jenkins of Buckley and Young Ltd. spoke on "The Manufacture and Applications of PVC" at a joint meeting with the Polymer Group on 26 February.

The N.Z.I.C. (Auckland Branch) Prize, for the best performance over Stage III chemistry courses, was awarded to Mr J. C. Peak.

The **Chemistry Department, University of Auckland,** currently has three visitors:

Dr N. S. Isaacs, Lecturer in Chemistry from the University of Reading who is working with Professor de la Mare from January to August;

Dr D. T. Cook, late of the University of Sheffield, who is on a post-doctoral fellowship, December-July, and is working with Professor T. N. Waters;

Mr W. S. Peddie of Wesley College who is spending the year in the department as a Visiting Teaching Fellow;

Dr E. Whalley of the Physical Chemistry Division of N.R.C. in Ottawa visited the Chemistry Department of Auckland University and gave a lecture on "Intermolecular Interactions in Some Molecular Solids", on 18 February.

D.S.I.R.

Mr O. H. Keys has retired as Government Analyst in Auckland and was farewelled at a function at Mt Albert. He was recently elected a life member of the Australian Corrosion Association in recognition of his service since its foundation.

Dr D. F. Nelson has been appointed to succeed Mr Keys both as Government Analyst and to be in charge of the Auckland Office of Chemistry Division D.S.I.R.

Personal

Mr A. C. Kennett has been elected Australasian Vice-President of the Australasian Corrosive Association.

Mr J. C. Bowles has left the Auckland Technical Institute to take the position of Head of Science Department, Otago Polytechnic. His position at A.T.I. is being taken by Mr N. Edwards who leaves Polymers (N.Z.) Ltd. to do so.

Mr B. C. Barrack has been appointed Technical Director for Warner Lambert (N.Z.) Ltd.

Dr K. R. Laing has been appointed to the staff of N.Z. Fertilizer Manufacturers Research Association at Otara.

Mr R. Hopgood is now Manager of Planning and Development of Chemistry Department of Gollin (N.Z.) Ltd.

Mr J. Yolland has been transferred to the Fletcher Timber Company.

Mr. L. Fletcher has left Fletcher Holdings to establish Materials and Testing Laboratories Ltd.

Mr M. Bell has been appointed Technical Adviser of TELARC.

Waikato

University of Waikato

The University of Waikato's annual Antarctic expedition has returned with some interesting chemical finds. By coring into Lake Bonney in the Taylor Dry Valley, to investigate further the salt deposits discovered last year, the expedition discovered thick layers of dihydrohalite ($NaC1.2H_2O$). This is probably the first discovery of a permanent deposit of dihydrohalite, which decomposes at temperatures above –0.5°C and at low relative humidity. The mineral was identified in the field by gravimetric analysis, and X-ray diffraction patterns were run at sub-zero temperatures at McMurdo's Earth Science Laboratory.

The expedition also investigated Lake Wilson (named 12 years ago after the present Professor of Chemistry at Waikato) and found that it was the deepest and probably the biggest lake in Antarctica. Although not as saline as some other Antarctic lakes, Lake Wilson also turned out to be both density stratified and thermally stratified. Analysis of the lake waters is proceeding.

The expedition was led by Dr. C. H. Hendy. Three other members of the Chemistry Department took part; Professor A. T. Wilson, Mr. A. Bonny and Mr. M. Grinstead.

Dr. A. L. Wilkins joined the staff of the Chemistry Department in February. Dr. Wilkins is a natural products chemist and has been working in the Dyson Perrins Laboratory at Oxford on the microbiological hydroxylation of steroids and the chemical synthesis of fluorosteroids.

Branch Meetings

At the November meeting Dr. B. L. J. Jackson, a soil chemist at the Ruakura Agricultural Research Centre, gave a talk on "Metahalloysite — is it kaolinite or not?"

At the March meeting Dr. C. L. Davey, President of the Institute, addressed the branch. He first gave a report on N.Z.I.C. affairs and then spoke on "Conversion of muscle into meat".

Canterbury

The February meeting took the form of a visit to Lincoln College. A tour of the Departments of Biochemistry, Microbiology, and Soil Science was preceded by a buffet tea.

On March 10 the branch was addressed by Professor W. D. Loomis of Oregan State University on the subject of the Biosynthesis and Metabolism of Lower Terpenoids in Plants.

Dr. A. Miller, recently appointed head of the European Molecular Biology Laboratory, Grenoble, gave a lecture on 27 February at the University of Canterbury on the subject of Structural Studies on Collagen.

Mr. N. O. Halstead, until recently head of the Science Department at Dannevirke High School, has taken up the position of Deputy Principal of Timaru Girls' High School.

Miss Alison M. Thomson has taken up a teaching appointment in Napier.

The branch prizes for 1974 were awarded to Mr. J. Ralph (Hons I Chemistry) of the University of Canterbury and M. I. Spurway (Stage III Chemistry, NZCS) of the Christchurch Technical Institute.

University of Canterbury

This year's visiting lecturer Dr. Karen Erikson has arrived from Clark University, Massachusetts. She will be undertaking a chemical investigation of New Zealand marine algae.

Professor M. P. Hartsorn has left on an Erskine Fellowship. He will spend about two months visiting North America and Great Britain in connection with his teaching and research interests in the chemistry of biological compounds. He will attend the 169th meeting of the American Chemical Society.

The Annual Practical Session organised by the Junior Chemical Society was held at the University on 17th March. Seventh Form pupils from High Schools in the Christchurch area spent the day doing qualitative organic analysis, studying the chemistry of agar and analysing oil products.

Lincoln College

Dr. S. R. Davis from the University of Nottingham has been appointed as a Post Doctoral Research Fellow in Biochemistry. He will be working in association with Dr. R. Bickerstaffe on the biochemistry of perfused mammary gland.

Dr. D. C. Reanny has been invited to speak at the 14th Annual Meeting of the Australian Society for Microbiology to be held at Perth in May. He will also speak at the 3rd International Congress of Virology at Madrid in September. His subject will be "Viruses as Agents of Accelerated Cell Evolution".

Clinical Biochemistry

A practical course organised by the Association of Clinical Biochemists on Separation Techniques in Clinical Biochemistry, was held at Lincoln College from 12 to 14 February. Thirty-two participants from all over New Zealand attended.

Wool Research Organisation

John Edgar of the Wool Science Section has resigned.

Dr. Ian Weatherall recently attended a Summer School on Polymer Degradation organised by the Royal Australian Chemical Institute at International House, University of Melbourne. He also visited a number of Australian research establishments to determine the potential value of Laser Raman Spectroscopy in problems relating to wool science.

Otago

Chemistry Department

The Department was saddened by the tragic drowning in January of Dr. David Hubbard, Lecturer in Physical Analytical Chemistry (see elsewhere for an Obituary).

Professor R. E. Corbett has returned from a sabbatical year spent as an Honorary Research Fellow at University College, London. During this time he visited a number of other University Chemistry departments and attended the 9th IUPAC Natural Products Symposium at Ottawa. He also attended the Chemical Society Congress in London and was the official New Zealand representative at the Centennial celebrations of the Society for Analytical Chemistry.

Associate Professor R. A. Matheson has also just returned from a year's leave spent in the School of Chemistry, Newcastle-upon-Tyne. Here he worked with Dr. A. K. Covington on laser and vapour pressure studies of concentrated electrolyte solutions.

Dr. D. E. Jones has resigned from his position as Senior Lecturer in Physical Chemistry.

Professor M. Panckhurst has left for a sabbatical year in the Chemistry Department, University of Florida, Gainesville.

Dr. D. V. Fenby has also left for a sabbatical year at the Centre de Reserches de Microcalorimetrie et de Thermochemie at Marseille, France.

Dr. W. T. Robinson visited the department at the end of the year and gave a lecture entitled "X-ray structure Analysis as a Spectroscopic Service?"

Dr. E. Percival from the Chemistry Department, Royal Holloway College and her husband Mr. R. H. McDowell visited the Department in February and gave a lecture on "Current Techniques in the Elucidation of Polysaccharide Structures".

Dr. J. Reiss from the Chemistry Department, La Trobe University also spent several days in the department and gave a lecture on the synthesis of circulenes and anulenes.

Department of Biochemistry

Dr. F. Sanger F.R.S. who visited the department from 8-11 December gave a lecture on sequence determination of DNA.

The department welcomes John C. Bowles who has arrived from Auckland to take up an appointment as Head of Department of Applied Sciences at Otago Polytechnic. We trust that he has not been led to believe that ice hockey is played on Otago Harbour every winter.

M. G. Shepphard has left on a Nuffield Travelling Felowship to be taken at Oxford University with Professor J. Mandelston, Department of Chemical Microbiology. His project will be on the biochemical events which accompany sporulation in *Bacillus subltis*.

N.Z.I.C. Branch

Dr. W. T. Robinson gave a lecture at the end of last year on "Modelling Haemoglobin".

Dr. A. Miller addressed a special meeting in February on "Structural and Functional Aspects of Insect Flight Muscle".

Pharmacy Department

Dr Michael Kingsford, Chemistry Division, D.S.I.R. Drug Quality Control Section, visited the Department of Pharmacy in October 1974 and gave two very interesting lectures to students and staff on Drug Bioavailability and Quality Control in Pharmaceuticals particularly related to Shelf Life Studies.

Manawatu

Massey University

Dr A. Miller, Laboratory of Molecular Biophysics, Oxford University, visited the Department of Chemistry, Biochemistry and Biophysics and gave a seminar "Structural and Functional Aspects of Insect Flight Muscle". Dr Miller has made an outstanding contribution to our knowledge of the structure and function of fibrous proteins using mainly X-ray diffraction techniques.

Dr J. Reiss, from the Department of Organic Chemistry, La Trobe University, also visited the Department and spoke on "Cyclophanes and Circulenes —Non Planar Aromatic Compounds".

N.Z. Dairy Research Institute

Mr Ross Hughes, formerly of the New Zealand Leather and Shoe Research Association, has joined the staff of the Institute as a biometrician. He will be responsible for assisting in experimental design and data analysis.

Dr L. K. Creamer is to travel to the 1975 Gordon Conference on Mammary Tissue and Milk to be held in New London, New Hampshire, in June. He will also visit a number of institutions with an interest in dairy research.

IUPAC NEWS

INTERNATIONAL NEWSLETTER ON CHEMICAL EDUCATION

No. 1, November 1974

The first Newsletter marks a new and important activity of the IUPAC Committee on Teaching of Chemistry. It contains information on Conferences and National and International efforts at improving chemical education. The second newsletter will be published shortly. The chairman IUPAC Committee on the Teaching of Chemistry requests material (up to three typed pages) for inclusion in any subsequent Newsletters. The following topics are particularly listed:

(1) Important news and novel experiments in chemical education. In particular, short reports or abstracts of national articles (citing references) concerning chemical education.

(2) Brief write-ups by chemical educators in a country on any unique or novel experiments being carried out by them.

(3) Suggestions and comments on important topics such as (a) teaching of chemistry as part of integrated science teaching in schools; (b) changes in chemistry curricula required to cope with the information explosion in a large number of allied areas with which chemistry is directly involved or has interfaces (unified chemistry teaching); (c) role of laboratory in chemical education.

Material should be sent to P. D. Gujral, Assistant Secretary (Publications), IUPAC Secretariat, 2-3 Pound Way, Cowley Centre, Oxford OX4 3YF, United Kingdom.

BOOK REVIEW

Chemistry in the Economy — An American Chemical Society Study. Published by The American Chemical Society.

One thing is certain. Modern man is surrounded by the products of chemistry. It gave him new fibres and fabrics; permanent press and drip-dry clothing; a well insulated home; long life, labour saving devices, tools and appliances, modern computers, inexpensive electrical energy, transportation and an enormous variety of foods and medical supplies. One can safely say that this trend will continue . . .

These are the topics that this study endeavours to cover—and is as pertinent to New Zealanders as to Americans. It is an excellent publication for all libraries, teachers, informed people and should be compulsory reading for all chemistry students.

In 1966 the American Chemical Society's Committee on Chemistry and Public Affairs decided that the United States, its policymakers, chemists and chemical engineers, would benefit by a broad and thoughtful look at the place of chemistry in the U.S. national economy. In 1973 this 600 page summary is the fruit of two co-chairmen, various committees, a large force of voluntary contributors and a financial grant from the National Science Foundation.

The study itself is divided into two parts prefaced by a summarial section on Opportunities and Recommendations which have resulted from the study and punctuated throughout by concise explanatory notes on more technical topics for the benefit of laymen.

The multiplying opportunities for advancement in chemical technology cover food, colthing, shelter, health, energy, transportation and communication, and ecology. Each of these areas is examined in varying detail in Part 1 of the study which reviews and projects the formidable, distinguished and far reaching accomplishments of chemists.

Three kinds of recommendations are offered as a result of this study. The first group is directed toward strengthening the information base for the appraisal and enhancement of chemistry's contribution to society. The second group is concerned with improvement of the climate for continuing progress in the application of chemistry to the needs of society. The final group relates to improving chemical education and especially to meeting the needs of industry for professionally trained manpower.

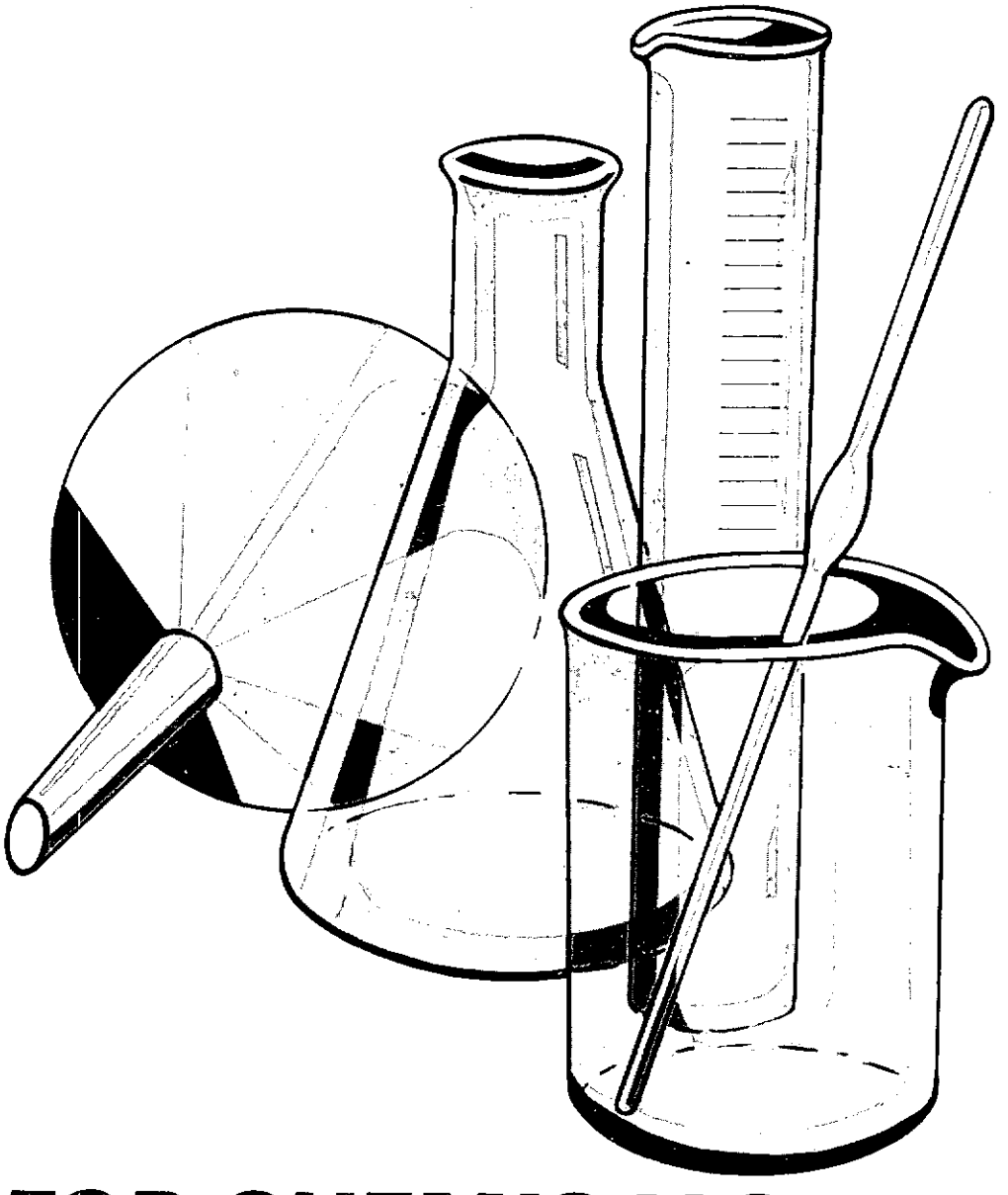
Part 2 of the study examines The People of Chemistry and is concerned with the size, educational preparation

and qualitative maintenance and improvement of the nations supply of chemists and chemical engineers (except technicians).

Although the study is short on statistics, graphs and related quantitative aspects of the various technologies, it is long on succint histories, present "state of the arts" and projections of chemicals, chemical industries and people.

It serves as an admirable blueprint for this Institute to emulate if and when a New Zealand version is considered.

J. G. Fletcher.



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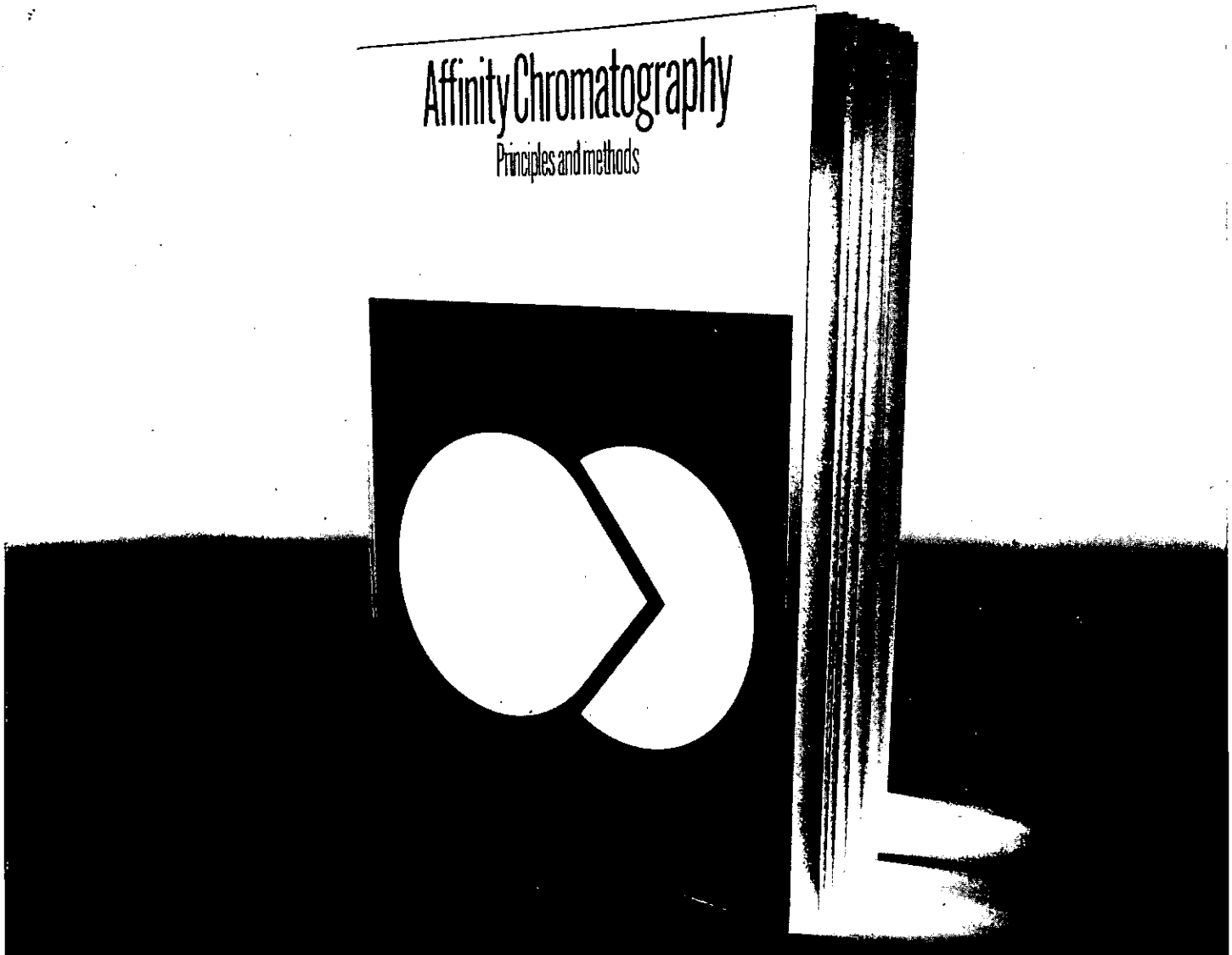

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Newsletter

The Royal Society of New Zealand

Editor: M. A. Collins No. 20, April, 1975

Editorial

At the last meeting of the Council of the Royal Society a party of scientists from the Chinese Republic was entertained. Historic as this may seem, the meeting will probably be better remembered for a decision taken there to proceed with the construction of the first stage of the Royal Society Science centre. This will be a building of some 7,000 sq. ft. and include facilities (lecture hall, meeting room, etc.) which will be of great benefit to the Society and member bodies. At last we're moving! Also at this meeting the first application by a member body (The N.Z. Psychological Society) for the use of secretarial and office space facilities was favourably considered by Council. Although details are still to be worked out this will entail use of equipment, part-time service of a member of the staff of the Royal Society and occasional use of office space for interviews, etc. Council would like to hear from any other member body requiring this service.

Member bodies have recently been asked for nominations for the Council of the Royal Society (closed 15th March). Each year nominations for Council are sought both from Fellows and from member bodies—nominees must be Fellows of the Society and are elected by Fellows. In addition to members of Council elected in this way the Member Bodies committee also elects two members of Council who need not be Fellows.

This issue of the Newsletter contains the Calendar of Meetings for 1975/76. This is a most valuable document as it brings notice of meetings to a very wide audience and helps to avoid clashes of meeting dates. It can only work if all parties make their forward planning known to the Royal Society Secretariat for inclusion. I would like to congratulate Dr Kidson for her painstaking work in compiling the calendar again this year.

International Communications

The first meeting of the ad hoc committee for inter centre communications was held on 17th October, 1974. The techniques of linking countries and centres for conferences by telephone and other means were discussed and the following resolutions were passed:

The Royal Society to explore the possibility of holding some of its meetings by this means of communication;

To also explore the possibility of relaying specialist lectures to one or more centres at the same time;

The ad hoc committee to be a guiding body to anyone interested in such inter centre communication;

The Royal Society to support an experiment in this field within the confines of a budget of $500.

Member bodies are asked to comment or make suggestions in support of the above activity within their area of interest to the chairman of the above committee, Mr M. Collins.

Visit of Delegation from the Chinese Academy of Sciences

Between November 29 and December 15, 1974, the Royal Society of New Zealand was host to a delegation from the Chinese Academy of Sciences. The delegation consisted of:

Huang Ping-wei, Professor (Chairman of the Delegation), Director of the Institute of Geography, Academia Sinica, Peking. Speciality: Physical Geography.

Chang Lung-hsiang, Professor (Vice Chairman of the Delegation), Deputy Head of the Educational Revolution Section, The Revolutionary Committee, Peking University, Peking. Speciality: Biochemistry.

Members of the Delegation:

Tung Wei, Head of the Geothermal Research Group, Department of Geology and Geography, Peking University, Peking. Speciality: Geothermal Power Generation.

Wang Chin-ken, Shanghai Institute of Physiology, Shanghai. Speciality: Physiological Research on Acupuncture Anaesthesia.

Chen Pang-yu, Kwangtung Institute of Botany, Kwangchow, Kwangtung Province. Speciality: Phytotaxonomy and Flora.

Sung Chang-ling, Deputy Head of Section, Bureau of Scientific Administration, Academia Sinica, Peking. Speciality: Administrative Management of Science and Technology.

Li Ming-te, Interpreter, Bureau of Foreign Affairs, Academia Sinica, Peking.

During its time in New Zealand the delegation was accompanied by Hsu Tung-chih, 3rd Secretary, and Wu Jung-ho, Attache, from the Chinese Embassy in Wellington.

The delegation was met on arrival in Christchurch by the President, Sir Malcolm Burns, the International Secretary, Dr E. G. Bollard and the Executive Officer, Mr L. C. Somerville, and for most of its visits was accompanied by one or more of these officers. During a trip by road from Wellington to Auckland the delegation was accompanied by Professor K. B. Cumberland.

The itinerary was arranged so that the delegation could meet as many New Zealand scientists as possible and yet, at the same time, see something of the countryside and life in New Zealand. The Chinese were easy guests to entertain. They were attentive and interested in all they saw. They were friendly and easy to converse with. The skill of their official interpreter, Mr Li, in both technical and informal conversation was amazing and contributed greatly to the smooth-running of the visit.

The Minister of Science, the Hon. C. J. Moyle, entertained the delegation at a reception in Wellington on December 5 and on the following day the Chinese Ambassador entertained the delegation and many New Zealand guests at a reception in the Chinese Embassy. The Council of the Royal Society of New Zealand met formally with the delegation in Auckland on December 13. The question of future contacts between scientists of the two countries was discussed. The delegation has supplied the Royal Society with a full list of the Research Institutes (36 in all) of the Chinese Academy. Considerable reorganisation has been taking place and this list has only recently become available.

The People's Republic of China does not yet belong to the International Council of Scientific Unions (ICSU) mainly because Taiwan is a member. At

the recent (September, 1974) General Assembly of ICSU in Turkey this matter was discussed and the Assembly recommended that China be again invited to become a member of ICSU. While the delegation was in New Zealand the International Secretary was handed a printed statement in which this action of ICSU was criticised because the invitation envisaged that Taiwan would continue to be a member of ICSU and this is apparently quite unacceptable to the Chinese.

A fuller account of the visit of the Chinese delegation will be published this year in the Proceedings of the Royal Society of New Zealand.

Congratulations

Congratulations are extended to Professor J. F. Duncan and Dr J. D. Atkinson on their award of the O.B.E.

Announcements

1. **Change of Name:**

   The New Zealand Branch of the Institute of Physics has been renamed The Institute of Physics in New Zealand.

2. **Forthcoming meetings:**

   23rd International Geographical Union Congress, Moscow, July 12 to August 13, 1975.

   For information contact:

   Dr R. G. Cant,
   Secretary,
   N.Z. National Committee for Geography,
   University of Canterbury,
   Christchurch.

   and

   Dr Yuri V. Medvedkov,
   Secretary-General,
   23rd International Geographical Congress,
   Steromonetryi per 29,
   Moskva 109017,
   U.S.S.R..

   2nd National Conference of the Australian Operations Research Society, Sydney, 25-27 August, 1975.
   For information contact:

   Prof. G. A. Vignaux,
   Dept.of Information Science,
   Victoria University,
   Private Bag,
   Wellington.

New Publications

The newsletter may be used by Member Bodies to give publicity to their publications. This publicity must not, however, be interpreted as meaning that the Royal Society of New Zealand is responsible for, or endorses, these publications.

Bulletin 13, Quatenary Studies: In July, 1975 the Society will publish selected papers from the IX INQUA Congress held in Christchurch (3-10 December, 1973). The four plenary-session papers by C. A. Fleming, Rhys Jones, J. D. McCraw and T. A. Rafter will be printed. The 37 other papers have been chosen to give a broad sample of topics discussed at conference sections. The bulletin will be about 500 pages, including illustrations, and is priced at $15.00. People registered at the IX INQUA Congress will receive a copy automatically. Other orders should be sent to:

The General Secretary,
The Royal Society of New Zealand,
P.O. Box 12249,
WELLINGTON.

Environment and Industry: A pollution report by New Zealand scientists. Published by the New Zealand Institute of Chemistry, price $1.95.

Available from: The Registrar,

N.Z.I.C.,
P.O. Box 1926,
CHRISTCHURCH.

This Newsletter has been compiled for your information and interest by members of the Member Bodies' Committee. Suggestions for later numbers will be welcome; please send to the General Secretary, Royal Society of New Zealand, Box 12249, Wellington.

D. P. JONES LTD.

Saturday morning, 24 May 1975:

4 RENEWABLE ENERGY RESOURCES

9.00 a.m. **4.1 The Future for Renewable Energy Resources.** Dr H. Tabor, Scientific Director, the Scientific Research Foundation, Jerusalem, Israel.

10.00 a.m. **4.2 Solar Energy Utilisation — Prospects for New Zealand.** Dr R. N. Morse, C.S.I.R.O., Victoria, Australia.

10.30 a.m. **4.3 Wind Energy Utilisation — Prospects for New Zealand.** Mr R. Chilcott, Department of Agricultural Engineering, Lincoln College, New Zealand.

11.00 to 11.30 a.m. **Morning tea.**

11.30 a.m. **4.4 Fuel Production from Crops.** Professor A. P. Mulcock, Department of Microbiology, and Mr G. Davies, N.Z. Agricultural Engineering Institute, Lincoln College, New Zealand.

12.00 noon **4.5 Small Hydro Potential for New Zealand.** Mr R. W. Morris, Morris & Wilson, Consulting Engineers, Christchurch, New Zealand.

12.30 p.m. **4.6 Energy Storage.** Mr H. C. Hitchcock, Senior Research Engineer, New Zealand Electricity Department, Wellington.

1.00 to 2.00 p.m. **Lunch**

Saturday afternoon:

2.00 p.m. **4.7 Discussion and debate on:**
A New Zealand Policy for Developing and Using Renewable Energy Resources. The panel will consist of speakers from the morning sessions with Dr H. Tabor as Chairman.

3.00 p.m. **5 Debate: Planning — The Desirable and the Possible.**
(a) **Ethical issues.** Is planning desirable? The conflict of interests.
(b) **Technical issues.** What planning is possible?
Chairman: Professor A. Titchener, Department of Chemical and Materials Engineering, University of Auckland.

CONFERENCE INFORMATION

Venue:
Please note that the venue has been changed to:—
LECTURE THEATRES, FACULTY OF SCIENCE. (Rooms S1 and S2)
UNIVERSITY OF CANTERBURY, CREYKE ROAD, ILAM, CHRISTCHURCH.

Date:
22 - 24 May 1975.

Registration:
Full registration $20
Partial registration $10 for first day of attendance
Fees include a copy of the Proceedings.
Pre-Registration by post is preferred; otherwise participants may register on the first day of the Conference on the second level of the Science Lecture Theatre block during the times indicated on the programme.

Parking:
The University is located about 5 km west of Cathedral Square and 3 km east of the Airport. There will be ample parking spaces within the University grounds either in the car park located between the Electrical Engineering and Zoology blocks with access from Creyke Road on the east side of the Chemical Engineering block, or in the park located between the School of Fine Arts and the Boiler House/Workshop block with access from Ilam Road. A site plan of the University grounds will be issued to each registrant.

Papers and Proceedings:
It is intended to make available a bound set of the Proceedings to all registrants before the Conference. Extra copies of the Proceedings will also be available at a cost of $4.00 to participants and $5.00 to non-participants.

Catering:
Light lunches will be available in the Students' Union. Further information will be provided at the Conference.

The facilities of the University Staff Club (Ilam Homestead) will be made available in the evenings for any participants who wish to enjoy a quiet relaxed atmosphere.

Accommodation:
Accommodation arrangements are the participants' own responsibility. However, limited accommodation will be available at the University Halls of Residence for anyone who wishes to "live in" in quiet, peaceful surroundings, across the road from the University. The daily tariff is $10 per person, inclusive of all meals. Since it will be essential to prebook this accommodation, please indicate on the registration form if you wish to have a place reserved.

Travel:
All participants out of Christchurch will be issued with a Get-Together Travel Voucher which will entitle the user to a 10% discount on N.A.C. fares to and from the Conference.

THE SECRETARY,
SECOND NEW ZEALAND ENERGY CONFERENCE,
DEPARTMENT OF CHEMICAL ENGINEERING,
UNIVERSITY OF CANTERBURY,
CHRISTCHURCH, 1,
NEW ZEALAND.

Telephone 71 - 649 Extension 222

REGISTRATION FORM

Dr/Prof
Mr/Mrs/Miss ..... surname ..... first name

Postal Address .....

.....

.....

Telephone: Home ..... Business .....

Occupation .....

Please indicate the amount remitted:

Full registration:	$20.00 ☐	
Partial registration: one day	$10.00 ☐	
two days	$17.50 ☐	
Accommodation deposit for Halls of Residence	$ 2.00 ☐	
TOTAL AMOUNT ENCLOSED		

For Office Use only
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☐ Proceedings
☐ Accommodation

ACCOMMODATION

Name and title.....

If you intend to stay in the University Halls, tick here ☐

Indicate requirements below:

Booking-in Time and Date ..... am/pm ..... May

Booking-out Time and Date ..... am/pm ..... May

Single Room ☐ Double room ☐

Will share with .....

NOTE (a) Early booking is essential and must reach the Secretary by 21 March at the latest.

(b) The deposit of $2.00 must accompany this request for reservation.

Make cheques/money orders/postal notes payable to

"THE SECOND NEW ZEALAND ENERGY CONFERENCE"

The Second New Zealand Energy Conference

SECOND NEW ZEALAND ENERGY CONFERENCE – 1975

PURPOSE AND SCOPE

The First New Zealand Energy Conference was held at the University of Auckland May 23 - 25 1974. It was aimed "at defining the nature and range of problems of energy production and utilisation that cannot be ignored". The Conference discussed electrical generation patterns in New Zealand, possible continuing sources of power, environmental impacts of nuclear power, fossil fuel reserves and a wide range of related topics. At the conclusion of the Conference the opinion was widely expressed that a second conference should be held as soon as possible.

The aim of the second conference is, therefore, to consider where co-ordination is necessary and how it can be achieved. There is already considerable piecemeal information about energy production and use in New Zealand and there is certainly a case for ading to it continuously.

However there is an urgent need to present an overall view of the energy situation and to examine how, by modification and co-operation, it can be improved.

THEMES

Four basic topics will be discussed:

(1) ENERGY FOR TRANSPORT: a problem of great urgency.

(2) STATIC ENERGY, its production and use; the impact of nuclear power.

(3) RAW MATERIALS: their relationship with energy supply. In what proportion should fossil fuels and agricultural raw materials be used to produce energy or material products such as plastics and chemicals?

(4) CONTINUOUS ENERGY SOURCES. New Zealand is favourably placed to produce power by wind, sun and water; what is the future potential?

PROGRAMME

Thursday morning, 22 May 1975

8.30 a.m. **Registration**

10.15 a.m. **Opening address**
The Prime Minister, the Rt. Hon. W. E. Rowling.

11.00 a.m. **Morning tea**

11.30 a.m. **Introductory lecture. Professor A. M. Kennedy, Department of Chemical Engineering, University of Canterbury.**

12.00 to 1.00 p.m. **Late registration**

1.00 to 2.00 p.m. **Lunch**

Thursday afternoon:

1 TRANSPORT

2.00 p.m. **1.1 A Future Energy Policy on Transport.** The main address describing the energy problem in transport with ways and means of alleviating the situation. Mr E. J. D. Pearson, Head of Division for Transport, Commission of the European Communities, Brussels, Belgium.

3.00 p.m. **1.2 Future Oil Requirements in New Zealand.** The future demand and availability of transport fuels in New Zealand with reference to the planning of future refineries. Mr P. J. Hall, Manager, Planning and Management Services, BP New Zealand Ltd, Wellington.

1.3 Transport Fuels from Coal. Possible methods of transport fuel production from coal, with an economic assessment. Dr B. V. Walker, Chemistry Division, D.S.I.R., Wellington.

3.45 to 4.15 p.m. **Afternoon tea**

4.15 p.m. **1.4 A Future Energy Policy for New Zealand Transport.** A panel discussion on prepared questions concerning the true cost of transport and the preferred development in the future of New Zealand transport. The panel will consist of session speakers, with Mr R. J. Polaschek, Secretary for Transport, as Chairman.

Friday morning, 23 May 1975:

2 STATIC ENERGY PRODUCTION AND USE

9.00 a.m. **2.1 The General Case for Overall Planning of Energy Production and Use.** Mr P. W. Blakeley, General Manager, New Zealand Electricity Department, Wellington.

9.45 a.m. **2.2 The Case for Nuclear Power.**
Professor N. C. Rasmussen, Department of Nuclear Engineering, Massachusetts Institute of Technology, U.S.A.

10.30 to 11.00 a.m. **Morning tea**

11.00 a.m. **2.3 A Total Energy Scheme – Overseas Experiences in Implementing District Heating Schemes.** Mr A. E. Haseler, founder of District Heating Association, U.K.

11.45 a.m. **2.4 Overall Planning of Energy Resources from a National (N.Z.) Viewpoint.** The present state of the art. Debate with Mr R. J. Hogg, Commissioner of Energy Resources, as main speaker.

1.00 to 2.00 p.m. **Lunch**

Friday afternoon, 23 May 1975:

3 RAW MATERIALS

2.00 p.m. **3.1 General Account of Organic Chemicals in our Present Technology.** Dr G. Leary, Chemistry Division, D.S.I.R., Wellington.

2.45 p.m. **3.2 Conventional Sources of Raw Materials – Petrochemicals.** Mr G. L. Decker, Dow Chemical Company, Midland, Michigan, U.S.A.

3.30 to 4.00 p.m. **Afternoon tea**

4.00 p.m. **3.3 Coal-derived Chemicals.** Professor A. M. Squires, Department of Chemical Engineering, City College of New York, U.S.A.

4.45 p.m. **3.4 Unconventional Sources of Raw Materials.** Dr K. L. Sutherland, C.S.R. Ltd., Sydney, Australia.