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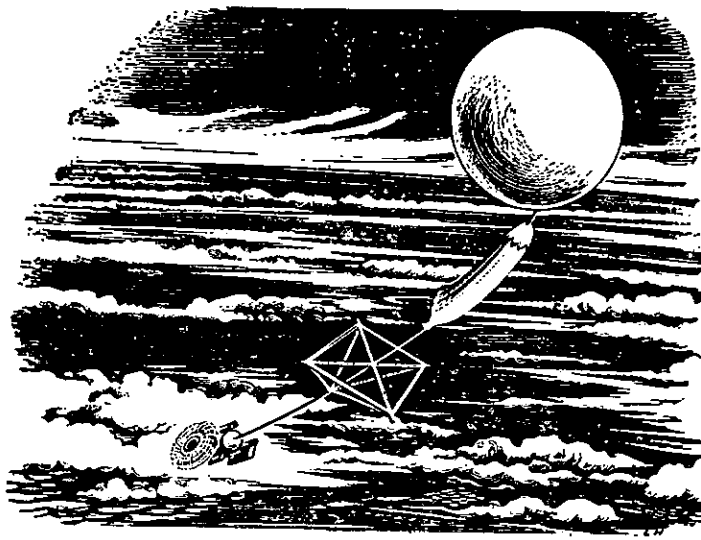

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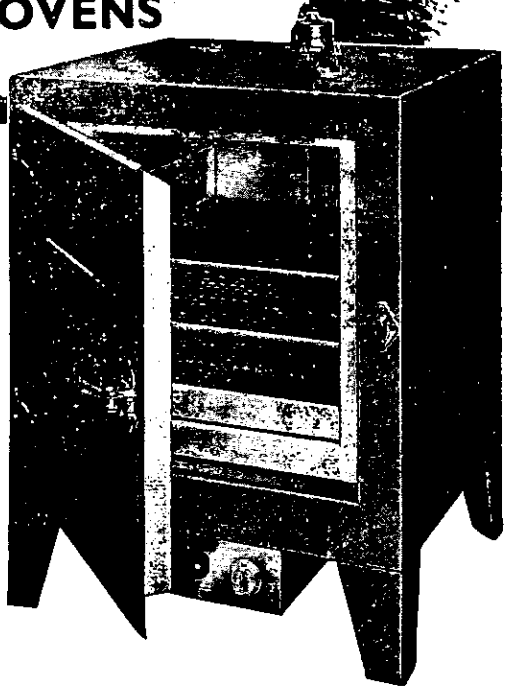

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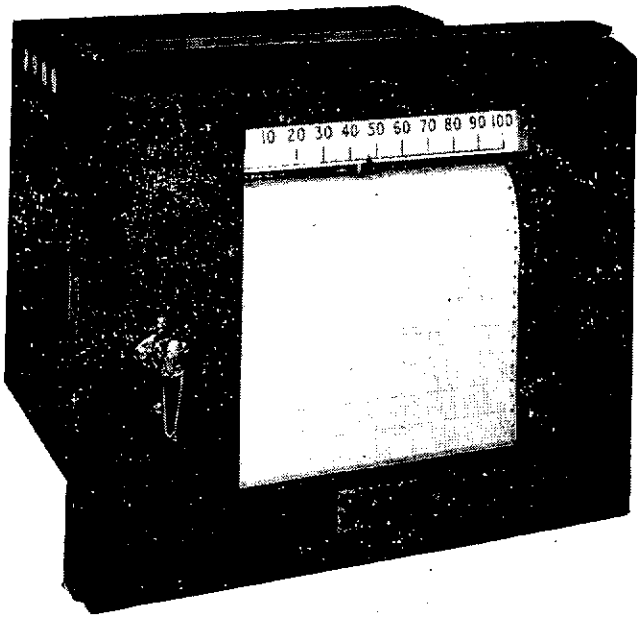

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W. A. JOINER,
PRESIDENT, 1957.

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PRESIDENT.

President for 1957 is Mr. W. A. Joiner, Assistant Secretary and Deputy Secretary, D.S.I.R., Wellington. A Fellow of both the R.I.C. and N.Z.I.C., Mr. Joiner took an active part in establishing our own Institute and was the first General Secretary-Treasurer. Since then he has served on a number of Institute committees, including the Examinations Committee and the Membership Committee. Some years ago he was Chairman of the Wellington Branch and in 1948 was Chairman of the New Zealand Section of the R.I.C.

Born in Scotland, Mr. Joiner was educated at Wellington College and Victoria University College where he graduated M.Sc. with first-class honours in Chemistry in 1923. A Senior Scholar and National Research Scholar, he spent 1934-35 at University College, London, where he obtained the Diploma of Chemical Engineering in 1935. Mr. Joiner's association with the D.S.I.R. commenced in 1924 when he was appointed Assistant Analyst in the Dominion Laboratory. In 1938 he inaugurated the Chemical Engineering Section of the Dominion Laboratory and in 1941 was apointed Assistant Director. 1946 saw his appointment as Director of the Dominion Laboratory and a year later he was appointed to his present position. In this capacity he is responsible, in the Head Office of the D.S.I.R., for Dominion Laboratory, Fats Research Laboratory, Geological Survey, Wheat Research Institute, a number of Industrial Research Associations and Information Bureau. He is the nominee of the D.S.I.R. Council on the management committee of a number of the Research Associations and is Chairman of the Manufacturers' Research Committee of the Council of the D.S.I.R.

We offer to Mr. Joiner our congratulations on his election and best wishes for a pleasant and successful year.

VICE-PRESIDENT.

The Vice-President is Dr. C. R. Barnicoat, Associate-Professor of Biochemistry, Massey Agricultural College, Palmerston North. Dr. Barnicoat is at present on Refresher Leave in Great Britain but will be returning early this year.

HONORARY GENERAL SECRETARY.

W. E. HARVEY,

Dr. W. E. Harvey, the new Hon. General Secretary, is Lecturer in Chemistry at Victoria University College. He was born in Auckland in 1925 and educated at Auckland Grammar School and Auckland University College. After graduating M.Sc. with first-class honours in Chemistry in 1945, he was a Junior Lecturer in the Chemistry Department at A.U.C. for two years before proceeding to England on a Post-Graduate Scholarship in Science to study under Professor Sir Alexander Todd. After completing his Ph.D. at Cambridge he went to Sweden as a Post-Doctoral Research Fellow in the Royal Institute of Technology in Stockholm where he worked on heartwood extractives with Professor H. Erdtman. Dr. Harvey returned to New Zealand in 1952 to a position at the Dominion Laboratory and took up his present position in 1953. He is interested chiefly in the chemistry of natural products with particular emphasis on wood chemistry.

Dr. Harvey has been Treasurer of the Wellington Branch for a number of years and was Assistant General Secretary of the Institute during 1956.

THE CHEMIST AND THE COMMUNITY.

BY M. M. BURNS,

(Based on Presidential Address Delivered at the Conference in Auckland in August, 1956.)

"The Chemist and the Community" is a broad title, you will agree, and one which will allow me considerable freedom of action. Moreover, I make no apology for speaking of the service of the chemist in the community for I sincerely believe that chemists are to-day the key group of professional men in this and every progressive country. They occupy an important place in our educational system at post-primary and university levels; they analyse soils and plants and control the manufacture of the necessary fertilizers and therapeutants to increase production in the primary industries; they control the processing and preservation of foods; they are the full partners of the physicists, the engineers, the medical men and indeed of practically every professional man; they rub Aladdin's lamp to conjure up the new materials, the plastics, insecticides, weedicides, pharmaceuticals, the metalurgical alloys and the thousand and one other things which have delighted, dazzled and sometimes bewildered the general public.

Chemists are the men behind the modern industrial revolution which poses so many challenges and holds out so much promise for the future welfare of all mankind. And are chemists content with this formidable list of material accomplishments? Certainly not; they are moving on merit into important administrative positions here and overseas, and into the managerial world, especially of the secondary industries. The forecast of Burnham in his book, "Managerial Revolution", is coming to pass with the "backroom boys" replacing the "figure men" in the executive suites. Whatever the reasons are for this development—the type of people who take up chemistry as a vocation, or the training and the experience they get in this vocation—it is a fact that as a group chemists tend to be versatile, human and decisive.

To those of you who have heard me speak in similar terms of the agricultural graduate let me remind you that agriculturalists and chemists have much in common, so during terms I justly extol the agricultural graduate—between terms, the chemical graduate: this is between terms!

With that by way of introduction let us look at the chemist, his training, his vocation and his prospects.

THE TRAINING OF THE CHEMIST.

In the post-primary schools chemistry is a basic subject; it is an essential prerequisite for nearly all who intend to advance in science at the University and for all who intend to take professional courses in engineering, medicine, dentistry, home science, veterinary science and agriculture.

Moreover, unlike many post-primary subjects chemistry is dynamic and I do not need to remind you of the tremendous advances of recent years or of the accelerating rate at which the frontiers in chemistry are being extended.

The advances in knowledge which on the one hand make it so hard for the established chemist to keep up with the literature, on the other hand kindle the enthusiasm of scientifically minded pupils and make necessary for the teachers of chemistry regular adjustments in the coverage of the subject. I well recall the surprise it was to me for whom co-valency was introduced somewhere after the first year at the University, to find that my daughter was introduced to it in the fourth form! Doubtless others of you have had similar experiences.

The stage has now been reached where it is almost essential for pupils of post-primary schools who intend to take chemistry at the University to spend two years in the sixth form. Moreover the second year in the sixth must be a year of real work. Whereas some of my academic colleagues in the University—not from the faculties of chemistry—would be prepared to accept all students who wish to take courses, I join with those who firmly believe that entry into the University should be limited to those who have had two years in the sixth form. The recent introduction of the allowances associated with the Higher School Certificate for all who complete a satisfactory year of work after University Entrance will do much to foster this desirable step.

But this extra year at the post-primary school loses much of its real value if pupils do not have sound teaching and if they do not enter for the scholarships examination.

One of the very great difficulties within the schools in providing for this extra year for pupils in the upper sixth form is the acute shortage of teachers qualified in chemistry. The Institute's membership list for 1954 shows only 38 graduates in Chemistry as teachers in the post-primary schools and of these several have moved into administration. Including those qualified in chemistry who are not members of the Institute it appears that the number of chemistry graduates in post-primary teaching is about 75 out of a total of about 600 science teachers. This mere handful of chemistry graduates in the post-primary schools has done and is still doing a wonderful job despite the rather antiquated facilities

so graphically described by Veale in the Anniversary Review. However, with increasing numbers of pupils staying on in the schools for the extra year and with the overall increase in the number of pupils entering the post-primary schools as the population wave moves upwards, it is absolutely imperative that a greater proportion of graduates in chemistry enter the teaching profession and that the laboratory facilities for teaching in the post-primary schools are improved.

I am not unmindful of the fact that there is an overall shortage of chemists to meet the needs of industry, research and teaching but you must agree that an adequate supply of teachers in the post-primary schools is the prior need. The action of the Education Department in granting studentships to selected undergraduates, who have undertaken to engage in post-primary teaching in return for the bursary assistance, shows promise of materially easing the situation. Thus at present there are 626 bursars doing undergraduate courses of whom 151 are in science. Although no definite information exists as to the number of bursars who intend to major in chemistry it is probable that it will be higher than the 8 per cent. of graduates in chemistry (57 out of 709) who entered post-primary teaching over the period 1930-47. This is a subject to which the Institute may well pay attention in the interests of our members who are teachers, in the interests of the profession of chemistry and thereby in the national interests.

Turning now to the university we find that here too the rapid expansion of knowledge has necessarily led to constant revision of the teaching programmes. You may regard this as a statement of the obvious but it is true and should be stated that the faculties of chemistry in the University Colleges are among the most progressive faculties in teaching and in research.

P. M. S. Blackett in his article on the "Education of the Scientist" writes as follows:—

> "What is it then that we as teachers of science have to communicate to the students? First and foremost it is our specialist knowledge; secondly, our delight in the activity of being a scientist, delight in the actual processes of experimentation and theoretical reasoning; thirdly, we have to give the students the opportunity to share the intellectual excitement of exploring the frontiers of knowledge. It is these tasks which I believe our universities are doing extremely well".

Blackett's words apply in full measure to the faculties of chemistry in this country. After that well deserved tribute to our academic colleagues I would like to suggest several developments all designed to strengthen the research side which I feel would enable the faculties of chemistry to improve still further the training of graduates. These are: firstly, the provision of bursaries for

Masterate and Ph.D. students; secondly, increased research grants; and thirdly, the establishment in close proximity to the Universities of research sections of State Departments and of Research Associations.

1. The provision of bursaries for Masterate and Ph.D. students. Recently it was suggested from Auckland that the number of Junior University and Entrance Scholarships should be increased to induce more pupils to enter for the scholarships examination. While there is some justification for this view, I for one am convinced that practically all really outstanding pupils now go on to the University and that the money necessary to implement the scheme would be far more wisely used in providing bursaries (either direct from the University or indirectly through D.S.I.R.) for students at the Masterate and Ph.D. stages. There are several very strong reasons for this view. Students entering the University already have financial assistance for four years under the Higher School Certificate awards whereas post-graduate students, with the exception of the few who gain special College scholarships, must depend largely upon their own resources. Moreover, undergraduates have much greater opportunities to earn money in the vacation periods than do post-graduates for whom research and study are virtually full-time. Another and even more significant reason in favour of bursary assistance for post-graduates is that this would lead to a strengthening of the research activities in the university and provide more highly trained men for the various research organisations.

It is in respect of assistance for graduates to do advanced work within the universities that New Zealand lags far behind the United Kingdom (where annually D.S.I.R. provides 1,000 grants to students, 400 of them chemists), Canada and, more important perhaps, Australia. The following extract from a letter received from Professor E. J. Underwood of the University of Western Australia is worth noting:

> "In the Faculty of Agriculture we pay students for Masterates and Ph.D's the same rates as are paid by the Department of Agriculture, i.e. £1,103 per year rising by £30 increments to £1,378. These rates do not apply to the University generally: the research Grants Committee scale from the budgetary allocation for research is first post-honours year £400 rising by £50 per year thereafter. For your information, I should mention that C.S.I.R.O. is now offering research studentships to pass graduates of £400 in the first year rising to £600 a year for the following two years plus fees and travel expenses.
>
> "The philosophy behind these relatively generous rates is a simple one. I believe that there is an urgent need in Australia for vastly greater numbers of graduates with specialised research

training and experience and the University is the proper source for them. The only effective way to obtain such people in adequate numbers is to offer adequate remuneration so that they are not under economic pressure to leave immediately on graduating."

While discussing bursaries there is one other matter worthy of comment. In this country there is an increasing tendency for the introduction of "tied" bursaries—that is, bursaries offered by various Government Departments—for which the advantages of financial aid and assured positions are associated with an obligation to serve the department under bond for a definite number of years. While we may well be sympathetic with the departments in their urgent needs, it is fair to point out that such tied bursaries do not increase the numbers of able students taking university training and as they are financed from universal taxation the tied bursaries may be roundly criticised on this basis alone by those sections of the community whose needs for graduates are also unsatisfied. I for one firmly believe that under the conditions of to-day, when the margins for professional skill have been whittled down, bursaries for advanced university training are essential but such bursaries should be given without restrictive ties for subsequent employment. This view has already been accepted by the Governments of the United Kingdom, Canada and Australia and I trust that New Zealand will not wait long to join them.

2. My second suggestion for strengthening the faculties of chemistry is by way of increased grants for research. During the second quinquennium (1955-60) of grants to the University the overall grant for research will be raised from £15,000 to £25,000 per year. While this sum is very small by comparison with the sums spent on research in our State Departments or by comparison, even on a relative basis, with the sums made available to United Kingdom and other overseas universities (Cornell University in the United States received 22 million dollars for research in 1954-55 of which three-quarters was from the United States Government), it is nevertheless a very great help in stimulating research in the University. The science faculties have been by far the most enterprising—again with the chemists in the vanguard—so much so that over the past five years, of the 50 theses presented for Ph.D's or D.Sc's, 20 have been in chemistry. Over the past eighteen months the registrations for Ph.D's in chemistry are 14 out of 57; a somewhat lower proportion but one which is explained by the increasing interest in research shown by other faculties notably physics and the biological sciences. It is to be sincerely hoped that this record of achievement in research within the university will be recognised by a continuing increase in the grants made to the university for research projects.

3. My third point to strengthen the research function of the university is the suggestion that research sections of State Departments and Research Associations should be located at or in close proximity to the universities. While such an arrangement is mutually beneficial to the staffs, there are also the added advantages which come from the opportunities thus made available to students to gain some knowledge of the work of the non-university research groups. It is now too late to effect this contiguous establishment with many groups but there is still time for it to be done with the proposed Institutes of Nuclear Science and Meat Research.

Before leaving this section on the training of the chemist there are two other matters worthy of reference—chemical engineering and the training of technicians.

The very great developments in technology have increased sharply the need for chemical engineers and while this need is not yet so acute in this country as it is in the highly industrialised countries overseas, it is certain that even here chemical engineering will rapidly develop into a major field with or without the added stimulus of nuclear science developments. The Department of Chemical Engineering at Canterbury College has done well despite the handicaps of inadequate facilities and equipment, and the recent decision by the Council of the College to establish a Chair in Chemical Engineering is heartening evidence that this important field of training is now fully appreciated and will be given the support that it has so well earned.

Though my remarks so far have dealt exclusively with graduates, I feel that this is an appropriate place to make reference to the training of technicians. Clare, in his Chairman's address to the Waikato Branch, drew attention to the fact that the rate at which chemical determinations can be done in the laboratory has been greatly stepped-up by the adoption of improved instrumentation and techniques and by the employment of greater numbers of well-trained technicians. While the ratio of technicians to chemists has improved in recent years it is still true that far too much time of professional men is taken up with the sort of work that skilled technicians can do equally well. This problem is also causing concern in the United Kingdom and the subject of technical education is a regular topic in recent issues of "Nature". The N.Z.I.C., by introducing the Laboratory Assistants Certificate, displayed vision as to the developing requirements and understanding of the need to provide the training and status necessary to ensure that young people could make this work a vocation. The Certificate has served its purpose well but it is now time for the Institute to review the Certificate and to give further consideration to the training necessary to bridge the gap between the L.A.C. and the Associateship by examination. My personal view is that the

course has been charted by our professional colleagues, the engineers, and I hope that some similar course of training carrying on beyond the L.A.C. and leading to a well recognised qualification can be developed for the technicians in chemical laboratories. The best of such technicians could then qualify for the Associateship of the Institute by examination just as they can in the United Kingdom.

THE VOCATION OF THE CHEMIST.

Those of you who have known the Institute over the past twenty years will appreciate the very considerable increase in membership which has taken place in recent times. To correlate this increase with the vocations of chemists I checked the membership lists of 1947 and 1954, a period over which the number of members rose from 340 to just over 500. Taking only unretired members in New Zealand for whom definite information was available, those engaged in industry including Research Associations rose from 119 to 180; those engaged in Government Departments rose from 103 to 137; those engaged in University teaching and research rose from 40 to 65; those engaged in Post-primary teaching rose from 27 to 38; and all others, including those engaged in consulting work and administration, rose from 14 to 30. Thus the three main fields of employment for chemists are in industry, research and analytical work in the Departments of Agriculture and Scientific and Industrial Research and in teaching. Excellent reviews of the place of the chemist in each of these fields have been published in the Institute's Jubilee issue of last November and for those who have read this issue, much of what I have to cover will traverse familiar ground, though, as it has been so well covered, I shall be brief and try and cover some additional points.

In industry, the early strongholds of the chemist—fertiliser manufacturing and meat processing—have shown steady progress. However, the major contributors in recent years to the increased number of chemists employed in industry have been the food industries (including brewing), the wood products' industries, and to a lesser extent the secondary manufacturing industries such as rubber, paint, textiles and petroleum products. It is certain that industry which collectively is now the employer of the greatest number of chemists—about 1 in 3—must continue to expand and that the every-growing need for stricter process control will provide both challenges and opportunities to the chemists.

Butler, Cousins and Melville have rightly drawn attention to the possibilities for the development of large industries based on the gasification of coals and on the utilisation of the iron sands—a possibility much improved since titanium has assumed importance.

To their list I would add uranium in which field the most active prospector at present is a well known member of this Institute. In addition to these there are opportunities for further developments in the processing of milk, in the utilisation of the by-products of the animal industries, and in the production of an expanded range of products from the wood industries. The successful establishment of such industries can only follow from intensified research much of which must be done under the aegis of the Government sponsored agencies. At this point it is fitting that I should pay a well deserved tribute to the D.S.I.R. for the very great assistance which the scientists, and particularly the chemists, of the Dominion Laboratory and the Dominion Physical Laboratory have already given in the national industrial developments which have been so marked of recent years. Quite apart from the guidance and knowledge provided, the Department has also been the source from which industry has recruited many of its senior technical men. These contributions of the Department to industry, though known and appreciated by many executives of industry, are not nearly as well known by the public as they deserve to be.

Though the role of the chemist in industry will continue to be primarily one of process control and management it is inevitable and desirable that research will assume a steadily increasing importance both within the larger industrial units and within the group-sponsored Research Associations. This is already taking place to an extent estimated to be somewhere in the vicinity of £300,000 per annum. Computed on the basis of the value of industrial output this is not large but it is increasing steadily.

The second major field of employment for chemists is in the State Departments, particularly in D.S.I.R. and Agriculture. While both departments undertake essential service and developmental work, for which due credit is all too rarely given, the majority of chemists in these departments are directly concerned with research activities covering very wide fields with the strongest concentration in work associated with plant and animal production.

At this stage it is pertinent to review on a rather broad basis the research situation in this country.

Firstly, Expenditure on Research.

Total expenditure on research and scientific services has been estimated by Dr. W. M. Hamilton, Secretary of the Department of Scientific and Industrial Research, at £2,600,000 in 1954-55, distributed over the various agencies listed in Table I.

TABLE I.

EXPENDITURE ON RESEARCH AND SCIENTIFIC SERVICES BY EXPENDING AGENCIES.

	Expended 1954/55	Estimated Expenditure 1955/56
	£	£
D.S.I.R.	1,063,000	1,116,000
Department of Agriculture	579,509	619,000
Marine Depatment	5,000	7,000
Internal Affairs (Wildlife)	12,149	9,700
N.Z. Forest Service	78,642	80,000
Civil Aviation	312,854	339,500
Ministry of Works	76,474	110,000
Council for Educational Research	4,000	4,000
Medical Research Council	55,000	55,000
Universities	101,835*	108,480*
Cawthron Institute	24,000	24,800
Museums	12,000	12,000
Royal Society	5,738	5,082
Incorporated Research Associations	84,689	93,675
Industry	240,000	250,000

*This does not include a grant from the Carnegie Corporation of 60,000 dollars spread over five years for research in the social sciences.

Dr. Hamilton does not claim the figures to be wholly accurate but they do portray the correct order of magnitude of expenditure by the various agencies. Computed as a percentage of the Gross National Product, this represents an expenditure of 0.25%, which is small by comparison with the United Kingdom, the United States and Canada where expenditure from Government sources alone is 1.3%, 0.58%, and 0.52% respectively of Gross National Product; or to put it another way, Government spending on research and development in New Zealand, when expressed as a percentage of G.N.P., is slightly less than half that in Canada and the United States and one-fifth that in the United Kingdom.

If the total expenditure on research and development in these countries—that is including the contributions of both Government and Industry—is used as the basis for comparison, the relative position of New Zealand declines still further.

Turning now to agricultural research, to which field New Zealand has rightly devoted considerable effort, we find that the annual expenditure, again as estimated by Dr. Hamilton, is now of the order of £1,150,000. This expenditure on agricultural research, when expressed as a percentage of the Gross Farm Income (0.40% for 1954-55), is relatively low at present prices for primary products, and this will still be true even if there is a decline in these prices. Research which has contributed millions per year to the value of our primary products has proved a sound investment and there is a very strong case on business grounds for an intensification of this research.

While total grants for research have steadily increased it is important to note that these increases have been almost wholly absorbed in salary adjustments and that in D.S.I.R. at least, staff numbers were lower in 1955 than in 1949 and expenditures in 1955 on other than salaries, despite rising costs, were also lower than in 1949. The increase shown in the recent budget allocation is also almost wholly absorbed in special grants such as £50,000 for the International Geophysical year project. This is an unhealthy situation which, in the interests of efficiency, should be corrected. There is no sounder logic in the view, frequently put forward by laymen, that because many scientists in the past—Rutherford included—did good work with poor facilities, scientists to-day should work with a similar standard of equipment, than there would be in the suggestion that, because men formerly hand-spread fertiliser on the hill country, we should dispense with aeroplanes.

Good equipment and facilities for research have always been important—to-day when the outstanding problems are the really "tough nuts", they are essential. This reference to the "tough nuts" leads me to comment that to some extent the scientists are now being subjected to criticism because the remarkable series of successes which have been achieved over the past twenty years has led the public to expect prompt answers to every problem including facial eczema, bloat, pregnancy toxaemia of ewes and others equally difficult. I have no intention of commenting on the administration of the research into these matters or of reviewing the problems: what I want to stress is that the chemical aspects of these problems are every bit as complex and as difficult to elucidate as are those associated with many of the human diseases which have engaged the attention of dozens of the world's top scientists for many years. Very good progress indeed has already been made on each of these problems of the animal industry and they *will* be solved though I for one do feel that in the case of facial eczema especially, the chemical aspects may well be handicapped until the conditions associated with the toxicity of grass can be determined from growth studies under the controlled conditions that are only possible with a

phytotron unit. Such a unit, the estimated capital cost of which is £100,000, is essential if future developments in pasture and crop production—including forest trees—are to be based on the soundest scientific information.

A second illustration of the type of major facility now regarded overseas as necessary for research and servicing is an accelerator, and if one is installed in this country—and it is very probable that one will be—then this will play an important role in the production of mutants in plant breeding work and in the production of radio isotopes for use in research and industry.

It is pertinent at this point when speaking of valuable equipment, to draw attention to the fact that far too many of our research units are housed in temporary accommodation, converted often at considerable expense from surplus army buildings and ancient houses. While the successive steps in the training of the average New Zealand scientists, from usually inadequately equipped and often poorly housed laboratories in the post-primary school, in the University and in the research station, may contribute to the development of the resourcefulness for which our scientists are well known, such a background, when contrasted with that of the overseas man, often saps enthusiasm and leads to frustration. It is to be earnestly hoped that over the next ten years the Government will adopt a definite building programme—as it has done for the universities—to provide suitable accommodation for the various departmental research units equipped with fireproof rooms for the preservation of important records. Such a programme of say £70,000 per annum spread over ten years would meet the really urgent needs: a relatively small capital outlay considering the importance of the projects.

The needs of the scientist are: (a) good facilities with which to work, (b) access to scientific literature and the opportunity to travel within this country and on occasions overseas to keep abreast of the progress of knowledge and the techniques in his field and (c) a salary scale reasonably competitive with those effective in other countries. Certainly the position in each of these essentials has improved steadily over recent years: continued improvements in each are necessary if we are to retain our top men and thereby to make the advances in knowledge which are required for our national development.

Australia has shown acumen in recognising the importance of the universities and the scientists and foresightedness in setting its levels of equipment and salary scales to recruit from a world market. While this country may not be able to keep pace with Australia we must not fall too far behind. In general, Governments must be guided by the feelings of the public. On the matter of providing increased grants for research and for the provision of

adequate accommodation for research units, I feel that they need have no hesitation. The public to-day is more conscious of the value of research than at any previous period and this is due in no small measure to the enlightened outlook of, and conscientious reporting by, the country's press.

The third major field of employment for chemists is in teaching both at the post-primary and the university level. This has already been referred to and I need only reiterate that there are many opportunities open in these fields and that the teachers of chemistry can take lasting satisfaction from the knowledge that their contribution is the foundation for all subsequent work.

Throughout this address I have referred to the certainty of expansion in scientific services requiring more chemists and yet we are all aware that the current output of graduates and indeed the anticipated output over the next few years is insufficient to meet present requirements. Is there any way to meet this situation over the short term and over the long term? A recent editorial in "Nature" gives us the best answer:

> "There are no short cuts or quick returns in educational development and apart from relieving a particular shortage which merely drains the supply from other demands and creates and intensifies other shortages the real hope for the short term allevation of the scientific manpower position lies in the more effective use of the resources already at our disposal".

As far as the shortage of chemists in this country is concerned I believe that the greatest gains would come from firstly, the introduction of tutorial classes at the University to help along the less well prepared entrants and thus reduce the heavy initial failure rate; secondly, from increasing the numbers of technicians working with each graduate; and thirdly, from providing better facilities by way of equipment and laboratories to increase the effectiveness of existing staff.

Over the long term we must see that a steadily increasing percentage of pupils take science and for this we are dependent to an important degree upon the post-primary teachers and Vocational Guidance Officers and upon the knowledge of the opportunities for employment brought before the pupils. The Institute through its branches can help materially by co-operating with the teachers, by giving talks, and by arranging for visits to laboratories. Some branches have already done much along these lines and other branches would do well to develop such activities.

FUTURE TRENDS.

"The Chicago reactor is a concrete shielded symbol of an economic force more far reaching even than atomic energy. The force: research in industry. In the past 15 years a torrent of technological change has brought the United States more material advances than any nation has experienced in all history. With every break through in the laboratory, industry has turned the new knowledge into new products for a society whose inventiveness has made achievements the bright converse of obsolescence. From the starveling stepchild of industry, scientific experimentation has become an industry in itself—perhaps the key industry. The United States to-day is spending 5 billion dollars a year for research: Government expenditure alone now totals more than the entire cost of Government in 1900".

These extracts from "The Age of Research" (Time, 6th July, 1956) stress the present position of research in the United States. In the same article reference is made to the development of the team approach to problems, the effect of which has been to eliminate the rigid boundaries that once separated one science from another. True the greatest developments in both the United States and the United Kingdom have been in industry, but the really significant points for this country to appreciate are that other countries well realise that scientific progress is not something which can be purchased in the bargain basement, and they are so certain that increased emphasis on research is sound business that they are placing a far higher priority on expansion of research and teaching facilities than are we in New Zealand, and they are fostering the team approach to the solution of the problems. It is certain therefore that in this country over the next few years there must be an intensification of efforts in the sciences extending all the way from post-primary teaching through to research and service in the primary industries and to a lesser extent in the secondary industries.

The team approach in research must be stepped-up—and in this connection I would like to stress again the importance of developing a small number of research centres with a concentration of scientific disciplines near university units—and scientific staff must be provided with good facilities and paid salaries reasonably competitive with those operating in other countries. The work

of the chemists already impinges on practically every field connected with our daily life and with the national welfare—as part evidence I refer you to the papers to be presented at this Conference—and their influence will be extended still further as developments in fuel technology, nuclear science, building research, meat research and other essential projects are undertaken. It is not my intention to visualise further the many developments which will certainly take place in this country over the next few years in the diverse facets of Chemistry; these have been well reviewed in the series of articles in the Anniversary issue. Repetition so soon after the publication is not warranted, so to conclude I shall quote the diverse facets of chemistry: these have been well reviewed in the final paragraph from an editorial in "Endeavour":

> "In the years to come, the world will inevitably turn more and more to science to solve the grave practical problems which beset it. The response will certainly be wholehearted but one would have to be very optimistic to believe that there will be no disappointments. These will be all the greater if it is believed that science is really a relatively simple matter, for it could make failure seem the result of indifference rather than of the intrinsic difficulty of the problems themselves. A limit to the extent to which science can help the world is set by the number of people who are able and willing to give the time and trouble necessary to acquire scientific knowledge appropriate to their purposes. This applies, of course, not merely to science, but to all learning: superficial knowledge will never be an effective substitute for real understanding. It is rather easy to forget that it is not on science but on scientists that we depend for the solution of some of our most pressing problems".

The chemists of this country have an enviable record of contributions to the national development in teaching, research and service work and in industry: a record to which they will certainly add in full measure in future years given the support, the facilities and the rewards which they so richly deserve.

NEWS AND NOTES.

CANTERBURY BRANCH.

Mr. S. R. Siemon, formerly Lecturer-in-Charge of the Department of Chemical Engineering, Canterbury University College, has been appointed to the newly-created Chair of Chemical Engineering at that College.

Professor Siemon came to Canterbury College in 1944 to lecture in applied chemistry from which his new department developed. He was born in Brisbane and from the Brisbane Grammar School entered, as an open scholar, the University of Queensland where he graduated bachelor of applied science in industrial chemistry with first-class honours in 1938, bachelor of science in 1940, and master of applied science in 1941. From 1938 to 1944 he served with the Queensland Meat Industry Board doing research on chemical control of meat cooling, dehydration, effluent treatment and plant design and over the latter three years was also a part-time lecturer at the Brisbane Technical College.

First appointed lecturer in applied chemistry at Canterbury College in 1944, Professor Siemon was promoted to senior lecturer in 1947 and lecturer in charge of the new department of chemical engineering in 1952.

In 1951-52 he was a Dominion travelling fellow of the Nuffield Foundation and worked at Cambridge University, afterwards spending three months in the United States as a travelling fellow of the Carnegie Corporation of New York.

A foundation member of the Canterbury Branch, Mr. W. O. R. Gilling, has been elected a Life Member of the Institute on the occasion of his retirement from the position of Chief Chemist to the Christchurch Gas Company. Mr. Gilling graduated B.A. in 1914 from Canterbury University College. He worked for some years in the Chemistry Department under Professor Evans, investigating New Zealand brown coals, taking his M.A. in 1916 and gaining his B.Sc. degree in 1917. In 1921, Mr. Gilling was appointed Chief Chemist to the Christchurch Gas Company, a post which he held with distinction until his retirement in June, 1956. Mr. Gilling is also a foundation member of the N.Z. Gas Institute.

OTAGO BRANCH.

Members of our Institute will hear with deep regret of the death in Dunedin of Mr. H. M. D. Wilson, who has been an active N.Z.I.C. associate since 1950, and has served for several years on the committee of the Otago Branch. Mr. Wilson was born in Glasgow, graduated at the Royal Technical College, and was appointed chemist to Campbell, Achnach & Co. Ltd., Glasgow, where he served for ten years before transferring to the associate company of Dunlop Rubber Co. Ltd., at Manchester. The Strathclyde Paint Co. Ltd., then secured Mr. Wilson's services for twelve years, first as assistant chemist, then chief chemist, and finally, as happens to many industrial chemists, he found himself taking on the administrative duties of works manager. During this period he was elected in 1938 to the associateship of the Royal Institute of Chemistry, and became a member of the Glasgow section of the Oil and Colour Chemists' Association, while in 1947 his interests in management problems were shown by his election as an associate of the Institute of Works Managers.

Mr. Wilson came to Dunedin in 1949 to join the staff of Jas. Wren & Co. Ltd., as chemist and works manager. His extensive practical and theoretical knowledge of paints, pigments and synthetic coatings soon became apparent to his professional and business associates. He took a

keen interest in the activities of the Otago Branch of the Institute, and also in the formation in New Zealand of a section of the Oil and Colour Chemists' Association. Early in 1956, Mr. and Mrs. Wilson spent seven months in the United Kingdom so that he could study recent developments in his field, but severe illness curtailed his planned activities.

Mr. Wilson earned great respect for his technical knowledge and experience, but most of all he will be remembered by his colleagues for his warm personality, his sincerity, his ready humour and all those rich human qualities which make his loss so deeply felt.

THE TWENTY-SIXTH ANNUAL REPORT

FOR THE YEAR ENDED 31st OCTOBER, 1956.
(Abridged)

The Council has pleasure in presenting to members a record of activities for the year ended 31st October, 1956.

MEETINGS OF COUNCIL:

Meetings of Council were held in November, February, May and August, the first three meetings being in Wellington, the last one in Auckland during the Conference. A general meeting of members was also held during the Conference. During the year the Vice-President, Mr. W. A. Joiner, and the Hon. General Secretary, Mr. W. G. Hughson were both granted leave of absence while on trips overseas. Dr. W. E. Harvey was appointed Acting General Secretary during the absence of Mr. Hughson.

REGISTRAR:

Technical Publications Ltd. intimated at the end of 1955 that they could not continue to handle the financial and secretarial affairs of the Institute. However, Mr. V. J. Wilson of the staff of Technical Publications Ltd., who had been dealing with the Institute's business, agreed to continue in a private capacity. We are fortunate to have acquired the services of Mr. Wilson who was already well-versed in Institute matters.

MEMBERSHIP:

During the year 24 Associates were elected. Sir Theodore Rigg was elected an honorary Fellow, and W. O. R. Gilling a Life Member of the Institute, in recognition of their services to the profession. Ten members resigned, the two main reasons being transfer overseas and no longer practising chemistry. Leave was granted to two members undertaking study overseas.

We regret to record the deaths of the following members: Donald Ralph Boaden, Hector Muir Dawson, Frederick Henry Valentine Fielder, and H. M. D. Wilson.

Membership figures for the past three years are as follows:—

	1954	1955	1956
Auckland	99	87	89
Waikato	31	32	33
Manawatu	32	34	38
Wellington	141	147	150
Canterbury	73	77	79
Otago	61	64	62
Overseas	43	51	52
	480	492	503

SUB-COMMITTEES OF COUNCIL:

A great deal of work continues to be carried out by sub-committees appointed by Council. In many cases the members of a sub-committee are all drawn from the same Branch, thereby facilitating chair discussions. This should not mean, however, that the membership of the sub-committees is static, and Council, during the year, reaffirmed its view that there should be a continuing change-over in personnel assisting the Institute in this way. Brief summaries of the work of the sub-committees are given below.

CONFERENCE COMMITTEE:

Conference is run by each Branch in turn, the Branch concerned being entirely responsible for the organisation and running of the Conference. The Conference this year was held in Auckland and a good attendance of members spent a profitable and pleasant few days in the Queen City. Two post-conference excursions to Kawerau and Wairakei were well attended and much appreciated by members.

EXAMINATIONS COMMITTEE:

A committee of Otago Branch members continue to carry out the large and responsible job of organising and controlling the examinations for the L.A.C. in which 27 candidates sat in nine subjects. The certificate was awarded to two who had completed the examinations.

EMPLOYMENT OFFICER:

Mr. E. S. Borthwick continues to answer any enquiries relating to the employment of chemists in New Zealand.

JOURNAL:

Dr. W. A. McGillivray, of Massey College, has continued as Editor of the Journal, and has introduced a number of new features which have found general approval. A special jubilee issue in commemoration of 25 years of Institute activity was produced near the end of 1955 and distributed to schools in the hope that it would foster interest in the profession. An index covering all the issues of the Journal is being completed by members of the Waikato Branch, and will be issued shortly.

MEMBERSHIP COMMITTEE:

Dr. R. Gardner, Professor L. H. Briggs and Mr. W. A. Joiner continued to carry out the most important job of scrutinising the qualifications of applicants for membership. During Mr. Joiner's absence overseas, Dr. J. K. Dixon was appointed to act in his place.

PATENTS OFFICER:

With the introduction of the new Patent Act it appeared that the need for a Patents Officer had ceased to exist and accordingly no appointment was made. The Institute is well represented in the Patents Office and members should have no difficulty in obtaining any information which they may require.

PROFESSIONAL STATUS COMMITTEE:

This committee which is situated in Auckland has had little to do during the year under review, pending receipt of the R.I.C. comments on their last report.

STANDARDS COUNCIL:

We continue to be represented on the Standards Council and on all the chemical sub-committees of the Council.

SALARIES COMMITTEE:

This committee situated in Dunedin has been quiescent during the current year. With the present salary position somewhat fluid (especially in D.S.I.R.) no new salary survey is contemplated at the moment.

COMMONWEALTH INSTITUTES:

We continue to exchange Journals with the other Commonwealth Institutes. An opportunity to meet some of our colleagues from Australia will be provided by the A.N.Z.A.A.S. meeting in Dunedin early in 1957. A number of our members have been intimately concerned with the organisation of this Conference.

INSTITUTE PRIZES:

The I.C.I. prize for the best contribution to the development of some Branch of Chemical Science as judged by recent published work was awarded this year to Dr. C. J. Wilkins, of Canterbury University College. The Morcom Green, Edwards prize for the encouragement of original work by young chemists with particular emphasis on applied chemistry was awarded to Mr. I. R. C. McDonald, of Dominion Laboratory. The Easterfield medal awarded by the New Zealand Branch of the R.I.C. every two years was awarded to Dr. R. E. Corbett, of the University of Otago.

FINANCE:

The Institute's finances continue to remain in a healthy position, and it should be possible to transfer further amounts to the Trust Fund and special reserve accounts.

THANKS:

Thanks are due to the many members who have served the Institute on committees and in other ways. In particular reference should be made to the members of Branch Committees in whose hands lies much of the strength of the Institute.

For and on behalf of Council,

M. M. BURNS, President.

W. E. HARVEY, Acting Hon. Gen. Sec. Treas.

HONORARY GENERAL SECRETARY RETIRES.

It is now 26 years since the New Zealand Institute of Chemistry was formed and for half this period one man has served as its Honorary General Secretary. At the last meeting of Council, Mr. W. G. Hughson did not seek re-election and retired after this long period of service to the Institute.

As Mr. Hughson himself puts it, "It is not every day that an Institute Honorary General Secretary retires". Over his period of 13 years in office, Mr. Hughson has witnessed considerable development in Institute affairs. He claims that the annual increase in membership and the enthusiastic support of members, new and old, has been responsible for the growth of the Institute and for the support accorded it as a society representing New Zealand Chemists, but it will be generally agreed that the activities of the ever-increasing number of sub-committees and the correlation of their work with the requirements of Council necessitates a considerable amount of secretarial guidance.

When first appointed, Mr. Hughson carried on this work alone, but the demands on time soon made it evident that a paid official was a necessity. A Registrar was appointed and also an Assistant Secretary and in addition much of the work was unloaded on to specialist committees in the different Branches.

Again during his first few years of office Mr. Hughson saw the reintroduction of annual Conferences in 1945 at Palmerston North and this annual feature of the Institute has been maintained as one of the year's

W. G. HUGHSON.

highlights. Exchange of information and liaison with other Empire Institutes of Chemistry has been one of Mr. Hughson's main interests and Journals and information are now received regularly from other Institutes.

In 1946, Mr. Hughson visited Melbourne and Sydney Branches of the Australian Institute and we now have an understanding whereby prominent overseas chemists visiting Australia will have the opportunity of coming on to New Zealand for a few weeks. In 1951, when our team of younger chemists was invited to attend the 90th Jubilee meeting of the American Chemical Society in New York, Mr. Hughson accepted an invitation to attend an international meeting of Secretaries and also a meeting of International Union of Pure and Applied Chemistry. Again, last year, while attending Fuel Conferences in Great Britain and on the Continent, Mr. Hughson took the opportunity of discussing mutual interests with the Secretary of the Royal Institute of Chemistry in London.

At the November meeting of Council the Auckland Delegate expressed the appreciation of the Institute for the long years of service which Mr. Hughson had devoted to the Institute. This was supported by speakers from the other Branches and Mr. Joiner, President for the coming year asked Mr. Hughson to accept the good wishes and the thanks of the Institute.

BRANCH CHAIRMEN

MANAWATU BRANCH.

H. R. WHITEHEAD.

Dr. H. R. Whitehead graduated at Leeds with honours in organic chemistry in 1921. He joined the staff of the University of Durham Medical School and worked for the next seven years in the Bacteriological Department on the chemical composition of bacteriological media and on the immunological properties of blood serum. In 1928 he came to New Zealand as Chief Bacteriologist to the newly-established Dairy Research Institute at Massey College. He took part in the organising and developing of the Institute which was one of the first branches of D.S.I.R. In 1932 he received his D.Sc. from Leeds on the basis of published work, and was elected a Fellow of the Royal Society of New Zealand in 1950. His main interest over the years since 1928 has been the bacteriology and biochemistry of cheese manufacture and ripening. The discovery at the Institute of the important part played by bacteriophages (bacterial viruses) in cheese bacteriology has opened up a new field in dairy research. Dr. Whitehead has wandered far from the main lines of chemical activity, but he still considers himself essentially a chemist and he believes that chemistry is a basic requirement in the training of a worker in many biological fields.

AUCKLAND BRANCH.

Mr. W. E. Russell, Works Manager of the Te Papapa Branch of the N.Z. Farmers' Fertilizer Co., who was chairman of the Auckland Branch last year, has been re-elected for a further term.

WELLINGTON BRANCH.

A. P. OLIVER.

Wellington Branch Chairman this year is Mr. A. P. Oliver, Chief Chemist, Central Laboratory, N.Z. Breweries Ltd. A graduate of Victoria University College, Mr. Oliver was appointed to the Agricultural Department Laboratory in Wellington where prior to, and immediately following the war, he was engaged on fat work with Dr. F. B. Shorland. During the war he saw service with the Navy in the Radar Section—this he regards as a very suitable occupation for a chemist. He was for a short time with the fish oil firm of R. Greenwell Ltd., Auckland, before joining the Dominion Laboratory in Wellington. Here Mr. Oliver worked in the Spectrochemical Laboratory and then in the Organic Section where he was engaged first on wood chemistry and later on toxicology. He took up his present position early in 1954.

Mr. Oliver has been a member of the Wellington Branch Committee and was Assistant General Secretary to the Institute for about two years.

CANTERBURY BRANCH.

R. M. ALLISON.

Dr. R. M. Allison is a graduate of Canterbury University College where he completed his Masters' Degree in Chemistry in 1940. His interest in biology took him first into cereal breeding under Dr. O. H. Frankel, then of the Wheat Research Institute. Later he took up Cereal Chemistry in the same Institute. After the war he transferred to Auckland to work on timber preservation with Plant Diseases Division of D.S.I.R. and later joined the Plant Chemistry Laboratory for secondment to Crop Research Division. He is now Chief Chemist at this latter institution situated at Lincoln. Dr. Allison was awarded a Fulbright Travelling Scholarship later in 1952 and studied biological nitrogen fixation and general biochemistry in the Department of Biochemistry of the University of Wisconsin where he obtained his Ph.D. degree. He returned to his present position early in 1955.

Dr. Allison has taken an active part in Institute affairs since his election to the Associateship in 1945.

WAIKATO BRANCH.

E. B. DAVIES.

Dr. E. B. Davies was educated at Nelson College and Victoria University College. After a year at the Census and Statistics Office he joined the Chemical Laboratory of the Department of Agriculture in 1926, under the late B. C. Aston. He graduated M.Sc. in 1931 and from 1935-7 worked at the Macaulay Institute for Soil Research where he obtained the Ph.D. degree of the University of Aberdeen.

In 1937 he was appointed Officer-in-Charge of the Fairlie Terrace Laboratory, responsible for soil, plant and fertilizer work for the Extension Division, Department of Agriculture. In 1945 he was transferred to the newly-formed Rukuhia Soil Research Station where he is at present Senior Chemist and in this position has been associated chiefly with the establishment of a soil testing service for advisory work, with investigations on the reactivity of agricultural limestones and the fineness of grinding required for effectiveness, and with the finding of widespread molybdenum deficiencies in New Zealand.

A Fellow of the Institute, Dr. Davies was Chairman of the Wellington Branch in 1944, and has also served on the Council for some years. From 1954-56, he was on the Council of the Royal Society of New Zealand as delegate of the Waikato Scientific Society of which he was chairman in 1954.

In 1954 he visited Australia, the British Isles, Scandinavia and Holland on a study tour, particular attention being paid to soil advisory services.

OTAGO BRANCH.

G. W. BROUGHTON.

Mr. G. W. Broughton graduated B.Sc. at Canterbury College in 1941 and then joined the staff of the Explosives Research Laboratory at Maribyrnong, Melbourne, where he spent four years on experimental work with cordites and the development of flashless propellants for anti-aircraft and naval guns. After the war he joined the staff of McLeod Brothers Limited, Dunedin, Manufacturers of Soaps and Fatty Acids, and was responsible for laboratory control and the department manufacturing commercial stearic and oleic acids. In 1955 he was appointed factory manager.

Mr. Broughton became an Associate of the Institute soon after his return to New Zealand; he has served for a number of years on the Otago Branch Committee, and was Secretary to the R.I.C.-N.Z.I.C. Conference Committee for the 1953 Dunedin Conference.

Problems of management have keenly interested Mr. Broughton and he is an Associate of the N.Z. Institute of Management. He was a part-time instructor for four years at the King Edward Technical College's industrial management course, and in this respect attended a teachers' refresher course in Wellington. He obtained the Diploma of the N.Z.I.M. in 1954, and last year was selected as the Institute's representative to attend H.R.H. The Duke of Edinburgh's Study Conference on the Human Problems of Industrial Communities, held at Oxford. While abroad he also visited plants in U.K. and U.S.A., engaged in the manufacture of soaps, synthetic detergents, fatty acids and cosmetics.

N.Z.I.C. AND R.I.C.

COMBINED CONFERENCE — AUGUST, 1957.

Conference this year will be held in Christchurch from Tuesday, 27th August, to Friday, 30th August. A fully representative conference committee, comprising Mr. E. W. Hullett (chairman), Drs. R. M. Allison, W. S. Metcalf, Messrs. N. P. Alcorn, M. S. Carrie, A. Fischer (secretary), D. J. Hogan, F. H. G. Johnstone and R. H. Shepherd, has been meeting for some months and already has arrangements well in hand.

The committee is seeking offers (by title only) of papers for Conference. Good papers on any topic bearing on chemistry are acceptable, including critical reviews, research reports, studies on the interrelations of advances in chemistry and other sciences, considered views on the teaching and practice of chemistry, and economic studies of chemical interest.

Papers and the discussion of them should last thirty, forty-five, or sixty minutes. Authors are asked to indicate their preference. (Note:—100 words require approximately one minute). The committee especially asks that papers on specialised topics should include sufficient background material to make them clear to a wide audience.

Projection facilities for 2" x 2" and $3\frac{1}{4}$" x $3\frac{1}{4}$" slides will be available; authors are requested to comply with the standards set out by Dolby (J.N.Z.I.C., 19, 51 (1955)) and Whittlestone (Proc. N.Z. Dairy Science Association, 1953, 1.)

30th April is the closing date for offers of papers. If papers are accepted authors will be asked to provide a stencilled summary of not more than two quarto pages for the Conference booklet.

Offers of papers should be made to the Conference Secretary,

A. FISCHER,

Canterbury University College,

P.O. Box 1471,

Christchurch.

EQUIPMENT PAGE.

Chemists are making increasing use of the freeze-drying technique for the preservation of biological samples. For this reason a description of a unit designed for handling fairly large volumes of material, which has been in use at Plant Chemistry Laboratory, Palmerston North, may be of interest.

The evacuated compartment is a wrought iron cylinder of diameter 2 feet, length 2 feet 8 inches and thickness $\frac{3}{8}$-inch. A thick lining is desirable to minimise dimensional changes as the temperature is lowered. A vacuum line of $\frac{3}{4}$-inch copper tubing leads to a standard single-stage vacuum pump. A normal freezing coil is situated inside the compartment near the vacuum lead. Both ends of the cylinder are sealed with vacuum-tight rubber gasket doors, one end being on a swivel loader for easy clearance. The evacuated compartment is fitted to accommodate six stainless steel trays each of which holds 2 litres of solution or 800 gm. fresh weight of herbage. Or the material may be contained in glass vessels to avoid any possibility of contamination.

Under normal operating conditions a vacuum of 20 microns is attained (100 microns is the lowest vacuum at which freeze-drying can be accomplished with any efficiency). One litre of water per hour can be removed from ice, but for biological samples longer periods are usually necessary. For example, 5 kilos fresh weight of herbage would require 36 hours for satisfactory drying.

In the event of power failures, a no-return switch prevents re-starting of the vacuum pump until a check has been made that oil has not been drawn out of the pump.

For those who require to grind soils for chemical analysis, attention is drawn to the Rukuhia Soil Grinder, a description of which was published by D. F. Waters and I. C. Sweetman in "Soil Science", May, 1955. Use of the grinder reduces the working time involved to one-third and the operation is done under relatively congenial conditions.

The "Rinco" rotating evaporator is proving itself to be a most adaptable tool at Plant Chemistry Laboratory. Rapid evaporation of solvents without bumping or frothing is readily accomplished. Provision is made for ready recovery of the solvent if desired.

BOOKS RECEIVED.

A LABORATORY STUDY OF CHEMICAL PRINCIPLES (Second Edition), by Harper W. Frantz. Published by W. H. Freeman & Co., San Francisco, May, 1956. 296 pages, 90 illustrations. Price 2.75 dollars.

This is a further volume in the Freeman series of Chemistry Texts edited by Professor L. Pauling. Written with the firm conviction that "student interest in the study of general chemistry and the fundamental framework of the course should stem from the students' own observations in the laboratory", this book contains much valuable information and ideas presented in a manner to stimulate the interest of student and teacher alike. Like others in the same series, it is well produced and profusely illustrated. Unfortunately the binding is unlikely to stand up to continual laboratory use, but one cannot expect too much for 2.75 dollars.

THE EXAMINATION OF NEW ORGANIC COMPOUNDS, by Walter T. Smith, Jnr., and Ralph L. Shriner. Published by John Wiley & Sons, Inc., New York, July, 1956. 136 pages. Price 3.50 dollars.

Of the steps involved in the characterisation of an organic compound, this volume is concerned primarily with the first—analyses. A brief introduction dealing with general principles, is followed by sections devoted to analysis for individual elements, molecular weight determinations and functional group analysis. In general the methods described are on the semi-micro scale and can be expected to give accurate results with a minimum of specialised training and equipment. The book will be of value to students and research workers alike.

LABORATORY MANUAL OF PHYSICAL CHEMISTRY (Fourth Edition), by Albert W. Davison, Henry S. van Klooster, Walter H. Bauer and George J. Janz. Published by John Wiley & Sons, Inc., New York, July, 1956. 260 pages. Price 4.75 dollars.

This edition retains, with some revision, the experiments of the previous edition. Four new experiments have been added, in three of which the student is introduced to high-vacuum techniques. Of particular merit from the teaching point of view is the fact that each experiment in this manual has been designed in such a way that it can be completed by the students, usually working in pairs, in one three-hour practical period.

MEDICINAL CHEMISTRY, Volume II. Edited by F. F. Blicke and C. M. Suter. Published by John Wiley & Sons, Inc., New York, June, 1956. 311 pages. Price 10.00 dollars.

This is the second of a series of reviews prepared under the auspices of the Division of Medicinal Chemistry of the American Chemical Society. A chief objective of this series has been to include in each chapter references to all compounds that have been tested for a particular type of pharmacological activity. Brief outlines of methods of synthesis and pharmacological test procedures are also included together with discussions of the relationships between chemical structure and pharmacological action. The present volume covers some aspects of Cardiac Glucosides by Stoll; Synthetic Estrogens by Hogg and Korman; Analygesics-Arylpiperidine derivations by Suter; and β-haloethylamine Adrenergic blocking agents by Ullyot and Kerwin.

Volume 3 of this series, just received, covers the following groups of chemical compounds: Methadone and Related Analgesics; Quarternary Ammonium Germicides; Non-mercurial Diuretics; and Synthetic Analogs of Physostigmine. *This volume was published in August, 1956. 346 pages. Price 10.50 dollars.*

WOOL WAX. CHEMISTRY AND TECHNOLOGY, by E. Vernon Truter. Published by Cleaver-Hume Press Ltd., London, September, 1956. 368 pages. Price £3.

This is an excellent text which will be of value alike to the research worker and the industrial chemist. A comprehensive and critical review of the by-products of the fleece, it deals with the occurrence, principles and methods of extraction, refinement and chemical processing, chemical constitution, extraction of biochemically important compounds, physiological steroids and lanostane analogues, and principal uses of wool-wax and suint. It is adequately referenced and profusely illustrated with graphs and diagrams.

A LABORATORY MANUAL OF PHYSICAL CHEMISTRY, by H. D. Crockford and J. W. Nowell. Published by John Wiley & Sons, Inc., New York, September, 1956. 184 pages. Price 3.75 dollars.

This is a well prepared introductory manual covering a range of experiments, all of which illustrate important principles. The instructions are clear and presented in a manner which should stimulate the interest of the student not only in the experiment itself, but also in the theoretical considerations to which he is referred at the start of each experiment.

BOOK REVIEWS.

STERIC EFFECTS IN ORGANIC CHEMISTRY. Edited by Melvin S. Newman. Published by John Wiley & Sons, Inc., New York, 1956. Price 12.50 dollars.

This is a book of thirteen chapters by a group of American theoretical organic chemists. The authors are of the younger generation for the most part, names such as that of H. C. Brown being conspicuous by their absence from the panel. The emphasis is largely on steric influences on the rates and mechanisms of the various types of organic reactions and on equilibria though the first chapter (W. G. Dauben and K. S. Pitzer) is on Conformational Analysis and the last three on Steric Effects on certain Physical Properties (L. L. Ingraham), The Calculation of the Magnitude of Steric Effects (F. H. Westheimer) and the Separation of Polar, Steric and Resonance Effects in Reactivity (R. W. Taft, Jr.). This last chapter and one by E. L. Eliel on Substitution at a Saturated Carbon Atom together occupy one-third of the book, each being of more than 100 pages. It appears to the reviewer that Taft's subject was been over-stressed and will not contain much of interest for the general reader. Two chapters of prime importance on Intramolecular Rearrangements and Olefin-Forming Elimination Reactions are contributed by D. J. Cram.

The work of many of the authors has been particularly noteworthy in recent years and will have commanded the interest of all organic chemists, theoretical or otherwise. This, together with the fact that the book is written for the non-mathematical reader, will give it a strong appeal to all who wish to keep abreast of the rapidly growing field of steric influences. Prospective buyers may be discouraged by the price of the volume but need have no doubts on the score that the authors are in a position to speak with authority on their subjects. Most theoretical organic chemists will wish to have a couy on their desks.

—B.D.E.

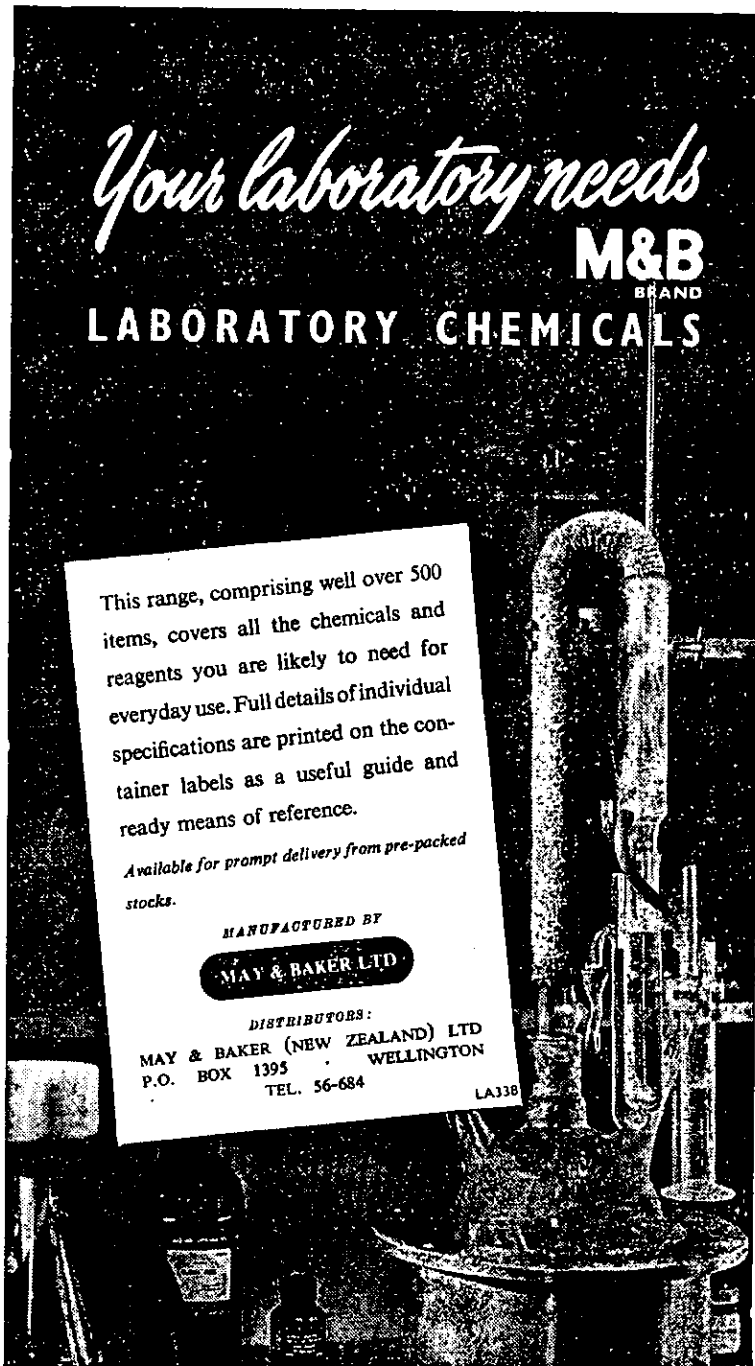
AN INTRODUCTION TO PAPER ELECTROPHORESIS AND RELATED METHODS, by M. Lederer. Published by Elsevier Publishing Company, London, 1955. 266 pages. Price 37/6.

Users of E. & M. Lederer's previous text on the principles and applications of chromatography will welcome this companion volume on paper electrophoresis. Written in the same style and with the same aim of providing a general survey of the possibilities of the techniques, an immense volume of valuable information has been packed into the present monograph.

Paper electrophoresis is, of course, used extensively already as a rapid clinical method, particularly in the separation of proteins in blood, urine, etc., but its possibilities in many other fields are rapidly being realised not only for separation and analysis but also in preparative work. In this present text, an introductory section, covering theoretical considerations and describing the technique of paper electrophoresis, is followed by clear and concise accounts of the application of the method to a range of inorganic and organic separations. Specialised applications such as continuous paper electrophoresis, electrophoresis on a cyto-scale and combination of electrophoresis and chromatography are dealt with briefly and the related topics of electrophoresis in packed columns and inside gels are also discussed. The text is well and clearly illustrated and adequately referenced.

Most chemists, whatever their field, will want this book on their shelves.

—W.A.McG.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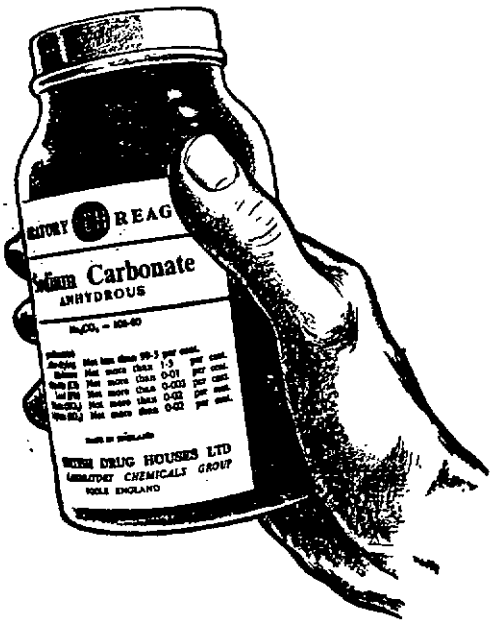

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