"Vera in omnibus quaerere."

JOURNAL

OF THE

Adelaide University Science Association

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IN CONJUNCTION WITH THE AGRICULTURAL SCIENCE STUDENTS' ASSOCIATION

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PROFESSOR J. G. WOOD BOTANY DEPT.

FOREWORD

THE ENDLESS FRONTIER

SINCE you have asked me to write a Foreword as Dean of the Faculty of Science it appears inevitable that I should make some sort of stock-taking of Science in the Universities to-day.

Amongst the events and difficulties which have befallen me in this the first post-war year in the University, two things stand out rather clearly: the first is the large number of students who have come to me and asked in what science I thought they would most likely find a job—the branch of science didn't matter, there was no active interest nor the curiosity which makes the research worker; the second thing which impresses me is the relatively large number of research students which I have and the fact that I am not able to cope with them as I would wish; in short that the University is not yet adequately equipped to teach numbers of research workers.

These two things are not unconnected, indeed each of them and their interaction, involves problems which are concerning all nations to-day. A few days ago I received a copy of the Bush Report whose title is the title of this Foreword, and whose findings are of such concern to us that I decided to deal with the essence of the major findings in relation to our present situation. Dr. Vannevar Bush, Director of the United States Office of Scientific Research and Development, was asked by President Roosevelt to set up specialized committees and to make recommendations on four points, the two most important of which were:

(1) What can the Government do to aid research activities of public and private organizations, and:

(2) How scientific talent in American youth could be assured on a level comparable with that during the war.

The report regards as axiomatic that scientific research is not only essential to national security but for the prosperity, well-being and progress of a nation, in short that the one inexhaustible national asset is creative scientific research. And further, one thing that has been clearer above others during the war, not only in America but in Britain also, is that the great scientific advances came not from Government scientific institutions but from the basic research carried out in the universities.

By basic research, as distinct from applied research, is meant that carried out without thought of practical ends, whose aim is general knowledge and understanding of nature and its laws, whose motive force is curiosity and whose essence is freedom—freedom to follow by-paths and to look at things from unusual angles, and which is best pursued at universities with their tradition of academic freedom and the protection they afford against convention and prejudice. Applied research, whether in Government organizations, in industry in agricultural institutions, etc., in the main is directed towards the solution of short-term projects, requiring as a rule organized research teams; however the borderline between applied and pure research is often indefinite.

Basic research above all else requires quality, but the number of individuals with high ability is limited. How limited may best be judged by statistics for U.S.A. in the Bush Report. In 1941 about 2,000,000 students entered high schools in U.S.A. and of these about one half completed the high school course. About 180,000 graduated from the universities and of these 53,500 graduated in natural sciences and technology, 16,000 of them in the pure sciences. The average number who received Ph.D. degrees in the sciences in the years 1935–40 was 1649. The Ph.D. is the equivalent of our M.Sc. degree and may be taken as a measure of ability to conduct independent research, though many of the degrees are of a pedestrian character. I am not concerned at the moment with the enormous wastage which these figures reveal and their attendant problems, but only with the large numbers of entries in science required to produce graduates of quality. I imagine that the percentage of science graduates in Australia who proceed to research degrees is about the same, although the numbers are much smaller.

In the U.S.A. where, during the war, education in science in the Universities was almost completely suspended it is estimated that there is a cumulative deficit of about 16,000 students who would have received the Ph.D. degree during the years 1941–45. The proposal in the United States is that the number of students entering the graduate schools should be greatly enlarged in order to provide the relatively few research

students of exceptional ability, although with this is the danger of overproduction of trained persons.

The situation in Australia is somewhat different; the need for students of exceptional ability is not less; we have produced large numbers of ordinary graduates in science during the war for special industries connected with it, but few trained research men; Government scientific establishments take graduates without research training in relatively large numbers. For training in research the Government has provided funds to the universities, but it is small.

But the same result to the Universities in Australia as in the U.S.A. has been brought about in another way, viz., the large influx into the universities under assistance schemes and from the armed services of undergraduates in Science; this inevitably will mean increased numbers who proceed to research degrees. It is in this way that the two points, which have struck me and with which I opened this Foreword, are connected.

The University of Adelaide, like all universities worthy of the name, is concerned not only with maintaining the knowledge of the past and imparting it to students, but with making new knowledge; indeed, high quality undergraduate training requires as its life blood scholarly interest in research. In most universities about half the time of the staff is supposed to be devoted to research. In the past Australian universities have been able to cope easily with their research graduates, because the numbers have been small.

Inevitably the impact of increased undergraduate teaching must reflect unfavourably upon research training unless considerably increased assistance is provided; but more important still, the universities must continue to make new knowledge as well as train for it, and high quality basic research cannot be maintained within the universities unless sufficient inducements are offered to keep men of ability within the universities. Like all problems the ones raised here are capable of solution, and some of them are obvious. The essence of the recommendations of the Bush Report is the establishment of an Agency similar in principle to the University Grants Commission of Great Britain, but essentially for research. However, for the moment I am less concerned with these than with putting the problem before you so that you can realize it, think about it and talk about it, for it concerns you all as Scientists in the making.

DR. S. W. PENNYCUICK CHEMISTRY DEPT.

SCIENTISTS ARE HUMAN

THERE is a fairly common belief that all great scientists are peculiar. When they were at school (so it is believed) they were queer or even "loony"; or else they were awkward, puny or suffering from ill-health. As they grew older their abnormalities and peculiarities grew with them (so it is believed); they became more and more queer, absent-minded, wrapped in their own thoughts, divorced from the affairs of the world of men, but tolerated, because they were considered to be essentially harmless.

People love to hear how Einstein went into the dining room of the Belgenland in his pyjamas; or how the famous Maxwell could never remember whether he had had dinner or not; or how Dalton put his watch in the saucepan and held the egg in his hand for three minutes; or how the great Newton cut two holes in the door of his study, one for the cat to go through and a smaller one for the kitten; or how, nearer at home, a well-known scientist paid his income tax twice over—that was in the good old days when such a feat was mathematically possible.

In spite of these exceptional stories, the great scientists were and are essentially—well, not exactly *normal,* but essentially *human.* They had their successes and their failures, their days of toil and their hours of leisure, their days of sadness and their simple pleasures, just like you and I have. But they had three special gifts that set them as men apart, gifts that spell genius—extraordinary powers of concentration, a capacity for taking infinite pains, and periods of inspiration.

In their school days many were indeed precocious; and a surprising number suffered from ill-health—men like Kepler and Darwin and Boyle and Priestley and a dozen others. Even James Watt, the steam engine man, whom we might picture as a big robust engineer, was a frail, shy and sickly child, whose imagination led him to the invention of fairy stories, which, by the way, he delighted in telling all his life. Einstein as a child began to talk so late in life that his parents had grave fears for his normality. Perhaps they were right. It has even been argued that frailty, physical weakness and poor health in childhood are not necessarily a handicap at all. By sharpening the mind, they may prove an asset, developing habits of prolonged and intense thinking.

Attempts have actually been made to pick the budding genius in his school days, so that he could be sheltered for the future benefit of the nation. Look at the value of another Faraday in pounds, shillings and pence! But the results have always shown that students who are particularly distinguished in their school work do not by any means become famous men. If there is a hall-mark of budding genius at school, it is not brilliance nor precosity, it is originality, a mental restlessness, an instinctive desire to search beneath the surface, a dissatisfaction to accept things just because they are said to be. The teacher who can foster this, is worth his weight in gold.

All through the lives of the great scientists you can see this mental restlessness, with its sharp-edged probe, originality, seeking and probing amongst the treasures. But, mark you, not always with success. There are failures and bitter disappointments; discoveries ignored; cherished ideas fought to the death. Just think of Joule and Darwin, Jenner and Simpson, Pasteur and Lister—all for a time utterly discredited, and sometimes, human enough to become embittered. But always their work went on. With all their concentrated effort, they followed the light. Their restless minds demanded it. And chance demanded it too. For when chance comes knocking at the door, the occupant must not be sleeping.

There is a saying in the scientific world—and I think it holds just as well in the business world—CHANCE FAVOURS ONLY THE MINDS WHICH ARE PREPARED. The unprepared or sleeping mind it passes by unseen. The chance is missed. "I never seem to have any luck", says the lazy man, with tears of self pity in his limpid eyes.

History says it was chance that led Priestley to the discovery of oxygen, Galvani and Volta to the discovery of the electric battery. It was chance that led to the discovery of dynamite, to the coal tar dyes, to anaphylaxis and to a hundred other things. In part, that's true. But remember, chance did not have to knock twice at the door; a prepared mind was waiting.

Of course it's not only chance or good luck that makes the great scientist. It is hard work, continuous effort, infinite pains, insight, imagination, and, more often than not, an intensely human outlook.

Take for example, that proud but humble son of a blacksmith, the man who made the greatest material contribution to mankind of any scientist who ever lived—the great Faraday himself. By a simple laboratory experiment amongst thousands, by moving a wire through a magnetic field,

the huge electric generators of to-day were born. Faraday's first model was such a simple little thing, that when it was shown to Mr. Gladstone, then Chancellor of the Exchequer, he commented, "Very pretty. But what are you going to do with it? What's the use of it?". To which Faraday is said to have made the prophetic reply, "Well, sir, some day you might be able to tax it". And now in every corner of the world, with graceful ease, it does the work of 1,000,000,000 human slaves. And is it taxed? I'll leave that to you.

But let's not go into Faraday's exploits. We'll admit that he was one of the greatest of all the experimental scientists. But what was he like personally? What manner of man was he? Was he a super-human, sub-normal eccentric, wrapped up in his own importance, proud and overbearing?

No! He was a humble, God-fearing man, intensely human. Instead of an overbearing pride, he showed a deep enjoyment of simple pleasures, an appreciation of a little nonsense, but above all, a boyish enthusiasm which he shared with his friends, young and old. His Christmas lectures to children were famous.

And he was a modest man. Modestly he refused all the titles and honours that were offered him. He scorned the riches that lay at his feet. He died, as he lived—a poor man. At his own request, without pomp and ceremony, he was buried in a poor and simple grave.

Like his parents before him, Faraday belonged to a very serious religious body, called the Sandemanians. He remained a Sandemanian all his life and regularly attended meetings. One Sunday he was missing. It turned out that he had been commanded to dine with Queen Victoria. But as he refused to express penitence to his fellow-worshippers for accepting a mess of regal pottage on the Sabbath, he was removed from office as an elder, and, the very depth of degradation, his name was taken from the membership list. This great and august man, instead of taking umbrage, sat by himself in the back row, a sort of black sheep, until a year later he was forgiven and taken back into the fold. Truly he was a great, a human and a humble man.

Then there was another man. His father was not exactly a blacksmith; he was a wheelwright. (I'm not too sure of the difference). Born on a little farm 10,000 miles from England, he became one of the greatest personalities in modern science. This young New Zealand boy, Ernest Rutherford, went to England and there exerted a single influence almost unique in the history of science. He is the man who laid bare the inner secrets of the atom; who blazed the trail into the inscrutable mysteries of the nucleus. The man who did the seemingly impossible—he split the atom. Of him it is written: He divided the indivisible; arranged the immutable; made plain the invisible; and unscrewed the inscrutable.

And what manner of man was he? A superman certainly, but was he eccentric? Not a bit of it. A kindly man, human and humorous; boyish and lively; with the keenest interest in life; with an uncanny instinct for picking up the trail where none but he could see the thread. He hated pretence; he hated underhand and unfair dealing; he was a leader, a public man, at times outspokenly frank. And characteristic of all the really great men, he was full of encouragement to the younger men about him. Faraday, as was the habit of the time, worked alone; Rutherford was surrounded by young men who drew inspiration from his dominating personality. When he died, some seven years ago, well was it said, "In our lifetime, we shall not see his like again". Such was Ernest Rutherford, Lord Rutherford of Nelson, whose personality can be best summed up in the words, he was a happy warrior.

And so we could go on, picking them out from the illustrious pages of science. There is Bragg, the elder, who was one of the busiest men in England. Was he bowed down by his great knowledge and responsibilities? Not a bit of it. He was human and lovable: a great man, and a great lecturer; one who could make the fourth dimension so clear that his listeners believed they understood it.

And there are men alive to-day, carrying on their great work. There is the great American, Langmuir, a giant among the modern chemists; at heart as young and curious as he was forty years ago, and human in the modern sense, for he pilots his own aeroplane.

And there is G. N. Lewis, another great American, one of the clearest thinkers in the scientific world to-day. Friendly and approachable, with an innocent face and a deceptive smile that masks his shrewd eyes, an ideal poker face, as many a man has found to his cost, including some Australians. He also is very human, for he smokes about sixteen cigars a day.

And so we could go on. There are exceptions of course. There are eccentrics. And there are harsh, over-bearing and intolerant men. These are the small men of science, not the big ones.

The really great men, the big men, are humble, hard working, friendly, tolerant, kindly and encouraging. In brief, they are human, like you are. Except for one thing: *they've* got brains.

The man who tries to drown his troubles in drink usually finds that he has only irrigated them.

THE ASSOCIATION IN 1945

OFFICERS DURING 1945.

Patron: DR. C. T. MADIGAN.
President: JOHN R. PRESCOTT.
Vice-President: MARGARET MATTNER.
Secretary: D. F. SANGSTER.
Treasurer: J. P. KEEVES.

Committee:

MISSES J. HAMILTON, B. EVERARD, M. HONE
MESSRS. C. S. CRISP, G. E. WALL.

MEMBERSHIP.

A new record for membership was set at 150 in 1945. This is still only about 50% of full-time Science students, but it appears from past records that such is usually the case. The remaining 50%, it seems, are at the University to get a good job and not an education—to become technicians and not scientists.

FRESHERS' WELCOME.

The first meeting of the year was, as usual, the Freshers' Welcome. The first item, billed as the Presidential Pep Talk, turned out to be an outline of the history of the Association since its inception in 1891, together with present day activities. This introduced not only freshers, but also members of several years standing to the traditions of the Association. Two short films followed, and then the Patron, Dr. Madigan, enlarged upon the President's remarks, and exhorted all members to try and give a paper to the Association while still a student. He then described his adventures in preparing such a paper himself several years ago.

Following this, the serious business of proving the mettle of the fresher Science students began. In addition, several members who had been overlooked in previous years were attended to. Highlights of the evening were the exhibition boxing matches between blindfolded freshers. There were no K.O's.

Thanks are due to the freshers for providing a colourful evening's entertainment, and for the good spirit in which they took the fun. Dancing afterwards in the George Murray Hall was enjoyed by all.

STUDENT PAPERS.

Once again offers to give student papers were few in number, but the papers given were of a high standard. Members should realize the benefits and experience to be derived from preparing and delivering a paper to the Association, and should start thinking out subjects suitable for papers well in advance. The same applies to articles for the journal.

Papers given at the students' evening were: D. I. B. Kerr, "Tissue Culture", dealing with the history from Haberlandt to modern times, and the culture of chick embryos. Claire Symons, "Ascaridole Oil", which was unique, in that specimens of the oil, the plant from which it was extracted and the beasties it destroyed, were on view. Max Raupach, "The Separation of Isotopes", outlining the main points of the four chief methods of separation. R. S. Beckwith, "Science and Society", dealing with scientific education and the organizing of research.

At the following meeting, the Presidential Address was delivered on "Photo Cells". This was illustrated throughout by demonstrations, and when these worked, as most of them did, greatly added to the appreciation of a very interesting paper. After a brief historical introduction, Mr. Prescott explained the action of various types of cell, and finally gave some idea of the use and applications of photo-electric cells in general.

OF MEETINGS.

The average attendance at meetings throughout the year was 110, which was very gratifying to the Committee, which had gone to no end of trouble to arrange a programme of as wide an interest as possible. The staff were individually invited by circular to attend each meeting throughout the year, but the response was poor. This may be due either to lack of interest, or to insufficient time to do anything outside their immediate duties. It is to be hoped that in future years the position will improve, and that the staff will take a keen interest in Association affairs.

We feel that this could provide a much needed opportunity for closer contact between staff and students.

STAFF PAPERS.

At the second meeting of the year, Professor Kerr Grant spoke on "Some Big Guns of Science". This dealt with the modern instruments—the cyclotron and the betatron—used in exploring the atom. For the next meeting, Professor A. A. Abbie, in "The Weaker Sex" traced woman's history through the ages, and after an excursion into the realms of genetics, explained the reason for women's living, on the average, longer than men, and discussed the social repercussions of this.

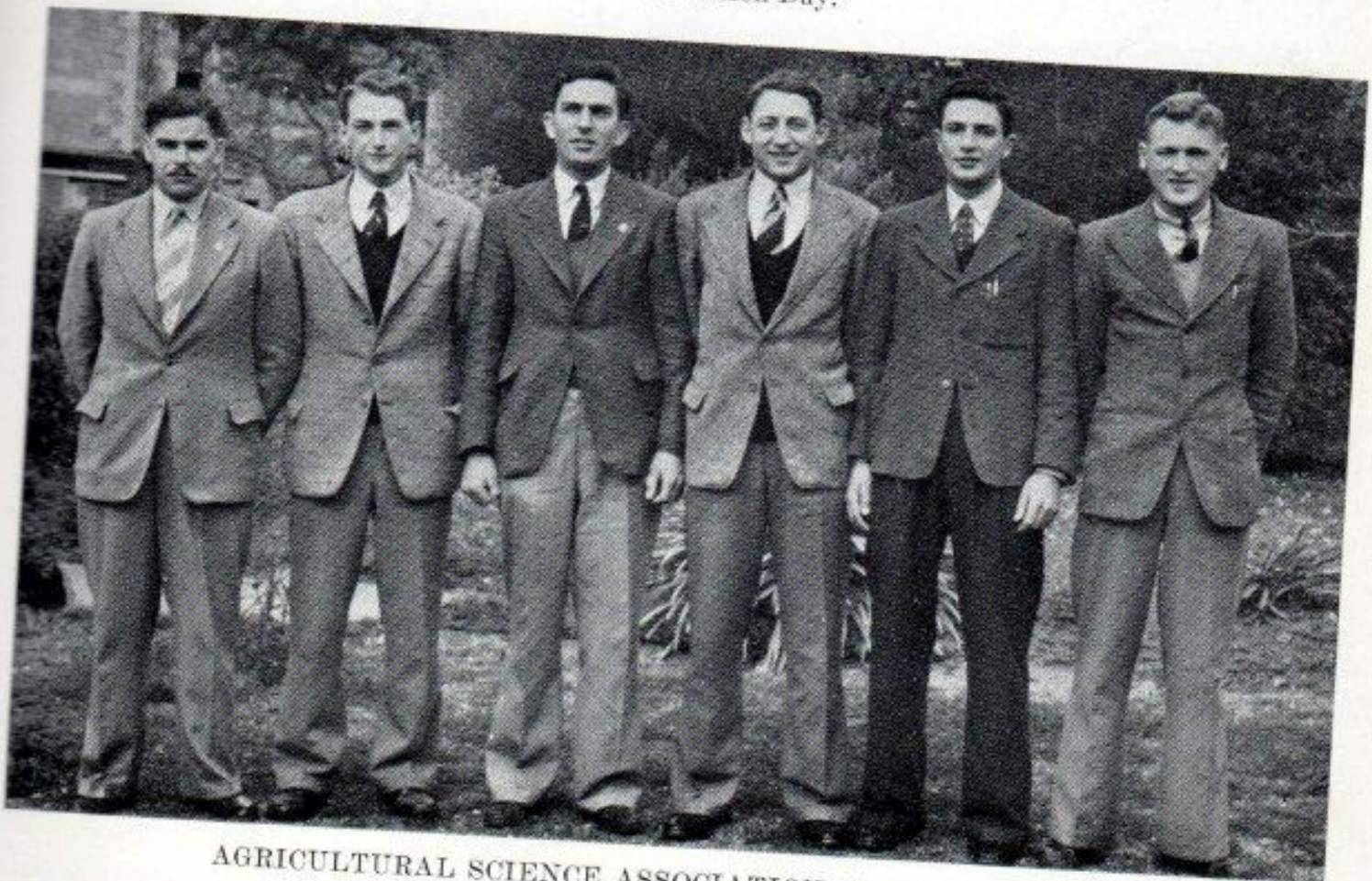
The Patron, Dr. Madigan, chose as his title, "Crossing the Simpson Desert". After showing a film, half of which was in colour, of the crossing made by the party led by himself, the speaker reminisced on incidents, often extremely amusing, which occurred on the way. We would

SCIENCE ASSOCIATION COMMITTEE, 1946.

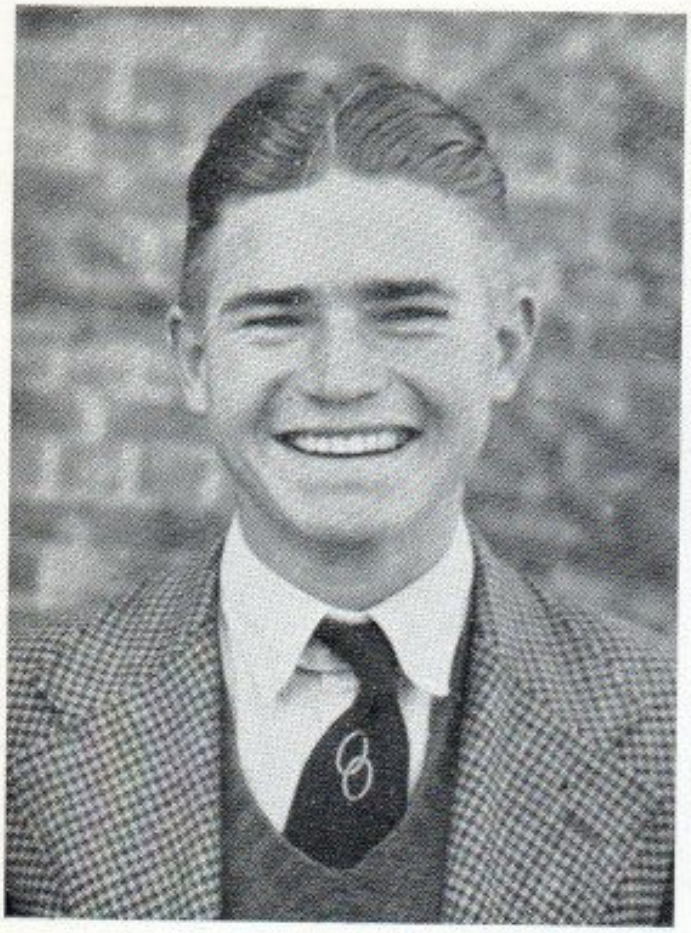
Back row (left to right): Prof. M. L. Mitchell (Patron), J. P. Keeves, D. F. Sangster (President), G. E. Wall, T. L. Judell.

Front row: Betty Everard, Jean Hamilton, Barbara Kidman, G. Robertson.

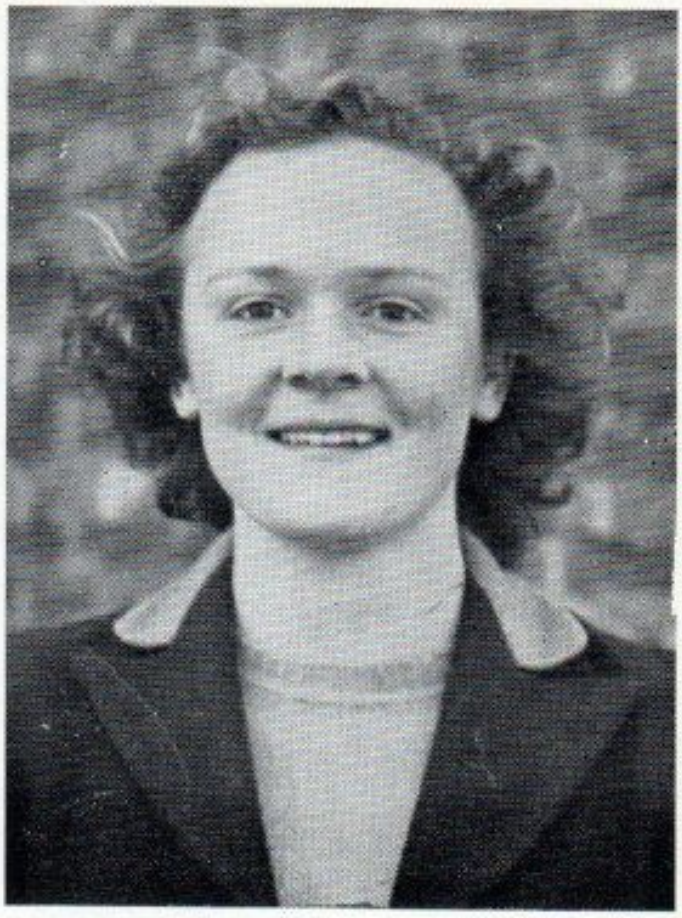
Absent: Alison Day.



AGRICULTURAL SCIENCE ASSOCIATION



Editor: W. H. CARTER.



Sub-Editor: ALISON C. DAY.

SCIENCE V. ENGINEERING CROQUET

like to thank Dr. Madigan for undertaking the position of Patron, and for his help throughout the year.

"Science and the Horticulturist" was the address given by Mr. A. G. Strickland of the Department of Agriculture. Stress was laid throughout this talk on the necessity for the applied scientist's having a good grounding in the basic sciences. Many aspects of horticulture were covered. At the last ordinary meeting for the year, Professor Trethewie of the Institute of Medical and Veterinary Science, spoke on "Signposts in Disease", which dealt with the pharmacologically active substances with which the speaker has been working.

THE A.G.M.

As the Presidential address had been given earlier in the year, films and dancing were featured. After the usual presentation and adoption of reports, and election of officers for the coming year, Mr. Prescott was elected an honorary life member of the Association in view of his efforts, both verbal and otherwise, in the interests of the Association during his three years with the Association Committee—as committeeman, Secretary and President.

UNION NIGHT.

The meeting at the end of the second term took the form of a Union Night. This comprised impromptu speeches on a great variety of subjects, a debate, "that we do too little work and have too much amusement", a quiz, and finally supper and dancing.

EXCURSIONS.

Altogether five places of general and scientific interest were visited during the year. In the first term, forty members visited Hardy's Winery at McLaren Vale. After a thorough inspection of the winery, the party gathered together for a sumptuous afternoon tea and a spot of scientific sampling of Tintara's better known products.

The next visit was to Cooper's Brewery, where the different types of beer were explained along with a host of handy hints for the home brew. As the contented party set out for Adelaide, the road seemed less straight and the sunshine more brilliant, while the expressions of enjoyment, which were given by all, showed clearly how profitable the trip had been.

Over thirty students attended the excursion to the Waite Institute, and in an interesting two hours, covered but a cross-section of the work being carried out there. Features of the organization were the work being done on soil analysis, the co-operation between departments and the excellent working conditions.

The trip to the Finsbury munition works was also a great success. All parts which leave the works must conform to very fine degrees of tolerance, and a large number of the machines used were made in Australia.

The final excursion was to Faulding's Laboratories at Southwark. There was seen the manufacture of such a variety of products as penicillin ointment, epsom salts, milk emulsion and perfumes. The visit concluded with afternoon tea.

We would like to thank all concerned for making these visits possible, and for the hospitality shown.

AGRICULTURAL SCIENCE.

Early this year Agricultural Science students expressed a wish to form an Association of their own, which would remain affiliated with this Association. We offered them our help, wished them good hunting, and invited them to participate in some of our activities, viz. Journal, Science Ball and the meeting at which Mr. Strickland spoke. An observer was appointed from each Committee to the other to establish a closer liaison.

SCIENTIFIC GERMAN.

The German class under Mrs. B. J. Kearney was continued, and those who completed the course went on to a more advanced course. Some failed to keep their work up to date and fell by the wayside. The necessity and value of this class can only be realized by those who have attempted to carry out some scientific research. Even if not a single paper is published in German in the future, the value of those published during the last forty or fifty years can not be under estimated.

JOURNAL.

In 1945 the Association produced its first Journal. Under the editorship of T. S. B. Robertson, the venture met with outstanding success. It is in itself a fitting and sufficient tribute to the efforts of Mr. Robertson and his staff.

WORLD STUDENT RELIEF APPEAL.

Proceeds from the Science Ball (amounting to £77/12/0), Faculty Stunt Day, "spare-change" supper levies and personal contributions from members, brought the Science total for W.S.R. to over £100. In spite of the increased Faculty membership, the amount from personal contributions was less than last year. To those who did subscribe, we can say "Well done!" To those who were approached, yet did not subscribe, we can offer no share in the glory.

SPORT.

For the second year in succession, the men's relay team won the Magarey Cup on Sports Day, and the women's team completed a double, by winning their event.

Once again, Science men defeated the team fielded by the Women's Hockey Association. The challenge football match against the Ag. Science team was won 16—17 to 3—7, and that against the Engineers by 14—12 to 13—9. A croquet match against the Engineers was played on the Refectory lawn one lunch hour, and in an exciting finish, our team (''Misses'' Prescott and Sangster) won by two pegs and a hoop. The only stain on our record is the defeat of the combined Science-Engineering rugby team at the hands of the Medicals by 33 points to 3.

In their respective spheres, several individuals distinguished themselves. Betty Hunter and Mary Hone were awarded basketball Blues, and with the return of more inter-Varsities, we hope to see many more members earning Blues.

UNION ACTIVITIES.

In general Union activities, Science has more than held its own. Mr. Prescott has been Vice-President of the Union and Chairman of the Men's Union Committee, Miss Mattner has been Secretary of the Women's Union, and Miss Hamilton and Mr. Crisp have also been members of the Union General Committee. Scientists have occupied key positions on the committees of many other associations connected with the University.

INTERSTATE LIAISONS.

Early in the year, an attempt was made to establish liaisons with cognate societies in other Universities, and we have given as well as received a few helpful ideas and suggestions. Melbourne and Brisbane each hold a very successful annual Conversazione or Science Display, and I suggest that this Association organize one as soon as possible.

While Interstate in August, Mr. Prescott took the opportunity of meeting Sydney and Melbourne Science people. It is hoped that the liaisons now established can be maintained and fostered to the mutual advantage of all concerned.

COMMITTEE.

Your Committee has met ten times throughout the year, and attendance has always been extremely good, in spite of the fact that most of the members had heavy commitments on other Committees. A number of others have contributed towards the efficient and smooth running of the Association throughout the year.

An Association, with as many activities as have been outlined in this report, requires much organization, and there is work for all members willing to do their bit, and valuable experience to be gained into the bargain. If this Association is to maintain its high position in student affairs, every member must pull his or her weight.

OLD MEMBERS.

In the editorial of the Journal last year, Mr Robertson suggested that old members, even if not directly connected with the University, should be encouraged to maintain their interest in Association activities, and I feel that all who pass out of the precincts of the University will be welcome at all future meetings of the Association.

D.F.S.

The Editor wishes to apologize for the lateness of publication, which was due to circumstances beyond his control. He hopes the final product was worth waiting for.

He also wishes to thank his staff, without whose help this Journal would never have been published.

RESEARCH NOTES

FACULTY OF AGRICULTURE

The Waite Agricultural Research Institute, which is associated with the Faculty of Agriculture, has a large staff engaged in research into agricultural problems. There are four main departments. In the Agnonomy department, pasture research and plant breeding are two of the principal activities. The Agricultural Chemistry department includes the C.S.I.R. Division of Soils and this department together with the departments of Plant Pathology and Entomology has a continuous research programme being carried out.

At Roseworthy Agricultural College, experiments into cropping rotations, with particular reference to weed control and the use of pasture in the wheat belt are being carried out. The Plant Breeding department is very active, particularly in the development of new wheats with the main objects of increasing the yields and improving the baking quality of Australian wheats.

In the Veterinary Department at the College, research into the effect of Dwalganup sub-clover on the fertility of Corriedale ewes is being carried out. Seasonal variation of milk production in cows and the correlation of birth coats with the mature fleece are other problems being investigated.

DEPARTMENT OF BACTERIOLOGY

Research work is proceeding on the following sujects:

1. Antibacterial substances in Australian plants and fungi.
2. Salmonellas occurring in Australia.
3. Bacteriophage and its use in typing various bacteria.
4. *Mycobacterium tuberculosis* and its attenuated varieties.
5. The anaerobic *Actinomycetes* and related micro-organisms.
6. Bacteriological investigations on the Adelaide milk supply.

All these projects are supported also by the Institute of Medical and Veterinary Science; some receive support from the National Health and Medical Research Council or from a private bequest; the Metropolitan County Board partly provides for the work on milk.

Hundreds of Australian plants and fungi have been tested for antibacterial activity but only about 30 have given positive results. The majority of these affect the same range of bacteria as penicillin. Among those affecting a wider range were members of the plant genera *Chamaelaucium* and *Persoonia*, the toadstool *Cortinarius rotundisporus* and the mushroom *Psalliota xanthoderma*. The latter two affect the *Mycobacteria*. Extracts of these plants and fungi are being fractionated.

We have set up a typing centre for Salmonellas and several hundred strains isolated in Australia, New Guinea and neighbouring islands have been investigated. Numerous different types occurred including many rare ones; most of them had not been recorded previously in Australia, and some had not previously been recorded as a cause of human disease. Particularly interesting was the discovery of *S. blegdam* as the cause of a severe enteric-like fever occurring in Australian soldiers in New Guinea and Bougainville Island. Prior to our description in 1944 of four strains of *S. blegdam*, the account of one strain only had appeared in the literature. Now we have over thirty strains and from this work no doubt remains that the organism is an important human pathogen.

Bacteriophage typing of various Salmonella cultures is also proceeding and 'phages are being adapted to new strains.

Vaccines of the vole and B.C.G. strains of tubercle bacillus are being prepared and tested for their immunizing properties.

DEPARTMENT OF BOTANY

The research work of the Botany School falls into two sections: plant physiology, and the taxonomic and ecological studies of the land and marine flora of South Australia.

Investigation in plant physiology has centred upon the relations between metabolites (protein, carbohydrates, organic acids, etc.) during the hydrolytic and synthetic phases of protein metabolism. Experiments are now in progress: (1) To elucidate the relation between nitrogen metabolism and the organic acid cycle. (2) To see if the plant can utilize directly various organic nitrogen compounds, which may be intermediate metabolites in an alternative path of protein synthesis.

In the studies of the land flora, a major work recently completed was the identification of plants collected on the 1939 Simpson Desert Expedition. A survey is also being made of the distribution of the vegetation in relation to soil types in areas of the Mount Lofty Ranges. Besides active, specific determinations of the extensive marine algal flora of the State, ecological and distributional studies in relation to environmental conditions are being carried out around Kangaroo Island.

DEPARTMENT OF CHEMISTRY

Over the past decade several groups of naturally occurring terpenes and their derivatives have been investigated here in the Johnson Laboratories. Most of these compounds have presented complex stereochemical problems. Much knowledge concerning the nature of such problems has been acquired from a detailed survey of epimeric substances of the cyclohexane series. Work of this nature constitutes the bulk of the research being carried out this year.

Methyl cyclohexane–2–carboxylic acid has been isolated in the *dl* cis and *dl* trans forms, and attempts to resolve these compounds are being made. Similar research is being carried out on the 3-carboxylic acid. The 3–methyl cyclohexylamine is also being investigated with a view to the isolation of the *d* and *l* cis and trans isomers. The proportion of cis and trans isomers yielded by a Ponndorf reduction of the three methylcyclohexanones is being studied.

Several new methods of optical resolution are being investigated. A resolution of trans 3 methylcyclohexanol through its N-methylphthalamates is being attempted, and to date appears successful. The possibility of using N–menthyl isophthalamic acid and ρ menthyl suphonyl benzoic acid as resolving reagents for alcohols is also being studied. Work on cryptone a ketone isolate from water fennel and oil of *E. cneorifolia* and *l*-cis cryptol has been prepared for the first time.

This year has seen the opening up of a new field of organic research in this department. This is the attempt at the isolation and subsequent identification of an anthocyanin which is believed to constitute part of the colouring matter of Azold. So far a phlobotannin and a substance giving anthocyanin reactions have been isolated. The separation of these two components is at present providing some difficulty.

In the field of inorganic chemistry research on an efficient method of accurately assaying beryllium is being carried out. This is an interesting subject, as beryllium has found an important place in modern metallurgy, and it is hence necessary that many quantitative estimations of the beryllium content of naturally occurring deposits of beryl, etc., are carried out so that Australia may exploit this metal to the full.

In the physical chemistry branch three main topics form the bulk of the research work. Firstly, an attempt to correlate surface area of small particles with rate of solution is being made. The work is tedious, but progress is being made, and it is hoped that results obtained may eventually find application in soil chemistry and other subjects where particle area plays a prominent rôle.

The second topic falls under the heading of colloid chemistry. Here work is in progress to ascertain the pH at which various acids coagulate platinum and gold sols. Theoretically, all acids should coagulate a given sol at the same pH; in practice this is not found to hold. Later in the year further work on colloidal nickel will be carried out.

Plans for research into the fission products from the nuclear bombardment of chemical compounds are being made. So far, no laboratory work has been carried out. The significance of this work is all too obvious in view of the advances made in atomic physics during the war.

All told, a considerable amount of original work is going on in this department, considering the heavy demands made on staff and two honours students by the greatly increased numbers of undergraduates.

DEPARTMENT OF PHYSICS

In spite of the work required of them to demonstrate to practical classes, to correct weekly class exercises, and to give tutorial instruction to the increased number of students, members of the staff of the Physics department are managing to find time for research on several different projects.

The Hilger spectrograph is being used at present for a study of the spectrum of Uranium. It has been successfully applied in both a qualitative and quantitative analysis of Uranium ores—a method which an eminent authority pronounced to be "unsatisfactory"—and an attempt is being made at the problem of the term analysis of the Uranium spectrum. To assist in this, a method of obtaining an under-water spark with Uranium electrodes is being developed. The spectograph is also being employed in the quantitative analysis of the small amounts of K, Na, Ca, Mg, which occur in blood plasma, in callaboration with the Physiology department which is interested in the development of a technique for the determination of small changes in the amounts of these elements.

Another investigation is being carried out into the properties of low loss magnetic dust cores. The P.M.G's. department is interested in this work from the point of view of the possible use of such cores as chokes at telegraph carrier-frequencies. To prepare the materials, the high frequency induction vacuum furnace is being used, since the alloys required contain aluminium, and must therefore be melted in a vacuum to avoid oxidation.

In another research laboratory apparatus is being constructed for use in the counting of neutrons. This will be used to study the adsorption and scattering of "thermal" neutrons in neutrons whose velocities have been reduced to the same order of magnitude as those of molecules at ordinary temperatures.

In collaboration with the C.S.I.R. section of Trilsophysics, the electron-diffraction camera is being used to study the behaviour of films of organic acids on metals, and especially in respect to the temperature of disorientation of these films. A "Langmuir trough" has been set up to enable deposition of monomolecular films of these substances on metal surfaces. The results of this work should help to explain some of the problems involved in "boundary lubrication".

Research is also being initiated into the field of dielectric heating of materials, the application of which to dehydration of vegetables has previously been demonstrated. A magneto-striction type of high frequency oscillator is also under construction.

DEPARTMENT OF PHYSIOLOGY

Dr. F. Lippay and Mr. B. J. Potter, B.Sc., are investigating physiological and pharmacological reactions of blood vessels under varying physical and chemical conditions. Vessels such as the Mesenteric Artery of a horse are suspended and perfused with Tyrode solution of body temperature. Factors like perfusion rate, perfusion pressure, oxygen tension, and chemical composition of the perfusion fluid are varied, and the reactions of the vessels are recorded by means of a special oncometer, either mechanically or optically. The experiments will be extended to vessels *in situ*.

Dr. Lippay, Mr. Potter and Mr. W. D. Brown, B.Sc., are investigating the effects of certain drugs on the plain muscle fibre. In these experiments isolated strips of suitable plain muscular organs are immersed in perfusion fluids at body temperature. Some of the experiments will be done on anaesthetized animals.

Electrophysiological experiments on the stimulating effects of currents of extremely short duration are being extended to still shorter shocks (duration less than 10^{-6} sec.) by Dr. Lippay and Mr. Potter.

Dr. M. H. Draper and Mr. R. S. Edgar, M.Sc., are working on electronic methods of recording biological activity. At present their interests are centred mainly on the recording of brain potentials.

Miss S. Neale, B.Sc., is conducting work on the isolation of Choline Esterase, a substance of great interest in experimental neurophysiology. Later this substance will be used in conjunction with electronic recording to attempt to investigate further problems of nervous integration.

Mr. D. I. B. Kerr is checking by physical methods the biological standardization of Choline Esterase activity, and has constructed a polarograph for this purpose.

Dr. W. A. Dibden is investigating Anxiety States, with special reference to those produced as a result of war service.

DEPARTMENT OF ZOOLOGY

One field which has engaged attention for many years past is the investigation of the life histories of the various Trematode parasites of Birds, Reptiles, etc., particularly those from the lower Murray. This involves the regular collection of various kinds of molluscs occurring on the Murray and associated swamps.

The various types of larval Trematodes are being carefully studied by Miss Beckwith, and attempts made to ascertain experimentally the succeeding stages occurring in vertebrates. Attempts have also been made to infect pond snails with the eggs of flukes obtained from local Fish, Reptiles, and Birds. The life history of the Sheep live fluke in South Australia has also been investigated, and its transmitting snail is now known.

Ectoparasitic Trematodes from the gills of Fish, as well as Acanthocephala and tapeworms from various hosts are also the subjects of active research in the Department by Misses Sanders and Clark, and Messrs. Frith and Edmonds.

The anatomy and life histories of various parasitic nematodes have also been investigated.

A report by Miss Neale on the lephalodiscida of the B.A.N.Z. Antarctic Research Expedition is nearing completion.

The animal Ecology of the beaches and reefs extending from the Port River to Port Willunga is being carefully studied by a team of workers including Miss P. Mawson, Mr. S. J. Edmonds, Miss J. Liddell, assisted by some of the senior students.

THE HISTORICAL SCENE *(continued from page 56)*

A more complete enumeration of hypothalamic functions would be out of place. Through the autonomic nervous system the hypothalamus maintains the body's internal environment, being sensitive to certain specific stimuli. This sensitivity is accompanied by a vulnerability which accounts for a variety of syndromes now known to be due to disfunction of this area and the associated hypophysis. It is probable that modern life imposes strains upon the system which a more "natural" existence would never do. Environmental and mental influences may largely derange the maintenance of the internal equilibrium; as a result we have a set of disorders thrust upon us by city life and these tend to be characteristically hypothalamic in origin. High blood pressure, cardio-vascular diseases, gastro-intestinal disorders, vasomotor instability, insomnia and emotionalism are but a few of this group.

We age under the influence of the hypothalamus and this can be influenced by heredity and infection. At the shuffling off, this mortal coil is laid aside by a quiet refusal of the autonomic system to function in a co-ordinated manner one moment more.

The modern knowledge of the system is a far cry from Aristotle's cooling system for the blood. But in our crude attempts to find out what really happens we have not gone much further; a little more than the surface has been disturbed and beneath lies all the unknown factors with which psychology and psychiatry concern themselves.

With the autonomic in action we are an anmial organism, a body,

> "Which has so many rare and curious pieces
> Of mathematical motion";

we are ourselves. Without the autonomic all is ended,

"Sleep after toyle, port after stormie seas,
Ease after warre, death after life does greatly
please".

And what then is left beside the memories?

> "A little, winsome, wandering thing,
> Bosom friend and guest to-day,
> Wither now, my soul, away,
> Wan and cold, and unattended,
> All our former frolics ended?"
>
> (The dying Emperor Hadrian to his Soul).

"How about that book I lent you a month ago?" one friend enquired of another. "Why that book!" came the reply, "Er—let's see—I lent it to a friend. Did you really want it back?" "No, I didn't", replied the first, "but the man I borrowed it from says the owner is looking for it".

THE RALPH TATE SOCIETY

TO assist in the revival of the above Society, space was requested in our journal to bring to the notice of the Science Faculty and other kindred Faculties, the advantages to be obtained from membership in such a society. We were only too pleased to be of some assistance in fostering such an excellent society. [Editor.]

The Ralph Tate Society was so named to commemorate the memory of Prof. Ralph Tate, who was for many years most active in promoting the study of Natural History in S.A.

HISTORY OF THE RALPH TATE SOCIETY.

The Ralph Tate Society was formed in 1938. Dr. Frank Fenner, a graduate in Science and Medicine, who was most active in its inauguration, in an early meeting outlined the aim of the Society as being to provide opportunity for students and others to gain experience in co-operative field work in the various branches of Science.

The foundation members included members of the Staff of the University, and of the South Australian Museum, and students interested in field work. Dr. C. T. Madigan was chairman.

It was originally intended that some locality should be chosen for an excursion each year, and should be intensively studied from as many aspects as possible. Only three such excursions were held before wartime conditions made it advisable to discontinue them temporarily. These three were to Swan Reach, Deep Creek, and Flinders Chase. Dr. Madigan was in charge of all three, and, as indicated in his letter published below, not only was some useful work accomplished, but a good time was had by all.

The aim of the Society is not so much the working out of an area, as the training of the personnel; not so much the raising of new species as the raising of new scientists. Nevertheless, in the process of their training much useful work can be achieved.

The constitution provides for an advisory committee and an executive committee. The advisory committee comprises the Professors of Zoology, Botany, and Geology; among other things, it considers the applications for membership.

Of the executive committee in existence in 1940, those members remaining in the University consider that the time has come to revive the Society's activities. Its members are most anxious to hand on to their successors the minute book, receipt book, 19s. 7½d, and many tales of the glorious past.

The Hon. Secretary,

The Science Association.

Dear Sir.

It has been suggested to me by some of the old members that I might be able to help in the revival of the Tate Society. This I am most pleased to do, to the best of my ability, but at present I am handicapped by illness, and can do no more than write.

The Tate Society is a thing very dear to me, and I am thoroughly convinced of the great value to the University of such an institution from the experience of its past activities. It naturally lapsed during the war, owing to lack of time even in long vacations, when there were either classes to attend, or war work to be done by both staff and students, as well as the shortage of petrol and transport. The Society was a luxury not to be indulged in while austerity was the watchword, but now its revival should no longer be delayed.

An article is being prepared for the Science Magazine on the past history of the Society, so I will not dwell on that, but I hope this letter may be published in support of the article. The main object of the Society is to promote excursions to places of general interest for work in all branches of the natural sciences. This may sound to the uninitiated to be somewhat old-fashioned and elementary, like those excursions where old ladies and gentlemen go for a pleasant afternoon's walk to gather orchids in the park (an activity not to be despised), but the Tate Society is much more than that. In it the emphasis is always on original work. In the three excursions I have attended, material has always been brought back for further study in the laboratory; new parasites have been found, new localities for plants and animals have been discovered, new information gained on the rock formations of the area, new rock types finally described. In our first excursion we disproved the locally held theory that the big cave at Swan Reach came up in New South Wales. The engineers had a nice little survey job there in the dark and winding maze.

THE OLD CURIOSITY SHOP

THIS section is intended to keep all old members in touch with one another. It can only become larger and more comprehensive if members send in news of themselves and their jobs. The Editor wishes to apologize for any mistakes and/or omissions, but points out that the section can only become a complete record when all old members co-operate.

B.Sc.'s, 1945

HAZEL ASHBY (1942–1945), Botany. Married Dr. M. Woodruff, Lecturer in Pathology at Melbourne University, earlier in the year and is now in Sheffield (England) with her husband.

SHIRLEY BADMAN (1943–1945), Bact. Demonstrating in Bacteriology Department.

COLIN BOWES (1943–1945), Chemistry, is at Maribyrnong, Victoria, working on corrosion.

DON. BOWES (1943–1945), Geology, is taking Honours in Geol. this year.

WARREN BURFORD (1943–1945), Chem. Spent the first few months of the year with S.A. Railways at Islington. Now with I.C.I. at Osborne.

STUART BUTLER (1943–45), Physics. Is a demonstrator in Physics Dept., and is taking Honours. Working on the determination, by spectra-graphic means, of minute traces of metals, e.g. in blood.

BRIAN CLARKE. High School teacher in Education Dept., at present teaching science subjects at Peterborough High.

MARGARET COLES (1942–1945), Bact. Is Allergy Biochemist at Perth Hospital (W.A.); is reported to be having a wonderful time in the West.

DOROTHY CULVER (1942–1945), Bact. Is working at the Institute of Med. and Vet. Science.

LES. DARLING (1942–1945), Chem. Is a demonstrator and doing Honours in Organic Chemistry.

ALAN DAW (1942–45), Physics. Is a demonstrator and taking Honours in Physics.

BRIAN DOHNT (1943–1945), Chem. Is at Faulding's Laboratories.

MARGI EGLINGTON (Chem.) Is working at Burford's Soap Factory at Dry Creek.

BETTY EVERARD (1943–45), Chem. Secretary of Science Assoc., 1946. Is taking Honours in Organic Chemistry and doing a certain amount of Demonstrating in between learning the technique of Microchemistry.

PEG. FRAYNE (née Ambrose). Has left the ranks of the Botany Dept. and has joined the home front.

LEO GALVIN (1942–1945), Zoology. Is a Demonstrator in Zoology Dept.

HAROLD HACKWORTHY (1941–1945), Chem. Is back in his beloved Tassy at Aust. Paper Manufacturers, Burnie.

BRIAN HANNAFORD (1943–45). Is picking up a few Arts subjects before starting High School teaching in earnest.

JOAN HARRINGTON (1943–45), Bact. Is studying bacterial souring of milk at Institute of Med. and Vet. Science.

MARY HONE (1942–45), Botany. Is a Demonstrator in Botany Dept., and is taking her Honours Degree this year.

ROGER IRVING (Chem.) Is doing Honours in Chem. investigating the separation and properties of beryllium compounds.

LLOYD JACKMAN (1943–45), Chem. Doing Honours in Organic Chemistry.

JOHN JACKSON (1943–45). Physiology. Has started 2nd Year Medicine—his lifelong ambition, and is also dabbling in the Arts.

DON. JOLLY (1943–45), Physics. Is a demonstrator in Physics while waiting for a job at Phillips.

KELVIN JONES (1943–45), Chem. Was working Gen. Electrolytic Zinc in Tasmania. Now with C. A. Smythe, Consultant Chemist.

JOHN KEEVES. (1943–45), Physics. Treasurer 1945, Committeeman 1946, Secretary Men's Union 1946, and also a tireless W.S.R. worker. Is another Demonstrator in Physics Dept., and is taking Honours this year. Has been working on Raman spectra.

ROY LEWIS (1943–1945), Chem. Is now teaching Science at Adelaide High School.

MAURICE LOCK (Physics). A Teacher's College man, now stationed at Kapunda High School teaching science.

JOHN LOUTIT (1942–45), Bact. Working on a Research Grant under Miss N. Atkinson in a search for bigger, brighter, and better antibiotics. Understands Geraldton wax flowers and mushrooms perfectly.

SIBLEY McLEAN (1943–1945), Bact. Is a Demonstrator in Bacteriology Dept.

DEANE McPHARLIN (1942–45), Physics. Is also taking Honours in Physics.

BETH McPHIE (1942–45), Bact. Clinical Pathologist for Dr. McLachlan, and is also doing some teaching.

MAURICE MARTIN (1943–45), Chem. Is doing Honours in Physical Chem. on methods of particle size analysis before commencing teaching.

MARGARET MATTNER (1943–45), Botany. Vice-President 1945, Secretary Women's Union 1945. Is a Demonstrator in Botany Dept., and is taking Honours in Plant Physiology.

FRANK NANKIVELL (1942–45), Physics. Is another man demonstrating and taking Honours in Physics. He has been working on the electric induction furnace.

REG. NICHOLS (1942–45), Chem. Is working with Tarac Ltd., producing cream of tartar from wine-making wastes.

MURRAY NICHOLSON (1943–45), Chem. Is working for the Packing Shed at Berri.

BILL PITCHER (1942–45), Chem. After a time teaching at Scotch College, and later at a paints works, is now in the Research Laboratory of the Vacuum Oil Co. in Melbourne.

BERESFORD PITMAN (1940–45), Chem. Still in the Education Dept. teaching.

BRIAN POTTER (1941–45), Physiol. Doing Honours in Physiology studying arteries, etc., and is also doing some Demonstrating.

REN. POTTS (1943–45), Physics. Men's President S.C.M. 1946. Is doing Honours in Maths.

BRYCE RANKINE (1943–45), Bact. Is working at Faulding's Laboratories on the production of penicillin.

MAX RAUPACH (1943–45), Chem. Doing Honours in Phys. Chem. Working on pH of coagulation of colloidal platinum.

DAVID SANGSTER (1942–45), Chem. Science Assoc. Committee 1943, Treas. 1944, Secretary 1945, President 1946, Union Chairman 1946, etc. Is Demonstrator in Physical Chem. and doing Honours. Hopes to work on neutron bombardment of chemical compounds.

JOHN SIEGELE (1943–45), Chem. Is working in Seppelt's Winery at Nuriootpa and is also doing a few oentology subjects at Roseworthy College.

GEOFF. SIMMONS (1942–45), Bact. Has been appointed Assistant Lecturer in Bact. at Queensland University.

RAY SPECHT (1943–45), Botany. A Teacher's College man who is doing Honours in Botany on Ecological work.

GEORGE SWEETAPPLE (1942–45), Chem. Is a Road's Scholar with Highways Dept., testing tars and rocks, etc.

CLAIRE SYMONS (1943–45), Botany. Demonstrating in Botany Dept., and taking Honours in Plant Physiology.

PHILIP TARDEW (1942–45), Chem. Has left Beckers and is now with Electrolytic Zinc in Tasmania. Rumour hath it that he and "Wacka" Weiss just could not be separated.

BRUCE WALTON (1943–45), Physics. Demonstrating in Physics and is doing Honours.

DON. WEISS (1942–45), Chem. Working for Aust. Paper Mills at Burnie in Tasmania.

CHRISTOBEL WILLIAMS (1942–45), Botany. Doing Honours in Botany on nitrogen metabolism in plants, and also a spot of teaching.

JOHN WOMERSLEY, Botany. Has left the Education Dept. and is now an Assistant Research Worker for C.S.I.R. on soil survey at Waite Research Institute.

HONOURS, 1945.

JOHN PRESCOTT (1942–1945), Physics. President Science Assoc. 1945, Chairman W.S.R. Appeal 1946. Is now a Demonstrator in Physics Dept. and intends working on radioactive studies, notably those involving neutrons.

JOHN SYMONDS (1941-1945), Physics. After a brief sojourn in Radio Physics Dept. of C.S.I.R. in Sydney, where he undertook some investigations on the Linear Accelerator, is now in Birmingham on a C.S.I.R. overseas scholarship.

BILL BECKWITH (1942–45), Phys., Chem. Is an Assist. Research Officer at the Waite Institute. Has been investigating determination of copper and molybdenum traces.

JACK NOBBS (1940–45), Phys. Chem. Back in Munitions, this time at Maribyrnong. Rumour hath it he has his beloved spectrograph to play with.

DAVID SIMMONDS (1942–45), Org. Chem. Has been appointed lecturer in Pharmaceutical Chem. and is working on cis-trans isomerism in organic compounds.

BASIL LEWIS (1942–45), Geology. Is now prospecting at Kalgoorlie (W.A.) for Dept. of Mines.

ALICK WHITTLE, Geology. Is evening lecturer in Geology Dept.

ANNE BECKWITH (1941–45), Zoology. President Science Assoc. 1944. Is lecturer and demonstrator in Zoology Dept., and is doing some research work.

STAN EDMONDS (Zoology). Is researching in worms, etc., in Zoology Dept. in between his job as Senior Science Teacher at Adelaide High School.

WARWICK BROWN (1941–1945). Physiology. Treasurer 1943, Vice-Pres. 1944. Is Tutor at St. Mark's College in Physiol. and is working in Physiol. Dept. Shortly moving to Dept. of Physiology, Birmingham.

PETER HUMAN, Organic Chemistry. A Graduate of Perth University. Obtained his Honours degree in March of this year, and is now a research worker and Demonstrator in the Chem. Dept.