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EDITORIAL

We are sure that members of this Institute welcomed as wholeheartedly as we did the announcement of Dr. F. G. Soper's appointment as Chemical Adviser on Munitions, and chairman of the Chemical Panel of the Scientific Advisory Committee. We congratulate the Government on its decision to make such an appointment and on its selection of the right man, and we wish Dr. Soper every success in a position which carries both opportunity and responsibility.

One early fruit of this development which we are particularly pleased to see is the opportunity which is now given to New Zealand Chemists who are able and willing, to play a part in the production of munitions on the scale needed in modern war, in this corner of the world. Since our industry is insufficiently developed as yet, it is certainly common sense to send our men where they will be most useful. Australia has the resources, we can help to supply the men, and we have no doubt at all that the number required will be found. Many will wish to go and thus achieve the satisfaction of direct service in this struggle, whom it will be impossible to permit to leave their present positions. This applies especially to men whose contributions to various manufacturing enterprises are essential to the maintenance of the standard of efficiency the country has the right to demand in a crisis, and to men holding key positions in the various research organisations. But apart from the work they are already doing, there is surely no end to the help trained minds which are in touch with industrial problems can be, to those who are directing New Zealand's War Effort. In this connection we were deeply impressed by the leading article in the Australian Journal of Science, of February 21st, which discussed Australian science and the war.

The writer sees three reasons for the failure to achieve full application of Australian science to their war effort. Firstly there has been a tendency to expect a lead from the politicians as to where research is needed and what problems are to be solved. It is suggested that the initiative must come from the scientist. Secondly, no machinery has been set up through which problems arising out of the war can be transmitted to the scientist and his ideas put before the appropriate department. Thirdly, there is the difficulty of locating precisely the problems which hold up production.

No doubt these factors have been important in New Zealand also. But we feel sure that New Zealand chemists will not be wanting in initiative and will be in no way backward in seeking and solving problems. Now that the machinery is working to provide them with the specifically war problems, we have no doubt they will respond to any calls made on their capacity and experience.

DEMOCRACY AND SCIENCE.

Those who are usually referred to as "the older generation" fought a war which was described by Woodrow Wilson as being "to make the world safe for democracy." While there may be room for difference of opinion as to the accuracy of this description, at least if it was intended to define the war aims of the allies at the time, the point has become academic and may be left to the historians. There can be little doubt that this second World War involves nothing less than the defence of the democratic way of life, and that that way will disappear if we lose. We believe that this is a matter of front rank importance to scientists, in addition to their concern with it as citizens. For science as we understand it is unthinkable in a world in which the fundamental principles of democracy are denied.

Those principles are simple. Democrats maintain that the individual should have rights which he can claim from the state. Nazi political theory claims that the individual is "subservient to the Whole," is a means and exists for the state. Democrats believe that the best way to proceed in matters of politics is by the use of reason; in other words that objectivity is necessary. This position is similar to that of the scientist, and in both spheres it rests on an act of faith, since the decision for instance to adopt scientific methods as the best available for arriving at explanations which fit the facts, can not be proved right, or in its turn defended by scientific methods. So also we cannot prove that objectivity should be a fundamental attitude in politics, but only point to the results of its denial, that political irrationalism and mysticism which leads its devotees to dependence on force to overcome opposition. The democrat claims the right to decide for himself what are the ends of his existence. Believing in freedom and equality, his belief in these things is not conditional upon the beliefs of others. If the majority appear not to want democracy, he does not surrender his belief but hopes that by discussion and argument, enough other people may be convinced that his attitude to politics is the best, to render collective action possible.

We think that these things may be said also of science. Science, that is, is democratic. That the Nazis recognise this is shown by the fact that they claim to have set up their own "Nazi Science," in which objectivity is specifically denied. More particularly in the biological and social sciences results must be obtained which glorify the German "race" and justify its claim to dominate. If the scientist's conclusions are laid down in advance in such a fashion, his thought is robbed of its spontaneity and freedom. "Nazi Science" is a travesty.

Scientific workers cannot avoid being concerned with the fate of democracy. More than this, there is every reason for them to be concerned with the problems of democratic government. Government involves the concentration of power. In democratic governments, unlike authoritarian ones, power is not an end in itself, indeed it is rather a danger to the accepted ends. The central problem of democracy is that of controlling the power of the state. In practice three methods of control have been devised; institutions such as elections which provide the means of dismissing those who have misused power; the balancing of one power against another, as in the right of appeal to a higher court; the preservation of the right of criticism, by means of free speech and a free press. There is no doubt that some of these institutions can be improved and strengthened but the fact that some of them are not as efficient as they might be is no valid reason for their abolition. Reform of democracy must be in the direction of more democracy.

We may say then that the art of being ruled is the art of providing adequate checks on power. Such checks are only possible in a democracy, and the fact that democracy can be improved is what makes it worth fighting for. This Institute is a democratic institution, one of the many institutions which go to make democracy what it is. It is a free institution, chemists do not have to belong to it, they do not have to agree with its president, for he is a president, not a Leader. They can change its nature and its function, but only by convincing enough of its members that the change is desirable. These are good things. We believe they are worth defending. Those who believe, as we do, that the continuance of democracy is essential to the survival of objective scientific methods can do much, even here on the Home Front, to defend and propagate their beliefs. They can expose and counter any propaganda or public statements which are subversive of democracy, and oppose the actions of any organisation which are detrimental to it. But before such activities can be properly performed, democrats must be clear in their own minds as to what is primary in democracy. We believe that the essentials are few and compatible with more than one form of government. Moreover we hold strongly that the institutions of democracy can do with the most careful scrutiny by people with scientific training.

COUNCIL MEETING

A meeting of Council was held on the 15th of May. Those present were Professor Soper (in the chair). Messrs G. S. Lambert (Wgtn.) R. L. Andrew (Canty. Proxy), P. White (Auckland Proxy) and J. A. D. Nash (Hon. Secretary).

The following items were discussed:—

Practical Examination Fee.—It was decided to ask Mr. A. D. Monro for a recommendation as to what fee should be charged.

Leave of Absence.—Miss A. E. Lorimer and Mr. R. W. Munro were granted leave of absence while serving overseas.

Election of Associates.—The following were elected: Mrs. J. G. Freeman, Messrs G. J. Sutton (Auck.), D. H. Freeman (Wgtn.) Dr. R. J. McIlroy and Mr. E. R. Hounsell (Canty.) and Mr. W. S. Metcalf (Otago).

Centennial Publication.—The secretary was instructed to convene a committee to edit the papers and proceed with publication forthwith. It was decided to print 500 copies—the price to the public to be 2/6.

Address.—In order to provide the Institute with a permanent address it was decided to hire a Post Office Letter Box.

Next Conference.—Discussion of the time and place of next Conference was deferred to the next meeting in August.

Import of Chemicals.—The following remit was received from Canterbury: "That a recommendation be made to Council to suggest to the proper quarter, that the advice of a properly trained chemist be sought in matters relating to the import of chemicals of a suitable purity for research work."

It was decided to make enquiries as to the position in regard to the import of chemicals.

Use of the Title Chemist—The following remit was received from Wellington: "That the Council draw the attention of the Public Service Commissioner to his recent advertisement in the daily press inviting applications from chemists to perform pharmaceutical duties in connection with the Social Security Act, and that it be suggested that he should use the word "pharmacist" in future. It was decided to take appropriate action.

Testing of Lime and Fertilisers.—A letter was received from the President (Dr. Gardner) suggesting that the Institute should make representations asking that provision be made in the proposed Lime Act for frequent analyses to be made and that these analyses should be done by members of the Institute.

After considerable discussion, during which further points in regard to the Acts were brought up, it was decided to refer the matter to Dr. Gardner for his further consideration.

Best Use of Chemists.—The following remit was received from Auckland: "Owing to the present serious shortage of industrial and analytical chemists in New Zealand, this committee recommends that those chemists liable for military service be reserved for essential industries, Government service, or military work where their specialised knowledge can be used. Chemists engaged in non-essential work should be transferred to more essential industries. The committee recommends further that the Council be asked again to bring the matter before the authorities and also to explore the position in Australia where there is also reported to be a shortage of chemists.

Professor Soper, who is Chemical Adviser on Munitions, assured the meeting that the position was being watched very carefully. Also in view of the Australian request for chemists the remit was received.

COUNCIL, 1941.

President: R. Gardner.

Delegates:— F. H. V. Fielder, Auckland.
G. S. Lambert, Wellington
M. M. Burns, Canterbury.
F. G. Soper, Otago.

Secretary: J. A. D. Nash, Dominion Laboratory, Wellington. or P.O. Box 250.

Branch Committees:

Auckland:

Chairman: F. H. V. Fielder.

Hon. Secretary: R. T. Danvers, C/o Thompson & Hills, Nelson Street, C.1.

Committee: J. Ricketts, J. C. Andrews, L. H. Briggs. K. M. Griffen.

Wellington:

Chairman: J. B. Hyatt.

Hon. Secretary: M. B. Rands, C/o Dominion Laboratory.

Committee: Miss B. Wall, J. K. Dixon, E. S. Borthwick, G. S. Lambert.

Canterbury:

Chairman: L. W. Ruddle.

Hon. Secretary: A. F. Adams, Lincoln College, Lincoln.

Committee: M. M. Burns, H. C. Holland, J. Packer, T. W. C. Tothill.

Editor of Journal: H. N. Parton, Canterbury College.

Otago:

Chairman: T. A. Thomson.

Hon. Secretary: M. V. B. King, Physiology Dept., Medical School, King Street, Dunedin, C.1.

Committee: F. G. Soper, R. Gardner, H. L. Longbottom, R. V. Peryman.

Need for Chemists in Munitions Work in Australia.

Owing to rapid expansion of munitions industries in Australia, there is at present an urgent and immediate need there for a number of graduate chemists. It is felt that a portion of this requirement may be filled by New Zealand trained graduates, with three or more years University training in Chemistry.

It is unnecessary to urge the importance of this work for which chemists are now needed. In some cases, however, it is realised that services in New Zealand cannot be dispensed with. This aspect will be given full consideration by the Committee considering applications.

Particulars will also be advertised in the press, but immediate application is necessary.

BRANCH NOTES

AUCKLAND BRANCH

The first address of the year, by Sir Theodore Rigg, had to be postponed and a report is thus not available for publication.

[Editorial Note: Apart from this, no one in Auckland is doing anything except work, and however much we appreciate such devotion to duty, the failure of Auckland's lamp to shine nearly precipitated a crisis in editorial circles. The Branch must take the blame for the resulting increase in the length of the Editorials.]

WELLINGTON BRANCH.

The Chairman, Mr. J. B. Hyatt.

Mr. Hyatt, who has been a member of the N.Z. Institute since its inception, received his early education in England, where he attended Whitgift Grammar School.

Later, in 1917-18, he served with H.M. Forces.

In 1924 Mr. Hyatt graduated B.Sc. (Agric.) London, from the South Eastern Agricultural College. In the following year he left for New Zealand, where he spent a year at close quarters with New Zealand farm life.

He was appointed to the Dominion Laboratory in 1926. Since then, with intervals in which he was engaged in fruit investigational work, Mr. Hyatt has proved his worth as bitumen control chemist, in which position he has built up the laboratory in which today a great number and variety of the materials which form our Highways are tested and developed.

In his Chairman's Address, Mr. Hyatt discussed "The Technical Status of Existing Methods for the Examination of Bituminous Highway Materials—some Difficulties and Anomalies."

He said that the study of bituminous materials had made a spectacular advance during the last two decades. The chemical-physical complexity of bitumens and tars is responsible for the slow development of methods of examination from the purely empirical to a stage where underlying principles are becoming more appreciated. The critical nature of methods for these empirical tests is very important, but over-standardisation is to be guarded against. In the case, however, of the test for penetration, which has been placed on a more scientific basis than formerly, the necessity for many of these often irksome restrictions as to detail has been removed.

The approach of the penetration test to the scientific threshold is largely due to workers who have shown the test to be dependent, not on viscosity or hardness alone, but also on plasticity, or non-Newtonian flow which, from the viewpoint of behaviour in the field, may be of as much importance as viscosity itself. Although the penetration test is not entirely scientific, it is particularly useful for checking uniformity of supply and assessing the grade of a given bitumen. The viscosity range of highway materials is enormous, and is covered by three types of commercial viscometer.

The range may be compressed considerably by utilising higher test temperatures, but such a compromise is unfortunate in that the service temperature is often far removed from the test temperature. However, this method of increasing the range of a viscometer is the only scientific one, and within limits viscosities at other temperatures may be arrived at by extrapolation from a double logarithmic curve, viscosity against temperature.

The design of a suitable test for the breaking point of bitumen emulsions has provided a certain amount of controversy. The rise to popularity of these materials in recent years has resulted in many efforts to provide significant tests for them, and in this respect the endeavour to assess in the laboratory the potential demulsibility of the binder in contact with the road surface, has lead to a great number of conflicting requirements. The two essential properties of an emulsion are, firstly, that it shall be sufficiently stable to remain unbroken for weeks in storage, and secondly, that it shall break as quickly as possible after application to the road.

The British Standards Institute has officially adopted an evaporative method, the "Lability" test, but this is not an entirely satisfactory test owing to the difficulty of determining the point at which a fragment of evaporation residue fails to mix with a slight excess of water when rubbed out on a glass plate. The most generally accepted treatment of emulsion for the recovery of the bitumen content has been by distillation, but it is doubtful if the properties of the recovered binder are the same as the original. An alcohol precipitation method has been used successfully and appears preferable to the distillation method.

The recovery of bitumen from solvents presents a problem for the complete understanding of which some knowledge of the colloidal nature of the asphaltic petroleum products is necessary, as unless peculiar precautions are observed, such as distillation in CO_2 or in vacuum, efforts for removal of the solvent may result in profound changes in the physical properties of bitumen binder Coal tar may be added to bitumen either as an adulterant or as a flux for the purpose of reducing viscosity. The object of adding bitumen to tar would be, firstly, to increase the viscosity of the latter and, secondly, to decrease its susceptibility to changes of temperature.

In the evaluation of these mixtures, qualitative chemical tests for tar offer little difficulty, but no reliable quantitative method has been devised. With the detection and estimation of bitumen in tar, the position is more unsatisfactory as no chemical method, qualitative or quantitative exists. The problem has been partly met by the use of selective solvents, but with the most recent methods, only reasonable accuracy is obtained up to 50% of bitumen, and the greatest accuracy is obtainable only up to 20% of bitumen.

Many of the routine laboratory tests come under the heading of "accelerated" tests, but they are often unsatisfactory. On the other hand, field tests are slow, consequently an accelerated road test has been devised by the Road Research Board in which a 10-ton chassis is driven electrically round a circular track 110 feet in diameter, on which the experimental road mixtures are laid. Recently a study has been made of the finished product of a road surface, and tests to determine hardness, stability, tensile and shear strength, have been developed by the Road Research Board, and a beam test is now proving a useful tool of the research worker

CANTERBURY BRANCH.

The Chairman.

The Chairman for 1941 is Mr. L. W. Ruddle, a director of H. F. Stevens Ltd., Manufacturing Chemists. With some difficulty he was persuaded to say that he was educated at the Christchurch Boys' High School, and entered pharmacy under the mistaken idea that it is chemistry. Before becoming qualified, he went to the Great War, and on his return continued in pharmacy for several years. Then he joined Messrs H. F. Stevens Ltd., and does their analytical work and some consulting work as well. After being a "silent member" for some years, Mr. Ruddle has come forward recently as a lecturer with some interesting things to say about the subjects nearest his heart, and has addressed the Branch on "Milk," "Fixed Oils" and "Alkaloids."

For his chairman's address, Mr. Ruddle discussed many aspects of the development of pharmaceutical chemistry. He began by recalling that at a conference about 1930, the President of the Pharmaceutical Society announced that by law the term chemist was confined to pharmacists in New Zealand and that Professor Easterfield could be prosecuted and fined to the extent of £5 per day if he continued to call himself a chemist. So far there do not seem to have been any prosecutions under this law.

Pharmacists occupy an important and very often overlooked place in the community, though they share the latter disability with members of our own institute. The medical and dental professions are strongly combined and are, in consequence esteemed more highly. This is especially clear in the Army where medical practitioners and dentists are commissioned, pharmacists revel in two or three stripes, and chemists rank as cannon fodder.

Early chemical researches were directed towards finding the Philosopher's Stone which was to convert base metals into gold (success being claimed in Christchurch some years ago), and the Elixir of Life which, though officially given up some centuries ago, still has a lease of life if one believes all the advertisements one reads. In their investigations many chemical substances were found, and many present day remedies are of ancient lineage. In Egypt, about 1500 B.C., some seven hundred remedies were in use, mostly derived from indigenous plants. It is estimated that 30% of the crude drugs in the modern pharmacopoeia were known to antiquity. The forerunner of the modern pharmicist was the apothecary, but the word translated thus in the Old Testament is more correctly translated perfumer. In 1540, the physicians were empowered to enter the apothecaries' shops to examine their wares and the fitness of their drugs. This was known as garbling, and an old wood cut shows four garblers examining a shop occupied by three workers, apparently the forerunners of present day inspectors. In 1609, garbling was claimed to be a burden on trade, and an act was passed exempting export goods from such inspection.

In 1606 the apothecaries formed a common guild with the grocers, who also imported, compounded and dispensed drugs. This proved unsatisfactory and in 1617 the apothecaries were granted a charter giving them a monopoly of keeping apothecary shops. By 1700 the chemists and druggists had come into existence as a separate group, and the apothecaries were perturbed by the encroachment on their preserves. These old time apothecaries made their own tinctures, infusions, etc., but today this work has passed to the manufacturing druggists.

Pharmaceutical chemistry is a truly remarkable subject with its latinised names, often given centuries ago. Many of them are extremely confusing.

Mr. Ruddle discussed some of the compounds used in pharmacy and remarked that aspirin, paraffin and glucose-D are the chief selling lines.

A hundred years ago there was still in use in England a text book of materia medica, in which every portion of every animal and plant had a place, and was claimed to have therapeutic value. The moss of dead men's skulls was a much vaunted remedy, but suffering humanity had to keep on suffering when the source of supply, the battle field of Culloden, was cleaned up. Today we have our gland therapy, a field in which valuable discoveries have been made, but claims also which are pure quackery.

The April meeting was addressed by Dr. I. E. Coop, who graduated from Canterbury College in 1936 and did research at Oxford for two years in the field of dipole moments and then studied biochemistry at Cambridge. He said that the study of the vitamins began when it was first realised that certain diseases, namely scurvy, beri-beri and rickets were due to dietary errors. Before that time cures for these diseases had been evolved on purely empirical grounds. The combined attack of these observations, the experimental production of the diseases in animals and the growth rates of animals on synthetic diets finally established the existence of the vitamins as we now know them.

The methods for determining the vitamins quantitatively were then dealt with, beginning with the fundamental method of biological assay. The graded dose method was explained, using growth rates or more specific variables such as keratinisation calcification, heart rate, etc, as the phenomenon under investigation. The introduction of chemical and physical methods for determining the vitamins was a great improvement on the more laborious and expensive biological method. The vitamins were then treated individually and the symptoms arising from their deficiency explained in detail. The natural and now synthetic sources of them were mentioned and the isolation of the pure substances, their chemical properties and constitution was explained. The requirements per diem of the various vitamins and their storage or otherwise in the body were discussed. After discussing the well-known vitamins, the differentiation of the B2 complex, and the properties and effects of its constituents were explained.

Finally, considerable stress was placed on our increasing knowledge of the mode of action of the water-soluble vitamins. The function of vitamin B1 pyrophosphate as co-carboxylase in carbohydrate breakdown, especially in the oxidation of pyruvic and lactic acids was explained. In addition, the complex mode of biological oxidation, involving dehydrogenases coenzymes, flavoproteins and the cytochrome system was explained as simply as possible. How the pellagra preventing principal, nicotinic amide, fits into the scheme as a constituent of the coenzymes and the importance of lactoflavin as a constituent of coenzyme III and as the prosthetic group of flavoproteins was then shown. Whilst our knowledge of the mode of action of these vitamins had progressed very considerably, that of the fat-soluble ones remained very obscure.

OTAGO BRANCH.

Mr. T. A. Thomson is again chairman of the Otago Branch and his address on April 16th was "About Balances."

He said that microbalances can be divided into two clauses:

1. Those of orthodox construction using knife edges working on bearings.
2. Other microbalances.

The first class has been mostly used for organic elementary microanalysis which work demands a load capacity of approximately 10 gms and a sensitivity of 0.001 mg. Such a large weighing range causes difficulty in operation when high reproducibility in weighing is desired. It is obvious that in work of this nature the adjustments of the knife edges and bearings require an almost incredible degree of accuracy.

Again formidable errors occur from variations in air density (buoyancy) caused by alteration in barometic height and temperature. Unless care is taken to use counter-poises of correct design these effects must be considered and in extreme cases can cause errors up to 1 mg. Uneven heating of the beam will cause errors for, as the linear coefficient of expansion of beam bronze is approximately 20×10^{-6}, the magnitude of the error caused by a 0.05 degree Cent. increase in one arm of the beam is one part per million.

Errors due to rider inclination in the rider notches may be as much as 0.006 mg. for a deviation of an angle one degree from the perpendicular. Fortunately manufacturers of microbalances are alive to these difficulties and there is quite a spate of instruments embodying novel features—for example, both Oertling and Sartorius offer balances fitted with "beam protectors." The beam protector is a device to keep the beam relatively heat constant. Sartorius manufacture balances with cylindrical quartz riders which fit neatly into notches in the beam to eliminate the inclination error mentioned above.

Another manufacturer, Starke and Kamnerer, constructs a most unusual instrument having two sensitivities. These are controlled by the operator and permit weighings to 0.001 mg.

to be made in only three movements, thus reducing the time of working and increasing the durability of the machine.

Of the second group of balances Mr. Thomson described two: torsion balances and balances with electromagnetic compensation. The first torsion balance that gained much favour was that invented by Nernst which appeared about 1900. The beam is merely a light silica tube firmly attached to a silica fibre which combines the functions of knife edge and bearings. A pointer attached to one end of the beam passes over a scale of 200 divisions which is read with the help of a micrometer telescope. The strength of the silica fibre is so arranged that this scale indicates a range of 0.002 to 5 mg. By the use of counterpoises a maximum load of 200 mg. may be carried. This balance is little affected by heat changes and is very quick in operation, a special technique of analysis having been developed for it. The chief disadvantage is that the deflections of the pointer are not proportional to the overload, so the scale must be recalibrated should the supporting fibre be broken. Many of these disadvantages are overcome in the improved micro-balance of Emich and Donau which is a sort of hybrid between a Nernst and fine assay balance. The construction of the Emich balance is more robust than Nernst's instrument, the beam being of high duty aluminium alloy 7 cm. long and weighing 1½gm. The supports for the beam and pans are silica fibres 0.03 mm. in diameter. The pointer moves over an index scale of 100 divisions observed as in the Nernst balance. The total range of this instrument is as great as 0.001 mg. to 2 gm. A simple system of air damping is fitted. Among the many advantages of this balance are: constant zero with small heat effects; wide range; low cost; errors due to knife edges eliminated. The speed of operation is very high, a weighing to 0.001 mg. being made in 10 seconds and, as all the analytical operations are carried out in one container (virtually the weighing pan), saving in time is maintained, and many losses prevented.

The electro-magnetic balance of Emich employs an interesting principle. In balances of this type a small piece of totally magnetised steel is attached to the weighing pan hanger. By passing an electric current through a solenoid mounted axially over the magnet the weighing pan is raised by magnetic attraction. The current is varied by a coarse and fine rheostat until the balance pointer reads zero. The current then passing in the solenoid is measured by a precision milliammeter. In this instrument the overload in the weighing pan in directly proportional to the solenoid current. The Emich balance had a limit of sensitivity of 0.000005 mg. the maximum load being 5 mg. This balance has the great theoretical advantages of null instruments and Mr. Thomson showed figures of analyses by several workers who used the Emich balance. In one of these the average result of a copper determination was 25.39% (theory 25.45%). The initial sample in these analyses weighed approximately 0.005 mg. The lecturer said he had made some experimental balances of this type but with one tenth the sensitivity and found them convenient to use in practice.

On Tuesday, May 8th, Mr. P. White gave a very instructive talk on "The Chemistry of Tanning." Mr. White said that since the first recorded mention of leather, some thousands of years ago, many thousands of experiments had been made in every country of the world, and the empirical knowledge so gathered could not be lightly discarded. On account of restricted travel, each country had developed its own characteristic type of leather, using the raw materials available. For centuries Moroccan leather bad been and still was the finest book-binding leather in the world. It had now been found that the sulphuric acid produced by gas lamps, gas fires, and coal fires, was absorbed by the leather bindings and destroyed them; but there were buffer salts left in the Moroccan leather which prevented this.

Oak bark had been the principal tanning agent used in England until the spirit of adventure made available valonia, sumac, chestnut from the Mediterranean countries, myrobalans from India, gambier from the Malay States, hemlock from North America, quebracho from South America, mimosa or wattle bark from Australia, and in the last seven years extensive research had enabled the use of a tannin from the eucalypts of Western Australia.

The word "tannin" was a generic term and did not denote a specific material. Some tanning materials produced soft comparatively flexible leather, while other astringent materials produced hard, firm leather, so that much of the art of tanning depended on the successful blending of different materials. The astringency of a tan liquor decreased after a pack of hides had been through it. A soft or mellow liquor penetrated quickly into the hide, while the rate of diffusion was inversely proportional to the molecular weight. Further, a tannin with a great affinity for collagen would not penetrate far, and the affinity for collagen was related to molecular size; but other factors such as temperature, pH, and strength of solutions had a great influence.

A tannin could be described as a substance which combined with collagen in such a way as to render it imputrescible, even when moistened with water. Tannins were estimated by finding the amount of material removed from a solution of the tanning agent by treatment with hide powder. One difficulty was that the percentage of tannin found depended on the concentration of the solution, so it was usual to make a 40 per cent solution

The determination of the molecular weights of tannins was very difficult. The freezing point method had been used, but was, of course, very much affected by impurities of low molecular weight. The degree of dispersion was also much influenced by conditions.

Sole leather was tanned first in mellow liquors to get quick and uniform penetration, and then some or all of the small molecules were replaced by larger molecules from astringent liquors. Colour was one of the desirable qualities of sole leather. Bad colour had been shown to be associated with a continuous film of water solubles on the surface of the leather, and to avoid this the leather was treated with a bleach liquor, which dissolved some of the surplus tannin.

Towards the end of last century "chrome tanning," in which chromium salts were used, had made its appearance, and had now replaced vegetable tanned leather almost completely for upper leather. A chrome tanning liquor was made from a chromic salt to which alkali had been added, which resulted in the formation of complexes containing up to 700 chromium atoms, and with a molecular weight of 84,000. The molecular weight depended on the pH and the method of preparation.

Notes.

Dr. Elizabeth Gregory has been appointed Professor of Home Science and Dean of the Home Science Faculty at the University of Otago.

G. B. Beath is an educational officer in the Air Force.

M. V. B. King has been transferred to the Medical School as a Lecturer in Bio-chemistry.