the porcelain works were visited under the guidance of several chiefs of departments. While not inferior to any other porcelain factory in its perfection of technical handling of the material and artistic treatment of form and colour, Sèvres undoubtedly surpasses all its rivals in the wide range of pigments which it possesses. Many of these are due to the scientific researches of the eminent chemists who have directed the operations of the factory, and research work is still continuously carried on, especially with the rarer elements which modern chemical progress has rendered available. A yellow titanium glaze was much admired, and a new method of decoration produced by the crystallisation of zinc oxalate in combination with various pigments promises to become a valuable adjunct to the decoration of vases and other decorative objects of porcelain. The dazzling white of the Sèvres material is said to be due, not only to the purity of the ingredients used, but also to the kind of wood used as fuel, namely, birch. No doubt there is some reason for this belief, because the heat in the furnaces is so intense that the greater part of the ash of the fuel is volatilised, and, although the ware is carefully packed in saggers and protected as much as possible from the furnace gases, the volatilised ash must to some extent permeate the whole mass. The waste during burning has been reduced of late years by the adoption of an electric pyrometer which enables those in charge of the firing operations to regulate the temperature within a few degrees. An interesting hour was spent in the museum, which contains a unique collection of porcelain from all parts of the world. Of special interest are the specimens of different pigments and glazes, and the ladies of the party regarded with curiosity the artificial rubies and sapphires made by Ebelmen. These were small, and cannot be compared with the beautiful specimens prepared by Hautefeuille which are preserved in the Museum d'Histoire naturelle; but they were the first of their kind, and the precursors of the gems now made in considerable quantities by Moissan's process. It may be remarked that even artificial emeralds are now being produced having the same chemical composition as the natural stones, from which they can only be distinguished by optical tests.

In the evening a banquet was given at the Palais d'Orsay which was attended by the foreign delegates and a number of French scientific men. Among the former were Sir W. Ramsay, Dr. H. Brown, Mr. C. E. Groves, Dr. Lewkowitsch, Dr. Markel, and Mr. W. F. Reid. From Germany came Graebe, Liebermann, and Dr. von Martius; from Italy, Prof. Piutti; from Switzerland, Werner, Guye, and Willstaetter; from Russia, Antonow and Jacovlew. Many distinguished French men of science had assembled to welcome their colleagues from other lands. M. Bouveault, president of the Société chimique de France, presided, ably seconded by M. A. Béhal, secretary of the society, well known for his researches in organic chemistry; M. Lindet, secretary of two international congresses of applied chemistry; MM. Poirrier and Lauth, representatives of the dye-stuffs and pigment industries; Prof. G. Bertrand, discoverer of oxydases; Le Bel, in whose fertile brain the idea of stereochemistry originated; Prof. Cazeneuve, whose researches on the derivatives of camphor are well known; M. Tanret, to whom we owe much of our knowledge of sugars; Le Chatelier, who is still investigating hydraulic cements; M. Haller, member of the institute; M. Armand Gautier, late president of the society; and a number of others no less distinguished.

M. Pichon, Minister of Foreign Affairs, represented the Government, and made an eloquent speech pointing out the advantage to the whole civilised world of such amicable meetings of scientific men of all nations, united in the common wish to promote science and thus advance the well-being of the human race. The British delegates present could not help thinking how unfavourably the action of our own Government contrasted with that of France. The latter had offered decorations of the Legion of Honour to three of the delegates, Sir W. Perkin, Sir W. Ramsay, and Mr. W. F. Reid, but the British Government raised objections, and at the time of the jubilee celebration these had not been withdrawn. The current explanation was that some mediæval rule exists that foreign orders are only to be received by British subjects connected with the Army or Navy. But the Legion of Honour is not a military order, and was specially founded for men of such eminence as Sir W. Ramsay and Sir W. Perkin, and Mr. W. F. Reid, who originated the modern industry of smokeless powder, may certainly claim to be placed on as high a level as Mr. Thomas Atkins, who uses it. It is high time that our Government paid more attention, if not to the claims of scientific men, at any rate to those of international courtesy. Their action in this matter has not given satisfaction in the French capital, and contrasts very unfavourably with that of Germany, which accepted gratefully what was, of course, intended as a graceful international compliment.

On Friday, May 17, proceedings commenced at the early hour of 8.30 a.m. with an exhibition of products and apparatus of the members of the Société chimique de France. Among many important exhibits, two especially aroused the interest of the visitors. Abbé J. B. Senderens showed a number of products obtained by a new method of catalysis. Amorphous phosphorus prepared at a low temperature is placed in a tube and heated to about 300° C. in a current of hydrogen gas. The vapour of the substance to be decomposed is then passed through, with the result that water is formed and condenses in the receiver with the product of the reaction. M. G. Bertrand exhibited about forty samples of products obtained by the action of a bacterium which he has isolated from sorbose. These contained a number of substances of extreme interest to the chemist, including several artificial sugars. At 10 o'clock a general meeting took place, at which M. Armand Gautier, a former president of the society, read an account of the work done by members of the society since its formation. Few societies can show such a record of discoveries of the first magnitude.

A distribution of prizes to the successful students of the École supérieure de Pharmacie then took place. At 1 p.m. a special train started for Chantilly, where the priceless art treasures presented to the nation by the Duc d'Aumale were inspected. In the evening a meeting of the Société chimique de France was held, at which country members only were entitled to read papers. Some communications of importance were read, and will be published in the Bulletin.

On Saturday a reception was held in the Hotel de Ville by the municipality. The president of the municipal council, Dr. Lefèvre, is himself a biological chemist, and made some humorous allusions to the important part played by chemists in modern municipal work. The beautiful paintings with which the building is decorated were shown and explained to the visitors, who also witnessed some of the preparations that were being made for the reception of the delegates of the University of London in the ensuing week.

During the evening a theatrical soirée was given at the Palais d'Orsay, which terminated the proceedings officially. There were, however, numerous private offers of hospitality extending into the following week, and the British delegates were loth to part from their hospitable colleagues of the Société chimique de France.

## STUDIES FROM A NORTHERN UNIVERSITY.

THE two contributions to science referred to below[1] form part of the publications issued by the University of Aberdeen when the Quatercentenary of its foundation was celebrated in September of last year. When men move northwards to occupy chairs in the most outlying universities of the kingdom, it has been said that the isolation and absence of external incentives are apt to cause a premature cooling of their zeal for science. However that may be, these two volumes contain convincing evidence that in recent years Aberdeen University has been

1 "Studies in Pathology." Written by Alumni to celebrate the Quatercentenary of the University of Aberdeen and the Quatercentenary of the Chair of Pathology therein. Edited by William Bulloch, M.D. Pp. xxx+412. (Aberdeen, 1906.) Price 15s.

"Proceedings of the Anatomical and Anthropological Society of the University of Aberdeen, 1904-1906." Pp. viii+241; illustrated. (Aberdeen University Press, 1906.)

able to produce graduates who are both willing and able to widen the bounds of real knowledge.

The volume containing the studies in pathology is of such merit that the history of its origin deserves a brief mention. In reality, its preparation was commenced five-and-twenty years ago, when Sir Erasmus Wilson wisely presented the University with sufficient funds to establish a chair of pathology—the second created in this country. By a happy inspiration Prof. D. J. Hamilton was asked to occupy it. Out of the raw material provided by the surrounding country Hamilton has raised the school of pathologists which has produced the volume under review, and very fittingly dedicated it to him. The studies are seventeen in number, and illustrate the diverse directions in which pathology has branched in recent years. To the old pathology—the morbid anatomy of Rokitansky and Virchow—only three of the studies belong, those of Dr. A. Keith, on the malformations of the heart; Dr. A. Low, on epignathus; and Dr. G. Duncan, on exophthalmic goitre. Experimental pathology, a recent development, is represented by Prof. A. Cushny's excellent paper on paroxysmal irregularity of the heart, and by Dr. J. J. R. Macleod's study of the condition that follows a direct diversion of the portal blood into the systemic circulation.

All the other studies, with the exception of that by Prof. St. Clair Symmers on bilharziosis, are concerned with bacteriology—a subject which has expanded into its present gigantic proportions since Prof. Hamilton went to Aberdeen in 1882. Five of the researches deal with a matter of the very utmost importance—that of immunity. To this group belong the papers by Dr. G. Dean, on plague immunity; Dr. Wm. Bulloch, on *Bacillus pyocyaneus*; Dr. G. G. Macdonald, on pneumococcal infection; Dr. R. D. Keith, on the relationship between hæmolysis and phagocytosis of red blood corpuscles; Dr. J. G. G. Ledingham and Dr. Wm. Bulloch, on the relation of leucocytosis to the opsonic content of the blood serum. The question of infection of the body from the alimentary canal is discussed by Prof. Hamilton in connection with his investigations of the disease in sheep known as "louping-ill." The bacteria found with this disease are described by Drs. J. M. Adam and B. R. G. Russell. Dr. Wm. Hunter has employed the data he collected as bacteriologist in Hong Kong to demonstrate that there is a very direct relationship between the epidemics of plague amongst rats and men. The administrative means which may be employed for the prevention of human tuberculosis are discussed by Dr. W. L. Mackenzie; the results of experiments on the efficacy of certain disinfectants are given by Dr. A. R. Laing. The manner in which these studies have been edited and arranged reflects the greatest credit on Dr. Wm. Bulloch.

To the quatercentenary publications the Anatomical and Anthropological Society of the University contributed a special volume of its Proceedings. Prof. R. W. Reid, the president of the society, has organised a fully-equipped department of anthropology in the University, with the result that graduates bring back most valuable information regarding the people of the countries or colonies in which they have stayed, and contribute their observations to their old society. In this volume appear five papers which deal with native races. Mr. George Moir writes on the natives of the Malay Archipelago; Mr. F. S. Maxwell contributes notes on Hausaland; Mr. D. Horn deals with the people of the New Hebrides; Captain A. W. C. Young, with the Tibet mission force to Lhassa; and Dr. R. H. Spittal describes skulls of New Guinea. Important papers on ancient or prehistoric subjects are contributed by Dr. Alex. Low, by Mr. A. Macdonald, and by Dr. J. S. Milne. Dr. A. Keith writes on the results of an anthropological investigation of the external ear, and Dr. R. J. Gladstone on the variations in shape and size of the skull. The paper on the development of the lower jaw in man, by Dr. Alex. Low, deserves especial commendation, both for the importance of its facts and for the very exact and complete manner in which he has recorded his observations. There is also an excellent paper by Miss A. V. Baxter on 1500 finger-prints which are recorded in the archives of the anthropological laboratory of the University.

## THE FLOWERING PLANTS OF THE MESOZOIC AGE IN THE LIGHT OF RECENT DISCOVERIES.[1]

THE subject which I have chosen for my address relates to plants of Mesozoic or Secondary age, ranging from the Trias, through the Jurassic, to the Cretaceous, the great period which bridges the gulf between the antique vegetation of Palæozoic days and the essentially modern type of flora which characterises the Tertiary formations.

We have abundant evidence of the existence of seed-plants in very early days, in fact, practically as far back in the Palæozoic as our records of terrestrial plants extend. On this occasion, however, I am going to speak of flowering plants, by which I do not mean the same thing as seed-plants, though the two terms have often been used as synonymous. One of the results of recent discoveries in Palæozoic botany has been to show that the seed-bearing and flower-bearing characters by no means coincide, for the fern-like seed-plants of Palæozoic age were in no sense of the words flowering plants. The evidence shows that their seeds, like the fructification of ordinary ferns, were borne on leaves differing but little from the vegetative fronds, and not aggregated on any special axis as are the parts of a flower. The nearest and, indeed, the only analogy to be found among recent seed-plants is in the female plant of Cycas, to which we shall return presently. The Mesozoic plants, however, with which we are now concerned were not only seed-plants, but they bore their reproductive organs in a form which everyone would naturally describe as a flower. They were flowering plants in the full sense of the term, however different in other respects from the flowering plants of the present day.

The Mesozoic floras from the Upper Trias to the Lower Cretaceous maintain, on the whole, a very uniform character, widely different from that of the preceding Palæozoic vegetation. True ferns were abundant, more so, no doubt, than in the earlier period; true conifers, often much resembling recent genera, were a dominant group; the family now represented by the maidenhair tree (Ginkgo) was prevalent, but the most striking feature of the vegetation was the abundance, in all parts of the world, of plants belonging to the class of the cycads, now so limited a group.

We will concentrate our attention on the cycad-like plants, or Cycadophyta, to adopt the broader class-name, appropriately suggested by Prof. Nathorst. The living Cycadaceæ are, it will be remembered, quite a small family, embracing only nine genera, and, according to a recent estimate, about 100 species, inhabiting the tropical or subtropical regions of both the old and new worlds, but nowhere forming a dominant feature in the vegetation. Throughout the Mesozoic period, however, at least until the Upper Cretaceous is reached, plants with the habit and foliage of cycads are extraordinarily abundant in all regions from which secondary fossils have been obtained; they are as characteristic of Mesozoic vegetation as the dicotyledons of our recent flora.

The most important point in questions of affinity is the fructification. Throughout the recent cycads this is of a simple type; in all the genera the staminate fructification is a cone, consisting of an axis densely beset with scales or sporophylls, each sporophyll bearing on its lower surface a number—often a very large number—of pollen-sacs, grouped, like the sporangia of a fern, in small sori. In eight out of the nine genera the female fructification is also strobiloid, each sporophyll bearing two marginal ovules. In Cycas itself, however, so far as the female plant is concerned, we find a much more primitive arrangement; no cone at all is differentiated, but the carpels are borne directly on the main stem of the plant, in rosettes alternating with those of the vegetative leaves. The carpels themselves are lobed and extremely leaf-like, bearing as many as six ovules in many cases, though in one species the number is reduced to two. Thus in Cycas the seeds are borne on organs still obviously leaves, and

[1] Abridged from the presidential address delivered by Dr. D. H. Scott, F.R.S., before the Royal Microscopical Society on January 16, and published in the Journal of the Society for April.