THE RIVER PILCOMAYO.[1]

THE river Pilcomayo has its source in the Bolivian mountain ranges, and traverses the virgin forests of the Gran Chaco in a south-easterly direction. For nearly two hundred years the idea of utilising this river for purposes of navigation has engaged the attention of the Governments of Argentina, Bolivia, and Paraguay, in order to provide the rich regions through which it passes with an easy means of communication, and to afford an outlet by water for the natural products of the fertile zones of the eastern part of Bolivia.

The author of the report before us, who is a member of the American Society of Engineers, was appointed by a syndicate of capitalists in 1905 to conduct an expedition for the purpose of studying the navigable condition of the river, and reporting as to the possibility of rendering it fit for the passage of boats.

The exploration party consisted, besides the chief, of two assistants, a land and forest expert, storekeeper, and twenty-five men. They took with them for the purposes of transport twenty-two mules, forty-one horses, sixteen oxen, and five boats. Twenty-two bullocks were also taken for food. The expedition occupied four months.

The country traversed appears to be sparsely inhabited by Indians who, on the whole, are friendly. A colony has been established at Buena Ventura, about 560 miles up the river, which contains thirty families of colonists, with a total population, including servants, "intruders," and squatters, of 1000 souls. There are also in the district some Roman Catholic mission stations.

The river Pilcomayo discharges into the Paraguay, the depth at low water at its junctions being about 10 feet, and above this for sixty miles there are no soundings less than 19½ feet. At 120 miles the depth decreases to about 7 feet; at 150 miles there was barely 3 feet. At about 317 miles from its mouth the river is lost for ten miles in a marshy tract of country, through which there does not exist any defined channel. Beyond this tract, which constitutes an immense horizontal plane extending to "distances unknown," at 327 miles from the mouth, the river again assumes a defined channel with a depth of from 10 feet to 12 feet. This channel was explored up to the Argentine boundary at El Hito, 677 miles from the mouth. The width varies from 100 feet at the lower end, where the course is well defined, to 300 feet in the upper part.

In the lower part of the river the water is brackish and unfit to drink, owing to a number of salt springs, and in the upper river it is turbid and of a reddish colour.

To render this river navigable for barges carrying twenty-five tons and drawing 4½ feet of water, over a length of 670 miles, or about 100 miles beyond the colony of Buena Ventura, the commission advised the construction of three cuts or canals, one to avoid the marshy district and the two others two porous districts in the upper length, these cuts to have a bottom width of 33 feet with 5 feet depth of water; the construction of seventy-three locks and dams; the regulation of the channel and clearance of obstructions. The amount required to carry out these works is estimated at a sum equal to about one million of English money.

CRETACEOUS FERNS.[2]

THE author states that he approached the subject of palæobotany as a layman whose earlier training had been mainly in physics and mathematics. He set himself to collect such fragmentary remains of fossil plants as the Lower Cretaceous rocks of his neighbourhood afforded, with the intention of making an intensive study of the several genera. This first instalment of his results deals mainly with a single genus of Mesozoic ferns, to which Dunker in 1846 gave the name Hausmannia. The fronds of this genus are characterised, in some species, by the possession of a bi-lobed lamina not unlike that of the leaves of the maiden-hair tree (*Ginkgo biloba*), while in other forms the lamina is divided into several linear lobes, and bears a resemblance to the leaves of Baiera, an extinct genus of the Ginkgoales. It is, however, with the recent Indian and Malayan fern Dipteris that Hausmannia exhibits a more than superficial resemblance. Despite the unfavourable nature of the Quedlinburg rocks from the point of view of preservation of detail, Prof. Richter's industry has been rewarded by an accumulation of material which has enabled him to add considerably to our knowledge of this well-defined genus of ferns. He has instituted, on what appear to be adequate grounds, a few new species. The flora of Quedlinburg is characterised by a preponderance of ferns, which are said to form 80 per cent. of the whole; no trace of Angiosperms has been found; Conifers and Cycads are rare; while ferns are represented by the Gleicheniaceæ, Matonidium, Laccopteris, Clathropteris, Hausmannia, Weichselia, and a few fragments of the common Wealden species *Onychiopsis Mantelli*. It would seem that in these fossils we have the relics of a vegetation which flourished in a situation favourable to ferns. Ferns undoubtedly played a more prominent part in the composition of Mesozoic floras than in the floras of the present, but it is unlikely that the Quedlinburg flora as a whole was composed almost entirely of these plants to the exclusion of Lower Cretaceous Gymnosperms which are recorded from other localities.

Prof. Richter's contribution does not throw any fresh light on the nature of the sporangia of Hausmannia; he has, however, demonstrated a striking resemblance in habit to recent species of Dipteris as regards the slender rhizomes and long leaf-stalks. The author is disposed to regard the affinity between this northern Lower Cretaceous type and the Malayan Dipteris as rather less close than has been assumed by Prof. Zeiller and by the reviewer. In the absence of well-preserved sporangia, the question of degree of relationship cannot be settled; but the account given of such fragments of fossil ferns as were accessible to the author of this monograph seems to strengthen the view that the Dipteridinæ were abundantly represented in the northern hemisphere in the latter half of the Mesozoic era. In age the flora is considered to be rather younger than Wealden, and is compared with the Urgonian flora of Greenland as described by Heer. It is difficult to draw a conclusion as to geological age from the small number of types so far described, but in our opinion the Quedlinburg plants might fairly be classed with the Wealden floras of northern Germany, England, Belgium, and many other regions.

Prof. Richter has done good service to palæobotany by his thorough and scientific researches, and one may express a hope that other amateurs may follow his example and devote themselves with equal energy and success to the detailed study of the fossils of a single district.

A. C. S.

[1] "The River Pilcomayo from its Discharge to Parallel 22° S., with Maps of Reference." By Gunnar Lange. Pp. 124. Translated from the Argentine Original. (Buenos Aires: The Meteorological Office Press, 1906.)

[2] "Beiträge zur Flora der unteren Kreide Quedlinburgs." Teil i., Die Gattung Hausmannia, Dunker, und einige seltenere Pflanzenreste. By Prof. P. B. Richter. Pp. iv+27+plates. (Leipzig: W. Engelmann, 1906.)

PROBLEMS OF APPLIED CHEMISTRY.[1]

THE science and art of the engineer are intimately interlaced with those of the practical chemist. The practical, as distinguished from the scientific, chemist possesses sufficient knowledge and experience to see to the working of machines and to minor repairs without calling in an engineer, save in difficult or complicated cases. In former times the chemical manufacturer learned his trade, both on the chemical and the engineering side, as far as it was indispensable, but he learned it simply "by rote," as the saying goes. To be sure, this never took place without large sums of money being thrown away, either in the form of misshapen or faulty apparatus and machinery, or of spoilt chemicals, and so on. And this happened to the unstudied "practical man," who, through family connections or by mere chance, had stumbled into chemical manufacturing, as well as to men who had studied the science of chemistry, and who desired to apply the knowledge thus gained to the execution of some well-known process, or to the working of some laboratory in-

[1] Abridged from a discourse delivered at the Royal Institution on Friday, March 15, by Prof. George Lunge, of Zurich.

vention on a large scale. Those men who possessed a scientific foundation were, in their turn, compelled to learn the technical side of their profession by dint of practice, just as the tailor has to learn the art of making clothes and the barber the art of shaving. A man of scientific attainments had certainly, even in the olden times, a clear advantage over the mere "practical man."

But many branches of manufacturing, which undoubtedly have a chemical basis, and in which to-day a large number of chemists are actually employed, were formerly carried on in a purely empirical manner, like any handicraft, for instance, soap-making, tanning, brewing—indeed, all those industries which are connected with food—and above all, dyeing and tissue-printing. But towards the middle of the last century we perceive the commencement of a scientific treatment of those industries. Even before then, the genius of Chevreul had thrown a flood of light on the chemical behaviour of fatty substances, and Persoz followed in the domain of dyeing fabrics. The cooperation of the various arts and sciences was distinctly promoted by the technical high schools in France, Germany, and Switzerland.

In Great Britain the chemical industries had from the first taken their full share in the astounding development of all branches of industry which in this country has for several centuries enjoyed an uninterrupted peace, whilst continental Europe was lacerated by frequent wars. Thus Great Britain had a long lead in all the fields of commerce and industry.

Some of the most important of the chemical industries have, indeed, altogether originated in this country, especially that of sulphuric acid and that of chloride of lime, both of which date back as far as the eighteenth century. But it is only fair to remember that some of the most important improvements in these manufactures are due to French inventors and French men of science. To France we owe the invention of the Leblanc process, which could not be at once introduced into this country, owing to the fact that common salt was burdened with an absolutely prohibitive excise duty. The abolition of this tax in 1823 acted like the wave of a magic wand, not merely in calling into life the manufacture of alkali itself, but by giving a strong impetus to all the chemical industries connected therewith, viz. those of sulphuric, hydrochloric, and nitric acid. Almost immediately the tide of inventions and improvements set in, and a few decades later we find Great Britain absolutely dominant, not merely in the branches just mentioned, but generally in the field of inorganic chemical industries. For many years, up to 1870 about, this predominance was not seriously called into question.

In this manner inorganic chemical industry was developed in Great Britain up to the middle of last century to a greater extent than in any other country, by men like the Muspratts, Tennant, Gossage, Dunlop, Chance, and many others. Most of them were neither studied chemists nor engineers, but in their school any theoretically educated chemist could immensely profit for the work of factory-manager.

In close connection with this state of matters we find in England among the greatest inventors men who, at the outset, did not even possess a routine knowledge of the field in which they achieved their later successes, and who were altogether "outside the profession," like Walter Weldon, Henry Bessemer, Sydney Gilchrist Thomas.

Peculiar to England is also the case of William Henry Perkin, who, at the early age of sixteen, entered Hofmann's laboratory in London. Two years afterwards he discovered the colouring matter called "mauve," the forerunner of all colours produced from coal-tar; and only a year later he built a factory for producing his mauve, which at once proved a success and laid the foundation for his splendid work in after life.

One of the great problems presented to applied chemistry in the last century, at which many inventors in all industrial countries have been working, was the utilisation of "alkali-waste." The first partial success in this direction was scored in 1861 by Ludwig Mond and by Max Schaffner. One of the first patents referring to it was taken out in 1837 by Gossage. He quite rightly recognised a number of the conditions necessary for realising that reaction, but, unfortunately, not all of them. It soon became manifest that there were unforeseen difficulties not yet overcome. The missing links in the process were only discovered in 1883 and 1887, and led to the application of that process at all the Leblanc works. This final success is connected with the names of Carl Friedrich Claus and of Alexander Chance.

Many German chemists (as well as the speaker himself) at that time came to England for their practical education, for instance, Caro, Pauli, Martius, Peter Griess, and Ludwig Mond. The two last-named have permanently associated themselves with this country, whilst the three first-named, as well as many other German chemists who had found a temporary home in England, returned later on to their own country, and these very men have been in the forefront of those to whom is due the remarkable development of German chemical industry.

Formerly the German professor, as well as his students, had been frequently held up to ridicule, not merely abroad, but at home as well, as idealistic dreamers, unsuited to the wants of real life and to the requirements of trade and manufacture, and in this there was only too much truth, so long as they were not in intimate touch with men of practice. But at last an amalgamation between these two classes of men took place. Within a very few years there arose those enormous establishments at Ludwigshafen, Höchst, Elberfeld, Berlin, Darmstadt, and elsewhere, which are conducted on a scientific basis, but with the most extensive utilisation of all the attainments of manufacturing experience. Austria, France, Switzerland, Belgium, and America have all made immense strides in that direction. And what of Great Britain? Seeing that in pure science the people of Great Britain have never lagged behind *any* other nation, and that, on the contrary, the land of Newton and Faraday has been a beacon to all others at more than one epoch, there is absolutely no valid reason why she should now, or at any other time, be behind any other in the combination of science with practice.

The history of the ammonia-soda process has been directly contrary to so many others. It was invented by two Englishmen, Dyar and Hemming, in 1838, who did not succeed in the *practical* application of their invention, nor did their numerous successors meet with any better fortune. A Belgian engineer, Ernest Solvay, found the first economical solution of that problem, and the economical superiority of the ammonia over the Leblanc process soon became evident. This was brought home to English manufacturers by the success of the firm of Brunner, Mond and Co. The Leblanc process, and the enormous sums of money invested in it, seemed even then doomed to speedy extinction. But for a time, at least, this calamity was averted by the perseverance with which the British alkali makers kept making improvements in the Leblanc process. The prolongation of its life is due to the fact that in the first stage of the process an important acid is produced, which is not furnished by the ammonia process, viz. hydrochloric acid. Most of this is immediately converted into chlorine, which gas is used up for preparing bleaching powder, bleach liquors, and chlorates. Of these, bleaching powder is a British invention, made by the Glasgow chemist, Tennant; but, apart from this, the manufacture of chlorine and of all chlorine products has been put on its practical basis almost entirely by English inventors, and has been developed more extensively in this country than anywhere else in the world. But this last entrenchment of the Leblanc process is being vigorously assaulted from another quarter—by the electrolytic processes, which split up the alkaline chlorides directly, and in the simplest possible manner, into free chlorine and caustic alkali.

Even now it is only quite exceptional that, wherever the electrical current has to be produced by means of *steam*, electrochemical methods can compete with the older ones for the manufacture of what is called "heavy chemicals." Just those two European countries which are the greatest producers of coal, Great Britain and Germany, are less favoured by nature in respect of water-power than other countries which possess little or no stores of mineral fuel, as Sweden, Norway, Switzerland, France, Italy, and Spain. A very different condition of affairs obtains in the United States, where we find the greatest coalfields combined with the greatest amount of water-power existing in any civilised country. The day will inevitably come when the coalfields will be so far exhausted that all those industries which consume large amounts of mechanical energy will be forced to emigrate to countries where water-power is abundant.

No other substitute has, as yet, been found for generating force, and, indirectly, electricity.

Even in those countries which are more favoured, the amount of water-power is by no means infinite; and, if it had to be drawn upon, not merely for motive purposes, but for the production of electricity for heating purposes, it would be found insufficient in most places. Here we are faced by one of the greatest problems of applied science, both in chemistry and in physics, a problem which will give plenty of occupation to generations of future inventors. At present we can only surmise that some solution will present itself in the shape of a direct conversion of the sun's rays into other forms of energy; but the means by which this would be practically accomplished are at present quite uncertain.

Seeing that the stock of mineral fuel upon this earth is so very limited, cannot we find means of husbanding it more than this has been done hitherto? Of the energy residing in coal, most ordinary steam-engines utilise less than 10 per cent., and even the most perfect steam-engines hardly more than 15 per cent. The conversion of pig-iron into steel, the manufacture of glass, and many other industries consume from four to twenty times, and even more, the quantity of coal required by theory. Moreover, in burning our fuel, whether it be for industrial or for technical purposes, we invariably send its nitrogen into the atmosphere, which surely contains quite enough of that commodity, the only exception being the manufacture of coal-gas. Here some of the grandest problems of applied chemistry present themselves to us—how to stop that fearful waste of fuel, and how to recover the nitrogen of the coal, if that be possible.

It is certain that we must look for the solution of these questions in the direction of converting coal into gaseous fuel. Another great stride ahead lies in the better utilisation of the waste gases from blast furnaces, in which respect the last few years have witnessed some very important improvements. All this refers merely to a better utilisation of the heating power of coal, but not to that other great task, the recovery of its nitrogen in a useful shape.

The immense importance of the problem lies in the fact that it touches our most urgent want, our supply of food. For agricultural purposes it does not make much difference whether we apply the nitrogen in the form of ammonia or of nitrates. The ammonia, apart from insignificant quantities otherwise obtained, all comes from the nitrogen of the coal, but up to about twenty years ago only that coal which was used in the manufacture of gas was made to yield ammonia, and only one-sixth of its nitrogen was obtained in this form. In the manufacture of coke, which is also a process of destructive distillation, and entirely analogous to gas making, very much larger quantities of coal are consumed. Up to about twenty years ago all the volatile by-products in the manufacture of coke were lost—that is to say, tar, gas, and ammonia. Even now, both in France and England, as well as in America, the recovery coke-ovens have found only a very limited adoption; in England perhaps 5 per cent. of the coke is made in this way, against upwards of 50 per cent. in Germany.

But that reserve is, after all, nothing like sufficient to cover the requirements of agriculture in the future, and it is quite likely that in the long run all the really available nitrogen of the coal would not suffice for the wants of man. And what about the time when coal itself will be exhausted? Well, there is an eternal and inexhaustible source of nitrogen in the atmospheric air. Four-fifths of this consists of nitrogen, calculated to amount to 4000 billions of tons. But until a very few years ago the problem of turning the atmospheric nitrogen into ammonia or nitric acid, although frequently approached in a purely scientific or, experimentally, in a technical way, had not been solved. Our days have seen the realisation of that most important task.

Let us first speak of ammonia. We must start from calcium carbide. Prof. Adolf Frank and Dr. Caro, of Berlin, found that when nitrogen is passed over red-hot calcium carbide it is absorbed with formation of calcium cyanamide. This latter, when treated with water under high pressure, is made to yield ammonia; but it is not necessary to do this, since the crude product, which they have called "lime-nitrogen," can serve directly as nitrogenous fertiliser, and is in that respect equivalent to its own weight of ammonium sulphate. The works already in operation, or in course of construction, will by the end of this year utilise water-power to the extent of some 55,000 horse-power, and will produce lime-nitrogen equivalent to 100,000 tons of nitrate of soda.

Important as ammonia is as a fertiliser, it ranks after the nitrates in that respect, and, unlike ammonia, the nitrogen of the nitrates is of immense importance for other purposes as well, viz. the manufacture of nitric acid and of explosives. These have, up to the present, been prepared almost exclusively from Chilian saltpetre. What, then, shall we do when the nitre beds of Chili are exhausted? an event which, according to most estimates, is bound to take place within thirty or forty years from now. Unfortunately, there is no tangible hope of similar beds being found in any other localities, certainly not to any great extent. The solution of *this* problem, if not altogether settled in its final shape, has now been found by means of that well-nigh omnipotent agent, electricity. At Notodden, in the Norwegian Hitterdal, a factory has been established to carry out the process of Birkeland and Eyde, who, by an ingenious application of the extreme heat produced by the electric current, make the nitrogen and oxygen of air combine to form nitric oxide, which at a lower temperature is spontaneously oxidised into nitrous vapours, with the ultimate production of nitrites or nitrates. This time there is really no doubt that a practicable and economical process has been discovered for which it is intended to employ, by the end of this year, water-power to the extent of 30,000 horse-power. The Notodden process bids fair to be followed by other even more efficient processes. The most important of these is that of the Badische Anilin- und Soda-Fabrik, for which an experimental factory is in course of construction, and for which 50,000 horse-power are to be employed.

Electricity has often been invoked to produce the most important of all inorganic products, iron. If this problem could ever be solved in an economical way, it would bring about a perfect revolution in the position of the leading nations. On the one hand, the enormous quantity of coal now consumed in the production of iron and steel (which is probably at least a quarter of the entire output of coal) would be set free for other uses, and the exhaustion of the coal-fields would be put off to a corresponding extent. On the other hand, the production of iron would pass over into the hands of those nations which command the largest amount of water-power, and which, therefore, can produce electricity most cheaply. Of the three countries which now produce between them the bulk, that is, seven-eighths, of the world's iron, Great Britain and Germany would go to the wall, and the United States, which already produce more iron than these two countries put together, would become omnipotent in that field.

One of the problems belonging to the domain of organic chemistry is the substitution of artificial for natural colouring matters. This, indeed, has now been carried out almost to the bitter end. Long ago, one of the oldest and most widely used colouring matters, that contained in madder, succumbed to the attacks of the chemists, among whom the names of Edward Schunck and William Henry Perkin testify to the glorious share taken by Englishmen in that victory. The colouring substance of madder—alizarin—is now made from English coal-tar, and has altogether taken the place of the impure form in which it occurs in the madder plant. The growers of this plant in the south of France and elsewhere have had to abandon its culture altogether, to their great sorrow.

A similar fate has already partly overtaken, and may, in the end, destroy entirely, the culture of indigo. Synthetic indigotin is now manufactured at such a low price that its competition has proved a severe blow to the indigo-planting interests. Thus the triumph of scientific investigation and practical skill in chemical manufacturing, gratifying though it be as a splendid achievement of applied chemistry, is a sad trial to many thousands of Indian ryots and their British masters; and this is merely the foretaste of what will inevitably happen in many other cases. What is food for one is poison for another.

Perhaps the very greatest problem of applied chemistry is the direct production of feeding-stuffs for man and beast. The synthesis of alimentary substances from inorganic matter has, up to this moment, not been even remotely achieved, nor can we at present so much as guess the direction in which this might be done, whilst, as for the production of food from sawdust and other waste organic substances, we are in no better case. But even here the word "impossible" should not be pronounced. In a more modest form, at all events, chemistry has found magnificent scope in that quarter, viz. in the extraction of alimentary substances from new sources and in the increase of production from old ones. The colossal industry of beetroot sugar is an instance of the former, whilst agricultural chemistry, as a whole, works in the latter direction.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

COURSES of lectures, and arrangements for informal instruction, have been arranged by the Oxford University Committee for Anthropology for the coming Easter term. There will be lectures and other instruction in general anthropology, physical anthropology, psychology, geographical distribution, prehistoric archæology, technology, sociology (religion, law, custom, &c.), philology, and other subjects of interest to students of anthropology.

THE sum of 6100*l.* has been subscribed by alumni of Harvard University to establish a Shaler memorial fund in commemoration of the long services of Prof. N. S. Shaler and of the great affection in which he was held by his many students and friends. It is proposed to place a memorial tablet in the geological section of the University museum, or some other suitable place, and to use the income of the balance for the benefit of the division of geology, in support of original research and in the publication of the results of research.

ON Tuesday, April 23, the Prince and Princess of Wales visited Glasgow and opened the new buildings at the University. These buildings were erected by Principal Story's university fund, which was largely raised by the efforts of the late Principal. They form an important addition to the laboratory and lecture-room equipment of the University. They consist of two large detached institutes to the west of the main building; one provides accommodation for the departments of physiology, materia medica, forensic medicine, and the other for the department of natural philosophy. The cost of the buildings has been defrayed by subscriptions to the amount of 40,000*l.* from the citizens of Glasgow and a grant of 40,000*l.* from the Carnegie trustees. A special honorary graduation was held on the same day, at which the honorary degree of LL.D. was conferred on the Prince and Princess of Wales, the Lord Provost of Glasgow (Mr. Wm. Bilsland), the Duchess of Montrose, the Chancellor of the Exchequer, who is also Rector of the University, Right Hon. Geo. Wyndham, a former Rector, Mr. Ure, the Solicitor-General for Scotland, Sir George Watt, Sir W. R. Copland, Miss Galloway, Prof. Emile Boutroux, Prof. Norman Collie, Prof. J. H. Poincaré, Mr. Sidney Lee, Mr. D. S. MacColl, Mr. Jas. A. Reid, Mr. N. Dunlop, Prof. J. G. McKendrick, Prof. G. G. Ramsay, Prof. A. M. Stuart, and Principal Donald Macalister.

ON Saturday last, April 20, the Borough Polytechnic Institute was open for the annual inspection and display of students' work. To judge from the crowds which thronged through the building during the evening, those who live in the neighbourhood must take a great interest in this educational centre. In the chemical laboratory there was an exhibition of electrochemical apparatus, and one saw the rapid deposition of metals by means of rotating electrodes. Apparatus for measuring the absorption taking place in reduction and oxidation methods was also shown working. In the general laboratory various chemical operations were in progress, such as fractionation, steam distillation, and the like. The general public who crowded the laboratories did not, of course, understand much, but they realised that what was to them mystical chemistry might be interesting, and perhaps a few of them will become students. The recently equipped electrotechnical department, which is in the engine-room, caused a good deal of interest. Many of the fittings have been put up by the students, who also helped to build up the experimental dynamo. The engineering department is becoming very complete, and students can now carry out tests upon quite a large scale. The latest addition here is a Delaval 5 horse-power steam-turbine engine coupled on to a dynamo. Some of the metal work and wood work executed by the students was of a very creditable character, the hammered copper work being especially interesting. A noteworthy exhibit was a vernier with micrometer screw which had been entirely made—scale and all—by a lad sixteen years of age in the technical day school. The average person who passed through the institute on Saturday night would probably be most interested in the bakery and confectionery department or in the book-binding or shoe-making. All these, of course, are of great importance, and much good work is being done, but it should not be forgotten that on the scientific side, which tends above all things to the nation's advancement, good work is being done with a rather difficult material and a small staff, the chemistry department being one of the very few in Great Britain which publishes research work.

THE question of education in relation to the British Empire was considered at a meeting held in the Guildhall, London, on Tuesday, under the presidency of the Lord Mayor. The following resolutions were unanimously adopted:—(1) That in the opinion of this meeting of citizens of London and others, the education of the people of Great Britain on the subject of the Empire is deplorably backward, and that as an illustration of this fact it may be pointed out that no official map or text-book in regard to the Empire is available for teachers and the public; that in the opinion of this meeting the teaching of Empire subjects with the aid of official maps and text-books should be obligatory in all elementary and secondary schools in Great Britain, and that the Government be requested to lend official assistance in the preparation of such maps and text-books, and to sanction the permanent display of Empire maps in all schools, post-offices, and public buildings (moved by the Duke of Somerset and seconded by Dr. Parkin). (2) That a public subscription for the purpose of Empire education be inaugurated, and that the aid of the London and provincial Press and of all societies and associations, without regard to party politics, be invoked to collect funds for the purpose; that copies of these resolutions be sent to the Government, all lieutenants of counties, lord mayors, and mayors throughout the country, inviting them to call public meetings and submit thereto similar resolutions, and appeal for subscriptions to the fund (moved by Lord Milner and seconded by Mr. Deakin). (3) That the fund be called the "Empire Education Fund," and that the first trustees shall be the Right Hon. Sir W. Treloar, Lord Mayor, his Grace the Duke of Somerset, the Right Hon. Viscount Milner, P.C., G.C.B., G.C.M.G., the Right Hon. Sir Rowland Blennerhassett, Bart., P.C., and Mr. Allen H. P. Stoneham (moved by Lord Strathcona and seconded by Lord Ranfurly).

A CONFERENCE on the teaching of hygiene and temperance in the universities and schools of the British Empire was held in London on Tuesday. Lord Strathcona presided at the morning session and Sir John Gorst occupied the chair at the afternoon meeting. From the papers read it is clear that in several of our colonies and in some foreign countries much more attention is given to instruction in the laws of health than has yet been granted to it in this country. The chief object of the conference was to give prominence to this fact and to urge upon our educational authorities the importance of remedying the defect. Sir Victor Horsley, F.R.S., in an address on the method of introducing hygiene and temperance into secondary schools and universities, suggested that an