dried and powdered brown coal and oil under a pressure of 200 atmospheres in contact with hydrogen, the reaction chambers being tubes 18 m. long, 0·8 m. diameter, and with walls 13 cm. thick. The materials are heated to a temperature of about 500° C. The liquid product is then distilled, and heavy oil (used in mixing with the coal), petrol (benzine) and middle oil obtained.

The middle oil then undergoes the second stage of the treatment. It is again brought in contact with hydrogen under 200 atm. pressure, the whole mass being heated so that it becomes gaseous, and the reaction is allowed to proceed in a furnace, no details of which are given. The gaseous and liquid parts of the cooled product are separated, the excess of hydrogen being previously taken off under pressure. The liquid is distilled and the middle oil obtained again undergoes treatment.

The process is said to be capable of producing lubricating oils as well as petrol. About 20 per cent of the carbon of the coal is recovered as gaseous hydrocarbons (methane to butane), which may be used as such or converted into chemical compounds. Propane and butane are fairly easily liquefied, and can be used for lighting and heating. Such gases are used in the motors of 'zeppelins'. The gases may also be converted into hydrogen by reaction with steam.

In the hydrogenation process, which is strongly exothermic, the control of the temperature is very important, and the whole process must proceed within a narrow zone of temperature. If this is allowed to be exceeded, the temperature rises very rapidly and the reaction vessel may burst. To prevent attack of the steel vessels by sulphur, they are treated with zinc vapour, which produces a diffusion layer of iron-zinc mixed crystals. The vessels themselves are of chromium-nickel steel, containing vanadium, molybdenum and tungsten.

The whole process is one of considerable interest and importance, and possesses obvious advantages—apart from costs, which are not dealt with—over petroleum cracking, since the latter process does not produce lubricating oils of any value from the crude oil and also leaves a considerable proportion of coke.

University and Educational Intelligence

CAMBRIDGE.—The Frank Smart studentship in botany is vacant. Any graduate of the University is eligible provided that not more than fourteen complete terms have elapsed after the first term of residence. The value of the studentship is £200, and candidates' names should be sent to Prof. A. C. Seward at the Botany School before October 2. Candidates should submit a statement of the course of research it is proposed to undertake and such evidence of qualifications as they think fit.

ST. ANDREWS.—The date of the installation of General the Right Hon. J. C. Smuts as rector of the University has now been definitely fixed as October 17. The Senatus Academicus has resolved, on the occasion of the installation, to confer the honorary degree of LL.D. upon the following, among others: Sir Thomas Holland, principal of the University of Edinburgh; Mr. John Hutchinson, of Kew Herbarium; General the Right Hon. J. C. Smuts.

A COURSE of evening lectures on television will be given on Thursdays, commencing October 4, by Mr. J. J. Denton, at the Borough Polytechnic, Borough Road, London, S.E.1. The syllabus and further information can be obtained from the Principal of the Borough Polytechnic.

ACCORDING to the Berlin correspondent of the American Medical Association (*School and Society*, Feb. 17), German universities should be fortified against the debilitating influences of departmentalism and high specialisation by reforms recently decreed by the Prussian Minister of Public Instruction. A candidate for appointment to an instructional post will in future be required to have served several months in a field station or work camp in which conditions are such as to test his virility. Only after undergoing this test with credit will he be admitted to the *Dozentakademie*. Here, participating in a strictly organised community life while pursuing courses of a general scientific character, he will have to prove his worth in fields outside his specialty and will be expected to develop the general impulses requisite for the instruction of youth in the Germany of to-day. Lastly, he will be examined as a specialist. All this involves a radical breach with the tradition according to which the appointment of instructors used to be left to the unfettered discretion of the department, if not to a single member of it, with the result that candidates were selected for their scholastic attainments within their chosen special field without regard to their general qualifications. The *Dozenten* have, moreover, been organised as a society with bureaux which will deal, *inter alia*, with questions pertaining to reforms in curricula and the privileges of Germans who have emigrated to foreign countries.

Science News a Century Ago

A Lecture on Animal Physiology

Lecturers who dealt with the more popular aspects of natural science had, in early times, to consider the moods and composition of their audiences. Although no actual censorship existed, it was not deemed desirable to invest a discourse in physiology or in botany with too full details respecting the processes of function, for there was a risk of offending current established and entrenched habits of thought. The *Analyst*, in reporting a lecture on "Animal Physiology", delivered on September 29, 1834, by George Sheward, before the Worcestershire Literary and Scientific Institution, made the following comments:—"Mr. Sheward made choice of 'Animal Physiology' as the ground work of his lecture, and it becomes our duty to speak of it as a composition written for oral delivery. We wish it to be clearly understood that we do not entirely object to the peculiar matter chosen for the lecture. . . . The great difficulty however, suggested to our mind, was, how to steer clear of those technical explanations which are necessary to unfold the history of the animal economy, without trenching on the delicacy and fastidiousness of the auditors, one half of which possibly were females—but we are bound to say Mr. Sheward very dexterously contrived to throw becoming drapery over this department of his scientific research, and adapted it to the ears of the sensitive and the scrupulous. There can be no doubt

that the lecturer stripped much professional detail—but some downcast looks from the sisterhood convinced us that he had not pruned quite enough. In truth, although unwilling to check the progress of science, we begin to think that some very peculiar subjects, such as, 'the digestive and other organs, midwifery', etc. had better be confined to the lecture rooms of the hospital."

Distilling Water for Ships

The simple process of obtaining a supply of fresh water in ships by distillation only came in after a long series of experiments, and a century ago men-of-war still obtained their fresh water from shore. "Casks were landed, rolled up the beach, filled and rolled down the beach, and 'parbuckled' into the launches." Yet, so early as 1593, Sir Richard Hawkins had a distilling apparatus in his ship, and in 1762 Dr. Lind showed the Royal Society how fresh water could be obtained from sea water. One experiment just a century ago, on September 29, 1834, is recorded in the *Times*. The apparatus was the invention of Mr. Wells and the experiment was made in a vessel moored for the occasion alongside "Carey's floating bath off Westminster Bridge". The experiment was entirely successful, and was watched by several naval captains and other persons interested in shipping. "The apparatus itself is in height about 4 feet 6 and in breadth and length about 4 feet. It is a steam kitchen calculated to supply the place of a galley and caboose, and capable of cooking for 70 or 80 persons. It weighs about 11 cwt. and consumes in 12 hours about 2 cwt. of coal. It purifies sea water at the rate of a quart a minute; the steam or distilled water is condensed with great rapidity by means of a pipe or tube through which it passes being carried along the outside of the bows and side of the vessel, and brought into immediate contact with the ocean, by which means it is rendered immediately cool; the pipe re-enters the vessel and the fluid drops from it as from the worm of a common stile. This simplification of the process of condensation appears to be the principal novelty, and it is not the less valuable for its simplicity of contrivance."

Washington and the American Philosophical Society

At a meeting of the American Philosophical Society held on October 3, 1834, the librarian presented the original reply of General Washington to an address sent to him as one of the members of the Society in December 1781, on the occasion of the capture of Lord Cornwallis. In his letter, which was addressed to Dr. Thomas Bond, a vice-president, Washington said: "Permit me through you, to return my warmest thanks to the American Philosophical Society, for this very polite mark of their attention and esteem. I have ever set the highest value upon the honour which was conferred on me, when admitted into a Society instituted for the noblest of all purposes, that of 'promoting useful knowledge' and have long wished for an opportunity of rendering myself, in some degree, worthy of my election. Happy am I, therefore, in receiving this public assurance from Fellow members, that my Services, upon a late important occasion, have contributed to give them an additional security in their pursuit of Science. . . ." The minutes of the Society recording the election of Washington as a member having been lost, it was ordered that the letter be entered in the minutes.

Societies and Academies

PARIS

Academy of Sciences, August 6 (*C.R.*, 199, 393–444). H. DESLANDRES: A simple and general relation of the molecular spectrum with the electrons and rings of electrons of the constituent atoms. SERGE BERNSTEIN: The absolute convergence of trigonometrical series. A. BIGOT: The Bathonian reefs of Normandy. SAUVEUR CARRUS: The trajectories of the meridians of a surface of revolution. THADÉE PECZALSKI: Study of the internal radiation of the electric arc. L. COLOMBIER: The variation of the electrolytic potential of nickel with the acidity. PAUL CORRIEZ: The X-ray diagrams of various peranthracites and true anthracites. MLLE. ELLEN GLEDITSCH and ERNST FOEYN: The actinium-uranium ratio in radio-active minerals. From the examination of seven minerals from different sources, the value 0·128 is deduced for this ratio. PIERRE AUGER: Absorption measurements of the γ-rays by the method of coincidences. The case of the radiation of excited beryllium. ANDRÉ DE PASSILLÉ and MARIUS SÉON: The thermochemistry of the ammonium phosphates. HENRI TRICHÉ: Quantitative spectrographic analysis: application to silicon. LOUIS MÉDARD: New results on the Raman effect of the hydroxyl radical. Data are given for formic acid, monochlorhydrin, glycol, hydroxylamine and glycerol. MME. SIMONNE ALLARD: The structure of a paraxylylene. YVES RAOUL: A new technique for the determination of hordenine. MARCEL MATHIEU and CONSTANTIN KURYLENKO: Remarks concerning the absorption of acetone by the nitro-celluloses. Discussion of the effects of the presence of traces of water during the absorption of acetone by the nitrocellulose. ANTONIN LANQUINE: The structure of the Provençal chains in the north of the eastern Varois region. PAUL CORBIN and NICOLAS OULIANOFF: Aerial photography in the service of geology. An account of work done in the Alps. JACQUES FROMAGET: New observations on the age and structure of the oldest sedimentary and crystalline formations to the north of Tonkin. PAUL SELTZER: The influence of a forest on the temperature of the air. Discussion of continuous records of temperature carried out in the forest of Haguenau (Bas-Rhin) with the view of determining the influence of the forest on the temperature of the air. PAUL BERTRAND: Observations on the classifications of the true Pecopteris. AUGUSTE and RENÉ SARTORY, JACQUES MEYER and HANS BÄUMLI: An attempt at differentiating between the parasitic cellulolytic fungi of paper. Comparison of the action of *Cladosporium*, *Fusarium* and *Aspergillus* on pure cellulose, with special reference to the effect of the culture media added. LÉON BINET, M. LAUDAT and J. AUCLAIR: The lowering of the alkaline reserve and the movement of the chlorine in the blood in the course of hyperthermia produced by short waves. The rise of temperature produced by short waves (15–18 metres) leads to a fall in the alkaline reserve of the blood plasma accompanied by a slight increase in the proportion of chlorine in the plasma and a slight fall in the number of corpuscles.

Academy of Sciences, August 13 (*C.R.*, 199, 445–468). LOUIS DE BROGLIE: The wave equation of the photon. A. C. MUKHERJI: Continued functions possessing a perfect ensemble of singularities, everywhere discontinuous. GEORGES ALLARD: A general method of statistics applicable to groups of indiscern-