

to the Advisory Committee by the Women's Hospital, from which it appeared that in the view of the staff at least 50 per cent. of the major operations performed at the hospital were due to gonorrhoea.

The Advisory Committee, after submitting their report to the Government, endeavoured to induce the press to take up the question, and in this they met with a certain amount of success. The National Council of Women were also approached, and they agreed to assist in an educational campaign and to co-operate with any reasonable measures the Government might bring in, provided that there was no legislation on the lines of the Contagious Diseases Acts and that no difference was made as between men and women. The Advisory Committee did not recommend legislation, but they advised the Government to subsidize the provision of wards for the reception of venereal cases in the general hospitals. This recommendation was adopted by the Government, and free beds were provided—24 for males at the Alfred Hospital and 20 for females at the Women's Hospital. The wards were equipped by the Government with the most modern appliances, and in addition a subsidy was made to the Melbourne University to provide for the carrying out of Wassermann tests.

At first there was some difficulty in filling the beds provided, but as it became known that the treatment was in a general ward and that the patients would not be dealt with differently from those in the other wards, a good demand for beds arose. The establishment of a night clinic at the Alfred Hospital also helped to popularize the arrangements.

Dr. Ham thought that the experiments conducted at Melbourne had led to a greater interest in the subject, and that in securing early treatment and early diagnosis they had achieved an important result. A Health Bill was at the present time before the Victorian Legislature, which contained provisions for adequate and gratuitous treatment of patients, for the prohibition of treatment by unqualified persons, and for making the transmission knowingly of venereal diseases a penal offence.

SCIENCE NOTES.

THE action of enzymes in promoting chemical changes is far from being perfectly understood, but the investigations of recent years have shown that a very large number of reactions, especially among the chemical processes of living organisms, are proximately caused by specific ferments or enzymes. In an address given recently at the eleventh International Congress of Pharmacy Professor Emile Bourquelot, of Paris, dealt with the action of enzymes in promoting synthetic changes or the union of two bodies into one of greater complexity, and in this connexion brought forward some previously unpublished work by his colleagues and himself. Enzymes were at one time supposed to be capable only of causing the splitting up of complex bodies into simpler ones—as, for example, the decomposition of sucrose into glucose and fructose under the influence of the enzyme invertase, or of amygdalin into glucose, hydrocyanic acid, and benzaldehyde by the action of emulsin. It was soon recognized, however, that the decomposition induced is of the "reversible" type, and if the products formed are allowed to accumulate in the liquid a point of equilibrium is reached and the decomposition stops, but can be restarted if the decomposition products are removed. Attempts were then made by various chemists to discover a reverse action of enzymes, in which the simpler bodies should be united to form the more complex. The first work in this direction was done in this country by Croft Hill in 1898; one molecule of maltose is split up into two molecules of glucose by the action of the enzyme maltase, and it was the reverse of this change which Croft Hill endeavoured to bring about by the action of maltase on a solution of glucose. Some of the latter disappeared, and there was some evidence of the formation of a biose, which, however, was not maltose, and was named revertose. Since then various other workers have succeeded in proving a synthesizing action of various ferments, but not in producing from its constituents, by the action of an enzyme, the same compound as would be decomposed by that enzyme under other conditions. This is what M. Bourquelot has now succeeded in doing in a number of cases. He explains previous failures by the

fact that the maltase, emulsin, or other ferment used is never a pure body, since no means are available at present for separating from one another those ferments which occur in Nature together, as, for example, in yeast. Therefore if, as he believes, each enzyme has a specific property of hydrolyzing or synthesizing one compound, since many bioeses can be produced by the combination of two molecules of glucose, each enzyme present would produce the biose for which it was adapted, and the result would be not maltose but a mixture of bioeses. Since the enzymes cannot be separated as pure substances, the best plan is to take such conditions that only one can act. The synthetic action is greatly favoured by the presence of excess of one of the constituent compounds; thus in a solution of glucose in excess of methyl alcohol, the enzyme capable of forming methyl-glucoside is in conditions favouring its activity, but enzymes capable of uniting two molecules of glucose together are much less favourably circumstanced, and others cannot function at all. By working in this way methyl-glucoside was prepared and crystallized, and M. Bourquelot and his colleagues have now successfully synthesized a considerable number of glucosides. As evidence that the synthetic and hydrolytic actions are due in any given case to the same enzyme, they record experiments in one of which the complex substance, and in another its hydrolytic products, were acted on by the same (impure) ferment, all conditions of dilution, etc., being the same; when equilibrium was reached the two liquids were of identical composition. Many new glucosides have been synthesized, and the field so opened up is practically unlimited; while an appreciable step has been made towards understanding the nature of enzyme action.

The Friday evening meetings of the Royal Institution will be resumed on January 23rd, when Sir James Dewar will speak on the coming of age of the vacuum flask. Among the lectures announced is one on the mechanics of muscular effort, by Mr. H. S. Hele-Shaw, F.R.S., M.Inst.C.E., and another on the production of neon and helium by electric discharge, by Professor Norman Collie, F.R.S. On February 20th Professor Arthur Keith, Conservator of the Museum of the Royal College of Surgeons of England, will relate the results of an anthropological study of the busts and portraits of Shakespeare and Burns. "The Royal Institution of Great Britain for the Promotion, Diffusion, and Extension of Science and of Useful Knowledge," to give it its full title, was founded by Count Rumford, and constituted by a charter granted by George III in 1800, enlarged and confirmed by an Act of Parliament in 1810. It possesses a library of about 60,000 volumes rich in scientific publications, but including also standard works on literature, art, and antiquarian research. There is a printed catalogue, and the books may be consulted in convenient reading rooms where English and foreign journals, magazines, and reviews may also be seen. The chief glory of the institution is in the remarkable scientific work which has been done in its chemical and physical laboratories by such men as Dr. Thomas Young in optics, by Sir Humphry Davy in chemistry, by Michael Faraday in electro-magnetism, by Tyndall in thermodynamics, by Lord Rayleigh in physics, by Sir James Dewar in the investigation of low temperatures, and by Sir J. J. Thomson on the constitution of matter. The historical collection of the institution contains Davy's first models for his miner's safety lamp and Faraday's electric apparatus, rough and ready in construction, but containing the promise of the extraordinary development of electric theory and its practical applications which the last half-century has witnessed. Young was professor from 1801 to 1803, Davy from 1802 to 1813, and Faraday from 1833 to 1867. The present professors are: in Natural Philosophy, Lord Rayleigh and Sir J. J. Thomson; in Chemistry, Sir James Dewar; in Physiology, Dr. William Bateson, who is also Director of the Horticultural Institution, Merton Park, Surrey, where he is continuing his researches in heredity. The average annual expenditure on experimental research during the last century has been £1,000. The Davy-Faraday Research Laboratory is an affiliated but distinct institution, founded by the late Dr. Ludwig Mond, F.R.S., to provide opportunities and facilities for research to persons who have credentials of scientific training and some experience in

original investigations. The annual subscription to the Royal Institution is five guineas and the entrance fee is of the same amount.

Since the discovery in 1907 by Halberstaedter and von Prowazek of peculiar cell inclusions in the conjunctival epithelium of patients suffering from trachoma, various views have been held as to the nature of these bodies. These inclusion bodies are composed of both minute granules and coarser oval forms imbedded within the cells in a rather indefinite homogeneous matrix. With Giemsa's stain the minute granules stained red and the coarser granules took a blue colour. When scrapings from the conjunctiva of trachomatous patients were introduced into the eye of monkeys a mild conjunctivitis resulted, and similar bodies were found in the epithelial cells; as the conjunctivitis disappeared the inclusion bodies could no longer be found. The authors concluded that there was an etiological relationship between these peculiar bodies and trachoma. This opinion was confirmed by others, but in 1909 the original workers discovered the same appearances in ophthalmia neonatorum, and in the following year Herzog put forward the idea that the so-called trachoma bodies were merely involution forms of the gonococcus. Noguchi, working with Cohen, considered them to be definite pathogenic organisms capable of producing well-defined conditions, and concluded that when they were found in gonorrhoeal conjunctivitis there was a double infection. By others the bodies were held to be degenerated Koch-Weeks bacilli, protozoa, or degeneration forms such as are met with in carcinoma cells. Recently Noguchi and Cohen have returned to the study of the trachoma bodies, and by the use of the Noguchi medium, which has proved to be such a fertile ground for the study of spirochaetes, the virus of rabies, the organisms of poliomyelitis and others, they claim to have cultivated these trachoma bodies. They took scrapings from the surface of the conjunctiva, and inoculated them in sterile ascitic fluid containing a piece of fresh animal tissue under anaërobic conditions. The result was that they were able to obtain cultures from all cases of trachoma in which smear preparations showed the bodies to be present, and from one of three cases of trachoma in which smear preparations were negative; they were absent in all the control cases. The primary cultures contained in addition various other bacteria, but after purification by Noguchi's method pure cultures were obtained of minute coccoid bodies in pairs or in masses staining red with Giemsa's solution. The colonies were barely visible to the naked eye. After several generations on anaërobic media the organisms could be grown under aerobic conditions on a glucose-agar medium. In addition to the minute granular forms staining red there were also found in the cultures larger oval forms, separately or in groups, taking a blue colour, and the latter could be observed to break up into the former. The typical appearance of the cell inclusion was obtained—a mass composed of an outer zone of coarse granules and a centre of minute granules. The organisms from a culture take Gram's stain, and are stainable also by carbol fuchsin and gentian violet. So far inoculations of cultures into the eyes of monkeys have been without result.

MOTOR CARS FOR MEDICAL MEN.

SMALL CARS.

DR. GEORGE WILLETT (Keynsham, Bristol) writes: In reply to Dr. Gordon Kelly, of Leicester, I beg to say that my statement that a hot-water jacketed induction pipe in a motor engine does conduce to an easy start up in the morning is founded on the following personal observations: On returning from a ten-mile run I took the temperature of the radiator water, and found it to be 155° F. The next morning at 9 a.m. I took it again; it was then 55° F., while a bucket of water standing close by as a control registered 52° F. Remembering that petrol begins to boil at 150° F., that it becomes less dense as the temperature rises, and also that my radiator water is 3° F. higher than the control water, I think I am quite justified in making this statement, particularly as the gain of these 3° F. corresponds to a change in the petrol density from 0.731 to 0.721, quite sufficient, in my opinion, to give the easy start up that I experience daily. As regards cylinder cooling, it is well known that pump systems (as in the De Dion) do not absolutely necessitate the radiator being kept quite full, whereas (as in the Singer) the thermosiphon type of water circulation demands for its success the regular replenishment of the water lost by evaporation.

THE RADIOTHERAPY OF CARCINOMA UTERI.

[FROM OUR SPECIAL CORRESPONDENT IN BERLIN.]

THE eagerly awaited and long-promised lecture by Professor Bumm on his results with radium in the treatment of cancer of the uterus was delivered to a crowded audience at a meeting of the Berliner medizinische Gesellschaft on December 3rd. It will be in the memory of my readers that Professor Döderlein's pronouncement this summer at the Gynaecological Congress at Halle was reported by me in full in these columns, and that it, and the discussion which followed, were on the whole decidedly optimistic in tone. It resulted, at any rate, in a great effort on the part of medical authorities throughout Germany to secure funds for the purchase of as much of the precious material as they could secure for the treatment both of hospital and private cases, and, as always where there is a large demand, in an artificial increase in the prices charged, due to the commercial speculators.

Professor Bumm began by recalling the favourable report he had made in the summer on twelve cases treated by radiotherapy. Further experience had afforded him no grounds to contradict what he then said concerning the local action of radium. There was nothing in the whole realm of the medical armamentarium that approached it in its power to produce shrinking of the primary growth together with inhibition of discharge and haemorrhage—effects that usually became apparent in from ten to twelve days. In favourable cases epithelialization of the tumours then took place, and the nodules diminished in size and ultimately vanished. Microscopic examination in such cases showed a disappearance of malignant mitoses, together with disruption of nuclei and protoplasm and a tendency in the malignant cells to loss of the power of staining. Ultimately only fibrous tissue with here and there the debris of carcinomatous tissue was found embedded in it. As he had pointed out in his previous short paper, successful results could not be expected by the destruction of a local growth only; the surrounding connective tissue always contained masses of carcinomatous cells, the selective destruction of which, without injury to the normal structures in the pelvic fascia, did not, as a matter of fact, occur. Very little of this destructive action on connective and other normal tissues had hitherto been noted or made public, for it was about six months to a year after the exposure that the evil results of this action manifested themselves. It was true that malignant tissue was more susceptible than the normal, but in cases in which long acting and deeply penetrating doses had been given the muscular and vascular structures had been found to undergo fibrosis, followed by hyaline degeneration—a stage of necrobiosis not far removed from real necrosis *en masse*. Such cases had presented themselves a year after exposure with nodules surrounding the body of the uterus which were not, as at first supposed, malignant recurrences, but hyaline degeneration bundles which might, and in one of his cases had actually gone on to rectal stricture a year later.

Professor Bumm went on to say that his present report was based on the treatment of 108 cases; 15 of these had so far recurred. He demonstrated casts of uteri which had been surgically removed after a preliminary radium treatment. It was clearly seen that, as far as the local growth was concerned, this had been entirely destroyed, but that cancer cell nests at a distance of 4 to 10 cm. had survived, in part at any rate, the destructive action on the primary focus. Generally speaking, the older the subject the better the prognosis, although this, of course, depended also on the stage of the disease. In 10 cases, by a preliminary irradiation, he had rendered an operation possible and had apparently eradicated the disease, for no recurrence had hitherto manifested itself.

Professor Bumm detailed his methods at some length. It was, he said, a serious mistake to imagine that the greater the dosage the better the ultimate result. He found himself constantly diminishing the weight of the radium employed, and he was now in the habit of using not more than 50 to 60 mg. at a time. Large doses were liable to produce fever; 300 mg. could in five or six hours produce a temperature of 106° F., which might continue with intermissions for days; 500 mg. at a dose were in