NOTES ON BOOKS.

In writing the *Life and Work of Sir Jagadis Bose*,⁷ who was this year elected a Fellow of the Royal Society, Professor PATRICK GEDDES has been actuated, not only by admiration for the first Indian of modern times to do distinguished work in science, but by his interest in raising and maintaining the professional standard and ideal above and beyond racial differences. This biography is, indeed, also a sociological study with the object of encouraging science students, especially in India, to overcome difficulties, and so follow the example successfully set by Sir Jagadis Bose. Born in 1858 in Eastern Bengal, and attracted to physics by the teaching of Father Lafont, professor in St. Xavier's College, Calcutta, Bose came to England with the object of studying medicine; but, as ill health rendered this inadvisable, he went up to Christ's College, Cambridge, and eventually, armed with science degrees from London as well as Cambridge, returned to India to take up teaching and research in physics. After considerable initial difficulties, he settled down to work and carried out further researches on Hertz's electric waves with results which met with warm approval from Lord Kelvin. Subsequently the electric response of inorganic and living matter engrossed his attention. A full account is given of the experiments on plant response, and there are good illustrations of the magnetic crescograph for magnifying ten million times the growth of plants, and of graphic records of those movements. These ingenious researches on the borderland of physics and physiology, which have attracted much attention, were followed by investigations in psycho-physics; and, though he retired as an Emeritus Professor in 1915, not only has he continued to work, but the Bose Institute for research in pure science will be a permanent memorial of this Indian pioneer.

A short but admirably written life of *Florence Nightingale*, by Miss ELEANOR FRANCES HALL,⁸ appropriately appears in the "Pioneers of Progress—Women" on the hundredth anniversary of the birth of the "Lady with the Lamp." It is dedicated to the memory of Dr. Elsie Maud Inglis, "whose Crimea was Serbia, but whose post-war work is in another world," and whose life's story is told in a companion volume of this series. The difficulties that Florence Nightingale had to overcome the conventional prejudice against devoting herself to nursing at a time when Mrs. Gamp was no fancy picture, and the preparatory training that she accomplished at Kaiserwerth under Pastor Fliedner and as postulant among the Sisters of Charity in Paris, are well and sympathetically sketched. After a graphic account of her work at Scutari, her successful labours in reforming the army medical service, hospital nursing, and Indian sanitation are described; and the concluding chapter, entitled "The Lamp Within," sums up her long life and the changing phases of her many-sided temperament.

The principles and practice of Continental therapy by baths, waters, and climate are set out in full detail in the large textbook of STRASSER, KISCH, and SOMMER, recently published in Vienna.⁹ The book is full of information, and may be recommended to medical men requiring a treatise on the subject.

*Baillière's Nurses' Complete Medical Dictionary*¹⁰ is a serviceable little book, fairly complete, clearly written, and well printed, that may be recommended to nurses and members of the lay public who want a small dictionary of terms in common medical use.

⁷ *Life and Work of Sir Jagadis C. Bose, C.I.E., C.S.I., M.A., D.Sc., LL.D., F.R.S., Emeritus Professor, Presidency College, Calcutta.* By Patrick Geddes, late Professor of Botany (University College, Dundee), St. Andrews University, and Professor of Sociology and Civics, University of Bombay. Longmans, Green, and Co. 1920. (Pp. 253; 9 plates, 23 illustrations in the text. 16s.)

⁸ *Florence Nightingale.* By Eleanor Frances Hall. In "Pioneers of Progress—Women," edited by Ethel M. Barton. London: Society for Promoting Christian Knowledge; New York: The Macmillan Co. 1920. (Pp. 84; 4 illustrations, 1 map. Price, cloth 3s. 6d.; paper 2s. 6d.)

⁹ *Handbuch der Klinischen Hydro-, Balneo- und Klimato-therapie.* By Professor Dr. Alois Strasser, Dr. Franz Kisch, and Professor Dr. E. Sommer. Berlin and Vienna: Urban und Schwarzenberg. 1920. (Spp. roy. 8vo, pp. 920; 48 figures. M. 210; Geb. M. 270.)

¹⁰ *Baillière's Nurses' Complete Medical Dictionary.* Edited by Constance M. Douthwaite. Second edition. London: Baillière, Tindall, and Cox. 1920. (Cr. 16mo, pp. 214; 3s. net.)

THE Hufeland Society of Berlin has chosen as a subject for the Alvarenga Prize for 1921 the etiology, symptomatology, and morbid anatomy of lethargic encephalitis.

MOTOR NOTES FOR MEDICAL MEN.

By H. MASSAC BUIST.

RISING FUEL COSTS.

OWING to the increasing cost of materials, workmanship, and so forth, not a few medical men who have returned from the war and who formerly were owners of cars have equipped themselves with motor bicycles. The latest increases in the cost of motor fuel, however, have rendered the operation of these lighter machines as costly in respect of fuel consumption as were small cars before the war. Nor has the worst phase of the matter been reached. In America a gallon of petrol costs about 2s. 1½d. But it is certain that, unless consumption can be reduced there, of which there is no prospect, the cost will be raised very soon. To-day America is consuming 2,000,000 more gallons of petrol than she can procure, so the reserves are lower than at this period last year. Moreover, she has a million more motor vehicles in use to-day than she had a year ago. In this country we are paying 4s. 3½d. a gallon for No. 1 spirit, which is scarcely superior to No. 2 spirit before the war. On the other hand, in France something over 12s. a gallon is paid for petrol. The diatribes levelled against the vendors of motor fuels in this country are chiefly on the lines of accusing them of profiteering, and showing how their revealed profits have increased since the outbreak of the war, but no reference is made to increased turnover and the other branches of these firms' enterprise. Such analyses are quite unsatisfactory, because these corporations all trade in various parts of the world. I am satisfied they could prove that they would be much in pocket if they ceased selling motor fuel in this country, and disposed of all they could secure in markets overseas. Nor must it be forgotten that large carrying corporations, such as the London General Omnibus Company, are supplied with fuel on long contracts which were working out at a loss of several pence a gallon before this increase of price, so that there will be over a shilling a gallon loss now. Likewise no serious attention need be given to the declaration by the Motor Fuel Committee, in its interim report of February last, that prices charged were too high, and so forth. The motor fuel business is a most intricate affair.

What it Means to the Doctor.

Instead of being concerned with propaganda, the medical man is interested in getting the facts as they bear directly on the running of his own motor vehicle for professional purposes. The plain fact is that there is more demand for motor fuel than world production can satisfy; that America owns 80 per cent. of the world's production of motor fuel, and controls some 50 per cent. of the balance; that the British Empire does not produce more than 2 per cent. of the total world's demands for fuel; and that we do not control more than another 4 per cent. Consequently what we pay for fuel in this country is dependent on the price at which the controllers, otherwise the United States, care to fix, and on the exchange. Certainly we have not come to the worst of the motor fuel situation in this country. This is the serious thing for the medical man, for already, if his motor vehicle runs thirty-four miles to the gallon of fuel, it will cost him 1½d. a mile. This has to be taken, too, in conjunction with the high cost of tyres and repairs. The majority of doctors consider themselves lucky if their cars will run twenty-three miles to the gallon, which represents 2½d. a mile. Those whose vehicles will do only seventeen miles to the gallon are paying 3d. a mile for their fuel. But the current prices, on which these calculations are made, will not obtain six months hence. On the contrary, as far as can be foreseen, we shall pass the 5s. mark, and even approach 6s. a gallon. But that would be a passing phase only. If British public opinion makes it too unpleasant for the petrol traders, who in this country are not masters of the situation, being themselves in the hands of the United States controllers, then the traders with establishments here will not trouble to bring the fuel to this country, but will sell it where they can get even higher profits. Fortunately the Government seems really intent on doing everything possible to develop the empire's motor fuel supplies rapidly, because it realizes already that the coal situation is such that 25 per cent. of the ships fuelled in home ports take

oil. The Government estimate is that in ten years' time at least 80 per cent. of such vessels will be supplied with oil fuel. Of course we can never discuss petrol without considering the oil industry, whence it is derived; even as it is idle to inquire why we are not pushing benzol production more when we have periodical troubles with the coal industry. It may be answered that shale will give us the benzol we need; but, though we develop the production from Scottish shale, all such increase would barely suffice for all the needs of the navy. The Government has always taken the output from these sources; consequently, as far as the public is concerned, if benzol is to be had at all, it must continue to come from coal. Benzol, therefore, is only a less practicable form of relief at the moment than is power alcohol, which is at present in the purely experimental stage, and will take longer to develop to a commercial scale than will the oil resources of the British Empire. Vast sums of money are being employed in exploiting possible oil supplies; there is no limit to them. All that is necessary is for other departments of the Government to assist the work of the Minister for Petroleum Affairs by rendering the thing profitable for those who are successful, and not to kill enterprise either by limiting or taking too much of the profits. This problem is closely bound up with human nature. No one likes paying exorbitant petrol bills. Probably most people consider themselves foolish not to have put their savings into the oil industry. Be that as it may, when it comes to motor fuel the only thing to do is, not to complain vainly—that will work no cure—but to weigh up the facts in their various bearings.

Causes and Remedies.

We are going through a very bad time, not only in this country, but throughout the world. The petrol demand will be greater than ever, because, despite something in the nature of a slump in the demand for motor vehicles, particularly of the utility sort, it must be borne in mind that quantities of parts have been manufactured, but are not yet assembled, consequently there is a bigger output to be absorbed by the buying public from the world's motor factories in general than they have yet actually delivered for sale. Moreover, works can dismiss hands wholesale, as is obtaining on the Continent as well as in America; still the output from the factories will not fall off, but will increase for several months to come, by reason of the fact that the parts of tens of thousands of vehicles are made already. When hands are turned off they are taken from those operations which are the preliminaries of manufacturing. Hands concerned with the final stages of building—assembly—are kept on. In addition, there are all the war vehicles to absorb. Then we have the practical steps taken by the London General Omnibus Company to tackle the problem of reducing vehicle weight per passenger carried. It is now known that the new style, K type, omnibus has proved itself and is coming on to the streets of London in quantity. But it is not so generally known that for every new style bus so placed on the streets an old "Red General" B type is available, thoroughly overhauled, for £500, completely fitted with body to hold thirty-four, or at £450 for the chassis. These vehicles will be eagerly sought after, and will make yet a further demand for petrol. Therefore let nobody suppose that the arrival of the inevitable slump in motor vehicle building will mean that less motoring will be done and, therefore, that the fuel situation will be eased. It will not. Slump or no slump, there will be more motor vehicles in use every year for the next ten, at least. Nor may we overlook agricultural motoring. Fortunately, however, that is tending gradually to develop a demand for the residuary products of treating crude oil, because more and more of these machines are being made to run on paraffin.

The Efficiency Aspect.

What we are really awaiting is for the tremendous impetus that is being given to the opening up of the oil resources of the world to begin to bear fruit. Probably we shall not come for four years to the point when fuel prices will fall. But it is unthinkable that the motor movement, and the medical man in particular, must be held up on that account. All that it can mean is that something in the nature of a slump in car production will arrive more quickly than otherwise would be the case,

because the situation is grossly aggravated by the high prices of cars, and the high running cost of motor vehicles according to the systems on which we build them—which leads at once to a remedy. Hitherto we have concerned ourselves with studying carburation; but that is only one way to achieve fuel economy. Much more has been done in that direction in this country than in America. But the typical British engine, with which fuel economy is achieved to a very high degree, is much more difficult to start than a typical American machine, wherein the carburettor has a pool of petrol always available. Consequently the latter will start at about fifty crank-shaft revolutions a minute against anything from 75 to 150 on a typical economical or high efficiency British or French engine. Why, however, be content with engine and carburation development, as we have been doing? Admittedly, with so-called light cars it is possible to run thirty to forty miles to the gallon on the average road; though that is not general in a doctor's service, because the car is apt to get cold in the long waits between relatively short runs, so that it rarely gets warmed up sufficiently. As a fact, it is agreed that sometimes a little more than half the fuel consumption in question is obtained in ordinary service. In this connexion there is no need to raise the old controversy as to the wisdom of using a mixture of the same richness whether the engine is running under a light or a heavy load. It is an incontrovertible fact that 1 lb. of air will burn completely 0.065 lb. of petrol. It cannot burn more. If more is fed, some will pass through the engine unburnt, or, at least, only partly burnt. If not enough heat is supplied under certain conditions of operation to vaporize the heavier constituents of the fuel, then a carburettor giving a richer mixture for that condition of operation may be of advantage from the standpoint of power. As regards economy, however, the proper remedy is to supply enough heat to vaporize all the fuel, and not to feed an excess of petrol. The two chief reasons for lack of economy in the use of motor fuel at present are that the engine is usually operated under a relatively light load, and that light load operation with the four-cycle, throttle-controlled engine corresponds to operation at low compression, which is an uneconomical condition. Again, the heavier constituents in the fuel are not reduced to the gaseous state before the explosion occurs; therefore they pass through the engine unconsumed. But we may leave it safely to our automobile engineers to continue making a reasonable amount of progress here, in spite of the fact that the falling quality of fuel tends to be less favourable to economical operation.

The Root of the Trouble.

The central fact—which also gives the likeliest hope of early relief—is that not one-third of the power generated by the engine is delivered in the form of propulsive effort where the tyres make contact with the road. In short, the whole transmission mechanism of a motor vehicle is extremely wasteful. Add to this the fact that there is not a motor car on the market which weighs less than 4½ cwt. for each passenger it is designed to carry, and it will be appreciated that there is here a vast opportunity to cut fuel consumption down to less than half. Halve the fuel bill, and 4s. 7d. aviation spirit becomes 2s. 3½d. a gallon, which is bad enough, but certainly a notable relief to present cost.

It is scarcely possible to conceive more adverse circumstances than those that obtain in regard to motoring at the moment and those which are in close prospect. But their synchronization gives a ray of hope. The situation is so bad that every form of enterprise concerned must perforce apply itself to remedies. On the one hand, the oil resources of the world are being exploited to an extent that has never obtained before; on the other, we see that, if the manufacturers are to have a chance of continued trade, they must seriously tackle the problem of reducing vehicle weight per passenger carried, also of economizing power in transmission. There must be more motoring for less fuel expenditure. In measure, too, as this effort is related to the task of reducing vehicle weight, it means, of course, less tyre expenditure. Meantime, there is nothing for the British medical man but to grin and bear it, and, above all, to keep very careful note of his expenses under these heads, claiming them when making his income tax return.