SATURDAY, AUGUST 23, 1924.

CONTENTS.

	PAGE
Problems of the Coal Mining Industry. By Prof. H. Louis	265
Theories of Growth and Senescence. By A. D. R.	267
Rockets to reach Planetary Space. By S. B.	270
Our Bookshelf	271
Letters to the Editor :—	
The Mass Spectra of Zirconium and some other Elements.—Dr. F. W. Aston, F.R.S.	273
The Zeeman Effect in Strong Magnetic Fields. (Illustrated).—Dr. P. Kapitza and H. W. B. Skinner	273
Biology and Sociology.—C. W. Soal; Dr. Bronislaw Malinowski	273
Solubility of Phosphates in Relation to Hydrogen Ion Concentration.—Dr. W. R. G. Atkins	275
The Phosphide Eutectic in Cast Iron. (Illustrated).—Dr. F. Rogers	275
"Bitumen" in Meteorites.—Dr. Percy Edwin Spielmann	276
Comparison of Wave-lengths with a Fabry and Perot Etalon.—Harold D. Babcock	276
A Substitute for the McLeod Gauge.—Dr. Norman R. Campbell, John W. Ryde, and Bernard P. Dudding	276
Life History of the Pearl Mussel.—Prof. A. E. Boycott, F.R.S.	276
A Hundred Years of Electrical Engineering. By Prof. G. W. O. Howe	277
The Frequency of Birds over the High Atlantic Ocean. (With Diagrams.) By P. Jespersen	281
The Planet Mars. (Illustrated.) By Dr. W. H. Steavenson	283
Obituary :—	
Prof. James Seth. By Prof. J. H. Muirhead	285
Dr. R. H. Jude. By Dr. Robert W. Lawson	286
Prof. Albert Hesse. By Dr. J. Reilly	286
Current Topics and Events	287
Our Astronomical Column	290
Research Items	291
Imperial Botanical Conference. By F. T. Brooks	293
The Maximum Recorded Temperature of the Air and its Circumstances. By L. C. W. Bonacina	294
Past and Passing Peoples of Polynesia. By Sidney H. Ray	295
Ancient and Modern Arithmetic	296
University and Educational Intelligence	297
Early Science at the Royal Society	298
Societies and Academies	299
Official Publications Received	300

Editorial and Publishing Offices :

MACMILLAN & CO., LTD.,

ST. MARTIN'S STREET, LONDON, W.C.2.

Editorial communications should be addressed to the Editor.

Advertisements and business letters to the Publishers.

Telephone Number : GERRARD 8830.

Telegraphic Address : PHUSIS, WESTRAND, LONDON

NO. 2860, VOL. 114]

Problems of the Coal Mining Industry.

WHEN Mr. Lloyd George was in power about 1919, various proposals relating to the mining industry were put forward by him; and it may be remembered that they were rejected successively by all the interested parties. The essential points of these proposals have now been re-stated in a report entitled "Coal and Power,"¹ just issued as a slender volume. We are not concerned here with the political aspect of Mr. Lloyd George's suggestions, but it may be worth while to consider the technical and economic sides. As regards coal mining, the suggestions fall into two main groups, namely :

1. The acquisition by the State of mineral royalties. (Incidentally it may be noted that the authors of the report have not decided how far they should go in this respect; in the introduction, the summary of the proposals suggests "purchase of all minerals and royalties by the State," whereas in the body of the report we find the following sentence: "Further, it is to be considered whether the State, when acquiring its coal resources, should at the same time acquire all the mineral resources of the country." Surely the author or authors of this report ought first to have made up their minds as to what they really want to do.)

2. The formation of consultative bodies consisting of miners and mine owners, who are apparently to discuss the problems of the industry. (Throughout, the author or authors of the report overlook the importance of the mining engineer and the mine manager; whenever the technical staff is casually referred to, it is looked upon as part and parcel of the mine ownership; any discussion of the future of the industry that fails to recognise that there are at least three separate bodies to be considered, namely, miners, mine owners, and technologists, must necessarily be imperfect.)

The report examines at some length the reasons for the present disturbed state of the industry, but fails to recognise one of the most serious. A small but active section of the miners' leaders appears to have determined to get the whole of the coal mining industry into its own hands, an operation which these men designate as nationalisation, and apparently they have come to the conclusion that the best way of attaining their object would be to wreck the industry as it now exists.

It is pointed out quite clearly in the report that nationalisation of the coal resources is a matter which can legitimately be undertaken by the State, whereas the nationalisation of the industry cannot. It is well known that there are two forms of mineral ownership. In one, which is adopted by most Conti-

¹ Coal and Power: the Report of an Enquiry presided over by the Rt. Hon. D. Lloyd George. Pp. xiv+139+16 plates. (London: Hodder and Stoughton, 1924.) 1s. net.

mental nations, the State owns the minerals and leases them to the mine owners; in Great Britain and the United States, the minerals are the property of individuals who may deal with these minerals as they see fit. Both systems operate and operate successfully, but it is a curious fact that the two countries where the minerals are privately owned are those where mining has reached its highest pitch of development, and, incidentally, where the miners' wages are the highest. The present report proposes to purchase the coal royalties, and shows a series of advantages which it claims would result from such change of ownership. Curiously enough, not a word is said about the fact that the Crown already owns quite important mineral areas; for example, it owns all the under-sea coal, and it owns practically all the coal in the Forest of Dean Coalfield. This State-owned coal, however, is leased and dealt with in precisely the same way as the privately-owned coal in the country, and none of the advantages which are claimed for the State ownership of minerals are apparent in the quite considerable tracts of State-owned coal already in existence. Incidentally it may be pointed out that wages in the Forest of Dean coalfield are about the lowest in the whole country.

No reference is made in this report to the very important lessons to be learnt from the United States. In the United States the minerals were originally the property of the State, and at first the Federal Government attempted to lease its minerals, but after something like half a century of experimenting on these lines it was found far better to get the mineral lands as soon as possible into private hands. The author or authors of this report might study with advantage the evidence given by Dr. R. W. Raymond before the 1889 Royal Commission on Mining Royalties upon the methods adopted in the United States. One sentence alone from his evidence may be repeated here: "I have been accustomed to say at home over and over again that it would be better for the United States to-morrow to give up all its mineral land and deliberately convey it to individuals for nothing in order to have somebody own it instead of the Government." In the face of such an emphatic pronouncement, based upon experience, it would surely appear to be a risky experiment to desire to revert in Great Britain to the method of State ownership of royalties. It may be freely admitted that the method is quite workable, seeing that it is in operation in most Continental countries, but there is no evidence that any advantage would accrue from it.

Another point which is emphasised in the report before us is the possibility, if all the minerals were State-owned, of doing away with barriers. Any experienced coal miner knows that some barriers are

indispensable for the safety of the mines; the report also overlooks the fact that power to have unnecessary barriers removed is given under the Mines (Working Facilities and Support) Act 1923, but so far not a single application for the removal of barriers under this Act has yet been made, which shows that the evil, if it exists at all, is certainly not a very pressing one.

The method suggested for the purchase of royalties is to divide all minerals into three classes, those which are known to exist and are actually under lease, those the existence of which is highly probable although they are not actually under lease, and those as to the existence of which nothing definite is known. It is proposed to deal forthwith only with the first named of these, and that they should be purchased for bonds issued by the Treasury, bearing interest, the rate of which the report conveniently omits to give. It is stated, though no basis of calculation is given, that the actual value of these minerals is approximately 70,000,000*l.* The total known coal reserves of Great Britain have been estimated at something like 150,000 million tons; assuming an average coal output of 300 million tons, the coal reserves would give a life of 500 years. For actuarial purposes this may be looked upon as a perpetuity, and the calculation in this way simplified. The amount of royalties paid on coal in 1923 was 6,300,000*l.*, so that unless royalty owners are to be deprived of a portion of their income, these bonds ought to bear 9 per cent. interest. These points are not considered in the report.

The second suggestion, which again is by no means fully worked out, is to appoint a series of bodies which are apparently to take a sort of paternal consultative interest in the mining industry. It is proposed to have three bodies, a National Mining Council to deal with the industry as a whole, District Boards for dealing with questions in each individual district, and Pit Committees to be "established in connexion with every pit, to consist of equal numbers representing the management and the workers." The report does not make it clear whether "pit" committee is meant or not. There are individual colliery companies having a dozen different pits; is it suggested that there shall be such a committee for each one of these pits? The idea of pit committees was decisively rejected by both the miners and the mine owners, and rightly so. The first essential for the safe and economic administration of a colliery is strict discipline throughout the pit, and it is obvious that there would be an end of such discipline if every petty question that arose had to be referred to a pit committee, while practical men do not need to be told that, in everyday colliery working, problems arise which must be dealt with on the spot and cannot be left to stand over

for discussion in a fortnight's time by the pit committee. District boards would probably do no harm, and a National Mining Council would probably be quite useful. Indeed, something approximating to this already exists in the Advisory Committee of the Mines Department.

A detailed discussion of all the statements in this report would demand far more space than is here available; the reader not versed in colliery matters should, however, be warned not to take all that he finds here as gospel truth, an unfairly coloured picture being presented in many cases. Thus to take one example, a number of photographs of miners' houses are shown, obviously with the intention of exciting the reader's sympathy. Three of these are of a block of cottages at Leadgate in Co. Durham. As a matter of fact, these cottages are now being pulled down by the colliery company which owns them in order to be replaced by more modern accommodation; surely the writer of the report ought to have known this fact, and if he knew it he ought surely to have stated it! It is difficult to understand how any one who knows the miner at all can write such a sentence as this: "Habituated with the conditions he (the miner) is not impressed with the imminence of danger, but he is aware of it; it is at the back of his mind always and affects his outlook on life." The miner rarely thinks of danger when he goes to his daily work, and would probably feel deeply insulted if any one suggested to him that he did. A couple of Durham pitmen who had been called up to London to give evidence in connexion with a mining case were heard on their return to be congratulating each other on being once again safe down the pit and away from the dangers of the London streets, and this represents the true attitude of the miner towards his daily occupation. As a matter of fact, their estimate of comparative danger was not really so far off the mark, seeing that there were *two-and-a-half times* as many fatal accidents (in 1922) in the streets as there were in the collieries of Great Britain. Great play is usually made in the discussion of coal mining, especially by those who are ignorant of the subject, with the dangers supposed to attend this work. It is unquestionably one of the more dangerous occupations, but its dangers are immensely exaggerated, and it may be hoped that the above simple statement of fact may help to put the problem in its proper perspective.

It need scarcely be said that there is only one real remedy for the difficulties with which the coal industry is struggling to-day, and that one, being unpalatable, as many salutary remedies are, is never mentioned in the report. It is summed up in the two words "MORE WORK."

H. LOUIS.

NO. 2860, VOL. 114]

Theories of Growth and Senescence.

The Chemical Basis of Growth and Senescence. By Prof. T. Brailsford Robertson. (Monographs on Experimental Biology.) Pp. viii + 389. (Philadelphia and London: J. B. Lippincott Co., 1923.) 12s. 6d. net.

THE physicist who theorises is more fortunate than the biologist. He may elaborate theoretical considerations for the whole of his life and still be talking sense at the end of it. It is hard for the biologist to theorise for five minutes without talking nonsense. Yet biologists, in spite of all the warnings of the past, find the theoretical impulse irresistible, and sometimes it is useful for them to give way to it. Not that their theories are likely to be true, but that they usually raise such acute opposition on the part of other biologists that the others devise experiments to refute them, and much valuable information is obtained. Not all theories have this salutary effect. Some act as intellectual soporifics providing attractive names, the frequent repetition of which hypnotises the hearers and stops all further inquiry. Of all the words that possess this "virtus dormitiva," there has been none greater than Weismann's "germ plasm." The "germ plasm," so far as we understand it, is a hypothetical substance with magical properties, which exists in living cells and enables them to divide. Some of it is infinitely divisible, and the possessors of this sort are germ cells; some of it resembles ordinary matter in being finitely divisible, and cells that possess this sort are somatic cells. Perhaps this statement is erroneous and the theory is not quite so bad really, but if so the difference is too subtle to have been grasped by its adherents or opponents.

Prof. Robertson's own theories are of the beneficent type just mentioned, but he has the misfortune to be haunted by the germ plasm, and at times the incubus is demoralising. The main theory which he advocates in this book is definite and capable of being put to experimental test. If it does not agree with all the facts, that is not surprising in the present state of knowledge. We may legitimately applaud Prof. Robertson for having found a theory which accounts for any of the facts, without therefore being expected to believe in it or to refrain from criticising it.

The fundamental facts on which the theory is based are, in brief, that the rate of growth of animals and plants follows a logarithmic formula that is the formula for the progress of an autocatalysed chemical reaction. Among the mammalia three growth cycles can be distinguished. Where, as in man, the cycles are definitely separated, the formulæ for each cycle show excellent agreement with the average curves of growth. In