

It is a relief to know that the Conservator is of opinion that there are very considerable quantities of pencil cedar in the Colony, but that the survey of these is still very incomplete. The existing sawmills with cedar concessions can supply any immediate demands, and it is hoped in the near future to have other areas ready for exploitation.

Mr. H. M. Gardner, who is now the permanent Conservator, and his officers may be congratulated on a report which shows real progress. He is evidently

an optimist, for the following extract shows that he has been able to perceive some benefit to forestry in the Colony as a result of the past drought. He writes: "The one satisfactory result of the drought conditions prevailing during the year was the very great increase in the public interest in forestry. The preservation of the existing forests and the increase of tree planting both on public and private land have become matters of public discussion throughout the Colony, which can result in nothing but good."

Physics in Fuel Problems.

DR. C. H. LANDER, Director of Fuel Research, delivered one of the public lectures on physics in industry which are arranged by the Institute of Physics, on Nov. 27, taking as his subject "Physics in Relation to the Utilisation of Fuel". Apart from the great development of physical instruments for the control of fuel-using appliances, physics enters into the study of most problems of preparation, treatment, and utilisation of fuel.

The microscope has been effectively enlisted in the examination of coal, both for the study of thin sections by transmitted light, whereby the more resistant plant remains are made visible for identification, and for the investigation of polished surfaces by reflected light. X-ray photography as developed by Kemp has proved very useful in revealing the distribution, nature, and amount of ash in coal, information giving a ready guidance as to the prospects of 'washing' a coal to improve its worth. Again, by means of the X-ray spectrometer, graphite has been identified in cokes of different types, and it has been found possible to correlate the size of the graphite crystals with the reactivity of the cokes as determined by a chemical method used at the Fuel Research Station.

All processes of coal cleaning depend on utilising differences between the physical properties of the coal and the impurity to effect a separation. Difference in density, size, shape, friction, resiliency, and surface tension to water have all been used for this purpose. These applications were illustrated by description of

the principles of the different methods of wet and dry cleaning.

Dr. Lander referred to the influence of the manner in which heat is applied on the process of carbonisation in retorts, and then turned to the physical principles of the utilisation of fuel. In order to reduce the size of the combustion chamber of furnaces fired by pulverised fuel, it has been considered advisable to create turbulence in the fire gases. Dr. Lander questioned whether uncontrolled turbulence will prove so satisfactory a solution as to obtain stable stream-line motion of air, and to induce the particles of fuel to move across the stream line in a controlled manner; this might perhaps be attained by giving a vortical motion to the air admitted at the perimeter of the chamber while the products are withdrawn axially. The fuel would be admitted at any convenient point or points, and the particles would be compelled to cross the stream lines in a stable manner.

The physics of the fuel fired furnace is complicated by the fact that it involves transfer of heat from moving gases. Unfortunately, the complications are such as to prevent the treatment of the problem by 'models', as in aerodynamical research. In such furnaces, in addition to the flow of combustion gases, heat interchange by conduction, forced and natural convection, and radiation are occurring. So complex are the conditions that reliance has usually to be placed on empirical formulæ of limited application, but progress is being made to place these on a more fundamental basis.

H. J. H.

Undulant Fever in England and Wales.

UNDULANT fever was regarded thirty years ago as a sub-tropical disease almost confined to the Mediterranean coast-line and islands; hence the old name of Mediterranean or Malta fever applied to the disease. It has now been recognised in every continent, with the possible exception of Australia.

The causative micro-organism of undulant fever is a micrococcus (*M. melitensis*), first described by Bruce in 1886 (though some regard it as a bacillus), and is spread almost entirely by goats' milk. In 1897, Bang of Copenhagen described under the name *Bacillus abortus* a micro-organism causative of contagious abortion in cattle. Research during the last few years has directed attention to the close similarity between *M. melitensis* and *B. abortus*, and inasmuch as *B. abortus* is frequently present in cows' milk, the question has arisen whether this organism may not cause a form of undulant fever in man. As a result of close clinical and bacteriological study of cases of irregular fever occurring in Great Britain, on the Continent, and in America, it has been shown that man is occasionally infected with the contagious abortion organism with the production of a form of undulant fever.

An exhaustive report on the subject by Capt. Dalrymple-Champneys has been issued by the Ministry of Health ("Undulant Fever." *Reps. on Pub. Health and Med. Subjects*, No. 56. London: H.M. Stationery Office. 1s. 6d. net), and it is found that at least 14 authentic cases of undulant fever in man caused by the *abortus* variety of the organism have originated in England. Many cases have been described in Denmark, some in Germany, and a number in America (366 cases this year, according to a *Daily Science News Bull.* issued by Science Service, Washington, D.C.). Contagious abortion is also widespread among animals other than the cow, namely, the sheep, pig, goat, horse, and dog, the causative organisms being of the *abortus* type, but sometimes presenting minute differences, so that several varieties exist.

Dr. Forest Huddleson has published a valuable contribution on the differentiation of these varieties, or species as he prefers to call them (*Technical Bull.*, No. 100, 1929. Agricultural Experiment Station, Michigan State College). The organisms are placed in a genus *Brucella*, which is divided into three main species, namely, *Br. abortus* (Bang), *Br. suis* (Traum),