controlling their quality. This laboratory makes about eight thousand tests every year. The Paint Section specifies and tests all kind of paint materials. It is also concerned with the routine control of the manufacture of paint- and varnish-cleaning agents. In the constant-temperature and humidity room the nature of all textiles is closely examined. A humidity control apparatus maintains constant conditions of 75° F. and 66 per cent relative humidity. This is essential, as the properties of textiles vary largely with temperature and humidity.

In the workshop, special precautions have been taken to prevent the transmission of vibration. In some of the rooms accelerated tests are carried out. For example, in the paint exposure laboratory, by the use of the 'weatherometer', results can be obtained in five weeks which with outdoor exposure alone would have taken twelve months. At the moment, more than a thousand outdoor exposures are in progress. Visitors were impressed by the practical nature of the tests, and the great economic value of the results to the Company.

Energy-Output of the Coal-Miner

IN a paper read before the Institution of Civil Engineers on December 13, Prof. Kenneth N. Moss discussed the energy-output of the coal miner.

The object of the first part of the paper was to show that the performance of manual work necessitates a food-input in excess of the energy-output. Thus if it is required to maintain a high work-output from men engaged in manual work, the engineer in charge must satisfy himself that the calorie-value of their food-input is adequate for the purpose.

Some years ago, Prof. Moss determined the calorie-value of the daily food-input of sixty colliers, and found that the average was a little more than 4,700 Cal. The average oxygen consumption per minute throughout the working shift on the coal-face for twelve colliers was found to be 1,333 c.c., which, after deducting the average oxygen basal resting-rate of 235 c.c. of oxygen a minute, was found to be equivalent to 16,950 ft.-lb. of energy.

The total energy expended below ground during a 7½-hour shift is about 2,800 Cal., and the energy expended during 24 hours is estimated to be about 4,500 Cal. Thus the calorie-value of the daily food-input of a miner should be 4,750–5,000 Cal., to enable him to do his work without loss of body weight or coal-output. The actual average work-output, assuming the mechanical efficiency of the body to be 25 per cent, was 4,237 ft.-lb. per min. during the time spent on the coal-face.

If a miner has to work or walk in places where he has to stoop a good deal, his energy-output is greatly increased, or in other words, the mechanical efficiency of his body is seriously diminished. Thus if a miner has to work in a stooping position so that his body height is reduced by 40 per cent, his energy-output is increased by 65 per cent. If men have to walk a good distance along low roadways the energy expended may be so great as seriously to affect their work-output in the working place. Alternatively, if men are called upon to walk to their work under such conditions, their food-intake must be increased to enable the extra energy to be expended.

Referring to the physiological aspect of the problem, Prof. Moss said that a miner at work in air at a dry-bulb temperature of 98°–100° F., and a wet-bulb temperature of 85° F., can lose as much as 18·56 lb. of moisture through the sweat-glands and respiratory tract during 5½ hours work. If the work-output below ground is equal to 2,800 Cal., it is necessary, assuming that no heat is lost by radiation and conduction, to evaporate 10·6 lb. of water from the skin to neutralise the heat generated in the body during work. The significance of a high wet-bulb temperature is thus clear.

The drinking of water when at work is essential in order to keep the body-temperature normal, though excessive drinking of water is harmful. The significance of the chloride content of the blood points to an effective remedy for heat-cramp and fatigue ; the addition of 5–10 gm. of sodium chloride to 1 gallon of drinking water will prevent the cramp, and to a great extent the fatigue, which is caused by hard work under trying air-temperature conditions.

Archæological Research in South Africa

ONE of the biggest drawbacks to the proper study of prehistoric archæology in South Africa has been, and still is, the complete absence of a properly worked out and correlated geological background. The advances and recessions of ice sheets during the Quaternary provide this background in Europe, and broadly speaking, the existence of the geological canvas has not only created a great stimulus to research in prehistory generally, but has actually become an essential feature of the proper study of the subject. In South Africa there is unfortunately no such background. Prehistorians will therefore be interested to know that the Directors of the Geological Survey and the Bureau of Archæology of the Union of South Africa have arranged a joint and detailed geological and archæological survey of certain vital sections of the Vaal and Riet River Valleys and their tributaries, with special reference to climatic and other conditions during the Quaternary. These valleys hold the secrets of climatic fluctuations and earth movements that were experienced in post-Pliocene times in South Africa, secrets that may be found to be intimately interrelated with climatic fluctuations and movements in other parts of the world—in East Africa and Europe particularly. If correlation is possible and earth