New Mining Department at Armstrong College, Newcastle-on-Tyne.

ON May 14, H.R.H. the Prince of Wales opened the new Mining Department of Armstrong College. In his opening speech he said, "The industry is confronted with stern competition from overseas. It must be equipped to meet that competition, and I think it is generally agreed that it is to science that we must look in our distress. Science must show the way to an improvement in our methods, and scientific training must be available both for the leaders and the rank and file, so as to ensure that no single ounce of energy is lost in the tug-of-war against our competitors."

The demand that Armstrong College should intensify and enlarge its share of work of scientific research in the interests of the coalfields it mainly serves has recently become specific. The coal owners of Durham and Cumberland, the Federation of Iron and Steel Manufacturers, the Department of Scientific and Industrial Research and the coke and gas industries, have co-operated with the College in the formation of a committee to supervise and encourage the prosecution of researches bearing directly on their respective industries. This work is now well in hand; valuable reports have already been issued, and more may be confidently expected in the near future. Similar co-operation between the College and the Fuel Research Board has begun: a physical and chemical survey of the coal seams in the northern coalfields is in progress, the chief purpose being to obtain an exact knowledge of the properties of these seams. This work is being carried out at present in temporary buildings, but it will shortly be transferred to the top floor of the new building.

The Department of Mining in Armstrong College has long and fine traditions behind it. It forms the oldest mining school in Great Britain, for it dates back in one form or another to the year 1837. Many of the foremost men in the mining industry to-day received their training in it. The present head of the Department is Prof. Granville Poole, who has designed the new building which now provides adequate facilities for the teaching of mining and the prosecution of research.

The erection of this building has been made possible only by generous grants from the Miners' Welfare Fund. The sum of £20,000 was subscribed by the Central Committee of the Fund and £10,000 from the Northumberland District Committee. Anonymous donors have contributed nearly £5000 to the equipment of the building and a further sum of £15,000 is required. The building will occupy a central position when the general scheme for the development of the College is completed. The architect is Mr. Dunbar Smith, of London, who was also the architect for the new College Library and for the National Museum of Wales, one of the noblest buildings erected in Great Britain within recent years.

Apart from the rooms set apart for research, the Department has several prominent features; for example, an exhibition hall containing plant and models of great educational value, and products from modern carbonising and hydrogenating plants, etc., also a specially equipped laboratory housing plant for the dressing of minerals.

The courses of the Department are arranged to meet the requirements of those who wish to specialise in any branch of mining, and the diploma and degrees obtainable are accepted by the Board for Mining Examinations in lieu of two years' practical experience in a mine.

Insect Nutrition and Metabolism.

THE subject of nutrition and metabolism in insects is highly important, in that its adequate exploration is likely to provide fresh viewpoints for problems of insect control. At the same time its relation to such insect products as silk, lac, honey, and wax should not be overlooked. At the present time, knowledge of the metabolic processes of insects is limited to scattered experiments and observations, usually confined to individual species, and of too inadequate a character to admit of reliable generalisations being made. The literature is very extensive and, for that reason, imparts the impression that a large amount of work has already been accomplished. A survey of any small branch in this field will, however, reveal how much of the available information is of a comparatively trivial or incomplete character, and what an infinitesimal amount of really fundamental knowledge has, so far, been gained.

In the *Transactions of the Entomological Society of London*, 1928, Part 2, Mr. B. P. Uvarov, senior assistant in the Imperial Bureau of Entomology, has brought together the results of all the work done on the subject of insect nutrition and metabolism. His memoir takes the form of an admirable introductory survey (65 pp.) of the range of problems involved, together with a bibliography of nearly six hundred titles. In the collation and examination of so large a mass of literature, the author has done a substantial service to entomology and laid the basis and provided a guide for future research.

If one selects, for example, the enzymes involved in the digestive processes of insects, rather a surprising amount of data will be found available, but much of the material is the result of old, or of imperfect, methods of technique. There is also the fact that the part played by micro-organisms living in the digestive tract further complicates the subject. The need for clearly ascertaining which enzymes are produced by the insect and which by micro-organisms of symbiotic or other relationship is abundantly evident. With plant-sucking insects we have evidence that they are capable of converting starch into sugars, but we know nothing concerning their utilisation of the protein constituents of cell sap. Buchner went so far as to conclude that the symbiotic micro-organisms of aphids, coccids, etc., are able to utilise atmospheric nitrogen and so make up for a supposed deficiency in nitrogen absorbed by such insects from their plant hosts. It is, however, abundantly clear that there is no positive evidence indicating that sucking insects do not obtain and utilise all the nitrogen they need from the cell contents: we have to admit that the rôle of the symbionts is still unsettled.

Again, the problem of cellulose digestion in insects is very far from being settled in spite of the existence of tens of thousands of plant-feeding species. The presence of a cellulase has been found in very few insects and, for the vast majority of species, it would appear probable that, if cellulose is digested at all, it is by the intervention of micro-organisms, as has been so well demonstrated by Cleveland in the case

of termites. We know surprisingly little concerning the nutritional requirements of blood-sucking insects which are concerned with the transmission of the pathogenic agents of certain virulent diseases. We need to know the length of time such insects can exist in the absence of a blood meal, the extent to which digestion of blood requires the interaction of micro-organisms, the influence of different types of blood upon fecundity, and the extent to which the selection of one mammalian host in preference to another is a chemical or a biological problem.

These few comments will serve to indicate the nature and importance of some of the problems involved. It is to the credit of the Dietetics Subcommittee of the Civil Research Committee that it directed attention to the need for examination of the nutritional problem in insects. Through the Empire Marketing Board it was able to arrange with the Imperial Bureau of Entomology to produce a collated bibliography of the whole subject, and Mr. Uvarov's memoir was the result. On the submission of the MS. to the Civil Research Subcommittee, the latter body approached the council of the Entomological Society of London, through the Empire Marketing Board, with a view to its publication. It must be added that the financial provision was made by the Empire Marketing Board, and that it affords yet another example of the breadth of view and wise foresight exercised by that Board in the furtherance of applied biological research.

The inception, preparation, and publication of this memoir reflects the greatest credit on all concerned. It may be added that Mr. Uvarov's actual summaries of the papers listed in his bibliography have been deposited in the Reid Library of the Rowett Research Institute for Animal Nutrition, Aberdeen. Arrangements have also been made for a set to be placed in the Science Library at South Kensington, where they will likewise be available for consultation. A limited number of copies of Mr. Uvarov's memoir are available on application to the Secretary, Committee of Civil Research, 2 Whitehall Gardens, S.W.1. A. D. IMMS.

Annual Visitation of the Royal Observatory, Greenwich.

AT the annual visitation of the Royal Observatory, Greenwich, by the Board of Visitors on Saturday, June 1, the Astronomer Royal presented his report, which describes the work of the observatory during the year ended on May 10. The observations with the transit circle numbered nearly nine thousand, embracing the sun, moon, planets (of which special attention was paid to Vesta, owing to its value for determining the equator point), fundamental stars, and stars needed for comparison with Eros at the time of its near approach to the earth in 1930–31. The correction to the longitude of the moon as calculated from Brown's tables is +5·51″ from the limb and +5·83″ from the crater Mosting A. The correction has been diminishing at the rate of a third of a second per annum since Brown's tables were introduced into the almanacs in 1923. The early observations of the sun and moon, from 1751 onwards, have been re-reduced; it is found that the longitudes deduced from the declinations are more trustworthy in the early years than those from the right ascensions. The results give support to the theory that there are variations in the earth's rate of rotation; they also indicate a secular acceleration of the sun's longitude, the amount of which is +0·78″ in a century.

Observations with the Cookson Zenith Telescope show that the variation of latitude in recent years has been abnormally small; the large amplitude of seven years earlier has not been repeated.

The 28-inch equatorial has been used for double star observation; 282 stars have been measured during the year, 44 of which are separated by less than half a second; a new working list of some 2000 pairs discovered by Dr. Aitken has been prepared. The old water-clock used for driving this instrument, and its predecessor the Merz equatorial, since Airy's days has been superseded by an electric drive of the Gerrish type, which was on view for the first time at the visitation. The Astronomer Royal gratefully acknowledges the help given in preparing the plans by Mr. F. J. Hargreaves, who had used a similar drive successfully on his small equatorial at Kingswood, Surrey. It was with this instrument that he was the first to photograph the comet Grigg-Skjellerup at its return in 1927.

Thirty-one stellar parallaxes were determined with the Thompson 26-inch equatorial during the year, bringing the total up to date to 400. A useful economy has been introduced of taking two parallax fields on the same plate; this halves the time spent in development.

The 30-inch reflector is being used for the determination of 'colour temperature' of stars. The absolute temperatures are obtained by comparison with the positive crater of a carbon arc lamp, which is mounted on the roof of the octagon room, 600 feet away. Twenty-four early-type stars, distributed as uniformly as possible round the northern hemisphere, have been selected as standards; forty other stars have now been compared with these; the comparisons being made at the same altitude in each case. Some notes on B-type stars of abnormally low temperature were published in the *Monthly Notices* last year.

With the astrographic equatorial, plates are being taken for comparison with those taken twenty-five to thirty years ago, in order to determine proper motions The result of this study for the zones from Decl. +64° to +72° is now in the press. The sunspot curve gives indications of a double peak, in 1926 and 1928 respectively. Daily spot numbers, both of the whole disc and of the central region, are sent to Zurich for the Bulletin which is published there under the auspices of the International Astronomical Union.

The magnetic elements determined at Abinger for the year 1928 are: Decl. 12° 47·0′ W.; Hor. Force, 0·18564; Vert. Force, 0·42941; Dip, 66° 37·3′; the Decl. is diminishing about 12′ per annum.

The mean temperature of the year ending on April 30, 1929 (misprinted 1928 in the report), was 48°·7, or 0°·8 below the average. Frost occurred on 71 days; the rainfall was 20·46 inches, or 3·78 below the average. March, with 0·038 inch, was the driest month ever recorded at Greenwich.

The performance of the two Shortt sidereal clocks has been very satisfactory; the temperature in the clock cellar is now maintained at 62°·8 Fahr. The progressive increase of losing rate still continues; it is proposed to substitute a bob of invar on one of the clocks.

Daily comparisons of time are made with Paris, Nauen, Annapolis, and Bordeaux. In all four cases the residuals appear to show an annual wave.

Allusion is made to the eclipse expedition to Kedah and Siam. The total equipment weighed ten tons. Unfortunately, no results were obtained in the investigation of the Einstein bending of light; but some results on the corona and prominences were obtained at Alor Star. A. C. D. CROMMELIN.