time existing in East Anglia, and broken up by the irruption of the sea into the area in Crag times. At Bawdsey, on the Suffolk coast, the sea is to-day attacking a cliff composed of London clay, Red Crag, Glacial Gravel and surface material. As these various beds are washed away, the heavier contents collect at low tide mark, and are forming a deposit similar in some respects to the Suffolk Bone Bed. It is indeed highly probable that this was accumulated under analogous conditions, and it is possible that the mammalian remains of different ages in the Bone Bed, together with the flint implements, at one time occupied their respective geological horizons in the now vanished land of Suffolk.

The mammalian bones and teeth in the Suffolk Bone Bed range from Upper Miocene to late Pliocene times, when this deposit was laid down. It is possible that the earliest group of the sub-crag flint implements may date back to the earlier part of the Pliocene, or even to more ancient times, but this is not yet established. The specimens of the earliest group, though exhibiting many archaic characteristics, cannot however be looked upon as the type of artefact likely to be made by the earliest representatives of the human race; but this group is obviously of an extreme antiquity, and its existence points to a much greater age for the human race than has hitherto been supposed. It has long been recognised and accepted that man was present in East Anglia before the deposition of the Red Crag some 500,000 years ago, but it now appears that this period of time must be greatly extended to include the earliest group of the pre-Crag artefacts.

The excavations which over a number of years have been conducted by Mr. Reid Moir in the Suffolk Bone Bed, have been made possible by the invaluable financial help of the Royal Society, the Percy Sladen Memorial Fund and Mr. T. R. Parkington of Ipswich.

Artificial Production of the Hormone of the Corpus Luteum

THE transformations of cholesterol into the male sex hormone (androsterone) and of stigmasterol into a crude product having the biological activity of the corpus luteum hormone[1] have been rapidly followed by further important developments in this field of investigation of the sex hormones, and the corpus luteum hormone has now been prepared in a chemically pure state from stigmasterol and also from pregnandiol.

The conversion of pregnandiol into the hormone was achieved by Butenandt and Schmidt[2] in a strikingly simple manner. Having first shown that by partial hydrolysis of pregnandiol diacetate the nuclear acetoxy group was hydrolysed, they converted the monoacetate by a series of stages into the hormone, and showed thereby that the hormone was the $\triangle^{1:2}$ or $\triangle^{4:5}$ unsaturated diketone corresponding with pregnandiol. These authors then found that pregnandiol could be transformed into the pure hormone by three simple stages, namely, oxidation to pregnandione, monobromination, and subsequent elimination of hydrogen bromide by heating with pyridine. As pregnandiol may be isolated from the urine of pregnancy without difficulty, there is no doubt that considerable supplies of the artificial hormone will be manufactured by this method.

The isolation of the pure hormone from the degradation products of stigmasterol has been recorded by Fernholz[3] and by Butenandt and Westphal[4]. As Fernholz and Chakravorty[5] have also shown that both cholesterol and stigmasterol may be degraded to the same 3-hydroxy-*nor-allo*cholanic acid, this conversion of stigmasterol into the corpus luteum hormone establishes the positions 3 and 20 for the two keto groups of the hormone. The $\triangle^{4:5}$ position of the double bond is also regarded by Butenandt and Westphal as established by the formation of the hormone from stigmasterol, but since the position of the double bond of stigmasterol is based only on analogy with cholesterol[6] it is better to admit that the $\triangle^{1:2}$ position for the double bond of the hormone has not been rigorously excluded.

Butenandt and Mamoli[7] have directed attention to the fact that pregnandiol is therefore a hydrogenation product of the hormone, and in the light of this conception it is easy to understand the presence of large quantities of pregnandiol in the urine during pregnancy, for the diol is thus seen to be the form in which the hormone is excreted, just as cholesterol is excreted in the form of its hydrogenation product, coprosterol.

The artificial hormone, like that prepared from corpus luteum extracts, exists in two polymorphous forms, one of which is readily converted into the other[8].

[1] NATURE, **134**, 758; 1934.
[2] *Ber.*, **67**, 1893, 1901; 1934.
[3] *ibid.*, p. 1855, 2027; 1934.
[4] *ibid.*, p. 2085.
[5] *ibid.*, p. 2021.
[6] Fernholz, *Annalen*, **507**, 128; 1933.
[7] *Ber.*, **67**, 1899; 1934.
[8] See Butenandt and Schmidt, *Ber.*, **67**, 2088; 1934.

Temperatures of the Stars

IN a lecture before the Newcastle-on-Tyne Astronomical Society on December 12, Mr. W. M. H. Greaves described the way in which stellar temperatures are derived from a study of the spectra of stars.

All information regarding temperatures of the stars is derived from their light and its analysis. In heating a metal, while at first the radiation is almost entirely limited to the infra-red, with increase of temperature it includes wave-lengths in the visible part of the spectrum, and the proportion of blue to red light emitted increases as the temperature rises. But we cannot generally find temperature from colour, since the emissivity of bodies varies. Nevertheless, our knowledge of the temperature of stars is derived from measures of the colour of star light, the source of which is the outer layers of the star.

The 'black body', which theoretically absorbs all radiation falling on it and which, when heated, emits radiation of all kinds, is taken as a standard of reference. For such a body the proportions of emitted light at different wave-lengths are connected with temperature by Planck's formulæ. Observation shows that, so far as measurement made between spectral lines is concerned, stars are emitting radiation in a

similar manner to black bodies, although they are actually 'grey body' radiators. This being so, the continuous spectrum of a star can be matched in colour with black body radiation corresponding to some temperature, and this temperature is called the 'colour temperature' of the star.

The light from a star consists of radiation from its surface and, to some extent, radiation from its lower layers which has only been partly absorbed on its way to the surface. Theoretical investigation shows that, subject to certain hypotheses, the colour temperature of a star is about twenty-five per cent greater than the actual temperature of the surface. A comparison is made between the light emitted by the star and a laboratory source the colour temperature of which is known, and it is necessary to measure the ratios of the radiations from the star and the laboratory source at two separate wave-lengths. Applying Planck's formula for the ratio of the radiations from the latter at the two wave-lengths, the measured ratios make it possible to derive the ratio of the radiations from the star at these wave-lengths. We then have the data to give the colour temperature.

For measurement, the spectra from the star and laboratory source are photographed on the same plate and the photo-chemical properties of the emulsion are utilised, since there is a relationship between the optical density or degree of blackening of the negative and the amount of light which caused it. By an additional series of exposures of the plate to sources of light the relative intensities of which are known, spectral images are formed which enable a calibration curve to be made for any particular wave-length, and from this, differences in optical density can be converted into ratios of light. The data obtained yield a quantity known as the 'colour function', which is related to colour temperature by a formula derived from Planck's formula, and thence the colour temperature of the star is obtained.

Star light is reddened in passing through the earth's atmosphere and the observations have to be corrected for this effect. Use is made of a system of stars the differences of colour function of which have been measured by a set of comparisons in pairs at equal altitudes above the horizon. Pairs of stars chosen from this system are now photographed at unequal altitudes, and each such comparison yields a quantity, part of which is due to difference in colour function and part to the atmospheric effect. As the difference of colour functions has been already obtained, atmospheric reddening can be determined and applied to comparisons between stars and the laboratory source used for comparison.

Well-determined colour temperatures for a number of stars are now available as a result of the work at different observatories, and in the study of the relationship between temperature and other effects a striking correlation of temperature with spectral type has been found.

Reorganisation of the University of Durham

THE University of Durham entered upon the second century of its existence three years ago with prospects somewhat clouded by controversies relating to medical education. The Royal Commission appointed in March 1934 to report on the University's organisation and work found the constitution of the College of Medicine, which, together with Armstrong College, forms the Newcastle Division of the University, and also the University statutes, to be radically unsound in many respects and more particularly in their failure to confer on the University any control over the fate of one of its own professors.

The recommendations of the Commission, embodied in the report just published (London: H.M. Stationery Office, Cmd. 4815. 1*s.* 6*d.* net) provide for the reconstitution of the Newcastle Division as a single unit by the amalgamation of its two colleges under a head, to be appointed, in the first instance, by the Crown. For the guidance of the organisation and development of medical education and the maintenance of close relations between the College and the associated hospitals, responsibility would be vested in a dean of medicine, to be *ex-officio* a member of the Court and Senate of the University and of the Council and Academic Board of the College and chairman of the Board of the Faculty of Medicine and of the Medical Studies Committee of the Academic Board.

Of the two schools of thought with regard to the place and treatment of chemistry and biology regarded as part of the medical curriculum proper, the Commission has ranged itself emphatically on the side of the champions of the closest collaboration between the medical departments and the science departments in a university, the precise allocation of the teaching of the various frontier subjects being left to be determined in the light of the whole of the teaching power which is available, rather than by mere departmental considerations: granted the desirability of relating the teaching of chemistry and biology to human physiology and anatomy and to medical problems generally, the one thing to avoid, in the interests of the teachers themselves as well as of the students, is a divorce of this specialised teaching from the university departments devoted to chemistry and biology.

Medical education in Newcastle has been somewhat hampered for many years by inadequate premises. Land for new buildings adjoining Armstrong College and opposite the Royal Victoria Infirmary has been acquired, however, and an extensive scheme involving the sale of the present site of the College of Medicine has for some time been under consideration. Among the recommendations of the Royal Commission on the affairs of the University is one for the constitution of a temporary board of five persons, four appointed by the College of Medicine and one appointed by Armstrong College, to sell the existing premises and generally to arrange for the finance of the new building, to control the proceeds of sale and the greater part of the capital funds at present vested in the College, to assume control of the new site and supervise the erection of the new buildings and ultimately to transfer the premises together with any funds in its hands to the proposed new University College to be formed by amalgamation of Armstrong College with the College of Medicine. A time limit not exceeding seven years would be fixed within which the Board would have to complete its activities.

The Durham Observatory, which was opened in 1841, is at present vested in the Council of the Durham Colleges, and is managed by a large body of curators, of whom some are teachers in Newcastle.