Research Items.

THE EVOLUTION OF MAN AND APES.—In volume I. of the new journal *Palæobiologica*, edited by Prof. Othenio Abel and published in Vienna and Leipzig (Emil Haim and Co.), there appears a paper by Prof. H. F. Osborn entitled "Recent Discoveries relating to the Origin and Antiquity of Man." This paper is less a review of recent discovery than a statement of Prof. Osborn's own opinion on the course that the evolution of man has taken. This differs from that usually held by the majority of investigators, in that it denies any close connexion between ape and man and places the ancestor common to the two stocks back to a period so remote as the Oligocene. While admitting that there are some anatomical resemblances, Prof. Osborn lays more stress on the difference in 'behaviourism' between man and the ape, and thinks that "scientific mythology has accumulated around the anthropoid apes, falsifying and exaggerating their human resemblances, minimising and ignoring their profound differences from man in habit and gait and in the anatomy and functions of the brain. . . ." Some resemblances, moreover, are to be attributed to convergence. There are two diagrams, both dated 1927, which express graphically Prof. Osborn's views on primate evolution. Propliopithecus at the base of the Oligocene is the common meeting ground of the two stocks. Dryopithecus and Pliopithecus are Miocene representatives of the Simian division, but with the exception of Hesperopithecus, on whose primate nature very great doubt has been cast (*v.* NATURE, Jan. 28, p. 148), there is no human representative actually known until towards the top of the Pliocene. This emphasises how much palæontological exploration has yet to do before there is enough evidence to form a clear opinion on this great problem of our own ancestry.

CARNIVOROUS HABIT OF AMERICAN MAGPIES.—In view of the well-known change of feeding habit in the New Zealand kea, a parrot of vegetarian tastes, which has developed a liking for the kidneys of living sheep, and has caused very serious damage to flocks in certain areas of the South Island, the description by E. R. Kalmbach of a similar development in the American magpie is of great interest (*U.S. Dept. Agr. Tech. Bull.*, No. 24, Oct. 1927). During the past ten years the magpie has begun to attack live stock on the western ranches, and since the first reports came to hand in 1917, its depredations have extended from Utah to Colorado, Wyoming, and Montana. Sheep, cattle, and horses have been attacked so severely that many have succumbed: recent reports mention that in one area several hundreds of cattle are destroyed each winter, and in another the magpie has become one of the greatest problems with which the ranchers have to deal. The magpies generally attack the animals about the loins, sometimes penetrating to the body cavity, sometimes reaching and devouring the kidneys. The origin of this habit in the States may throw some light on the predisposing causes which gave rise to the kea's depredations in New Zealand. It has been found that sheep were first attacked when they showed fresh wounds caused during shearing, cattle on fresh brand marks, and horses on unhealed saddle-sores. But the habit having been formed, the magpies learned to begin an attack without any direct incentive such as exposed raw flesh. The magpie concerned is the black-billed magpie (*Pica pica hudsonia*), a geographical race of the British magpie, and in normal circumstances the feeding habits of the two are similar.

DIURNAL VARIATION OF OXYGEN IN RIVER WATER.—The degree of saturation of river water with oxygen is an important criterion in forming a judgment as to the suitability of a river for maintaining fish life. This property is one frequently determined in work dealing with the pollution of rivers, as the proportion of dissolved oxygen falls in the presence of oxidisable organic matter. It has recently been found, however (Butcher, Pentelow, and Woodley, *Biochem. Jour.*, **21**, 945, and 1423-1435; 1927), that there are both diurnal and seasonable variations in the proportions of dissolved oxygen and ammoniacal nitrogen in river waters. This has been established by making hourly determinations over periods of 24 hours both on a contaminated stream in Suffolk and on a pure and unpolluted Hampshire trout stream. The diurnal variations in the oxygen dissolved were greater in the case of the River Lark in Suffolk, although quite distinct in the pure River Itchen. The ammoniacal nitrogen, which varies in a sense opposite to that of the dissolved oxygen, also showed a diurnal variation in the Lark, but was constant in the Itchen. The variations, especially in dissolved oxygen, are very large, ranging in some cases from 60 per cent. of saturation shortly after midnight, to 150 per cent. shortly after midday. The rise is attributed to the photochemical evolution of oxygen from organisms, and the fall to the absorption of this oxygen by organic matter, and by processes of respiration. It has thus become clear that in conducting a field survey of a river, the value of a single determination of the dissolved oxygen is of little value. Investigations over a period of 24 hours are necessary, and consideration must be given to such factors as time of year, actinic conditions, nature of plant and animal life present, as well as to the character of the river bed and its history with regard to past pollution. It is probable also that the diurnal variation in the supply of oxygen available for the needs of fish may have a bearing on their movements, a subject of constant interest to the fisher.

THE WHEAT BULB FLY.—The late Prof. J. F. Gemmill's observations on the life-history and bionomics of this fly, *Leptohylemyia coarctata*, have recently been published in *Proc. R. Phys. Soc. Edin.*, vol. 21, part 3, 1927. The fertilised eggs are laid during July, August, and early September in bare, loose soil, preferably among early potatoes and scarcely ever among cereals or in pasture. The egg develops slowly and the larva does not hatch until towards the end of January or in February. The newly hatched larvæ seek out, and by means of their mouth hooks bore into, young wheat plants, entering just above the so-called bulb. Reaching the centre of the plant they ascend for one to three inches, and the infected wheat plant soon shows withering of the central blade, and in early or poorly growing wheat the whole plant withers and dies. The larva makes its way to a second plant, which it affects in the same way, and it may destroy a third or even a fourth plant. If, however, the wheat plant is so far advanced when attacked as to show good lateral buds, the larva completes its growth in one of these and the plant saves itself by sending out additional lateral buds. The larvæ, which undergo two or three moults, are fully grown by the beginning of May; they then leave the plant and pupate in the soil half an inch or more below the surface. The flies emerge in late June and early July and, after having laid eggs, die off by the end of September.

The larvæ can infect barley, rye, and couch grass, and in these can complete their life-history. Couch grass appears to be the natural wild host in the area investigated. Prof. Gemmill recommended that in an infected area wheat should not be sown after potatoes or other root crop or fallow, and stated that if this were done in a single year he believed the numbers of the fly would be so reduced that it would not be a menace for many years to come. Short of this drastic action, he recommended to avoid sowing wheat after early potatoes, or to sow it after the middle of February, to arrange that potato fields shall not adjoin wheat fields in any one year, to get rid of couch grass, and to avoid deep burial of the wheat seed, for shallow-rooted plants form lateral shoots earlier. A field may be regarded as being badly infected in which during November the soil contains half a million to one million eggs of the fly per acre.

TEXTILE PROPERTIES OF INDIAN COTTONS.—Progress in research work on the textile properties of standard Indian cottons is reported by A. J. Turner in *Bulletin 11*, issued by the Technological Laboratory of the Indian Central Cotton Committee. The foundation of the work lies in the annual testing of the fibre characteristics and spinning properties of some eighteen pure strains, the objects being generally, to accumulate data for the investigation of the methods of determining the intrinsic value of a cotton, and specifically: (1) to prepare a series of standards by which to judge other cottons, particularly new cottons produced by cotton breeders; (2) to determine the extent to which these standard cottons are affected by seasonal variations; (3) to determine the minimum weight on which a spinning test can be carried out satisfactorily; and (4) to assist in the marketing of these cottons by providing the cotton trade with detailed information concerning them. These objects have been achieved by submitting, year by year, typical samples of each variety to spinning tests which, though carried out on full-size machines, require only small quantities of material. The significance of small-scale tests has been investigated in accordance with object (3) above, and it has been shown that trustworthy results can be obtained by spinning duplicate lots weighing 5 lb. each. In addition, efforts have been made to determine the relationship between the physical properties of the fibres with spinning value, and while no conclusions of a positive character have been arrived at, the way seems to have been cleared for a more definite attack. Among the supplementary problems that have arisen in the course of work are those of the effect of temperature and humidity on cotton spinning, and the effect of subjecting cotton to repeated blow-room treatment. These are the subjects of *Bulletin 9* and *Bulletin 10* respectively. The latter has perhaps more of a technical than a general scientific appeal, but the former is interesting inasmuch as it embraces a very lucid résumé and criticism of previous work on the subject, and shows that Lancashire is by no means unique in the suitability of its climate for the manufacture of cotton goods.

THE ANTHRAXOLITE OF SUDBURY.—The so-called 'coal' occurring in the pre-Cambrian rocks of Chelmsford, near Sudbury, has given rise to the suggestion "that terrestrial floras had a long pre-Devonian history." In the *Amer. Jour. Sci.*, Jan. 1928, Prof. A. P. Coleman shows conclusively that there is no need to assume pre-Cambrian land plants to account for the deposits in question. He finds that the veins of supposed coal cut across the stratification of a black slate, and reaches the conclusion that the slate was originally an oil-shale, and that the coal-like material must have reached its present position while it was plastic and still retained its original volatile hydrocarbons. The latter were probably driven off by the heat of the nickel-bearing eruptive of the Sudbury basin, residual carbon being left behind. Since the material differs both in origin and properties from *anthracite*, it is important that this name, with its inevitable implications, should not be applied. The term *anthraxolite*, used for coal-like deposits forming the end-products of the metamorphism of petroleum, is clearly more fitting. There remains the problem of the formation of oil-shales in the pre-Cambrian. At least one can conclude that the waters of the time were thronged with lowly types of plants and animals.

APPARATUS FOR THE INVESTIGATION OF FLUORESCENCE.—A new and simplified apparatus designed for the investigation of fluorescence is described in the *Chemiker Zeitung* of Jan. 11, by Dr. F. W. Müller, of Essen, from whom it may be obtained. Instead of the quartz mercury lamp, the source of ultra-violet light is a carbon arc lamp fitted with carbons containing iron and tungsten, which provide an almost completely continuous spectrum. The apparatus can be used even in daylight, and the ultra-violet light, filtered from visible rays, may be directed either from above or in a horizontal direction. A suitable resistance is provided with the apparatus, which can be used for direct or alternating current.

A MICRO-METHOD FOR THE DETERMINATION OF SURFACE TENSION AND DENSITY.—A method for the determination of surface tension and density, using only one piece of apparatus and a very small sample of liquid, down to 0·1 c.c., is described by V. R. Damerell in the *Journal of the American Chemical Society* for December. This apparatus is very simple in design and operation and may readily be constructed from the materials available in any laboratory. The results obtained were satisfactory for all except the most volatile liquids, such as ether, and the method has an accuracy of between 1 part in 100 and 1 part in 300.

THE INTERACTION BETWEEN RADIATION AND ELECTRONS.—The main problems presented by the absorption and scattering of X-rays are discussed by Prof. A. H. Compton in the January number of the *Physical Review*. In his opinion the two phenomena are essentially similar, in that the whole momentum lost by the radiation is transferred to the electron, indicating that the action is sensibly instantaneous, but they differ in the extent to which they conform to classical electron theory. Experiment shows that the direction of emission of photoelectrons is given, at least statistically, by the Lorentz equations, whereas the preferred direction of motion of recoil electrons is perpendicular to the electric vector of the incident rays. Prof. Compton points out that conservation of angular momentum has also to be taken into account when dealing with circularly polarised waves. The point of view which he has adopted throughout is that of the older quantum theory, only one reference being made to the wave mechanics, in connexion with Wentzel's analysis of the angular distribution of photoelectrons.

AN IMPROVED APPARATUS FOR THE REMOVAL OF DISSOLVED GASES FROM WATER.—The various forms of apparatus used for removing dissolved gases from water depend upon the use of heat and a vacuum, either separately or both at once. Those employing both heat and a vacuum are the most efficient, and a new apparatus of this type is described by Lorch, Williams, and Thompson in the *Journal of the American*

Chemical Society for December 1927. This apparatus is of simple construction and is adaptable to any amount of liquid or gas.

THE ESTIMATION OF GOLD AND SILVER IN SEA WATERS.—It is well known that sea water contains traces of gold and silver, and a new method for their estimation is described by M. Yasuda in the *Bulletin of the Chemical Society of Japan*, vol. 2, No. 12. Mercuric chloride is added to the sea water and then reduced to a fine suspension of metallic mercury, which removes the gold and silver (with the exception of that present in organic colloids) as it settles down. The amalgam thus obtained is absorbed in a bead of pure lead and, finally, the gold is obtained free by dissolving the other metals in nitric acid.

COLOURING MATTERS OF CARAJURA.—Carajura (or crajura or chica red) is a rare colouring material prepared from certain leaves and bark and used by various American Indian tribes. The main colouring matter is a crystallisable substance known as *carajurin*, and an interesting investigation of its constitution by E. Chapman, A. G. Perkin, and R. Robinson is described in the issue for December last of the *Journal of the Chemical Society*. Perkin (1914) considered carajurin to have the empirical formula $C_{18}H_{16}O_5$, but it is now shown to be $C_{17}H_{14}O_5$. Carajurin on demethylation yields salts of *carajuretin*, and these have been shown to be identical with certain flavylium salts prepared synthetically, thus enabling a provisional formula to be advanced for the constitution of carajurin. The synthesis of this substance is now being attempted and a second colouring matter, *carajurone*, has been isolated from carajura. The investigation involved a large amount of experimental work, including the synthesis of a number of new compounds.

YIELD-POINT IN IRON AT VARIOUS TEMPERATURES.—The *Journal of the Royal Technical College, Glasgow*, for December 1927 contains several papers of considerable importance, not the least interesting of which is one on the yield-point in iron by Prof. J. Muir. The work was carried out on some hard-drawn wrought-iron wire, 0·024 in. in diameter and of composition: carbon, 0·05 per cent.; manganese, 0·30 per cent.; phosphorus, 0·016 per cent.; sulphur, 0·032 per cent. Before use the material was annealed in nitrogen at a temperature of approximately 800° C. The stress at the yield-point, the extension taking place there, and the time required for that extension were all measured at temperatures ranging from 17° C. to 250° C. Excluding two results at 185° C. and 215° C., which were doubtful, the amount of the extension at the yield-point shows a progressive drop from 4·65 per cent. at 17° C. until at the highest temperature used (250° C.) the yield-point so characteristic of iron at ordinary temperatures has practically disappeared (0·5 per cent.), a stress-strain curve similar to that, for example, of a non-ferrous metal being obtained. Another interesting observation was concerned with the rapidity with which these extensions took place. At 17° C., 150 minutes were required for the extension to complete itself. At 52° C. the extension took place very much more rapidly and was complete in about 8 minutes. At 210° C. and 215° C. the yielding took place with startling rapidity in about a second, and was characterised by a number of very rapid jerks, a phenomenon which had entirely disappeared at 250° C. The loads at which the yield-point occurred varied from 19·4 lb. at 17° C. to 20·25 lb. at 195° C. to 14 lb. at 250° C. A load of 1 lb. corresponded very nearly to a stress of 1 ton per square inch.

DOMESTIC APPLICATIONS OF ELECTRICITY.—Two papers were read on the domestic applications of electricity on Feb. 16 to the Institution of Electrical Engineers. The load on the various power stations has been rapidly increasing in Great Britain for a number of years owing to the extensive use of labour-saving appliances. The importance of standardising the systems of wiring in use and of making provision during the building of houses for the installing of the electric wires was emphasised. An experiment carried out recently at Birmingham showed that the saving in the cost of building an 'all electric' as compared with an ordinary house is about fifteen per cent. In the Weir system of houses for working classes the cost of wiring is reduced to a minimum. The parts of the houses are all duly wired in the factory, so that when the house is erected by ordinary workmen, an electrician can make all the requisite connexions in about two hours. The total cost comes to about £5 per house. Electric cooking is successful commercially, there being very few dissatisfied consumers. The standard rate of consumption for cooking is one unit per day per person. The radiant system of cooking is becoming popular. In this system the oven elements consist of two vertical radiators which radiate heat directly on to the food. As the food is grilled on both sides simultaneously, much time is saved, and it is claimed that the quality and flavour are greatly improved. The time required to cook a 5 lb. joint of beef is 40 minutes and the energy consumption is only half a unit. An ordinary electric oven takes more than twice as long and takes four times as much energy.

STRESSES ON HIGH TENSION CABLES.—A progress report by the Research Department of the Detroit Edison Company, which was presented at a meeting of the Association of Edison Illuminating Companies, held at Colorado Springs on Sept. 26, gives a very interesting study of the mechanism of the actions which cause the failure of high tension electric cables. In experiments with a new three-core lead-covered cable of modern type, it was found that internal pressures as high as 85 lb. per square inch were sometimes developed after the current had been flowing for several hours. If the current is kept flowing for many hours the pressure begins gradually to diminish, due largely to the stretching of the lead. When the current is now diminished to half its value, vacuous spaces develop in isolated regions along its length; the pressure falling to about 15 inches of mercury below atmospheric pressure. The vacuum in these spaces may exist for days if the cable is left unloaded. These vacuous spaces are subjected to a high electric stress, and cumulative ionisation ensues, an electric discharge taking place through them. The shape of these spaces being unknown, it is impossible to compute the electric stresses to which the insulating material is subjected. The experimental results prove the novel result that the cable insulation produces a definite rectifying action on the current flowing through it. The direct current component of the voltage thus produced was found to be of the order of eight per cent. of the peak value of the alternating current voltage. It is stated that this is detrimental to the cable and that the relative magnitude of this effect increases with the length of time the cable has been in use. Resin oil evolves large quantities of gas under electrical bombardment. From this point of view its use is deleterious. On the other hand, its conductivity improves with temperature, and this generally has the beneficial effect of relieving the electric stress on the air cavities.