Research Items

The Campas Indians, East Peru.—Some notes on the culture of the Campas Indians of eastern Peru are given by Prof. Morris G. Caldwell and Mr. John Calhoun in the *Scientific Monthly* for March. An area covering several thousand square miles of jungle and mountainous land and intersected by several tributaries of the upper Amazon is characterised by a common culture sufficiently uniform to justify the name of 'the Campas Culture-area'. It extends from the Pachitea River south to the Mantaro, and from the Ucanali westward to a line from Jauja to Huanaco. The Indians possess a well-developed culture, though it appears to be retarded. They use bamboo arrows three feet long, tipped with a sharpened palmwood head sixteen inches long. Four small prongs encircle the point to catch in the flesh. Blunt hardwood heads are used for killing small birds. Fish arrows have three prongs. The bow is of palmwood five feet long. A hunting axe of dull porous stone hafted on a two-foot wooden handle is used. The principal means of transportation is by canoe—a dugout about thirty-five feet long and five feet wide. It is made from palmwood by the use of axe and fire. Pottery jars are made from the yellow river clay; they are used for carrying water, fruit berries, etc. Garments are made from cotton which grows wild, and are often decorated with feathers, bunches of bone, seeds, nuts, toes of small animals, and bones of small birds and monkeys. The dress is a slip-over garment without sleeves and a poncho. They chew coca leaf and have an intoxicating liquor made from yucca root chewed by the old women.

Egyptian Magic.—An Egyptian bilingual papyrus, long in the British Museum but unknown to scholars, has been translated and edited by H. I. Bell, A. D. Nock, and Herbert Thompson (*Proc. Brit. Acad.*, vol. 17). It gives a number of short magical formulæ current in Egypt, presumably at the date of writing, which is placed at somewhere towards the end of the third century A.D. The procedure is usually to invoke a god or some higher power and compel him to assist the invoker in procuring what he wishes. In the present collection the Demotic text includes an invocation to Thoth for aid, a method to discover a thief, spells for reputation, and an amatory spell. The Greek texts are mainly concerned with the last named. In a spell to obtain an answer to a dream, a laurel leaf is placed under the head when the invoker goes to sleep. On it are written seven invocations, that is, seven strange forms of the names of Horus and Thoth, to which *kh* has been added, possibly representing some peculiarity in pronunciation of the divine name. In "the way of finding a thief", the head of a drowned man is used, a stalk of flax grown from the ground under which it has been buried for the purpose, being used to tie the magical knot which binds the thief. In a charm to win a woman's love, a figure of Osiris in wax, wound in ram's wool, is buried with the bone of a lizard under her threshold, while a spell is chanted to Isis at the rising of the moon. The influence of the lizard is seen again in a charm in the Greek text, of which the object appears to be to secure the woman's love by ensuring her separation from her husband. Numerous examples of the use of the lizard in medicine and erotic magic are collected in the editorial notes.

Flocking Habits of Birds.—The use of bird-ringing (or banding, as it is called in America) in conjunction with bird traps has brought to light some interesting features regarding the grouping of birds during the winter or non-breeding season. On the campus at Stanford University, California, flocks of golden-crowned and white-crowned sparrows (*Zonotrichia coronata* and *Leucophrys pugetensis*) arrive on autumn migration or stay over the winter until the return in April and May. To supplement the ringing method, which entails the handling of birds for identification, some feathers of the birds were distinctively stained so that the individuals could be recognised in the field. The results, recorded by John B. Price (*Condor*, 1931, p. 238), show a constant return of the same bird to the same area and even the same trap. The author concludes that both species spend the winter in definite flocks, each with its own range of 15-20 acres. Between the flocks there is very little interchange of individual birds, and the memory of the territory seems to persist from year to year, for in most cases an individual bird was found to return to its original flock territory after migration.

Classification of the Gulf-Weeds.—On British coasts' the most conspicuous of the brown seaweeds are members of the group Fucales, represented by a few genera, each with one or only few species, the commonest being *Fucus* spp. In warmer seas, the group is also prolific, but represented by other genera, of which one of the more important is *Sargassum*. Unlike *Fucus*, *Sargassum* is represented by a large number—probably more than three hundred—of species, and a wide field is still open to systematists to bring the classification of this genus into a satisfactory condition. Problems are presented not only by the large number of species, but also by variations in form due to environment and to the fact that some of the species are dicœcious, with morphological differences between plants of the two sexes. Dr. Setchell of California has given an account (*Hong Kong Naturalist*, vol. 2, No. 4; 1931) of the existing schemes of classification and the main features of the five subgenera, based on the system of J. C. Agardh (1848–1889). He adds also a tentative artificial key for the identification of species occurring in the Hong Kong region, where the genus is well represented. This should prove of great assistance to any who have opportunities of studying the genus further.

Maize Hybrids with *Tripsacum*.—Induced parthenogenesis is a possible method of obtaining homozygous strains instead of prolonged inbreeding. Mangelsdorf and Reeves (*J. Her.*, vol. 22, No. 11) attempted to produce such seeds in maize by pollinating it with a related grass, *Tripsacum dactyloides*. This species extends from the Atlantic to Texas, the Texas form used having narrower leaves and $2n=36$ chromosomes, while the Connecticut form has $2n=72$. Crossing with the Texas type was obtained by shortening the maize silks or stigmas to about two inches. By double pollination it was found that hybrid seeds develop better adjacent to normal seeds. No parthenogenetic embryos were obtained, but the hybrid seeds usually showed 38 chromosomes. In maize $n=10$, so with double fertilisation an endosperm containing $10+10+18$ chromosomes should be found. The embryos of these seeds usually had 28 chromosomes. When pollen from the tetraploid *Tripsacum* was used, seedlings were obtained with 46 chromosomes in their root tips, as expected. Most of the seeds in these crosses were abortive and shrivelled, but could be germinated on agar. From some 185,000 silks exposed to pollination, only 84 seeds matured. Certain maize varieties crossed more

readily than others, and curiously enough the tetraploid *Tripsacum* was more successful than the diploid as pollinator. The hybrids more nearly resemble the male parent, especially when the tetraploid form is used. Some plants from this cross which matured are sterile in pollen and seeds. Meiosis shows 18 bivalents, presumably the *Tripsacum* chromosomes pairing with each other, and 10 lagging maize chromosomes. Numerous small nuclei are formed, resulting in aborted pollen. The reciprocal cross, *Tripsacum* × maize, has never succeeded. These results differ in some respects from earlier work of Collins and Kempton.

Magnetic Distribution in China and Tibet.—In *Veröffentlichungen d. Preuss. Meteorolog. Inst.*, No. 379 (Abh. Bd. 9, No. 7), Berlin, 1931, O. Venske gives a reduction and discussion of the terrestrial magnetic observations made by W. Filchner on his expedition through China and Tibet in 1926–28. Prior to this journey, very little was known about the magnetic distribution in Tibet. Filchner measured the declination, dip, and horizontal force at about 150 stations, about 50 km. apart, using a magnetic theodolite, the dip being measured with the aid of soft iron induction bars. The stations lay on two routes, each lying roughly in the east-west direction ; the northern one was from Tashkent (41° N., 69° E.) by Tihua (44° N., 88° E.) and on to Lussar (36° N., 102° E.), and the southern one from Lussar to Leh (34° N., 78° E.) over the Tangla Pass, 15,000 ft. above sea-level. Despite many difficulties and privations, due to ill-health and Tibetan hostility, Filchner's measurements, according to Venske, are of satisfactory accuracy. The declination nowhere differed much from 0°, confirming that the agonic line runs east-west in Tibet; local disturbances are small and suggest (in agreement with gravity data) that the non-magnetic surface rocks reach down to great depths.

Spitsbergen Geology.—D. Sokolov and W. Bodylevsky (*Skrifter om Svalbard og Ishavet*, **35**, pp. 151, pls. 14; 1931) describe the Jurassic and Lower Cretaceous faunas of the west coast of Spitsbergen and discuss their stratigraphical relationships. The horizons which have been recognised from palæontological evidence range from Upper Callovian to Lower Aptian. Lower Callovian and Albian may also possibly be present in Spitsbergen. The Lower Aptian does not appear to have been previously recognised in the Arctic region. Typical Oxfordian is not present. The abundance of *Aucella*, of which about thirty species are described in this memoir, gives a characteristic aspect to the Upper Jurassic and Lower Cretaceous faunas and recalls that of Petschora-land. Continental conditions are indicated by the occurrence of *Gingko* and other plants in beds above the undoubted Valanginian and below the Crioceras beds of the Lower Aptian.

Atmospheric Ozone.—The main conclusion reached by D. Chalonge in his paper (*J. Phys.*, January) on the vertical distribution of ozone in the air, is that little is known about this, and that the present methods of investigation based on ultra-violet spectrophotometry are unsatisfactory. In particular, he shows that it is misleading to refer to an absorbing layer at 50 km., if this is taken to mean that the region where absorption occurs is restricted, or even that the centre of gravity of the ozone is defined by it. Ozone is, on the contrary, present in considerable quantity so low as 20 km., and, probably with a concentration increasing with height, up to 80 km., which is not much below the Heaviside layer. What appears to be most urgent is some entirely new experimental method, if this can be devised, and, until this is forthcoming, ambiguity is likely to attach to the results obtained with current methods, including the one which makes use of ozone absorption in the yellow, which has recently been described by O. R. Wulf (*Smithsonian Misc. Coll.*, vol. 85, No. 9).

Optical Glasses.—As the result of an examination of the properties of a large number of optical glasses as given in a manufacturer's catalogue—that of the Parsons' Optical Glass Company—Mr. T. Smith, of the Optics Department of the National Physical Laboratory, has come to the conclusion that a knowledge of the refractive indices of a glass for light of three wave-lengths is sufficient to enable the index for any other wave-length within the visible spectrum to be calculated. The refractive index for any wavelength can be expressed in the form $a + bw^n$ where a, b, and n are constants for each glass and w is the wave number, that is, the reciprocal of the wavelength. From this it follows that between the indices and wave numbers for three lines we have $(\mu_1 - \mu_3)/(\mu_2 - \mu_3) = (w_1^n - w_3^n)/(w_2^n - w_3^n)$, and if n is found so that the equation is satisfied for three lines for which the μ's are observed the μ of any other line of known w may be calculated. It is therefore more convenient to define the reciprocal dispersion or constringence ν as $(\mu_F - 1)/(\mu_F - \mu_C)$ where F and C are the blue and red hydrogen lines, and in comparing glasses it is more useful to the computer of optical systems if $\log \nu$ instead of ν is plotted against μ, and Mr. Smith hopes glass makers will publish diagrams of this kind on an agreed uniform scale in their catalogues. He considers that at present a larger variety of glasses is produced than is necessary for optical purposes. His conclusions were well received at a meeting of the Optical Society in February, 1931, and his paper and the discussion on it appear in part 3 of vol. 32 of the *Transactions* of the Society.

Crystal Structure of Benzene.—It is somewhat surprising that although benzene is one of the simplest of organic compounds, yet its crystal structure has never been at all fully worked out. It is true that the dimensions of the unit cell have been determined consistently in two different investigations, and that the space group and the number of molecules to the cell are known, but there are various technical difficulties which make it difficult to proceed further. Some account of these, and of the way in which they have been partially overcome, has been published by E. G. Cox (*Proc. Roy. Soc.*, March). One of the major difficulties is the high vapour pressure of benzene, which is five times that of ice at 0° C., and makes it impossible to keep the solid in the open for long. To overcome this, the crystal was enclosed in a gelatin capsule ; this was reasonably transparent to X-rays, and sufficiently impervious to benzene vapour when lightly coated with shellac for the crystal to be kept for several days. It was, however, still impracticable to work with an ionisation spectrometer, and hence the rotating crystal method, with a special cooled camera, had to be employed. Even so, it was not considered worth while to make other than eye estimates of intensity. The main result which emerges is that the experimental results are strongly in favour of a flat-ring molecule ; a puckered ring would exaggerate some of the discrepancies observed, and would not agree with the absence of cleavage of the crystals and their considerable hardness. Beyond this, little more can be said than that the ring structure is loosely knit ; the average distance from centre to centre of carbon atoms in neighbouring molecules is

about 3·8 A., compared with 3·5 A., which is the distance most usually found to occur in organic substances.

Reactivity of Metals with Water.—We have received from Mr. Binayendra Nath Sen, of 57 Patuatola Lane, Calcutta, a communication in which he advances a rule that only those metals react with water at the ordinary temperature in which the distance of closest approach of the atoms is not smaller than 3·00 A. The list includes lithium, sodium, potassium, calcium, bismuth, magnesium, cerium, and lead. Mr. Sen states that other metals are not acted upon by water at the ordinary temperature, and in them the distance of closest approach is less than 3·00 A., with one or two exceptions.

Oxidation of Phosphorus.—A number of new observations on the oxidation of phosphorus vapour at low pressure, which bring out the fact that this can occur in more than one way, have been described by H. W. Melville and E. B. Ludlam (*Proc. Roy. Soc.*, March). They are concerned with the manner in which the reaction takes place in the presence of tungsten and platinum when the pressure is too low for an explosion, but in order to avoid the difficulties which arise in applying the usual methods for measuring low pressures in this instance, the explosion limit was made use of for this purpose by determining how much additional oxygen was required to pass to the critical value for explosion to occur. When platinum was put in the reaction chamber, the rate of reaction could be measured conveniently with it at 200° C.; no glow could be seen during the reaction, and it probably occurred at the platinum surface. With a tungsten filament, on the contrary, it was necessary to go to 500° C., and the reaction was accompanied by a green glow; from this, and from other evidence, it was concluded that the change started at the metal surface, but was propagated through the gas, and finally ended on the walls of the tube. Gold, silver, and molybdenum, although not studied in detail, appeared to behave similarly to tungsten.

Pressure on Retaining Walls.—A paper was read before the Institution of Civil Engineers on Feb. 23 by Prof. C. F. Jenkin on "The Pressure on Retaining Walls". Researches on this subject were begun by the author in the Engineering Laboratories at Oxford in 1926, and during the last two years have been continued at the Building Research Station. An account of the work up to last year was given by Prof. Jenkin to the Royal Society; but the present paper describes the latest type of experimental apparatus and gives the results of tests on the pressure exerted by sand on walls of many types. The tests include measurements of the forces on the wall (in magnitude, direction, and position) and also the determination of the planes of rupture and the nature of the motion of the sand down the back of the wall. Approximate formulæ have been developed and their application is summarised in practical working rules. The errors in many of the old forms of wedge theory are pointed out, the reaction of the wall on the sand is discussed, and the author expresses the hope that others may be saved from the pitfalls into which he himself has fallen.

Astronomical Topics

New Comet.—Two telegrams and circular No. 361 from the I.A.U. Bureau, Copenhagen, announce the discovery of a comet of the ninth magnitude by Mr. H. E. Houghton (presumably at Pretoria) on April 1. It was observed at the Cape observatory as follows: April—$2^d\ 18^h\ 0^m$ U.T., R.A. $13^h\ 39^m\ 16^s$, S.Decl. 75° 50′; daily motion, $-6^m\ 0^s$, N. 1° 26′. No orbit is to hand, but the rapid northward motion may bring it into the view of European astronomers before very long. Actually the U.T. of the above observation was given as 6^h, but as there was daylight at the Cape at that time, it is presumed that 18^h was meant.

There is some doubt as to the letter that should be assigned to this comet. Nothing more has been heard of the object reported by Prof. van Biesbroeck on March 6; also, the status of the Delporte object of March 12 is still in doubt—it may be either a comet or a planet.

The comet Grigg-Skjellerup should now be within reach of moderate telescopes; the following ephemeris for 0 h. is from *B.A.A. Circular*, No. 111:

April 15	R.A. $6^h\ 23^m\ 6^s$	N.Decl. 2°	10′
,, 20	6 33 54	4	5
,, 25	6 46 0	6	17
,, 30	6 59 42	8	52

The comet is likely to be large and diffused.

Brazilian Tide Tables for 1932.—These tide tables were calculated at the Observatory of Rio de Janeiro, with the aid of a Kelvin tide-predictor, and are published by the Brazilian Ministry of Education. They give the times of every high and low water throughout the year for the fifteen principal ports of Brazil; also the height of water above the zero marks on the tide gauges at the ports. The marked differences between the heights of the tides at the different ports are of interest. The range appears to be smallest at Rio de Janeiro, where the range at the highest springs scarcely exceeds a metre. The port of St. Luiz is at the other extreme; on April 21, which is the highest tide of the year, the range from high to low water is 5·8 metres. Some of the ports show a considerable diurnal term, by comparison between the two high waters twelve hours apart. There is much in the book that will interest students of the tides; their astronomical interest has increased since it was shown by Taylor and Jeffreys that tidal friction is probably sufficient to explain the excess of the moon's acceleration over that arising from astronomical causes.

The Delporte Object.—The determination of an elliptical orbit for this object from the early observations presented difficulties, owing to the object being nearly in opposition to the sun. It is unlikely that the orbit is really parabolic, but the following parabola, by S. Arend of Uccle, represents the observations with fair accuracy up to the end of March; the observed declination is then 3′ north of the predicted one.

T 1932, April 4·0284 U.T.
$\omega = 25{\cdot}662°$
$\Omega = 171{\cdot}694$ } 1932·0
$i = 20{\cdot}137$
$q = 1{\cdot}16335$

The following recent observations made at Uccle are published in R.I. *Circ.* 584:

	R.A. 1932·0.	N. Decl.
March 23·812165	$13^h\ 26^m\ 7{\cdot}16^s$	20° 55′ 27·8″
,, 26·976600	13 53 42·37	25 32 6·1
,, 28·914416	14 10 32·39	28 0 28·6

Uccle positions of March 23, 24, and 25, previously published, were erroneous, belonging to a different object. The Delporte object was photographed at Heidelberg on March 26, the magnitude being 14. It was noted as doubtful, but is confirmed by the Uccle observation.