Research Items.

The Hadzapi or Watindega of Tanganyika.—In *Africa*, vol. 4, pt. 3, Miss D. F. Bleek describes a tribe of hunters living in the northern part of the central province of Tanganyika, near Lake Eyazi, who speak a clicking language related to the Bushman and Hottentot tongues. In physique, colouring, and physiognomy the Hadzapi are entirely different from the Bushman, for they are tall, black, and very prognathous. They live by hunting. Arrow heads are made by the men themselves from bits of iron bartered with neighbouring Bantu tribes. Paint is not worn by the men, but many showed on their faces and bodies an elementary kind of tattooing used to cure illness. For cooking their food, which consists of roots, bulbs, and fruits collected by the women, the Hadzapi use clay pots which are bought from neighbouring tribes. The sun is their god, but he is not addressed, and is feared. He makes the people well and ill as he desires. If an invalid's relatives bother the sun with prayers, he will certainly die. Most men own two wives. Girls marry at sixteen, the men a little older. There does not appear to be any initiation ceremony for young people or any marriage ceremony. Dancing and singing is part of the daily life of the men, especially when there is plenty of meat. Their dancing and singing resemble that of the Bantu more than that of the Bushmen. The sounds of the language are less difficult than those of the Hottentot and Bushmen.

Shoshonean Linguistics.—Dr. Edward Sapir has published in the *Proceedings of the American Academy of Science and Arts*, vol. 65, pts. 1-3, a sketch of the Southern Paiute language, a number of Kaibab Paiute and Uintah Ute texts, and a Southern Paiute dictionary. The Shoshonean languages, to which Paiute belongs, comprise four groups—the Plateau Shoshonean languages; Tübatulabal of south-central California; Hopi; and a group of southern Californian languages comprising the Serrano dialects, the dialects of the San Luiseno-Cahuilla branch, and the Gabrielino dialects. The differences between the groups are considerable. All these languages, taken as a whole, comprise the northernmost representatives of the Uto-Aztekan stock, which includes, besides Shoshonean, Nahuatl or Aztekan and the Sonoran or Piman languages spoken in the long stretch of country between the Mexican State of Jalisco and the Rio Gila. So far as is at present known, the Uto-Aztekan languages are not generically related to any other American group. The dialect with which Dr. Sapir deals chiefly is Kaibab Paiute of south-west Utah and north-western Arizona, Kaibab being an anglicised form of an Indian expression signifying 'mountain-lying plateau'. They belong to a number of tribes loosely grouped as Southern Paiute, Paiute belonging to the Ute-Chemehuevi branch of Plateau Shoshonean. Southern Paiute and Northern Paiute must be carefully distinguished as distinct and mutually unintelligible languages.

Breeding from Colour Varieties.—Two examples of breeding from colour varieties, of interest to students of genetics, are given in the *Avicultural Magazine* for August. On p. 209, Mr. J. C. Laidlay records breeding, from hen-pheasants that had been bred white for four generations, and a cock which was white but for some red on the breast, three, among about twenty chicks, marked like the melanistic variety, a form which has come much into notice of late years. In it the chicks are very dark in the down; if males, they assume a dark purple-and-green glossed plumage with no red, and, if females, most strikingly resemble red grouse in colour. The production of this dark form from white parents reminds one of the occasional occurrence of the proverbial black sheep among our white flocks; in neither bird nor beast is the new colour ancestral, though less abnormal than white. The other instance is in Mr. D. Seth-Smith's editorial notes (p. 235) and concerns the breeding from birds reared at the zoological gardens from a blue mutant of the Masked Love-bird (*Agapornis personata*) paired to a normal specimen. One pair have had a brood of two blues and one green, while another had four greens and one blue—rather too many recessives for Mendelian expectation, but future broods may restore the balance, though it may be mentioned that two nests last year, respectively gave two greens and one blue, and one of each colour.

Growth of the Cockle.—A. C. Stephen (*Jour. Mar. Biol. Assoc.*, **17**, No. 2, 1931) records observations on the growth of the cockle on the Scottish coast. He found on the Ayrshire coast that small cockles appear about the beginning of August, a fact which points to the breeding season being in summer and not in spring, as is usually stated. Further evidence on this point is afforded by examination of the reproductive organs, which, at Millport, appear to be ripe from about the end of July. Spawning was observed only once; cockles collected on July 1, 1930, spawned on the following day in the laboratory, but the eggs did not develop. By the end of the first autumn a few of the young cockles in the sand are 10 mm. in length, but most are less than 6 mm. The first winter ring on the shells is faint and easily overlooked; the first of the several well-defined rings is therefore not the first but the second winter ring. The first ring is seen in young specimens up to one or two years of age, but in older shells, especially if there has been any erosion, is often obliterated. The size of cockles increases regularly from high-water mark to low-water mark, due to an increased rate of growth. The scattered cockles living in the *Tellina* ground, that is, seawards of the cockle-beds proper, grow very fast.

Insect Vectors and Virus Diseases of Plants.—The first virus disease to be detected was mosaic disease of tobacco. It was discovered by Iwanowsky in 1892, and in 1901 Takami provided the earliest evidence of the insect transmission of such diseases when he showed that the mosaic disease of rice was carried from plant to plant by the leafhopper, *Nephotettix apicalis*. Since these discoveries a large and increasing number of virus diseases of plants have been made known, and, in many cases, insects have been shown to be the vectors responsible for their spread. In *Biological Reviews* of the Cambridge Philosophical Society, Vol. 6, July 1931, Dr. K. M. Smith gives a comprehensive survey of knowledge respecting these various plant viruses and the insect carriers with which they are associated. With few exceptions these vectors are sucking insects belonging to the order Hemiptera, and, among the latter, the Aphididæ are by far the most important. The single species, *Myzus persicae*, is an aphid that is now known to be associated with the spread of fourteen different viruses. The data collected together by Dr. K. M. Smith seems to point to the conclusion that a relationship, other than a merely mechanical connexion, exists between plant virus and insect vector in certain cases. Thus, there is evidence that points to the conclusion that the virus is capable of multiplying within the body of the insect. The

whole subject of the nature of plant viruses, and the factors governing their transmission by means of insects, is one of great difficulty. The problem is further complicated by the fact that, in two cases, different symptoms are known to be produced in the plant by the same virus when the latter is inoculated by needle and insect respectively. This carefully prepared review of the subject, which is provided with an extensive bibliography, should be read by all interested in plant pathology.

Crust-Movements after the Tango Earthquake of 1927.—In 1929, a fourth series of levellings was carried out across the central area of the Tango (Japan) earthquake of Mar. 7, 1927. The results of this and the preceding series have been studied by Prof. C. Tsuboi (NATURE, vol. 126, pp. 923-924). Nearly a year later, June-Sept. 1930, a fifth series along the same route was made and the results again examined by Prof. Tsuboi (*Tokyo Imp. Acad. Proc.*, vol. 7, pp. 234-237; 1931). Generally speaking, after the lapse of three years, the ground seems to have become nearly stable, the greatest change during the preceding year amounting to only two-thirds of an inch. Prof. Tsuboi gives two curves, one showing the changes along the route before and immediately after the earthquake, the other the total change during the three years since the earthquake. When the vertical scale in the latter curve is taken ten times that for the other, the two curves are very similar in form. The principal difference between them is in the neighbourhood of the two faults produced at the time of the earthquake. Instead of the discontinuities along the faults in the earlier curve, the later shows a sensible drag upwards along the faults, suggesting that, after the earthquake, the land-blocks on opposite sides of the faults have adhered to one another.

Articulation of Isolated Sounds.—The issue of the *Zeitschrift für Experimentalphonetik* for July 1 contains an account by Messrs C. E. Parmenter, S. N. Trevino, and C. A. Bevans, of the Phonetics Laboratory of the University of Chicago, of the methods they have adopted to determine the motions of the median outline of the mouth and throat during the articulation of isolated sounds. The head of the speaker is clamped to a board between the X-ray tube and the photographic plate, the median section of the head and the plate being at right angles to the axis of the X-ray beam. The outline of the median section of the face is secured by means of a streak of powdered barium in vaseline on the nose and lips, that of the hard palate by a strip of lead foil $\frac{1}{8}$ in. broad pasted on it from the front teeth to the uvula. The outline of the tongue is secured by means of a fine gold-plated locket chain, one end of which is fastened to the lip and the other end swallowed by the speaker. The chain is long enough to allow about three inches of it to be tucked under the tongue. Six examples of photographs obtained are reproduced.

Mechanism of Drying.—Owing to the large number of variables concerned in the process and to the variability in condition of the material as the process advances, analytical treatment of the drying of a solid substance involves considerable difficulty. Two communications on this subject by Dr. G. Bozza are published in the issue of the *Rendiconti della Reale Istituto Lombardo di Scienze e Lettere* for the current year (parts 6-10). The errors into which previous authors dealing with this question have fallen are indicated, and complete differential equations for the process, and also those corresponding with the surrounding conditions, are deduced. For the simplest case, when the substance does not suffer deformation, and when the coefficient of diffusion remains invariable during the drying, the differential equations are integrated for non-hygroscopic materials for the two periods when the surface moisture is respectively above and below the critical proportion. In this way, quantitative relationships between the moisture content of each point of a strip or parallelepiped and the time are obtained. Methods are given for the experimental determination of the necessary coefficients, as also are the results of a large number of experiments, made in conjunction with I. Secchi, to establish the relation between the coefficient of evaporation and the air velocity, knowledge of this being necessary for the further development of the investigation.

Krypton and Xenon.—A method of extraction of krypton and xenon from liquid air residues and determinations of some physical constants of these elements are described by F. J. Allen and R. B. Moore in the July *Journal of the American Chemical Society*. The method of separation avoided the use of large gasholders and the elements were obtained in a very pure condition. Preliminary density determinations indicated that the atomic weights at present assigned to krypton and xenon are too low, in agreement with Aston's mass spectrograph results. The average density of krypton was 3·733 gm./lit., that of xenon 5·887 gm./lit., and these give, with Watson's compressibility values, the atomic weights, Kr = 83·6 and Xe = 131·4. The possible errors are ± 0·2 and ± 0·3 respectively. The boiling points were found to be: Kr, −152·9°, and Xe, −107·1°, in each case ± 0·3°; and the triple points were Kr (−156·6°; 557 mm.) and Xe (−111·5°; 600 mm.). The values for the boiling points differ from the accepted values. It is clear that a revision of the properties of these two elements is indicated.

Molecular Weight of Insulin.—Sjögren and Svedberg, in the July issue of the *Journal of the American Chemical Society*, describe a determination of the molecular weight of insulin by the ultracentrifuge method. The crystalline insulin was supplied by Dr. Jensen, of Johns Hopkins University, and had been prepared from commercial beef pancreas insulin by crystallisation. Previous studies have shown that insulin is of protein nature, giving several protein reactions, having an empirical composition resembling that of proteins, being an amphoteric electrolyte and possessing an isoelectric point and ultra-violet absorption spectrum in the same region as most of the proteins. It is now shown that insulin is stable from *p*H 4·5 to about *p*H 7, and possesses a molecular weight of 35,100; at lower and higher *p*H values its molecule disintegrates into smaller units, the process being reversible near the borders of the stability region. The constants of insulin are, within the limits of error, identical with those of egg albumin and Bence Jones protein. It is very probable that insulin is a well-defined protein, and that its physiological activity is a property of the insulin molecule itself or some special group within it.

Utilisation of Atmospheric Electric Fields.—The *Zeit. für Physik* for June 20 contains a report by A. Brasch and F. Lange of their work upon the production of high potentials. Part of this has been done in the laboratory by the method in which a battery of condensers is charged in parallel, and the connexions rapidly changed to the series arrangement. A study has already been made in this way of the most suitable forms of discharge tubes for use with high voltages, and X-rays have been produced with an exciting potential of two million volts, and hydro-

gen positive rays with an accelerating potential of almost a million volts. A generator is now being built which it is hoped will give a potential of seven million volts. An even more interesting part of their work has, however, been carried out on Monte Generoso, in northern Italy. The district is very liable to thunderstorms, and use has been made of the large vertical fields which then occur in the atmosphere. To do this, a collector consisting of a large number of points suitably mounted was suspended in a small valley between two peaks. The whole had to be heavily insulated, as potential differences of more than ten million volts were encountered, and at the same time, as is evident from the photographs of the installation, its construction must have called for considerable mountaineering experience. The exact magnitude of the high potentials which were obtained from the apparatus is not certain, but sparks twenty-five feet in length were measured, and the corresponding potential difference estimated to be eighteen million volts.

Radio Observations during a Solar Eclipse.—In the *New Zealand Journal of Science and Technology* for June, Dr. M. A. F. Barnett gives a summary of the results obtained by the Radio Research Committee in New Zealand during the total solar eclipse of Oct. 21 and 22, 1930, by means of radio observations. As the path of totality passed across the Pacific Ocean, the observing stations near it were necessarily limited. The results agree well with those obtained during other eclipses. Observations were made on long waves (11,500 metres), on medium waves (850 and 800 metres), and on short waves (52 to 16 metres). In most cases the transmission path crossed the line of totality. The signal strength was estimated by aural methods. The strength of the long waves between Rugby and New Zealand was increased during the eclipse period, but nothing definite was obtained from the other long wave observations. On the medium wave transmissions, an effect equivalent to a partial return to night time conditions was observed. With short waves the only eclipse effect observed was a partial return to night time conditions in a few cases of the 52-metre transmission. Test records were made of the strength and persistence of atmospherics during the eclipse, but only in a few cases was a slight increase in their strength observed. It is concluded that in general the effect of the eclipse was to produce a partial return to night-time conditions. The resultant changes in signal strength follow fairly closely the equivalent changes in the amount of solar radiation reaching the atmosphere. There are indications, however, of a slight time-lag between the effects produced and the amount of solar radiation between the transmitter and the receiver.

Astronomical Topics.

Comet Ryves, 1931 *c*.—This comet was first seen by Mr. Ryves at Zaragoza on Aug. 10; he observed it almost daily up to Aug. 17, and noted that it was growing brighter. The only observation of position made elsewhere, so far as we know, was on Aug. 14 by Prof. G. van Biesbroeck, at Yerkes, who saw a tail one degree in length.

A telegram from the U.A.I. Bureau at Copenhagen has circulated the following parabolic orbit, computed by Mr. F. E. Cunningham, which indicates that it approached the sun within seven million miles on Aug. 25; it is quite likely that it would be visible in daylight about the time of perihelion:

T	Aug. 25·900 U.T.	
ω	168° 26′	1931·0
Ω	101 4	
i	169 11	
log q	8·8633	

EPHEMERIS FOR 0 H. U.T.

	R.A.	N. Decl.	log r.	log Δ.
Aug. 27	10h 37m 49s	7° 47′	8·9987	0·0150
,, 31	10 44 22	5 36	9·4339	0·1028
Sept. 4	10 45 56	4 54	9·6070	0·1489
,, 8	10 45 30	4 32	9·7388	0·1895
,, 12	10 46 14	4 13	9·8228	0·2172

It will be seen that the comet remains near the sun in the sky, and observation in a dark sky will not be possible until it has become much fainter. If the above value of the perihelion distance is correct, this comet approached the sun more closely than any other comet observed in the present century, but less closely than the great comets of 1843, 1880, 1882, 1887.

Harvard Card No. 169 gives the following observed position of Nagata's comet by Prof. G. van Biesbroeck at Yerkes Observatory:

		R.A. 1931·0.	N. Decl.	Mag.
Aug. 12	10313 U.T.	12h 17m 57·25s	10° 8′ 18·4″	7·5

He noted that "A sharp nucleus is visible; the round coma is followed by a broad tail visible for 25′ in position angle 110°": as the comet is moving south more slowly than the sun, the conditions for observation are improving slightly.

John Harrison's Third Time-keeper.—The *Observatory* for August contains an article on this interesting old time-piece, on which Harrison was engaged from 1740 until 1757. It has been cleaned and repaired by Commander Gould, and was restarted in March last. All the four time-pieces of Harrison will shortly be in going order; the last to be undertaken is No. 1, on which Commander Gould is now at work. Harrison evidently bestowed more care and thought on No. 3 than on No. 4, which is much smaller. Yet it was the latter that won the Government award of £20,000. No. 3 was the first time-piece that contained a bimetallic compensation; it also anticipated the modern idea of a master clock and a slave one; it consists of an inner clock that is wound every thirty seconds by an outer clock. Being intended for use at sea (though it seems never to have actually been tried there), it is controlled by two large slowly-moving balances, instead of a pendulum. All Harrison's time-pieces will live in history, from the important part they played in solving the ancient problem of finding the longitude at sea.

Another Large Reflector in America.—A Science Service *Bulletin* from Washington, D.C., dated Aug. 10, announces the successful completion of the 69-inch mirror for the Perkins Observatory of Ohio Wesleyan Observatory, Delaware. It is stated to be the first very large mirror made entirely in America; in other cases the glass had been obtained from Europe. The mirror has been figured in the works of J. W. Fecker, at Pittsburgh. The tests of figure are stated to have been satisfactory; nearly 16,000 hours of work have been spent upon it. It has a central aperture, and will be used as a Cassegrain. The mirror is 10·3 inches thick and weighs 3790 pounds.