

regard to the habit of growth of the plant and the diseases to which it is liable. Although no tests seem to have been made, it is suggested that on the typical "ragi" soils basic slag and bonemeal would probably be more advantageous than superphosphate.

The most casual survey of the available literature shows clearly that the possibilities of agriculture in India are being recognised as never before. Indian soils have hitherto been starved, and much of the cultivated land has almost reached the maximum state of impoverishment (D. Clouston, *Agric. Journ. India*,

vol. xv.), and, consequently, it is likely to respond well to manurial treatment. Fungal diseases and insect pests take heavy toll of the crops, and demand much investigation before they can be controlled. Nevertheless, the need for improvement is fully recognised, and steady but slow progress in this direction is being made by the patient and determined efforts of the many workers who have the interests of the country at heart, and the advance already made is of good augury for the future.

W. E. BRENCHLEY.

### Precious Stones in 1919.

THE long and valuable series of annual reports on precious stones commenced by Dr. George F. Kunz, of New York, in 1883 in the publications of the United States Geological Survey, and continued by him since 1907 in the *Mineral Industry*, bears witness to his enthusiasm for a subject in which he is the leading authority. His latest report, for 1919, has just been issued as an advance chapter (30 pages) of vol. xxviii. of the *Mineral Industry*. From it the following points are extracted:

During the war period the demand for articles of luxury naturally fell, but now a marked reaction has set in, and sales in Paris and elsewhere already exceed those of the pre-war period. Not only are a greater number of articles sold, but they also command higher prices. This is especially the case in the United States, where the annual value of the imports of precious stones is now (105,000,000 dollars in 1919) more than double ever before. As with everything else, the war has had far-reaching effects on the trade in precious stones. Difficulties have arisen owing to the varying rates of monetary exchange, labour questions, and the shifting of the centres of industry. Efforts are being made to discover fresh sources of supply. As in previous times of great disturbance, speculators and refugees acted wisely who converted perishable goods and almost worthless paper-money into portable and durable jewels.

Diamond is by far the most important item. To the South African output, which is controlled by the London Diamond Syndicate, the new territory of South-West Africa contributes 21 per cent. The total production of the Union in 1919 of rather more than 2,500,000 carats (about half a ton) amounts to only half that for the year 1913, but the value (nearly 12,000,000l. sterling) is actually greater, so great has been the advance in price. The sales, however, somewhat exceeded the production for the year, the reserve stock having been drawn upon. "River stones," being of better quality, command higher prices; the average in 1919 was just above 13l. per carat, as against 4l. in 1915. These stones are now being collected from the bed of the Vaal River with the aid of diving-bell caissons and compressed air. A notable diamond is one of 1500 carats (=300 grams) found in the Premier Mine, near Pretoria, in 1919;

it is, perhaps, a portion of the same large crystal as the famous "Cullinan" diamond found in 1905. New diamond fields are recorded in Kenya Colony, Gold Coast, Bechuanaland, Griqualand West, and Orange Free State. The Belgian Congo yielded in 1919 about a quarter of a million carats, whilst the returns from other countries (except a small quantity from British Guiana) are practically negligible.

As a diamond-cutting centre Amsterdam still takes the lead, but the industry is now being developed in England, particularly at Brighton for the employment of disabled soldiers. More cutting is also being done in America, as shown by the increased imports of uncut stones, and the establishment of cutting works in South Africa is under consideration. For these reasons the Dutch are considering the possibility of increasing the output from Borneo by systematic mining. The Arkansas diamond field is also to be explored more systematically. Besides its use as a gem, diamond has many important technical applications, but it is a significant fact that the American imports do not show an increase in this direction, the enormous increase noted above being accounted for by the imports of cut, but unset, gems.

Pearls form the next largest item in the American imports. Here again attempts are being made to increase the production of the pearl fisheries on the western coasts of Central America, whilst the freshwater pearls of the rivers of the United States are likely to be collected on a large scale.

Corundum gems show a steady, though comparatively small, output from Upper Burma (ruby and sapphire) and from Fergus County, in Montana (sapphire). Opal deposits are now being successfully developed in South Australia, and a new deposit of "black opal" has been discovered in New South Wales. Fine examples of "fire-opal" are mentioned from Western Australia. A fine mass of precious opal weighing 527 grams has been found in the new opal-mining district in Nevada. Mention is made of the beautiful, bright blue zircons which have recently appeared in the gem market, but no information is given as to their source. This has been variously suggested to be Ceylon, India, Siam, or Queensland; it is evidently kept a secret for trade purposes.

L. J. S.

### Copper Deposits of Arizona.

A VERY complete and highly interesting monograph on the copper deposits of Ray and Miami, Arizona, by Mr. F. L. Ransome has just been issued by the United States Geological Survey as Professional Paper 115. These ore-bodies have rapidly attained first-class importance among the great copper producers of the United States. For a good many years, dating back to 1880, work had

been carried on in this district, the small richer veins being worked and a fair amount of copper won, but these deposits were not of a permanent character. About 1905 the attention of mining men was directed to the low-grade disseminated ore of the region, and work on this commenced about 1911. Up to 1918 nearly 46,000,000 tons of this ore had been mined and 490,000 tons of copper produced. The reserves

NO. 2680, VOL. 107]

in one group of these mines, that of the Ray Consolidated Copper Co., were estimated in 1916 as more than 93,000,000 tons, averaging 2.03 per cent. of copper; those in the Miami mines at 50,000,000 tons, averaging 1.6 per cent.; and those in the Inspiration mine at 97,000,000 tons, carrying 1.63 per cent. The ore-bodies are large, irregular, flat-lying masses, and consist partly of Pinal schist and partly of granite and monzonite porphyry, carrying disseminated copper ore, some being more or less uniformly distributed through the rock and some concentrated in threads or veinlets. The copper occurs principally as chalcocite, though chalcopyrite is also met with. The ore-deposits have apparently been formed by a process of secondary enrichment upon rock that contained relatively little copper. The latter is termed by the author "protore," and apparently contained from 0.4 to 0.8 per cent. of copper. This "protore" appears to have been formed by the action of thermal alkaline sulphide waters carrying copper in solution, and there is considerable evidence that the presence of great bodies of monzonite porphyry lying far deeper than the present ore-bodies were in some way connected with the presence of these hypogene solutions.

### University and Educational Intelligence.

CAMBRIDGE.—H.R.H. the Prince of Wales will visit the University to receive an honorary degree on May 31 next.

Mr. A. D. Browne has been elected to a fellowship at Queens' College. Mr. W. M. Smart, Trinity College, chief assistant at the observatory, has been appointed to the John Couch Adams astronomership, recently founded under a bequest by the late Mrs. Adams.

Smith's prizes have been awarded to L. A. Pars, Jesus College, for an essay on "The General Theory of Relativity," and to W. M. H. Greaves, St. John's College, for an essay on "Periodic Orbits in the Problem of Three Bodies."

A course of thirty lectures on applied entomology is to begin in the Easter term and Long Vacation by Mr. F. Balfour Browne for those students who wish to complete their training for such work in the tropics or in this country.

DR. WALTER E. COLLINGE, of St. Andrews University, has been appointed keeper of the York Museum.

THE annual gathering of the South-Western Polytechnic Institute, Chelsea, will be held to-morrow, March 11. The chair will be taken at 8.15 p.m. by Mr. C. H. St. J. Hornby (chairman of the governing body), and a lecture will be given by Prof. A. Harden on "Vitamins—Essential Constituents of Food."

THE National Union of Scientific Workers announces a public meeting to be held on Tuesday, March 15, at 6 p.m., in the Geology Theatre, Royal School of Mines, South Kensington, when Mr. W. Brierley will speak on "Personal Impressions of American Biological Research." The chair will be taken by Sir A. D. Hall.

IN view of the large demand for tickets for the lecture on "Himalayan Exploration, with Special Reference to Mount Everest," recently delivered by Profs. J. N. Collie and E. J. Garwood at University College, London, the lecture will be repeated on Monday, March 21, at 5.15 p.m., at the college. The

proceeds of the lecture will be devoted to the College Athletic Ground Fund, for which a sum of 6000*l.* is needed.

At a recent meeting of the Bristol University Colston Society Committee it was decided to alter the title of the society to Colston University Research Society. Originally founded as the University College Colston Society in 1899, its funds were applied in the first instance to the General Sustentation Fund of the college, and afterwards to a considerable extent to propaganda work in connection with the proposed Bristol University. On the establishment of the University the society automatically became the University Colston Society. At the same time the decision was made to apply the funds of the society henceforth to the support of research work within the University. The new name, Colston University Research Society, emphasises the fact that the society exists to support research work within the University, and should make it clear that the funds are devoted entirely to facilitate and extend this work, the value of which to the industrial and commercial world and to the community at large cannot be over-estimated. The annual dinner of the society is fixed for May 23, being the day preceding Founder's Day, and this day has been adopted now as a permanent date. The president is Alderman F. Sheppard, and Sir William Bragg, Quain professor of physics in the University of London, has accepted the invitation to be present as the guest of the society. The president-elect is Mr. E. Walls.

A VERY interesting and comprehensive course of six lectures on Italian engineering is now being given under the auspices of the University of London by Prof. Luiggi, of the University of Rome, at the Institution of Civil Engineers. In his first lecture, presided over by the Italian Ambassador, Prof. Luiggi outlined the subjects he proposed to consider, and pointed out that an impelling motive of nearly all modern engineering work in Italy was the necessity of increasing the food production of the country by irrigation and by the reclamation of marshy lands in order to provide for a present population of about 40,000,000, which is increasing at the rate of 500,000 a year. Another vital problem is to develop their great water-power resources owing to the scarcity of fuels and the impossibility of paying for imported coal and other fuels at present-day prices. In southern Italy, where water is scanty, it has been necessary to construct the Apulian aqueduct, nearly 1000 miles long, and by far the largest work of its kind in the world. In his second lecture some important irrigation canals will be described and the various schemes of reclaiming marshy land by drainage canals, by silting up with muddy flood-water, and by pumping. The main topic of the third lecture will be the great hydro-electric installations, some of which have units of 20,000 h.p. working under exceptionally high heads, as in the "Adamello," where an available fall of 3000 ft. has been successfully utilised for several years, although this working head will be surpassed in other plants now under construction. Applications of electrical power to railways will also be described, as will an extremely interesting power station at Larderello in Central Tuscany, in which steam for three turbines, each of 4000 h.p., is derived from volcanic heat tapped by pipes driven to depths of from 500 ft. to 600 ft. The University of London is particularly fortunate in having so distinguished an authority and so able a lecturer as the president of the Institution of Civil Engineers in Rome to give this course of lectures to its students and the engineering world.