

Research Items.

THE LAPCHAS.—Vol. 31, No. 4, of the *Journal and Proceedings of the Asiatic Society of Bengal* is a study of the folk-lore of the Lapchas of Sikhim, supplemented by incidental notes on their social anthropology, by Mrs. G. de Beauvoir Stocks, which is based upon observations made on two journeys in that country in 1925. Very little attention has been paid to the Lapchas and, owing to contact with Tibet—the Sikhim Rajas are of Tibetan descent and are recognised as in a sense alien by the people—and India, and their conversion to Buddhism, their folklore shows extraneous influences, also perceptible in their customs and beliefs, but not always easy to disentangle in the present stage of our knowledge of them and their immediate neighbours among the Himalayan peoples. For example, the conceptions of gods is vague, and apparently it had not attained any advanced stage of development when it was superseded by Buddhism. It would appear that there were five deities, but even their names may have been forgotten as the terms at present applied to them in certain cases are purely descriptive, e.g. *It-Mo*, "The Ancient Mother," while others are of Tibetan origin. The five original deities are a family of mother, father, two children, and a son of the mother. Among them the creative power is attributed to the female deities. The mother is probably the living force of the animal and vegetable world. An especially significant figure is the *Bong-thing*, or medicine man, the son of a goddess who was sent as a Shaman to relieve human beings from the tortures of the demons. In Lapeha belief, as in Tibetan Buddhism, and in India, demons play a very prominent part, and the heroic tales are filled with demoniacal beings, ogres, etc., who haunt every locality which presents some dangerous or unusual character, such as the unhealthy jungle with its dangers from wild animals, or a hill-top, or cascade. One demon inhabiting the top of Mt. Tendong was said to take a toll of two lives in each year.

EGYPT OVER THE BORDER.—Sir Flinders Petrie in Part II. of *Ancient History* for 1927 describes the results of his excavations in Palestine during the past winter. The site chosen for excavation was Tell Jemmek, which has been conjectured to be the site of Gerar. It has fifty feet depth of ruins, all dating from before the Roman period, whereas the "ruins of Umm Jerar," formerly identified with Gerar, are entirely of late Roman Age. The site is evidently, from the size of the ruined granaries, of importance as the centre of a great corn country. This fact, in conjunction with its position, explains much of the Genesis narrative. Four periods of construction so far have been examined: (i.) The granaries, which belong to the latest occupation of the site in the fifth and fourth centuries B.C. These must have served as the base of the Persian army in maintaining the Persian hold on Egypt, for they are much larger than the needs of the inhabitants would require, being twenty and thirty feet across and probably thirty and fifty feet high. (ii.) A fort similar to those of Naukratis with pottery of the seventh century B.C.; foundation deposits of model corn-rubber and calf bones marking it as of Egyptian origin. Scythian bronze and arrowheads were found around it as well as an iron arrowhead of the type found later in central Russia. (iii.) Chambers built without any regular plan with Cypriote pottery of the eighth and ninth centuries B.C. (iv.) Buildings of grand style built of great yellow bricks in a thoroughly Egyptian method of construction, which at latest can be assigned to the time of Shishak. Thirty feet of ruins still remain to be uncovered.

SPRAYING POTATOES.—Potato blight is a disease which attacks the haulms and foliage of the plant, and also causes the tubers to rot. In general it may be expected in Great Britain between mid-May and mid-June, though the time of its appearance varies in different parts of the country, usually being later in the north and drier eastern counties, for it is greatly encouraged by wet and mild conditions. Methods for the prevention and control of this disease are given in the Ministry of Agriculture's Leaflet No. 23. Bordeaux and Burgundy spray mixtures are especially recommended, successful results having been obtained since their first employment in 1885. Both contain copper sulphate, mixed with milk of lime and washing soda respectively, and full details of their preparation are given in the leaflet. The spray forms a gelatinous film over the surface of leaf and stem, acting as a protective rather than a remedy against the fungus, therefore spraying should preferably be done *before* the blight is detected. A second application after an interval of three or four weeks is recommended, and in wet summers a third may be needed. Dusting with powders is also used, but the results are not so satisfactory, as a less efficient film is formed. Further, the commercial article is liable to contain impurities, whereas the ingredients of the spray mixtures are readily obtained pure. Dusts are therefore not recommended except in cases where a shortage of labour or water occurs, though they are preferable to no action at all. The cost of one spraying is probably between 5s. and 7s. 6d. per acre, 100-120 gallons of mixture being required; to this must be added the cost of labour. The increased value of the crop may on an average be reckoned as equivalent to the selling price of one to two tons per acre.

GREENHOUSE FUMIGATION.—A number of pamphlets have recently come to hand dealing with greenhouse fumigation by means of calcium cyanide. With the expansion of the greenhouse industry there is an increasing demand for efficient fumigants. The old method of generating hydrocyanic acid gas by means of sodium cyanide or potassium cyanide and diluted sulphuric acid involves both trouble and some skill. Within the last two or three years calcium cyanide has been widely tested in the United States and placed on the market. In England this compound has also attracted some attention and a certain number of trials have been made. According to Mr. H. W. Miles (*Annals of Applied Biology*, vol. 14, 1927, p. 240), for the majority of plants, routine fumigations require only one-quarter ounce of calcium cyanide per 1000 cubic feet of space to maintain a high degree of pest control. Its special advantages are the ease attending its use, since the powder is merely poured from its container into a measuring receptacle and distributed along the greenhouse paths, the house being then closed down and locked. On coming in contact with atmospheric moisture the calcium cyanide slowly evolves hydrocyanic acid gas. With the dosage mentioned it is stated that an area of 40,000 cubic feet can be fumigated at a cost of 1s. 8d. plus the cost of labour.

ACARINE DISEASE IN HIVE BEES.—*Bulletin* 33 (1927) of the North of Scotland College of Agriculture, by Dr. John Rennie, deals with the cause, nature, and control of Acarine disease in the hive bee. It is now tolerably well known that in this disease the thoracic breathing tubes of the bee are infested with mites which pass their whole existence in that situation. These mites are true parasites belonging to the family Tarsonemidæ and to the species *Acarapis woodi*.

Rennie. Worker, drone, and queen bees are all liable to infection and, when the mites become securely established, affected bees eventually become disabled. This is primarily due to the continuous loss of blood, which the mites absorb through their piercing mouth-parts. There is, further, a blocking of the air-tubes by the mites, which thus restricts the oxygen supply of the bee and causes a deterioration of the tissues connected with the infested parts. Weakened bees may work for a long time, but finally become unable to fly or to share in the normal life of the colony: the larvae or brood of the bee, however, are never infested. The difficult subject of treatment of the disease is discussed at length. With slight infestations and with a stock numerically strong in autumn, there is a possibility of survival. In cases of this kind where the percentage of infested bees in a random sample is about 30 per cent. or less, treatment of the hive with a mixture of chloropicrin, camphor, and methyl salicylate in minute doses is advised. This mixture, it is claimed, kills the parasitic mites without seriously interfering with the bees. Stocks badly infested in autumn or spring are useless; they merely function as sources of infection and are best destroyed. In cases of summer infection, treatment with volatile substances is not expedient, and success in such cases rather lies in management, so that the maximum of young foraging bees is produced at the time of honey flow. This is best effected by the early introduction of young queens, which produce bees faster than the disease can destroy them. Stocks thus saved, even though only temporarily, can be maintained for a time, at least, with profit.

SALMON OF THE OUTER HEBRIDES.—We have for the first time information on the salmon of the Grimersta District, Lewis, as a result of examination of scale measurements and other details obtained by Mr. W. M. Menzies (*Fisheries, Scotland, Salmon Fish.* 1926, 6 (January 1927)). A total of 803 fish taken on rod and line in 1925 are dealt with. Of these fish, 80 per cent. were grilse, the remainder being mostly 2 and 2+ winters fish. Compared with east-coast districts the scarcity of small summer fish was marked. The grilse were mostly taken in July, August, and September, 57.3 per cent. of the whole season's catch of grilse occurring in July. Previously spawned fish were only slightly more numerous than in the steadily netted districts of the east coast. The average smolt age was considerably higher than in most other east-coast districts, 60 per cent. migrating in their third year; this is perhaps to be correlated with the scanty food supply available in the waters, which are surrounded by infertile, peaty and rocky country. One-year smolts were entirely absent, and 5 per cent. of the parr stayed in the fresh water for four or even five years before migrating. The grilse were a pound heavier and nearly two inches longer, on the average, than those from the Dee and Spey, but it is to be remembered that in the Grimersta district they run later than they do on the east coast, which possibly gives more time for feeding and growing. The scale erosion on the grilse begins in July, that is, very soon after cessation of feeding, the percentages with eroded, or, rather, absorbed, scales being 49.2 per cent. in July, 99.1 per cent. in August, and 100 per cent. in September. A check in growth was also noticed on the grilse scales, occurring apparently at about the same time as is the case for east-coast fish.

NATURAL PLANT HYBRIDS.—Numerous natural hybrids have been recognised in the flora of New Zealand and Mr. H. H. Allan has recently described several of these hybrid swarms in a series of short

papers in *Genetica* (vols. 7 and 8). Some of the hybrid forms have been produced artificially by crossing. *Coprosma Cunninghamii*, which was described by Sir Joseph Hooker as an extremely variable species, is found to occur wherever *C. robusta* and *C. propinqua* grow together. An artificial cross of these species produced a uniform F_1 closely resembling some forms of the wild *C. Cunninghamii*. *Melicope simplex* \times *M. ternata* gives a series of wild forms which are believed to be partly the result of epharmonic response by the individual to wind-swept conditions and partly the sorting out of suitable forms by the diverse conditions. Other apparent wild hybrid swarms are *Nothopanax anomalum* \times *N. simplex*, *Hoheria augustifolia* \times *H. saxstylosa* and *Corokia buddleoides* \times *C. cotoneaster*. A hybrid community of Hebe (the shrubby Veronicas) is more fully studied in conjunction with Messrs. G. Simpson and J. S. Thomson. The Hebes at Blanket Bay are found to show a mingling in various degrees of the characters of *H. elliptica* and *H. salicifolia* var. *communis*, which are also found in the community. The conditions indicate a freely intercrossing population of forms in areas where both species occur; and the same is believed to apply to various other pairs of species of Hebe as well as other genera. These results will be further elucidated by crossing experiments which are being undertaken.

CURRENTS OF THE ENGLISH CHANNEL.—Mr. J. N. Carruthers (*Jour. Marine Biol. Assoc.*, vol. 14, No. 3, March 1927, pp. 685-721) reports on an experiment with drift bottles, both surface and bottom, carried out by the Ministry of Agriculture and Fisheries and the Marine Biological Association jointly in July 1924. The bottles were liberated at the International Stations E2 and E3, and on the steamship route Southampton-St. Malo. Of the surface bottles, those which did not run ashore on the Channel coasts were carried rapidly up Channel into the North Sea and across to the Dutch and Scandinavian shores. Many reached the Skaggerak, some 700 miles away, travelling at an average rate of 6 miles a day or more. During the period covered by the experiment there was an almost unbroken prevalence of south-westerly winds. It cannot of course be inferred from these results that the water mass as a whole moved with the velocity indicated, and further experiments with well-submerged drifters would be valuable and interesting. The results have, however, enabled Mr. Carruthers to work out a relation between velocity of wind and surface current which corresponds closely with that found by R. Witting in the Baltic. The information yielded by the bottom bottles is summed up by Mr. Carruthers as follows: "There seems to be in Long. 2° W. (approximately) a parting of the ways in respect of the movements of the bottom water. To the north of 50° N. Lat. there appears to be a west-going bottom set, whereas to the south of this parallel there is a set in an easterly direction."

SPEED OF LIGHT IN MOVING BODIES.—In the tenth volume of the *Archives Néerlandaises des Sciences Exactes*, Prof. P. Zeeman has collected together the work done by himself and his colleagues to determine the fraction of the speed of a moving body through which light is passing, which must be added to the normal speed of light to give the actual speed of the light. According to Fresnel, this fraction should be $1 - 1/\mu^2$, where μ is the refractive index of the material for the light used. According to Lorentz, this fraction should be increased by $(-\lambda/\mu)d\mu/d\lambda$ where λ is the wave-length. The measurements were made on water flowing through pipes and on quartz and flint-glass rods to which a to-and-fro motion was given by means of a revolving crank and connecting rod. The method

used was in principle that of the Michelson interferometer. The results agree with the formula of Lorentz.

THE POSITIVE COLUMN OF GEISSLER DISCHARGES.—Prof. Günther-Schulze has recently published the results of an extended series of measurements made by him on the electric fields present in a uniform positive column. The point on which he lays particular stress is that the mean free path, rather than the pressure, is the relevant variable, and that it is therefore necessary to take into account the temperature of the ionised gas, which can be calculated in the way proposed many years ago by Warburg. With this precaution, the results of his measurements are fairly well expressed by two semi-empirical formulæ. For polyatomic gases the potential gradient is determined by the mean free path and by the diameter of the tube, and is practically independent of the current density: for monatomic gases the gradient is independent of the mean free path (and hence of the pressure), but is a function of both the current and the size of the tube. The processes of ionisation and conduction in a discharge-tube are still imperfectly understood, in spite of much recent work on the subject, but the data in these papers (*Zeitschrift für Physik*, 41, p. 718, and 42, p. 763) provide valuable material for future theoretical development.

THE X-RAY INVESTIGATION OF INDIA-RUBBER.—In the *Chemiker-Zeitung* for May 21 is an account of two lectures by Dr. J. R. Katz of Amsterdam on the application of X-ray analysis to the structure of india-rubber. So far, rubber in the unstretched condition has yielded very little information beyond the production of an 'amorphous ring spectrum,' similar to that obtained from liquids. Recent work by the author appears to substantiate the hypothesis put forward by him in 1925 that rubber changes on stretching from an amorphous to a crystalline condition, the degree of change depending upon the extension. X-ray examination has revealed indications of a three-dimensional orientation of molecules, undiscernible in the unstretched material, although some of it still remains amorphous, as shown by the unchanged diameter of the 'amorphous ring' of the spectrum. Moreover, there is a critical extension, below which the phenomenon is not observed. The conflicting results of W. H. Keesom's attempt in 1922 to apply a modification of Bragg's formula—which was specially designed for crystals—to calculate the mean distance of adjacent molecules (to a first approximation) in a liquid from the diameters of these rings, have now been shown to be due to the fact that the molecules were always assumed to be approximately spherical. This assumption is of course only applicable in certain cases, and it is now shown that the abnormal values were due to marked deviations in molecular structure from the spherical shape. The experiments of Katz appear to open a new and promising field of research.

HELIUM IN CANADA.—A comparatively new use of helium, and one that promises to become of very great importance, is its utilisation in the production of artificial atmospheres under which divers and caisson workers carry out their operations. It is anticipated that such atmospheres will permit of much greater depths being reached under water, longer periods being spent without fatigue, and, in the case of tunnel and caisson workers, that the prevention of what is known as 'caisson disease' will be facilitated. Investigations along these lines are being carried out by the United States Bureau of Mines, and accordingly considerable impetus has been given to the helium industry, which thus has other outlets besides that

of supplying airships with non-inflammable gas. The Canadian Mines Branch, during the period 1922 to 1926, made a special study of the helium-content of natural gas occurring within the Dominion, and the results of this investigation are now available in a report under the above title by Dr. R. T. Elworthy (No. 679. Ottawa: F. A. Acland, 20 cents). It is significant that Canada is the only source of helium in the British Empire. The report summarises our knowledge of this gas and is particularly valuable for its account of modern methods of recovery; it includes details of the varied helium-bearing gases (with analyses) in the Dominion and much interesting experimental data. The most important source of supply of this substance discovered is in the natural gas from three small wells at Inglewood, Ontario, which yields as high a percentage of helium as that forming the basis of commercial operations at the well-known plant at Fort Worth, Texas; leases have been taken up by the Ontario Government in the Inglewood district, and it is anticipated that the National Research Council will lay down an experimental helium extraction plant, providing sufficient gas is available. The natural gas of Alberta, with the exception of Bow Island and Foremost fields, contains little or no helium, which, in view of these enormous resources, is unfortunate. However, if only 0.2 per cent. helium-bearing gas could be treated economically, it is believed that the Dominion could supply about 5,000,000 cubic feet annually.

IRON AND STEEL IN INDIA.—A paper by Richard Mather published in the *Journal of the Royal Society of Arts*, May 12, reveals the rapid advances which have been made during the last twenty years or so in the ferrous industries of India. Although Indian Wootz steel has deservedly possessed the highest reputation for quality for hundreds of years, it has only been during the last decade or two that the initial difficulties associated with the establishment of a heavy iron and steel trade there have been overcome. Now, however, a large portion of the existing Indian demand is satisfied by Indian products, and also a surplus is available for export. This applies to pig-iron rather than steel, and the growth in the exports of this material during the last few years are as follows:

Year.	Tons of pig-iron exported.
1923	181,500
1924	271,000
1925	402,000
1926	315,000

In 1926, Japan took 75 per cent. of this iron and the United States 13 per cent. In the former country Indian iron has become a serious competitor with the home product. With regard to steel, Indian production in 1911 was 10,000 tons; last year it was 540,000 tons, and it will probably exceed 600,000 tons in the present one. So far as future developments are concerned, Mr. Mather states that "the conclusion may safely be drawn that the Indian steel industry will develop, perhaps fairly rapidly, during the next few years, and that for some time afterwards its growth will depend mainly on the rate at which the demand increases. But for the next few years imports will not diminish to a great extent, unless the consumption declines or remains stationary; and even in later years there will remain an important market in India for certain kinds of steel." As an example of the value of this industry during the War, it was pointed out in the discussion that the military railways by which the Mesopotamian campaign was carried on, and even the line by which Lord Allenby made his successful attack on Palestine, were constructed of steel from the Tata works.