

reached a height of more than 8000 metres (five miles). Two of them had travelled at a rate of 100 miles per hour. The maximum height reached was 17,037 metres, or nearly eleven miles, and the lowest temperature recorded was -79° C., at a height of 14,800 metres.

While Mr. Clayton was crossing the Atlantic to Gibraltar to join M. Teisserenc de Bort and M. Maurice on the cruise of the *Otaria*, he executed six kite flights, and on the cruise nineteen flights were made. From the Azores, Madeira, and Canary and Cape Verde Islands twelve balloons were sent up, and records were obtained of the wind velocity and direction up to altitudes of 13,600 metres. It was demonstrated that the upper return trade winds in the northern hemisphere blow generally from the south, and that the chief features of the vertical distribution of temperature and humidity were the differences between the east and west sides of the permanent anticyclone and the stratification of the atmosphere in the region of the trades and the doldrums (see NATURE, November 16, 1905, and March 8, 1906). These investigations are to be continued to see if the proximity of land influences the upper-air currents over the ocean.

In the tables giving the records obtained by the flights in 1903 and 1904 at Blue Hill, the reading corresponding with the different altitudes of the kites, are all compared with simultaneous readings made in the observatory, and the initial and final readings on the meteorographs are compared also with those at the station at the base of the hill. The height of the kite was determined from its angular height and the length of the wire, with a correction for sag. When the kite was not visible, its height was determined from the corrected readings of the barograph it carried.

In order to eliminate the effect of sluggishness of the instruments, the temperature readings were taken from the records at points which coincided with stationary points in the flight. Humidity was recorded by means of a hair hygrometer, which had been standardised by comparison with a psychrometer before and after the flight. The direction of the current in which the kite was flying was determined by the azimuth of the kite from the reel.

During 1902 and 1903 a long series of observations was made to study the effect of meteorological conditions on atmospheric refraction. From Blue Hill, Boston Lighthouse can be seen more than fourteen miles away, and the difference between the geodetic and observed dip of the line of sight observed three times a day. W. M.

SCIENTIFIC WORK IN THE STRAITS SETTLEMENTS AND CEYLON.

THE last number of the Journal of the Straits Branch of the Royal Asiatic Society is full of matter interesting to various classes of readers:—for botanists, Mr. H. N. Ridley's studies on the grasses, sedges, Scitamineæ, and Begonias of Borneo; for zoologists, Mr. P. Cameron's account of the Hymenoptera of Sarawak; for anthropologists, Mrs. Bland's description of the curious Anyam Gila basketry of Malacca, and Mr. Howell's Dyak ceremonies in pregnancy and childbirth, with a list of remarkable taboos imposed upon the woman before and after delivery; and, lastly, for folklorists, several tales collected by Messrs. Maxwell and Laidlaw. The most important contribution to the number is Mr. Ridley's article on the menagerie at the Botanic Gardens, Singapore. This was started by a local society in 1859, taken over by the Government in 1874, and, finally, the valuable collection was dispersed in 1903 on the ground that the authorities could not afford funds for buildings and a modest annual grant for maintenance. It is certainly a misfortune that this institution should have met such a fate. As Mr. Ridley points out, there are few places in the world better suited for a zoological garden than Singapore. Maintenance charges are low, and the vicinity of the source of supply renders it possible to procure specimens at a small cost. Mr. Ridley gives valuable notes on the various genera, and supplies useful hints on the methods of keeping animals in captivity. He lays down as a maxim that "the only way of knowing what an animal thinks is

comfortable and snug is to keep it and observe its ways. It will soon let you know what it likes, which probably does not at all fall in with your ideas of what it ought to like." His notes on the habits of the larger Quadrupeds are based on first-hand knowledge. A pair of Indian jackals, he tells us, bred in the gardens, which is, to say the least, unusual. The Malay tapir (*Tapirus indicus*) displayed remarkable cryptic characters. When in its young pelage it hid in a palm bush, "and when I went to fetch it, on opening the bush and looking down, I could not see it. I seemed to be looking on the dark brown ground with spots of sunlight through the leaves. The little animal lay in such a position that the yellow spots were exactly where the vertical sun rays would fall, the yellow streaks resembling the slanting streaks of light from the side. It was for a few minutes quite invisible, though I was looking down on it." No. 47 of the journal of the same branch of the society is devoted completely to a Malay manuscript entitled "Hikaiat Shamsu'l Bahrain," which, however, has no claims to special interest, being of a common type.

The address delivered by the Hon. J. Ferguson, president of the Ceylon branch of the Royal Asiatic Society, gives an interesting sketch of past and present scientific work in the island. In natural science the most valuable recent publication is that of Prof. Herdman, on the pearl oyster fisheries, with supplementary reports on the marine biology by other naturalists. The mineralogical survey has led to the discovery of many novelties, including thorianite, the only thorium-bearing substance to be found in any British possession. It is much to be regretted that the local government has been unable to provide funds for the establishment of an observatory, the want of which is much felt by the shipping trade, and was obliged to decline the offer of Mr. A. R. Brown, one of the Cambridge school of anthropologists, to undertake a survey of the Veddas. The suggestion made by Sir H. A. Blake, on native authority, that the connection between mosquitoes and malaria was known to Susruta, a Hindu writer of the fourth century A.D., has been examined by Prof. Jolly, with the result that the term Masaka cannot be confined to the mosquito, but includes various other insects popularly believed to cause disease. In regard to membership, the society is in a sound position. In spite, however, of the president's optimism, we gather that the supply of papers is not so large as might be desired, and that some of the enthusiasm which has revived the sister society at Calcutta is needed at Colombo.

AGRICULTURAL EXPERIMENTS.

WISCONSIN Experiment Station Twenty-second Annual Report.—From the time of Thomas Andrew Knight onwards, horticulturists have remarked the effects of an excessive food supply on variability in cultivated plants, but one seldom hears of a case in which such pronounced results have followed excessive feeding as those which occurred in an experiment described by Mr. E. P. Sandsten in the twenty-second annual report of the Agricultural Experiment Station of the University of Wisconsin. To a batch of tomato seedlings growing in a greenhouse a mixed manure consisting of 800 lb. nitrate of soda, 600 lb. sulphate of potash, and 1000 lb. bone per acre was applied. The seedlings soon began to vary, with the result that out of ninety-six plants scarcely any two were alike. Some plants were dwarfed, others developed internodes of abnormal length; the leaves varied in size and shape; the blossoms were abnormal in form; the stamens were much modified, and in one case became "almost aborted"; the pistils, on the other hand, were greatly overgrown, and some of the plants produced seedless fruits. Two seedless types, a large- and small-fruited, were specially noticeable, and cuttings of these and of some of the other marked variations were made. These were subsequently grown in an ordinary soil, and produced plants which retained all their abnormal characters.

Variation in the Composition of Milk.—In Bulletin No. 11 of the Edinburgh and East of Scotland Agricultural College, Dr. Alex. Lauder gives some interesting par-

ticulars about the composition of the milk of a well-managed and well-fed herd of Shorthorn dairy cows. The herd, numbering twenty-two, was maintained for the purpose of supplying Rosslynlee Asylum with milk. The milk of each cow was weighed daily, and sampled weekly; the mixed milk of the herd was also sampled once a week. The investigation began in May, 1905, and lasted for a year. The cows were milked at 6.30 a.m. and at 4 p.m., and, as is always the case when the milking periods are unequal, the milk was found to be poorer after the longer than after the shorter interval. The morning milk averaged 3·15 per cent. of fat for the whole year, while the evening milk averaged 3·91 per cent. There was a marked difference in the milk of individual cows; one animal, for example, produced 655 gallons of milk during the year, containing 3·58 per cent. fat in the morning and 4·81 per cent. fat in the evening, while another produced 638 gallons, which contained only 2·96 per cent. fat in the morning and 3·5 per cent. fat in the evening. Until the middle of January the mixed milk of the herd always contained more than 3 per cent. of fat, but in spite of good management the quality then began to fall, and during the next three months the mixed milk contained less than 3 per cent. of fat eight times in the morning and four times in the evening; as the milk was sampled only once a week, it must, therefore, have usually contained less than 3 per cent. of fat in the mornings in February, March, and April. Although the cows were liberally fed, additional rations were tried for the purpose of improving the quality of the milk, and four animals were given 2 lb. linseed cake and 2 lb. oats per head per day. In accordance with experience, it was found that the addition of concentrated foods to rations, already liberal, produced no improvement in the milk.

West of Scotland Agricultural College Reports and Experiments, 1906.—The seventh and eighth annual reports of the West of Scotland Agricultural College have been issued as a single volume. This volume contains reprints of four bulletins which have already been issued separately. Among the subjects dealt with are the uses of inoculating materials for leguminous crops. Several crops were treated, but the only positive results were obtained with lucerne. At two centres it was found that lucerne was much benefited by treatment with Hiltner's inoculating material. In the first case lucerne was sown on April 12 on land which had probably never grown this crop, and had certainly not done so for twenty-eight years. Part of the seed was treated and part untreated. Early in July the crop growing from treated seed began to show signs of improvement, and in August, when flowering, it stood 20 inches to 21 inches high, while the adjacent untreated crop was but 13 inches to 14 inches. It was noticed that the inoculating material only did good on land which was well supplied with phosphates and potash; on soil deficient in either of these, inoculation produced no effect. At the second centre lucerne had been growing for a year before it was treated, and it was noticed that a few nodules had developed on the roots, but the crop was far from vigorous. On May 28 some sand was inoculated, and this was sprinkled over part of the lucerne. On July 15 the lucerne was cut; the treated plot then yielded 56 cwt. and the untreated plot 54 cwt. per acre, so that inoculation had not been effective. Directly after mowing, however, an improvement in the treated crop was noticed, and this improvement became more marked as time went on, so that when a second cutting was made on September 25 the land which had been treated with Hiltner's culture produced 74 cwt. per acre, as against 30 cwt. from the untreated soil. These experiments were made in 1905, when, at the instance of the Board of Agriculture, similar experiments were made in all parts of the country; and the West of Scotland tests illustrate the general result, which was that inoculating material proved useful for a leguminous crop newly introduced into a district, but was seldom beneficial in the case of crops commonly cultivated. The nodule organisms of these are abundant in most soils. Several of the experiments recorded in this volume deal with the best time of year at which to apply manures. In the case of turnips, the conclusion is stated that superphosphate, basic

slag, kainit, and muriate of potash are better applied in spring than in autumn; for hay, on the other hand, it is better to apply potash manures in autumn than in spring. For both turnips and potatoes it was found to be more profitable to apply farmyard manure in spring than in autumn.

ANTIPODEAN BIRD-LIFE.¹

IN an illustrated pamphlet bearing the date 1903, and published at the Government Press, Wellington, Mr. R. Henry, who has for many years acted as caretaker of the bird-reserve on Resolution Island, furnishes a fund of interesting information with regard to the habits and life-history of the flightless birds of New Zealand, with notes relating to other species. As he himself remarks, if anybody ought to know what there is to be known about New Zealand birds it is the author, who has, *willy-nilly*, enjoyed exceptional opportunities of observing them. As might have been surmised, a large amount of space is devoted to the birds commonly known in this country as kiwis (*Apertyx*). It appears, however, according to the author, that this usage is not justified, the name kiwi belonging by right only to the grey species and its immediate relatives, while such species as *A. australis* and *A. oweni* are designated "roa" by the Maori. Very interesting are the author's observations with regard to the breeding habits of these birds, among which the cock assumes the office of incubation. As regards kiwis, it is stated that although they live in nearly the same situations as rowas, they prefer open ground, while the latter seek the densest shade of the forest. "Kiwis generally have white grubs in their stomachs, with things like big maggots, wire-worms, and all that class, while the roas depend more upon earthworms, water-insects, and berries." When a roa becomes conscious of the presence of intruders it alters its usual stealthy gait to a loud tramp. Is this, it may be asked, defiance?

A very strange statement is made about the kakapo, or ground-parrot, namely, that it breeds only once in two years. This, however, is not all, for it is stated that, in place of some individuals nesting in one year and others in the succeeding season, the whole of the birds will breed in one particular year, while in the following year none will do so.

Continuing his remarks on the habits of the kakapo, the author observes that, "months before the appointed breeding season the male is developing an air-sac in his throat which he can puff up like a drum, and which may act like a sounding-board to assist in making the curious drumming notes in the spring. This note is not unlike the boom of the bittern, but is repeated five or six times in succession, and can be heard at a great distance. . . . It appears as if the breeding season were controlled by the males, for when there is no drumming in the early summer, there are no eggs or young ones."

Another bird about which the author has a good deal to say is the weka rail, or wood-hen, and it cannot be said that he gives it a good character, mainly on account of its egg-stealing habits. One of these birds, although it had never previously seen a goose in its life, seemed to know by instinct that the eggs of the latter would be buried in the ground, and promptly proceeded to disinter them. Apart from moas and the nearly extinct Notornis, penguins are the last of the flightless birds to claim the attention of the author. He has, however, much to say regarding such species as black swans, paradise-ducks, grebes, moreporks, &c., and in the case of all these the ornithologist should find much to interest him in this little volume, which is certainly a storehouse of information with regard to the habits of New Zealand's birds. It may be hoped that the Government will not only see its way to maintain Resolution Island as a bird-sanctuary, but that it may establish other stations of the same nature.

¹ "The Habits of the Flightless Birds of New Zealand; with Notes on other New Zealand Birds." By R. Henry. Pp. 88; illustrated. (Wellington, 1903.)

"Glimpses of Australian Bird Life." Thirty-one original photographs direct from Nature, with Notes by R. Hall. Pp. 63. (Melbourne: T. C. Lothian, 1906.) Price 1s.