

learn that she proposes to commence a new series with the next volume, with a slight alteration of plan, and to continue the work as long as her health will permit, which all entomologists will hope may be for many years yet. She is also about to issue a general index to the contents of the twenty-two parts of the first series.

Thirty-seven insects of various orders are mentioned in the present report, among the most interesting being fleas, which have been met with in some places in extraordinary abundance; the forest fly, which has latterly been very troublesome in various parts of Wales; and the "murrain worm," or the larva of the elephant hawk moth (*Choerocampa elpenor*), which is said to be the cause of disease among cattle in various parts of Ireland. As this larva is frequently found in plants growing near water, Miss Ormerod suggests that the mischief may perhaps be caused by some poisonous plant, such as water dropwort or water hemlock (*Oenanthe crocata*), growing in the neighbourhood of the plants on which the caterpillars feed.

Notes from a Diary: kept chiefly in Southern India, 1881-1886. By the Right Hon. Sir M. E. Grant Duff, G.C.S.I. In Two Volumes. Vol. i., pp. xii + 373; vol. ii., pp. 373. (London: John Murray, 1899.)

THESE books are the fifth and sixth volumes of notes from the diary kept during the half-century now almost complete, by Sir M. E. Grant Duff. These pages, dealing with the years during which the author was Governor of Madras, are largely filled with extracts from the letters received from friends in Europe and elsewhere, interspersed with interesting information concerning the flora of Southern India.

Many of the items afford evidence of the interest which the author has always taken in botany.

Sir W. T. Thiselton-Dyer and Prof. Asa Gray, amongst others, reaped some of the fruits of this enthusiasm. On February 23, 1884, it is recorded that the former wrote: "Seeds have descended upon us in a perennial shower. The fountain was mostly sealed to us till your vigorous wand smote the rock of seclusion. We have distributed the residue punctually, as you wished." On July 19 of the same year was entered: "By last mail came several pamphlets from Asa Gray, to whom I have been sending Nilgiri and other seeds." Not the least interesting feature of these pleasantly-written experiences are the references to several men of science with whom Sir M. E. Grant Duff has come into contact. One of the most marked characteristics of both volumes is the collection of good stories; some are old friends, it is true, but many are new.

Fertilisers: the Source, Character and Composition of Natural, Home-made, and Manufactured Fertilisers; and Suggestions as to their use for different Crops and Conditions. By E. B. Voorhees. Pp. xiv + 335. (New York: The Macmillan Company. London: Macmillan and Co., Ltd., 1898.)

PROBABLY more popular text-books have been issued on the use of manures than on any other part of the subject of agriculture. The present book is carefully written. It gives the reader a good general view of the reasons which make it advisable to apply artificial manures to the land, it describes the principal American fertilisers, and offers prescriptions for all American crops. The recommendations have the appearance of being generally theoretical. There is a great lack of examples showing the actual effects under known conditions of different applications of manure. The important subject of the effectiveness of the residues of previous manuring is scarcely touched.

R. W.

NO. 1538, VOL. 59]

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Further Notes on Recent Volcanic Islands in the Pacific.

IN NATURE (vol. xli. p. 276, and in vol. xlvi. p. 611) I gave notes on an island in the Tonga Group, called Falcon Island, which had risen from the sea as the result of an eruption in 1885, when it was about two miles long and 250 feet high, and which had in 1892 been greatly diminished in size by the wash of the sea.

The site was again examined in 1898 by Captain Field in H.M.S. *Penguin*, and the island has now wholly disappeared leaving a breaking shoal in its place.

It will be very interesting to watch this shoal in the future and observe to what depth the sea is able to cut it down, if a fresh eruption does not again reinstate it as an island. I have stated my belief that the sea in this part of the ocean is able to cut such a protuberance down to over twenty fathoms. This island will afford an opportunity of testing the facts.

Metis Island, 75 miles N.N.E. from Falcon Island, also a volcanic product, first seen in 1875, has likewise been reduced to a shallow bank, under water, and will furnish another illustration of the erosive powers of the sea.

Metis Island was reported as a rock 29 feet high in 1875, subsequent eruptions raising it to 150 feet; but, from the fact of its total disappearance in twenty-four years, it would seem that it was, like Falcon Island, all ash, with no solid plug or lava.

W. J. L. WHARTON.

April 15.

Mosquitoes and Malaria.—The Manner in which Mosquitoes intended for Determination should be Collected and Preserved.

THE widespread interest now being taken by English medical men and others in all parts of the world, in the dissemination of malaria parasites by means of mosquitoes, which would seem to have been placed beyond dispute by the recent researches of Major Ross, I.M.S., in India, and of the Italian school represented by Drs. Grassi, Bignami, and Bastianelli at Rome—an interest due to the fact that, as a price of world-wide empire, the English race suffers more than any other from the malaria scourge—renders it highly desirable that there should be in the British Museum in London a collection of carefully preserved and accurately determined Culicidæ of the world. Such a collection, when once worked out, would be invaluable for settling the identity of any species that might become an object of suspicion, and the specimens composing it would be at all times available for comparison. Most of the existing descriptions of Culicidæ leave much to be desired (having been based too often upon insufficient material), and are but rarely accompanied by figures of any kind. A collection such as is suggested would, however, enable us to amend or amplify existing descriptions; or, if these should be found altogether unrecognisable, to prepare new ones based upon types in satisfactory preservation; it would also be possible to publish coloured or other plates of the more important species. For all these purposes it is absolutely necessary to have specimens in the best possible condition. Like a large number of other Diptera, mosquitoes from various quarters of the globe differ but little in outward appearance, and even to the eye of a Dipterist a *Culex* or *Anopheles* from Calcutta may look remarkably like a specimen from Chelsea. But when it is found that the hæmatozoa of malaria, while capable of development in one or more species of a genus, are not so in others, although closely allied—in view of the hoped-for practical outcome of the present investigations, the necessity for the accurate and trustworthy determination of the species of mosquitoes becomes doubly manifest. Unfortunately (from the present point of view, which is scientific as well as practical), a mosquito is among the most delicate of Diptera, with its wing-veins and legs clothed with scales, which inevitably come off if rubbed, while the legs themselves part company with the body on the slightest provocation. Since it is upon the scaly covering of the mosquito

that we have chiefly to rely for its specific characters, especially valuable features being often furnished by the banding of the legs (and palpi also in some species of *Anopheles*), any method of collecting, preserving, and sending home specimens that does not take account of these points is likely to be of little use.

In November last year, by desire of Prof. Ray Lankester, the writer drew up a series of instructions for the collecting of mosquitoes, which were forthwith printed by the British Museum in pamphlet form, under the title "How to Collect Mosquitoes." Copies of this pamphlet have been forwarded by the Museum to possible helpers in all parts of the globe; while the Colonial Office, which is taking a great interest in the matter, has furnished other copies (accompanied by injunctions to collect) to the medical officers under its control throughout the empire. It is hoped that ere long, in response to these preliminary measures, consignments of properly collected mosquitoes will commence to flow steadily into the British Museum.

The pamphlet of instructions contains a list of the articles required, and a detailed statement of the proper method of collecting, killing, and preserving mosquitoes intended for determination. The most important points in the technique of mosquito-collecting are that the insects, when captured in the open, must be brought home alive in pill-boxes of a special kind, must on no account be put into spirit, but be killed by being placed for a few moments in a cyanide bottle, and then immediately pinned on an exceedingly fine pin (known to English entomologists as a "No. 20"), which, in order to protect the insect's legs, is thrust through a disc of card, the latter being finally supported by being transfixed by, and drawn rather more than half-way up, an ordinary or toilet pin. The pamphlet concludes with directions for the transmission to England of specimens intended for the British Museum. It may be added that copies of the pamphlet can always be obtained on application to the Director, the British Museum (Natural History), Cromwell Road, London, S.W.; while, if further information on any point is desired, I shall be happy to supply it myself.

Unfortunately, widely as the pamphlet has been circulated, it has not yet reached the hands of *all* mosquito-collectors; and I, therefore, avail myself of the present means of making its existence more extensively known, the impulse to do so having been supplied by certain recent arrivals. From the nature of the present movement very many collectors—perhaps the majority—are medical men who, unfortunately, seem endowed with a sort of natural instinct prompting them to preserve everything by placing it in a bottle of spirit or glycerine. Mosquitoes when treated in this manner reach England in sorry plight. Sundry bottles of specimens from the West Indies and the Far East are now before me. The latter are in the worse condition; continual shaking in the course of the long journey home has precipitated most of the legs to the bottom, which is quite covered with them. Since all previous descriptions of mosquitoes, as indeed of all other Diptera, have been prepared from *dried* specimens, a mosquito "preserved" in this fashion must be removed and dried before any comparison can be made of it. Such a specimen, with its scales either washed away or matted, and its body shrunken and shrivelled, is a bedraggled-object indeed. There may, perhaps, to some people, be a peculiar appropriateness in the idea that the last state of the sharp-tongued mosquito should be similar to that of a victim of the old-time ducking-stool, but the scientific value of the specimen so treated is little greater than if it had been crushed with the hand.

A bottle of mosquitoes in spirit from one West Indian locality is not only thick with floating scales and fragments of legs and wings, but is also distinguished by a turbidity unpleasantly suggestive of putrefaction.

Another method recently adopted is to dry the mosquitoes and send them home in small tubes containing cotton-wool; the results are nearly or quite as disastrous as when glycerine or spirit is used. It seems to be forgotten that because specimens may be practically perfect when put into a tube, it by no means follows that they will reach London in the same condition. Mosquito legs adhere to cotton wool, and inevitably get pulled off in numbers; while if any space is left between the specimens and the wool, the former by dint of constant shaking become reduced to a sort of coarsely granulated powder. This is the actual condition of two tubes of specimens recently received. As an instance of misdirected energy it may be worth while to quote one collector's description of this method; he writes as follows:—

"I am making a collection for you of all the different mosquitoes that occur here; they are put into a tube after having been killed in the cyanide bottle, a bit of cotton wool pressed against them, and then kept in the exsiccator over anhydrous chloride of calcium—this to free them of moisture, and thus prevent mould; afterwards corked up.

"Upon arrival remove cork and allow the tube to remain a day in a damp chamber; this can be easily made by inverting a tumbler over a piece of wet blotting-paper; the insects will absorb some moisture, and can afterwards be handled without being broken, mounted on cards or otherwise set up."

Now, when it is absolutely impossible to pin specimens, according to the method prescribed in "How to Collect Mosquitoes," there is just a chance that they may reach London in a more or less useful condition if treated as described in the foregoing extract, provided that a plug of *thin tissue-paper* is substituted for the cotton-wool; this plug should be pressed down until it is in close contact with the specimens, while the latter are still soft; the tubes should be as narrow as possible—preferably not more than $\frac{1}{8}$ inch in diameter, and must of course be tightly corked; they should be packed in a tin box filled with cotton wool, so as to reduce all shaking to a minimum.

I would, however, strongly urge no one to adopt this method who can obtain the articles necessary for pinning specimens in the manner prescribed in the pamphlet of instructions, since the latter is *the only really satisfactory plan*. Specimens thrown into spirit are absolutely useless; masses of material entangled in cotton are nearly as bad. It is a pity that so much well-intentioned labour should be thrown away.

ERNEST E. AUSTEN.

British Museum (Natural History),
Cromwell Road, London, S.W., April 14.

Sunspots and Rainfall.

THE question of sunspots and air-temperature was recently considered in these columns with the aid of a method in which each month since 1841 (at Greenwich) was first characterised as + or -, according as the temperature was above or below the normal; a year with *more* than the average number of plus months being considered *warm*, and with *less*, cold.

Rainfall data may of course be treated similarly, and your readers may perhaps be interested to see how the method works out in this case. The values are those for Greenwich, extending as far back as 1815; but those previous to 1841 are to be thought less trustworthy than the others. Two sets of averages have been employed for the two periods (before and after 1841).

Taking 5.4 as the average number of wet months in a year for the whole period, and so 27 as the average number in 5 years, let us now consider the five-year groups about maximum and minimum sunspot years, noting how the number of wet months in each of these groups differs from the average.

Max.	5-year group.	Wet months.	Difference from average.
1. 1830 ...	1828-32 ...	33 ...	+ 6 e
2. 1837 ...	1835-39 ...	27 ...	0
3. 1848 ...	1846-50 ...	23 ...	- 4
4. 1860 ...	1858-62 ...	27 ...	0
5. 1870 ...	1868-72 ...	25 ...	- 2
6. 1884 ...	1882-86 ...	23 ...	- 4
7. 1894 ...	1892-96 ...	22 ...	- 5
Sum. ...			- 9
Min.	5-year group.	Wet months.	Difference from average.
1. 1823 ...	1821-25 ...	32 ...	+ 5
2. 1833 ...	1831-35 ...	34 ...	+ 7
3. 1843 ...	1841-45 ...	31 ...	+ 4
4. 1856 ...	1854-58 ...	20 ...	- 7 e
5. 1867 ...	1865-69 ...	34 ...	+ 7
6. 1879 ...	1877-81 ...	30 ...	+ 3
7. 1890 ...	1888-92 ...	26 ...	- 1 e
Sum. ...			+ 18

A pretty distinct contrast appears in these two tables.¹ There seems to be (at Greenwich) a greater tendency to wetness in years about sunspot *minima*, than about maxima. Thus in seven maximum groups we find only one (e) with an excess of wet months; while in the seven minimum groups an excess appears to be the rule, to which there are two exceptions (marked e).

¹ A still better contrast, I think, comes out on comparing the five years ending with a minimum, with the five years following a minimum.