

In Dr. Sanderson's letter additional particulars are given,\* which also do not form part of the statement of those conditions under which Dr. Bastian tells us in his book on the "Beginnings of Life," that he has in the proportion of 999 cases out of 1,000 obtained a development of Bacteria from turnip-solution—boiled and sealed boiling. It appears that Dr. Bastian considers it a condition favourable to success—that the rind of the turnip be excluded from the preparation of the infusion. This is for the first time announced in Dr. Sanderson's letter. Also it is there for the first time that an accurate description of the flasks (not tubes) used, and of the quantity of infusion enclosed in each flask is given.

I now merely desire to know the quality of the small quantity of pounded cheese added to each flask. Let me say that another condition of the experiment—not given by Dr. Bastian, but now for the first time by Dr. Sanderson, is the addition of the cheese after the infusion is in the flask—so that no straining or filtration is made use of, subsequently to its addition. In the absence of so distinct a statement on this point as that of Dr. Sanderson, it was natural to suppose that the turnip and cheese infusion would be strained in some way, to get rid of coarse particles. It seems important that it should be known (1) what kind of cheese was used, (2) about how much to each fluid ounce of turnip infusion, (3) to what extent the cheese was "pounded" before addition, and whether particles of cheese visible to the naked eye, and of what approximate size, were present in the infusion during its boiling? (4) whether the turnip solution was strained before the addition of the cheese, and whether it contained obvious solid particles, and of what size?

I trust that Dr. Sanderson having placed your readers, and those interested in the natural history of Bacteria, under so great an obligation by his careful statement of the conditions of the experiments of which he was witness, will kindly add to our debt by furnishing this additional information.

In numerous experiments with turnip solution made by Dr. Pöde and myself recently in the laboratory of the Regius Professor of Medicine of this University, we found that under the conditions given in Dr. Bastian's book, no life was developed—a result contrary to that obtained by him in 999 cases out of 1,000. It will be necessary to make further experiments by aid of the light furnished by Dr. Sanderson's letter, in order to explain this discrepancy.

It is desirable to call to mind that Pasteur himself and others have recorded experiments regarded by them as demonstrating the survival of the Butyric form of Bacterium or its germs, after exposure to temperatures of 100° or even 105° C.

Exeter College, Oxford E. RAY LANKESTER

#### THE NATIONAL HERBARIA MEMORIAL

WE are glad to be able to lay before our readers the reply to the memorial to Mr. Gladstone, signed by so many eminent botanists, which appeared in NATURE for January 16. The answer is in every respect satisfactory:—

"Treasury Chambers, January 23, 1873

"Sir,—The Lords Commissioners of Her Majesty's Treasury have had before them your letter of the 3rd instant, and the Memorial enclosed in it from various gentlemen engaged in the pursuit of botany or in instruction therein, with respect to the transfer to the branch of the British Museum about to be constructed at South Kensington, of the scientific collections and library now existing at the Royal Gardens at Kew.

"Their lordships desire me to request that you will inform the memorialists that Her Majesty's Government have not formed the intention of removing the collection to South Kensington, and that should anything lead them hereafter to entertain the idea, they will take care that ample notice shall be given, and that the judgment of the persons most accomplished in botany shall be fairly weighed in the first instance.

"I am, Sir, your obedient servant,

"WILLIAM LAW

"The Rev. M. J. Berkeley, Sibbertoft,  
"Market Harborough"

#### THE METEOROLOGICAL OBSERVATORY AT MAURITIUS

THE Meteorological Society of Mauritius have recently presented to the Governor of that colony a memorial (contained in a copy of the *Commercial Gazette* sent to us) requesting him immediately to place on the estimates a sum sufficient to complete the new meteorological observatory there before the end of the present year. One of the objects for which this excellent society was formed in 1851, was to aim at the establishment of a permanent meteorological and magnetical observatory; and since 1860 the members have been doing their best to urge the Colonial Government to help them to accomplish their object; but one untoward event after another has occurred to postpone its consummation. The old observatory, a very inconvenient one, was sold in 1866 for 10,843*l.* and about half this sum was made available by the Government for the new observatory and instruments; besides this, another sum of 4,500*l.* is available, though the Government hesitate to make use of it. In 1870 a small portion of the new building was erected, and the foundation stone of the main building laid by H.R.H. the Duke of Edinburgh, but nothing more has been done since; and the staff, owing to the scanty allowance for the purpose, has been utterly inadequate. The memorial then asks the governor to grant at once the funds necessary to complete the building and to maintain an adequate staff; and urges, as a reason for haste, among other more enduring and general reasons, the approaching transit of Venus. The people of Mauritius, both for their own sakes and for the sake of science, the Society believe will be glad to lend a helping hand. We cannot but think that if the Government of Mauritius give the matter their serious consideration, they will at once accede to the prayer of the society's memorial. The benefit which such an observatory, in the heart of the Indian Ocean, would confer on science and humanity would be immense: and to cripple such an institution would be anything but economy. The vast importance in agricultural, nautical, and sanitary points of view, of having an observatory in Mauritius, is generally acknowledged; indeed, it is well known to those who have resided in Mauritius, as well as in other tropical countries, that timely warning of a single hurricane (which experience shows can be given), might save as much money as would suffice to build an observatory, and to maintain it for years. The Society does not seek any help from the Imperial Government; and we sincerely hope that no narrow and short-sighted notions of economy will prevent the Governor of Mauritius from at once granting the means of fulfilling the so frequently frustrated hopes of the Meteorological Society.

The Society concludes its memorial by "strongly recommending that no deviation should be made from the plan proposed by the President and Council of the Royal Society of London; that is, that meteorological, magnetical, and solar spot observations should be carried on simultaneously by photography. To endeavour to carry out a half-measure, liable to change and interruption, would be almost a waste of time and money. It is probable that meteorology, terrestrial magnetism, and sun-spots, are intimately connected by some law or laws not yet determined; and nothing short of long-continued photographic records of the several phenomena concerned, would meet the present requirements of Science."

#### THE NATIONAL HERBARIA

THE Memorial printed in NATURE for January 16 will probably be held to be a sufficient indication of the estimation in which Kew is held as a scientific establishment by the botanists of the country as well as of the undesirableness in their opinion of its being in any way dismembered.

It will not I hope be considered improper if I venture (entirely, of course, on my own responsibility), to make some remarks with the view of aiding those who are not botanists to form an opinion upon the matter.

In the first place it may be well to give some notion of the nature of a public herbarium and the purposes it serves. Most persons are aware that with a little care specimens of almost any plant can be dried under pressure, so as to give, even to those who are not accustomed to study such specimens, some notion of what the plant is like in the fresh state. To a professed botanist they yield of course a great deal more information.

A herbarium then consists of a collection of dried plants. Whatever may be the plan adopted by private individuals, it is absolutely necessary in a public herbarium that the specimens should be securely stuck down upon sheets of paper, in order that they may bear frequent handling without injury. This does not, however, prevent the detachment under proper supervision of such fragments as can be spared and are requisite for scientific investigation. The sheets on which the specimens are fastened are placed in loose covers, and these are arranged in proper classificatory order on the shelves of cabinets which are made to hold them.

Any botanist interested in any particular group of plants, and visiting a well-worked herbarium, has only to go to the proper place to find everything that the herbarium contains belonging to that group ready to his hand, and in a state suitable for study. Such a result is not, however, attained without immense labour on the part of those who have charge of the herbarium. Fresh accessions of plants have continually to be examined in detail before the proper positions for their intercalation in the arranged collection can be determined.

A public herbarium derives its additions from three sources:—gifts, exchange, and purchase. The first includes, besides collections given by the government departments, at whose instance they have been made, supplies coming from private individuals. At Kew the Garden and the Herbarium benefit in common by the extensive correspondence carried on in every part of the globe with persons of every grade. Contributions, both large and small, are constantly arriving of living and dried plants, seeds, and specimens unsuitable for herbarium purposes but which find their place in the Museums. This correspondence it has required a long period to organise, and it needs no small exertion to continue and extend it. I conceive that it is, putting aside all others, a very strong argument for the maintenance of a herbarium at Kew, that it participates, as no other herbarium in this country could do, in the results of a correspondence which must necessarily be kept up for the purposes of the Garden, and which indeed could hardly be carried on elsewhere for the advantage of a herbarium alone, to anything like the same extent. Moreover the correspondents of Kew constantly send dried plants to be named, besides making demands for every kind of information which nothing but a herbarium and library on the spot could enable them to be supplied with.

The dried plants which are received at Kew from different sources necessarily include a large number of duplicates, that is, of specimens not needed for the herbarium. These, however, are not wasted, but are sent from Kew to various establishments with which exchanges can be effected. This is a most important matter, because the authentically named specimens of foreign botanists which are received in exchange are far more useful for purposes of comparison than any figures or descriptions.

The uses of a large herbarium are in the main two. In the first place it supplies the material for purely scientific investigations, both with regard to the structure and classification of plants as well as with regard to their geographical relations and the problem of how their world distribution has come to be what it is. But a herbarium

is also most important on purely utilitarian grounds. An immense number of important products are derived from the vegetable kingdom, and it is very necessary to have exact and precise information as to the plants which produce these. Dried plants preserved in herbaria are standards of reference in comparison with which the names of specimens can be accurately determined. Botanical names have a universal currency, and therefore obviate all the divergencies and confusion of those which are merely local and vernacular. Horticulturists moreover look to those who have access to herbaria to guarantee the correctness of the nomenclature of garden plants.

Besides the herbarium at Kew there is the older one belonging to the British Museum. It is still in a measure *sub judice* what is to be the future position of these two institutions. That the Kew Herbarium should not be severed from the Garden is the all but unanimous judgment of those who are best qualified to give an opinion. With respect to the British Museum Herbarium there is greater difference. Some botanists have wished to see the valuable type specimens which it contains added to those at Kew, just as they might wish, if it were in their power, to condense there what is best in some of the leading foreign herbaria. In my opinion the transference to Kew of any portion of the British Museum collections would be very undesirable. The British Museum specimens are mounted on paper of a very different size, and the sheets could not be cut down without impairing their authenticity. Moreover, at the British Museum there is an extensive series of ante-Linnean herbaria most valuable from a historical point of view, but not otherwise available for study, and these would, on that account, be out of place at Kew. Again, with collections so combustible as those of dried plants, it is all but imperative to divide the risk of losing the whole national accumulations in one conflagration.

The two Herbaria have also two well-marked but distinct fields of activity open to them. Let the Kew Herbarium remain, as at present, to be used for the varied ends of the Kew establishment, and by such students as are engaged in important works, as original memoirs and colonial or forest floras executed for the Government. They would be willing to gain, as they do now by the distance from town, tranquillity from the incursion of visitors less permanently occupied with botanical pursuits. Then the British Museum collections (which, if it were possible, it would be a convenient arrangement to retain in Bloomsbury) would serve still for persons who would use them rather for reference than for continuous study, although this also would not be precluded. It must, however, be admitted that they are capable of very great improvement even for purposes of reference, and it would be very desirable to this end that the Kew and Bloomsbury establishments should be brought into some sort of amicable relation. I will give a few instances quite arbitrarily selected from my own experience, which will show how very far behind the British Museum Herbarium is in completeness to that of Kew.

The Indo-Malayan genus *Dipterocarpus* is represented in the former by 17 sheets, including 10 species, in the latter by 116 sheets, including 31 species; the South African genus *Stapelia*, consisting of plants very difficult to dry, in the former by 4 sheets of 3 species, in the latter by 48 sheets of 25 species; lastly the Tasmanian *Athrotaxis* (*Conifera*), of which one species is to be found in nurserymen's catalogues, is represented at Kew by 16 sheets, illustrating all the three known species; while at the British Museum I have not succeeded in discovering a single specimen in the arranged collection at all.

But a very large portion of the plants at the British Museum are practically inaccessible. Unfastened on paper, and much in the state in which they were received from the collectors, except a rough geographical distribution into



cupboards, they are little more assorted than the plants which constitute a haystack. A considerable part, if not the whole, of the 7,000 specimens of plants from the expeditions of Hooker and Thomson, which cannot have been received less than fifteen years ago, were, quite lately, still unmounted and unincorporated. Again, merely to quote instances which have come unsought within my own observation, the plants collected in Nepal half a century since by Wallich, and as I learn from a distinguished Indian botanist, in a district which has never since been botanically explored, were recently, and perhaps are still, amongst the unarranged collections. These altogether, I should judge, roughly form in bulk about one-sixth of the whole herbarium. The arranged portion is estimated to possess 77,400 species of flowering plants, contained in 306 cabinets with 8 shelves; the Kew Herbarium, on the other hand, possesses 105,000 to 110,000 species in 450 cabinets, on an average of 16 shelves. As I have ascertained that the shelves are in each case about the same width apart, and about equally filled, these figures give roughly three times as many shelves to the Kew Herbarium, and somewhat less than half as many more species.

There can be no doubt, therefore, that the British Museum Herbarium might be materially developed, especially when it is remembered that Mr. Bentham's herbarium, when presented to Kew, contained between 60,000 and 70,000 species, and that this was formed in less than forty years by a single individual. The examination of the unarranged collections in the British Museum would, no doubt, yield a large number of duplicates, and these should be exchanged with foreign herbaria. If this were done—and there is no reason why the appliances of Kew should not be utilised for the purpose—it would be easy, without interfering with the independent action of either establishment, to bring about for the future a mutual interchange of specimens. Nor is there any reason why, when needful, the type specimens of the older botanists should not be lent to Kew from the other Herbarium, considering that both are Government property.

The development of the botanical collections in the rooms open to the public at the British Museum into something more useful, educationally, would probably be achieved by the officers, if they possessed more space. In this case it would be very desirable to transfer to them the collections belonging to vegetable palæontology in the Geological department. At present the nucleus of a collection of fossil plants bequeathed to the Botanical department by Robert Brown is being gradually developed, so that there are now actually two distinct collections, both having the same object, and existing independently of one another, and in charge of different officers, in the same building.

W. T. THISELTON DYER

#### THE RAINFALL AND TEMPERATURE OF NORTH-WESTERN EUROPE

THE Scottish Meteorological Society have just received letters from their observers in Iceland and Faroe, together with the regular observations made by them for the Society to the end of November last, which are of interest in connection with the unprecedentedly wet and changeable season we have had in Scotland and elsewhere.

The rainfall in Iceland this year to the end of October has been 4·84 inches under the average of the ten months, the deficiency occurring chiefly in January, February, July, September, and October. In Faroe the deficiency has, to the end of November, amounted to 11·00 inches, the dry months being February, 4·50 inches under the average; July, 1·09 inch; August, 2·97 inches, and November, 4·17 inches. In Scotland, February was everywhere a wet month, except in the northern and western islands and in Clydesdale; and September, October,

and November were very wet months,—all these months being characterised by a small rainfall in the north.

The mean temperature at Stykkisholm, in the north-west of Iceland, was 33°·7 in January, or 6°·8 above the average, being the highest mean temperature recorded in January since 1846, except that of 1862, which was 1°·0 higher; 52°·7 in July, and 51°·6 in August, being respectively 3°·6 and 3°·4 above the average of these months, and the highest that has occurred since July 1847 and August 1846. And as June was 0°·6 and September 1°·0 above the average, the past summer has been one of the finest experienced in Iceland for many years. The temperature in April was 3°·5, in May 1°·4, and in October 1°·0 under the average. On the other hand, the temperature of Faroe closely agreed with that of Scotland during the year, viz., above the average in January, February, March, April, June, July, and November, and under the average during the other months, especially September.

At Melstadt, on the north coast of Iceland, the summer was very fine, but in the beginning of October the weather broke, and on the 13th the temperature fell to 3°·0 or 29°·0 below freezing. At Reykjavik, the summer was also fine, but the autumn was remarkable for north and north-east gales, frequent auroras, low sea temperature, and large amount of ozone. Along with the unusual manifestation of these phenomena, inflammatory diseases were prevalent, especially bronchitis, catarrh, croup, and diphtheria.

The temperature of the sea presented certain very interesting anomalies during the year. In the earlier months it was, equally with the temperature of the air, above the average of former years in Iceland, Faroe, and Scotland. But at Stykkisholm it was 2°·7 in May, and 4°·2 in June below the average, it being at the same time from half a degree above the average in Faroe and Scotland. On the other hand, the sea was, at Stykkisholm, 2°·8 in August, and 2°·6 in September above the average, whereas at Sandwick, Orkney, it was 1°·2 and 1°·1 below it in the same months. In Faroe the temperature of the sea was above the average every month of the year (except October, when it was 0°·3 below it), amounting during the eleven months to an average excess of 1°·1.

The following are the differences from the averages of the sea temperatures at Stykkisholm from March to October, 1872:—

|       |        |           |        |
|-------|--------|-----------|--------|
| March | + 1°·5 | July      | + 1°·3 |
| April | — 0°·1 | August    | + 2°·8 |
| May   | — 2°·7 | September | + 2°·6 |
| June  | — 4°·2 | October   | + 0°·4 |

In May the mean temperature of the sea was 36°·7, and in August 53°·1. So great an increase as 17°·6 has not been previously observed in these months.

It is also a noteworthy circumstance that the means of the nine months' barometric pressure, from February to October, at Stykkisholm, have been in every case above the average, amounting to an average monthly excess of 0°·118 inch. In Norway also, from February to August, to which the observations have reached us, the means were every month above the average, amounting at Vardoe (lat. 70° 20') to a mean monthly excess of 0°·260 inch; Christiansund, 0°·129 inch; Christiania, 0°·151 inch; and Maudal, near the Naze, 0°·084 inch. On the other hand, barometric pressure was every month from February to October, below the average; at Paris, and in Guernsey, the mean monthly deficiency being respectively 0°·074 and 0°·090 inch. At Greenwich, the mean deficiency for the last nine months was 0°·083 inch; Glasgow, 0°·091 inch; Edinburgh, 0°·088 inch; Aberdeen, 0°·072 inch; Culloden, near Inverness, 0°·34 inch; and at Stornoway, the station nearest to Iceland, only 0°·006 inch. This high barometer in Iceland and Norway has had an important bearing on the unprecedentedly wet weather, and the accompanying low barometer we have had south of that region.

ALEXANDER BUCMAN