

THE SURVEY OF INDIA.<sup>1</sup>

THE report on the operations of the Survey of India for the year 1907-8, in addition to the usual record of map-making of a utilitarian character, contains several features of scientific interest. We have long been accustomed to a high standard of work from this department, and it cannot be other than a subject of congratulation that we should see evidence, not only of the maintenance of its previous level, but also of continuous advance. The most recently completed geodetic triangulation, extending for a distance of 480 miles from the Indus to the peak Koh-i-Malik Siah, the junction point of India, Persia, and Afghanistan, is the most accurate operation of its class ever carried out in any country. Computed by the ordinary methods, the probable error of a single angle is  $0''\cdot 21$ , a quantity not much more than half that of the corresponding figure obtained in any triangulation outside India.

This series of triangles carries the geodetic work to a point marking the most westerly limit reached by the principal triangulation of India. At this distance from the centre of the network the errors of the assumed spheroid become noticeable. Thus the astronomical azimuths observed along this line are consistently smaller than the azimuths computed from the triangulation, showing that the computation is taking the points too far to the north, *i.e.* that the curvature of the spheroid used for the reductions is, over this region, appreciably greater than that of the true geoid.

Pendulum operations were carried on during the year with the special object of ascertaining whether the force of gravity would be found in defect in sub-montane tracts in the south of India to the same degree as in the Himalayan region. In all cases the deficiency was found to be considerably less at these stations than at places of similar altitude in the north. It was also found that for stations on "isolated" hill-masses the degree of compensation of the visible mass is much less than it is on Himalayan stations. From this the general inference is drawn that it is chiefly the subjacent masses that affect the compensation of those visible on the surface.

All this is quite in accordance with the theory, first advanced by Osmond Fisher, that the "roots" of mountain masses are broader and shallower than the mountains themselves. The time is not far distant when it will be possible to draw an approximate section of these roots. It would be interesting to attempt this, in the first instance, by selecting a mountain, of as great a mass as can be found rising abruptly in a flat country, and carrying out a detailed gravimetric survey of the whole area, including the mountain and the flat region, for a considerable distance from it.

The year under review marks an important epoch in the history of the magnetic operations in India in that the preliminary magnetic survey was completed over the whole country with the exception of some frontier regions. Three iso-magnetic charts are published in the report, showing respectively (1) isogonals, and lines of equal secular change of declination; (2) isoclinals; (3) lines of equal horizontal force. During the current year the beginning of the detailed magnetic survey was projected.

Among other points of interest we may note a re-standardisation, with the international metre at Sèvres, of Colonel Everest's old 10-foot standard, indicating that no appreciable change has taken place in the

lengths of the Indian standard bars during the last forty years.

Latitude observations were made with the view of eliciting some information as to the cause of the abnormally high deflection of the level found at Chania. It was observed that the deflection diminished rapidly in every direction from the apparent centre, and the conclusion is drawn that its magnitude originates "in a purely local cause, situated either at the surface or at a small distance below it."

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## NIGERIA AND ITS PLANTS.

THE first part of an account of "The Useful Plants of Nigeria," written by Mr. J. H. Holland, now of Kew, but sometime curator at Calabar, appears as one of the Bulletins of Miscellaneous Information (Additional Series, ix.) recently issued by the Royal Botanic Gardens, Kew. A brief outline of the history of Nigeria is given in the bulletin, followed by a survey of the physical features, climate, peoples, botany, agriculture, and forestry, and finally the first part of the account of the useful plants of Nigeria.

Mr. Holland complains that "all the maps constructed so far have been compiled in England from sketches made at various times by numerous surveyors independently of each other." This must have been written some years ago, as Government surveyors have been at work since 1902, both in Lagos and southern Nigeria, and some very good maps have been compiled and issued both by the Survey and the Intelligence Department since 1906. In this connection southern Nigeria has to be congratulated on the excellent work done by skilled native surveyors who have been trained on the coast by the heads of these departments.

It is only too true that the entrance to most of the rivers is too shallow to admit steamers of any great draught, but it has to be remembered that this difficulty has to a certain extent been met by the remarkable build of Messrs. Elder Dempster's steamers, and so far as Lagos is concerned by the indomitable will of Governor Egerton, who already has two great dredgers at work on the Lagos bar. Much larger steamers are now entering the Lagos lagoon, and the hope is that passengers for Lagos who are now transferred from the ocean-going steamers to branch boats will soon be able to land direct on the marina. When these difficulties are overcome, and the railway, already open as far as Jebba and beyond, reaches the hinterland of northern Nigeria, Europe will have easy access to a climate described by Mr. Holland as bracing and delightful, and a country rich in agricultural and mineral wealth.

Under the heading "Climate," Mr. Holland touches on the remarkable difference between the rainfall on the coast and the interior; "during 1906 the maximum rainfall was 251.49 ins. at Egwanga, and the minimum at Olokemeji 40.92 ins." The latter place is only ninety miles from the coast. The author also mentions the Harmattan, a wind which comes from the north-east, across the Sahara desert, characterised by excessive dryness. This wind is prevalent during the dry season, and it is this break in the seasons and this Harmattan that we fear are going to decrease the yield of latex of the Para (*Hevea brasiliensis*) introduced from Ceylon. The Director of Agriculture for the French Colonies on the West Coast of Africa is said to be satisfied, so far as the coast is concerned, that *Hevea brasiliensis* is not going to be a success. We know that the trees at Aburi, on the Gold Coast, have ceased to yield latex. From experiments, however, in southern Nigeria on trees nearly

<sup>1</sup> General Report on the Operations of the Survey of India, administered under the Government of India during 1907-8. Prepared under the direction of Colonel F. B. Longe, R.E. Pp. iv+62, and maps. (Calcutta: Government Printing Office, 1909.) Price 3s.