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THE SURVEY OF INDIA, 1892-93.

By C. E. D. BLACK.

THE work of the Indian Survey Department during the years 1892-93 was carried on by twenty-one parties and three small detachments, who were engaged as usual on trigonometrical, topographical, forest, cadastral, and traverse surveys, latitude and tidal observations, spirit-levelling, geographical surveys and reconnaissances, and the regular mapping and reproduction ancillary to these operations. The triangulation lay along the meridian of $96^{\circ} 30'$ in Burma, north of Mandalay, and was extended for a distance of 70 miles as far as the parallel of $23^{\circ} 30'$ N. latitude. A secondary series on the parallel of 21° was carried eastwards over 104 miles, the measurement beginning a little east of Fort Sandeman and terminating near the Mekong. The most important topography delineated was in Baluchistan and the adjoining parts. A detailed reconnaissance through the Helmand desert, Sistán, and Perso-Baluchistan was entrusted to Mr. E. A. Wainwright, who was assisted by Ahmed Ali, K.B., Atma Ram, and Sheikh Mohiuddin; while Yusaf Sharif, K.B., did a good outturn of surveying along the Persian coast, his first base being measured at Chabar, and his second at Bandar Abbas. His work generally was connected with Mr. Wainwright's reconnaissances. The extension of triangulation into the Zhob valley was executed by Captain Mackenzie, while Messrs. Claudius and Tate took charge of the special surveys near Quetta and the settlement surveys for revenue purposes in the Peshin valley. Mr. H. Kitchen had control of the half-inch topography of the Lower Bela district, a tract which is comparatively open near the coast of the Arabian Sea, but becomes very rough to the northward. As the spring advances, water in this region is scarce and bad, and there is great difficulty in keeping up communications in the hill districts. Mr. Kitchen never recovered from the trying effect of the season's work, and died at Quetta on July 5, 1893. Some 3700 square miles of topography in Makran were completed by Abdul Guffar, K.S., who with Atma Ram was subsequently, in May, 1893, deputed to Gilgit to undertake reconnaissance work there. A more extraordinary change of climate from the burning wastes of Makran to the eternal snows of the Himalayas can hardly be conceived. Two other native surveyors were attached to a political party on tour through the outlying districts of Zhob and Kundar, and brought back 4500 square miles of reconnaissance on the quarter-inch scale. Colonel Holdich visited the Makran and Persian coasts, and made some interesting experiments with a view to estimate the value of the cable for longitude determinations. Unfortunately, though special reports were prepared by him on these operations as well as on the general subject of trans-frontier surveys, none of these reports finds

place in the present account of the survey, an omission which is the more inexplicable as the Baluchistan narratives have been hitherto regularly included in the annual reports of the Surveyor-General. During the year Sub-assistant Superintendent Imam Sharif returned from special duty with the Anglo-German boundary-demarcation party in East Africa. He had been warmly commended for his able assistance as a topographer by the British Commissioner, and received a decoration from the Sultan of Zanzibar. His health has, however, suffered considerably from hard work and exposure amid the dangers of the African climate. Another important survey commenced during the year was that of the River Indus in Sind, from the Punjab frontier to the sea—a measure which has been rendered necessary by the great changes that have taken place in the course of the river since it was last mapped in 1856 to 1870. The new survey will occupy at least three years. The cadastral and other detailed surveys in Bengal, Burma, and elsewhere, do not call for special notice, but mention should be made of the work of two sections of No. 11 party, who accompanied the Commission for demarcating the boundary between Burma and Siam. A good deal of country had already been well reconnoitred by the surveyors with previous boundary missions, but corrections were made by No. 11, and gaps filled up where necessary. Colonel Woodthorpe and Mr. Kelly were in charge of the eastern, and Messrs. Doran and Shaw of the western section. The boundary itself being in every case a conspicuous watershed or the course of a stream, very little artificial marking has been adopted beyond clearing all salient hilltops of forest, and marking one or two trees with the broad arrow and '93. The programme of the party for the current season (1893-94) was to continue the survey of the Shan States, to fill in a small gap in the map of the Karenni country, and to complete the Anglo-Siam boundary. In the northern Trans-Salwen Shan States, Captain Renny-Tailyour mapped in 1892-93 over 5000 square miles of a hitherto but little known region, while to the north east of Lashio a sudden rising of the Kachins was suppressed by the promptitude and pluck of the survey officer, Mr. J. M. Kennedy. The most interesting new ground explored was that covered by Captain Renny-Tailyour's operations. This included the Wa country, whose inhabitants had been reported to be cannibals and to live like wild men in the jungles, but who turned out to be more civilized than expected. They are all spirit-worshippers, and offer up large numbers of buffaloes, pigs, and fowls; their least pleasing idiosyncrasy is an idea that on very special occasions, such as when they sow their fields, or an epidemic of sickness is abroad, it is advisable to offer up a human head. These heads are obtained in the wild Wa country by sending out a head-hunting party, who catch any stray travellers they come across and decapitate them. Near Hsan Htung Captain Renny-Tailyour and his party came on the bodies of three men lying on the road whose heads had

been cut off a few hours before. The Was near Lün Long are said by the Shans to be "not so very bad," the principal difference being that they buy their heads instead of raiding for them. The country generally is hilly and populous, the villages are numerous and large and are connected with each other by very good roads, but there is next to no trade. The main road usually runs into the heart of the village, through a tunnelled entrance, which proved a great obstacle to transport. Much ground is given up to the cultivation of the poppy for opium, and large silver-mines undoubtedly exist; but though gold is also said to be plentiful, the surveyors did not see any. No actual fracas took place with the Was, but Captain Renny-Tailyour thinks that the next attempt to traverse their country may meet with considerable opposition.

The photographic, lithographic, drawing, and other head-quarter officers of the Survey did good work as usual. Among the more notable maps may be mentioned the sheets of the new survey of Calcutta, which are being rapidly turned out, and a third edition of the two-sheet map of the city. A new geological map of India, on the scale of 96 miles to the inch; a map on the same scale, showing the railway lines and distribution of coal; and three maps illustrating events in Mr. G. W. Forrest's 'History of the Indian Mutiny,' were also completed, besides a large number of plates of illustrations for archæological and other works published by Government. Colonel Waterhouse records his experiments for reproducing brush-shaded maps, and printing them in colours by heliogravure, one of which has been attended with decided success. In this case, the hills were drawn on ground-glass with a black creta-levis pencil, which drawing served at once as the positive transparency for obtaining the image on the copper plate. A capital specimen of this photo-etching, printed in three colours, is appended to the new volume, and there appears to be no doubt that the greater clearness, finish, and durability of the copper plate will render the process far superior to lithography for high-class map work.

THE ITALIAN MONUMENT TO COLUMBUS.

By CLEMENTS R. MARKHAM, C.B., F.R.S.

ITALY has undoubtedly contributed the worthiest and best memorial in honour of the fourth century of the discovery of the new world by her illustrious son. A collection of all the contemporaneous documents relating to Columbus, with essays by the most learned men to be found in the land, on every disputed point and every question of interest relating to the great discoverer, is a noble monument. Many of the brightest intellects of his native country have devoted five years to the grateful task of elucidating the history of their immortal compatriot

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