

these were weighted with stone brought down the Ohio River from a distance of 1320 miles, the quantity used amounting to 100,000 cubic yards. The mattresses used were about 100 feet long, and from 40 to 50 feet wide. They were built on inclined ways at the head of the Pass, and when completed launched like a boat and towed floating to their place along the line of the jetty, and then loaded with stone and sunk. The same method of training the outfall of the river has been adopted on other parts of the coasts of the Gulf of Mexico and of the United States.

The jetties at the mouth of the river Maas, in Holland, were also constructed of fascine mattresses in a somewhat similar way. These piers are about one and a half miles in length, and terminate in a depth of twenty-two feet at low water. Experience shows that their elasticity saves them from any damage from the shocks caused by the impact of the waves. They were economical in construction, and have been found after twenty years' experience to stand the wear and tear of the waves of the North Sea. The great dam across the Zuyder Zee at Schellingwoude, in connection with the North Sea Canal, was also constructed with fascine mattresses on the exterior, the centre part being filled in with earth.

Owing to the scarcity of material for making the fascines, this system of mattresses has not been employed in this country. But more than half a century ago fascine training walls were largely adopted for the improvement of the four large Fen rivers emptying into the Wash, and this system is still in use. They have answered their purpose admirably. The fascines are made of thorn faggots about three feet in girth, tied together by tarred rope. These faggots are brought to the spot where the training wall is being constructed in barges, and placed in layers, the number of faggots in width depending on the height the wall is to be carried. Each layer is covered with clay or marsh sods, and the side next the river finished to a slope of about six inches horizontal to one foot vertical, the brush ends being placed outwards and trimmed up. Sometimes the faggots are staked down, but this, as a rule, is not found to be necessary. This method of training has by experience been found to be economical, durable, and efficient; and has this great advantage over stone training walls, that vessels which by accident run on to the walls are not damaged in the way they are when they come in contact with the stone.

A full description of this work, and also of the mattresses used in Holland and America, with illustrations, will be found in the chapter on "Training," in the work on "Tidal Rivers," added a short time ago to Longmans' Engineering Series.

*SIR WILLIAM MACGREGOR'S RECENT JOURNEY ACROSS NEW GUINEA, AND RE-ASCENT OF MOUNT VICTORIA.*¹

BY the courtesy of the Prime Minister of Queensland, Sir Hugh M. Nelson, I have been favoured with the following copy of a telegram from His Excellency the Administrator of British New Guinea to His Excellency the Governor of Queensland:—

"Without loss of life or limb have crossed New Guinea

¹ Read at a special meeting of the Royal Geographical Society of Australasia, Brisbane, October 30, 1896.

from mouth of Mambare to mouth of Vanapa. Followed Mambare to foot of Mount Scratchley where river divides to embrace the mountain. Ascended Mount Scratchley, on top of which observed with small theodolite. Found easy road west of Stanley Range, without descending re-ascended Mount Victoria to observe, but weather unfavourable. Descended Mount Knutsford, and found a not difficult road to coast. The miners have been at work at foot of Scratchley, probably the whole of which is auriferous. Wharton Chain connects Mount Scratchley with the great Mount Albert Edward, which is also well inside British territory. All these great mountains seem composed of slate and quartz. No natives between Government Station and Mount Scratchley. On the latter is very friendly tribe. Excellent relations with natives from Mount Knutsford to the coast. Had scarcely a single completely dry day. I strongly dissuade any travelling towards the interior before April or May. Native carriers will not be permitted to proceed inland with Government sanction before then, when all possible



FIG. 2.—Constructing Fascine Mat on Mattress Ways

facilities will be given to prospectors during the dry season. (Signed) "WM. MACGREGOR."

It is well known that in 1889 Sir Wm. MacGregor, who at that time had but very limited resources at his command, successfully accomplished the ascent of the Owen Stanley Range to its highest summit, which he named Mount Victoria.

In the course of my official duties, the work of compiling the map illustrating the explorer's route on that occasion devolved upon myself, and I am consequently morally responsible for the correct delineation of all the features upon it, although this does not appear on the face of the map itself. At the same time I had the privilege of being the first to deal with, examine, and make public the geographical results of that famous journey, in a paper read, in Sir Wm. MacGregor's presence, at a meeting of the Royal Geographical Society of Australasia, Brisbane, on September 2, 1889. I mention this to show that I have an intimate knowledge of every detail connected with the work and results

of the expedition in question, and am fully prepared to enter into all the particulars of it, even more fully than I have done on a previous occasion, or in my work on "British New Guinea."

For many years before the arrival of Sir Wm. MacGregor in New Guinea, several attempts had been made to explore the Alpine region of the Owen Stanley Range. For various reasons, no one had been able to accomplish it. These attempts, by Captain Armit, Messrs. Chalmers, Goldie, Morrison, Hartman, Hunter, Cuthbertson and Forbes, resulted in signal failure, neither of the explorers reaching even the foot of the great range. In a letter published in the *Proceedings* of the Royal Geographical Society, London, September 1890, Mr. H. O. Forbes stated that his "nearest approach to Mount Victoria, by my own map, is between eight and nine miles," and that it was only necessary for him to descend to and cross the Warume River below him to obtain access to several leading spurs running directly to the summit of Mount Victoria. He believed that the road traced by his eye from the hills in the Sogeri region on his first arrival in New Guinea was more eminently feasible than the one followed by Sir Wm. MacGregor in the latter's journey to the summit of Mount Victoria. Against this statement it may be pointed out that there seems no doubt whatever that Mr. Forbes did not see the highest crest of the mountain from his nearest approach to it, and it is almost certain that he could not have obtained access to the crown of Mount Victoria along the south-easterly spur of it. Concerning this accessible spur which Mr. Forbes purposed ascending, Sir Wm. MacGregor says, it is a mighty precipitous buttress exceeding 12,000 feet in height "bristling with peaks and pinnacle-like rocks, and contains hundreds of inaccessible crags and precipices."

Sir Wm. MacGregor's route lay for some distance up and along the Vanapa River, and apparently he has followed his old track very closely from the crown of the Owen Stanley Range to the South Coast in his recent journey across New Guinea. The important bearing which the successful accomplishment of this remarkable journey must necessarily have upon the development of the country will be fully apparent to all who have watched the progress of British enterprise in the possession since its establishment some ten years ago. Apart from the increase to our knowledge of the geographical conditions of the interior of the south-eastern portion of the island itself—an increase that cannot fail to be of the very greatest interest and importance—the advantage of having a practicable trade route across the British Territory is one that can scarcely be over-estimated. It is almost impossible to give an accurate forecast of its bearing upon the opening up and settlement of the country and the development of its mineral resources. That valuable minerals occur in the high ranges of the interior has been clearly enough shown by the alluvial gold obtained in the upper reaches of the Mambare River, and the auriferous character of Mount Scratchley, to which special mention is made in Sir Wm. MacGregor's telegraphic message to the Governor of Queensland. There is little doubt, too, that mineral deposits will also be found on the southern slopes, or near the base of the Owen Stanley Range, and this region will soon be rendered accessible along the overland trade route passing the western spurs of the range in question.

The Mambare River (the Clyde of the Admiralty Charts) debouches into Traitors Bay on the north-east coast of the possession. The mouth of this interesting river is only about two miles inside the Anglo-German boundary, on the 8th parallel. It is navigable for an ordinary-sized steam launch for about forty miles up, and on the lower reaches are extensive areas of good alluvial land interspersed with remarkably fine fields of

sago palms. The district is famous for its very lofty forest trees and fine climate. The river was explored for the first time by Sir Wm. MacGregor in 1894, and recently he again ascended it on his journey across the island. There is no doubt but that it affords easy access to the mineral areas of the interior, and especially to the bracing highland zones of the Owen Stanley Range, Mount Albert Edward, Mount Scratchley, and other neighbouring ranges, that were hitherto regarded as inaccessible. It forms an easy section of the great overland trade route now discovered, and for the first time opened up by the Lieutenant Governor, and it is almost certain that the Mambare district will ere long become one of the most important in British New Guinea.

Excellent relations have been established with the natives of the interior, and indeed all along the overland route the natives met with have been very friendly, a prevailing condition that will have an important bearing upon the future development of the country by British enterprise.

Not the least important geographical results of Sir Wm. MacGregor's recent journey is the discovery of a connecting chain between Mount Albert Edward and Mount Scratchley, and the practicability of ascending the Owen Stanley Range to its highest summit on Mount Victoria from the north-east as well as from the opposite side.

J. P. THOMSON.

JOHAN AUGUST HUGO GYLDÉN.

THE ranks of astronomers have suffered severely of late, and it is with deep regret that we are compelled to record that the Royal Observatory of Stockholm has now lost its renowned Director. Prof. Hugo Gyldeń could ill be spared, especially at such an early age as fifty-five. On November 9 last he was seized with paralysis of the heart, and died during the afternoon at the Observatory. The following particulars of his life and work have been gathered from the obituary notices contributed to the *Astronomische Nachrichten* by Herr Karl Bohlin, and to the *Comptes rendus* by M. Callandrea.

Hugo Gyldeń was born at Helsingfors in the year 1841 (on May 29), his father, Nils Abraham Gyldeń, being a professor of Greek at the University. At the age of sixteen he went to the University of that town; after first studying chemistry, and, at a later date, mathematical astronomy, he gained in 1860 the title of "Magister der Philosophie." To make his studies more complete he went abroad, and during the years 1861-62 he was found at Gotha and Leipzig, having come in contact with Hansen, Le Verrier, and Delaunay. In December of 1862 he was elected a Teacher of Astronomy, and in the following year a Doctor of Philosophy.

Pulkowa saw him first in 1862, and after a year's work there he was made an "Adjunct Astronom," being promoted in 1865 to "Älteren Astronomen." The following year he received the title of "Hofrath."

About this time his investigations related to the constitution of the atmosphere and refraction, which form now the basis of the refraction-tables at Pulkowa. At the same time, also, he was busy with elliptic functions in their relation to the "mécanique céleste," the first results of which appeared in the *Studien auf dem Gebiete der Störungstheorie*, I., 1871.

The important service he thus rendered to astronomical science led the Royal Academy of Sciences of Stockholm to offer him the vacant place of Astronomer of the Academy and Director of the Observatory in Stockholm. This he accepted and retained until his death.

His activity, while holding this office, was displayed not only in the development of pure scientific works, but in drawing around him a number of students, among which may be mentioned O. Backlund, A. Donner, P. Harzer,