

level requiring a large number of locks, for which an adequate water-supply is not obtainable; or (3) torrential streams whose control within economical limits defies the skill of the engineer."

"Nicaragua is free from all these obstacles."

It would naturally be supposed that Mr. Colquhoun was summing up the views he had arrived at after due deliberation; but in reality he is only acting as the mouth-piece of Mr. Menocal, for the statement is taken verbatim from this engineer's paper on "The Nicaragua Canal," read before the Water Commerce Congress of Chicago in 1893. Summing up the results of his visit to the Panama Canal, the author says:

"The general impression I gained from my visit was that a large amount of useful work remained accomplished. Still the Chagres river and the Culebra cut appeared to me to be obstacles which may be considered insurmountable"; whereas, in reference to the Nicaragua Canal, he says: "The only serious difficulties are (a) the Ochoa dam, (b) the Great Divide, (c) the Greytown Harbour, none of them, however, insurmountable."

In fact, Mr. Colquhoun exhibits a disposition to minimise the obstacles to the construction of the Nicaragua Canal, and to exaggerate those of the Panama Canal, which occasionally leads him to make contradictory statements in different parts of the book. Thus on p. 116, he says:

"While the lake region and Pacific slope are healthy and superior to Panama, the country embraced between Ochoa and Greytown, in my opinion, presents much the same climatic difficulties. Here occurs the dredging of the channel through the stagnant swamps of the San Juan delta, as well as the cut in the 'Great Divide' and the Deseado and San Francisco basins through dense tropical jungle with a rich (but rotten) surface soil. The past history of the Panama Canal and Panama Railway, with their enormous expenditures of life, makes it imperative to treat very seriously this question, and to take every possible precaution. The climates of both Colon and Panama have greatly improved since the canal days."

Later on, however, in contrasting the two schemes on page 142, he remarks:

"The advantages over Panama are these:—It is a fresh-water canal, with an admirable natural reservoir—the lake; it passes through a region offering prospects of great development, free from the marshy soil, the overpowering heat, and the unhealthy climate of Panama; there is no Chagres River problem, and the 'Divide' stands in a different category to that of the Culebra at Panama."

Again on page 317, he states:

"The Panama isthmus, in addition to being very unhealthy, is a region of floods with very poor local resources; the Suez Canal runs through a sandy desert. Nicaragua stands in marked contrast to both these projects. It has a climate immensely superior to that of Panama, a fertile soil, and internal intercommunication, with great resources both vegetable and mineral."

It may be observed, with regard to these last two extracts, that the Panama Canal with locks would be a fresh-water canal, amply supplied by the Chagres, Obispo, and other rivers; it is curious to call the Suez Canal a project; and the desert traversed by the Suez Canal has proved no bar to its unprecedented financial success.

In justice to English engineers, we must draw attention to a misstatement made by the author on page 138, where he says, with regard to the Suez Canal: "The report of other engineers was equally unfavourable." If Mr. Colquhoun had referred to the report he alludes to, he would have found that the Commission which reported was an international one, that the report was eminently favourable and formed the basis of the subsequent canal works, and that, in addition to the foreign members, three English engineers signed the report.

The Nicaragua Canal has naturally been preferred by the United States, as being nearer, and therefore more convenient for the trade of North America; and we agree with Mr. Colquhoun in considering that the simplest solution of the difficulty of connecting the Atlantic and Pacific Oceans, would be for the Government of the United States to construct the canal, which would be of incalculable benefit to the trade of that country. If, however, the United States is deterred from embarking upon this work by the very unfavourable report of the Government Commission, there appear to be no insuperable obstacles to the completion of the Panama Canal with locks, provided the necessary capital can be raised in France and elsewhere.

IN THE HEART OF A CONTINENT.¹

THE small size of this record of ten years' travel is in keeping with the character of the author, as revealed in his pages. It is rare to meet a man so simple, brave, and kind-hearted as Captain Younghusband, and rarer still to find a book of travel so straightforward, concise, and modest as this. Many volumes have been written by travellers who have spent fewer months than Captain Younghusband has spent years in Central Asia, and without them it would perhaps have been difficult for us to estimate the magnitude of the difficulties, the overcoming of which the author so quietly relates. But this book differs from those by an entire absence of "padding," of hearsay statements, and of rash speculation. There are chapters indeed which are not purely descriptive, dealing in fact with the opinions formed and the thoughts suggested by ten years largely spent in the most remote and desolate regions of the earth. These thoughts and opinions are perhaps the most striking part of the book, showing in a remarkable manner the power of travel and the contemplation (rather than the study) of nature in educating an appreciative mind. To read the following extract from the five chapters of "Impressions of Travel," one would hardly suspect the author of being a young soldier:—

"No one, indeed, who has been alone with nature in her purest aspects, and seen her in so many different forms, can help pondering over her meanings, and though, in the strain and stress of travel, her deepest messages may not have reached my ear, now, in the after-calm, when I have all the varied scenes as vividly before me as on the day I saw them, and have, moreover, leisure to appreciate them and feel their fullest influence, I can realise something of her grandeur, the mighty scale on which she works, and the infinite beauty of all she does. These impressions, as I stand now at the close of my narrative, with the many scenes which the writing of it has brought back to my mind full before my eyes, crowd upon me, and I long to be able to record them as clearly as I feel them, for the benefit of those who have not had the leisure or the opportunity to visit the jealously-guarded regions of the earth, where nature reveals herself most clearly."

It is rare now-a-days to have the magnitude of the earth, the vastness of distances intervening between places, the month-long silence of desert and mountain forcibly brought before one, and it is startling to reflect how little the resources of modern applied science have done to facilitate journeys in really remote regions. Except for some articles of food and the means of defence, men must travel in Central Asia now just as they travelled in the days of Marco Polo, or even of Alexander.

A sketch of those journeys which have won for Captain Younghusband the gold medal of the Royal Geographical

¹ "The Heart of a Continent." A narrative of travels in Manchuria, across the Gobi Desert through the Himalayas, the Pamirs, and Chitral, 1884-1894. By Captain Frank E. Younghusband, C.I.E. (London: John Murray, 1896.)

Society, will prepare the reader for considering the opinions he was led to form on some important questions regarding men and things. In 1884, at the age of twenty-one, Younghusband was invited by Mr. James to accompany him into Manchuria. Never was invitation more eagerly accepted, and once released of his military duties in India, he threw his whole being into travel. Starting from Newchwang on the Yellow Sea, they pushed northward, visiting the Ever-white Mountain, and describing for the first time the wonderful crater lake on its summit, 8000 feet above the sea, whence flows the river Sungari. Thence the journey continued down the Sungari to Kirin, and north-westward into Mongolia, eastward again, and southward through thriving colonies of strong, self-reliant, diligent Chinamen, to the Russian fort of Nova-Kievsk, south of Vladivostok. Thence they went back to Newchwang and Peking, experiencing all the severity of a Siberian winter, and observing amongst many objects of interest the curious phenomenon of a frozen mist, the

hot lower air. Thence the route lay along the edge of the Tian-Shan Mountains to Kashgar, where the glory of the vegetation and the comforts of the Oriental city-life were fully appreciated after the weary crossing of the desert. From Kashgar he proceeded to Yarkand, and thence, with Balti guides, plunged into the sea of mountains with the object of reaching India by a new route. Few enterprises in modern mountaineering have been more daring or more successful than Younghusband's rediscovery and crossing of the Mustagh Pass, inexperienced as he was in the ice-craft of alpine climbers, and solely dependent on native guides, who had themselves never passed that way before. To an experienced and well-equipped alpinist the danger would perhaps be inconsiderable, but the high specialist's point of view is not that from which to judge the work of a traveller, unused to mountains, arriving worn from the desert with no mountaineering outfit.

The next journey recorded is one of remarkable interest, bearing as it does on the political condition of the Indian

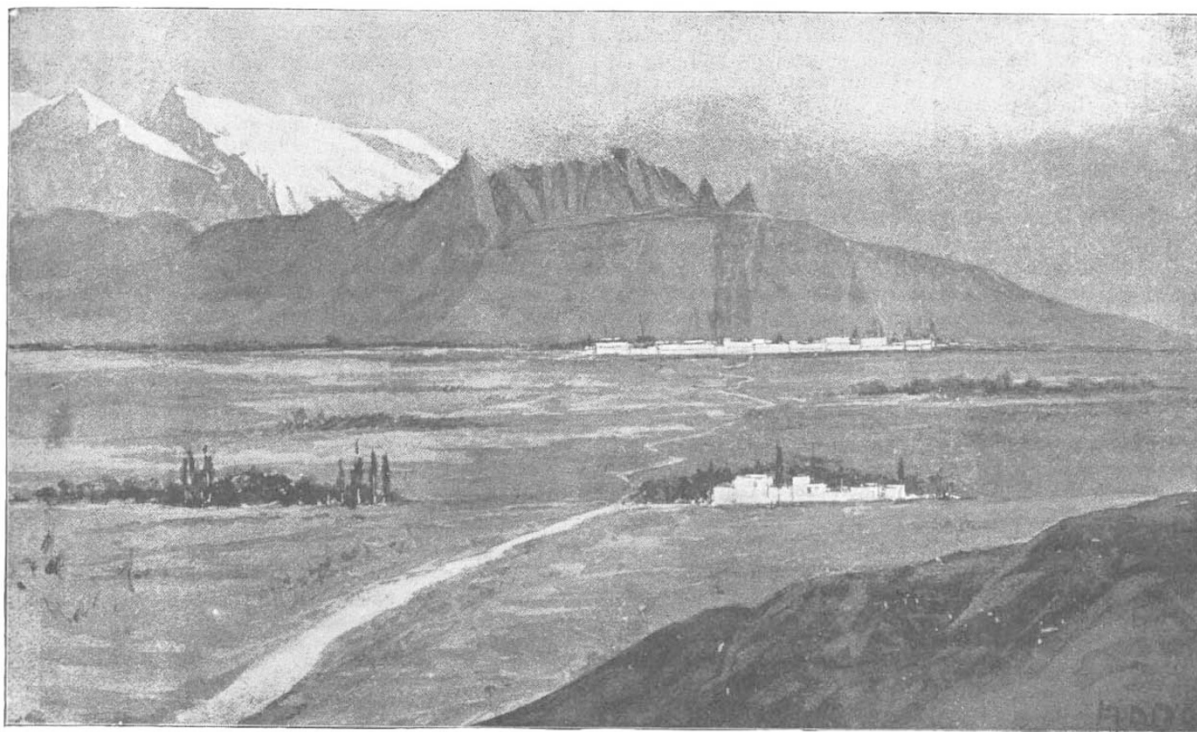


FIG. 1.—Kashgar.

particles of ice being so small that the whole air glittered in the sunlight. At Peking, Captain Younghusband was fortunate enough to get permission to return to India overland; and in the spring of 1887 he set out alone with a small party of Chinamen to find his way across the Gobi Desert to Kashgar (Fig. 1), and thence over the Karakoram Mountains into India by a route never previously taken by Europeans. The journey was full of incident, if not of adventure, as far as Hami, 2000 miles from Peking, which was reached in three months, at the end of July. The scenery of the Gobi Desert is powerfully described, and the singular character of the gravel-covered valleys, the cliffs, and the sand-dunes very clearly explained. It is a region of æolian formations where erosion by the alternation of heat and cold and the furious blasts of the prevailing winds has its full course unchecked and unassisted by water or ice. Several instances are recorded of heavy showers of rain, not one drop of which reached the parched ground, so rapidly did evaporation proceed in the

frontier. It was a reconnaissance of the passes across the great mountain barrier from the north, and a visit to the almost-unknown valley of Hunza in 1889. On this occasion Captain Younghusband was accompanied by a small detachment of Gurkhas, the native Indian troops, whose praises as mountaineers and good companions have been sounded by every European who has had occasion to do difficult work in their company. The description of the primitive little State is so attractive, that the reader feels relieved when he is assured that since its subjection to the Indian Government local autonomy has been maintained, and only the raids of the mountaineers on their lowland neighbours have been checked.

In 1890 commenced a longer and more important journey, which led Captain Younghusband back to Yarkand and Kashgar, where he spent a winter studying the curious cosmopolitan population of the capital of Chinese Turkestan, and doubtless collecting information which, not concerning the general public, is not

referred to in the volume. An interesting contrast is noted between the dreamy philosophical indifference of the Chinese to all questions of geography and natural science, their absolute and voluntary ignorance of other countries, and the quick intelligence of the Turki and Indian merchants who travel far, observe keenly, and hold surprisingly clear views on the difficult political questions which the convergence of the domains of the three dominating powers of Asia brings to a focus in Kashgar. At length Captain Younghusband was ordered back to India, making an exploring expedition through the Pamirs on the way, and it is almost amusing to notice how little he speaks of the sport of that famous region; indeed, the killing of *Ovis poli* seemed to interest him less than the observation of the wolves which weed the herds of the old rams when the weight of years and horns makes their removal a benefit to their species. On the Pamirs there were great political problems in course of development, and such information as the reader gleaned of Captain Younghusband's intercourse with Russian officers, only whets his desire for the full history of all that went on. At one time the officers of both nations were drinking the health of their sovereigns, and imparting useful hints as to dealing with exacting natives; the next day the Englishman was informed by his Russian friend that he must quit the Pamirs instantly for Turkestan, and sign an undertaking not to cross into India by any known pass. This was done; but instead of returning to the northern plain, Captain Younghusband set to work to discover an unknown pass, and so fulfilled his mission without breaking his word.

The remaining journeys were of less value as exploration, being carried out in the course of military and political duty in Hunza and Chitral, duty which gave to Captain Younghusband a unique knowledge of the intrepid mountaineers whose misguided rulers precipitated the recent war with the Indian Government. For the details of that war we are referred to the special book in which the author narrates his experience as correspondent of the *Times*.

Captain Younghusband gives in his preface one of the most powerful reasons for the inclusion of natural science in ordinary education. He says: "It has been a ceaseless cause of regret to me that I had never undergone a scientific training before undertaking my journeys. During the last year or two I have done what I can by myself to supply this deficiency; but amongst the Himalaya Mountains, in the desert of Gobi, and amid the forests of Manchuria, how much would I not have given to be able to exchange that smattering of Greek and Latin, which I had drilled into me at school, for a little knowledge of the great forces of nature which I saw at work around me."

With one more quotation we must close this notice. Captain Younghusband has been considering the universality of the law of evolution, and proceeds to apply it to the human species with somewhat remarkable results.

"The traveller," he says, "frequently associates with men who are little more than beasts of burden, and on his return he meets with statesmen, men of science, and men of letters of the first rank in the most civilised countries of the world. He sees every step of the ladder of human progress. And, so far as I have been able to make use of my opportunities of observation, I have not been impressed with any great mental superiority of the most highly-developed races of Europe over lower races with whom I have been brought in contact. In mere brain-power and intellectual capacity there seems no great difference between the civilised European and, say, the rough hill tribesmen of the Himalayas; and, in regard to the Chinaman, I should even say that the advantage lay on his side."

It is to the moral superiority of the European races that Captain Younghusband attributes their power over all

the races of the East. The illustrations are comparatively few but good and well-chosen, as the specimen on p. 131 shows, while the maps are sufficient as regards number and scale, and show the routes very clearly.

HUGH ROBERT MILL.

PROFESSOR DAUBRÉE.

ONE of the brightest lights in the geological department of French science has been extinguished by the death of Prof. Daubrée, who has passed away at the ripe old age of eight-two years. Born at Metz on June 25, 1814, he early devoted himself to minerals and rocks, and from the *École Polytechnique* passed in 1834 into the *Corps des Mines*. In these early years he paid visits to the mining districts of different parts of Europe, and communicated papers on his observations to the *Geological Society of France*, the *Annales des Mines*, and the *Comptes rendus* of the *Academy of Sciences*. He already began to display that breadth of view and width of sympathy which distinguished his career, for, while studying minutely the mineral districts of Scandinavia, he devoted much time and thought to the erratic formations then beginning to attract attention, and published his views regarding them. Gradually his attention was more and more directed to the experimental side of his favourite science. He studied the artificial production of various minerals, and entered upon a course of profound investigation in which he became the great leader, and did more than any other observer to advance that department of the science.

With a deep admiration for Sir James Hall, the true founder of experimental research in geological inquiry, he threw himself with especial ardour into the investigation of the influence of water-vapour on minerals and rocks when exposed to high temperatures and under great pressure. The difficult problems of metamorphism had a peculiar fascination for him, and he devoted himself with admirable patience to the task of trying to solve some of them by actual experiment. Every geologist who has studied these questions will feel that by the death of Daubrée, the great pioneer who first lighted up for us some of the darkest pathways of the subject has passed away. The various researches collected in his "*Études Synthétiques de Géologie Expérimentale*" have taken their place among the classics of modern science.

Nor were his investigations confined to the earth. He took special interest in meteorites, and besides diligently gathering specimens, studied their composition and structure, and carried on a series of experiments in order to reproduce their characters artificially, and thus to throw light on the chemistry of extra-terrestrial space. His last important volumes discussed in ample detail the phenomena of underground water, and traced the various solutions and changes which water is now producing and has formerly effected within the crust of the earth.

M. Daubrée spent the greater part of his scientific life in Paris, where he occupied official posts in the *École des Mines* and *Muséum d'Histoire Naturelle*. He retired from office two or three years ago, but continued to interest himself actively in scientific research. He was an indefatigable worker, and, like most busy men, found time for more than his own professional duties. He was one of the most regular attendants of the *Académie des Sciences*, and one of the most influential members of that distinguished body, serving on many of its Committees, and taking an active part in all its concerns. At its meeting last week, the *Academy*, after some eulogistic words from the President, at once rose in token of its respect. Daubrée was likewise a member of the *Council of the Legion of Honour* until the whole body resigned some time ago.