

EXPLORATION OF THE KARAKORAM RANGE.¹

IN the communication referred to below H.R.H. the Duke of the Abruzzi gives a very interesting account of his expedition last summer to Baltistan, in Kashmir territory, undertaken with the object of ascending K2, the highest

from this point of the gigantic peaks and spurs of the main range, of which one, now known as Mustakh Tower, is the most striking feature, is described.

Beyond this camp reference is made to, and a hypothesis ventured on, a very conspicuous feature (mentioned in my paper, "The Glaciers of the Mustakh Range," R. G. Soc., January, 1864)—the long line of white ice in masses more or less detached, and distinct in structure from that of the ice on either side. I was unable to follow this ice-flow to its source. I venture yet another hypothesis. Its position is central; it appeared to originate from the precipitous western face of Gusherbrom, and to be glacial ice quite free from any morainic matter drawn into the flow of the main northern and southern branches, but had never been subjected to the pressure and formed under the same conditions as the ice which carried and partly held it in position. This is only one of the phenomena connected with these great glaciers awaiting elucidation and calling for that closer investigation which the first explorers had not the time to solve.

On reaching the base of K2 a close examination of the peak was made, first on the western side up the tributary glacier named Savoia, leading to the saddle at its head, 21,863 feet. It was a stiff climb; steps in the ice had to be cut all the way up to the summit. The Tibetan side presented a precipitous wall of rock; beneath was a glacier flowing west to the Oprang Valley, probably a tributary of the glacier descending from the Mustakh Pass. As the Duke describes it, the northern flank of K2 seen from that side must form a gigantic wall nearly 10,000 feet in height. Seen well from here, K2 was deemed impracticable for the Alpine climber. The explorers next attacked the eastern side, and

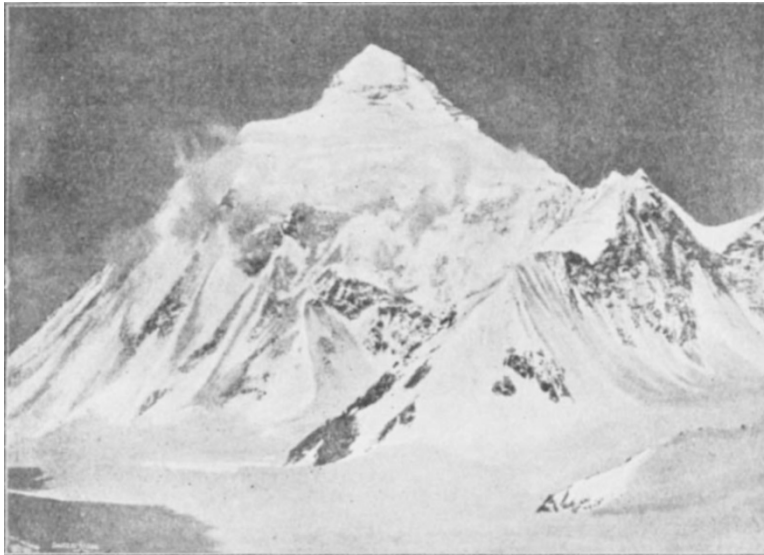


FIG. 1.—The Peak K2 from Windy Gap.

peak in the N.W. Himalaya, as well as to investigate the physical features of that range, which his previous mountain work in North America and Africa would render so valuable by comparison.

The rapidity and facility of modern-day travel compared with that of fifty years ago is remarkable. From Srinagar to the foot of the Baltoro occupied only fifteen days, which in 1861 took me twenty-nine. The Duke proceeded *via* the Indus Valley and the Braldoh River, and returned by the Skoro La and the Deosai Plains, all now well known and constantly travelled over.

The Baltoro Glacier has since 1861 been made famous by the visits of no fewer than three exploring parties, commencing in 1892, who have added to the topographical detail of its furthest sources. This last expedition was large and well equipped; besides its leader, there were the Marquis F. Negrotto, Messrs. Vittorio Sella, F. De Filippi, three Italian guides, G. Petigrew and A. and E. Brocherel, four porters and an assistant photographer, and Mr. Baines, who joined the party in Kashmir to look after the transport arrangements, so that the number of porters proceeding from Askolay was about 360. On May 18 they began the ascent of the great glacier, the first camp being at Liligo, on the right bank, where the marginal ice cliff is mentioned as being 196 feet high. The next day Rdokas, on the same side, was reached, where the party were detained three days by bad weather, snow falling and covering the surface of the glacier. This was made the base-camp. The magnificence of the view to the north



FIG. 2.—The Bride Peak.

reached the points attained by the Anglo-Austrian expedition. From this splendid Alpine basin, as it is described, K2, with its precipices and snow cone, shows itself in all its splendour; the difficulties of its ascent were apparent, and they had to declare themselves conquered—that only in an aeroplane could the summit be reached. From the

¹ *Bollettino della Società Geografica Italiana*, April, 1910. *Esplorazione nei monti del Karakoram*. By S. A. R. Luigi Amedeo di Savoia, duca degli Abruzzi. Con due carte e 5 illustrazioni fuore testo.

water parting on this side they saw a precipitous slope on the Tibetan side, not vertical as at the Sella Savoia, but a very crevassed glacier. The Italian guides and porters might have descended, but returning was the difficulty. The Duke was under the impression they would see from here the Oprang Valley; however, he was surprised to find a great glacier flowing south-east, separating Windy Gap from a great mountain chain which appeared to connect with Staircase Peak on the north; this glacier received numerous tributaries from the eastern face of the Staircase and mountains south of Windy Gap. The Duke says that here are two important geographical problems to be resolved—how the chain is attached to Staircase Peak and where the glacier the travellers saw emerges. From Windy Gap and Sella Vittoria Sella the eastern peaks of Gusherrum were seen, and the Duke suggests that the glacier from there and the Staircase was the one seen by Young-husband from the Oprang Valley. A most plucky attempt was made by the Duke and two porters to reach the top of Staircase Peak, but after a night at 21,650 feet they were baffled by a *bergschmund*, which they failed to work round. From here K₂ appeared more than ever inaccessible; it is recorded, also, that its northern face is precipitous, also that towards the east chains and mountains were lost in the distance.

Rejoining his party on June 28, the Duke determined to make a final effort to ascend the Bride Peak (K₆), 25,119 feet. Ascending the main Baltoro glacier, from Footstool Camp of Conway, on July 3, he and Sella started for the Kondus Saddle; the view they obtained from this point, 20,772 feet, compensated them for all they had gone through. To the south it lay over the Kondus Glacier, embracing Peaks K₇, K₈, and K₉; he noted that this valley trends to the east, then bends to the north, coming round Golden Throne and Hidden Peak, and perhaps joins the pass at the head of the Ordoch Glacier of Young-husband.

Although the work was most severe and many camps were in exposed and trying sites, great praise is due to all, and the account is written in a most natural, unpretentious way. The value of the Italian guides on work of this nature is well exemplified, for when they were on the Chogolisa Saddle, and Sella had left for Rdokas, they prevailed on the Duke to wait for fine weather and attack the "Bride Peak," and the little party actually stayed three weeks on this exposed ridge of 21,000 feet.

The ascent was finally made, and a point 24,577 feet reached, close below the summit, when, dense mist coming on, and the remaining 500 feet being of a dangerous nature, they reluctantly had to descend, having attained the highest altitude yet reached by man. More it was impossible to do. The Duke trusts some future traveller, profiting by his labours, may some day reach the magnificent summit of the Bride Peak (Fig. 2). The future surveyor who may be sent there is taught a valuable lesson by these most capable mountaineers towards the securing of an accurate plane-table survey of the wonderful unknown country lying to the eastward. With the numerous peaks fixed by the triangulation, it is shown conclusively that the area occupied by the Terim Gangrhi and glacier, together with the Snowy Range from which the Remo Glacier descends, could all be mapped and dozens of peaks fixed from points already visited by the Duke of the Abruzzi and Dr. Longstaff, supplemented by a few others at the head of the Kondus Valley and those seen from the Mustakh Pass crossed by Young-husband.

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FURTHER OBSERVATIONS OF HALLEY'S COMET.

A NUMBER of further observations of Halley's comet are recorded in Nos. 4415-8 of the *Astronomische Nachrichten*. In No. 4416 (p. 401) Prof. Max Wolf gives a sketch showing the position of the tail on May 12 at 14h. 15m. (Königstuhl M.T.). A slight curvature was noted, the convex side being towards the north, and the extremity of the tail lay on a line joining α Equulei and β Aquarii. From this observation it was deduced that the actual length of the tail was about 45 million kilometres (28 million miles), whilst that part

through which the earth would pass, if passage took place, was at least 3° broad. Observations extending from May 17 to 24 indicate that the halos observed at the Königstuhl Observatory on May 19 were more than twice as strong as those observed on the other days. Dr. Cerulli directs attention to an apparent shortening of the tail towards 15h. (M.E.T.) on May 18, which he ascribes rather to the alteration of direction, in regard to the line of vision, than to the approach of daylight.

Herr A. Miethe records that, at the photographic observatory of the Royal Technical High School, Berlin, on May 24, the nucleus of the comet was seen to occult the 8.5 magnitude star A.G. Lpz. I. 4615; for 28.1 seconds the star was lost in the brightness of the nucleus, but at 9h. 0m. 40.5s. (M.E.T.) it was again seen amongst the matter streaming out from the nucleus. It then appeared as an absolutely sharp, bluish point of light, and suffered no apparent alteration beyond a slight twinkling. Herr Osthoff records some cloud observations made at Cologne on May 19, but found nothing which might be ascribed to the action of the comet's tail; the 22° halo around the sun is accepted as the natural result of the presence of the cirrus clouds observed.

Observations made at Warsaw on May 26 indicated that the axis of the tail, in the plane of the comet's orbit, made an angle of 11° with the radius vector at distance 0.18 from the head. Computations by Dr. Banschiewicz show that this would mean a delay of 0.6-0.7d. in the passage of the earth through the tail after the conjunction of the comet with the sun.

No. 23 of the *Comptes rendus*, for June 6, contains several further reports of observations of the comet.

MM. Luizet and Guillaume (p. 1492) give a *résumé* of their observations since early in December, 1909, directing special attention to the changes which took place in the form of the nucleus, the structure of the various parts of the head, and the extent of the tail after the beginning of March. On May 15 it was noted that the pronounced flattening of the nucleus was in a direction perpendicular to that observed on May 14.

MM. Cirera and Ubach give the results obtained at the Observatoire de l'Èbre (Spain), during the period May 11-26, from observations of terrestrial, atmospheric, magnetic, and electrical phenomena. Some disturbances were recorded on May 18 and 19, but the authors believe that they were not connected in any way with the comet, although they hesitate to pronounce definitely on the subject until the results have been more fully considered.

M. Comas Sola, of the Fabra Observatory, describes (p. 1496) a very brilliant projection of gas from the nucleus on May 31. A photograph, exposed for eighty-three minutes, showed that this projection extended some million kilometres from the nucleus, in the direction opposed to that of the sun. A condensation in this projection gave the appearance of a second nucleus, which, on June 2, was about 40" from the primary nucleus, and was some three magnitudes fainter. Between these two nuclei there appeared to be an alignment of very feeble stellar points, but these were so faint as to be doubtfully seen. A photograph taken, with ninety minutes' exposure, on this date showed, among other interesting details, a long aigrette emerging from the nucleus and forming a medial line in the tail. On June 4 the secondary nucleus was invisible, but the primary was accompanied by four condensations, which travelled rapidly away from it. In 110 minutes the principal one of these was displaced 5.9", in regard to the primary, in the direction of the tail.

M. Giacobini also directs attention (p. 1496) to the breaking up of the nucleus on June 2. To him it appeared that the comet had split into two nebulosities, each having a nucleus, the only difference between their aspects being that one was considerably fainter than the other. He also remarks on the rapid alteration of the form of the nucleus since May 24. Prior to that date it had been distinctly nebulous and elliptical, but since then it has appeared as a sharply defined point.

As mentioned previously in NATURE, M. Jean Mascart travelled to Teneriffe to observe the comet, and set up his instruments on the spot occupied by Piazzi Smith in 1858. He now describes (p. 1497) the instruments and the observing conditions during his two months' sojourn at the station. At an altitude of 2715 metres he was well above