

racter of the electric field might be expected to reveal itself at high altitudes. The presence of ions in the atmosphere is an experimental fact. Any electric field would produce a convection current of these ions in their respective directions. If the aurora borealis could be viewed as such electric discharges, their parallelism to the lines of magnetic force would indicate the existence of an electric *dipole* field parallel to the Earth's magnetic field. The auroræ are generally explained as being due to streams of electrons or  $\alpha$  particles from the sun. It is however remarkable that both solar "coronal," as well as the terrestrial "auroral" streamers, which are the origins and terminations of the streams, follow the lines of magnetic force when they should move at right angles to them. The agreement of direction of auroral streamers and lines of magnetic force is very close indeed. The difference is hardly more than  $1^{\circ}27'$  (L. Vegard, "Results of Northlight Investigations," etc., *Phil. Mag.*, 1921).

Slipher and Lord Rayleigh have found evidence of a permanent aurora, and that at quite low latitudes, by spectrograms. The question naturally arises here as to whether the direction of the auroral streamers is also parallel to the lines of magnetic force or at right angles to them.

For solar coronal streamers "following the magnetic lines of force in the neighbourhood of the equator," see Birkeland's experiments with magnetized-globe cathode (Figs. 247 *a* and 253).

From such evidence the existence of a dipole electric field seems strongly indicated, and Reeves's experiments, repeated at Spitsbergen, Camerouns, Arizona, and other places, may be taken as demonstration of the horizontal component of the Earth's dipole electric field, specially when gravitational and magnetic explanations of the phenomenon have been recognized to be inadequate.

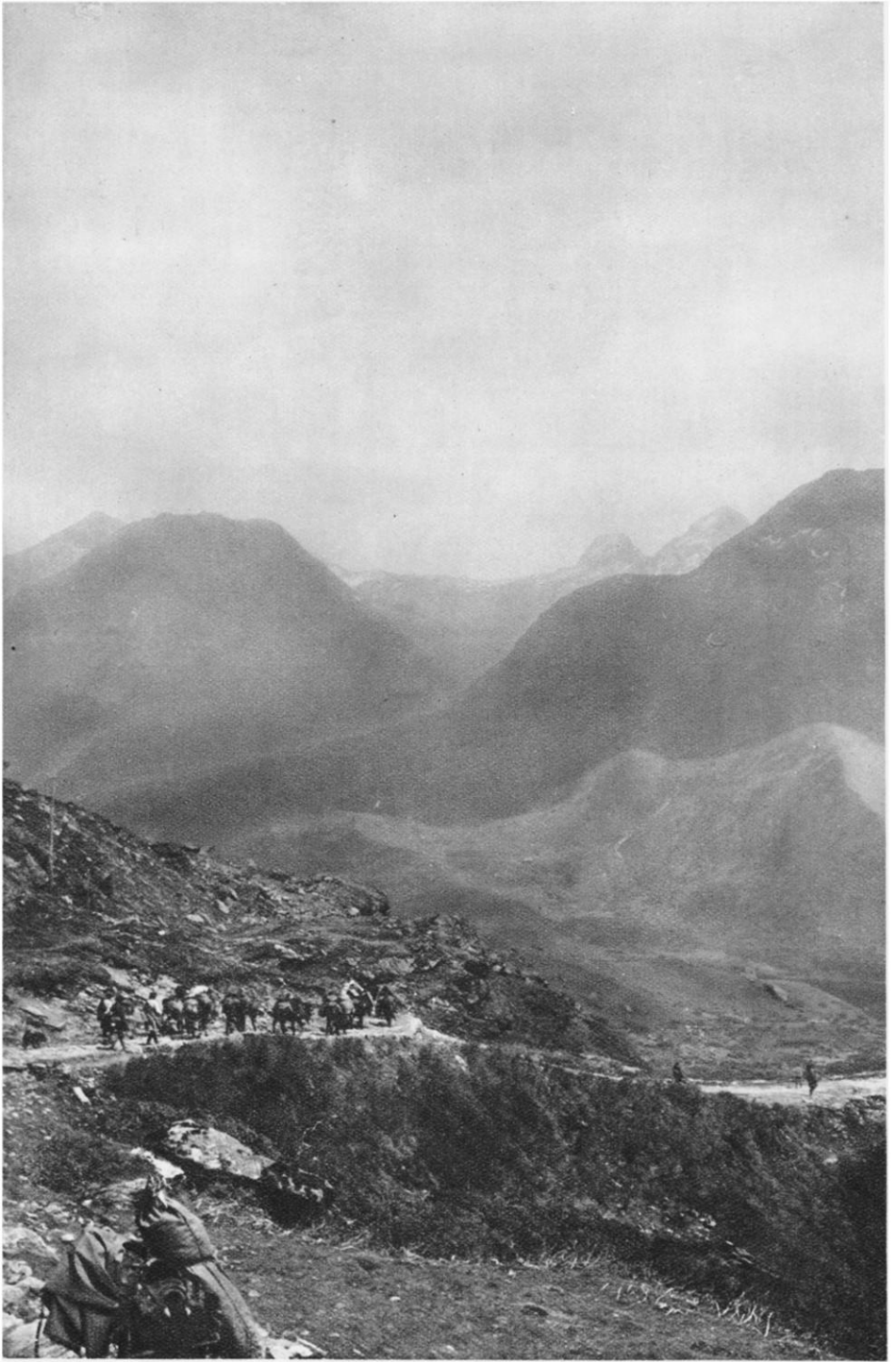
University College, London, 5 July 1922.

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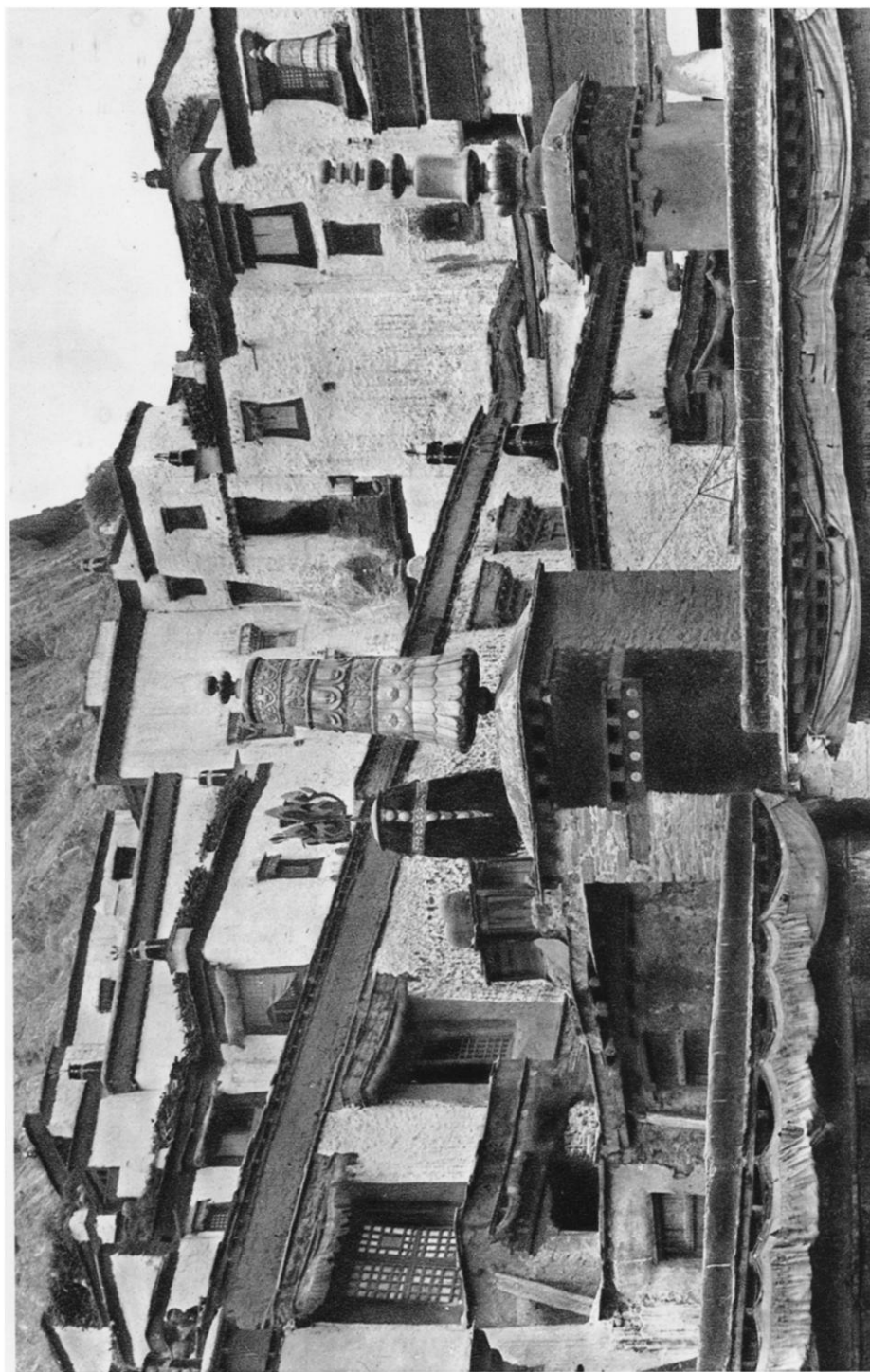
## PHOTOGRAPHS FROM THE MOUNT EVEREST EXPEDITION

FROM the very large number of excellent negatives sent home by Captain Noel we have selected for reproduction a series which shall illustrate the *route* of this year's expedition without overlapping the photographic results obtained last year by Colonel Howard-Bury and Mr. Wollaston, of which three sets were reproduced in photogravure for the *Journal* of October and December 1921 and February 1922. Reference should be made to the maps published in the latter number, or to the photographic survey of Major Wheeler, of which two sheets have been received, the third, covering the west Rongbuk glacier and the Khombu Pass, being still awaited. Copies of this map may be seen in the Map Room, and a special edition over-printed with a red grid was provided by Colonel Ryder for use in the field this year: without however eliciting a single map reference in report, letter, or list of photographs!

The main body of the expedition was fortunate in finding the Jelap La nearly free of snow so early in the season; but the same heavy snowfall which caught them beyond Phari caught Captain Finch and Mr. Crawford on the pass: and there are in the collection many beautiful pictures of



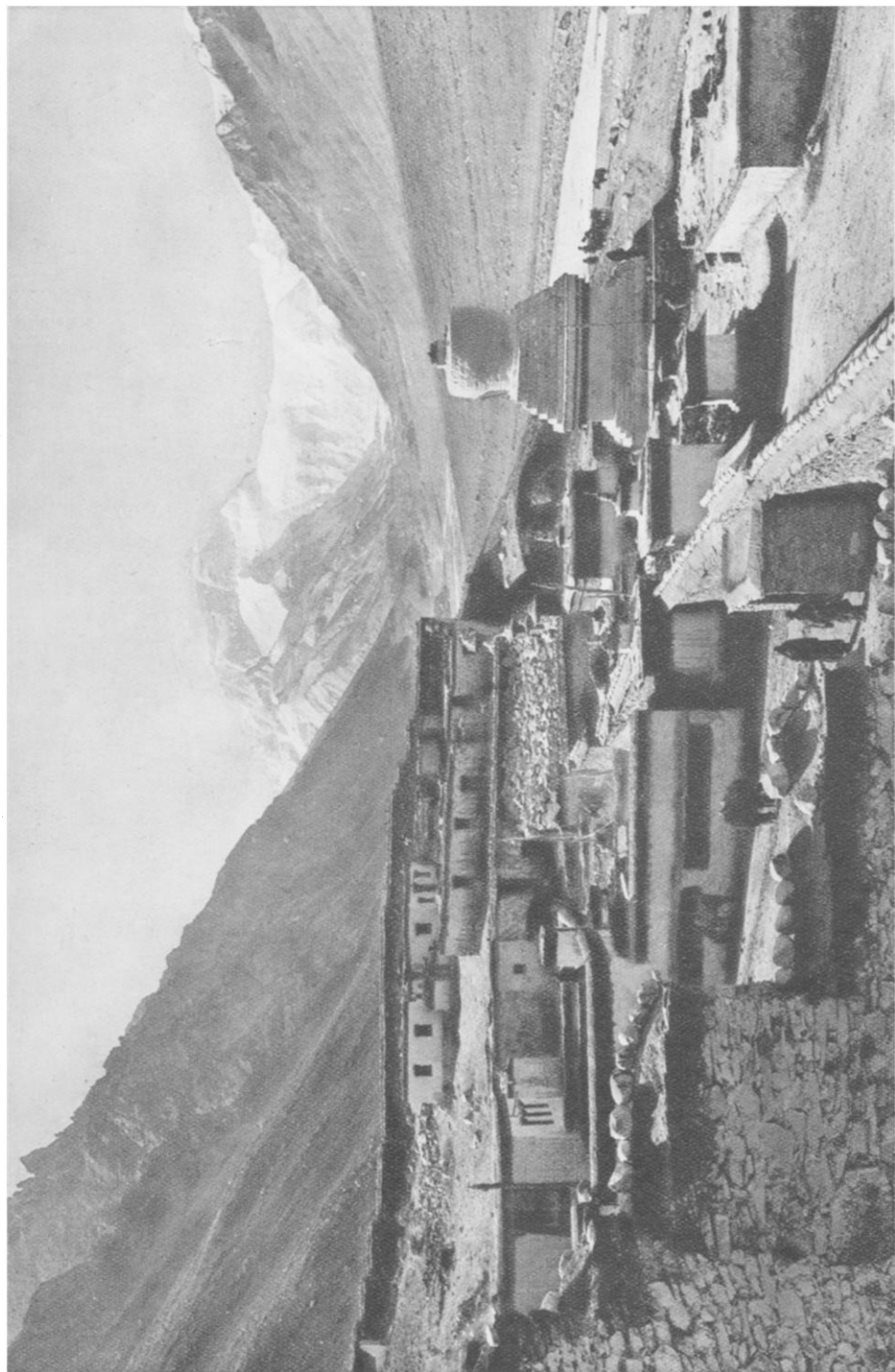
1. APPROACHING THE JELEP LA



2. SHEKAR MONASTERY FROM THE ROOF OF THE PRINCIPAL TEMPLE

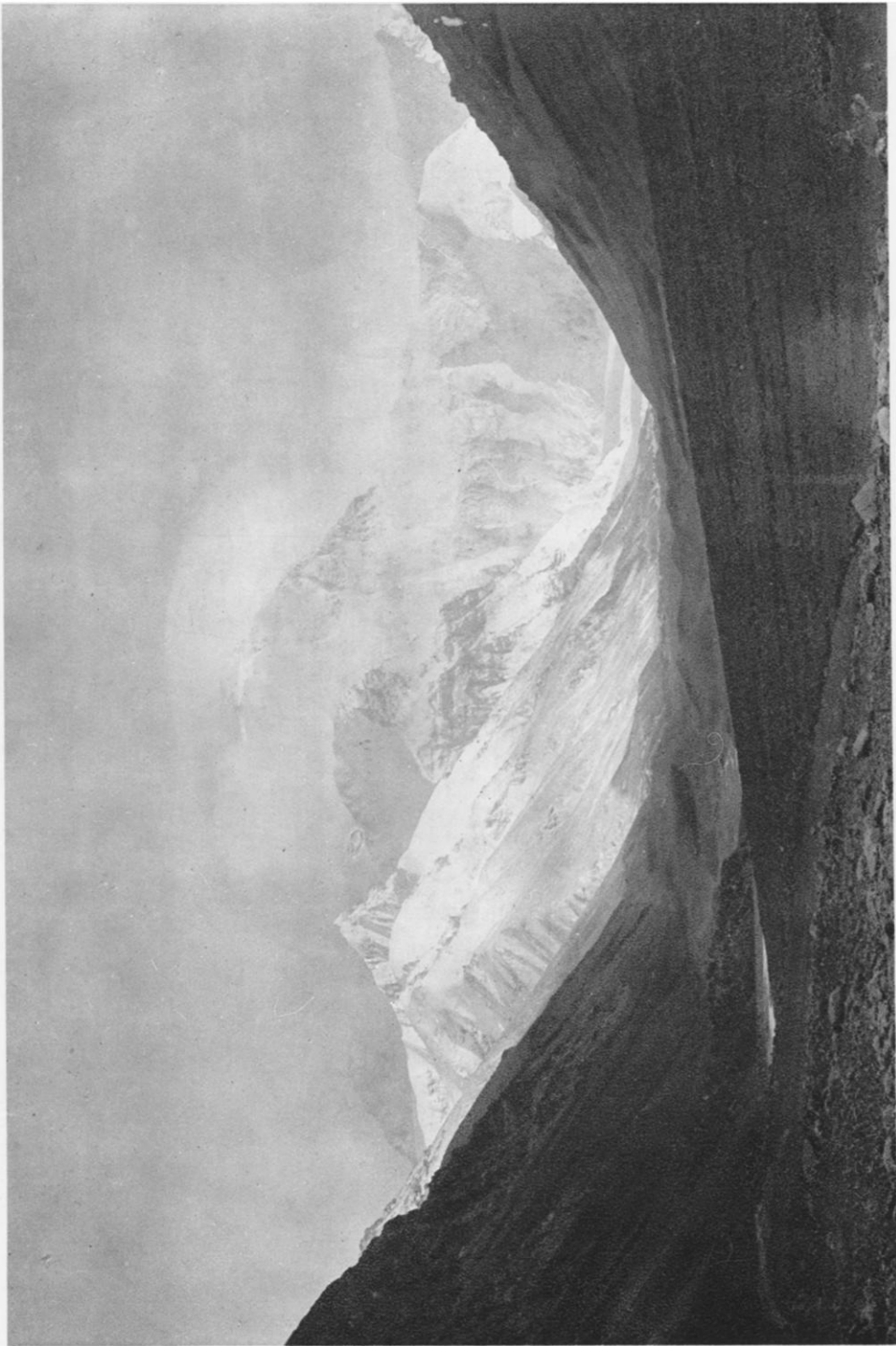


3. MOUNT EVEREST AND THE CHOMO LUNGMA GROUP FROM THE PASS SOUTH OF SHEKAR BETWEEN THE VALLEYS OF THE BHONG CHU AND THE DZAKAR CHU

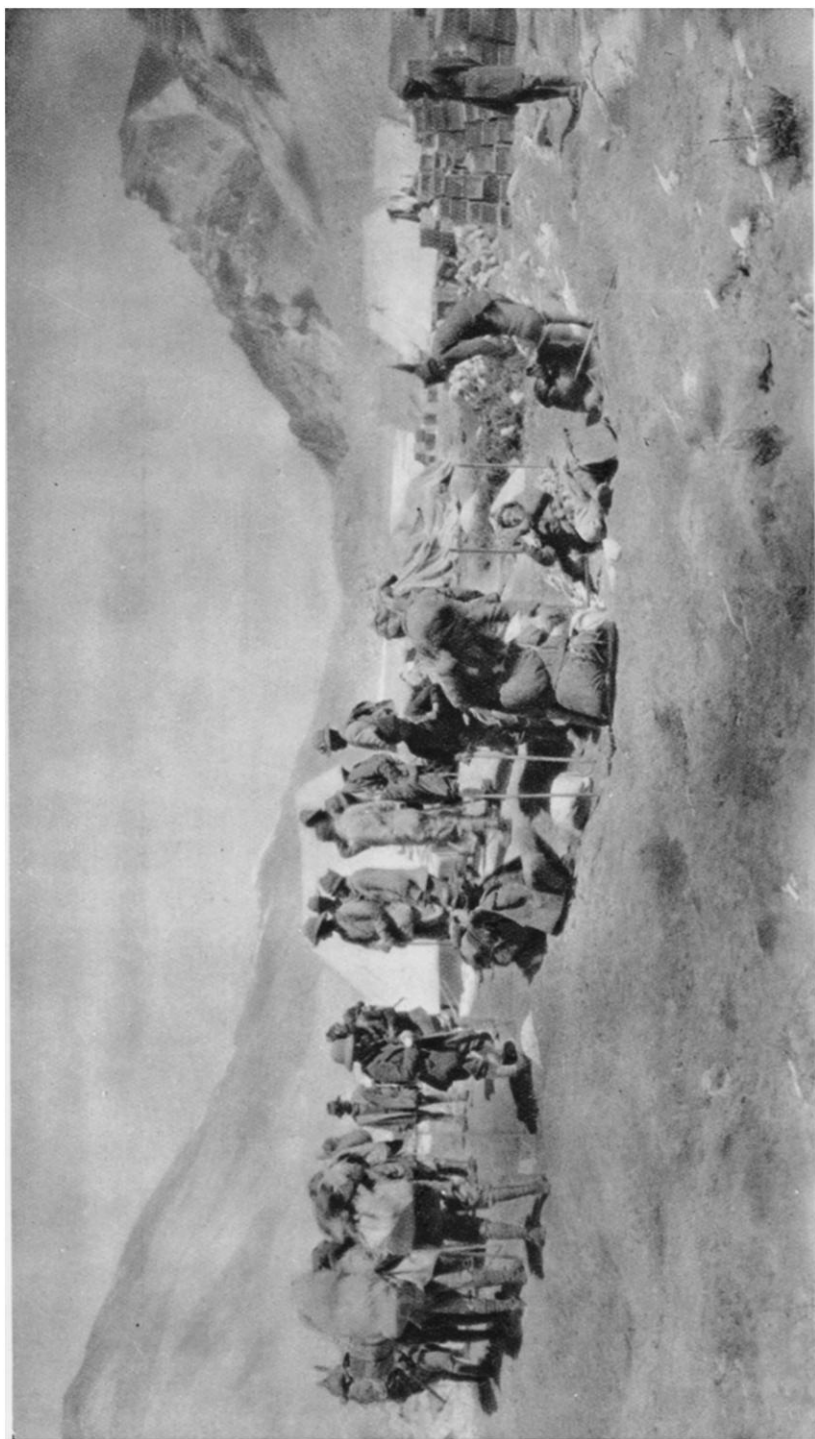


4. THE RONGBUK MONASTERY

22580      Changtse      Mount Everest



5. MOUNT EVEREST FROM THE RONGBUK VALLEY



6. THE BASE CAMP, RONGBUK VALLEY



7. SERAC ON THE EAST RONGBUK GLACIER

*Photo. by Dr. Longstaff*







8. EAST RONGBUK GLACIER BETWEEN

Chang La  
Camp IV.

Changtse



9. HEAD OF THE EAST RONGBUK GLACIER



8. EAST RONGBUK GLACIER BETWEEN CAMPS II. AND III.

gtse

Camp III.



9. HEAD OF THE EAST RONGBUK GLACIER AND THE CHANG LA

23180

NORTH  
↓

22460

22740



Camp II.

10. THE

Changtse



11. LOOK



10. THE EAST RONGBUK GLACIER FROM ABOVE CAMP II. (PANORAMA)

Khartaphu Lhakpa La



11. LOOKING DOWN THE EAST RONGBUK GLACIER FROM THE CHANG LA.

Camp III.

EAST  
↓

Khartaphu  
23640

Rapiu La



DRAMA)

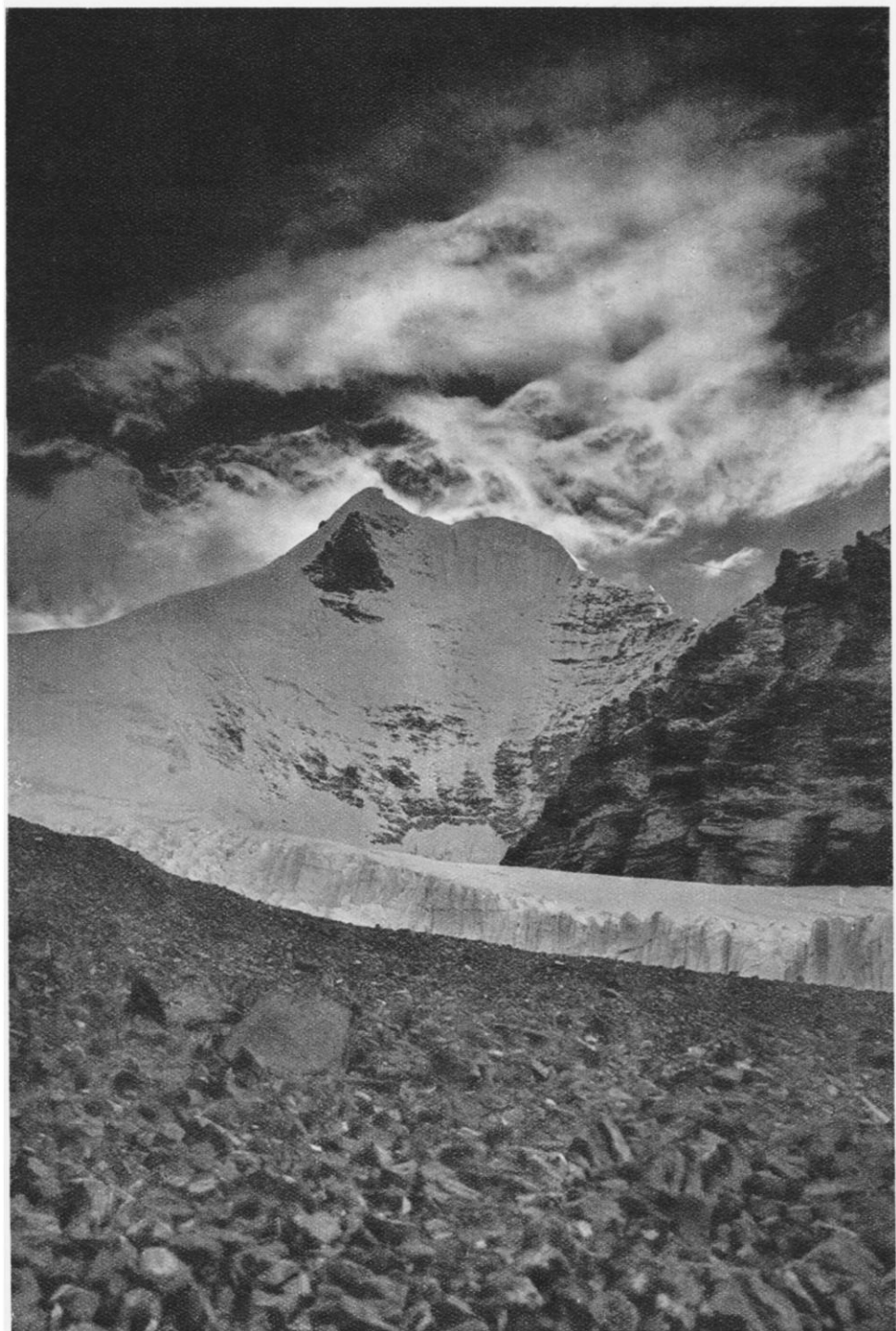
Khartaphu Lhakpa La

22850

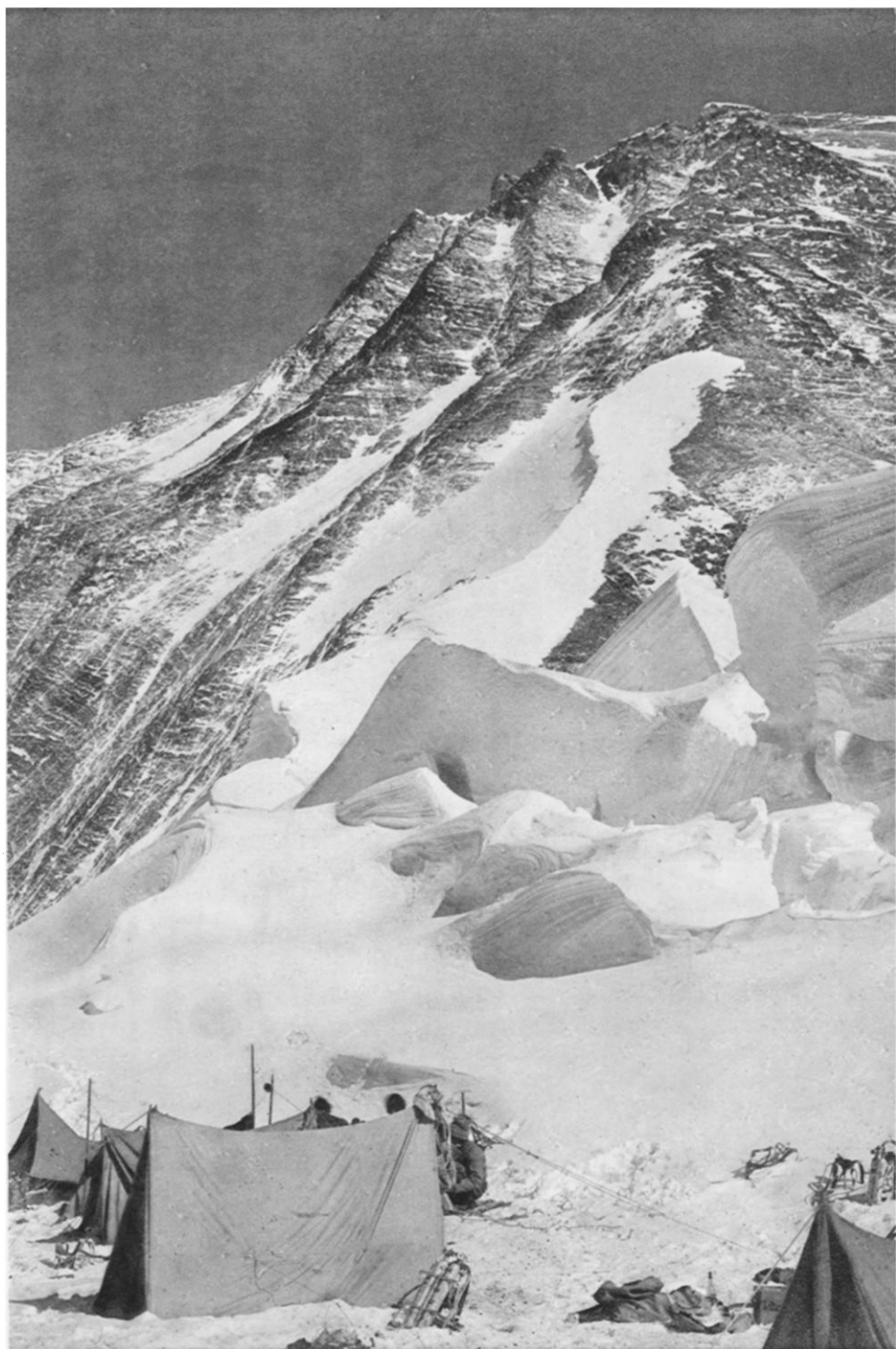


MANG LA.

Camp III.



12. SUNSET FROM CAMP II.



14. THE NORTH-EAST SHOULDER AND NORTH ARÊTE FROM CAMP IV.



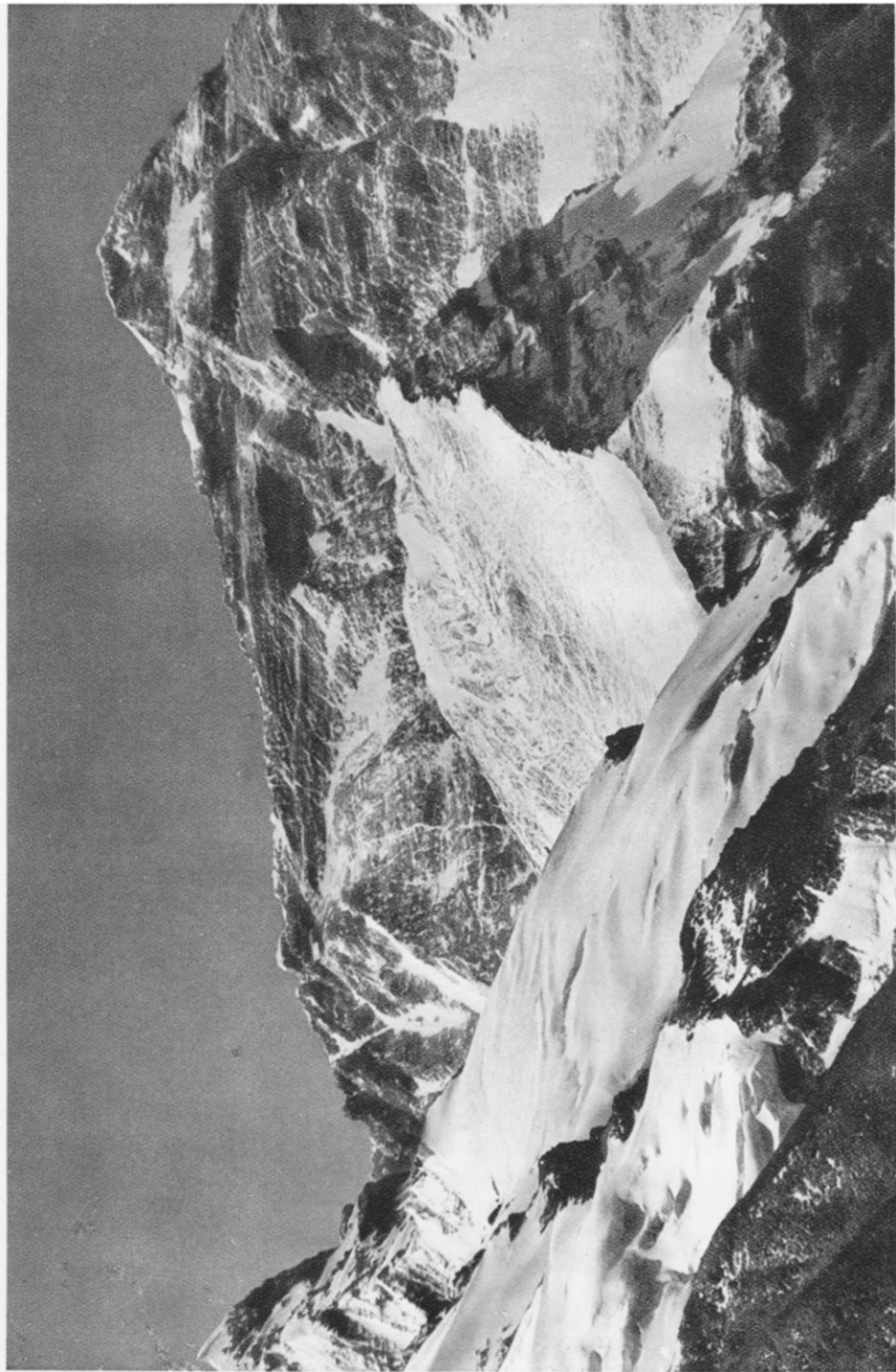
13. THE APPROACH TO THE CHANG LA



N.E. Shoulder

Changtse

Summit



15. THE NORTHERN FACE OF MT. EVEREST (TELEPHOTOGRAPH FROM THE BASE CAMP)

the plains towards Kampa Dzong all snow-covered and exceedingly cold. It is certain that the expedition started this year at the earliest possible date.

They went by Shekar for convenience of transport, and to pay their respects to the Dzongpen in whose district they would be operating; and they obtained a whole series of beautiful pictures of Shekar town, monastery, and fort—enough to illustrate and to provide a monograph on Tibetan architecture. From Shekar they travelled almost due south across the Bhong Chu (Arun river), and so by a pass, which is not named on Major Morshead's map, from which there was a comprehensive view of Mount Everest and the Chomo Lungma group (Plate 3). This is an aspect different from anything that was obtained last year, and the picture will repay careful study and measurement, as soon as we can obtain from Captain Noel the focal length with which it was taken. The deep valley in the foreground is that of the Dzakar Chu about Namda. Here the expedition turned a little westward and reached the Rongbuk valley by a way somewhere in the right of the picture. The valley in the middle distance, below the first snows, is that leading to the Doya La by which one gets to Kharta. We are looking from a little east of north; the main Rongbuk valley runs rather west of north, and so is not clearly seen in this picture.

Plate 4 shows the Rongbuk monastery, well up the valley, and only a few miles below the snout of the main glacier. Last year this monastery, curiously enough, was little mentioned and not photographed, and we were hardly prepared for the considerable part it has played in this year's expedition. The chief Lama received the General and his party with great ceremony, realized that it was the sacred duty of this Society and the Alpine Club to visit the most celebrated mountain, and gave his blessing to the porters and coolies. The friendly relations and sympathetic interest thus established were of the greatest importance to this year's and to any future expedition, for it was a veritable invasion of the usually silent, bare, and by nature inhospitable valley, without supplies, without fuel, and remote from the passes into Nepal by which Kharta and the Kama valley can be supplied.

The main camp was pitched a little above the monastery and below the glacier moraine, in the foreground of picture 5, which shows the entrance to the East Rongbuk valley just beyond the dark hill on the left, and in front of peak 22,580. Camp I. was established just round the corner here, on the left bank of the tributary stream, and above this camp began the struggle with the excessively awkward East Rongbuk glacier. The only knowledge we had last year of this glacier was derived from Major Wheeler's photographs and account: and there was little in these to prepare one for the fantastic scenes about Camp II., shown in pictures 7, 8, 10, and 12. The tributary glacier coming down from peak 22,580 (Plate 12) is bordered by an ice-cliff near 100 feet high: the

seracs on the main glacier are of the same order of height, as may be seen on comparison with the small figure shown in Plate 7. And from the slight accounts we have of the last days on the glacier, when the camps were being evacuated after the monsoon had broken, it would seem that this fantastic ice structure alters very rapidly each summer. What a field it would be for stereographic survey of glacier movement!

The small party who came last year to the head of this glacier from the Kharta valley over the Lhakpa La, missed all the exciting stage between Camps II. and III., and encountered only the relatively easy surfaces shown in Plates 9 and 11, up to the foot of the Chang La. They made no special reference to difficulties in the ascent, and took no photographs from close at hand: also they were dealing with much deeper snow, after the monsoon. Plates 9 and 13 show that the route is formidable, beset with crevasses and ice-cliffs on a scale which seems at first sight out of proportion to the relatively small catchment area and the very thin covering of the mountain. For the mountain before the monsoon is mostly bare rock (Plates 14 and 15), but the dip of the strata is toward the north, and the slabs are therefore tilted in such a way that they are very dangerous when thinly covered with snow.

The last picture (No. 15) is one of a pair taken near the base camp with a telephoto lens, on a base of about 160 yards. The pair give an excellent stereoscopic combination, bringing out the structure of the northern face excellently, though it is about 12 miles away. The pictures can be seen in the stereoscope in the Society's Map Room. In examining these photographs one must remember that the telephoto lens often gives curious perspectives: see, for example, Plate 12 in the *February Journal*, where the walls of the great cirque seem to be flattened up against the north-east shoulder of the mountain; also that the camera was a good deal tilted up, so that, although the picture was taken from 16,500 feet, the spectator seems to be nearly level with the summit of Changtse (24,730), which, it should be noted, is not the point at the end of the long ridge leading away from the camera, but is the rounded dome further back and to the left, or perhaps even beyond this. The first climb reached a point about 450 feet below the north-east shoulder; the second, by a long traverse across the north face, reached about the snow-patch to the left of the big black mark, just over Changtse.

True heights by aneroid have been checked by theodolite observations (incomplete owing to persistent bad weather) made by Major Norton and computed by Major Morshead. They confirm very well the aneroid heights for Finch and Bruce, and suggest that the Mallory party went somewhat higher than they estimated, very nearly 27,000 feet. We hope to publish later a full discussion of the height determinations, when all the details have been received from India.

Major Norton has returned in good health, but has lost by frostbite a small piece of his right ear. Major Morshead writes that his frostbitten

hand is doing better than was expected, and he may lose only one fingertip. Dr. Wakefield will be home before the end of September, and General Bruce early in October. Captain Noel is expected in London the day before the joint meeting at the Central Hall on October 16, at which all the members of the expedition who went out from England will be present except perhaps Mr. Somervell.

The greater part of the collections have now been received. About 400 specimens of pressed flowers have been sent to Kew for identification, and the roots of two different primulas which it is hoped may have survived the journey. A small collection of insects and reptiles, and a few birds and mammals, are being examined at the Natural History Museum. The geological specimens, after examination by Dr. Heron, are on their way home. We understand that Mr. Somervell has made a large number of sketches, and has also recorded the music of many Tibetan songs. Captain Noel, when he wrote last from Gyantse, had obtained excellent films of Tibetan life and of Lama ceremonial.

General Bruce has reported to the Mount Everest Committee that suitable provision has been made for the families of the seven Nepalese porters unhappily lost in the third attempt. The Commissioner at Darjeeling has very kindly undertaken the monthly payment of the allowances, on behalf of the Committee.

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## THE INTERNATIONAL GEOGRAPHICAL UNION

AT a Conference held in London in October 1918, between representatives of the Academies of Science of the principal Allied Powers, it was resolved that the nations at war with the Central Powers should as soon as possible denounce the conventions governing International Scientific Associations, and should form new scientific associations for international co-operation, with the eventual concurrence of the Neutral Powers. To this end an International Research Council was organized at Brussels in 1919 by representatives of the Principal Allied and Associated Powers, and to this Council the neutral nations, Spain, Holland, Sweden, Norway, Denmark, and Switzerland have since adhered.

A principal object of the International Research Council is to promote the formation of International Unions in the different sciences or groups of sciences. When a new Union is proposed, the first step is to form in each country a National Committee for that science, under the auspices of the National Academy of the country. When, therefore, it was proposed by certain French and Belgian delegates to the first General Assembly of the Council that an International Geographical Union should be formed, the Royal Society consulted the Conjoint Board of Scientific Societies, and on its recommendation constituted a National Committee