

GEOLOGICAL STUDIES IN SOUTH AFRICA.

THE Report of the Geological Survey of the Transvaal Mines Department for 1904 (Pretoria, 1905, price 7s. 6d.) is a folio volume, issued at a very moderate price. It contains twenty-three plates, from which our figures are reductions, and two large coloured maps, the latter being conveniently placed in an envelope

the glacial Dwyka conglomerate were traversed (Fig. 2). The boulder-bed, as described in supplementary notes by Mr. Mellor, does not seem more than 50 feet thick, and is associated with sandstones. It was laid down, as in other cases, on a land-surface eroded by streams, and the original topography is now being revealed by the denuding action of the Elands River and other agents.

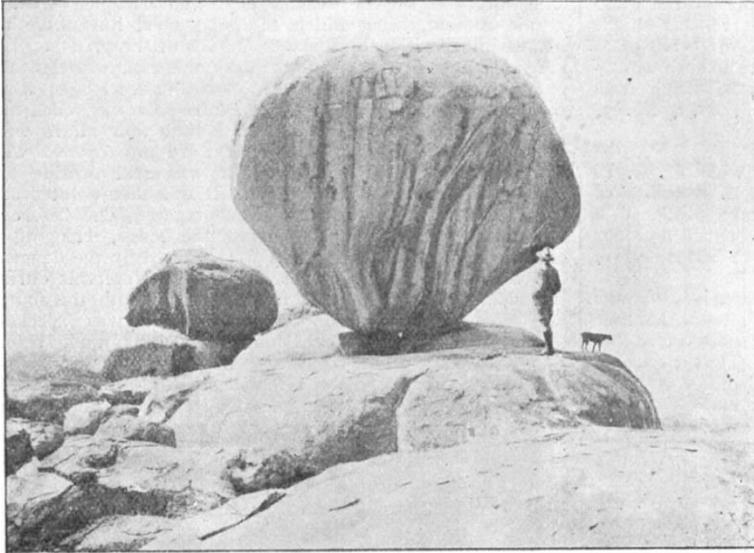


FIG. 1.—Weathering of granite on characteristic koyje near Chuniespoort, N. Transvaal.

at the end. The cessation of topographical work in the country must in future hamper systematic geological mapping, and the Geological Society of South Africa has already approached the Colonial Secretary in Pretoria on the subject (Proc. Geol. Soc., S. Africa, 1906, p. liv). It might be thought that military considerations alone would be sufficient to place an accurate map among the first requirements of the colony.

The director of the Survey, Mr. Kynaston, describes a traverse of the country between Pretoria and Pietersburg, during which he visited the remarkable Salt Pan, some twenty-five miles N.N.W. of Pretoria. This lake, which is about as salt as the Dead Sea, lies in a circle of granite hills, 250 feet below their crest, and about 200 feet below the general level of the country on their outer side. Its salts include 72.70 per cent. of sodium chloride and 27.25 per cent. of sodium carbonate. Except that an explosive origin has been suggested by Cohen, no adequate explanation of the hollow is as yet forthcoming. Considering, moreover, the antiquity of the last volcanic eruptions in this area, a crater of explosion ought to have become long ago filled up by products of denudation. One feels tempted to ask if it is possible for the materials filling an igneous neck to sink back long after they have solidified. Could the fragmental materials so common in South African pipes behave in this way? Mr. A. W. Rogers has cited cases where the weathering of these necks has caused hollows at the surface; but the Salt Pan near Pretoria is 200 feet to 250 feet in depth.

On Mr. Kynaston's return journey from the mouth of the Elands River, the most northerly known outliers of

of a new discovery suggests comparison with something else a thousand miles away, one probably expects too much from the petrographer. One can imagine the prospector, who has returned bronzed and muscular after his days upon the veld, reading the bare descriptions

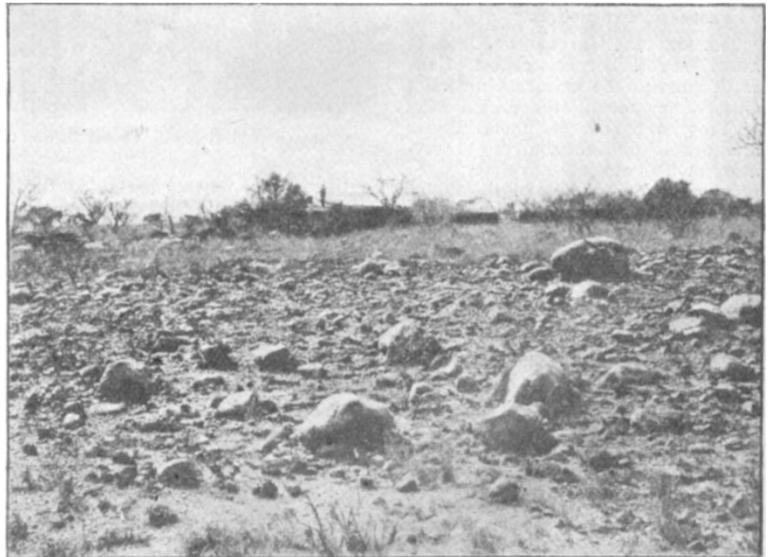


FIG. 2.—Weathering of Permian glacial conglomerate, showing the original boulders, Toitskraal, Elands River.

of rocks with a certain irritation. If they could be inserted in connection with the account of the masses in the field, their true interest would at once appear, for the South African of all men has a pleasurable keenness for geology.

This fact is well attested by the publication of the dis-

cussions that take place at the meetings of the Geological Society of South Africa (Proceedings of the Society for 1905), and by the considerable space given to written criticisms and replies. The Transactions would be very incomplete without these additions, which may be commended to the notice of many publishing societies in our islands. Dr. F. W. Voit, for instance, read a paper (Trans. Geol. Soc., S. Africa, vol. viii., p. 106) on September 4, 1905, entitled "Preliminary Notes on 'Fundamental Gneiss Formation' in South Africa," in which he claimed that the gneisses of the Limpopo Flats correspond to the fundamental formation of the continent of Europe. At the meeting three members contributed structural and mineralogical details from their own notebooks (Proc. for 1905, p. lvii), recorded with an altogether admirable clearness of expression. The full paper was read on October 30, 1905 (Trans., p. 141). Dr. Voit points out, in agreement with his predecessors, that the main granite is intrusive in the Swaziland beds, "long drawn out lenses of quartzite, chlorite, actinolite, and other schists, swimming, as it were, in a granite magma." But the Limpopo gneisses are, for him, still older, and he looks forward to finding the granite intrusive in them also. By the way, we must object to his using, on p. 145, the term "interbedded igneous sheets" for intrusive masses that have come up along planes of fracture in the granitoid mass. On November 20 (Proc. for 1905, p. lxxv) the author sent in a letter in which he supported his views by quoting Mr. Anderson's observations in Natal, and on December 18 Messrs. Sandberg and Jorissen made a reply to Dr. Voit, in which Credner is cited as their authority, in a manner that almost recalls the Wernerian discussions of a hundred years ago. The bottom, if we may speak irreverently, is here knocked out of the "Urgneissformation" with considerable vigour, and the references to European literature, though disfigured by a few misprinted place-names, add zest to a spirited discussion.

Dr. Hatch, in his presidential address (Proc. for 1906, p. xxv), refers to Dr. Voit's suggestion, and remarks that the Limpopo gneiss may be only "a sheared or metamorphic portion of the granite." The address, on the geological history of the South African formations, covers ground on which much has been written, and on which silence might now conveniently be preserved, until some of the critical questions touched on can be decided by new and indubitable evidence.

Mr. J. P. Johnson (Trans. Geol. Soc., S. Africa, vol. viii., p. 135) describes and illustrates primitive stone implements from the plateau of the Victoria Falls. Mr. Lamplugh directed attention to these (Report of Brit. Association for 1905, p. 300) as being possibly older than the excavation of the Batoka Gorge, and Colonel Feilden has already urged their importance upon the readers of this Journal (NATURE, vol. lxxiii., p. 77). We trust that we have said enough to show that geology in the best sense, as a critical and comparative science, flourishes in the dusty and inchoate city of Johannesburg. Probably there is no part of the world where geological phenomena play so large a part in the thoughts of cultivated men.

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AËRONAUTICS AND METEOROLOGY.

THE fifth conference of the International Commission of Scientific Aëronautics was held at Milan, and commenced its sittings on October 1. The conference was formally opened by Prof. Celoria, representing the committee of the Milan Exhibition, M. Gavazzi, representing the municipality, Prof. Palazzo, and Prof. Hergesell, president of the commission.

A large number of representatives attended the conference; Mr. Dines represented the Meteorological Office, and the other English members were Major Baden-Powell, Mr. Patrick Alexander, and Mr. Charles Cave.

The first meeting for the discussion of scientific questions was held in the afternoon of October 1 under the presidency of General Rykatchew and Prof. Palazzo. Prof. Hergesell read his report, and various questions were discussed relating to the business of the conference. In the

evening the committee of the exhibition entertained the members of the conference at dinner.

On October 2 the members went to Pavia, where M. Gamba showed them over the observatory, and liberated two *ballons-sondes*. After visiting the university the members were entertained at luncheon by the municipality of the town.

The second meeting was held on October 3 under the presidency of Prof. Assmann and M. Teisserenc de Bort. Dr. Erk urged the necessity of making ascents in the neighbourhood of the Alps for studying local phenomena, such as the Föhn. M. de Quervain explained a method of using small pilot balloons for determining the winds at different altitudes; small india-rubber balloons were liberated and watched with a theodolite; assuming that the balloon ascended with uniform velocity, it was possible to determine its course from one station. Prof. Hergesell spoke very highly of the method which he had used at Strasburg and elsewhere, and mentioned that in Spitsbergen he had watched the balloon to a distance of 80 kilometres. M. Ebert explained his method of determining the deformation of the electrical equipotential surfaces in the neighbourhood of a balloon, and exhibited a new apparatus for measuring the ionisation of the air.

The third meeting was held in the afternoon of October 3 under the presidency of Colonel Vives y Vich and Mr. Cave. General Rykatchew and M. Riabouschinsky read the reports of the work of their observatories. M. de Quervain read a paper on the thermal inertia of thermometers used in kite and balloon ascents. In connection with this an important discussion took place on the relative value of *ballons-sondes* and kites for the study of the air up to 5000 metres or so. Prof. Hergesell strongly advocated the use of balloons in preference to kites; General Rykatchew and M. Berson thought that kites were far more suitable.

Mr. Rotch read a paper on the ascents of *ballons-sondes* in America, and General Rykatchew read a paper on the temperature gradient as observed at Pavlovsk.

Prof. Hergesell explained a method of recording vertical movements in the atmosphere by attaching a "log" to balloons. M. de Quervain gave proofs of the reality of the isothermic zone.

In the morning of October 4 the members visited the aeronautical section of the exhibition, and *ballons-sondes* were liberated by M. Gamba, M. Teisserenc de Bort, and Prof. Hergesell. In the afternoon the fourth meeting was held under the presidency of Mr. Rotch and M. Scheimpflug. General Rykatchew described M. Kouznetzow's method of determining the height of clouds at night by means of a search-light, and gave some of the results obtained at Pavlovsk. M. Köppen, M. Teisserenc de Bort, and Mr. Rotch observed that the method had been used at Hamburg, in France, and in America. Mr. Alexander read a communication on the forms of propellers for flying machines.

M. Moedebeck urged the necessity of having descriptive charts for aeronautical purposes that would show, for example, dangerous places such as those where there were wires carrying currents at a high potential. M. Scheimpflug gave an account of his method of making maps from photographs taken from balloons. M. Teisserenc de Bort read a report on the necessity of extending the number of stations at which ascents are made, and Prof. Hergesell said he would make every effort to carry out this suggestion. Prof. Palazzo said he hoped that he would shortly be able to establish a kite station on Mount Etna. M. Hinterstösser then gave a lecture on aëronautics from the points of view of science and sport, and illustrated it with lantern-slides.

On Friday, October 5, M. Mangili, president of the committee of the exhibition, entertained the members in an excursion by steamboat on the Lago Maggiore. It had been proposed to make kite ascents, but this proved impossible owing to want of wind. Prof. Hergesell attempted to demonstrate his method of dropping *ballons-sondes* at sea. Unfortunately his apparatus had not arrived, and the *ballon-sonde* sent up did not come down as soon as was intended, and was last seen at a great height and still ascending.