

*Orthis personata*, Zeill.

*Orthis vulvaria*, Schl.

*Orthis circularis*, Sow.

*Spirifer primævus*, Stein.

*Spirifer subcuspidatus*, Schnur.

*Spirifer cf. hystericus*, Schl.

Crinoid columnars, some very large,  $\frac{3}{4}$  inch across. B.M.,  
E 14062.

The *Lodanella*, which was obtained by the last drive of the crow-bar, is magnificent and quite equal to the type-specimen.

It is hoped that these lists will stir up others to search for fossils in this interesting area. We are much indebted to Mr. G. C. Crick and Mr. W. D. Lang, who have most carefully examined and helped us with some of our material.

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#### NOTICES OF MEMOIRS, ETC.

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BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.  
MEETING IN SOUTH AFRICA, AUGUST 15TH TO SEPT. 1ST, 1905.  
PAPERS READ BEFORE SECTION C, GEOLOGY.

I.—ON THE RELATION BETWEEN ORE VEINS AND PEGMATITES.  
By PROFESSOR R. BECK.

THE author gave a summary of the latest investigations on the origin of pegmatites, by W. C. Brögger, H. Rosenbusch, S. Arrhenius, J. H. L. Vogt, U. Grubenmann, and others. In conformity with these authors, he explained pegmatites as products of crystallisation from the superheated water, which remained, after the consolidation of a plutonic magma, as a concentrated solution containing many of the rarer chemical elements and compounds formerly distributed through the whole fluid mass. Being retained in the depths of a plutonic focus under high pressure, these remains of magmatic water could pass through a very gradual process of cooling; whereas the so-called 'juvenile' thermal waters (*Juvenile Quellen*) of similar origin found their way to the upper parts of the earth's crust, and caused there the formation of minerals at lower temperatures and pressures.

Most ore veins belong to the second class, but a considerable number of occurrences may be styled metalliferous pegmatites.

The best known examples of these are found in the group of tin ores, and as such were discussed the ore veins of Zimwald, Graupen, Embabaan, and others.

As examples of copper ores were cited those of Telemarken in Norway; and finally some gold-bearing quartz reefs were described which are very nearly related to pegmatites, and that not merely by their characteristic mineralogical composition (Berezowsk, Southern Appalachians, Yukon District, Passagem, and other instances in Brazil). It may be mentioned in proof of this that certain gold quartzes contain tourmaline, the characteristic mineral of all pegmatites.

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II.—THE CLASSIFICATION OF THE KARROO BEDS OF SOUTH AFRICA.  
By Professor R. BROOM, M.D., B.Sc.

AN attempt is made from the study of fossil remains to give a more satisfactory subdivision of the Karroo System than has hitherto been possible. The larger subdivision into the Dwyka, Ecca, Beaufort, and Stormberg Series is retained.

The Beaufort Beds are divided into series. The lowest is characterised by the presence of Therocephalians and Anomodonts. These lower beds can be again divided into an earlier series, in which occur *Pareiosaurus* and *Titanosuchus*, and a later series characterised by the prevalence of *Dicynodon* and *Oudenodon*.

Above the Lower Beaufort Beds occur a Middle series, characterised by the rarity of reptilian remains other than of *Lystrosaurus*, which is very abundant.

The Upper Beaufort Beds are characterised by the presence of the Theriodonts. In the earlier subdivision of these upper beds *Procolophon* is the most characteristic fossil, and in the upper the Theriodont *Trirachodon*.

The Stormberg Beds appear to be divisible into two groups—a lower, the Molteno Beds, and an upper, which includes the Red Beds, the Cave Sandstone, and the Volcanic group.

The Dwyka and Ecca Series are believed to represent the Lower and Middle Permian of Europe, and the Lower Beaufort Beds the Upper Permian.

The Middle Beaufort and Upper Beaufort Beds are believed to correspond to the Lower and Upper Trias of Europe.

The Stormberg Beds are believed to be Lower Jurassic or Rhætic, and the Upper Stormberg Beds Lower Jurassic.

III.—THE STORMBERG FORMATION IN THE CAPE COLONY. By  
ALEX. L. DU TOIT, B.A.

THE Stormberg Formation is the uppermost division of the Karroo System in South Africa, and builds up the whole of Basutoland and the adjoining portions of the Cape Colony, the Orange River Colony, and Natal. In the Cape Colony the tract occupied by this formation is confined to the immediate neighbourhood of the Drakensberg Range, widening out considerably in the south-west over what is known as the Stormberg area.

The Stormberg series is subdivided as follows in downward succession :—

- (4) Volcanic Beds,
- (3) Cave Sandstone,
- (2) Red Beds,
- (1) Molteno Beds.

The strata lie nearly horizontally, or are only inclined at low angles, consequently the lower divisions crop out along the foot of the mountain ranges, while the upper beds form all the higher ground. The Molteno Beds consist of a thickness of 1000–2000 feet of sandstones, with thin, dark shales and mudstones and occasional

coal-seams. Arenaceous material is predominant, and the sandstones vary from fine-grained grey felspathic varieties to coarsely crystalline 'glittering' sandstones, with small pebbles of vein-quartz. Boulders of hard white or brownish quartzite, derived evidently from the Cape Formation, are common, usually scattered irregularly throughout the sandstone beds, but occasionally forming conglomerate bands. The coals are thin, and contain from 15 to 30 per cent. of ash, but are the only workable deposits in the Cape Colony. Fossils are almost entirely those of plants, e.g., *Thimfeldia*, *Teniopteris*, *Callipteridium*, etc., from which the Rhætic age of the beds has been deduced.

The Red Beds are more argillaceous in character, and consist of 600–1600 feet of strata, in which red and purple shales, mudstones, and sandstones are predominant, though thick beds of fine-grained white sandstone are also common. Fossil remains are chiefly those of carnivorous Dinosaurs, such as *Euskelesaurus* and *Massospondylus*.

The Cave Sandstone is a thick bed of fine-grained felspathic sandstone, usually white or yellowish in colour, and of very striking appearance. As a rule, it is unbedded throughout, except towards its summit, or less commonly towards its base. In some places it attains a thickness of 800 feet, but as a rule it varies from 150 to 350 feet. In a few places the Cave Sandstone is entirely absent, and the volcanic beds rest directly upon the red beds. The Cave Sandstone weathers into most fantastic outlines, and gives rise to very peculiar scenery along the Drakensberg.

The sediments of the Karroo System were deposited in a great inland sea, 'the Karroo Lake,' in which the water was either fresh or slightly brackish, and not very deep. During the formation of the Stormberg rocks the shore-line stretched where the coast ranges of the south of the Colony now rise, and extended eastwards into the Indian Ocean, and then north-eastwards parallel to the coastline of Natal. This old land surface was formed of rocks belonging to the Cape and Pre-Cape Systems, quartzites, granites, and metamorphic rocks.

During Cave Sandstone times volcanoes came into existence, and great eruptions of basic lavas took place. Over 100 volcanic necks have been mapped by the Geological Survey, some of which are over a mile in diameter. Many of the pipes are filled with siliceous breccias, or with fine-grained sandstone-like tuffs. The erupted material consists almost entirely of basic lavas, compact to vesicular, the most interesting variety of the latter being the 'pipe-amygdaloid'; enstatite-andesites occur in a few places. Beds of volcanic ash are met with in Barkly East and around Jamestown. In the former district there are frequent alternations of lava, ash, and sandstone, the even bedding and passage of sandstone into ash, either laterally or vertically, pointing conclusively to sub-aqueous eruptions. The later flows were probably subaerial.

At the close of the volcanic outbursts, after 2000–5000 feet of lavas had been erupted, the area was affected by gentle folds by which the direction of flow of the Kraai and Orange Rivers was

determined. Then followed the gigantic and extensive intrusions of dolerite, which at the present day form such a conspicuous feature in the scenery of the Karroo.

The interior of the colony was intermittently elevated, and the old land surface in the south disappeared beneath the waters of the Indian Ocean. A series of peneplains, or plains of river-erosion, mark the periods of rest and elevation of the country, the highest of which is now found at an altitude of a little over 8,000 feet above sea-level. The plateau of the Drakensberg has been deeply cut into on the west and south-west, but on the south-east it presents an almost unbroken face, over 300 miles in length, rising from 2,000 to as much as 6,000 feet above the ground at its base.

IV.—INDEX GENERUM ET SPECIERUM ANIMALIUM.—Report of a Committee, consisting of Dr. HENRY WOODWARD (Chairman), Dr. F. A. BATHER (Secretary), LORD WALSLINGHAM, Dr. P. L. SOLATER, Rev. T. R. R. STEBBING, Dr. W. E. HOYLE, and the Hon. WALTER ROTHSCHILD.

**S**ATISFACTORY progress has been made by Mr. David Sherborn in the recording of literature from 1801 onwards. Among other works now indexed up to 1850 may be mentioned the "Annals and Magazine of Natural History," the "Academia Cæsarea," and the "Neues Jahrbuch für Mineralogie." Various tracts dealing with the collation of difficult books have been issued, and a reprint of the descriptions of new species of birds drawn up by Pallas for "Vroeg's Catalogue," 1764, has been published by the Smithsonian Institution, under Mr. Sherborn's care, from the unique copy in the Linnean Society's Library. The search for rare books still continues, and any such acquisitions are made available for public use by transference to one or other of the accessible libraries. Special thanks are due to the Italian Government, the University of Padua, and Professor Dante Pantanelli for enabling the Committee to examine the "Tavola alfabetica delle conchiglie adriatiche" of Stefano Andrea Renier (1804). Help of this nature, as well as valuable criticism, is continually forthcoming from home and abroad, and the general interest taken in the published volume (1758-1800) is highly gratifying to Mr. Sherborn and satisfactory to this Committee, which, in this connection, desires to return its thanks especially to Mr. L. B. Prout and Mr. C. W. Richmond.

#### R E V I E W S.

I.—MESOZOIC PLANTS FROM NAGATO AND BITCHU. By M. YOKOYAMA. (Journ. Coll. Sci. Univ. Tokyo, vol. xx, art. 5, pp. 13, and 3 pls. 1905.)

**P**ROFESSOR YOKOYAMA has continued his studies of the Mesozoic floras of Japan, and in the present communication confirms his previous conclusion as to the Rhætic age of the fossil plants of the Coal-bearing series of Nagato. Eight species are