GEOLOGY OF THE LOWER OLD RED SANDSTONE DURMOTTAR GROUP, SCOTLAND.

The area along the coast from Stonehaven Harbour to Tremuda Bay, which comprises the Dunnottar Group of the Lower Old Red Sandstone in Kincardineshire, was mapped on 25 inches to 1 mile scale, to show the different rock types, trends of the bedding, and the structure.

The entire succession was divided on lithological grounds into thirteen zones which are often quartzite conglomerates with sandstone lenses but occasional bands of other sedimentary rocks like breccia and mudstone, mixed sedimentary and volcanic rocks like tuffaceous sandstones, sandy tuffs and volcanic conglomerates and igneous rocks like andesitic and basaltic lava flows are found. A description of the location of each zone in the area, their lithology and other important characters is given.

A grain size and roundness analysis of sandstone samples representing the entire area is carried out. Pebble orientation studies from eight suitable localities is also performed, on the basis of which an evaluation of the nature and position of the source area has been attempted,

The major and minor dislocations, in the area, are mapped and found to belong to two distinct groups having different trends of their strikes, different senses of movement and probably different ages.

The development of two lava flows, having different origins and ages, are found in the area. The earlier flow, an andesite lava, is believed to be associated with a local, short lived burst of volcanic activity within the area. Among the younger basaltic lavas, two flows are recognised which are probably multiple flows composed of several flow-units. These lavas mark the end of Dunnottar Group and probably belong to the same flows which now constitute the Sidlaw and Ochil Hills.

The area lies in Kincardineshire, along the east coast of Scotland.

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Sulphide mineralization in Gunnison Plateau, Utah (U. S. A.)

The area of investigation, which lies on the eastern front of the Gunnison Plateau between Coal Canyon and Maple Canyon (south), is formed of formations of Upper Mesozoic and Cenozoic ages.

The formations of Upper Mesozoic age are represented by Twist Gulch-Upper Jurassic, Indianola undifferentiated-Upper Crataceous. Price River Cretaceous, and the lower part of North Horn-Upper Cretaceous. The formations of Cenozoic age are represented by the upper part of North Horn-Paleocene, Flagstaff-Paleocene, Colton-Eocene, and Green River-Eocene.

Of all the formations, the Twist Gulch is the only marine formation present in the area. The other formations represent deposition under fluviatile, fluviolacustrine, and lacustrine environments. The clastic sedimentary rocks account for more than two third of the total thickness of the strata exposed in the area. The North Horn formation constitutes as much as 2000 feet of clastic sedimentary rocks.

Igneous activity is indicated by the glass associated with the Flagstaff formation (limestone) and felsitic lava flows associated with the Green River formation. Some intrusions of quartz-monzonite prorphyry occur west and north of the area of investigation.

The area is traversed by EW and nearly NS striking high angle normal dip-slip faults, A few high angle reverse faults are also present. In the eastern part of the area of investigation recent faulting has occurred. This faulting is mainly confined in recent alluvium and has given rise to prominent scarplets which strike NE—SW.

North of Dry Canyon, the North Horn strata are mineralized. The mineralization of the strata is mainly limited to sedimentary units in the basal part of the North Horn formation where galena, pyrite, and chalcopyrite occur.

A detail field work and laboratory studies revealed that galena, pyrite, and chalcopyrite associated with the North Horn strata are of epigenetic origin, and represent deposition at relatively low temperatures.

The regional relationship of the area of investigation supports an epigenetic origin for these sulfide deposits associated with the North Horn strata,

Evidence for the above conclusion consists of :

1. The localized occurrence of the sulfide deposits.
2. The occurrence of the quartz-monzonite porphyry intrusive bodies in adjacent localities.
3. Igneous activity during Green River time.
4. The typical replacement features present in the pyritized limestone and galena bearing sandstone and conglomerate.

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