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Master Drainage During Deglaciation

Charles Keyes

SANDSTONE OF DES MOINES AGE IN FAYETTE BRECCIA AT ROBINS, IOWA

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In examining the rock exposures in a quarry near the village of Robins, Linn County, Iowa, Mr. R. B. Van Cleve reported finding plant remains in Des Moines sandstone associated with rocks of the Wapsipinnicon Stage of the Iowa Lower Devonian.

Exposures of a terrane carrying a fauna of Devonian age apparently below the Gyroceras beds of the Cedar Valley have been found in Buchanan County and in well drillings containing species of the same fauna in Linn County. This terrane is known as the Independence and has been regarded as older than the Cedar Valley, although the fauna is similar to that of the Upper Devonian Lime Creek formation of Cerro Gordo County.

The discovery by the writer of an extensive exposure of this terrane along the highway west of Middle Amana re-opened the question of the validity of the above interpretation. The finding of Des Moines associated with the Fayette Breccia is regarded as having an important bearing on the question.

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MASTER DRAINAGE DURING DEGLACIATION

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As occupying the middle of the main lobe of the Ashawa glaciation, the upper Des Moines River held strategic position in one of the strangest drainage recoveries and reversals, during ice-cap retreat, that has ever been recorded. While melting of this Keewatin ice-cap, of the Last Glacial cycle, was going on, the Des Moines River played a curious part. It carried off the major volume of melt-waters for an interval of 300 years, until the ice had melted back to Blue Earth, Minnesota, on the drainage divide between the Des Moines and the Minnesota rivers. Then the greatly in-

creased waters from the glacier were turned down the old Minnesota River valley, becoming the River Warren.

During deglaciation of the Keewatin ice-cap, the master drainage effects took on four different and independent phases. River Warren continued to drain the ice-field for 150 years, until the ice-front melted back to Big Stone lake, at the divide between Gulf of Mexico drainage and that of Hudson bay. Then it became the outlet for the ever growing Lake Agassiz, which became continually larger and deeper as the ice retreated down the old Red River valley, where, of course, the front of the glacier served as a dam against northern outlet.

In some respects Glacial Lake Agassiz is unique in its genesis amongst the lakes of the world. Potential lake-basins commonly began to give rise to bodies of water by filling first at the lowest place, and continue to enlarge until overflow at the lowest point in the basin's rim. In strong contrast, Lake Agassiz began to form at its highest level, at the point of overflow, and gradually grew in depth as the ice removed itself from the deeper and deeper parts of the pre-Glacial, north-sloping basin, until, finally, when the ice-front had melted back from the basin's lowest part and permitted access to Hudson bay, the lake was suddenly drained.

Thus the upper Des Moines River took part in one of the strangest changes of drainage that the world has ever experienced.

DES MOINES, IOWA.

CHRONOLOGIC SETTING OF DES MOINES COAL MEASURES

CHARLES KEYES

In its broader, or continental, relationships, the chronologic position of our Iowa Productive coal measures assumes an altogether different aspect from that heretofore commonly presented, and that is implied by their incorporation under the title of Pennsylvanian series. Recent physiographic and diastrophic analysis separates completely our Des Moines coal measures, of the continental interior region, from the typical Pennsylvanian coal section of the Atlantic border.

Instead of the western and the eastern coal measures being deposited at the same time, and being parts of the same terrane, the Des Moines series was largely formed from the ruins of Appa-

