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## Missouri Equivalent of Cedar Valley Limestone

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either as the Thurman-Wilson fault or as the Redfield anticline are not based on sufficient field evidence. They do not form a single straight structure with approximately the same magnitude the entire distance. At the only place where this projected structure has been crossed by a traverse other than along the Missouri Valley the structure was lacking. This traverse is the Middle River traverse by Condra and Upp. Furthermore, where best exposed (i.e. at Jones Point, Nebraska and near Thurman, Iowa) the structure plunges to the northeast 65 feet in  $4\frac{1}{2}$  miles. At this rate it would soon die out. While it is true that there is some deformation of strata in this region, the paucity of well records and of exposures and uncertainties as to the exact correlation of the strata do not reveal the magnitude of the displacement.

It is more likely that there is a series of deformations, possibly en echelon, forming a broad zone of faulting and monoclinical or anticlinal folding. Many small faults and folds are exposed in the field, paralleling this structure. Therefore a zone of faults or folds several miles in width would best explain the displacement of the strata.

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## MISSOURI EQUIVALENT OF CEDAR VALLEY LIMESTONE

CHARLES KEYES

When Louis Agassiz delivered, at the University of Iowa, in 1867, his now famous lectures on Ancient Coral Reefs, he selected for his main theme the great coral reef upon which Iowa City was built. Reputation of Iowa's great Coral Reef was established. This reef was, as we now know, the main median body of Owen's Cedar Valley limestone. Now this great coral reef appears not to extend very far south of Iowa City, and seems to be altogether unrepresented in Missouri. Inasmuch as in Missouri the Cooper limestone appears to be the equivalent of the Wapsipinicon limestone of Iowa, the Mineola limestone the extension of the Solon limestone of Iowa, and the coral reef to be **absent in the south**, it leaves the Callaway limestone representative not of the whole of the Cedar Valley section of Iowa, as commonly assumed, but

only that portion above the coral reef, and known as the Hutchison formation. All the numerous Callaway fossils common to the two states come from this uppermost Cedarian horizon. In view of the Callaway being the first title proposed for the formation it is now introduced into Iowa terranal terminology.

DES MOINES, IOWA.

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## EXTENSION OF MARYVILLE LOWLAND INTO IOWA

CHARLES KEYES

In the recent description of the major physiographic provinces of Iowa (*Pan-American Geologist*, volume LXX, p. 39, 1936) the Loessial Hills belt and the Dividal Upland division were represented as reaching quite to the Missouri boundary, in the southwestern quarter of our state. Notwithstanding the circumstance that this is quite so, there is yet obvious diminishing force of the two provinces mentioned towards the extreme south. The area south of the Red Oak fault is very noticeably flattened and hollowed, and is occupied in the down-throw depression by little-resistant shales. This shallow basin is rimmed all about by limestone escarpments, and to a notable extent impresses its form upon the larger provincial features as to almost over-shadow them at times.

The basin feature is really a continuation, from Missouri, of what Marbut long ago defined as the Maryville lowland. And this title now seems very appropriate for the Iowa part of the physiographic province also.

DES MOINES, IOWA.

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## OLDEST FLOWERING PLANTS ARE FROM IOWA

CHARLES KEYES

Recent analysis of an abundant coal flora dislodged from "coal-balls," or "sulphur balls" of the miners, obtained near Des Moines, reveals a number of fine flowers showing all the essential structures of present-day forms. These occur near the base of the local coal measures. Stratigraphically the horizon is very low in the Mid Carbonic general column. Above this level are now known no less