

is very different from that of southeastern Missouri, and much confusion attended the earlier attempts to refer this formation to its proper position in the series. This confusion was evidently due, in large part, to the failure of earlier workers to recognize the disconformities at the base and at the top of the formation. The apparent tendency of the Spergen to grade laterally into the Warsaw or the Saint Louis has resulted entirely from these relationships. In addition, the Spergen is very variable in lithologic character in this region, due in part to original conditions of sedimentation, and in part to differences in the degree of dolomitization. It is not uncommon to find a cross-bedded, crinoidal limestone passing laterally within a short distance through imperfectly dolomitized limestone into massive, brown dolomite, and this again into a brownish arenaceous dolomite, which may in turn give way to a fine-grained, bluish sandstone. Such rapid changes clearly indicate near-shore conditions during deposition. This is also suggested by the limited extent of the formation in Iowa, and by its rapid thinning to the northwest. Its thickness in this region varies from 0 to 35 feet.

The Saint Louis limestone of Iowa also shows marked evidence of shallow conditions during deposition, although it has a much more widespread distribution than the Spergen. It consists of two distinct subdivisions separated from one another by a disconformity. For convenience these may be designated as the Lower Saint Louis and the Upper Saint Louis. The Lower Saint Louis is by far the most extensive of the two members. This extends far to the northward, overlapping all the earlier formations of the Mississippian except the Kinderhook, upon which it rests in Humboldt county. It consists for the most part of massive beds of compact, dolomitic limestone, but frequently these are found to grade laterally into gray, non-dolomitic limestone within short distances. At most localities, the lower beds are arenaceous. Ripple marks and cross-bedding may appear locally at any horizon. In southeastern Iowa, mound-like reefs of limestone with undisturbed layers lapping up on

their flanks are occasionally found in the formation. These were evidently formed by wave action during deposition. The thickness of this division is about thirty feet. The Upper Saint Louis consists for the most part of light gray compact limestone which is locally dolomitized either wholly or in part, and shows the same evidence of shallow water deposition as the Lower. Locally, this division passes laterally into sandstone in part. The Upper Saint Louis seldom exceeds twenty-five feet in thickness.

The writer has observed further evidence of the relation of the extensive dolomitization to the shallow water zone in the Cedar Valley limestone, of Upper Devonian age, in Iowa. In Johnson county, which is located a short distance south of the east-central portion of the state, this formation has an exposed thickness of approximately one hundred feet and consists of fairly pure, gray fossiliferous limestone almost entirely devoid of dolomite. But in Mitchell, Howard, Winneshiek and other counties in the northern portion of the state, the Cedar Valley is made up of interbedded limestone and dolomite, and bears evidence of having been deposited in shallow seas. The beds are impure, shaly partings are common between the layers, and evidences of contemporaneous erosion are frequently encountered.

The suggestion is ventured that careful study of other Paleozoic limestones will disclose similar evidence of more extensive dolomitization in their shallow water facies.

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