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A SPIRIFER DISJUNCTUS FAUNA IN IOWA

LOWELL ROBERT LAUDON

INTRODUCTION

The Sheffield formation is found in north central Iowa lying unconformably on the Owen limestone of Upper Devonian age and unconformably below the Hampton formation of Kinderhook age.

The region in which the Sheffield is best exposed is in northeastern Franklin county within the area of the Iowan drift. The drift is thin enough in this area to reflect the underlying rock surface. The soft nature of the Sheffield material has allowed the streams to curve out a mature rolling topography in this portion of the county. Because of the thin Iowan drift the exposures of the Sheffield are found near the tops of the hills as well as in the beds of the streams. The drainage of this area is east into Shell-rock river.

PREVIOUS WORK

Very little detailed work has been done in this region and consequently very little has been published. In 1904, I. A. Williams and S. W. Beyer¹ published a report in which they referred the shales south of the city of Sheffield to the Lime Creek series of the Upper Devonian.

Two years later in the report on the geology of Franklin county I. A. Williams² again referred these shales to the Lime Creek series of the Upper Devonian.

In 1919 C. L. Fenton³ proposed the name Sheffield for the plastic blue shale which underlies the Hackberry formation. Fenton undoubtedly thought that the shales beneath the Hackberry formation were identical with the shales near Sheffield.

This situation was straightened out in 1922 by A. O. Thomas⁴ who proposed the name Juniper Hill for the shales lying immediately beneath the Hackberry formation and retained the name

¹ Williams, I. A. and Beyer, S. W., *Technology of Clays*, Ia. Geol. Surv., Vol. 14, pp. 402, 1904.

² Williams, I. A., *Geology of Franklin County*, Ia. Geol. Surv., Vol. 16, pp. 453-507, 1906.

³ Fenton, C. L., *The Upper Devonian of Iowa*, Am. Jour. Sci., Vol. 48, pp. 355-376, 1919.

⁴ Thomas, A. O., Ia. Geol. Surv., Vol. 30, pp. 116, 1922.

Sheffield for the shales which overlie the Owen limestone near Sheffield.

The Sheffield shales were referred to the base of the Kinderhook in 1922 by Van Tuyl⁵ who was evidently under the impression that they were equivalent to some part of the basal Kinderhook shale bed of southeastern Iowa.

DISTRIBUTION AND THICKNESS OF THE SHEFFIELD

The exposures of the Sheffield are practically limited to a few counties in the north central portion of the state. The best exposures are within the limits of Franklin county where it has been extensively mapped. A few exposures may be seen in the southwestern portion of Butler county. Furthermore the Sheffield formation has been positively identified in an exposure at Amana, Iowa which is over 125 miles southeast of Franklin county. A few exposures may also be seen along Iowa river in eastern Marshall county and western Tama county that undoubtedly should be referred to the Sheffield. Well sections penetrating the shale bed which overlies the Devonian limestones show considerable portions of dolomite in the area between Franklin county and Iowa county. The presence of this dolomite indicates that the Sheffield outcrops beneath the drift in a continuous belt from Franklin county to Iowa county.

The entire Sheffield section may not be seen at any one exposure. By measuring each of the zones within the Sheffield the total thickness of the formation has been computed to be 125 feet.

LITHOLOGIC CHARACTER

The basal portion of the Sheffield consists of soft unctuous blue to gray shales. The basal shale bed is overlain by a series of dolomite beds interbedded with soft yellowish calcareous shales. Occasional lenses of sandstone and a little white chert also occur in this central portion of the formation. A single zone of thin bedded hard gray fossiliferous limestone about eight feet in thickness occurs about six feet below the highest observed beds in the formation. The uppermost bed consists of soft brown highly weathered dolomite filled with silicified fossils.

STRATIGRAPHY

The Sheffield formation lies with distinct disconformity on the

⁵ Van Tuyl, F. M., The Stratigraphy of the Mississippian Formations of Iowa, Ia. Geol. Surv., Vol. 30, pp. 91, 1922.

Owen limestone in Franklin county. The unconformity at the base of the Sheffield apparently bevels the whole Lime Creek series and in Iowa county the formation undoubtedly rests on the Cedar Valley limestone. In several places in Franklin county the Owen limestone appears at the same topographic level as do the uppermost beds of the Sheffield within distances of less than one half mile.

The Sheffield is unconformably overlain by the Chapin member of the Hampton formation. Great variations in the thickness of the basal portion of the Chapin member are seen within short distances. This unconformable surface may be traced entirely across Iowa and into northeastern Missouri where the basal Kinderhook beds rest on Ordovician strata. The Kinderhook beds overlap against this unconformable surface and only the uppermost formation of the Kinderhook reaches Franklin county.

PALEONTOLOGY

The fauna of the Sheffield formation is not large as far as number of species is concerned. Many of the zones however are crowded with individuals of one or two species. The fossils of the formation occur mainly as casts in the dolomite but in some places chert replacements have given excellent preservation to the specimens. The lower shale zone is virtually unfossiliferous but fossils may be found in most of the beds above the basal shale zone.

Fauna of the Sheffield Formation

- Aulopora sp.
- Coral, gen. and sp. undet.

- Cystodictya sp.
- Bryozoa, gen. and sp. undet.

- Orthotetes chemungensis
- O. arcostriata
- Streptostriata sp.
- Streptorhynchus sp.
- Chonetes sp.
- Productella lachrymosa
- P. stigmata
- P. costatula
- P. onusta
- Productella sp. No. 1
- Productella sp. No. 2
- Orthis? tioga?
- Camarotoechia sappho

C. contracta
C. orbicularis
Camarotoechia sp.
Spirifer disjunctus
S. mesistrialis
S. mesacostalis
Athyris angelica

Pelecypod gen. and sp. undet.
Pelecypod gen. and sp. undet.

Orthoceras sp.

Fauna taken from the exposure at Amana, Iowa County.

Chonetes sp.
Productella lachrymosa
P. onusta
Athyris cf. *polita*

Liopteria sp.
Crinoid joint
Fish scale

CORRELATION

The fauna of the Sheffield may be correlated definitely with the Chemung of New York since all of the common species of the Sheffield formation are found in the Chemung of that state. *Spirifer disjunctus* occurs in a great variety of forms in the Sheffield formation in much the same manner it does in the Chemung of New York.

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