The Paleoecology and Astogeny of *Prasopora falesi* in the Kings Falls and Sugar River Formations, Trenton Group (Middle Ordovician) at Inghams Mills, New York

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Introduction

Purpose- The Kings Falls and Sugar River Members of the Middle Ordovician Trenton Group exposed at Inghams Mills contain numerous fossils which were deposited when the area was covered by the transgressing sea. Included among these fossils is *Prasopora falesi*, a trepostome bryozoan, which produced a dome-shaped colony on the ocean floor. The purpose of this project was to study the growth habits, living environment and paleoecology of this bryozoan.

Stratigraphic Setting

Kings Falls Formation- Titus (1988) described the Kings Falls Formation as a thick bedded, coarse, sparry calcarenite, with the fossil communities having low diversity and high levels of dominance. The measured section at Inghams Mills is an alternating coarse grained packstone, coarse grained grainstone and calcareous shale.

Sugar River Formation- Titus (1988) described the Sugar River as a fossiliferous, thin-bedded, shaly calcarenite and calcisiltite. The area represents a deep offshore shoal facies as part of the transgressive sea. The exposed section at Inghams Mills is an alternating packstone and grainstone.

Utica Shale- Prasopora samples were also collected at Wintergreen Park in Canajoharie, New York, about 20 km southeast of Inghams Mills. The exposed section there is the Utica Shale, a black shale exposed throughout central New York. The Utica Shale is the equivalent of the Denley Limestone, which overlies the Sugar River, in the Upper Trenton Group.

Methods

The Kings Falls and Sugar River sections at Inghams Mills were measured using a ruler and measuring tape and marked with orange flags. A stratigraphic column was constructed with the recorded measurements and unit descriptions. *Prasopora* samples were collected from the outcrop wherever possible, noting the horizon (Fig. 3). Samples were also collected at Canajoharie, New York, but detailed stratigraphic information was not available. The samples were cut, and acetate peels made of them, using the method of Wilson and Palmer (1989).

Paleobiology of *Prasopora falesi*

The life cycle of *Prasopora falesi* started with a free swimming larva which settled onto the sediment on the ocean floor. The larva metamorphosed into the *ancestrula*, or first *zooid*, and began to asexually bud. The initial budding was apparently disorderly with a small area of zooid growth in diverse directions (Fig. 1). Once the colony was stable, zooids budded parallel to one another. Zooids budded into a hemispheric, dome shaped colony, by budding first sideways along the ocean floor to form a base so that the colony was less likely to be overturned by currents. Once the colony was stable, budding continued on the distal edges, with the zooids being parallel to the base and growing upwards only at their distal ends.

As the zooid walls grew distally, the feeding organ inside would also move outward to remain near the opening. A *diaphragm* made of calcite would be constructed across the zooecial interior to close off the unused space. These diaphragms are evenly spaced in the zooid. Similarly, *cystiphragms*, which are blisterlike laminae which extend about halfway across the zooecium, were constructed to partition off unused space (Fig. 2).

It is reported that the colonies lived on ripple crests if available (Arens 1989) and usually lived in clusters. When a storm would strike, the currents may have ripped up the colonies, carried them, and deposited them elsewhere (Ross 1972). The colonies which landed right side up would quickly try to resume growth while the others would be buried in sediment and die. If colonies were broken or damaged, they would attempt to repair the damage and continue growing.

Results

Prasopora falesi lived on the ocean floor. The colony grew quickly to avoid being smothered in sediment deposited by a storm and to avoid being ripped up by the currents of a storm.

Borings were also studied in the acetate peels and were found to be *Trypanites*. The borings indicate during life boring as seen by calcite walls formed along the boring after it occurred. Post-mortem borings also exist, as seen by borings through zooid walls and not repaired or bounded by calcite.

Conclusions

1) *Prasopora falesi* lived in a shallow water, storm-influenced environment.

2) The colony budded from the ancestrula as a disorderly mass of zooids, but once it was established, would grow into a dome shape, with parallel tubular zooids.

3) *Trypanites* borings indicate both during life and after death boring.

Systematics of *Prasopora falesi*

Phylum Bryozoa Ehrenberg, 1831

Class Stenolaemata Borg, 1926

Order Trepostomata Ulrich, 1882

Family Monticuliporidae Nicholson, 1881

Genus *Prasopora* Nicholson & Etheridge, 1877

Prasopora falesi (James, 1884)

Prasopora simulatrix ULRICH 1886, p. 85, 1895, p. 243-246, Pl. 16 figs 1-10; CUMINGS & GALLOWAY, 1915, Pl. 11, fig. 19, Pl. 12, fig. 21; MCFARLAN, 1931, p. 95, Pl. 2, figs. 16,17; BASSLER, 1953, p. G97, figs. 57, 4a,b; SPARLING, 1964, p. 1076, Pl. 161, figs. 1-5. (References available on request)

Derivation of name.-- For Professor J. C. Fales, of Center College, Danville, Kentucky.

Holotype.-- Field Museum of Natural History, UC 740.

Type Locality and Horizon.-- *Orthis lynx* bed, Cincinnati, Ohio.

Diagnosis.--*P. falesi* is distinguished from other species by uniform spacing of cystiphragms and diaphragms in zooecia and mesopores; subcircular shape of zooecia and distribution of mesopores is distinctive in tangential section.

Description.-- Externally characterized by sub-conical to hemispherical shape. Flattened, wrinkled discoidal base (epitheca). Cylindrical zooecia of uniform diameter, varying in length. Thin zooecial walls, small angular mesopores, with more cystiphragms and of variable diameter. Acanthopores found mainly within walls of colony where thin, granular walls thicken and become laminar. Poorly defined dark tissue with translucent center. Slight thickening of walls commonly extending for short vertical distances. Diaphragms, thin laminar plates, extend across zooecia and mesozooecia. More closely spaced in mesozooecia. Cystiphragms are convex blisterlike structures projecting from zooecial tubes curving around 3/4 of zooecial tube. Maculae consist of zooecia of above average size encircling a central cluster of mesopores; may or may not be present.

Dimensions.-- Up to 50 mm height; up to 100 mm diameter.

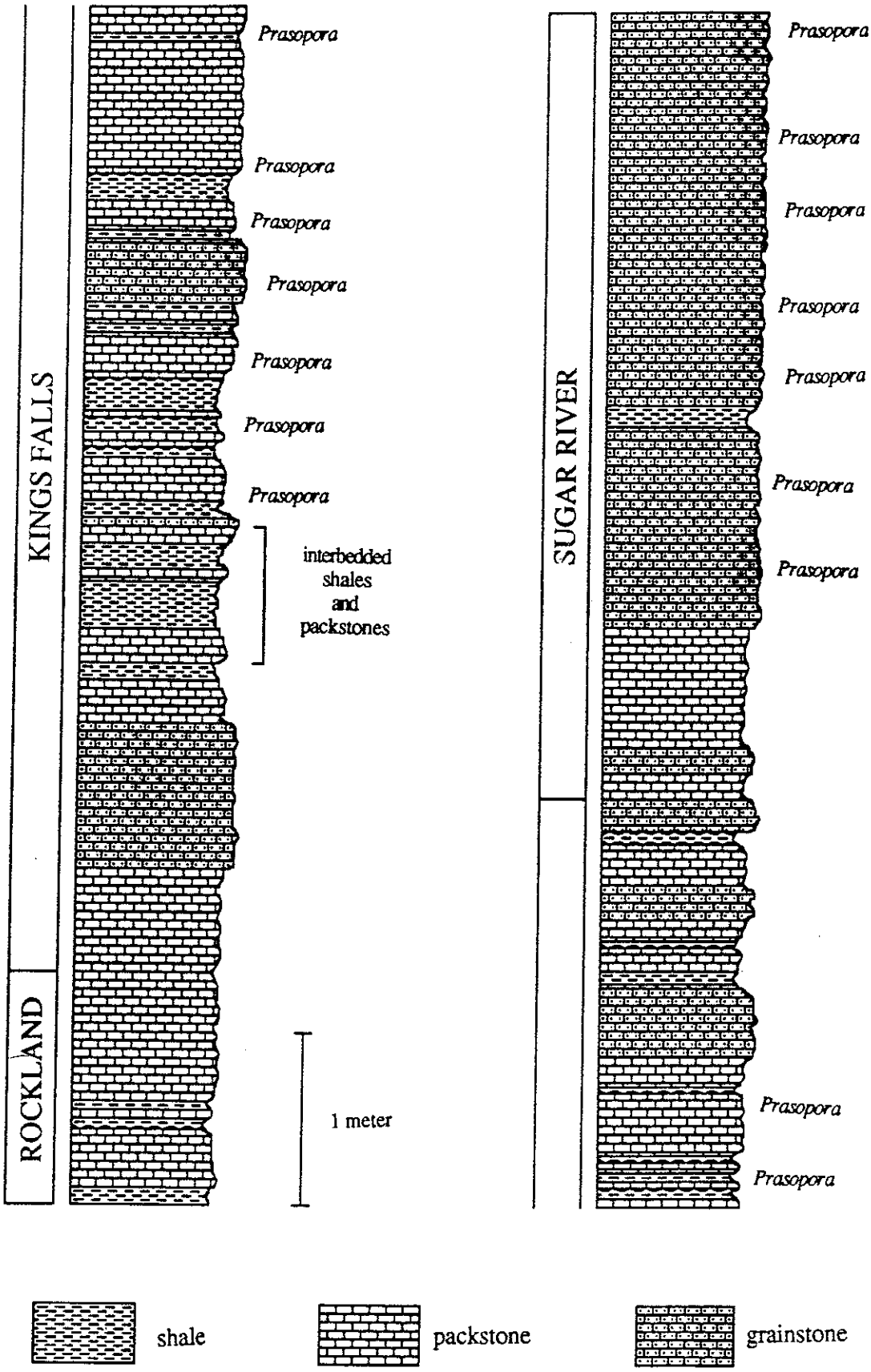

Fig. 3- Stratigraphic column of Inghams Mills with markings where *P. falesi* were sampled.

References

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Fig. 1- Longitudinal section of *Prasopora falesi* showing growth from ancestrula (40 x). From Inghams Mills, Trenton Group (Middle Ordovician).

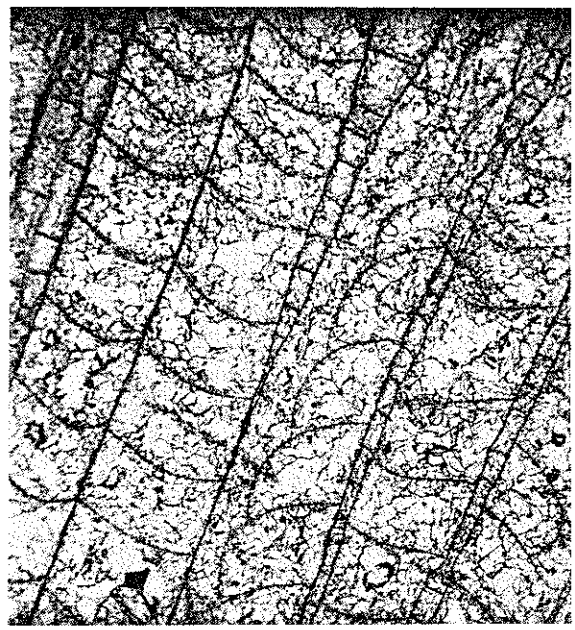

Fig. 2- Longitudinal section of *P. falesi* showing cystiphragms and diaphragms (40 x). From Inghams Mills, Trenton Group (Middle Ordovician).