

A WELL-PRESERVED *DINOBOLUS* FROM THE
SANDPILE GROUP (MIDDLE SILURIAN) OF
NORTHERN BRITISH COLUMBIA

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ABSTRACT. A silicified individual allows a more detailed description of the posterior portion of *Dinobolus* than was previously available. There is no trace of the existence of a pedicle and a functional pedicle may have been atrophied in the genus.

THE Sandpile group (Middle Silurian) of northern British Columbia contains an extensive silicified coral and brachiopod fauna preserved in fine-grained, slightly cherty, thick-bedded dolostones. A single incomplete specimen of *Dinobolus* was etched free and is thought to represent a mature individual. The two valves were in contact within the rock, but became separated during the etching process.

In the descriptions of the genus and of the family by Hall and Clarke (1892), and by Davidson and King (1874), the internal characters are almost entirely based on naturally forming internal moulds, whereas the Sandpile specimens are silicified valves. The Schuchert Collection at Yale University contains a representative selection of the Trimerellidae including gutta-percha impressions taken from many of the internal moulds from which Hall and Clarke reconstructed drawings of the original valves (Hall and Clarke 1892, pl. 4A-4D). In most of these drawings the beak and hinge regions of the valves have been considerably restored.

The Sandpile material does not amplify knowledge of the interiors of the valves over that presented by Davidson and King, but does allow further description of the structures of the hinge, and of the pseudodeltidium. Most of the terminology is derived from Davidson and King (1874), but the following terms are also used in this discussion for convenience of description: cardinal socket, pseudodeltidium, plate (Pl. 41, figs. 16, 17).

Family TRIMERELLIDAE Davidson and King 1874

Genus DINOBOLUS Hall 1874

Type species *Obolus conradi* Hall 1868

Dinobolus sp. cf. *D. conradi* (Hall)

Plate 41, figs. 8-17

?*Obolus conradi* Hall 1868, pp. 368-9.

?*Dinobolus conradi* (Hall); Davidson and King 1874, pp. 160-1.

?*Dinobolus conradi* (Hall); Hall and Clarke 1892, pp. 38-39.

Description. Test biconvex, thick shelled, with faint concentric growth-lines near the margin. Pedicle valve with a small beak. Pseudodeltidium low, broadly triangular, slightly convex, bounded laterally by two grooves, and with a well-developed anterior slope curving into the cardinal socket at the hinge; without ornament preserved on the surface of the pseudodeltidium and without perforation or median groove (Pl. 41,

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figs. 8, 9). Hinge plate bearing a low pedically directed undulation and supported by a well-developed cardinal buttress (*c* of fig. 10). Platform prominently vaulted with a biconvex brachial surface, vaults separated by a median partition (*m*). Cardinal buttress forming a double-chambered umbonal cavity; buttress tapered anteriorly, resting medianly on the platform. Muscle scars present on the platform and on the valve floor outside it.

Brachial valve with an inconspicuous beak. A thin, elevated, saucer-like, transverse plate located in front of the beak and fitting snugly into the cardinal socket of the pedicle valve (fig. 15). Two cardinal impressions on the hinge immediately in front of this plate, moulding the brachial surface of the pedicle valve's hinge plate. Platform vaulted, with a depression above the median partition, surface biconvex but less strongly so than the surface of the platform of the pedicle valve. Umbonal cavity with a deep subcardinal impression (the figured specimen shows a hole in the shell at the centre of this depression).

Distribution. Sandpile group, Geological Survey of Canada collection 35165, from altitude 5,750 feet, 2 miles north-west of the southerly of the two lakes in Sandpile Creek, McDame, British Columbia; 59° 03' north, 128° 11' west. Geological Survey of Canada numbers 14487a (pedicle valve) and 14487b (brachial valve).

Discussion. The paucity of the studied material and the lack of complete valves preclude a complete description and identification, but the individual agrees with *Dinobolus conradi* (Hall) as discussed by Hall and Clarke who allowed a great deal of variation within the species. *D. conradi* has been reported from rocks of Niagaran age.

Davidson and King (1874) described one structure that they thought characterized the Trimerellidae, the sub-marginal crescent, confined to the posterior half of each valve and formed of three portions, the crown, the sides, and the ends. 'This part (p. 130), or merely a portion of it, may present itself in relief, excavated, obscurely, often partially in any of these conditions, or complicated by successive enlargements of its area; so that we feel a difficulty in representing it otherwise than diagrammatically, or in giving a description that is strictly accurate when applied to any single case.'

The crown is described as a line, the sides as pointed ovals, and the ends as obscurely defined areas. Examination of the specimens from British Columbia finds the crown to be situated between the hinge and the pseudodeltidium, i.e. at the site of the cardinal socket, and it appears to have little in common with the sides of the crescent, other than geometric continuity. The sides and ends of the crescent may well be the sites of muscle scars.

The cardinal facet of Davidson and King (p. 128, corresponding to the cardinal socket of this description) 'generally inclines or falls towards the cavity of the shell', and (p. 130) 'there is situated on the cardinal facet an oval-shaped scar or *lozenge* (*g*), having its long axis in the transverse direction of the valve'. This socket houses the plate of the brachial valve when the valves are in contact.

The deltidium of Davidson and King (pseudodeltidium of this description) represents the track on the pedicle valve of the edge of the plate of the brachial valve, and its anterior slope (deltidial slope of Davidson and King) suggests accelerating increase in size of the plate and the cardinal socket during growth.

The grooves bordering the pseudodeltidium are thought to represent the tracks of the cardinal extremities of the brachial valve. No trace was observed of 'deltidial ridges'.

Discussing the brachial valve, Davidson and King state (p. 128): 'The central portion of the hinge in certain species show nothing remarkable, . . . but in others it distinctly displays an excavation or *cardinal scar* . . . the excavation is bicupped in *T. ohioensis*; but the same species also presents it transversely grooved. There is no prominence in these cases. In some other species, however, the cardinal scar, though in general badly seen, appears to be situated on an elevation . . . rounded, or squared, and more or less developed, according to species. Nay, in the same species, as in *T. Lindströmi*, the elevation varies much in size, certain individuals having it very small, others very large and standing out like a great tooth . . . so large that it must have dipped deeply into the umbonal cavity of the pedicle-valve.'

Comparing these statements with the Sandpile specimens, and bearing in mind the nature of the internal moulds from which the authors drew most of their information, their elevation corresponds to the plate, which lies immediately behind the pair of cardinal impressions, referred to by them as the cardinal scar. This explanation suggests that their material revealed these structures so poorly that confusion of such closely adjacent structures was possible.

Investigation of *D. sp. cf. D. conradi* reveals no trace of a pedicle opening in the pseudodeltidium, nor of a groove in the hinge region of either valve, such as might be expected had the pedicle passed between the valves. Indeed, the plate of the brachial valve fits into the cardinal socket and would prevent the extrusion of a median pedicle. A functional pedicle may have been completely atrophied in *Dinobolus* and possibly also in the rest of the Trimerellidae.

There is no trace of the hinge teeth and sockets that characterize the class Articulata, but the species certainly does possess articulation as defined by Schuchert and Cooper (1932, p. 6), thus leaving as obscure the position of the Trimerellidae in a scheme of classification.

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