# CONTRASTING FEEDING STRATEGIES RECORDED BY BIVALVE TRACE FOSSILS FROM THE UPPER CARBONIFEROUS (PENNSYLVANIAN) OF EASTERN KANSAS

MANGANO*, M. Gabriela, Kansas Geological Survey, 1930 Constant Avenue, The University of Kansas, Campus West, Lawrence KS 66047, U.S.A.; BUATOIS, Luis A., Kansas Geological Survey, 1930 Constant Avenue, The University of Kansas, Campus West, Lawrence KS 66047, U.S.A.; MAPLES, Christopher G., Kansas Geological Survey, 1930 Constant Avenue, The University of Kansas, Campus West, Lawrence KS 66047, U.S.A.; WEST, Ronald R., Department of Geology, Kansas State University, Manhattan KS 66506, U.S.A.

Modern bivalves have been the object of extensive study concerning feeding habits and burrowing process. Little has been done, however, to apply this information from modern faunas to interpret bivalve trace fossils in terms of behavior and trophic types.

The Upper Carboniferous of Kansas near Waverly (Stull Shale Member, Kanwaka Shale Formation) represents a superb occurrence of different trace fossils associated with the activity of burrowing bivalves, commonly referred to as *Lockeia*, *Uchirites*, *Imbrichnus*, *Walcottia*, *Chevronichnus*, and *Palaeophycus*. Another unique aspect of the Waverly section is the existence of thin shell lenses within ichnofossil-bearing beds. Although relatively poorly preserved, bivalve body fossils (e.g. *Wilkingia*, *Phestia*, pectinids indet.) are quite common and offer a realistic picture of the possible producers. Waverly deposits consists of thin-bedded, amalgamated, lenticular, rippled-top sandstones and siltstones that display a distinctive set of sedimentary structures indicative of tidal flat sedimentation (e.g. wavy and flaser bedding, wrinkle marks, flat-top ripples). Crowded surfaces display cross-cutting relationships of ichnotaxa and differential preservation of epichnial *Lockeia* (concave vs. convex epireliefs) that record a complex history of succesive events of colonization, erosion, deposition, and recolonization. These composite horizons represent, in some sense, time-averaging surfaces.

From a trophic standpoint, two groups of traces recording contrasting feeding strategies have been recognized: suspension and deposit-feeders. Size frequency distribution analysis, functional morphology, and morphologic features displayed by biogenic structures point out to *Wilkingia* (Pholadomyidae) and *Phestia* (Nuculanidae) as the most likely tracemakers of respective groups.

Large *Lockeia* (length mode 30 mm) hyporeliefs are commonly connected with vertical to incline burrows ending in oval to almond-shaped, concave or convex epireliefs. Horizontal locomotion traces are not associated. These structures record vertical displacement through the sediment, and suggest relatively stable domiciles. Irregular outlines displayed by some large hypichnial *Lockeia* may indicate the cast of the foot, while others exhibit outlines that closely match anterior sagital sections of *Wilkingia*. Relatively fixed vertical to inclined life positions and restricted upward-downward mobility suggest a filter-feeding strategy. Moreover, the elongated shell and pallial sinus of *Wilkingia* provide a strong independent line of evidence, which supports a siphon-feeding tracemaker with siphon located at the posterior end.

A second group of bivalve traces include small *Lockeia* (length mode 16 mm) and various locomotion ichnotaxa (e.g. *Uchirites*) whose construction was mainly controlled by substrate fluidity. In many cases, locomotion traces end in small specimens of *Lockeia*, indicating different behavior of the same architect. When sharply preserved, small *Lockeia* exhibit distinctive fine parallel lines that undoubtely correspond to *Phestia* ornamentation. The presence of a longitudinal ridge probably records the post-mortem opening of the valves and suggests that many *Phestia* died in their own resting traces. This association of structures indicates significant horizontal locomotion and suggests an active burrower wandering around in search of food. Lateral migration typically characterizes the activity of deposit feeders. Assuming that small resting traces probably record the life position of *Phestia*, subhorizontal orientation and lack of any indication of siphons suggest an habitat close to the sediment/water interface.