

LATE DEVONIAN GONIATITES (Cephalopoda, Ammonoidea)
FROM NEW YORK STATE

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ABSTRACT

This paper is a revision of the classic nineteenth century goniatite collections from the Devonian of New York State described by James Hall and John M. Clarke. Type material is illustrated photographically, mostly for the first time; the taxonomy is revised, and ontogenetic and statistical data are given, where possible. Detailed biostratigraphic work is reported through the late Givetian, Frasnian, and Famennian, aimed at determining the precise horizon and location of primary material at 184 localities. A description of the considerable additional goniatite material is integrated with that of the classic type specimens to treat the faunas systematically and as a whole. Noteworthy is the different contribution to knowledge provided by a range of preservation patterns, especially of the material preserved as barite replacements from the Cashaqua Shale. The goniatite-bearing horizons are mostly associated with transgressive pulses that punctuate the Catskill Delta succession. The major ones are the upper Tully Limestone, the Genesee and Renwick black shales, the Genesee Limestone, and the Middlesex, Rhinestreet, Pipe Creek, and Dunkirk black shales.

The refined goniatite succession reported is perhaps the most detailed known in the world through the interval studied. The New York faunal levels are correlated with those known elsewhere, especially with Old World successions, and with the new international standard established by Becker & House (2000). Minor regional variations give a more detailed Appalachian regional zonation of 25 zones, which is integrated with the international standard. The succession associated with the major late Givetian faunal turnover (Taghanic Event) is described, and the influence of sea level changes and anoxia on faunal entry and diversification is reviewed. Very little endemism is recognized in the faunas, apart from the multilobed Triainoceratidae that are well developed in the mid-Frasnian of central New York. The late Frasnian succession associated with the Lower and Upper Kellwasser Events is documented. Parallel conodont work provides correlation with the conodont zonation scale. New taxa described are *Koenenites styliophylus kilfoylei* n. ssp., *Koenenites beckeri* n. sp., *Sandbergeroceras? enfieldense* n. sp., and *Manticoceras sinuosum clausium* n. ssp.; the older names *sinuosum* Hall, 1843, and *tardum* Clarke, 1898, are regarded as subspecies of *Manticoceras sinuosum* (Hall, 1843). Lectotypes are designated for *Pharciceras tridens* (G. & F. Sandberger, 1850), *Sandbergeroceras syngonum* Clarke, 1897, *Acanthoclymenia genesee* (Clarke, 1898), *Chutoceras nundaium* (Hall, 1874), *Koenenites styliophilus styliophilus* (Clarke, 1898), *K. ?fasciculatus* (Clarke, 1898), *Manticoceras contractum* Clarke, 1898, *M. sinuosum apprimatum* Clarke, 1898, *M. sinuosum tardum* Clarke, 1898, *M. accelerans* Clarke, 1897, *Carinoceras sororium* (Clarke, 1898), *Delphiceras cataphractum* (Clarke, 1898), *Sphaeromanticoceras rhynchostomum* (Clarke, 1898), *S. oxy* (Clarke, 1897), *Tornoceras uniangulare uniangulare* (Conrad, 1842), and *Truyoloceras bicostatum* (Hall, 1843). The Genesee Limestone Horizon is proposed as a new informally named horizon of the Genesee Group.

INTRODUCTION

Nowhere in the world is the Upper Devonian exposed so continuously and accessibly as in New York State. The lower Upper Devonian (upper Givetian-Frasnian) in particular is seen in quite unparalleled excellence, and this interval has the greatest potential for refining the biostratigraphic record of goniatite cephalopods. The Upper Devonian in New York State crops out over an area of approximately 15,000 mi² (39,000 km²). The sequences are well exposed in innumerable creek, gully, and riverside sections. The beds are undis-

turbed, and over a wide outcrop tract more than 280 mi (450 km) long, the dip of the rocks rarely exceeds 1.5° to the south. With so extensive an outcrop, and so simple a structure, the facies changes from the thin marine sequence near Lake Erie on the west to the thick non-marine sequences in the Catskill Mountains to the east can be correlated and analyzed in great detail (Text-fig. 1).

These goniatite faunas have been known since the work of James Hall (1843) and Lardner Vanuxem (1839, 1842), but it was their description by John M. Clarke (1898, 1899a, b) that made them particularly well known. Clarke