

THE SUBSURFACE ONONDAGA LIMESTONE:
STRATIGRAPHY, FACIES, AND PALEOGEOGRAPHY

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Basin-wide depositional patterns of the Middle Devonian Onondaga Limestone are imperfectly known because its arcuate outcrop belt deceptively exposes only the most shoal-water facies of the formation. The subsurface Onondaga in New York and Pennsylvania, on the other hand, is dominated by moderately deep-water carbonate facies which grade into and are partially time equivalent to the Needmore and Marcellus Shales and the upper Huntersville Chert to the south.

The Onondaga disconformably overlies the Schoharie and Carlisle Center Formations on the eastern side of the basin and the age-equivalent Bois Blanc Limestone (equivalent to the lower Huntersville Chert) on the western side of the basin. In the north-central part of the basin, it unconformably overlies progressively older units from east to west: the Oriskany Sandstone, Helderberg Group, and Bass Islands Group (Upper Silurian). There is, however, no direct evidence for regional subaerial exposure immediately preceding Onondaga deposition.

The Onondaga ranges from 2.5 to 65m (8 to 215 ft) thick and is readily divisible into the Edgecliff, Nedrow, Moorehouse, and Seneca Members. Of these, only the upper part of the Moorehouse Member is present throughout the basin. Other units are absent in places because of nondeposition or submarine scour or because of lateral gradation with the Marcellus Shale.

Onondaga facies are represented by mudstone (fine calcisiltite) or by grainstone, packstone, and wackestone characterized by skeletal constituents of either shoal-water or deep-water faunas. The total absence of oolites, peloids, carbonate intraclasts, coated grains, and calcified or stromatolitic algae indicate that if particularly shallow, nearshore environments existed, they lay north of the present outcrop belt, perhaps marginal to the Algonquin arch and Adirondack massif. Facies patterns for the Edgecliff, Moorehouse, and Seneca Members reveal successively transgressive paleogeographies. Presumably deep-water facies containing styliolines and delicate brachiopods delineate the epicratonic Appalachian basin in south-central New York and most of Pennsylvania. Facies dominated by crinoids, bryozoans, and robust brachiopods outline an arcuate platform that circumscribed the basin on its northern and

western sides. Basin and platform were joined by a south-sloping ramp that was locally dissected by troughs and surmounted by isolated platforms or banks. Basinward, down this ramp, facies change from shoal-water grainstone, packstone, and wackestone, to mudstone and deep-water wackestone and packstone, and finally to gray or black shale.

During deposition of the Onondaga Limestone, water depths increased progressively throughout the basin, as reflected by gradual northward shift of all carbonate facies comprising the successive members and by northward migration with time of the Marcellus Shale. The steadily transgressive Onondaga deposition was terminated by basin-wide stagnation of bottom waters and slow burial by the Marcellus Shale.