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FOSSIL TURTLES FROM THE LOWERMOST NAVESINK FORMATION (MAASTRICHTIAN) IN MONMOUTH COUNTY, NEW JERSEY

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ABSTRACT: Fossil turtle carapace and plastron fragments representing the families *Trionychidae* and *Toxochelyidae* occur as rare constituents of the lowermost Navesink Formation (Maastrichtian) in Monmouth County, New Jersey. These turtle fossils co-occur with skeletal remains of other reptiles, chondrichthian and osteichthian teeth, mollusks, and decapod crustaceans, as a macrofossil residuum within a prominent lag deposit in the lower part of the Navesink Formation. This lag occurs directly above a type two disconformity separating the Marshalltown and Navesink Depositional Sequences and reflects third order, regressive-transgressive sea level cyclicity of Global Sea Level Cycles UZA 4.3-4.4 of Haq et al. (1988). The rarity and fragmentary nature of these turtle fossils, and the fact that they derive from species having disparate habitat preferences, suggest a complex taphonomic history that is the result of extensive reworking of the upper Wenonah-Mt. Laurel sediments and mixing and subsequent re-deposition of this older material during early Navesink time. Turtles and other macrofossils that occur directly above the contact between these formations thus represent animals of upper Campanian to lower Maastrichthian age.

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NEW JERSEY'S CRETACEOUS AMBER DEPOSITS

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ABSTRACT: The early history of amber discoveries in New Jersey is briefly reviewed, and the first reports of amber in North America are noted. Recent discoveries of insects in amber from the Parlin Pit are placed within a stratigraphic and depositional context. The occurrence of amber in the Merchantville, Mount Laurel, and Navesink Formations in the Atlantic coastal plain is documented. Amber droplets are found associated with dinosaur bones at the Ellisdale site in the Marshalltown Formation (Campanian). A unique form of amber composed of a naturally occurring polystyrene is found in the lower part of the Hornerstown Formation near the Cretaceous/Tertiary boundary in this vicinity. It is proposed that the unusual chemistry of this highly polymerized amber may be due to elevated temperatures associated with the K/T boundary impact event.

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GEOLOGIC WORK TO TEST GAS POTENTIAL OF LOWER PALEOZOIC (SAUK SEQUENCE) CARBONATE FORMATIONS IN EASTERN AND SOUTHEASTERN NEW YORK STATE

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FOREWORD: This paper is based on a research proposal prepared in 1993 requesting funds for a pre-drilling geologic study and a scientific test hole in the Albany, New York area. At the time of writing this proposal the research questions were shifting away from deep borings. In fact even the research agency changed its name from DOSECC (Deep Observation and Sampling of the Earth's Continental Crust) to Drilling Observations and Sampling of the Earth's Continental Crust. Hence funds for a proposed deep-basin drill hole, originally recommended, were not available when the proposal was submitted. As research moves forward into a new century, we thought it would be prudent to reflect on where we stood in 1993, what has already been accomplished, and to emphasize the continuing importance of a study of a scientific test hole to test gas potential of Lower Paleozoic (Sauk Sequence) carbonate formations in eastern and southeastern New York State.

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TEXTURAL EVIDENCE FROM PRESERVED FOSSILS FOR SECONDARY POROSITY DEVELOPMENT DURING CONTACT METAMORPHISM OF THE BALLYSHANNON LIMESTONE, KILLALA BAY, IRELAND

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ABSTRACT: Pore-lining cements associated with preserved fossils from wollastonite-zone metacarbonate suggest that secondary porosity developed and closed in the contact aureole of a 5.3 m thick basalt dike during metamorphism. The textures in the preserved fossils from the wollastonite-zone are similar to textures developed during the diagenesis of fossiliferous limestone. The pore-lining cements are interpreted to indicate that partial to almost complete dissolution of fossils occurred to form molds and/or vugs during metamorphism locally enhancing the porosity of the metacarbonate. Apophyllite±analcite infilled the molds during cooling of the contact aureole. The distribution of apophyllite±analcite suggests that porosity was developed in the inner grossularite- and wollastonite-zones. Modal analysis of samples from the wollastonite zone indicate that up to 8 percent secondary porosity was developed in the metacarbonate. Secondary porosity development

was restricted to metamorphosed biomicrite where significant amounts of devolatilization reactions occurred. The occurrence of devolatilization reactions was controlled by the presence of smectite in the biomicrite. Interbedded biosparite mainly responded to the metamorphism by grain coarsening. The porosity remained open due to a combination of a shallow emplacement (21 to 48 MPa) depth and the probable overstepping of the devolatilization reactions until infilling by apophyllite±analcite during cooling of the contact aureole.

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THERMAL MATURITY PATTERNS IN NEW YORK STATE USING CAI AND %R_O

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ABSTRACT: New conodont alteration index (CAI) and vitrinite reflectance (%R_O) data collected from drill holes in the Appalachian basin of New York State allow refinement of thermal maturity maps for Ordovician and Devonian rocks. CAI isotherms on the new maps show a pattern that approximates that published by Harris et al. (1978) in eastern and western New York, but it differs in central New York, where the isotherms are shifted markedly westward by more than 100 km and are more tightly grouped. This close grouping of isograds reflects a steeper thermal gradient than previously noted by Harris et al. (1978) and agrees closely with the abrupt west-to-east increase in thermal maturity across New York noted by Johnsson (1986). These data show, in concordance with previous studies, that thermal maturity levels in these rocks are higher than can be explained by simple burial heating beneath the present thickness of overburden. The Ordovician and Devonian rocks of the Appalachian Basin in New York must have been buried by very thick post-Devonian sediments (4-6 km suggested by Sarwar and Friedman 1995) or were exposed to a higher-than-normal geothermal flux caused by crustal extension, or a combination of the two.

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NORTHEASTERN UNITED STATES CRUST AND MANTLE ELLIPTICAL STRUCTURES: CORRESPONDENCES WITH THE SHALLOW CRUSTAL SEISMICITY

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ABSTRACT: Comparisons between the seismicity, topography, and upper mantle structure are keyed to a regionally dominant NW-SE mantle ellipsoid lying centered at 425 km beneath eastern Vermont. Overhead which the mantle features appear to have been rotated laterally relative to their correspondent features within the crustal topography displacements which in turn follow the shape of the underlying ellipsoid as though caused by its upward movement. Also seen overhead are twin areas of Mesozoic crustal intrusives that decrease in age along the ellipsoid's axis, in either direction away from the ellipsoid's centerpoint; the intrusives in turn being flanked along axis by areas of seismicity that are shaped like the areas of intrusives:in the pattern of the Mesozoic Atlantic. All of which

suggests that the ellipsoid has at least since the Jurassic been lifting overhead arising thermal anomaly; thus disturbing the overlying layers and emplacing the intrusives. Which now constitute an essentially aseismic plug, the seismic activity consequently having migrated out in either direction along axis.

On the other hand, this overprints a wider, albeit less active NE-SW elliptical web-like seismicity pattern; itself comparable to the shape of the Jurassic Atlantic; with the web centrum in western Massachusetts being at the imagry's Bahamas platform position. This in turn is overprinted as well to the south, where the Connecticut mantle contains an upwardly youthful sequence marking steps in the rise overhead of a NW-SE elliptical crustal dome; SE end of which conforms to the two Moodus area SE-convex seismicity belts. Which are interpreted to be mini-images of today's East Pacific Rise; each as part of one of three distinct seismicity patterns, each of which in turn mini-images the net outline of the current Americas vicinity plate margins.

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