A SILICIFIED LATE TRIASSIC (NORIAN) BIVALVE MOLLUSCAN FAUNA FROM THE ALEXANDER TERRANE, SOUTHEASTERN ALASKA

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ABSTRACT

A taxonomically rich and ecologically diverse silicified bivalve-dominated fauna is critically examined from the upper Norian Hound Island Volcanics of Kuiu Island, southeast Alaska. More than 1000 silicified bivalve specimens isolated by acid digesion of carbonate blocks yield a wealth of taphonomic, paleoecologic, paleogeographic, and taxonomic information. Petrographic analyses and scanning electron microscopy reveal specimens are preserved with silicification fabrics of quartzine-lutecite bladed masses and spherulitic chalcedony conserving fine details of original skeleton by both selective and complete replacement. Taphonomic indices indicate the fauna represents a parautochthonous storm-condensed assemblage of a shallow subtidal and relatively soft-bottom carbonate setting. Bivalves, ammonoids, conodonts, and the hydrozoan *Heterastridium* largely suggest a late Norian (*Gnomohalorites cordilleranus* ammonoid zone) age for the fauna.

The assemblage is taxonomically rich, containing 31 recognizable bivalve species (or equivalent taxa in open nomenclature) distributed amongst 11 orders, 17 superfamilies, 24 families, and 30 genera. Of the 31 taxa, 12 are incompletely known and left in open nomenclature and the following 11 are new: *Palaeonucula muffleri* n. sp., *Pinna keexkwaanensis* n. sp., *Plagiostoma scallanae* n. sp., *Entolium alaskanum* n. sp., *Filamussium walleri* n. sp., *Harpax articulatum* n. sp., *Erugonia boydi* n. sp., *Minetrigonia newtonae* n. sp., *Myophorigonia parva* n. sp., *Palaeopharus orchardi* n. sp., and *Tancredia norica* n. sp. The Erugoniidae n. fam. is proposed for smooth shelled trigonoideans with trigoniid-grade dentition but lacking marginal carina. The fine-scale preservation and large sample size revealed previsoulsy unrecognized morphologic details permitting revision of two bivalve families (Palaeopharidae Marwick, 1953 and Palaeocarditidae Chavan, 1969) and one genus (*Septocardia* Hall & Whitfield, 1877). The most diverse group is the Pteriomorphia with 16 species (51.6% of species and 69% of individuals), followed by the Heteroconchia with 12 species (38.7% of species and 28% of individuals) and Protobranchia with three species (9.7% of species and 2.8% of individuals). The assemblage is dominated by the pterioid *Cassianella cordillerana* McRoberts in McRoberts & Blodgett, 2002, which, taken with other reclining suspension-feeding species, accounts for 43.9% of individuals. Shallow infaunal burrowers comprise the second most common trophic group (27.6% of individuals), followed by epifaunal cementing forms (15.5% of individuals). The assemblage is dominated by endemic taxa, yet several species are known from other Norian faunas of the South American Cordillera and, to a lesser extent, North American terranes (Wrangell, Nixon Fork, and Wallowa). The biogeographic relationship with the Norian molluscan faunas of South America supports a southerly paleolatitude for the Alexander terrane with some biogeographic connection with other tropical terranes of eastern Panthalassa.

INTRODUCTION

The Late Triassic is generally regarded as a time in which reefs and other marine life flourished—the biotic recovery following the end-Permian mass extinction was largely complete and complex marine ecosystems are, at least locally, well established. The Triassic reorganization of benthic communities resulted in the replacement of brachiopod-stenolaematid-crinoid dominated faunas typical of the Paleozoic by a marine fauna of modern aspect dominated by bivalve and gastropod mollusks, bony fishes, gymnolaematid bryozoans, echinoids, and certain crustaceans, representing an increase in trophic variety ranging from deep infaunal suspension feeders to active nektonic carnivores (Sepkoski, 1981). The diversification and ecological restructuring that began in the Early Triassic has been dubbed the Marine Mesozoic Revolution (MMR), which has the central tenant that new adaptations and behaviors within certain invertebrate groups, such as bivalve and gastropod mollusks, may in part have been driven by a concomitant increase in durophagous predators and escalating predator-prey interactions (Vermeij, 1987). Within the contextual framework of the MMR, the Triassic is an important time during which bivalves numerically dominated shallow level-bottom benthic marine communities (Fraiser & Bottjer, 2007) and several major bivalve clades either originated or diversified. A most informative example is the oysters, a group of cementing bivalves that originated in the Middle Triassic (Hautmann & Hagdorn, 2013) and whose cementing life-habit may have been an adaptive defense strategy against durophagous predators (Harper, 2004). By Late Triassic time, bivalve dominated faunas occur throughout the Arctic, Tethys, and Panthalassan seas, and are known from an increasing number of well-preserved and well-documented