

ROCK AND ICE: The Origins of Pennsylvania's Eastern Pearlshell

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For millions of years, Eastern Pearlshell mussels (*Margaritifera margaritifera*, which translates to “pearl-bearer”) have stood as silent sentinels in relatively few eastern Pennsylvania mountain trout streams. These natural water filters have anchored stream sediments and its shells have served as habitat for generations of mayflies, stoneflies and caddisflies—the primary food source for some of Pennsylvania’s most sought-after sport fish. In an epic story of survival, these ancient pearl-bearers of the Schuylkill River and Delaware River basins have persevered despite geological upheaval and a series of catastrophic human events.

Of mountains, fish and mussels

The Eastern Pearlshell probably made its first appearance along the East Coast of the North American continent around the time of the dinosaurs. A slow motion but incredibly powerful collision brought together the continents of North America, Europe, Asia and Africa to form the supercontinent Pangea. This collision formed the Appalachian Mountains out of what was once the flat, hot, swampy plains of Pennsylvania. This continuous string of mountains stretched north from the states of Georgia and South Carolina into what is now the United Kingdom and Scandinavia. As the young Appalachians began to erode, and stream channels began to form, salmonids invaded the mountain streams, bringing along pearlshells. The gills and fins of the Atlantic Salmon, Brook Trout and Brown Trout and their ancestors served as important nursery “habitat” necessary for the pearlshell to complete its life cycle and disperse throughout the

landmasses we now know as North America and Europe.

When the continents began to separate and drift away from one another, the Eastern Pearlshell populations found in these mountain habitats drifted apart as well. This continental drift and the movement of fishes among the landmasses explains why today there are also pearlshell populations found across the planet’s northern hemisphere in places like England, Ireland, Germany and Russia.



Eastern Pearlshells

Deep freeze refugees

Eastern Pearlshells are thought to have persisted in Canada and the northeastern United States, including the Delaware River and Schuylkill River basins, until another Earth-changing event—the Ice Age. The Ice Age dawned about 1- to 2-million years ago when lobes of a massive continental glacier moved south from Canada, blanketing much of the North American continent beneath thousands of feet of ice. The slow, grinding advance of these glaciers obliterated most Eastern Pearlshell populations as the ice gouged and carved its way into northeastern Pennsylvania. As the earth’s temperatures rose and then refroze the glaciers ground to a halt, beginning a series of retreats and readvances, sending torrents of glacial meltwater down the valleys of the upper Delaware River watershed.

Despite the disappearance of pearlshell habitat beneath the ice, all was not lost. The earth’s climate during the



Eastern Pearlshell habitat, Little Schuylkill River, Schuylkill County.

An Eastern Pearlshell filtering water.

An Eastern Pearlshell with its foot extended.

Ice Age was actually quite dry, with most of the world's moisture captured in the huge sheets of ice. The world's oceans during this period were, therefore, 300- to 350-feet shallower and thus extended the East Coast far out into what is now the sea. This shallow state of the Atlantic Ocean allowed the remaining pearlshells—southern refugees of the glaciers—to persist in pockets near where these extended rivers met the sea. Just one unglaciated pocket—the Schuylkill River basin—would remain above the coastline as ocean levels began to rise. As the glaciers receded, the Schuylkill River valley and other remnant pearlshell populations would become the seeds for a new North American pearlshell population. These northeastern streams and rivers eventually became isolated from one another as common outlets disappeared beneath a rising sea.

The “black hell”

After the Ice Age, Pennsylvania's Eastern Pearlshells had to brace for the modern human era. The same immense pressure that created the Appalachian Mountains also created deep veins of anthracite coal. The anthracite coal veins that ran beneath some Pennsylvania's pearlshell streams were also the world's largest anthracite reserves. These reserves were formed when the swampy plains of Pennsylvania were folded and compressed during the formation of Pennsylvania's ridges and valleys.

The mining of the Coal Region that began in the 1850s undoubtedly led to the destruction of Pennsylvania

pearlshell habitat. In 1919, Arnold Ortmann of the Carnegie Museum noted numerous streams in the upper Schuylkill River basin where aquatic life had been destroyed by coal mining activities. Anthracite coal production from this region peaked in 1917 when more than 100 million tons were removed.

The Pearl Rush

As anthracite mines boomed in support of the Industrial Revolution, there was a mad rush to exploit a more recently derived mineral—pearls. The 1857 discovery of a \$70,000 pearl (today's value) in a New Jersey stream sparked the destruction of countless pearlshell populations during the nation's great Pearl Rush of the 1850s and 1860s.

On extremely rare occasions, Eastern Pearlshells were known to produce a natural pearl. Julius Caesar of the Roman

Empire is said to have been motivated to invade England for the island's magnificent pearlshell pearls. While there were no attempts to invade the United States for pearls, the North American pearlshell populations suffered a similarly destructive fate. The nearly complete annihilation of pearlshell populations in Pennsylvania, New York and New Jersey by “pearl-fishers” destroyed the local pearl market along with pearlshell populations. Cultured pearl technology developed by Japanese entrepreneurs in the early 1900s eventually replaced the large-scale extermination of pearlshell beds by pearl-fishers in reckless pursuit of a single valuable, but exceedingly rare, pearl.

Conservation

Today in Pennsylvania, this extraordinarily long-lived mussel persists only in remote and isolated streams of the Schuylkill River and upper Delaware River. Here, Eastern Pearlshell mussels still live in close association with native trout that these mussels have coexisted with since time immemorial. A Pennsylvania Fish & Boat Commission (PFBC) Species Action Plan has been prepared to address historical and current threats and to begin habitat and recovery efforts for both the pearlshell and its native host fish species. The PFBC continues its efforts to implement the action plan and to protect and recover this rare, resilient survivor of violent geological and modern times. For more information about the Eastern Pearlshell Species Action Plan, visit www.fishandboat.com/Resource/Documents/species-plan-margaritifera.pdf. ☐