



PILOT LOG 2001

The Illusion of a River

Vernon Benjamin



Of all the Hudson Valley's geological features, the most striking and enigmatic is the Hudson River, which appears as illusionary as a fine work of art. As Benson Lossing, its first historian, pointed out, the river appears to turn New England and Maritime Canada into a peninsula connected by a narrow isthmus at Fort Edward—an island, even, when the Hudson-Champlain canal cuts through that isthmus. The image is enticing. A subterranean rock trench that runs from the Hudson to Lake Champlain supports the island-like idea. The river's straight appearance in its run from Troy to the Highlands results from basement rock defined by a deep fault line. The river's geological structure is also actually gorge-like, despite the wide expanse and all the post-glacial sediment (called alluvium) that has accumulated in only the last ten or fifteen thousand years. A series of faults also define the hook-shaped course of the river through the Bear Mountain narrows, but there the island illusion ends. The cataclysms that characterized most of our geologic history fell to the left and right, or slashed across the river, not along the fault lines of the river and the central Valley. If New England ever was separated from the middle states region, and there is some fossil record to suggest that, the "dividing" line of that record lies east of New York and never intruded this far. Although affected by the Adirondack uplift 50 million years later, the upper reaches of the Hudson River existed at least 75 million years ago. The age of the lower Hudson is more of a mystery, however. Ten or 15 million years ago (and perhaps as late as twenty thousand years ago), the Hudson seems to have flowed not past Manhattan, but southwesterly through the stunning geological gap at Sparkill, near Piermont in Rockland County, and then south through today's Hackensack Valley to Raritan Bay. Although a stream of some sort went by Manhattan in ancient time, the river there today is a mere infant in geological swaddling clothes. How all this happened is one of the most stunning, and least-told tales of geological lore.

But first the fjord. In the lower Hudson, several miles north of Sparkill between

Montrose and Cornwall, a spectacular rock cut made by the ice gouged the narrow, v-shaped defile of the Hudson Highlands into a u-shaped trough as much as 800 feet deep, what geologists call a fjord. And the Hudson's is not just another common or garden-variety fjord; it's the lowest latitude fjord in the world.

The Ice Age ended some 15,000 years ago with the creation of a series of "proglacial lakes" that yielded ultimately to two major but short-lived water bodies, Lake Hudson in the southern Valley and Lake Albany from the Highlands north. The theory among geologists before 1990 was that as the glacier melted, the waters drained southwesterly via the Sparkill Gap, just as the Hudson River itself drained in Tertiary time. But later evidence suggested that about 15,000 B. C., as melting ice uncovered the Sparkill Gap, meltwater from the Hackensack Valley (as well as the Saddle and Passaic river basins in today's New Jersey) forced all to drain east through the Gap into glacial Lake Hudson. Lake Hudson spilled eastward across the hard gneiss rock at Hell Gate, at today's East River. This drainage pattern also afforded an early outlet for glacial Lake Albany.

Northward the meltwaters of the glacier continued to build behind lakes Hudson and Albany. A massive system of temporary lakes filled with suspended debris forced a breach of such power that it burst through the moraine at the Narrows and debouched (in what geologists call a "coulee effect") into what was then the lower Hudson Valley. The event must have been stupendous, a sudden release of water that slashed through the moraine and plummeted progressively deeper across more than a hundred miles of plain, and then, propelled by the force and accumulated mass of debris that rushed through the breach, forced open a gully or chasm that stretched in an ever-deepening gouge another one hundred and ten miles to the Continental Shelf. The water and debris cut through the plain, a thousand feet deeper than the Grand Canyon, and created the Hudson Canyon, unique among all river channels on the eastern seaboard of the United States.

The melted icewater drained away and the land, relieved of its stupendous ice-weight, lifted airily into the sky in a phenomenon called isostatic rebound. This uplift tipped the edge of the continent down, so that the icewater poured into the ocean and raised sea level as much as three hundred feet. The ocean water overflowed at the Shelf and rolled onto the plain, drowning the Canyon (hence it is now "submarine," hidden a mile and a half beneath the surface) and the river as far as Troy. The river now was transformed into an estuary, literally an arm of the sea. It was no longer what it seemed. More than seventy river systems in the United States, including the Connecticut, have watersheds larger than the Hudson's, yet this is the one whose river Karl Baedeker deemed "grander and more inspiring" than the Rhine.

"For 350 years," Harvey Flad of Vassar College wrote in 1978, "the Hudson River Valley has been a region in which the city, the wilderness, and the countryside have existed in close proximity to one another. The river and its environs have formed a strong linkage between the spiritual landscapes of the mind and the physical landscapes of everyday life."

A harbor seal startled visitors to the Saugerties Lighthouse already this year. The return of the bald eagle along the estuary placed a kind of natural imprimatur on its healthy revival in recent decades. Securing such a legacy may mean an uncertain future in the face of the state's insatiable need for energy production. Yet a new day and age has arrived and a perennial sense of intimacy now leads us to champion the river as we would an old, dear, and abused friend.