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News from...

Hudsonia

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Bard College Field Station
Annandale, N.Y. USA 12504
Telephone: (914) 758-1881

LIFE ON A LIMESTONE LEDGE

Emerging

A ledge is a delightful place to spend a sunny spring day. Abruptly elevated above the adjacent lowlands, a high ledge affords a broad vista that both pleases the eye and educates the inquiring mind. Landforms seen before only as isolated features coalesce into a whole landscape.

Of course the ledge itself is part of the same landscape, and it may be better appreciated as a landform from some open vantage point in the valley below. A flight by small plane can fill out more completely one's picture of a complex local landscape, especially when a topographic map is carried along to graphically simplify what is being viewed.

The Hudson River valley contains many ledges, a broken ridge-and-valley topography characteristic of the Appalachian Mountains. The land east of the river is mostly rolling hills with fewer bedrock-formed highlands. The rugged western landscape has resulted from tens of millions of years of erosion of an elevated rock plateau, the Catskill Delta. To the east of the Catskills are rocks of different chemical composition and geologic origin. Among these lower rock strata are various limestones, high in calcium carbonate, an important mineral for some plants and animals.

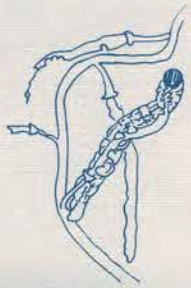
Courting

Over 300 million years ago, western New England and most of New York State were covered by a shallow sea bordered by high mountains in what is now eastern New England and western Europe. Early deposits in this ocean were fine, slow to accumulate, and largely of organic origin, rich in carbonates from dead sea animals and from mineral salts precipitated out of the sea water. These deposits exist today as the limestones (interbedded with shales from land-based muds) of the western Hudson Valley; similar but older rocks form the rolling hills to the east. As land erosion increased, the composition and texture of sea deposits changed; sands, silts and gravels became the primary types of deposits, which accumulated at a much greater rate. Today these sediments form the rocks of the Catskill Mountains and other highlands of the Hudson Valley.

Because of the great variety of sedimentary rocks in this region, they have eroded at different rates, so that some resist erosion and remain elevated above the more eroded portions of the land, giving the region its hills and valleys, cliffs, mountains, waterfalls and steep ravines. This varied

Mating

Chrysalis



Caterpillar

Egg

Egg Laying

Life cycle of the falcate orange tip.

topography accounts in part for the unusual diversity of natural organisms in the Hudson Valley. So also do the many types of soils, enriched by the variety of bedrock which erodes to become a major soil component.

These underlying geologic, edaphic (pertaining to soils) and topographic qualities help to determine the kinds of plants and animals which live on Hudson Valley ledges and their immediate environs. If the bedrock of a ledge is limestone, the soil on the ledge crest and in the talus at the ledge base will be more alkaline than most soils of the region due to carbonates dissolved out of the limestone. Plants with limited acidity tolerance will be found growing on and about such ledges.

Among these plants are the ferns wall rue, purple cliff-brake, and walking fern, which grow directly on the rock, rooted in cracks and small hollows. The walking fern deserves its odd name for its habit of forming new plants at the ends of the greatly elongated leaf tips, which arc outward to find new microfissures in which to root.

The viney shrub fragrant sumac is confined to dry limestone soils, particularly of crests and ledges and dry talus. Its leaves resemble those of poison ivy but are bluntly scalloped, and in spring it sports small golden blossoms. American bladdernut is another lime-loving shrub more likely found in slightly deeper soil back from the edge of a ledge. In spring a few of the large, brittle brown fruit may still cling to the twigs. Red cedar is a common evergreen shrub or small tree of limestone ridges.

Trees are found only in the deeper soils back of the open ledge, which may support a semi-xeric forest of chinquapin oak, hop-hornbeam, sugar maple and occasionally hackberry.

Many herbaceous plants grow on or near limestone ledges, and most of these flower in early spring before the leaves of shrubs and trees shade them over. These flowering plants include wild columbine, early saxifrage, and lyre-leaved rock cress on open ledge faces; early buttercup on open ledge tops; round-lobed hepatica, long-spurred violet, early blue violet, rue anemone and round-leaf ragwort in dry limestone forests; and in moist ravines between crests, yellow ladyslipper and large-flowered bellwort.

Several small spring butterflies are associated with limestone ledges in the Hudson Valley. The olive hairstreak never strays far from its host plant, red cedar. Hairstreaks can be flushed by tapping small cedars with the handle of an insect net. Spring azures may be seen flitting about the ledges, nectaring on the tiny blossoms of fragrant sumac, which may be a larval host.

The butterfly most restricted to ledges (both limestone and sandstone) is the falcate orange tip. This small white butterfly might easily be

LIFE ON A LIMESTONE LEDGE: A Hudsonia centerfold

1. Anise millipede (35mm)
2. Liverleaf (flower: 20mm)
3. Purple cliffbrake (20 cm)
4. Land snail (15mm)
5. Wall rue (13cm)
6. Columbine (20-50cm)
7. Walking fern (leaf: 15cm)
8. Chinquapin oak (leaf: 12cm)
9. Long-tailed salamander (11cm)
10. Jumping bristletail (5-12mm)
11. Falcate orange tip (25mm)
12. Lyre-leaved rock cress (11-23cm)

overlooked because of its close resemblance to the European cabbage butterfly, an introduced species and probably the most common butterfly in the Northeast. Orange tips are smaller and have a more delicate flight; indeed they are the ultimate image of fragility as they bob up and down along the length of rocky cliffs in search of nectar, a potential mate, or plants on which to lay eggs. Only the males have orange wingtips; a female would need to be netted to tell it from a cabbage butterfly.

Orange tips begin to fly in the Hudson Valley around the third week of April and continue flying through mid-May, longer—to early June—along the eastern escarpment of the Catskills, where they reach their highest elevational limit in New York state, at the summit of Overlook Mountain (976 m). Very quickly the males find females and mate, after which the females lay the characteristic day-glo orange eggs on stems, leaves, flower calices and seedpods of rock cresses and bittercresses over a period of two or three weeks.

The caterpillars grow quickly and may reach maturity and pupate while adults are still flying. The larvae form well-camouflaged thorn-shaped crysalids attached by a silken sling to twigs and plant stems. There is but one generation per year, unusual among spring-flying butterflies, probably because the host plants dry out later in the season and so would not be available for a second brood.

The orange tip butterfly ranges from the southeastern states northward to the warm corridors of the Connecticut and Hudson River valleys. In the Hudson Valley it ranges north to Potic Mountain in the town of Leeds (Greene County), but appears to be absent from suitable habitats north of Potic, such as High Rocks in the town of Coxsackie. The butterfly's expansion westward is blocked by the high Catskill Mountains where the insect's host plants become scarce. The orange tip is recorded from Connecticut, but its distribution in the eastern mid-Hudson Valley is virtually unknown at present.

Other small organisms common on limestone escarpments are land snails, which may derive shell-building calcium from limestone plants and soils; millipedes, including the remarkable anise millipede which exudes a volatile oil which smells like anise. Two genera of jumping bristletails are commonly found in this habitat. These small arthropods are active at dawn and dusk, hiding during the day and night in cracks and under rocks. Garter snakes, black racers and black rat snakes often hibernate in fissures of ledges and can be found sunning in spring. In moist parts of ledges may be found red-backed, slimy and long-tailed salamanders.

In addition to the living communities they support, limestone bedrock areas contain a wealth

of fossils, clues to living communities of the distant past. These fossils are entirely marine in origin—shellfish, trilobites, crinoids, corals and other sea organisms. Fossils and microfossils are abundant in some local limestones.

Limestones are intermittent among the rocks of the Hudson Valley. A broken row of limestone ridges extends along the west side of the river, bisected for much of its length by the New York Thruway. North of the Catskills, the limestones reappear and veer westward as the Helderberg escarpment. South of the Shawangunk mountains, the limestone belt curves gently southwest with outcrops near Port Jervis, New York and in nearby Pennsylvania and New Jersey. East of the Hudson, limestones occur locally in Dutchess and Columbia counties, including the largely quarried Becraft Mountain near Hudson, at Verplanck Point on the Hudson River in Westchester, and locally eastward to western Connecticut. These primarily older limestones also occur in Orange County, New York and Sussex County, New Jersey.

Wondering what Hudsonia researchers do when Springtime arrives? Steve Nyman couldn't wait until it rained to survey spawning habitats of the endangered Tiger Salamander on Long Island. Erik Kiviat is watching Dutchess County swamps for the first appearance of Blanding's Turtles. Roy Budnik just finished flying over a residential development site observing land use and soil characteristics. Back at the field station Kristin Westad has finished computer cataloguing 3,000 pressed plant specimens in our regional herbarium. Newly purchased nets are being unpacked for Bob Schmidt's study of fish use of water chestnut beds in the Hudson River. And Jim Stapleton has been deciphering manuals for computer equipment acquired with a grant from the Hudson River Improvement Fund.

You are welcome to send us names and addresses for our newsletter mailing list. For a copy of our new nature trail guide to Bard College's Sawkill, send a self-addressed, business-sized envelope with 22¢ postage.

This issue was designed and illustrated by Kathleen A. Schmidt, written by Spider Barbour with assistance from Roy Budnik and Erik Kiviat and produced by Kathy Anne Schmidt.

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Erratum: Ref. Nov. 1986 issue, the illustration of species #4 was erroneously captioned "eel grass." It should have been "spikerush". Although the flowers of spikerush are normally above water, they may be submerged by a sudden rise in water level.