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Technical Bulletin #12

NATIONAL SLATE ASSOCIATION

Technical Bulletin No. 12: Getting To Know The Fossils In Bundenbach Slate

Slate is an outstanding and unique material. Its strength and resistance to heat and severe weather make it an optimum choice for roofing. There is more to slate, however, than its roofing benefits. This material has often fascinating origins and compositions useful, in some instances, to the field of paleontology.

How Slate Is Formed

Slate has been created from mud, volcanic ash, or other fine-grained sediments that can be millions of years old. As such layers of sediment thickened, the make-up of the materials transformed from open structures into compact configurations of shale or mudstone. Then, strong geological forces metamorphosed the minerals present in the rocks. Some of these minerals, such as quartz, were stretched and flattened, giving the slate durability and strength. Others, such as clay, were recrystallized, forming cleavage planes, which enable the slate to be split into thin slabs.

Fossil-Rich Slate

Fossils can be common in some slates formed from muds during the Denovian period since that environment was suitable for animal and plant life.[1] In the Rhine and Moselle Valleys of Bundenbach, Germany, many towns boast buildings with beautiful slate roofs. The municipality of Bundenbach is located in the Birkenfeld district of Rhineland-Palatinate and lies on the *Hunsrück Schiefer-und Burgenstraße* (translated in English as “Hunsrück Slate and Castle Road”). Deposits of Hunsrück slate have been mined since ancient times, and during mining, workers have often come upon fossils. One of the best locations for well-preserved fossils is Bundenbach, where black slate has been mined for roofing tiles since the 1500s. Historically, there were more than 600 quarry pits in the region.

The slate in this region dates to the early Devonian age, making the slate more than 390 million years old. The thickness of their sediment deposits is estimated to have been approximately 4,400 feet, occurring in offshore basins. The main area of deposits extends some 100 miles from northwest to southeast, with the thickness only at about 220 feet to the south. Scientists have determined that deposits occurred in basins that subsided and were separated by swells.

Quite often, the fossil remains were covered by a surface layer of pyrite. During a rapid burial, fossils could be totally replaced by pyrite, which resulted in excellent preservation. In some ways, this process is similar to how dissolved minerals replace cell walls to create petrified wood.

Initially, the images in the stone were considered whims of nature. Their scientific significance was first recognized by geologist C.F. Römer in 1862. When X-rays were later discovered in 1895, the fossils could be viewed photographically. X-ray technology allows researchers to look inside delicate fossils without damaging them.

Animal Remains Preserved

Fossils discovered in Hunsrück slate mainly originated from bottom-dwelling organisms. Over the years, more than 260 species of animal fossils have been found, but discoveries of land plants have been rare. Examples of these animal

Figure 1: A brittle starfish fossil dating from the Devonian period

fossils include sponges, corals, jellyfish, worms, and gastropods (such as snails and slugs). Echinoderms (such as sea urchins, sea cucumbers, sand dollars, starfish, and brittle stars) have been discovered in concentrations around southwestern Bundenbach, while brachiopods (bivalve marine animals that can resemble clams) have been uncovered in the northeast areas. In addition, more than 60 species of crinoids (ancient marine animals with long stalks) have been found in Hunsrück slate.

One example of a crinoid fossil is the brittle starfish shown in Figure 1. The brittle star has five slender arms that it would use to gather food from the ocean floor. It is shown in the black slate matrix in which it was discovered. Estimated to be about 400 million years old, this and other pyritized fossils of Bundenbach are highly prized by fossil collectors.

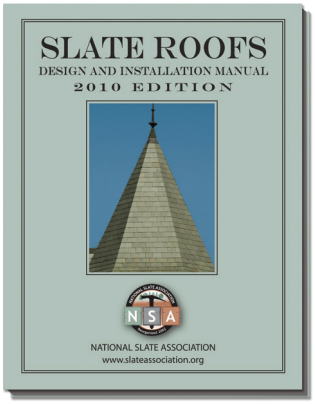
In addition to their innate beauty, fossils remind us of slate's long-lasting durability and sustainability as a construction material.

About the Author: Trent Cotney is a partner at Adams and Reese and is co-leader of the firm's construction team. He specializes in construction law and is nationally recognized for his expertise in this field of practice. He was able to win the brittle starfish fossil in a live Bonham's auction held on December 7, 2021, in Los Angeles, California, as part of a Fine Gems, Lapidary Arts, and Natural History event. It required enhanced shipping for insurance purposes and to protect the item during transit. It is now part of a larger collection of roofing-related artifacts he has collected that exceeds 10,000 pieces, including more than 400 porcelain, metal, and paper/cloth roofing signs. He added the brittle starfish fossil to his collection to demonstrate the superiority of slate as a roofing material.

Endnote

[1]Fossils are very rare in slates formed during the earlier Ordovician and Cambrian periods that are typical of North American slate deposits.

For more information on slate roofing, please see *Slate Roofs: Design and Installation Manual,* 2010 Edition, available at www.slateassociation.org



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