Teaching with Tombstones: Geology at the Cemetery

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Abstract

The Cleveland Museum of Natural History has used local cemeteries as part of informal (public-oriented) and formal (grade school and college classes) educational activities for two decades. These activities have focused on a range of topics, including dimension-stone quarrying, mineral composition and provenance of stone used for headstones and monuments, stone seriation, and effects of acid rain on headstones and monuments. Most activities have centered on Lake View Cemetery, an elegant Victorian-style cemetery located near the museum, but have also taken place at other cemeteries in northeastern Ohio. Geology walking tours are now offered twice a year as part of the Lake View Cemetery Association's series of community activities. A wide variety of rocks can be seen at this cemetery. These include granite and other igneous rocks, marble, limestone, and sandstone used for monuments and gravestones; and shale, siltstone and sandstone, which crop out along a stream in the cemetery. Our collaboration with Lake View Cemetery has provided an enlarged audience for discussions of gravestones, dimension stone, and other geological topics. This collaboration fits in well with the cemetery association's efforts to promote its use as an educational resource.

Introduction

Geological observations in cemeteries have a long history. Indeed, the naming of charnockite, a variety of granite, is based on the tombstone of Job Charnock (d. 1693). Geologists, as well as archeologists, historians, and genealogists have taken classes to cemeteries to make observations and investigate a myriad of topics.

Gravestones are included as examples of rock weathering in many geology, earth science, and geography texts, including such popular textbooks as Press and others' *Understanding Earth* (2003, p. 143) and Strahler and Strahler's *Physical Geography* (2002, p. 415), as well as Alan Cvancara's *A Field Manual for the Amateur Geologist* (1995). Geologists have pointed out the potential of cemeteries as urban geological resources (Robinson, 1996a, 1996b), reported their work with students in cemeteries (for example, Ferrell and others, 1998; Roberts, 2000; Lohrengel and Eves, 2002), and have recommended cemetery field trips for all ages (for example, Sandy, 1994; Kvale and others, 2002, p. 341). Morris (1994), in a review of cemeteries in the United States published in the proceedings of a National Interpreters' Workshop, encourages the cultural and natural history (including geological) interpretation of cemeteries. Sandy (1992) has produced a guidebook to the geology of monuments in a Dayton, Ohio, cemetery, and one British cemetery includes a geological trail (Baldwin and Alderson, 1996). Research and laboratory projects (for K–12 and college classes) related to weathering rates (Roberts, 2000), earthquakes (Nottis, 2004), and other topics (Froschauer, 1988), can be found both in print and on the Internet.

At the Cleveland Museum of Natural History, we have utilized cemeteries as a geological education resource for two decades, using local cemeteries as part of informal (public-oriented) and formal (grade school and college) educational activities. Our activities in cemeteries began as one component of a set of urban geology field trips (see Hannibal and Schmidt, 1991). As preparation for and as a result of questions posed by education-based activities at cemeteries, we have also formally investigated gravestone provenance and weathering, as well as trends in stone used for gravestones over time in northeastern Ohio (Bauer and others, 2002).

Our public and student field trips have included trips or walks in Erie Street Cemetery, Cleveland's oldest surviving cemetery; Riverside Cemetery, a garden-style cemetery on the west side of Cleveland; and Lake View Cemetery, a garden-style cemetery located on the Cleveland/Cleveland Heights boundary (see Hannibal and Schmidt, 1991). Most recent activities have focused on Erie Street and Lake View cemeteries.

In this article, the initial letters of both parts of the name of formal rock units (for instance, Berea Sandstone) are capitalized, but only the first part of informal rocks units (for instance, Euclid bluestone) are capitalized. Commercial names of stone are italicized to distinguish those names from rock-unit names.

Erie Street Cemetery

Erie Street Cemetery (fig. 1), located in the heart of downtown Cleveland on East Ninth Street (once known as Erie Street; now also known as Rock & Roll Blvd.) across the street from the baseball stadium, is Cleveland's oldest surviving cemetery. Because of its age, and because it contains the graves of a number of prominent early Cleveland residents, the cemetery is one of the most beloved by Clevelanders. Owing to public support, this cemetery has withstood a number of efforts to close it and change the use of the land.

Erie Street Cemetery received its first burial in 1827 but some of its burials are from an even earlier downtown Cleveland cemetery. Gravestones and monuments in this cemetery are fashioned from sandstone, limestone, marble, and various intrusive igneous rocks including granite. The Cleveland Museum of Natural History has led field trips to Erie Street Cemetery a number of times over the last two decades. One of these was part of a walking tour in downtown Cleveland. My Cleveland State University physical geography class has also completed a gravestone-weathering analysis in this cem-

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Figure 1. Photograph (2002) of gravestones at Cleveland's Erie Street Cemetery. The light-colored gravestones are marble. The large tower in the distance in the upper left of the photo is part of Cleveland State University.

etery as a class project. (The Cleveland State University campus is only a few blocks east of the cemetery.) This cemetery was also studied as part of a formal analysis of gravestone seriation, provenance, and weathering (Bauer and others, 2002). The study used techniques pioneered by Dethlefsen and Deetz (1966), Deetz (1977), and Meierding (1993a, 1993b). This study also included analysis of gravestones in two suburban cemeteries, Ridgeville Cemetery in North Ridgeville and Warrensville West Cemetery in Shaker Heights, for comparative purposes.

Lake View Cemetery

Lake View Cemetery is a splendidly landscaped necropolis filled with Victorian and more recent monuments (fig. 2). Opened in 1869, it is one of a few large, garden-style cemeteries in Ohio. It was designed in the style of North America's first grand garden-style cemetery, greater Boston's Mount Auburn Cemetery (Linden-Ward, 1989). The establishment of Lake View Cemetery followed that of several Ohio garden-style cemeteries, including Akron's Glendale Cemetery (1839; see Hannibal, 2006), Dayton's Woodland Cemetery (1841; see Sandy, 1992), and Cincinnati's Spring Grove Cemetery (1845). Lake View Cemetery contains a wealth of stone monuments made of rock quarried at many different sites in North America, Europe, and Africa, and erected in the cemetery over a period of more than 130 years (although, as in Erie Street Cemetery, some gravestones predate the opening of the cemetery). Lake View Cemetery is situated on the Portage Escarpment, and it is this hilly, sloping site and its stream and ponds that make Lake View stand out as one of the most scenic of Ohio's garden-style cemeteries.

Figure 2. Photograph (2002) showing rolling topography, monuments, and gravestones in Lake View Cemetery. The Lehman monument, which features resused stone columns from a house in Cleveland, is at center. The light-colored Rockefeller obelisk is towards the upper right of the photograph, 70 ft (21 m) tall .

Lake View Cemetery has long been known for its prominent deceased, including Cleveland's economic, political, and social elite. This cemetery is the final resting place of mayors and robber barons, as well as U.S. president James A. Garfield (1831–1881) (figs. 3 and 4) and the baseball player Ray Chapman (1891–1917). There are also graves of those who achieved fame for their intellectual and scientific work. These include the graves of the celebrated Cleveland inventor Garrett Morgan (1877–1963), the renowned naturalist Jared Potter Kirtland (1793–1877), and two famed nineteenth-cen-

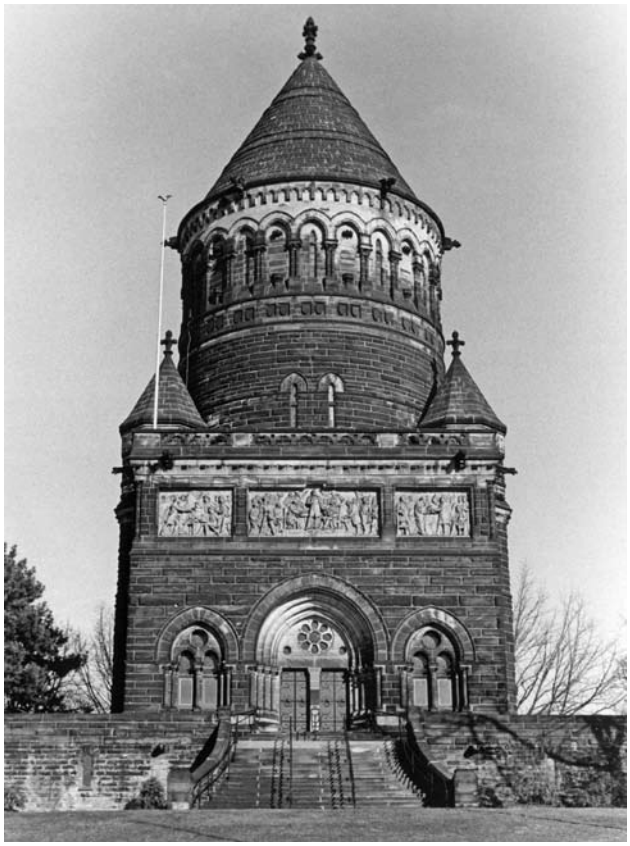

Figure 3. Photograph (1999) of the Garfield Monument. Except for the rectangular bas reliefs depicting scenes from the president's life, the exterior is Berea Sandstone quarried in Berea, Ohio.

tury geologists, John Strong Newberry (1822–1892) and Colonel Charles Whittlesey (1808–1886) (see Hannibal, 1999).

Lake View Cemetery has an incredible wealth of geological features (Hannibal and Schmidt, 1988a, 1988b), including gravestones and monuments made of sandstone, limestone, marble, and granite, as well as other intrusive rocks. Also, shale, siltstone, and sandstone belonging to the Chagrin and Cleveland Shales and to the Bedford Formation, including a sandy part of that formation known as the Euclid bluestone, which was once quarried on the cemetery grounds, are exposed along the stream which bisects the cemetery. The stone monuments are done in a great variety of styles, including neoclassical, gothic revival, and art nouveau. The cemetery's major monuments were erected during what has been called the golden age of American funerary art (McDowell and Meyer, 1994, p. 183). Many of the individual monuments are well known and are mentioned or illustrated in works on cemetery monuments (for example, Bliss, 1912; *Stone*, 1933), publications on building stone (Dale, 1923), and books on Cleveland.

Figure 4. Photograph (1995) of the statue of Garfield inside the Garfield Monument. The statue and its base are composed of Cararra marble. Stone from the United States, Canada, Europe, and Africa are also used inside the monument as flooring, wainscoting, pillars, and other architectural features.

Some of the best-known funerary stones are found in the cemetery, including Barre Granite (a granodiorite) from Vermont and Quincy Granite (another granodiorite) from Massachusetts.

Geology Tours of Lake View Cemetery

In the mid-1980s, Lake View Cemetery was one of the first cemeteries in the United States to actively encourage outreach activities centered on its natural and built aspects. Indeed, it has served as a model for other cemeteries. The Lake View Cemetery Association actively promotes the cemetery's use as an outdoor museum.

Our field trips to Lake View Cemetery were initially designed as informal educational activities for Cleveland Museum of Natural History members in 1985. The idea of having activities focusing on natural history there originated with the cemetery association. Our original field trips utilized museum vans and covered disparate gravesites, monuments, and outcrops in various parts of the cemetery. Beginning in October 1993, geology walking tours have been offered as part of Lake View Cemetery's series of walking tours. In recent years, the trips have been held twice a year, once in the spring and once in the fall, on Saturday mornings or Sunday afternoons. The trips are designed to feature diverse geological points within a relatively leisurely 2-hour walk.

Trip participants meet near the Garfield Monument where they are given handouts—a map of the cemetery with a simple stratigraphic section on the reverse and a two-page article on the geology (stone used for gravestones, outcrops, and so on) of the cemetery. The Garfield Monument (fig. 3), completed in 1890, was the first imposing presidential sepulcher to be constructed in the United States. It is a splendidly eclectic structure, built in honor of the U.S. president who was shot near the beginning of his term and died a few months later. Discussions at the monument include the life of James A. Garfield (1831–1881), a preacher, teacher, Civil War general, radical Republican legislator, the twentieth president of the United States, and a great champion of government-sponsored geological investigations (Hannibal, 1996). The discussions emphasize Garfield's relationship to geology. In the late 1850s he taught geology at what is now Hiram College in Ohio. (His class was held at 5 a.m. in the college chapel!) As an Ohio state senator, Garfield tried, unsuccessfully, to revive an Ohio geological survey and, as a U.S. congressman, he helped to spearhead the formation of the U.S. Geological Survey, which was formed in 1879. A larger-than-life Cararra marble statue of Garfield (fig. 4) standing in the center of the monument's rotunda serves as the centerpiece of a discussion of marble types and of the history of marble quarrying in Italy.

A visit down to the crypt is made to pay respects to the slain president. A trip is also made to the outdoor viewing platform of the monument, which allows for a view of much of the cemetery, of downtown Cleveland, of the Erie Lake

Plain north of the cemetery, and, on a clear day, of Lake Erie itself. The formation of Lake Erie as a glacial "puddle" is explained from the platform while participants view the lake, the lake plain, and the escarpment in the vista in front of them.

The exterior of the monument is Berea Sandstone, which is the focus of discussion regarding its geology, quarrying, and weathering. A series of large quartz crystals and a sandstone model composed of clear marbles (representing individual quartz grains) in a small box, showing the arrangement of grains and pore spaces in sandstone, are used to help explain properties of the stone. Stonework details such as rock facing and drovework (chiseled grooves) of the monument are also discussed.

From the Garfield Monument, the walking tours wind their way through the upper part of the cemetery, stopping at gravestones, monuments, and mausoleums fashioned from sandstone and limestone (fig. 5), marble, and igneous rocks such as granite and granodiorite (fig. 6). Topics discussed include the provenance and mineralogic composition of the stone, the cleaning of stone, the effect of acid rain on limestone and marble (McGee, 1995) (fig. 7), and the change in stone use over time (seriation patterns). The quarrying and manufacturing of dimension stone are also discussed, as are the production of designs and lettering on gravestones. One stop is at the Hay monument (fig. 5), a sculpture in *Napoleon gray marble* of a muscular Michael the Archangel (*Stone*, 1918), along with a strategically placed podium that honors John Milton Hay (1838–1905), Abraham Lincoln's private secretary. The monument is not only fascinating iconographically and metaphorically (recalling Milton's *Paradise Lost*), but the fossil content, including horn corals, large brachiopods, and stylolites, and the weathering of the stone are interesting in their own right.

The walking trip's farthest point is the old Euclid bluestone quarry area in the cemetery. Here the Euclid bluestone, a stone that many of the trip participants have heard of as it was widely used for sidewalks in northeastern Ohio (Hannibal and others, 2007), is discussed, as are the underlying shales. These shales include the Cleveland Shale, a rock unit famous for its Late Devonian fossil fish content. No collecting, of course, is done on the walking tours.

Additional gravestones and monuments are visited on the way back to the Garfield Monument. These include a pair of large neoclassical Greek-style tablets (fig. 8). The neoclassical tablets are fashioned from *Bethel white granite* in imitation (and in one case, replacement) of marble tablets. This leads to a discussion of the form and history of funerary monuments over time, and the reason that various types of rocks have been used for gravestones and monuments. Near here, a large dam (fig. 9) and adjacent outcrops of the Chagrin and Cleveland Shales are viewed.

The walking trips typically end with a discussion of the large Rockefeller obelisk (fig. 2). This great monolith, fashioned from Barre Granite, is a high point of the trip. The obelisk, said to be the largest in any American cemetery (Jackson

Figure 5. Photograph (1995) of the John Hay Monument, made of *Napoleon Gray marble* (*Stone*, 1918), a fossiliferous limestone of Mississippian age quarried in Green County, Missouri. The monument was erected in 1915. Weathering has been particularly severe along stylolitic seams and the scabbard of the sword has been replaced with concrete. The base is made of a granitic rock.

Figure 6. Photograph (1995) of the elegant Doric-style mausoleum of Samuel Andrews (1836–1915). The mausoleum is made of Barre Granite. The form and coloration, but not the rock type, is reminiscent of the Parthenon.

Figure 7. Photograph (1994) of a marble headstone weathered by acid rain. The 1870s gravestone is 16 in (40 cm) tall.

Figure 8. Photograph (1995) of the large upright monument designed in the form of a typical 4th century B.C. Greek grave stele. The monument is fashioned of *Bethel white granite* in imitation of white Greek marble.

and Vegara, 1989, p. 81), is made of the *light Barre* variety of Barre Granite quarried in the Wetmore & Morse quarry (Dale, 1909, p. 69), which was located just southeast of the

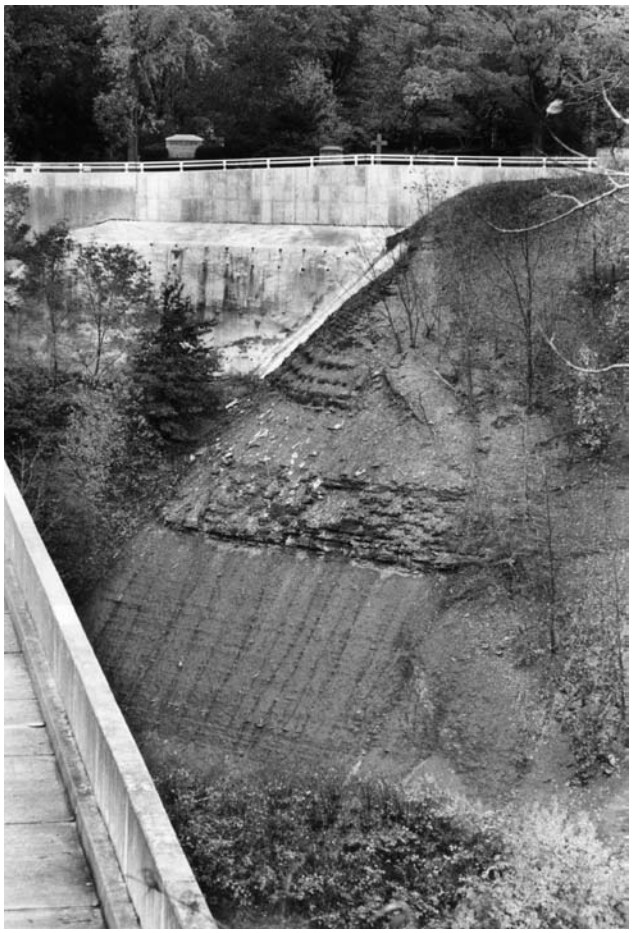

Figure 9. Photograph of outcrops of the Cleveland Shale (blocky, top) and Chagrin Shale (smoother bottom portion of outcrop) adjacent to the dam in Lake View Cemetery.

city of Barre, Vermont. There are a great number of interesting stories and anecdotes related to obelisks to be told (recall, for instance, the popularity for Egyptian antiquities sparked by Anthony and Cleopatra, and Napoleon) that relate to the use of stone obelisks in cemeteries.

The walking trips and other community activities are listed in *The Heritage*, Lake View Cemetery's quarterly newsletter. They are also promoted in brochures and on leaflets available at the Garfield Monument and are listed on the cemetery association's Web page. A modest fee is charged for the field trips, which tends to ensure that people signed up for the tours actually come. An evaluation of one of the geology walks in May of 2005 was very favorable. All respondees (9 respondees of 27 who attended) indicated that the information provided was helpful and informative. All felt that the 2 hours spent was adequate, except for one person who wanted to spend even more time on the trip.

Various geologists have used the cemetery, with permission of the cemetery association, for student work. This has included laboratory sessions and projects for geology classes at Case Western Reserve University. The university is located

only 0.5 mile (about 800 m) to the west of the cemetery. I have also worked with classes from other universities and grade schools at this cemetery.

Outcomes of Activities at Lake View Cemetery

Cleveland Museum of Natural History activities at Lake View Cemetery have resulted in geology and geologists being noted in various cemetery publications, including an educator's handbook (Dooner and Bossu, 1995) and in Lake View Cemetery's newsletter, *The Heritage* (Hannibal and Schmidt, 1988a), and the American Geological Institute publication *Earth Science* (Hannibal and Schmidt, 1988b). This has led to publicity outside of northeastern Ohio (Marx, 2003), and we have appeared on a local public television show *Applause* with cemetery staff. The cemetery is aware of its geological importance, and the cemetery is noted as containing a "treasure chest of discoveries in architecture, geology, sculpture, animal life and horticulture" (*American Cemetery*, 2003).

Collaborating with the cemetery has proven beneficial, as it has provided us with an interesting geological locale and an enlarged audience. This association also fits in well with the cemetery's efforts to promote its use as an educational resource, and has resulted in favorable publicity for both the cemetery and the museum. The Cleveland Museum of Natural History's geology field trips and walks at Lake View Cemetery may be the oldest continuous, ongoing series of geology trips in a cemetery.

The movement to make cemeteries more accessible to the community has grown in recent years. Kiernan (2003) has, for instance, detailed the community activities of Cincinnati's Spring Grove Cemetery. Thus, the potential exists for collaborations such as that detailed above in cemeteries in other locations.

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