Carlsonite: New Mineral Species Discovered in Northern Ohio

by Daniel Blake

February 18, 2015—Ohio is now the birthplace of one of the world's new mineral species. The new mineral, *carlsonite,* has been discovered by Dr. Anthony Kampf of the Natural History Museum of Los Angeles County and Dr. Peter Richards of Heidelberg University, who spent time investigating a shale fire along the Huron River in 2009.

Thin tablets of carlsonite $(NH_4)_5Fe^{3+}{}_3O(SO_4)_6 \bullet 7H_2O$ from a shale fire site along the West Branch Huron River near River Road, in Huron County, Ohio. Field of view is 2.0 mm. Anthony Kampf specimen and photo.

"It is always exciting when a new mineral is discovered—one that has never been seen before anywhere," said Richards. "Carlsonite is the first new mineral to be described from a location in Ohio, other than two that were discovered in a meteorite that just happened to fall here."

The mineral is named after the late Dr. Ernest Carlson (1933–2010), a Kent State University professor, for his outstanding contributions to mineralogy. Dr. Carlson passed away in November 2010 in Cleveland at the age of seventy-six. At the time of his death, he had completed and submitted a revision of his popular *Minerals of Ohio*, originally published in 1991 by the Ohio Geological Survey, and was engaged in a study of the Huron River shale fire.

The shale fire occurred in a rock outcrop of the Late Devonian Huron Shale Member of the Ohio Shale along River Road, northeast of the town of Monroeville in Ridgefield Township, Huron County. At the time of inspection, geologists were uncertain of the cause. The current hypothesis suggests the fire started in September 2009 as the result of spontaneous combustion. The shale fire burned until March 2011 and created a variety of exotic mineral species, such as boussinggaulite and lonecreekite, as well as the never-before-observed carlsonite.

A shale fire smolders on the east side of the West Branch Huron River, Huron County, Ohio, in 2009. Photo by Glenn Larsen.

"The natural shale fire in which [carlsonite] formed is a rare mineral-forming environment, especially in an otherwise tame geological state like Ohio," said Richards.

Carlsonite was produced by the condensation of gases in the oil -shale fire. It occurs in crystal form as thin to thick tablets up to about 0.5 mm but often much smaller. At this scale, the yellow to orange-brown crystals are best viewed through a high-powered microscope. As defined by Carlson, a mineral is a naturally formed solid substance generally having a definite chemical composition and specific physical properties. Carlsonite's physical properties include perfect cleavage, irregular fracture pattern, tan streak, and a glassy,

transparent luster. Density could not be measured because the mineral is soluble in liquids used to measure density.

In addition to carlsonite, another new mineral species has been discovered from the Huron River shale fire site and has yet to be named pending further study.

The Ohio Geological Survey is grateful to Dr. Anthony Kampf and Dr. Peter Richards for their dedicated research in the field of mineralogy and contributions to the State of Ohio.

Further Reading

- Larsen, Glenn, 2010, Survey inspects a rare Ohio geohazard: *Ohio Geology*, 2010, no. 1, p. 7. [pdf]
- Carlson, E.H., 2010, Analysis of Huron River shale fire minerals reveals two specimens New to Ohio: *Ohio Geology*, 2010, no. 2, p. 7. [pdf]
- Carlson, E.H., 1991, *Minerals of Ohio*: Ohio Department of Natural Resources, Division of Geological Survey Bulletin 69.
- Kampf, A.R., Richards, R.P., and Nash, B.P., 2014, The 2*H* and 3*R* polytypes of sabieite, $NH_4Fe^{3+}(SO_4)_2$, from a natural fire in an oil-bearing shale near Milan, Ohio: *American Mineralogist*, v. 99, no. 7, p. 1500–1506.