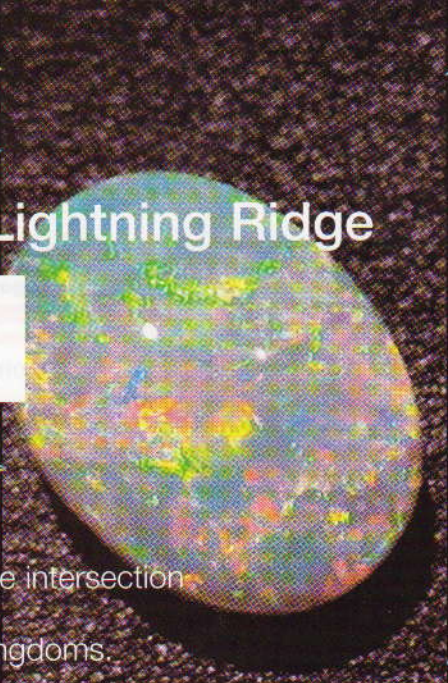


# The Biology of Lightning Ridge Opal

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Black opal may represent the intersection  
of the animal and mineral kingdoms.



One does not just take a moonlight stroll through the outskirts of the mining community of Lightning Ridge. If a hapless stroller survives the 50-ft. fall into an uncapped shaft, there's no telling what else may have survived it as well—that is, if it isn't half-filled with water. And even if you avoid the poisonous snakes, you might corner a kangaroo having a bad hair day, which can do more to you than a \$200 paper shredder. Worse yet, you could waltz into the wrong pub.

Once at the Ridge, however, one learns quickly to avoid the wrong place/time/circumstances, and, with a few good mates over a pint of Victoria Bitters, talk soon becomes light-hearted, covering anything from the Goat Races to the hilarious fight between two lizards at the Glengarry Hilton. As Lightning Ridge is mainly made up of self-employed people, half or more from overseas, a diverse and individualistic culture has evolved.

**Mining opal.** Mining has become modern and fairly organized over the last 20 years. It requires more capital and machinery than the pick-and-shovel days, although those on a low budget may still do it the old way. A prospector must first ask permission to enter a landholder's property, then obtain an Opal Prospecting License (OPL) and prospect in a designated area. He'll usually use a 9-in. auger drill to obtain core samples, and if the area shows promising color in the patch, the prospector then pegs and registers a mineral claim, which allows prospecting within an area of 50 m x 50 m. At this point, the miner will hire an outfit equipped with a Caldwell drilling rig. Looking like a drum with teeth,



Down a 30-ft. to 90-ft. shaft into the darkness of an opal mine can be a claustrophobic experience for some, but the claustrophobia is quickly forgotten when you begin to notice the large spiders and beautiful black opal seams that exist in the underground tunnels.



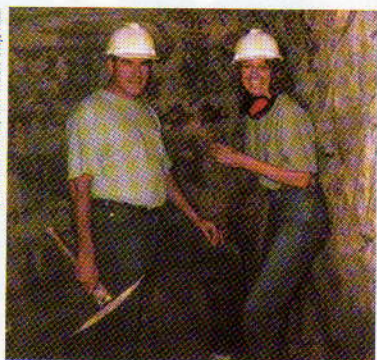
Flying over the area of Lightning Ridge, Australia, reveals a flat, ancient seashore, teeming with opal beneath the surface. The latest important black opal find is in the Glengarry and Grawin fields, which are about 70 km southwest of town.

this telescopic bucket mounted on the rear of a truck can cut a nice 3-ft. circular shaft deep into the ground.

**Where you find it.** Opal is generally found at depths between 30 ft. and 90 ft. below the surface in a layer of “opal dirt” or claystone, immediately below a level of sandstone. Once your shaft has been dug, the more careful horizontal digging takes place. After picking away at the precious seams comes the removal of all the excess dirt and rock. This is done with picks and jackhammers or, better yet, hydraulic diggers. The overburden then must be removed from the mine via the shaft. Old-timers did it with buckets, but now giant vacuum cleaners called blowers can suck a rock the size of your head all the way into the dump truck above. The blowers make work a literal breeze,

sucking fresh air into the deep mine.

After swallowing down an acrophobic moment, my wife, Cara, and I descended into what looked like access into Hades itself, descending on a narrow metal ladder hanging from the collar of the shaft. Each 6-ft. segment has another ladder hung onto it with hooks, and halfway down you swing a bit. When you reach the bottom, there’s a claustrophobic moment, knowing the only way out is up the shaft. All was quickly forgotten, though, when a large wayward black spider was sucked up the blower, and we started pulling opal right off the walls of the earth. The area we visited was the Glengarry and Grawin fields, which are about 70 km southwest of Lightning Ridge. Material from these mines does not need to be washed in puddlers like the traditional Lightning Ridge nobbies since it occurs in seams and is easily identified underground. Like mining everywhere, many tons of earth must be removed just to find a few decent stones.



Bear and Cara Williams go opal mining in Lightning Ridge and come back with black opal and a good tale to tell.

Photos by Bear Williams, C.C.,  
Bear Essentials, Jefferson City, Mo.

**The opal code.** New codes of conduct and requirements from the New South Wales Department of Mineral Resources and the Lightning Ridge Miners Association determine proper disposal of the dirt and the rehabilitation of the mine area once you are finished. This is to ensure the area is left in good shape, and so you don’t

fall down those bloody holes either. Other common-sense pointers discussed in the NSW DMR handbook "Safe Opal Mining" include:

- Don't consume drugs *and* alcohol before entering a mine.
- Don't swing like Tarzan when going down the ladderway.
- Use long fuses on dynamite.
- Petrol engines must not be used underground.
- You may agree, what goes up must come down, but what goes down does not always come back up. Don't go it alone; have a mate with you.

Ratting is still a no-no. A lot of the miners will forsake looking through their overburden, which provides an opportunity for others to fossick or "spec" for opal in these piles of rock. Also called "noodling," it is best to obtain permission before approaching a claimholder's area—otherwise, you could be mistaken for a "ratter." "What ratters do is actually go into your mine at night when you are not there," explains Dan Hatcher, a landowner and mining prospector in the area. "In the old days we would deal quite harshly with these thieves, but their lives are protected by the law nowadays."

**Why Lightning Ridge opal is black.** While the science of what makes opal and why it displays colors is widely known, some newer theories on the formation of black opal are surfacing. At the 15th Australian Geological Convention held in Sydney, Professor H.J. Behr of the Institute for Geology and Lithospheric Dynamics and his co-authors Drs. K. Behr and J.J. Watkins presented some thought-provoking ideas. Discussion centered around the discovery of specific groups of air-breathing microbes and their remains found within the opal and the host rock. As reported in the *Australian*

*Gemmologist*, first quarter 2001, "The Behr, Behr and Watkins model ... hypothesized that biomats of these microbes lined the bottoms and walls of gas cavities in ancient organic muds. These microbes excreted acids and enzymes that weathered the clay minerals and the feldspar content to produce  $\text{Si(OH)}_4$ ,  $\text{AlO(OH)}$ , and Fe-oxides. These formed colloidal particles that were stored in the compaction water of the mud. For many years this acted as a culture medium for further bacterial growth." This material is said to form the black biological organic pigment creating the coloring for the start of a black opal. "Clear residual sols [fluid colloidal solutions] of lower viscosity, which subsequently accumulated above this potch layer, became the source of precious opal."

While it is a radical departure from previous theories, it does stand to reason that a biological origin may explain why the silicas of Lightning Ridge display such a spectrum of fine color while most other silicas do not. Ask any miner, and he usually has his own ideas that tell him where to dig next. Many of these theories are based on above-ground flora and fauna sightings. Of course the jury continues to be in recess on the matter, but it is known that you can find opal under the clay and sandstone layers. The latest findings reported in November 2001 by a group of geologists who just concluded an airborne electromagnetic survey state that research confirms the detection of this claystone layer through the use of EM and magnetics. The land where all of this activity exists was once an inland freshwater sea whose complex mixture of pre-existing mounts, canals, faults, fluids, and microbes all contributed somehow to give us the beautiful gem that Shakespeare described as "that miracle and Queen of Gems." ♦