The Home of Australian Boulder Opal

Queensland produces boulder opal, an unique type of opal which is found attached to a host rock, ironstone. Boulder opal is unique to Queensland, and occurs in deposits in weathered sedimentary Cretaceous rocks in the west of the state.

Much opal mining in Queensland is carried out in 'open cut' mining operations, which is vastly different to shaft mining.

The Queensland opal fields are within a belt of deeply weathered Cretaceous sedimentary rocks known as the Winton Formation, which extends in a north-westerly direction from the New South Wales border at Hungerford stretching west of Cunnamulla, Quilpie, Longreach and Winton to Kynuna, a distance of about 1000 km.

Timeline of the Queensland Opal Industry

1869 Blackall Station overseer finds Boulder Opal on Listowel Downs near Adavale

1871 Pride of Hills first Opal mining lease near Toompine

1871 Eromanga fields discovered

1873 Opal miners Berkleman & Lambert launch Barcoo Opal at International Exhibition

1875 Bond takes up leases Aladdin, Scotchman and Cunnavalla mines in the Kyabra hills

1878 Fermoy Opal fields discovered

1879 Herbert Bond floats a company in London for 2500 pounds

1884 Yowah's first opal mining lease registered

1884 White Cliffs in New South Wales discovered by Kangaroo Hunters

1886 Colonial & Indian Exhibition attended by Mr Bond with a gem and Opal cutting display

1887 Joe Bridel takes parcel of opal to Silverton NSW displaying at office of F.E. Harris.

1887 Opalton discovered

1888 Craggs Boulder Opal mine first Opal claim registered in NW Qld

1888 Tully Wollaston goes to meet Opal miner Joe Bridle out of Eromanga

1889 Tully Wollaston bought the first parcel of White Cliffs Opal

1889 Tully Wollaston's first London trip with Opal deals with Hasluck Bros a conduit to US market

1890 Jundah discovered

1891 Duck Creek discovered

1893 Yowah: Herbert Bond & Co obtain lease @ Southern Cross

1894 Kynuna discovered

1895 Opalton's Great Opal Rush

1896 Opalton proclaimed mining district, 500-600 men on the field

1897 Koroit discovered

1901 Yowah: German syndicate takes on Bond's lease at Southern Cross

1901 Tully Wollaston takes White & Boulder Opal to Empire Exhibition London

1902 Yowah's population reaches 100

1902 Lightning Ridge in New South Wales discovered

1915 Coober Pedy in South Australia discovered

The commonly held view of the formation of opal is as follows.

A Simple Explanation

Opal is formed from a solution of silicon dioxide and water. As water runs down through the earth, it picks up silica from sandstone, and carries this silica-rich solution into cracks and voids , caused by natural faults or decomposing fossils. As the water evaporates, it leaves behind a silica deposit. This cycle repeats over very long periods of time, and eventually opal is formed.

A Detailed Explanation

Occasionally, when conditions are ideal, spheres of silica, contained in silica-rich solutions in the earth form and settle under gravity in a void to form layers of silica spheres. The solution is believed to have a rate of deposition of approximately one centimetre thickness in five million years at a depth of forty metres. If the process allows spheres to reach uniform size, then precious opal commences to form. For precious opal the sphere size ranges from approximately 150 to 400 nanometres producing a play of colour by diffraction in the visible light range of 400 to 700 nanometres.

Each local opal field or occurrence must have contained voids or porosity of some sort to provide a site for opal deposition. In volcanic rocks and adjacent environments the opal appears to fill only vughs and cracks whereas in sedimentary rocks there are a variety of voids created by the weathering process. Leaching of carbonate from boulders, nodules, many different fossils, along with the existing cracks, open centres of ironstone nodules and horizontal seams provide a myriad of moulds ready for the deposition of secondary minerals such as opal.

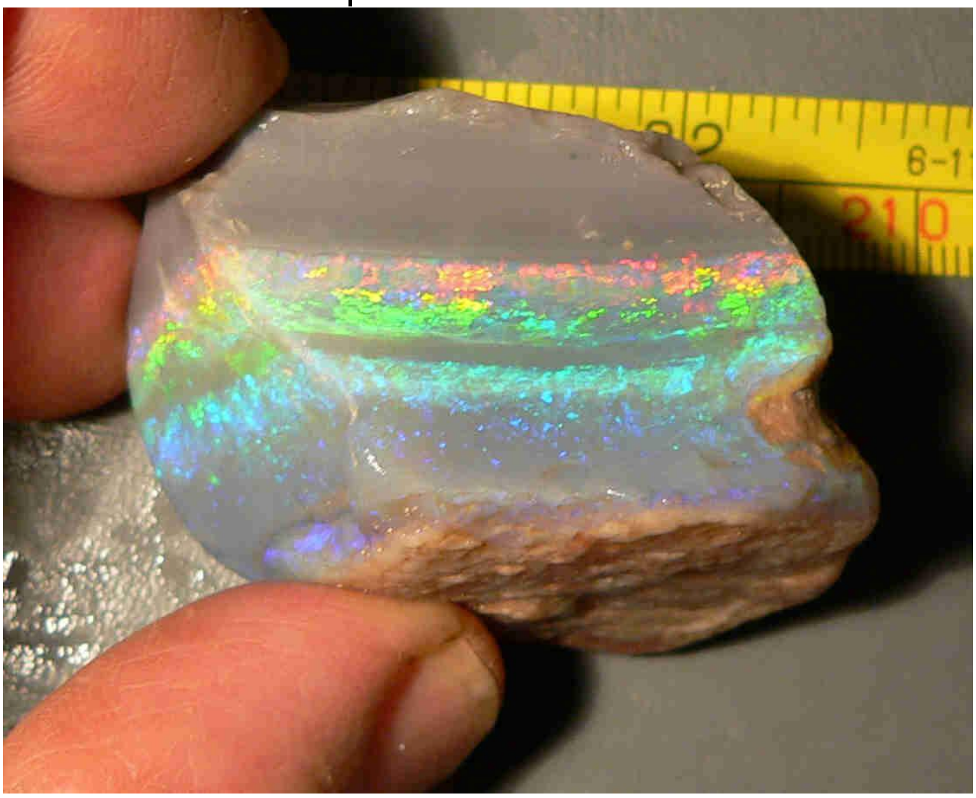
Much of the opal deposition is not precious. It is called "potch" by the miners, or *common opal* by the mineralogist, as it does not show a play of colour. Opaline silica not only fills the larger voids mentioned but also may fill the pore space in silt and sand size sediments cementing the grains together forming unique deposits, known as matrix, opalised sandstone or *"concrete"* which is a more conglomeratic unit near the base of early Cretaceous sediments.

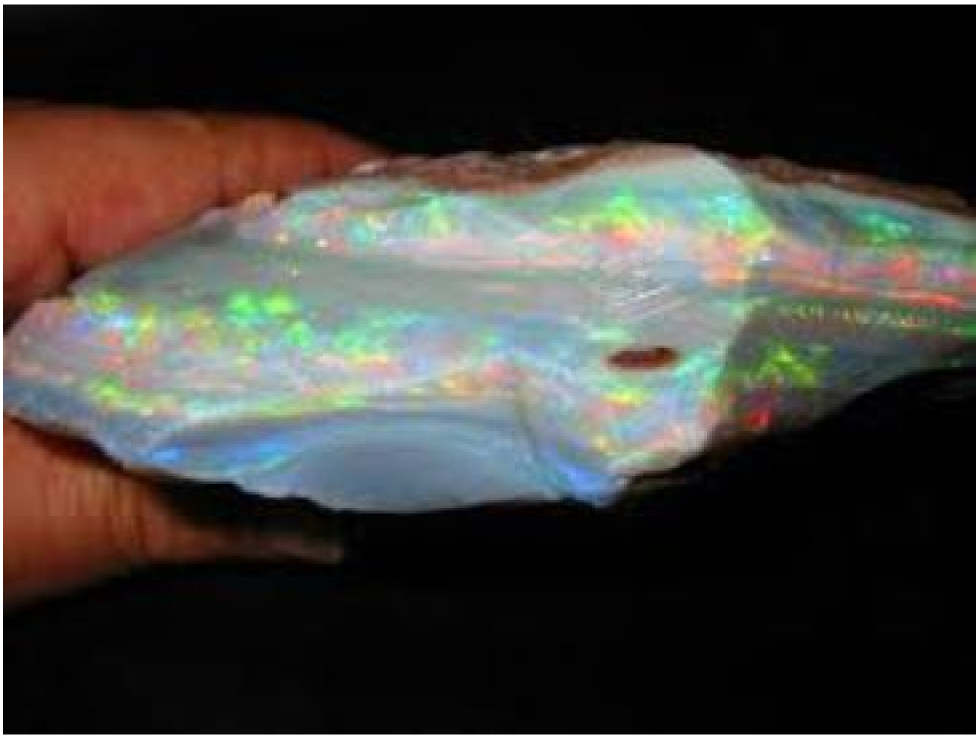
The many variations in the types of opal depends on a number of factors. In particular, the climate provides alternating wet and dry periods, creating a rising or more importantly a falling water table which concentrates any silica in solution. The silica itself is formed either by volcanic origin or by deep weathering of Cretaceous clay sediments producing both silica and white kaolin often seen associated with the Australian opal fields. Special conditions must also prevail to slow down a falling water table in order to provide the unique situation for the production of its own variety of opal.

The chemical conditions responsible for producing opal are still being researched, however some maintain that there must be acidic conditions at some stage during the process to form silica spheres, possibly created by microbes.

While volcanic-hosted and other types of precious opal are found in Australia, virtually all economic production comes from sediment-hosted deposits associated with the Great Australian Basin. Australia has three major varieties of natural sediment-hosted precious opal - black opals from Lightning Ridge in New South Wales, white opals from South Australia, and Queensland boulder and matrix opal.

This idea appears to be confirmed when one sees the horizontal bands of colour in much of the opal from the others fields in Australia.





This may hold true when one looks at some boulder opal. However there may be another explanation.

Based on personal observation of opals that I have purchased or cut I have discussed the possibility of another theory with a geologist friend and an older experienced opal miner. Both agree that at least some of the opal in Western Queensland was probably formed by hydrothermal action. When one realizes most of the Queensland opal fields lie within or on the edge of the Great Artesian Basin then these fields overlie the hot artesian waters of that basin. Prior to the depletion of the waters of the basin there were many active hot mud springs in Western Queensland. In my early trips to the Yowah field these mud mounds were still semi liquid on top and would occasionally ‘burp’.

When one looks at the following opals it is easy to see the flow patterns as the opal solution was forced through the narrow fissures in the ironstone boulders.

So it may be that there are several ways in which the silica rich solution was formed and deposited. From the above photographs it appears that the hot silica solution solidified much too quickly to allow the solution to settle in nice horizontal bands.

With some boulders the opal solution did not completely fill the fissures and some of these have what appears to be a thing layer of ‘dross’ on top of the gem opal. This ‘dross’ could only be formed by a fairly rapid flow of very hot liquids through the surrounding material and being very fluid the ‘dross’ had time to float to the top before solidification took place.