Tuesday, July 14th, 2009 – Lyndhurst, South Australia

Against All Odds … The Great Australian Crust Hunt

Today we went on the great crust hunt. Yesterday's exploration of the area around Marree did not turn up any crusts, so our challenge was to search more intensively today. We broke into two teams – one travelling up the Birdsville Track and the other (consisting of me, Chris, Jane and David) up the Oodnadatta Track. The landscape was flat, sparse, and consisted of areas of desert pavement and the silty soils where we find crust in the Mojave. There was to be a prize for the team that found the crust and our hopes were high that we would be the winners as the land looked very promising. Our first stop turned up nothing, but at our second stop, we found crust! David and I found some on one side of the road, at about the same time Chris and Jane located some on the other side of the road.

These crusts look much the same as those found in the Mojave, with one big exception – they are much smaller in size. If you imagine the crusts in the Mojave as cities, then these crusts are like small country towns and homesteads. We don't quite understand why we don't see communities that we see in the Mojave. It could be due to substrate, or environmental conditions, or some other factor.

After successfully securing the prize, (which turned out to be a Mars bar) for finding the crust, we travelled up the Birdsville track to visit some unique desert pavement that the rest of the team has spotted yesterday. While we were there we investigated some unusual rocks that turned out to be the source of the ochre used by the aborigines in their art. (See Mike Spilde's geology report below for more information). The colours that formed by this simple depositional process were amazing.

Shannon Rupert

Appendix

How do iron concretions form?

As ground water moves through the soil, it can break down minerals and dissolve iron, silica, and other elements from those minerals. The iron is in a reduced state, so it can easily go into solution in the water. If the water encounters something that causes a chemical reaction, the iron may be changed from the reduced state to the oxidized state. This might occur, for example, if the water mixes with oxygen near the soil surface. When iron in the water is oxidized, it becomes insoluble and precipitates out of the water as iron oxide, which may be either goethite (yellow) or hematite (red). Sometimes the chemical reaction also causes silica to precipitate at the same time as the iron. This reaction produces a hard, black concretion of ferruginous silica. If only the hematite is precipitated, a dark red powder may result. Microbes may also cause iron oxide to precipitate by oxidizing the reduced iron to gain energy. Much like we can eat a hamburger and oxidize the carbon in our food for energy, certain bacteria can "eat" reduced iron and oxidize it for energy. The resulting iron oxide is often yellow goethite powder.

These reactions often occur around some object in the ground. For example, a piece of wood (like a tree root) may contain bacteria that can oxidize the iron. Goethite is precipitated out, replacing the wood as the bacteria consume the wood and oxidize the iron. This affects the local conditions by changing the acidity or pH around the root. The change in pH causes both iron and silica to precipitate. Thus you can find a hard, black circular concretion of ferruginous silica with a soft yellow goethite core.