Granites

There are only a small number of granites exposed in this part of the Granite State. During metamorphism, pre-existing rocks partially melted and formed migmatites. Enough molten rock pooled and accumulated to produce granites. Two of the largest granites of this type are exposed at Wildcat Ski Area and in Bigelow Lawn. Both have been dated at 401 and 399 million years old respectively, synchronous with the intense metamorphism during the Acadian collision. There are also dozens of smaller granitic bodies that occur as pods between 5 and 100 meters in length within the metamorphic rocks. Many of these are coarse-grained, some with crystals up to several centimeters in length. One such pod is exposed along the summit of Mt. Monroe, another near Slide Peak, and others along Cold Brook near the Town of Randolph.

There are three granites found in the lower elevations of the Presidential Range. These have been named the Peabody River, Bickford, and Bretton Woods granites. They all look very similar; white, small in grain size, and composed of the minerals quartz, feldspar, muscovite, and biotite. Photo 15 shows a typical granite exposure at Coldspur Ledges on Cold Brook, part of the Bickford granite. All three granites have been dated using radioactive methods and their ages cluster around 360 million years ago. This makes them a full 40 million years younger than the metamorphism and deformation described above. The likely cause of this period of igneous intrusion was the collapse of the ancestral Presidential Range after the tectonic stresses ceased. Once the stress that builds a mountain range and keeps it uplifted ceases, the mountains sag and decrease in elevation. As the mountaintops drop, the base of the Earth’s crust rises up and heat
from the underlying mantle causes the base of the crust to melt. This generates great volumes of new magma that rise up into the upper crust and cool to freeze as granites. These young granites cut across all the metamorphic rocks as well as the D1 folds and D2 faults. They are probably related to the late D5 and D4 folds and may have created the folds when the magma pushed its way up through the rocks.

The Bickford granite exposed at Coldspur Ledges on Cold Brook. This is one of three young granites that intruded about 360 million years ago at the end of the plate tectonic activity in the Presidential Range. Geologists Jesse and Matt are preparing to measure and describe the outcrop.

The three younger granites in the Presidential Range: The Bretton Woods, Bickford, and Peabody River granites. All of these granites are approximately 360 million years old and occupy the lower regions of the range, presumably because they eroded much more readily than the schists in the high peaks.