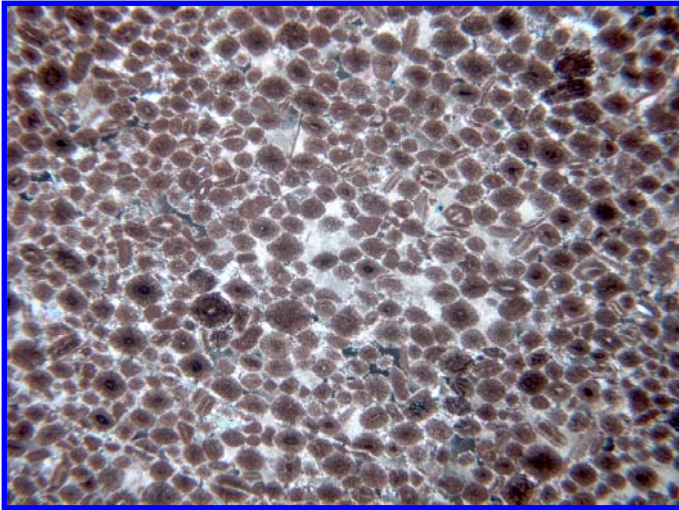


Non-skeletal grains

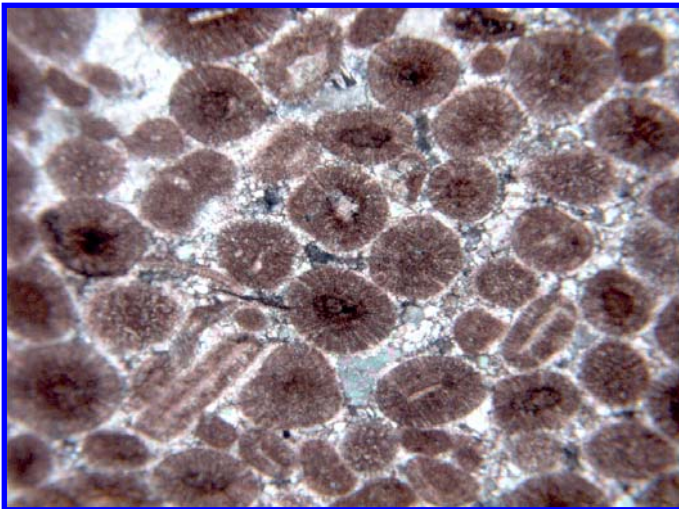
Ooids



Ooids, Example #1

Pennsylvania, Union Furnace outcrop Black River Formation

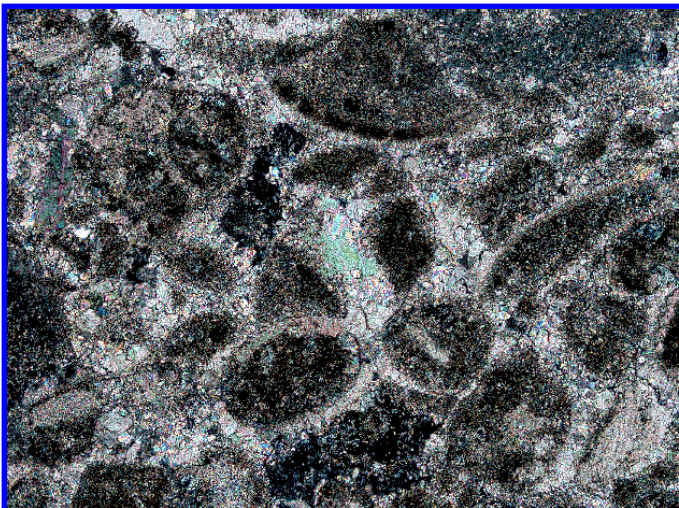
This oolitic grainstone occurs in the Black River Formation of Pennsylvania. The ooids in this thin section have not been extensively micritized and the original radial fabric has been preserved.



Ooids, Example #2

Pennsylvania, Union Furnace outcrop Black River Formation

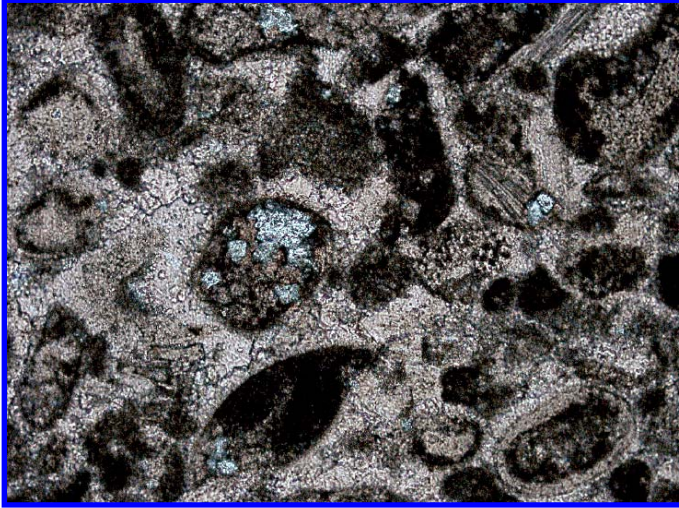
This photograph is the ooid grainstone shown above at higher magnification. The radial fabric and concentric laminations of the ooid structure is more obvious in this photograph. Notice the elongate ooids that are coating elongate skeletal grains. Sparry calcite cement is the only intergranular material present.



Ooids, Example #3

West Virginia, Wood County Black River Formation, 10103 ft

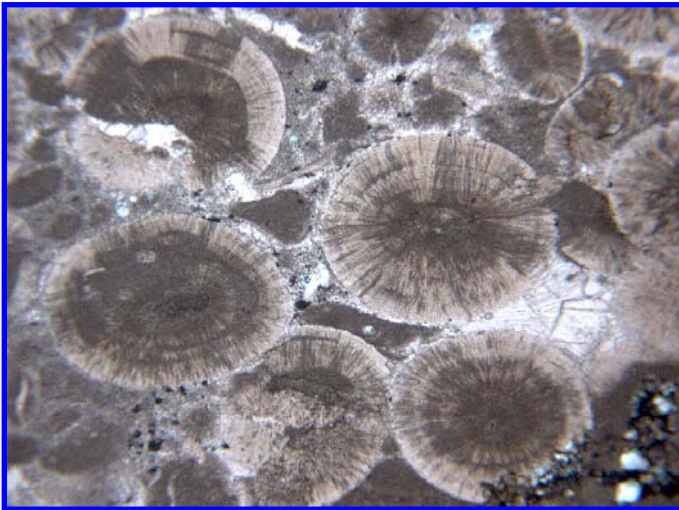
Unlike the ooids above the ooids in this grainstone have been highly micritized and the outer structure has been replaced with calcite. The relic radial fabric is still recognizable. Ooids are not nearly as common in this grainstone as above. This photograph was taken under crossed polars.



Ooids, Example #4

**West Virginia, Wood County
Black River Formation, 10103 ft**

This is another view of the ooid in the grainstone shown above. In this photograph, taken in plane light, the core of the ooid is highly micritized and the outer laminae replaced with calcite spar.

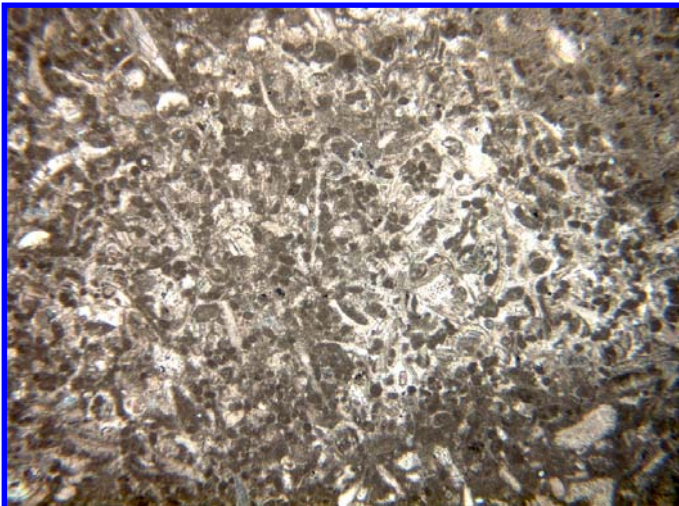


Ooids, Example #5

**Pennsylvania, Union Furnace outcrop
Black River Formation**

The radial fabric and concentric laminations of the ooids are very evident in this photomicrograph. These ooids have been partially dissolved as a result of pressure solution. The intergranular material is both micritic matrix and sparry calcite cement. There also appear to be some meniscus type cements between the individual ooids. These cements were not precipitated in the vadose zone, but are microbially induced marine cements.

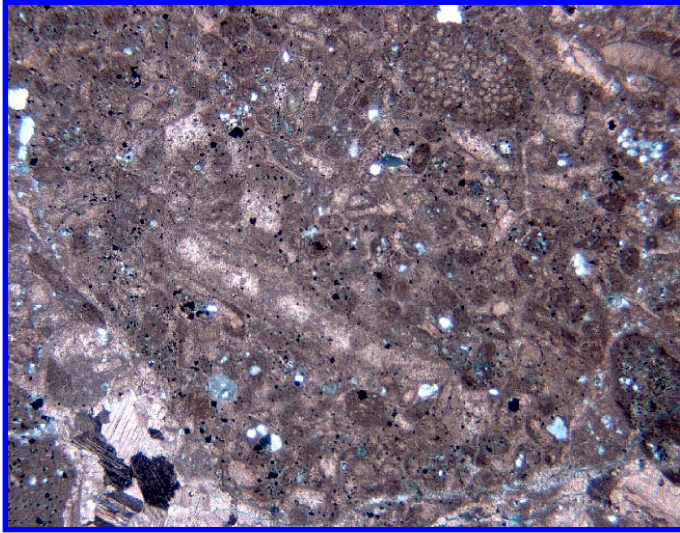
Peloids



Peloids, Example #1

**Pennsylvania, Union Furnace outcrop
Black River Formation**

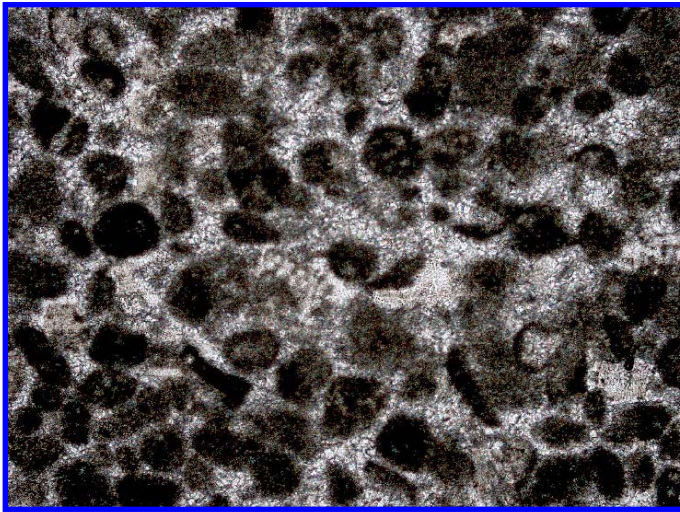
The peloids in this peloidal/skeletal grainstone from Pennsylvania are small and irregularly shaped. The irregular/elongate shape of the small peloids grains may suggest that they are micritized skeletal grains.



Peloids, Example #2

Pennsylvania, Union Furnace outcrop Black River Formation

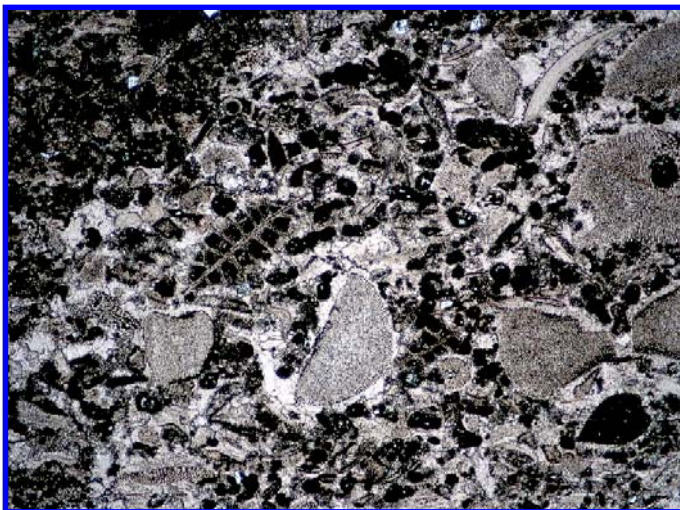
The peloids in this packstone from Pennsylvania are larger than those shown above and not as abundant. Some of the peloids near the lower portion of the section have a visible core grain suggesting that the peloids in this slide are micritized ooids.



Peloids, Example #3

West Virginia, Wood County Black River Formation, 10048 ft

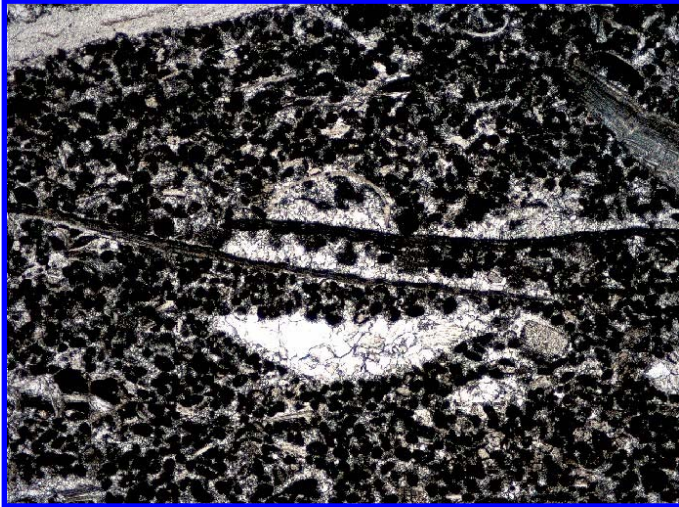
The peloids in this grainstone are typical of those observed in the West Virginia core. Notice the distinct grain boundaries of the peloids in the photograph; this is very different from the 'fuzzy' boundaries observed in peloidal cements.



Peloids, Example #4

West Virginia, Wood County Black River Formation, 10100 ft

The peloids in this skeletal grainstone are clearly micritized skeletal grains. Evidence for the micritization is obvious in the bivalve grain that has been completely micritized in the lower right corner of the section. The grain is clearly identified by its distinct shape.



Peloids, Example #5

**West Virginia, Wood County
Black River Formation, 10048 ft**

The origin of the peloids is hard to determine in this thin sections. The peloids are much smaller than any of the skeletal grains present and all the peloids are about the same size and shape.

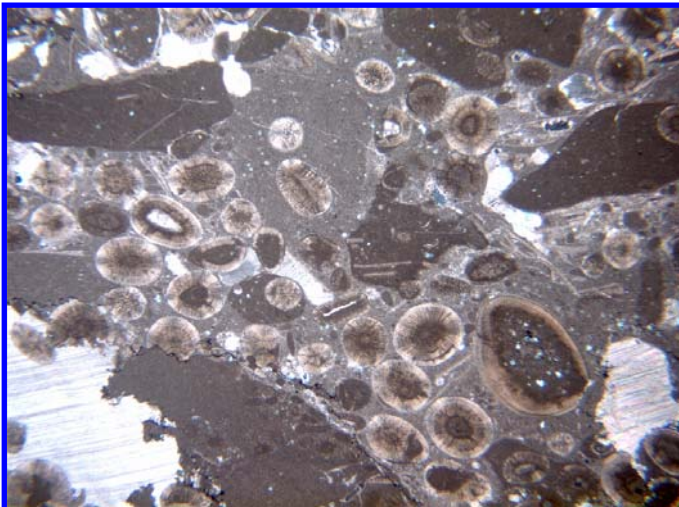


Peloids, Example #6

**West Virginia, Wood County
Trenton Formation, 9796 ft**

Peloids are the only grains observed in this peloidal grainstone from West Virginia. The peloids are very well sorted.

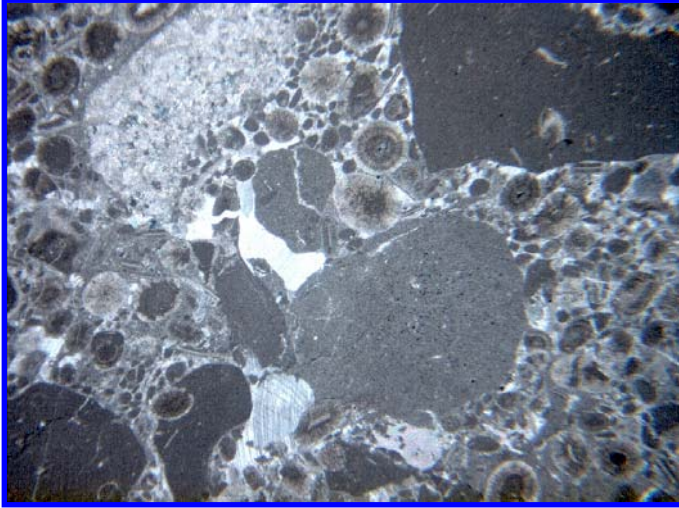
Intraclasts



Intraclasts, Example #1

**Pennsylvania, Union Furnace outcrop
Black River Formation**

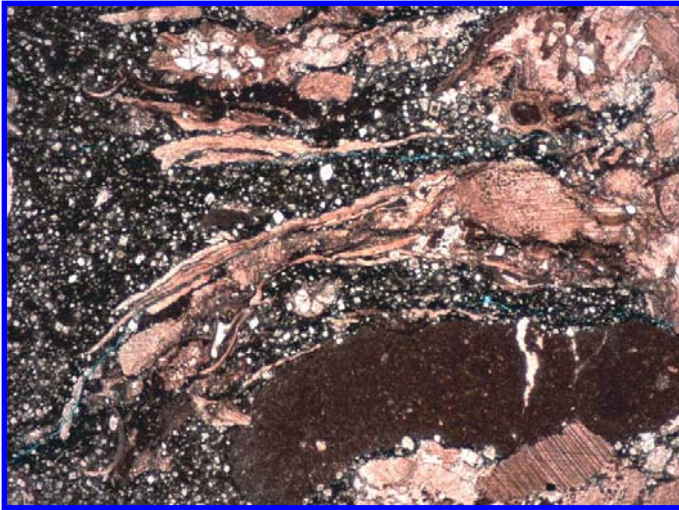
There are two types of rip up clasts observed in this Pennsylvania, Black River thin section: mudstones and ooid wackestones. The mudstone intraclasts are dark in color and irregularly shaped. The ooids have very good preserved microstructures. The matrix in the ooid wackestones is lighter in color than that observed in the mudstone rip ups.



Intraclasts, Example #2

Pennsylvania, Union Furnace outcrop Black River Formation

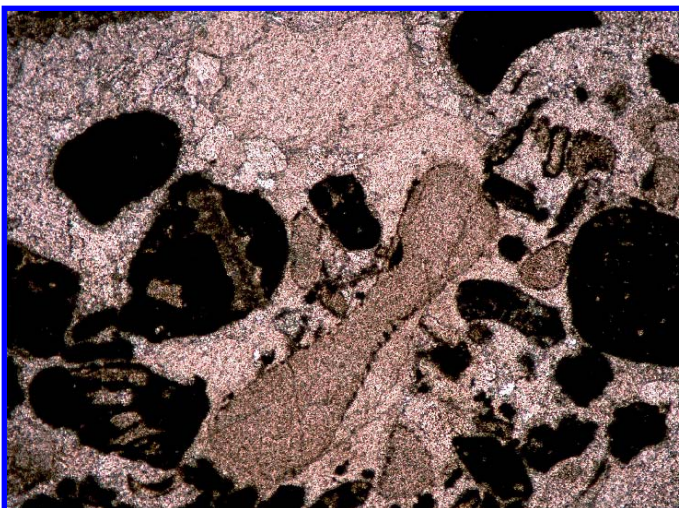
The individual intraclasts in this mixed oolitic/mudstone intraclastic wackestone are hard to identify. It appears that you have mudstone intraclasts and oolitic wackestone intraclasts, but in some cases ooids are incorporated into the mudstone clasts.



Intraclasts, Example #3

Pennsylvania, Union Furnace outcrop Black River Formation

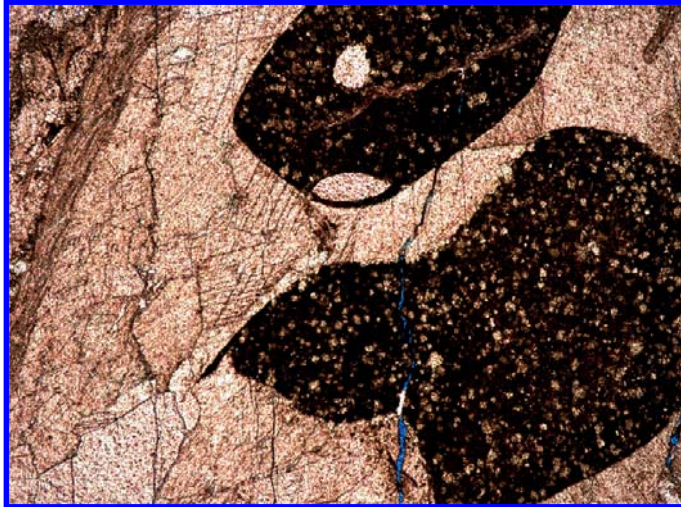
The subrounded muddy intraclast at the bottom of the section contain some calcite filled fractures. These fractures are clearly early because they have not affected the rest of the rock.



Intraclasts, Example #4

West Virginia, Wood County Trenton Formation, 9798 ft

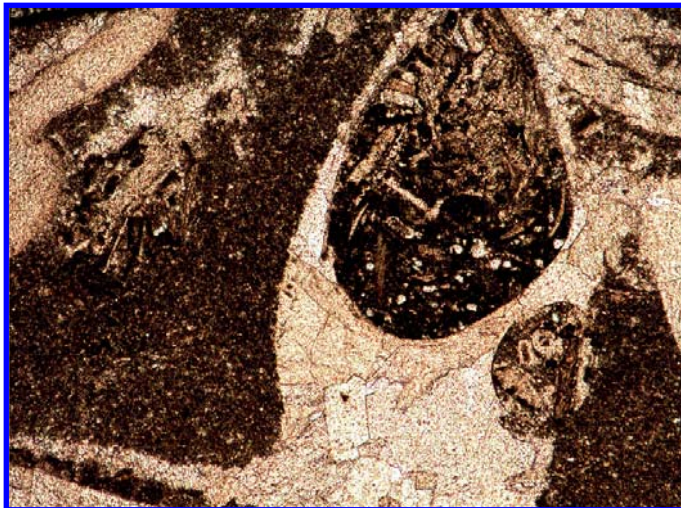
The rounded intraclasts in this thin section are poorly sorted showing a range of sizes and shapes. Notice that most of the intraclasts do not contain recognizable grains, but skeletal grains are observed in some of the larger ones indicating that these rocks were originally skeletal wackestones.



Intraclasts, Example #5

**West Virginia, Wood County
Trenton Formation, 9630 ft**

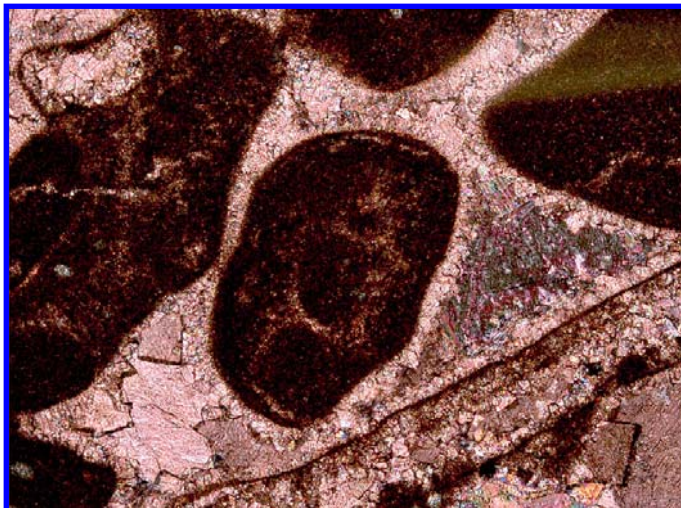
The intraclasts and the calcite spar are both large in this intraclastic/skeletal grainstone. The intraclasts are irregularly shaped and contains some skeletal material as well as a dolomitic matrix.



Intraclasts, Example #6

**West Virginia, Wood County
Trenton Formation, 9647 ft**

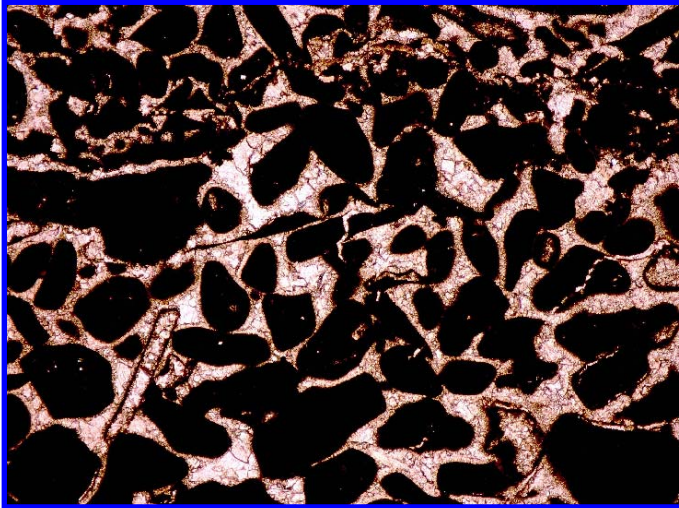
This intraclastic grainstone is very similar to above, but the irregular shaped intraclasts clearly contain recognizable skeletal grains.



Intraclasts, Example #7

**West Virginia, Wood County
Black River Formation, 9951 ft**

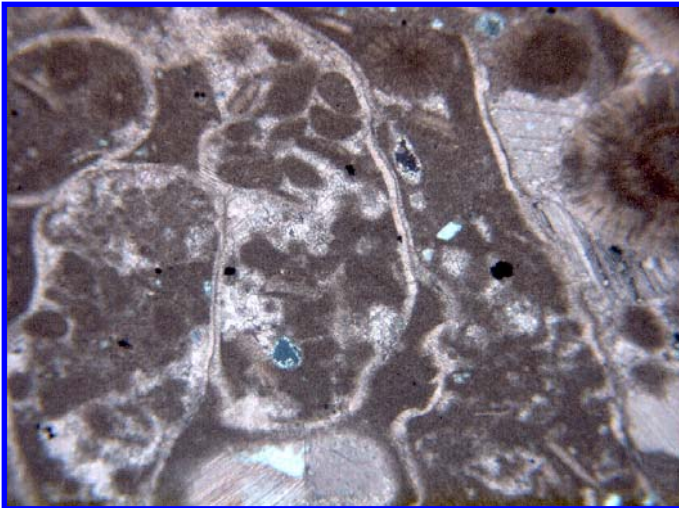
The intraclasts in this grainstone are composed of a peloidal wackestone. The original peloids are still discernible in this thin section. Notice the variety of cements in this photo including drusy, prismatic and intragranular spar.



Intraclasts, Example #8
West Virginia, Wood County
Trenton Formation, 9655 ft

The intraclastic grainstone in this photograph contains a variety of irregularly shaped intraclasts. The grain shapes suggest that some are micritized skeletal grains. There is a mollusk grain in the lower left portion of the slide with a very well developed micritic envelope.

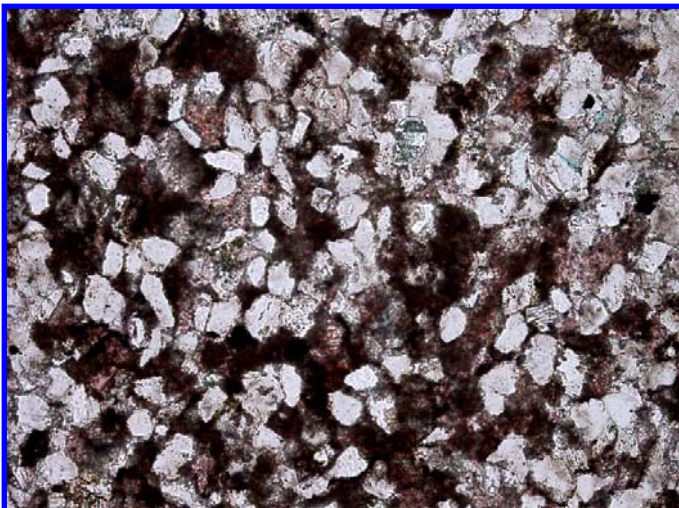
Aggregates



Aggregates, Example #1
Pennsylvania, Union Furnace outcrop
Black River Formation

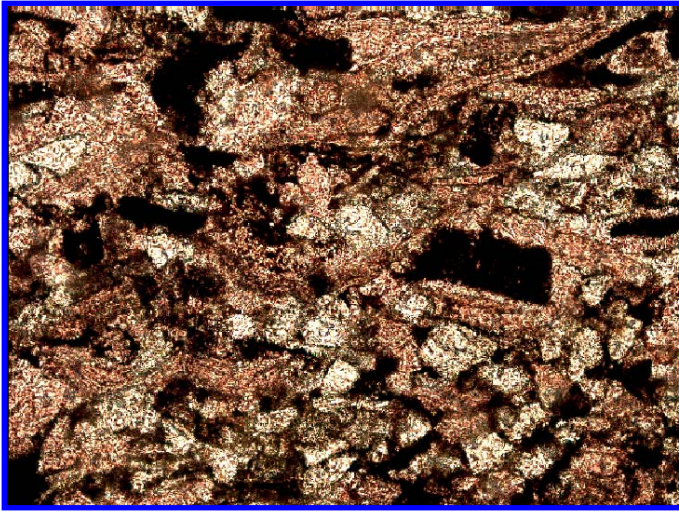
The aggregates in this thin section are comprised of peloids. Notice that the peloids are bound by sparry calcite cement. The aggregate grains also contain a thin, superficial, oolitic coating.

Non-Carbonate Grains



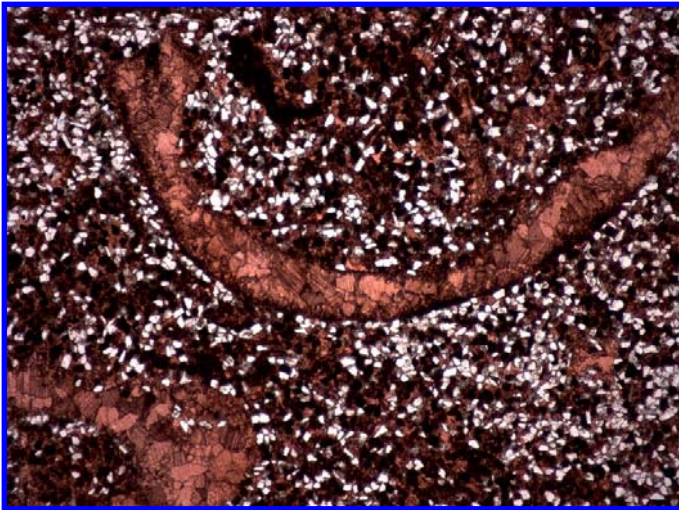
Quartz, Example #1
Pennsylvania, Union Furnace outcrop
Black River Formation

The quartz grains in this rock from the Black River Formation in Pennsylvania are the dominant grains present. The grains are rounded to subrounded.



Quartz, Example #2
West Virginia, Wood County
Trenton Formation, 9662 ft

There are quartz grains found in the Trenton Formation in West Virginia. Notice the pyramidal terminations of the colorless quartz grains in this thin section. This crystal shape is characteristic of quartz.



Quartz, Example #3
Pennsylvania, Union Furnace outcrop
Black River Formation

Quartz is an important component in this skeletal/peloidal packstone. This quartz rich zone likely represents a time of sea level low when terrigenous sediment was transported into this lagoonal environment.