Fossils of McCoy, Colorado

by Wayne M. Itano

Introduction

About 300 million years ago, during the Pennsylvanian Period, Colorado was largely submerged by a tropical sea. Due to continental drift, what is now Colorado was then much closer to the equator, and this is reflected in the fossil remains, such as corals, that we find from that time. Most of the land mass was in two large islands, the Ancestral Front Range Uplift and the Uncompahgre Uplift (see Fig. 1). The area near the present-day town of McCoy, Colorado was then near the western shore of the Ancestral Front Range. Due to fluctuations in the sea level, this area was sometimes inland and sometimes offshore. These fluctuations are reflected in the Pennsylvanian rocks at McCoy, which make up the Minturn Formation, being made up of alternating layers of marine and nonmarine sediments.

Some of the marine limestone and shale beds of the Minturn Formation at McCoy are highly fossiliferous. Land plant fossils are also abundant in places. The fossils have been studied at least since the early 1900s, when Junius Henderson collected for the University of Colorado. Roth and Skinner (1930) published a faunal list and described some new microfossils (ostracodes and foraminifera). They named the Pennsylvanian strata at McCoy the McCoy Formation. Chronic and Stevens (1958) recognized that these strata were equivalent in age to those near the town of Minturn, Colorado, and redesignated them as the Minturn Formation.

The most comprehensive study of the paleontology of McCoy is the University of Colorado Master's thesis of Stevens (1958). Another useful guide to the paleontology of McCoy was written by Houck and Lockley (1986). In particular, it contains new information on the bivalves and vertebrates. Other publications describe specific groups of fossils of McCoy, such as brachiopods (Stevens, 1962), echinoderms (Strimple and Moore, 1973; Webster and Houck, 1998; Itano and Bateman, 2001), and sharks (Lockley, 1984; Itano et al., in press).

Some fossiliferous localities at McCoy are on land managed by the BLM (Bureau of Land Management), in which case invertebrate and plant fossils can be collected without a permit. Be sure to get permission before collecting on private land. Collecting is often done simply by walking along the outcrops and finding specimens that have weathered out. Some fossils, such as crinoids, are best found by quarrying into shale beds. Plant fossils are best found by splitting the rocks.

The following is a brief guide to the more common fossils at McCoy. Due to space limitations, this cannot be comprehensive. Certain groups, like trace fossils, are not represented, for lack of specimens to illustrate and lack of expertise on my part. Most of the specimens illustrated were found by me. Exceptions are noted in the captions. Some of them were coated with ammonium chloride before being photographed, in order to cover up superficial color variations. In many cases, I am uncertain of the species, so only the genus is given.

Land Plants

These consist mainly of leaves and twigs preserved in thin-bedded sandstones and siltstones. Large pieces of fossil wood have also been found. One of the more distinctive plant fossils at McCoy is an early conifer, Walchia (see Fig. 2). The conifers at McCoy are among the earliest known in North America. Other plants found at McCoy include Cordaites (a kind of tree), Calamites (a relative of the modern horsetail rush, and seed ferns.

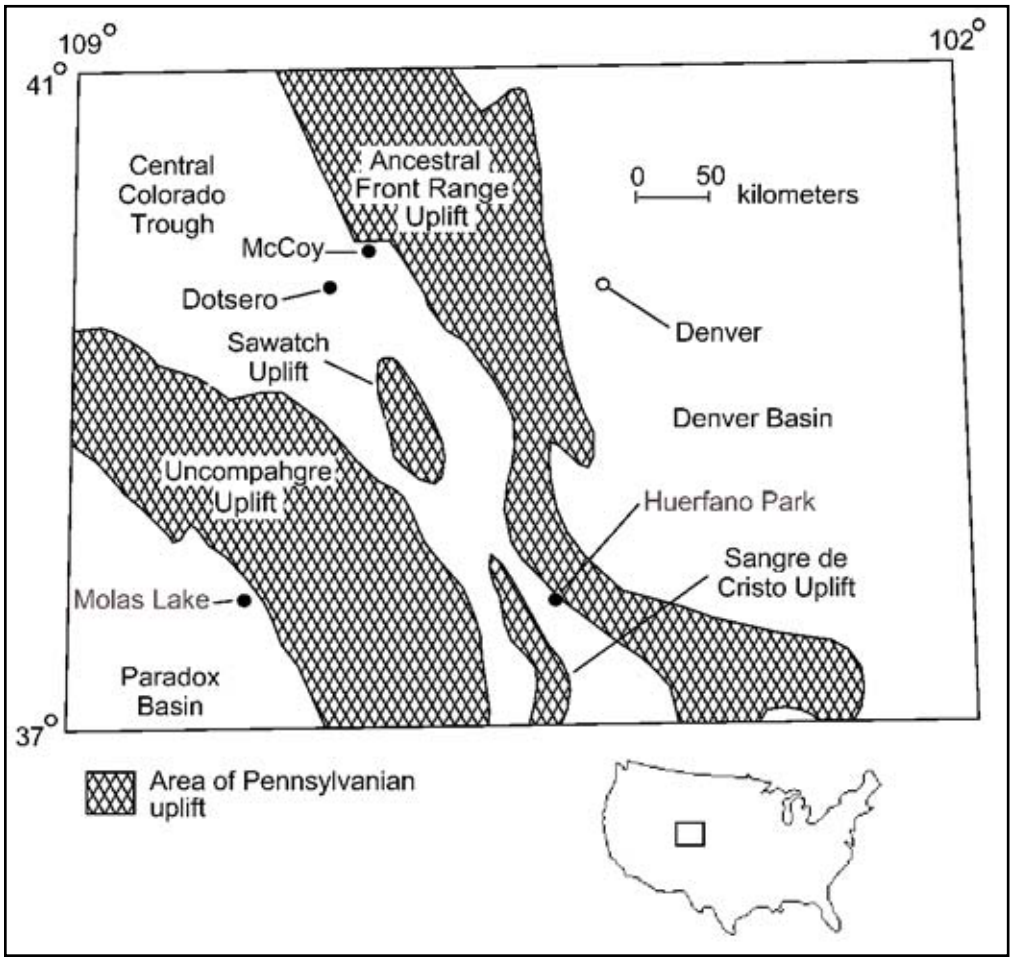

Figure 1. Paleogeography of Colorado during the middle Pennsylvanian Period, showing regions of uplift. The black dots show the locations of McCoy and some other Pennsylvanian fossil localities. (From Itano and Bateman, 2001. After Mallory, 1972; De Voto, 1980; Webster and Houck, 1998.)

Fusulinids

Fusulinids were a kind of foraminifera (one-celled organisms with calcareous shells). The ones commonly found at McCoy look like grains of wheat and are up to a few millimeters long (see Fig. 3). They are useful as index fossils for dating sediments. In fact, the most accurate dating of beds in the Minturn Formation at McCoy is based on fusulinids (Houck, 1997). Identification requires making thin sections and examining them under a microscope.

Bryozoans

Bryozoans are colonial animals, which have various shapes. They may occur in encrusting, branching or sheetlike forms. They are recognized by the tiny openings in the surface, called zooecial apertures, which housed the individual animals of the colony. Figure 4 is a fenestrate bryozoan, which has a lacy structure. On this specimen, the zooecial apertures are not visible, because they are on the other side. The holes that are visible are the openings between parts of the branching skeleton and are much larger than the zooecial apertures.

Corals

Corals occur at McCoy both in colonial forms and as solitary, conelike, "horn corals" also called rugose corals. Positive identification of corals generally requires sectioning them to see the internal plates, called septa, which radiate outward from the central axis. A lateral view of a typical horn coral is shown in Fig. 5A. A top view of another horn coral is shown in Fig. 5B. Note the septa, radiating outward from the center, in Fig. 5B.

Echinoids

Echinoids, commonly known as sea urchins, are usually found at McCoy only as isolated plates or spines. The polygonal plates, which made up the outside of the body, generally have a central knob, or boss, to which an elongated spine was attached. Occasionally, associated spines and plates are found together, as in Fig. 6A. The spines seem to be of two different types: ones with a rounded triangular cross-section and three rows of small spines (*Archaeocidaris triplex*) and ones with densely packed small spines (*Archaeocidaris ourayensis*) (see Fig. 7). The plates also seem to be of two different types: ones with a raised outer margin and ones without such a margin. From associated finds of spines and plates, it

appears the plates with the raised margin (see Fig. 6A) go with the *A. ourayensis* spines, and the plates without a raised margin go with *A. triplex* (see Fig. 6B).

Crinoids
Crinoids are echinoderms which are usually attached to the sea floor with a long stem. The main part of the body, called the crown, is made up of the dorsal cup and arms, used for feeding. Pieces of crinoid stems (see Fig. 8) are among the most common fossils at McCoy. Interestingly, there is a separate taxonomy for isolated stems (Moore and Jeffords, 1968). We often don't know which cups they belong to, but it is still possible to attach a name to them. For example, the stem shown in Fig. 8 is called *Blothronagma cinctutum*. According to Webster and Houck (1998), it may go with the crown assigned to *Synarmocrinus molasensis*. Isolated pieces from the cup and arms are common, but complete cups are rare (see Fig. 9). Nearly all of the crinoid species identified at McCoy are endemic, that is, they are found nowhere else. One of these species, *Sciadiocrinus wipsorum*, was named after WIPS (Western Interior Paleontological Society), because of the help that WIPS members had provided in collecting specimens for a study of McCoy echinoderms (Webster and Houck, 1998). Another new species, *Synarmocrinus cobbani*, was found by Bill Bateman, a WIPS member, and described by us (Itano and Bateman, 2001). Some other crinoid specimens, including one found by Jordan Sawdo of WIPS that appears to be a new species, are the subject of a publication that is currently in progress (Webster et al., unpublished).

Brachiopods
Brachiopods are animals that superficially resemble bivalves, since they have two shells, but they differ in their symmetry. In a bivalve, the two shells (valves) are usually mirror images of each other. In a brachiopod, the two valves are not equivalent, but each valve has a plane of symmetry. Brachiopods are perhaps the most diverse and abundant fossil group at McCoy. There are two classes of brachiopods, the inarticulates and the articulates. The inarticulates lack teeth or sockets to hold the valves together. Inarticulates are not common at McCoy. Figure 10 shows one, called Orbiculoidea. Some of the most common genera of articulates are Antiquatonia, Composita,and Anthracospirifer (see Fig. 11).

Cephalopods
Cephalopods include molluscs with chambered shells, like nautiloids and ammonoids. The only cephalopod which is reasonably common at McCoy is the orthocone (straight-shelled) nautiloid *Pseudorthoceras knoxense* (see Fig. 12). Coiled cephalopods are also present, but are rare.

Gastropods
Gastropods (snails) are molluscs with a single, undivided shell. These can be difficult to identify, particularly if they are only preserved as internal molds. Some of the gastropods from McCoy resemble modern ones, at least superficially, such as Strobeus (see Fig. 13C) and Worthenia (see Fig. 13D). Platyceras (Orthonychia) (see Fig. 13B) has a shape like a pointed hat and lived attached to a crinoid. (The word Orthonychia in parentheses after the name of the genus Platyceras is the name of the subgenus.) Some gastropods had a bilaterally symmetrical shape, so that from the outside, they resemble coiled nautiloids. Bellerophon (Pharkidonotus) (see Fig. 13A) is one such gastropod.

Bivalves
Bivalves (molluscs with two valves, like clams) are found at McCoy, but are less common than brachiopods. Figure 14 shows Wilkingia, Myalina, and Promytilius, three of the more common bivalves at McCoy.

Trilobites
Trilobites are not common at McCoy. The few that are found probably all belong to the family Phillipsidae. As they are often found incomplete, it can be difficult to assign them with certainty, but many, perhaps most, belong to the genus Ameura. Figure 15 is a cast of a trilobite pygidium (tail) made by pressing modeling clay into a natural mold (impression) that was found in a piece of limestone.

Vertebrates
The most common vertebrate remains are teeth and finspines of chondrichthyans (sharks and

their close relatives). By far the most common tooth is *Petalodus ohioensis*, which has a broad, blunt crown and an elongated base (see Fig. 16). Another common tooth has a broad, flat base and a sharp central cusp with small side cusps. This was previously identified as *Symmorium reniforme*, but should probably be called *Symmorium occidentalis*. Other teeth which are somewhat common are Lagarodus, Deltodus, and Sandalodus. These are all flat tooth plates, used for crushing prey.

Among the other shark remains are finspines. These are positioned in front of the dorsal fins. A few modern sharks, such as the spiny dogfish Squalus and the hornshark Heterodontus, have such spines. The most common such spine at McCoy is *Ctenacanthus buttersi* (see Fig. 17). At the present time, we can't be certain which tooth belonged to the shark that carried the *Ctenacanthus buttersi* spines.

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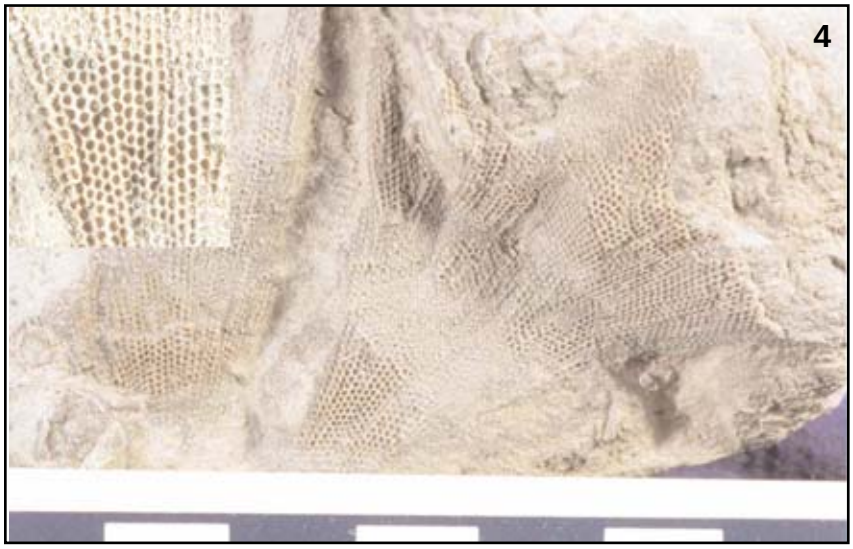


Fig. 2. *Twigs of the early conifer, Walchia.*

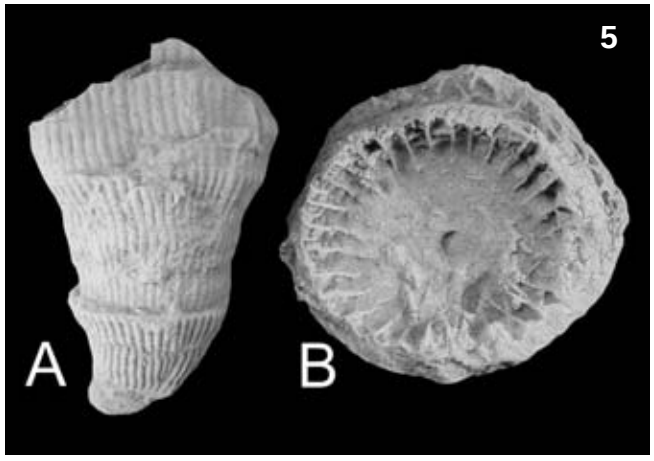
Fig. 3*. The small, striated objects are shells of one-celled organisms called fusulinids. The circular object at the top right is a section of crinoid stem. The divisions on the scale are 1 mm.*

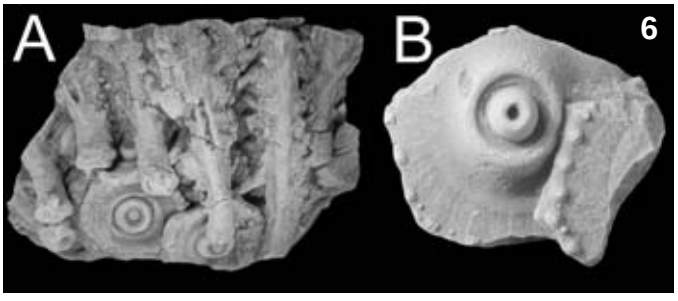
Fig. 4. *Fenestrate bryozoan, probably Fenestella or Polypora. Scale is in cm. Inset at top left is enlargement of same specimen.*

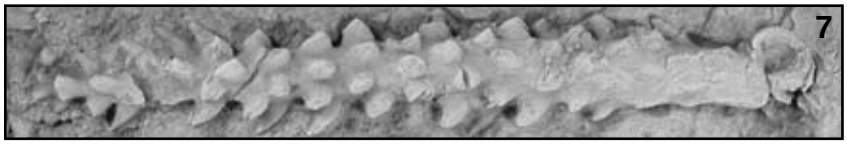
Fig. 5. *Horn corals. A, lateral view (2.3 cm high); B, top view of another specimen (2 cm wide).*

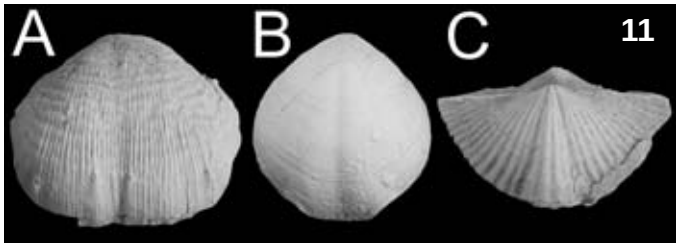
Fig. 6. *Echinoid plates and spines. A, associated echinoid interambulacral plates and spines, Archaeocidaris ourayensis (4.4 cm wide, Collected by W. Bateman); B, interambulacral plates, probably Archaeocidaris triplex (1.2 cm wide).*

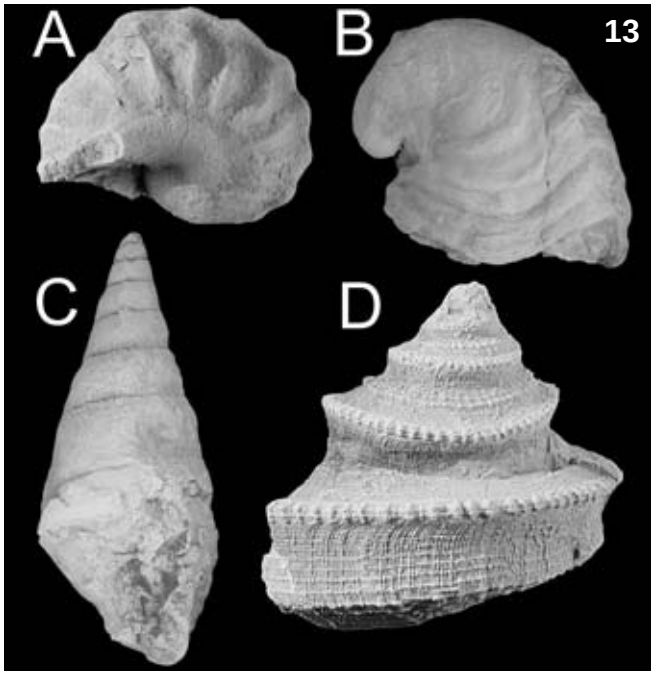
Fig. 7. *Spine of the echinoid Archaeocidaris ourayensis (4.1 cm long).*











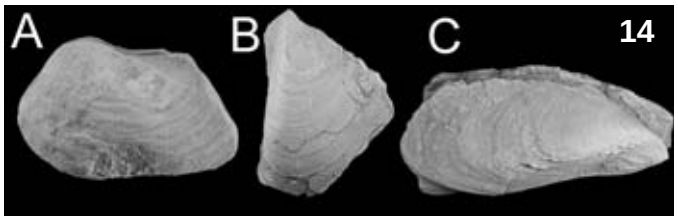


Fig. 8. *Partial crinoid stem, called Blothronagma cinctutum (2.8 cm long).* ***Fig. 9.*** *Basal (bottom) view of cup of the crinoid Aglaocrinus magnus (4.3 cm diameter).*

Fig. 10. *Orbiculoidea, an inarticulate brachiopod (2.2 cm long). Fig. 11. Some common articulate brachiopods. A, Antiquatonia (4 cm wide); B, Composita (2.3 cm wide); C, Anthracospirifer (3.2 cm wide).* ***Fig. 12.*** *Section of a straight nautiloid, Pseudorthoceras knoxense (2.2 cm long). The left part has been sectioned to expose the septa which divide the interior into chambers.* ***Fig. 13****. Gastropods. A, Bellerophon (Pharkidonotus) (1.6 cm high); B, Platyceras (Orthonychia) (2.8 cm high); C, Strobeus (4.1 cm high); D, Worthenia (1.3 cm high).* ***Fig.14****. Bivalves. A, Wilkingia (2.9 cm long); B, Myalina (2.2 cm long); C, Promytilius (4.6 cm).*

Fig 15. *Cast of the pygidium (tail) of a trilobite, probably Ameura (1.2 cm long).*
Fig. 16. *Petalodus ohioensis, the most common shark tooth at McCoy. Collected by M. Lockley.*
Fig. 17. *Partial Ctenacanthus buttersi (shark) finspine (18 cm long).*