

COLORADO'S OLDEST VERTEBRATES

By Kenneth Carpenter

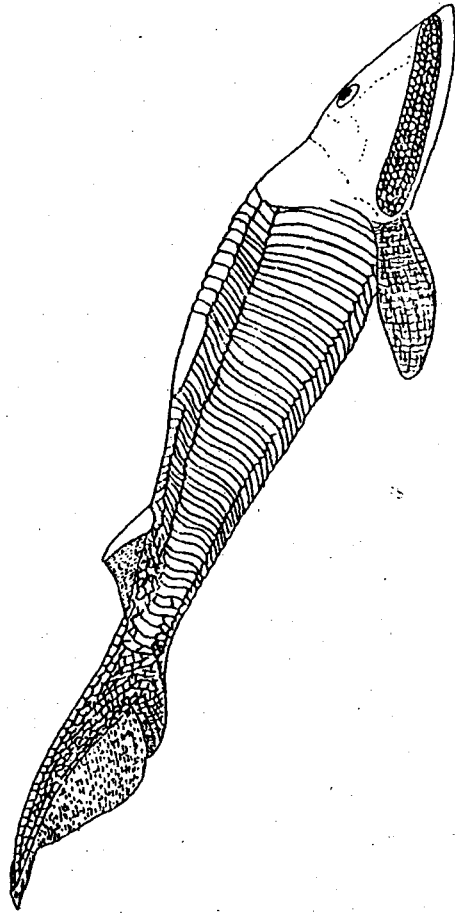


Figure 1. *Hemicyclopsis murchisoni*, an advanced Agnathan
After Stensio and A. Heintz

Some of the world's oldest vertebrates are known from Colorado. These are primarily fragments of bone armor or scales that covered the bodies of the earliest known fishes *Astraspis* and *Eriptychius*, both which lived about 450 million years ago during the Ordovician Period. These fish belong to the group known collectively as Agnathans, or jawless fish, because they lacked a movable lower jaw (Figure 1 shows an advanced Agnathan). Instead of a moveable lower jaw they had an opening very similar to that seen in the hagfish and lamprey living today.

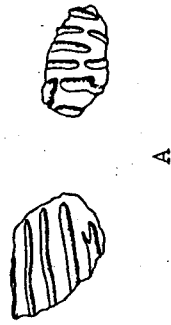
Most paleontologist agree that the ancestry of the vertebrates lay somewhere in one of the many invertebrate groups, but which one is a matter of much dispute. Some have used the similarities between the embryos of the echinoderms, which include both the starfish and the sea urchin, and the embryos of vertebrates to link the two to a common ancestor. Others have used the segmentation and well-developed nerve chord of the

annelid worm to link them to the ancestry of the vertebrates. In fact, almost every invertebrate group has been cited at one time or another as being the ancestral group which gave rise to the vertebrates. Unfortunately, the fossil record is so incomplete that the actual invertebrate ancestor may never be known.

Both *Astraspis* and *Eriptychius* have long been known from the Middle Ordovician Harding Formation of Colorado (where they were first discovered), Wyoming, and Montana. More recently the fish have been reported from Nova Scotia, the Franklin Mountains of West Texas, and the Arbuckle Mountains of Oklahoma. In most instances the bones are not abundant, but in a few places in Colorado the bones are so abundant as to make a bone conglomerate. One such place that is easy to get to is a roadcut on U.S. 50, 5.1 miles west of the main entrance to the Colorado State Penitentiary. The best place to collect is the west end where the Harding Formation is a dark-red to light-pink fine-grained sandstone.

The bones are quite small, about a quarter inch across, and are bluish to light gray in color.

With a good hand lens it is easy to distinguish *Astraspis* from *Eriptychius*. The outer surface of *Astraspis* is covered with close-lying asterisk-shaped denticles, while the outer surface of *Eriptychius* is covered with long, closely set parallel ridges (see Figure 2). Unfortunately, the outer surface of the bone armor isn't always exposed and this makes identification difficult; nevertheless careful examination of the fossils collected should



A



B



C

Figure 2. A. *Eriptychius* B. *Astraspis* Both x10. C. *Astraspis* x20.

University of Colorado Museum

show a few identifiable specimens. Sometimes it is possible to expose the outer surface (distinguished from the lower surface which is pitted) by careful picking with a needle mounted in the end of a piece of dowel. To make this valuable tool, simply drill a tiny hole in the end of a short piece of quarter-inch dowel and insert a good-sized needle. The needle can be securely fastened by dipping the end with the needle's eye into a little white glue, such as Elmer's All Purpose Glue.

-Probably NW 1/4 NE 1/4 SW 1/4 of section 12,
(SE justification), T18S, R71W, Fremont
County [Royal Gorge 7.5'], ca. mile -
post 272.55 on SH 50