

# CARBONIFEROUS FORMATIONS AND FAUNAS OF CENTRAL MONTANA (ABSTRACT)

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Carboniferous strata above the Madison were studied in the Big Snowy and Little Belt Mountains because that area offers the best outcrops of these beds near oil production in eastern Montana and western North Dakota. The work was sponsored by the U.S. Geological Survey because of its broad regional applications to stratigraphic studies in the Williston Basin, the northern Great Plains, and the northern Rocky Mountains, and because of its bearing on Mississippian-Pennsylvanian boundary problems.

As originally defined, the Big Snowy group consisted, in ascending order, of the Kibbey, Otter, and Heath formations. Strata of the so-called Amsden formation overlying the Big Snowy group in central Montana are not continuous in outcrop with nor have been proved to be equivalent to Amsden strata of the type section. Paleontologic evidence shows that lower shaly strata of the so-called Amsden are in part equivalent to the Heath formation and that elements of the Chester faunas extend up into the upper carbonate strata of the so-called Amsden formation; therefore, extensive revisions of stratigraphic boundaries and names are under way.

Two distinct faunas are present. The well-known late Chester fauna of the midcontinent constitutes the fundamental background of collections from the Otter and Heath formations. A second fauna is intermingled with the typical Chester fauna and may largely replace it in lower shales of the so-called Amsden. This latter fauna resembles the Tarussa and Steshevo (Lower Carboniferous) faunas of Russia but contains some generic elements not thought to be represented in Paleozoic seas of the western United States until early Pennsylvanian time. The Sacajawea formation in Wyoming contains the Chester fauna which seems to have immigrated from Asia. Recognition of certain petroliferous sandstone lenses (once termed the Tyler sand) at the top of the Heath formation is facilitated by their association with the same immigrant fauna.

Paleontologic evidence indicates that a major break occurs between the Madison and Big Snowy groups; the Meramec equivalent seems to be absent although the two groups are accordant. A striking intra-Chester unconformity at the base of the Amsden shales disappears as one approaches the center of the basin of deposition. A third notable unconformity exists above the Amsden carbonates where mid-Pennsylvanian strata overlie Amsden strata with Chester (or possibly very early Pennsylvanian) fossils. At the fourth and most profound unconformity Ellis (Jurassic) strata overlie strata as old as Madison. Three of the four unconformities above have been generally recognized but potential reservoir rocks are associated with all four unconformities. The extra stratigraphic unit in the Amsden can be differentiated on paleontologic grounds.