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Jurassic Paleobiogeography of Western Canada Basin

Abundant microfossils are present in the Jurassic sediments of the south half of the Western Canada basin. These can be used to correlate north toward the Peace River area and south into the northern United States. Previously published Paleobiogeographic maps illustrating the Lias, Bajocian-Bathonian, Callovian-Oxfordian, and Kimmeridgian-Portlandian stages are now revised to include additional well and outcrop data. Some fossil information is presented concerning the Lower Cretaceous/Jurassic contact.

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History of Development and Economic Aspect of Jurassic of Northern United States

Petroleum was found in Jurassic strata early in the history of Montana. Part of the oil in the Kevin-Sunburst field reportedly came from the basal Ellis (Sawtooth) sand, the Ellis-Madison contact. This field was discovered in 1921.

Sandstones of the Sundance formations in Wyoming were found to be productive even earlier (1917). No production from Jurassic strata has been found to date in North or South Dakota. A tabulation chart showing present fields producing from Jurassic formations and date of discovery is given. A penetration chart showing depth to Jurassic formations across Montana is included.

Jurassic formations have proved to be productive where suitable reservoir characteristics exist. Changes in facies as well as rapid variance in porosity and permeability should play an important part in pointing future areas to prospect the strata of Jurassic age.

A discussion of the Jurassic of the Sweetgrass area of Montana is reviewed.

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Jurassic Subsurface of Peace River Area

Marine Jurassic sediments of this area can be tentatively correlated with those in the Central Plains of Alberta and in the Foothills to the west. The Fernie group consists of dark marine shales and sandstones with minor amounts of limestone and chert. Southeast of Sturgeon Lake limestones and cherts become prominent in the lowermost part of the group. The constant lithology permits well defined correlations except where there is a lateral facies change. The distribution of these beds was influenced by late Jurassic or early Cretaceous erosion. The strata are truncated to the north and northeast. They overlie with erosional unconformity either Triassic or Paleozoic sediments.

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Jurassic Subsurface in Southern Alberta

Jurassic rocks underlie all of southern Alberta from its eastern and southern boundaries to the Rocky Mountain front on the west. The northern boundary is roughly crescent shape, approximately coinciding with the South Saskatchewan River and its tributary, the Oldman River, to within a few miles of Lethbridge. From that point the boundary trends northwest, passing a few miles east of Calgary. On Alberta plains, Jurassic strata are readily divisible into three formations, which were originally described and named in Montana, and which are, in ascending order, Sawtooth, Rierdon, and Swift. In Alberta Foothills, Jurassic strata are called the Fernie formation, which is roughly the equivalent of the three formations of the Plains.

Jurassic strata in southern Alberta rest unconformably on the Rundle formation of Mississippian age. On the Plains they are overlain unconformably by the basal sandstones of the Blairmore formation which have been correlated with the Cutbank and Sunburst sands of Montana. The unconformity at the top of the Jurassic truncates the formations so that they wedge out northward; consequently, the Swift, being the uppermost, has a very limited distribution in Alberta having been eroded completely from the crest of the Sweetgrass arch and remaining only in the extreme southeastern corner of Alberta and in a narrow belt paralleling the Foothills. The Rierdon and Sawtooth formations extend northward approximately to the limits of the Jurassic as defined. In the Foothills the Fernie is overlain by Kootenay sandstone and shale.

The Sawtooth formation consists of two sandstone members, separated by green, pyritic, noncalcareous shale. The upper sand is a reservoir for oil and gas in several small fields in Alberta. The formation has a maximum thickness of about 235 feet. The Rierdon formation is made up of an alternation of gray calcareous shale and greenish gray limestone with some pyrite, glauconite, and ironstone, and has a maximum thickness of 200 feet. The Swift formation lies unconformably on the Rierdon and has a maximum thickness of 150 feet. It consists of glauconitic sandstone, siltstones, concretions, dark gray shale, and usually has chert pebbles at the base.

Facies changes take place from west to east in the Sawtooth, Rierdon, and Swift formations so that at the eastern boundary of Alberta they may be readily correlated with the Gravelbourg,