

# INDIGENOUS PRECAMBRIAN PETROLEUM REVISITED

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## ABSTRACT

In 1964-75, Murray pointed out the occurrence of indigenous hydrocarbons in strata, then classed as Late Precambrian, in the Amadeus Basin of central Australia and, because of the widespread occurrences of early forms of life already documented at that time, inferred (1) these strata could be potential new frontiers for exploration, in instances where they are sufficiently unmetamorphosed and (2) whenever possible they should be the object of planned exploration. Subsequently, these inferences have been substantiated by discoveries of significant quantities of oil and gas in the Irkutsk Region of the U.S.S.R., in strata classed by the Russians as Late Precambrian (Riphean and Vendian); they are reported as self-contained in the Riphean and Vendian strata. The oldest of the producing zones, assigned by the Russians to the Riphean, reportedly has been dated, using glauconites, as approximately 680 million years of age. Younger producing zones, assigned by the Russians to the Vendian, have been dated as approximately 670 and 608 million years of age. Additionally, numerous publications in the last decade have documented an even greater and wider existence of varied forms of life in strata historically considered Precambrian by virtue of their sequential position below lithostratigraphic and biostratigraphic units commonly designated Cambrian. Some forms of life of an early evolutionary stage have been identified in strata more than two billion years old.

Certain geologists have questioned the assignment of oil and gas containing strata of Australia and the U.S.S.R., as well as certain rocks below the Cambrian in other parts of the world, to the Precambrian. They argue that the earliest occurrence of complex, multicellular organisms should be considered as the base of the Phanerozoic even though such occurrences may not represent temporal synchronicity.

The problem of what is the base of the Cambrian, or the top of the Precambrian, is a moot issue. Geological time, under the best circumstances, is difficult to determine and the location of the synchronous surface or boundary, in widely separated areas of the world, is infinitely more so. Should the base of the zone of *Olenellus* be considered the base of the Cambrian and, therefore, the base of the Paleozoic? Is this an artificially conceived boundary and should it be redefined? Should the base of the Phanerozoic coincide with the base of the Cambrian or should it be placed lower stratigraphically at the first recorded occurrence of well organized, multicellular forms of life? Should those rocks below the zone of *Olenellus*, and their demonstrable equivalents, be considered Eocambrian, Late Precambrian, or pre-Paleozoic Phanerozoic rocks?

Our purpose here is not to engage in semantical, philosophical, or conceptual arguments regarding the placement of stratigraphic boundaries but rather to propound a pragmatic

exploratory thesis. Rocks equivalent in age to other rocks which contain oil or gas should be explored by the drill. It makes little difference that various individuals would call them Eocambrian, Late Precambrian or pre-Cambrian. They represent generally unaccepted exploratory goals. But our nation's energy situation, as well as the necessity for us to utilize imagination and all available data in exploration, lead us to conclude that though the

chances of finding oil and gas in the "pre-Cambrian" rocks may be substantially less than in Cambrian and younger stratigraphic sequences, these earlier fossiliferous rocks should be tested. As explorationists, we should deliberately plan and program wells to penetrate sedimentary rocks below the Cambrian whenever and wherever it appears possible that they may be unmetamorphosed.