older uplift. The "pod" was forced upward and outward over adjacent basins by depression of these basins located north, northeast, and south of the position of the "pod" in the earth's crust. There was an apparent combination of overthrusting of the mountains and underthrusting of the basins. Further, the "pod" was propelled east by compressive forces pushing from the orogenic belts of southeast Idaho and central Utah. Faulting along the flanks of the Uinta arch occurs in a zone of multiple ruptures and combines faults of normal, reverse, and overthrust types. Where the Uinta arch was folded across the older north-south trend, east-west cross-folds such as Rangely and Salt Wells anticlines resulted.

The Uinta Mountains were greatly reduced from middle Eocene through Miocene time, and the eastern end of the Uinta arch collapsed in late Miocene time into a complex regional graben.

The Rock Springs uplift and probably the Vermilion basin uplift are the result of a still younger episode of cross-folding and upwarping of Pliocene age which has possibly persisted into the Pleistocene in some minor movements.

16. GEORGE R. DOWNS, Consultant, Denver
Oil Producing Structures as Related to Major Tectonic Features in Rocky Mountain Area

The oil and gas producing structures of the Rocky Mountain area may be classified according to their genetic relationship to major tectonic features. Patterns established by this classification may be helpful in searching for unknown structures. Producing anticlines and domes are considered to be subsidiary or secondary structures which were formed by the same forces and created at the same time as the more obvious large features. Based on past experience, favorable environments for new discoveries may be expected: (1) in the zone of adjustment between mountain uplifts and basin blocks; (2) *in front of* thrust sheets; (3) *above basement faults*; (4) as "warps" *in broad basin areas*; (5) at terminal parts of mountain uplifts or arches; (6) above igneous intrusives. It is suggested that by "working backward" from known major tectonic features that subsidiary structures may be found which will be proved effective oil and gas traps.

17. H. H. R. SHARKEY, Carter Oil Company, Denver
Structural Control of Oil Fields in Wind River Basin, Wyoming

The Wind River basin of central Wyoming is a typical intermontane tectonic depression. It was formed by the Laramide orogeny at the end of Mesozoic time, and during the early stages of the Tertiary.

Throughout the Paleozoic and Mesozoic eras the stratigraphic record shows that the area of the present basin was a part of the eastern marine shelf of the Cordilleran geosyncline. A conformable sequence of 10,000–12,000 feet of predominantly marine sediment was laid down prior to the period of mountain building.

The Laramide orogeny was manifested by southward and westward compressional forces which developed major overthrust mountain belts. These ranges, the Wind River Mountains west of the basin, the Owl Creek Mountains at the north, the Granite Range at the south, and the Powder River lineament at the east, formed a parallelogram around the Wind River basin.

The orogenic movements were also effective through the basin in forming numerous anticlinal folds. These folds may be classified in four major groups: (1) a series of north-trending anticlinal axes projecting basinward from the Granite Range and including features like Sand Draw; (2) along the east side of the Wind River Mountains, in the westward part of the basin is a series of asymmetric folds caused by crustal shortening; productive structures include Dallas, Derby, and Winkleman; (3) the major overthrusts of the Owl Creek Mountains and of the Powder River lineament have caused the development of major down-buckling along the north and east flanks of the basin; there are a few anticlines in these zones—West Poison Spider is an example; (4) in the northwest quadrant of the parallelogram is a group of anticlines formed under a combination of the stresses outlined in groups 2 and 3, the combination of compressive movements from the Owl Creek Mountains to the north, plus the crustal shortening induced by the uplift of the Wind River Range resulted in a series of folds including Steamboat Butte, Circle Ridge, and others.

Almost all the oil produced in the basin is obtained from structural traps whose origin was the Laramide orogeny. This event developed as the primary significant interruption to the regional continuity of the various marine formations, and therefore it was of primary importance in the localizing and accumulating of oil. Almost all the exploratory test wells in the Wind River basin were drilled on anticlinal structures. This form of exploration has been very successful, and the more obvious anticlines have been drilled.

Future prospecting will undoubtedly consist of geophysical work, to find the more subtle structures, plus subsurface geology to find stratigraphic traps similar to the two most recent discoveries in the Wind River basin.