controlled by the lenticular and lithologic character of the sands. Some structural control is indicated. Gas is found in the structurally higher parts of the sands.

5. "Geology and Occurrence of Natural Gas in Oriskany in Faulted Anticlines with Particular Reference to Northern Pennsylvania and Southern New York Producing Area," *by F. H. Finn.*

The Oriskany sandstone, which has been important as a source of natural gas in the Appalachian area, has been productive in 66 different pools throughout the Appalachian area. Many of the pools are small, and some of them were discovered many years ago when the Oriskany was not recognized as the producing formation. Most of the pools have resulted from structural trapping, although more than half of the total reserve of gas has been found in a large pool in West Virginia which is productive chiefly because of an interruption in porosity in an updip direction. Over 1½ trillion cubic feet of gas reserves have been discovered in the Oriskany since 1930.

In northern Pennsylvania and southern New York a producing province including 34 pools has been developed between 1930 and the present. Practically all of these pools result from structural traps caused by doming and thrust faulting along a series of prominent anticlines.

The province is described and a structure map of the area is presented. One of the most prominent producing trends (the Hebron-Harrison-Woodhull area), involving a complicated faulting pattern and the merging of two anticlines, is described in detail by means of surface and subsurface structure maps and cross sections.

6. "Structural Accumulation of Natural Gas in Oriskany Sand of Tri-State Area," *by John T. Galey.*

In the Tri-State area, comprising east-central Ohio, southwestern Pennsylvania and northern West Virginia, between the highly folded structures (Chestnut Ridge anticline) on the east, and the area in which the Oriskany sand becomes patchy in its distribution on the west, seven gas pools have been found in the Oriskany sand on low-relief domes. The history of discovery, stratigraphy, structure of the surface rocks, structure of the Berea sand, convergence between the Berea and Oriskany sands, and structure on the Oriskany sand, together with development, operation, and reservoir data, are discussed for the three most important of these pools, which are Blackhawk, located in South Beaver Township, Beaver County, Pennsylvania, and the Knox and Round Knob located in Knox and Madison townships, Columbiana County, Ohio, respectively.

7. "Oriskany Sand in Ohio," *by J. R. Lockett.*

The Oriskany is a somewhat regular sand body in an area comprising parts of fourteen counties in eastern Ohio. The western limit of this consistent deposit can be plotted as a very irregular line between Trumbull and Meigs counties. Although relatively large lenses of sandstone have been encountered at this horizon as far west as Knox County in the central part of the state, only two small fields have been discovered in western outliers.

The Cambridge field, discovered in 1922, was developed along the western pinch-out of the Oriskany in a typical stratigraphic trap extending from southwestern Guernsey County into south-central Tuscarawas County. The sand was absent west of the field, oil has accumulated immediately below the gas and a definite water horizon was encountered on the normal southeast dip below the oil at a depth of 2,600 feet below sea level. Although hard and sharp, the sand was exceptionally open in texture. Virgin rock pressure was 1,150 pounds. Gas wells were large in volume but relatively short lived. At its peak in 1926 the field produced 190,000 MCF per day.

During 1935 a small gas field with a virgin pressure in excess of 1,600 pounds was discovered on a closed structure in Madison and Wayne townships, Columbiana County, at an average depth of 3250 feet below sea level. The few wells drilled were soon ruined by water and the field was of no commercial importance. During 1946 a gas field was developed on a similar structure and at approximately the same depth a few miles east in Madison Township. High pressures and large initial volumes encouraged development but water encroachment ruined these wells within a year. These two small gas fields are the only producing areas developed in Ohio where accumulation in the Oriskany sand was definitely controlled by anticlinal structure.

In 1944 a gas field was discovered along the western limit of the Oriskany in eastern Knox Township, Columbiana County, at an average depth of 2,400 feet below sea level. Initial rock pressures were in excess of 1,300 pounds. Although no oil was discovered downdip, high permeability of the sand and large initial volumes of the wells indicate that their history will be comparable with that of the Cambridge field.

A gas well with an open flow capacity of 2,500 MCF was recently completed at a depth of approximately 2,100 feet below sea level near the Pennsylvania line in Vernon Township, Trumbull County. It is one location west of two small oil wells which are located immediately up the normal dip from

FIG. 1.—General chairman Hugh R. Brankstone welcoming geologists to A.A.P.G. regional meeting at Pittsburgh, Pennsylvania, October 4, in Urban Room of William Penn Hotel.

FIG. 2.—At registration desk, Silver Room.

FIG. 3.—Donald L. Norling, holding field-trip guide-book; Hugh R. Brankstone, general chairman; John T. Galey, president, Pittsburgh Geological Society.

FIG. 4.—At technical session: John F. Hosterman, James L. Tatum (standing), Paul Weaver, John L. Ferguson.

FIG. 5.—At banquet: Clarence L. Moody, Paul Weaver, J. V. Howell.

FIG. 6.—Speakers' table, at banquet: E. R. Weidlein, director, Mellon Institute of Industrial Research, and Kenneth C. Heald, vice-president, Gulf Oil Corporation.

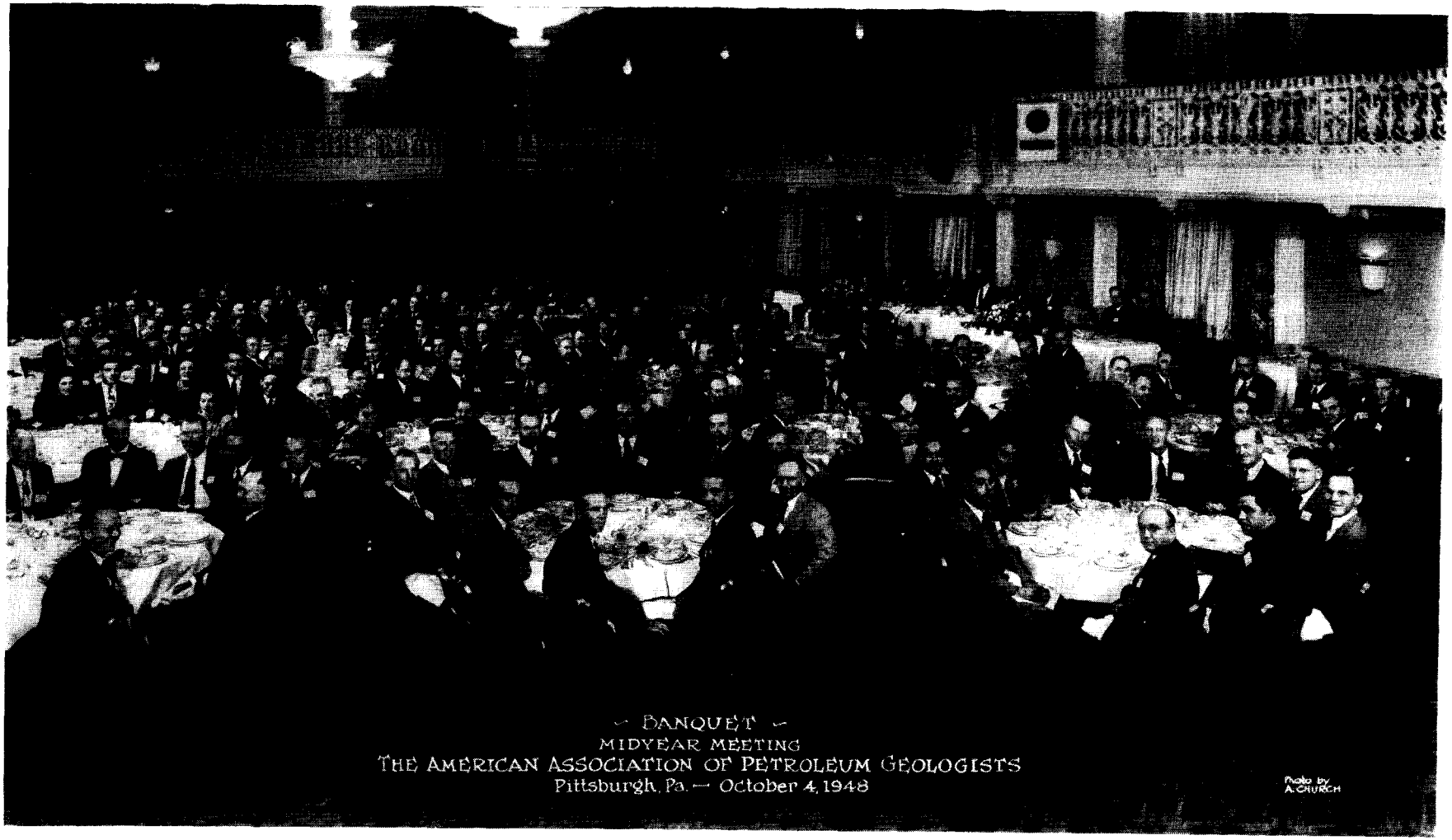

FIG. 7.—Banquet, William Penn Hotel, October 4.

four dry holes completed in water bearing Oriskany sand. These tests are located within a distance of one mile east and west and indicate the possibility of a stratigraphic trap along the western limit of the sand in that area.

The position of the Oriskany sand in the series of Devonian and Silurian limestones and dolomites called the "Big Lime" and its possible correlation with the Austinburg sand in Ashtabula County are discussed.

8. "Kanawha-Jackson Oriskany Gas Field," *by A. H. McClain.*

The Kanawha-Jackson Oriskany Gas Field is in Kanawha and Jackson counties, West Virginia. The main pool extends north from Charleston in a broad tapering belt 15 miles wide at Sissonville and 2 miles wide in northern Jackson County. The Blue Creek pool is 8–12 miles above Charleston in a band 4 miles long and 3 miles wide. The Boone County-Campbells Creek pool is on the Warfield anticline 6 miles south of Charleston in a belt 12 miles long and 3 miles wide. On January 1, 1948, the total area was 193,000 acres and the total gas produced was 721,482,555 MCF. At that time 1,239 wells had been completed to the sand, of which 1,076 were saved as gas wells and 163 were dry holes. The 1,076 gas wells have produced an average of 737,269 MCF per well. It is estimated that the field is 75–80 per cent depleted, and that the ultimate production will be 910,000,000 MCF, an average of 4,715,000 MCF per acre.

9. "Mayfield Pool, Cuyahoga County, Ohio," *by Howard E. Rothrock.*

The Mayfield gas pool, most prolific Newburg "sand" pool in Ohio, is in northeastern Cuyahoga County. The rocks that have been tested by drilling range from Upper Ordovician to Upper Devonian. Outcrops include rocks of Upper Devonian and Mississippian age. They are extensively covered by Pleistocene and Recent deposits. Gas and a small amount of oil is obtained from the Newburg "sand" (Middle Silurian) at an average depth of 2,875 feet, and from the Oriskany sand (Lower Devonian) at a depth of about 1,800 feet. The reservoir is of the structural type in the Oriskany sand and of a combined structural and porosity type in the Newburg "sand." The structure is incompletely outlined because of Pleistocene cover at the surface and restrictions on drilling south and southwest of the pool. At the surface it is dome-like with limbs dipping about 0°–18′. In the subsurface it appears to be a broad anticline trending northeast with a known closure of approximately 100 feet. Its southeast limb dips about 0°–38′. Fifty-two tests, eleven of which were dry holes, have been drilled on the anticline. The total yield of gas, as of December 31, 1947, has been about $13\frac{1}{2}$ billion cubic feet from wells showing a distribution ratio of 30 acres per well. The chances of obtaining oil or gas from deeper Ordovician and sub-Ordovician strata are considered to be chiefly dependent on the amount of closure that occurs in the structure in these deeper strata, and on the porosity of the rocks.

10. "Philosophy of Research," *by E. R. Weidlein, Director, Mellon Institute of Industrial Research.*

Banquet address.

11. "Salina-Guelph Fields of Southwestern Ontario," *by W. A. Roliff.*

The dolomites of the lower part of the Salina formation and the upper part of the Guelph-Lockport formations, of Silurian age, comprise the most important and most prolific gas-productive zone in southwestern Ontario, total production to date amounting to 275 billion cubic feet. This zone has also yielded 1,500,000 barrels of oil. Commercial production was first obtained in the Salina-Guelph zone in the year 1889, and by 1906 the two most important Salina-Guelph fields in the Province had been discovered. Subsequent exploration has been very sporadic, and although eight relatively moderate-sized pools have been discovered, 10,000 square miles, or 80 per cent, of the area underlain by these formations remains relatively untested.

Folding and faulting appear to be the dominant factors controlling accumulation, but reefs, variations in porosity and incipient fracturing seem to be almost equally important.

This paper describes the geological conditions affecting accumulation and the recently renewed efforts to find additional pools in this zone, and briefly discusses the prospects for future discoveries.

12. "Geology and Occurrence of Oil in Medina Sand of Blue Rock-Salt Creek Pool, Ohio," *by James F. Swain.*

13. "Rose Hill Oil Field, Lee County, Virginia," *by Byron N. Cooper.*

Commercial production of high-gravity paraffine-base oil from Middle Ordovician limestones beneath the Pine Mountain overthrust block was initiated in 1942 in the Fourmile Window near Ewing, Lee County, Virginia. Drilling activities since May, 1946, have been sufficiently successful to