

---

## SCIENTIFIC NOTES

### Abstract:

### A Review of Geological Concepts and Economic Significance of Salt Domes in the Gulf Region, Michel T. Halbouty\*

There are salt domes in both hemispheres in many countries in the world but none anywhere have the economic significance of those of the Gulf Region of Texas, Louisiana and Mississippi. The salt domes of the Gulf Region are located in five Basins: (1) The Texas-Louisiana Coastal Plain, (2) The East Texas Basin, (3) The North Louisiana Basin, (4) The East Central Louisiana-Mississippi Interior Basin, and (5) The Rio Grande Basin. Although the four latter basins have produced a considerable amount of gas and oil and will certainly produce more in the future, they do not compare in stature with the prolific Texas-Louisiana Gulf Coastal Plain. The thick Tertiary beds in this basin constitute the most multiple, prolific producing series of formations, horizons, and reservoirs in the world.

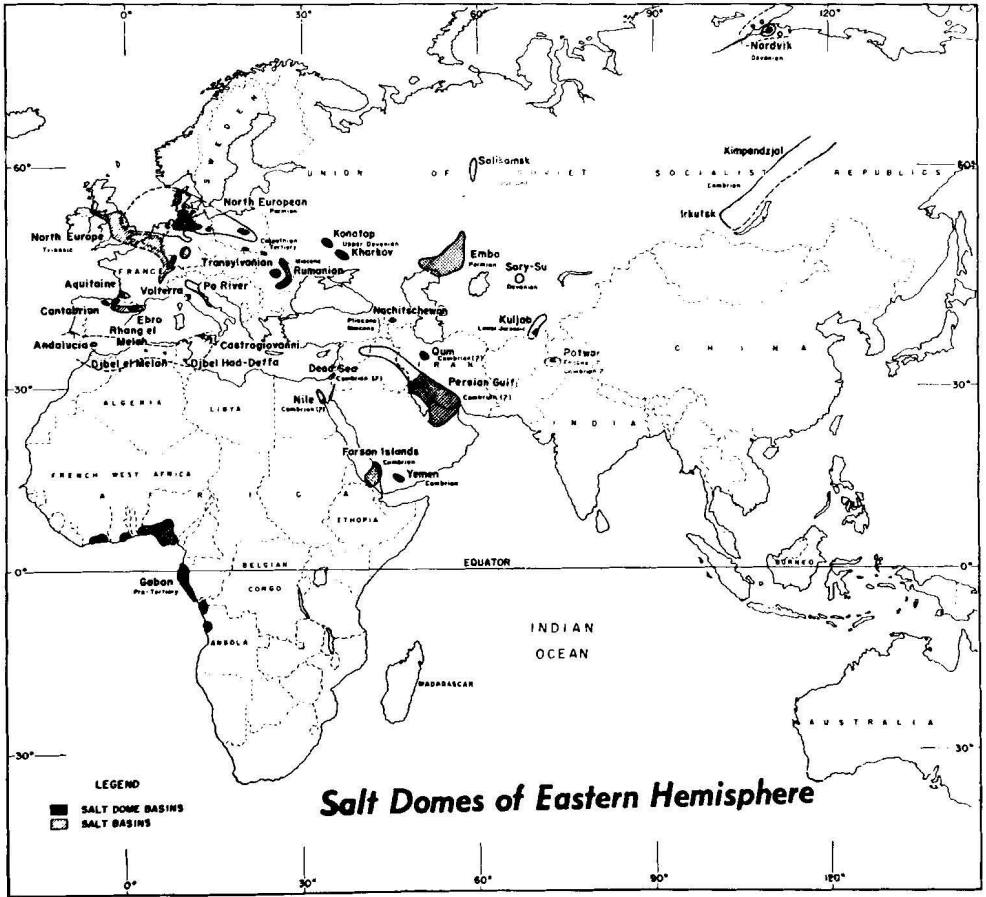
Despite the absence of structures of great relief which characterize many other oil producing provinces, accumulations of hydrocarbons are present in the Gulf Coast in less intense features, such as small anticlines, faults, faulted anticlines, sand lenses, stratigraphic traps of all types, reefs, and a combination of these structural and stratigraphic forms. The general progressive and thick deposition during the Tertiary in this large Gulf Coast homocline, amounting to a total of approximately 5,000 feet, has resulted in certain structural features, among which the most outstanding are the piercement-type salt domes. The motive force of the uplift of these domes has been the static weight of the thick Tertiary sediments, so that the great vertical growth of the domes has taken place during the Tertiary. Because of the uplift of the domes through thousands of feet of strata the conditions for gas and oil accumulation around them is excellent. It was the discovery of oil from the caprock of a piercement-type salt dome in 1901 that gave birth to

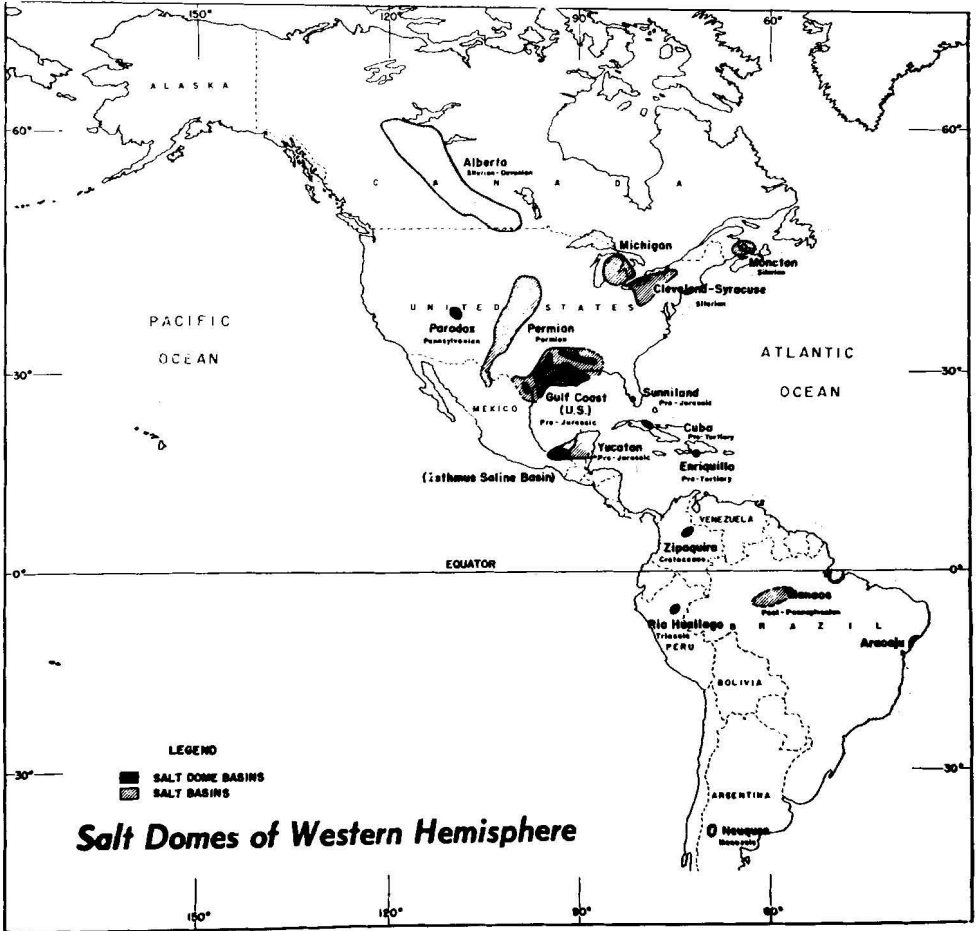
---

\*Paper presented before the Society, September 1959.

Illustrations on following pages.

---





---

the modern day oil industry. Since that date, geological thinking on these structures, and their deep-seated affiliates, has advanced slowly but progressively throughout the years; however, in each year of the last decade students of salt dome geology have arrived at important conclusions heretofore unknown.

There have been concentrated research and studies made on salt domes which have revealed certain basic concepts which have proven to be of economic importance. These concepts may be applied on a general basis on each dome whether productive or not, and to a marked degree of success to those domes which have not yet proven to be commercially productive. These concepts have been the result of studies first made, then backed by actual drilling -- which data today represent the most valuable group of economic and scientific information assembled on salt dome exploration.

These new conclusions primarily derive from a better understanding of the effect of salt dome growth on the local structural area and the effect of sedimentation around the uplift during the growth of the dome. Not only have these studies resulted in a better understanding of the detailed subsurface geology and cause of gas and oil accumulation around these structures, but they have also opened vast unexplored areas around these domes, which in turn will add materially to the future reserves of the province.

In order to completely understand these concepts, the student must first comprehend the principles involved in the movement of the salt from the mother salt bed to form salt domes, and the importance of detailed dome growth studies of individual type domes. A study of the tectonics of domes throughout the world reveals that each salt basin, wherever it may be located, has its own peculiarities and the domes within these basins have their own manner of upward movement varying with type.

It is recognized by all who have worked with salt domes that the geology associated with them is most complicated and difficult; however, these new geological concepts of salt dome geology are most important to the future exploration of these structures, and this paper reveals the approach to such studies and the predicted results that may be obtained by exploring behind them -- which in turn surely may be applied to similar salt dome structures throughout the world wherever such are being explored for hydrocarbons.

---