

PETROLOGY AND PALEOCURRENT STUDY OF
THE DAGGER FLAT (CAMBRIAN), MARATHON BASIN, TEXAS

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ABSTRACT

The Dagger Flat Formation of Late Cambrian age crops out along the crests of two major anticlinoria in the Marathon Basin, Texas. The formation consists of shale, sandstone, limestone, and conglomerate in order of abundance.

The rocks of the Dagger Flat are complexly deformed and provide excellent examples of such structural features as major folds, drag folds, thrusts, transverse tear faults, joints, and fractures. Owing to this structural complexity the thickness of the formation is unknown; estimates range from 300 to 960 feet. The thickness is here thought to be approximately 550 feet. Shale is composed mainly of illite and minor amounts of silt-size quartz.

The predominance of illite, the absence of fossil hard parts, and scarcity of silt indicates that the bulk of the shale was deposited in deep quiet water.

Most sandstone, limestone, and pebble conglomerate beds show a common upward sequence of internal structures (graded bedding to horizontal lamination to cross-stratification) which suggest deposition from waning currents. This fact, the presence of associated sole marks, and evidence of deposition in deep water suggest that these beds were deposited by turbidity currents. Turbidites, with a wide range in thickness, are interbedded with pelagic shale to give a flysch-like aspect to the bulk of the formation.

Mineral composition shows that the major source of detritus was sedimentary rocks; granitic rocks were a minor source; trace amounts were derived from volcanic and low-grade metamorphic rocks.

Directional sedimentary structures, grain fabric, and field relationship suggest that sedimentary source rocks were located in a compass span of west through north and east to south a spread of about 270 degrees. At least three sedimentary rock units (two sandstone and one limestone) contributed detritus to the Dagger Flat. Subangular to rounded fresh feldspar and quartz were derived from a different sandstone unit than that which contributed quartz partly replaced by calcite.

The presence of granite pebbles in conglomerates of the Roberts Ranch area and their absence in conglomerates of the Leary Ranch area to the southeast indicates that the granitic source was to the northwest

of the site of deposition, The uncommonly wide spread of directional sedimentary structures could be attributed to either:

1. an erroneous tilt-correction procedure, in which no correction was made for the plunge of folds, or
2. deposition of the Dagger Flat is an elongate basin connected to a larger body of water to the southwest and surrounded by land on all other sides.

Thick massive sandstone (orthoquartzite) beds and muddy sandstone (arkose) are found mainly in the Leary Ranch area; a few massive sandstone beds also crop out in the Threemile Hill area. These sandstones lack the internal structure characteristic of turbidites and other current-laid deposits. Their mode of deposition is uncertain; it is possible that they are local slump deposits.