SEDIMENTOLOGY OF THE UPPER CAMBRIAN LION MOUNTAIN AND WELGE SANDSTONES, CENTRAL TEXAS

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ABSTRACT

The Upper Cambrian Lion Mountain Sandstone Member of the Riley Formation and the Welge Sandstone Member of the Wilberns Formation crop out around the margins of the Llano region of Central Texas. A reconnaissance study of the Lion Mountain was made to complement a detailed study to determine the source area and environment of deposition of the overlying Welge Sandstone.

The Lion Mountain is a sequence of interbedded green glauconitic quartz sandstone, siltstone and shale, and white coarse-grained trilobite coquina. The member as defined herein ranges from 50 to 70 feet thick. The definition of the unit differs from that given by previous workers, although this is not proposed as a substitute. Crossbed dip-direction readings in the sandstones have a bimodal distribution: the predominant mode faces northeast, and a secondary maximum lies diametrically opposite. Organic structures and trace fossils are common in the Lion Mountain. Quartz and glauconite pellets are the main clastic components of the rocks. The quartz grains are highly rounded and many are frosted.

The stratigraphy and sedimentary structures of the Lion Mountain Sandstone suggest that the unit was deposited in an extensive tidal-flat environment on a stable shelf. The predominant source of the detrital material was the Texas Craton lying to the north and west of the study area.

The Welge Sandstone is a blanket sandstone that disconformably overlies the Lion Mountain Sandstone. The unit as defined herein ranges from about 10 to 30 feet thick and thins to the east. The rocks are predominantly supermature quartzarenites, but thin laminae of shale are common in the northwestern study area. The strata are chiefly massive, but poorly-defined tubular crossbedding is common in most outcrops. Paleocurrent readings have a prominent northeast mode and a secondary maximum facing southwest.

The sandstones generally have a bimodal grain-size distribution. The mean grain-size attains a maximum and the standard deviation a minimum along a northeast axis across the center of the Llano region. Amareal skewness plot

shows increasing positive values to the south and southeast, and is interpreted as evidence for a source of fine-grained detritus to the north of the study area.

Mean roundness values of the grains and standard deviations of roundness increase and decrease respectively to the north. These trends are interpreted as reflecting the influence of the currents active during deposition.

The sandstones are almost entirely composed of highly-rounded and well-sorted quartz grains. The heavy mineral fraction of therocks is a supermature suite of ilmenite and well-rounded zircon. Areal plots of undulose quartz and angular zircon show higher percentages of these mineral varieties in the eastern part of the study area. A source which supplied these varieties is inferred to have lain immediately east of the present-day Llano region.

The predominant primary source of detritus of the Welge Sandstone was the granitic Texas Craton to the north and west of the study area. The material derived from this region underwent a prolonged period of sedimentary recycling prior to deposition in the Upper Cambrian sediments, and thus attained a high degree of textural maturity.

The Welge Sandstone was deposited under tectonically stable conditions in a near-shore environment, strongly affected by tidal currents.