

GEOLOGY OF THE WENDEL QUADRANGLE, KIMBLE, GILLESPIE, AND KERR COUNTIES, TEXAS

VIRGIL E. BARNES

GENERAL SETTING

Wendel quadrangle is entirely within the Edwards Plateau province and is situated southwest of the Llano region. The geology of the Wendel quadrangle is shown on a planimetric map, and the only topographic map available is the reconnaissance 30-minute Kerrville quadrangle. Elevations ranging between 2,041 and 2,284 feet were determined during traversing for control, but neither the highest nor the lowest elevation was reached. However, it is estimated that the relief within the quadrangle is about 270 feet, ranging between 2,020 and 2,290 feet. The quadrangle is drained in diverse directions with about half of the drainage going westward and northward to Little Devils River, reaching the Llano River by way of James River, White Oak Creek, Fall Prong, and Burr Oak Draw are the chief tributaries of Little Devils River. The head drainage of Pedernales River occupies about one-third of the quadrangle and is centered in the south-eastern part. A small area in the north-west corner drains into Threadgill Creek and thence into Beaver Creek and Llano River. A small area in the southwestern part of the quadrangle is in the Guadalupe River drainage basin and reaches the river by way of Rough Hollow and Johnson Creek. The Wendel quadrangle is on the southwestern side of the Llano uplift, and Cretaceous rocks crop out in all of the quadrangle. Rocks of Ordovician and Carboniferous age are probably at a depth of less than a thousand feet below the surface. The Cretaceous rocks are essentially horizontal. References cited below deal more broadly with some of the stratigraphic, structural, economic, and geophysical problems of the region. This publication on the Wendel quadrangle is one of a series of similar publications, an index to which is shown on the opposite page. The reader is referred to the index map to locate other quadrangles mentioned in the present text.

GEOLOGIC FORMATIONS

MESOZOIC ROCKS

CRETACEOUS SYSTEM

(LOWER CRETACEOUS)

Fredricksburg Group

The only rocks of the Fredricksburg group cropping out within the quadrangle belong to the Edwards limestone. The Comanche Peak limestone and the Walnut clay are present in the

subsurface and are probably very similar to their outcropping equivalents in adjacent quadrangles. The boundaries of the units of the Fredricksburg group are gradational, and for this reason Thompson's (1935) observation that the units should have about the rank of members seems logical. However, instead of introducing a new name, Fredricksburg could easily be dropped from group to formational rank, especially as the U. S. Geological Survey excludes the Kiamichi clay from this group.

Edwards limestone

The outcrop of the Edwards limestone within the Wendel quadrangle is about 350 feet thick, and there is perhaps another 40 feet present in the subsurface, making a total of about 390 feet. The Edwards limestone is composed of a variety of rock types including limestone, dolomite, and chert. The limestone and dolomite vary in composition, texture, thickness of beds, and hardness; and this variation is clearly shown on aerial photographs by vegetational handling. The hard limestone beds in the sequence weather slowly and have only a thin soil covering or are bare and nearly void of vegetation. The softer beds develop a more adequate soil and are thickly vegetated mostly by a scrub oak identified by Gayler (1931) as "Quercus fusiformis Sargent (minuscule scrub oak)".

The Edwards surface is mostly rocky, and the presence of hard limestone beds and chert. The chert has a fairly general distribution but is present in some of the units. The chert is essentially horizontal. References cited below deal more broadly with some of the stratigraphic, structural, economic, and geophysical problems of the region. This publication on the Wendel quadrangle is one of a series of similar publications, an index to which is shown on the opposite page. The reader is referred to the index map to locate other quadrangles mentioned in the present text.

Except in the vicinity of White Oak Creek near the northern border of the quadrangle, much of the surface of the Edwards limestone is gently sloping, and it is almost impossible to measure and describe a section that is more than a few feet thick. One section in the lower part of the Edwards measured along White Oak Creek is described below. The lower part of the section is on the Fall Prong quadrangle about 400 feet north of the Wendel quadrangle.

A traverse was continued from the top of the section up the west branch of White Oak Creek to the first pasture road crossing the creek without finding appreciable outcrop except for some honeycombed limestone near the road. To the east of the creek an occasional bed of white limestone is exposed along the hillside; one of these beds contains an abundance of gastropod molds. Accumulations of chert in the soil indicate a number of chert horizons, and some of the chert appears to be excellent for the manufacture of flint implements. Much of the flint shows evidence of having been worked.

A small exposure of Edwards limestone is situated along Ranch Road 385 between Pedernales River and U. S. Highway No. 290. A section measured here is described below. Within the Wendel quadrangle there is about 275 feet above the base of the Edwards limestone. Limestone in the northern corner of the pit is hard, white except for a little yellowish-orange discoloration along joints, contains a few fossils seen in cross section, and appears to be horizontal. Pulverulent limestone is at the same elevation on the eastern side of the pit. The pulverulent limestone is a product of weathering and appears to be laterally equivalent to the hard limestone in the northeastern corner of the pit. The pulverulent limestone contains *Gryphaea* and a few oysters which correspond to the cross sections seen in the hard limestone.

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In the eastern end of the pit the horizontal beds of the Edwards limestone are truncated by caliche beds in the regolith which are not parallel to the ground surface. It is likely that the caliche formed in response to ground-water level at some period in the past. Two depressions are present on a high, flat-topped divide in the west-central part of the quadrangle. A strong current of air was issuing from a well in the vicinity of the depressions when they were visited, and other wells in the quadrangle are reported periodically to take up and release air. The air is caused to flow by changes in barometric pressure, and caverns must be present to form a reservoir sufficient to furnish the air necessary to maintain the air current for considerable lengths of time.

Five fossil collections were made within the quadrangle, only one of which, locality 20-22B, was examined by Dr. Ralph Inlay. The collection was made in a road material pit, and the fossils are as follows:

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Proving. Reports of other localities containing perturbed wood and silicified fossils were investigated. One of these is in Kimble County south of the highway and north of locality 5-12A and the caliche formed in response to ground-water level at some period in the past. Two depressions are present on a high, flat-topped divide in the west-central part of the quadrangle. A strong current of air was issuing from a well in the vicinity of the depressions when they were visited, and other wells in the quadrangle are reported periodically to take up and release air. The air is caused to flow by changes in barometric pressure, and caverns must be present to form a reservoir sufficient to furnish the air necessary to maintain the air current for considerable lengths of time.

QUATERNARY DEPOSITS

No Quaternary deposits were mapped within the Wendel quadrangle. A thin silty alluvial cover follows the tips of many of the drains in the outcrop area of the upper portion of the Edwards limestone. The alluvium in many of the drains is not breached, supports a rank growth of grass, and is mostly in narrow belts and patches considered too insignificant to map. Some of the alluvium along the Pedernales River is mappable, but even here it is difficult to determine the boundary as the soils of both the alluvium and the Edwards are black.

SUBSURFACE GEOLOGY

The O. W. Killian No. 1 Gibson well near the western border of the quadrangle entered Pennsylvanian shale at a depth of about 1,000 feet and continued in shale and some sandstone to a depth of 1,650 feet. Extremely fine-grained light olive-gray limestone predominates from 1,650 to 1,720 feet and is more prominent in the lower part. The upper portion of this interval may belong to the Marble Falls limestone of Pennsylvanian age and the lower portion to the Chappel limestone of Mississippian age.

A collection made from locality 1-16A, near the county corner in Kimble County, consists of a limestone slab composed of *Gryphaea*, some of which are partly and poorly silicified because the silica is in the form of boehmite. Another collection from Kimble County, locality 1-30A, contains *Gryphaea* and a few oysters. The section measured here is described below. Within the Wendel quadrangle there is about 275 feet above the base of the Edwards limestone. Limestone in the northern corner of the pit is hard, white except for a little yellowish-orange discoloration along joints, contains a few fossils seen in cross section, and appears to be horizontal. Pulverulent limestone is at the same elevation on the eastern side of the pit. The pulverulent limestone is a product of weathering and appears to be laterally equivalent to the hard limestone in the northeastern corner of the pit. The pulverulent limestone contains *Gryphaea* and a few oysters which correspond to the cross sections seen in the hard limestone.

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THE UNIVERSITY OF TEXAS BUREAU OF ECONOMIC GEOLOGY

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GEOLOGIC QUADRANGLE MAPS WENDEL QUADRANGLE

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EXPLANATION

SEDIMENTARY ROCKS

Edwards limestone (well bedded, beds in the vicinity of Thompson's well in comparison, hardness, and thickness of beds)

Lower Cretaceous (northward from Fall Prong)

Locality of fossil collection

Fossils noted but not collected

Windmill

Altimeter elevation of gravity station

Altimeter elevation

Line of described section

Section Near Junction of Ranch Road 385 and U. S. Highway No. 290

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