

GEOLOGY OF THE NORTH GRAPE CREEK QUADRANGLE, BLANCO AND GILLESPIE COUNTIES, TEXAS

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GENERAL SETTING

The North Grape Creek quadrangle is south of the Llano region and is mostly in the broad Pedernales River basin. A few outliers of the Edwards Plateau are present in the western part of the quadrangle.

The geology of the North Grape Creek quadrangle is shown on a planimetric map, and the only topographic map available is the reconnaissance 30-minute Fredericksburg quadrangle. Elevations ranging between 1294 and 1,775 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 640 feet, ranging between about 1,200 and 1,940 feet in elevation.

The quadrangle is entirely within the Pedernales River drainage basin and is mostly drained by North Grape Creek and its tributaries, some of which are White Oak Creek, Smith Spring Hollow, Dry Hollow, and Smith Spring Branch. The southern part of the quadrangle is drained by Pedernales River and its branches, some of which are Iron Rock Creek and Rocky Creek. North Grape Creek flows from the high on the southeastern side of the Llano uplift, and rocks from pre-Cambrian to Ordovician in age outcrop in about three-quarters of the quadrangle. Faults related to the Ouachita orogeny trend mostly northeast-southwest; some trend east-west. Gneissous rocks are essentially horizontal, dipping eastward perhaps about 10 feet per mile.

Broader discussions of the stratigraphic, structural, economic, and geophysical problems of the region cannot be given in the space available. References cited below deal with some of the problems. This publication on the North Grape Creek quadrangle is one of a series of similar publications on the geology of the Edwards Plateau. The reader is referred to this index map to locate other quadrangles mentioned in the present text.

GEOLOGIC FORMATIONS

PRE-CAMBRIAN ROCKS

METASEDIMENTARY ROCKS

Valley Spring Gneiss

The Valley Spring gneiss is predominantly fine grained, massive, and pinkish. Only one outcrop, about 1,000 by 1,500 feet in size, situated in the southeastern part of the quadrangle is present. The gneiss dips about 65° northeastward toward Town Mountain granite. To the south it is overlain by Hickory sandstone and is in contact with a granite that may be Otman Creek granite, and to the west it is in fault contact with Hickory sandstone and Point Peak shale. A prospect shal along the fault reveals no mineralization.

IGNEOUS ROCKS

Town Mountain Granite

All the outcrops of Town Mountain granite within the quadrangle probably belong to the Grape Creek granite mass (Barnes, Dawson, and Parkinson, 1947, p. 45). The preponderance of outcrop is in the northeastern part of the quadrangle where much of the granite is in fault blocks separated by the Hickory sandstone. A small outcrop of Town Mountain granite in the northwestern part of the quadrangle has Ordovician rocks down-faulted against it.

A sample collected along North Grape Creek, locally 6-28A, by Barnes, Dawson, and Parkinson (1947, Bl-11, pp. 52-53) is coarse grained, somewhat porphyritic, and of a light pink color. It is composed predominantly of microcline, quartz, plagioclase, and biotite. Accessory minerals are magnetite, fluorite, apatite, titanite, and zircon. The granite shows the effects of two periods of shearing accompanied by mylonitization, an earlier one in which the mylonite is completely

lithified and gradual into undisturbed granite; and a later one connected with the Ouachita orogeny in which the mylonite is mostly about one-quarter inch thick and in a sharp contact with unshattered granite.

The granite consists of a few small pegmatites, apatites, and quartz bodies, and at locality 6-29A (Barnes, Dawson, and Parkinson, 1947, Bl-6, p. 25) a considerable area of fine grained, coarse grained, white to pink and red granite may be an apitic phase of the Town Mountain granite. It is in turn contact with gneiss, pegmatites, and inclusions. A sample collected from a lighter colored portion of the mass has an estimated mineral composition of plagioclase 44, quartz 25, microcline 25, biotite 2, and muscovite 1 percent. Accessory minerals are very scarce and consist of fluorite and zircon.

Along Iron Rock Creek and Pedernales River all but one of a series of granite knobs (buried hills) are surrounded by Cap Mountain limestone, the one exception being a knob which extends up into and is partly surrounded by Lion Mountain sandstone. The granite is siliceous, being very resistant to weathering, and these knobs may have stood as much as 600 to 800 feet above the surrounding surface at the advent of the Cambrian sea.

Granite from four of the knobs, in-

sandstone forms a sparsely vegetated bench on which motes of live oak are common. It is readily identified on aerial photographs.

Wilmers Formation

Wedge sandstone member.—The Pelge sandstone member is perhaps between 10 and 15 feet thick within the quadrangle and forms a narrow wedge-shaped outcrop. The Wedge is medium to fine grained, massively bedded, and lighter in color, somewhat coarse grained, and of about the same mineral composition as above. However, fluorite crystals up to 3 mm in size are present. The fourth sample examined, locally 6-24F=Bl-9, is coarse grained, has an average grain size of 10 mm, is brownish tinged by red and yellowish green, and takes an exceptionally brilliant polish. It is composed predominantly of microcline and quartz and contains some hornblende and biotite. Plagioclase is extremely rare as individual crystals and where present is associated with the feldite mineral areas. Accessory minerals are magnetite, apatite, and zircon.

PALEOZOIC ROCKS

CAMBRIAN SYSTEM (UPPER CAMBRIAN)

Hickory Sandstone

Hickory sandstone member.—The Hickory sandstone crops out in the northwestern part of the North Grape Creek quadrangle in fault blocks situated on the crest of a broad anticline which pitches southwestward. The lower part of the Hickory sandstone is massive, cross-bedded, coarse grained, contains microcline, and has some conglomerate lenses near its base. Upward the beds become somewhat thinner, cross-bedding when present is in smaller sets, and toward the top shale and silt become sufficiently abundant so that weathering reduces this portion of the bed to which is shown on the map. The sand in the Hickory is poorly sorted, mostly angular to subrounded, and mostly has rough surfaces. Fossils seen but not collected are lingulid brachiopods in the upper portion. The Hickory sandstone supports deciduous trees, prominent among which are the broad-leaved oaks, and it contrasts with the overlying Cap Mountain limestone which supports cedar, live oak, and an assortment of daggers and cacti.

Cap Mountain limestone member.—The Cap Mountain limestone outcrop belt broken by faults is situated on the southwestward-pitching anticline mentioned above. In the southern part of the quadrangle the Cap Mountain limestone is in contact with the Hickory sandstone and is in contact with a granite that may be Otman Creek granite, and to the west it is in fault contact with Hickory sandstone and Point Peak shale. A prospect shal along the fault reveals no mineralization.

The entire sequence of the Cap Mountain limestone is exposed in a broad outcrop in the vicinity of Hog Thiel Bend and in a less broad outcrop to the south of the anticline. A small outcrop of the quadrangle only about the upper hundred feet of the Cap Mountain limestone is exposed and here it rests directly on pre-Cambrian granite. Initial dips are well displayed in the Cap Mountain limestone about the granite knob. The Cap Mountain limestone in its lower portion is composed predominantly of sandstone cemented by calcium carbonate and where so cemented it is a light pink color, which is distinct from the sandy bench at the top of the Hickory sandstone. Sand becomes less abundant upward, and near the middle of the member relatively pure fairly massive, solution-jointed limestone is present in which the pattern of the solution joints shows on

cherty, limonite-brown dolomite beds south of Iron Rock Creek. A collection, locally 6-45A, of chert fossils from the limestone is mostly gastropods of a type not commonly seen in the Morgan Creek limestone.

Near the top of the Morgan Creek limestone Billingsella are common in several beds and calcareous Billingsella are common above the Eozonella zone. Trilobites are common to abundant throughout the Morgan Creek limestone near the east edge of the quadrangle at the point marked "P" on the map, and one at locality 6-36A on the south bank of the North Grape Creek. Fossil collections of trilobites and brachiopods were made from localities 5-60D, 6-34A, 6-34B, 6-35A, and 6-35B. Wilson (1949) described some of the fauna from beneath the Eozonella zone to the base of the Morgan Creek limestone in a bluff along the north side of Pedernales River just upstream from the mouth of Iron Rock Creek.

Point Peak shale member.—The Point Peak shale member varies in thickness ranging from about 65 feet in the northern part of the quadrangle to 25 feet or less in the southeastern part. Just a short distance to the east of the quadrangle a section measured on the Scott Klett ranch contains 11 feet of stromatolite limestone followed by 14 feet of thin-bedded argillaceous dolomite which possibly should be included with the Pedernales dolomite but which was provisionally assigned by Cloud and Barnes (1948) to the Point Peak shale.

In the northern part of the quadrangle the thin-bedded argillaceous dolomite is a stromatolite limestone which is persistent throughout the area. The lower 35 feet is mostly an alternation of stromatolite limestone and covered intervals almost to the cherty. South of Iron Rock Creek near the county line the Point Peak is similar, but eastward its upper boundary is lowered, caused by dolomitization of the stromatolite limestone, and the lower shale is replaced by stromatolite limestone.

The Point Peak shale crops out on the flanks of the anticline mentioned above. Fossils collected from the Point Peak shale at locality 6-37A are silicified brachiopods.

Pedernales dolomite member.—The Pedernales dolomite in general flanks the broad anticline of the northern part of the map except that only the lower part of the dolomite is present in the southern limb of the fold, the rest being faulted out. It is present on the southern limb, is particularly free of faults, and the lower portion of the quadrangle all of the member appears to be the same.

The thickness of the Pedernales dolomite was estimated in the northern part of the quadrangle in an area where the attitude of the beds is difficult to determine. The thickness obtained for the Pedernales is 230 feet, consisting of a basal 50-foot and an upper 30-foot of fine-grained dolomite separated by 150-foot coarse-grained dolomite. In the Sandy P. O. quadrangle (Barnes, 1953), the thickness of the Pedernales was estimated in the northern part of the quadrangle in an area where the attitude of the beds is difficult to determine. The thickness obtained for the Pedernales is 230 feet, consisting of a basal 50-foot and an upper 30-foot of fine-grained dolomite separated by 150-foot coarse-grained dolomite. In the Sandy P. O. quadrangle (Barnes, 1953), the thickness of the Pedernales was estimated in the northern part of the quadrangle in an area where the attitude of the beds is difficult to determine. The thickness obtained for the Pedernales is 230 feet, consisting of a basal 50-foot and an upper 30-foot of fine-grained dolomite separated by 150-foot coarse-grained dolomite.

boundary is mapped as a collapse contact.

In the northwestern outcrop area fossils were collected from localities 2-1A, 2-1D, 2-2A, 2-2B, 2-3A, 2-3B, 2-3C, 2-3F, and 2-3G. The fossils are of the Wilmers formation of the Wilmers, probably by erosion before the deposition of Ordovician sediments.

A sample of dolomite was collected by Barnes, Dawson, and Parkinson (1947, pp. 148-149) from a quarry just north of the highway and on the west bank of Rocky Creek. The rock is mottled in gray and brownish-gray, and some porosity is present, some of which is filled by calcite.

German Formation

Dolomite facies.—The dolomite facies of the German formation crops out in the northwestern portion of the quadrangle and dips westward. It is mostly in fault contact with the Tanyard formation beneath, but two short lengths of normal contact are present in which the microgranular dolomite of the German rest upon the coarser grained dolomite of the Tanyard. The dolomite German contains a scattering of sand grains in a number of beds, and these along with microgranular dolomite and calcite form a calcareous facies to identify it. Nodules of porcellaneous to chalcodolite chert are common.

Caliche facies.—The caliche facies of the German formation crops out in a small area in the northwestern portion of the quadrangle. It overlies in normal contact the dolomite facies. The dolomite is a fine-grained, light gray, and is in fault contact with the Tanyard formation beneath. It is mostly in fault contact with the Tanyard formation beneath, but two short lengths of normal contact are present in which the microgranular dolomite of the German rest upon the coarser grained dolomite of the Tanyard. The dolomite German contains a scattering of sand grains in a number of beds, and these along with microgranular dolomite and calcite form a calcareous facies to identify it. Nodules of porcellaneous to chalcodolite chert are common.

Walnut clay.—The Walnut clay is very poorly exposed within the quadrangle. It is a thin, silty, light gray, and is in fault contact with the Tanyard formation beneath. It is mostly in fault contact with the Tanyard formation beneath, but two short lengths of normal contact are present in which the microgranular dolomite of the German rest upon the coarser grained dolomite of the Tanyard. The dolomite German contains a scattering of sand grains in a number of beds, and these along with microgranular dolomite and calcite form a calcareous facies to identify it. Nodules of porcellaneous to chalcodolite chert are common.

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MESOZOIC ROCKS

CRETACEOUS SYSTEM (LOWER CRETACEOUS)

Shingle Hills Formation

Hensell sand member (Barnes, 1948).—The Cretaceous rocks dip eastward in the North Grape Creek quadrangle, but just to the west of the quadrangle a section measured on the Scott Klett ranch contains 11 feet of stromatolite limestone followed by 14 feet of thin-bedded argillaceous dolomite which possibly should be included with the Pedernales dolomite but which was provisionally assigned by Cloud and Barnes (1948) to the Point Peak shale.

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crushed for use as an aggregate. Lead—Galena and a trace of sphalerite are common in the Cap Mountain limestone in the vicinity of the granite dome along Pedernales River near the eastern border of the quadrangle. Galena and sphalerite are also present in prospect holes at the western end of the next granite mass reveals only a very few tiny specks of galena. The lead deposits in the Cambrian limestone of central Texas were sampled during the spring of 1950, mapping was completed, and a publication on the findings is contemplated.

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