SANTA CATALINA FOOTHILLS FAULT IN THE PONTATOC AREA

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The Arizona Geological Society field trip of December 1960 was conducted to examine the Pantano beds in the area immediately northeast of Tucson and the boundary fault which separates these beds from older gneissic and granitic rocks. This fault, mapped as a single break along the foot of the Santa Catalina, Tanque Verde, and Rincon Mountain blocks, has been described as a thrust (Moore, et al., 1941; Wilson and Moore, 1959). In the Santa Catalina foothills area, the fault is best exposed near the Pontatoc mine.

The Pontatoc area is shown in Figure 1. North of the end of Pontatoc and Valley View roads, the fault strikes almost east-west, with an average dip of about 50° to the south. Westward, at the north end of Campbell Avenue, a short exposed portion of the fault strikes somewhat north of west, and dips about 45° south. Pantano beds outcrop to the south of the fault and Catalina gneiss outcrops to the north.

The old Pontatoc mine workings and a number of scattered prospect pits occur within the fault zone. In these workings it can be seen that the Catalina gneiss, which forms the footwall, is brecciated, sheared, altered, and mineralized for a number of feet away from the fault, while the sand and silt of the Pantano beds are unaffected except for slight development of gouge on the fault plane. The mineralization commonly fills the interstices between breccia fragments in the gneiss, and must be later than at least some of the brecciation. The Pantano beds were not observed to be mineralized.

These observations suggest to the writers that the present fault is the expression of a zone of structural weakness older than the Pantano beds, and that this zone was subject to recurrent stress and movement prior to the deposition of the Pantano beds. This seems to be the best explanation for the wide zone of brecciation and shearing in the competent gneiss, with little disturbance of the weak Pantano beds, and the fact that the mineralization occurs only in the gneiss. The following general sequence of events is suggested: (1) original faulting in the gneiss which caused brecciation, (2) mineralization and alteration along the fault zone which may have been accompanied by further brecciation, and (3) final faulting by which the Pantano beds were moved down to their present position in contact with the Catalina gneiss. The age of mineralization may or may not be older than the Pantano beds, since these beds could have been already deposited, but at a stratigraphic position which was not reached by the mineralizing solutions.

No direct structural evidence of relative movement along the fault was seen in the Pontatoc area, but the foregoing data suggest that the fault is not thrust, but normal, at least in its final phase. Most important points in favor of this view are: (1) the high dip of the fault plane, measured where possible, and indicated generally by the straight trace of the fault, and (2) the indications that this high-angle break is an old line of weakness, subject to recurrent movement. Such a feature may have had lateral, normal, or even reverse movement during the course of its history, but it does not fit the commonly conceived picture of

the large-scale overthrust.

Since earlier interpretations of the nature of the boundary fault are questioned in the Pontatoc area, it should be closely examined in its entire length along the Santa Catalina-Tanque Verde-Rincon periphery. The extent of thrusting along this zone may be much less than has been believed. The question also arises as to whether this long feature is a single fault or a more complex combination of structural breaks.

REFERENCES

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