

## Age of the Colorado Plateau: Discussion

McKee and Anderson (1971) and McKee and McKee (1972) have shown that there has been 600 to 850 m of throw between 5 and 10 m.y. ago in the vicinity of Jerome, Arizona, and have correlated uplift of the Colorado Plateau with that faulting.

Ransome (1915) commented on the great step down from the Paleozoic rocks of the Plateau to the Cretaceous rocks of the Basin and Range province. Cretaceous strata occur on the Plateau along the Mogollon Rim southeast of Flagstaff at 2,350 m to 2,400 m above sea level. Strata also occur at Apache Junction at 600 m elevation. Post-Cretaceous uplift of the Plateau of more than 1,800 m is evident.

In Cedar Breaks, Utah, the base of marine Cretaceous strata is at 2,400 m elevation, and the top of marine Cretaceous strata is near 3,000 m. At Las Vegas, Nevada, Cretaceous strata are less than 600 m. Uplift of about 1,800 m is once again evident.

Shift of the base of the Paleocene-Eocene Claron Formation across the Hurricane fault is 2,000 to 3,000 m near Toquerville, Utah (Lovejoy, 1964, 1973); stratigraphic separation (more than shift due to reverse drag) is about 3,300 m (Gardner, 1941; Lovejoy, 1964, 1973). About 500 m of the total shift occurred after deposition of the Black Ridge basalt between Toquerville and Kanarraville, Utah (Gardner, 1941). The age of the basalt was considered to be Quaternary (Gardner, 1941).

Hamblin (1963) thought the basalt was Pliocene(?) or Pleistocene(?) in age. Lovejoy (1964) suggests that they may be late Miocene to Pliocene in age. Thus, 500 m of shift occurred after basalt-flow deposition, which may have occurred at any time between the end of the Miocene and the Pleistocene. The other 1,500 to 2,500 m of shift must have occurred at the time of the earlier major faulting along the Hurricane and Grand Wash faults.

Thus, along the Hurricane and Grand Wash faults west of Toquerville, Utah, of 2,000 m of post-Cretaceous (minimum) uplift of the Colorado Plateau (with respect to the Basin

and Range province), 500 m occurred in late Miocene to Pleistocene time. This agrees very well with the results obtained by McKee and Anderson (1971) and McKee and McKee (1972).

Nevertheless, 1,500 to 2,100 m of uplift must have occurred prior to late Miocene to Pleistocene time. Lovejoy (1964, 1973) has shown that of the total of about 3,300 m of stratigraphic separation which occurred on the Hurricane fault between Toquerville and Kanarraville, Utah, about 85 percent was accomplished by the end of Oligocene time. Pre-basalt shift across the fault zones is 1,500 to 2,500 m. If 85 percent of that shift occurred prior to Miocene time, then a Colorado Plateau existed at least in the early Miocene.

McKee and Anderson (1971) and McKee and McKee (1972) have not discussed the possibilities of pre-Pliocene uplift of the Colorado Plateau. I cannot agree with McKee and McKee (1972, p. 1923) that "the major relative uplift of the Colorado Plateau must have occurred within the 5 to 10 m.y. interval, or in early to middle Pliocene time." They have demonstrated a time for about 25 percent of that relative uplift of the southern edge of the Plateau; they have not solved the problem of the date of the other 75 percent.

I suggested elsewhere (Lovejoy, 1973) that major reverse drag associated with Hurricane faulting, hence Plateau uplift in the vicinity of Toquerville, Utah, also occurred during deposition of the Paleocene-Eocene Claron Formation. I have concluded, therefore, that uplift of the Plateau began in the Laramide with major faulting on the Hurricane fault (Lovejoy, 1959).

Longwell (1945) also noted that displacement on the Grand Wash fault might have begun in Laramide time.

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