



## On Calcium Deficiency and Brittle Antlers

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## LETTER TO THE EDITOR . . .

### On Calcium Deficiency and Brittle Antlers

In a recent paper, Gogan et al. (1988) discussed potential causes of antler anomalies in tule elk (*Cervus elaphus nanodes*). These authors noted that Bubenik (1966, 1982) associated antler anomalies with imbalances of calcium and phosphorus in *Cervus elaphus*. Gogan et al. (1988, p. 659) went on to state that, "Normal-appearing but brittle antlers in tule elk in the Owens Valley, Inyo County, California (USA), have been attributed to calcium deficiency (McCullough, 1969)." This statement is, however, erroneous.

McCullough (1969, p. 121) actually stated, "It appears that the weakness of antlers in the Independence and Tupman herds [of tule elk] is caused by structural deficiencies due to inadequate mineralization, particularly as regards phosphorus. The vegetation chemical analyses indicated that calcium is more than adequate, but that phosphorus may be inadequate." Further, McCullough (1969, p. 123) noted that, "The poor antler structure is at least in part attributable to generally low phosphorus availability and the fact that there is little phosphorus storage in the body (Rerábek and Bubenik, 1956)."

There is an unfortunate tendency among researchers to rely on material cited by secondary sources, in lieu of going to the

original literature. I offer this corrigendum, therefore, in an effort to preclude the proliferation in the literature of the notion that McCullough (1969) associated calcium deficiency with brittle antlers in tule elk.

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