MID-MIOCENE POST-DISTURBANCE VEGETATION DYNAMICS AND THE EMERGENCE OF COLD DESERT/STEPPE VEGETATION IN THE NORTHERN INTERMOUNTAIN REGION.

TAGGART*, Ralph E. and CROSS, Aureal T., Dept. of Geological Sciences, Michigan State University, E. Lansing, MI 48824-1115 U.S.A.

The mesic broad-leaved and coniferous forests of the Middle Miocene of the northern Intermountain region of the United States contrast strongly with the semi-arid shrub/grassland steppe vegetation that comprises the extant vegetation. This contrast is a consequence of the progressive development of a regional rain shadow, beginning in the Late Miocene, coincident with the uplift of the Cascades to the west. It is generally assumed that the emergence of the extant vegetation was a consequence of a combination of _in situ_ evolution of taxa in response to moisture and thermal stress and the immigration of taxa already adapted to such stressful environments. The study of stratigraphically sequential successional vegetation stages in a number of Middle Miocene floras in the northern Great Basin suggest that many elements of the extant vegetation of the region were already present as taxa adapted to the several characteristic environmental conditions of landscapes affected by volcanic disturbance.

The Middle Miocene "climax" vegetation of southeastern Oregon and southwestern and southcentral Idaho, documented by paleobotanical and palynological data from floras such as Stinking Water (Oregon), Succor Creek (Oregon-Idaho), and Trapper Creek (Idaho), was a complex mosaic of vegetation types comprised of broad-leaved evergreen, mixed mesophytic, and mixed coniferous forest elements. These floras are preserved in volcaniclastic sediments. Palynological analysis of sequential samples from overlying strata indicate that the bulk of the sedimentary record at each of these sites records vegetation in varying stages of recovery following destruction of forests by local volcanism. The earliest seral stages following such events are characterized by taxa, including _Artemisia_, _Sarcobatus_, and other Malvaceae, Chenopodiaceae, Amaranthaceae, Compositae, and Gramineae that represent important components of the extant vegetation of the region.

An ash-covered landscape, denuded of forest cover, is a highly stressful environment. Ash forms an edaphically dry and nutrient-poor substrate and such sites would be exposed to a significantly greater range of annual temperatures and much greater exposure than forested sites. Grasses, forbs, and shrubs that evolved in ways that permitted the colonization of such landscapes would be preadapted to the drier and less equable climates that would accompany the development of the Cascadian rain shadow. In addition, such successional areas also supported a mammalian fauna dominated by grazers in contrast to the browsing-dominated fauna of the climax forest mosaic. It would thus appear that the post-disturbance grass/forb/shrub communities provided an evolutionary proving ground for mammalian niches that now dominate the extant cold desert/steppe biome.