Use of Insect Remains to Reconstruct Paleoenvironmental Change in the Northern Willamette Valley, Oregon

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METHODS: MUTUAL CLIMATIC RANGE

Examine the paleoclimatic changes in the Willamette Valley using the Mutual Climatic Range method. Beetle remains have been an effective proxy for paleoclimatic reconstruction. Beetle exoskeletons preserve well in the fossil record, and they are very sensitive to environmental change; many are only able to live within specific temperature ranges or ecological zones.

BACKGROUND

The first studies of paleoenvironmental change in the Willamette Valley were conducted by Henry Hansen (1941, 1942, 1947), who used plant remains (pollen, charcoal) as a proxy for climate change. Beetle remains show a faster response to climatic change than plants, making them a valuable tool for reconstructing past environments. This should be a far more accurate measure of climate change than the paleo-climate range (the Mutual Climatic Range) that Hansen used.

Comparison of paleoclimate records (Hansen 1941, 1942; Pearl 1999) has shown that the Mutual Climatic Range method provides a more accurate measure of climate change than previous pollen-based studies. This is because insects are more sensitive to environmental changes than plants, and they can live in a wider range of conditions and ecological zones.

METHODS: INSECT EXTRACTION

Sample collection involves removing beetle remains from the samples through the use of insect extraction techniques. The samples are divided into 5 cm increments, and stratigraphy is taken into consideration. The author used the JEOL-35C Scanning Electron Microscope for parts with good chance of identification. Geochemical analysis and age dating (AMS radiocarbon) are also important aspects.

RESULTS:

The exact timing of climatic changes is not specific at this point, but there are only two chronological records in the sample (2 mm and 500 μm). Temperature reconstructions for sample 16F show a rapid cooling period, which may correspond with the timing of the Younger Dryas. Further study is needed to determine the exact timing and magnitude of the Younger Dryas. Additional studies will involve analyzing the paleoenvironmental conditions experienced by the Willamette Valley at that time.

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CONCLUSIONS:

More radiocarbon dates will be needed to show the exact timing of paleoclimatic change in the Willamette Valley. When this study is completed, a much clearer picture of Willamette Valley paleoclimatic change will be evident, including the timing and magnitude of the Younger Dryas.

In addition to the pollen record, the results from this study can be compared with other proxies used to track paleoenvironmental change, such as ice core analysis, sea level fluctuations, algal records, and the timing of climate change events.