

# Enterolactone and Other Lignan Metabolites as Taxon-Specific Markers in Modern and Ancient Woodrat Middens

David A. Zinniker<sup>a</sup>, Camille A. Holmgren<sup>b,\*</sup>, and Bernd R. T. Simoneit<sup>c</sup>

<sup>a</sup> Department of Geological and Environmental Sciences, Stanford University, 450 Serra Mall, Braun Hall, Building 320, Stanford, CA 94305, U.S.A.

<sup>b</sup> Department of Geography and Planning, SUNY Buffalo State, 1300 Elmwood Avenue, Buffalo, NY 14222, U.S.A. Fax: +1-716-878-4009. E-mail: holmgrca@buffalostate.edu

<sup>c</sup> Department of Chemistry, Oregon State University, Corvallis, OR 97331, U.S.A.

\* Author for correspondence and reprint requests

Z. Naturforsch. **68c**, 327–335 (2013); received January 30/June 13, 2013

Diversely sourced degradation products of higher plant lignans were identified in modern and ancient woodrat (*Neotoma*) middens. The markers indicate extensive chemical modification by intestinal microbial communities of mammals. The observed defunctionalized phenols represent a group of natural products, and their structural elements reveal information about the plant source. The phenols are derived mainly from two precursor types: (1) enterolactone and derivatives from conifer lignans, and (2) 2,3-bis(3'-hydroxybenzyl)butane and related compounds from lignans such as nordihydroguaiaretic acid common in *Larrea* sp. (e.g. creosote bush).

*Key words:* Enterolactone, *Neotoma*, Middens, *Larrea tridentata*