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Pre-Oral Digestion: A Phospholipase A_2 Associated with Oral Secretions in Adult Burying Beetles, *Nicrophorus marginatus*

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Abstract

We report on a phospholipase A_2 (PLA_2) found in the oral secretions, but not midgut contents, of the burying beetle, *Nicrophorus marginatus*. PLA_2 is responsible for hydrolyzing fatty acids from the *sn*-2 position of dietary phospholipids (PLs), an essential step in digestion and absorption of essential polyunsaturated fatty acids. Like the digestive PLA_2s known from mammalian systems, and the one described insect digestive PLA_2 the *N. marginatus* oral secretion PLA_2 depends upon Ca^{2+} for full activity. However, unlike most digestive PLA_2s, the *N. marginatus* enzyme is only partially inactivated in the absence of Ca^{2+}. The PLA_2 in *N. marginatus* oral secretions was influenced by altering the enzyme reaction conditions, including reaction time, protein concentration, pH, and temperature. Standard reaction conditions for assessing enzyme activity include 1.0 μg protein/μl incubated at pH 9.0 for 30 min at 28°C.

Keywords: Burying beetles; *Nicrophorus marginatus*; Silphidae; digestion; phospholipase A_2; essential fatty acids