

Intestinal absorption: a view from molecules to ecosystem

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Digestive physiology links physiology to a variety of ecological applications valued by society. I illustrate this applied and integrative perspective with several case studies. House sparrows (*Passer domesticus*) and many other birds have absorptive flexibility to changing diets, which is important for adapting to habitat and/or climate change. They absorb hydrolyzed water soluble monomers such as glucose mainly passively via tight junctions between enterocytes (i.e., paracellular absorption), and thus match absorption to dietary load. Such species may be good models for studying this process, which is important biomedically for absorption of drugs. High paracellular absorption has interesting ecological implications, such as enhancement of absorption of low molecular weight natural water soluble toxins. Also, reliance of American robins (*Turdus migratorius*) on passive absorption makes them less sensitive to types of plant toxins that inhibit mediated glucose absorption. Determining absorption of environmental contaminants is another important ecological application. Common loon (*Gavia immer*) chicks absorbed 83% of methyl mercury in fish meals, eliminated the mercury slowly, and consequently are predicted to bioaccumulate mercury to higher concentrations than in their foods. The quantitative details of these relationships can be used to set regulatory levels for mercury in the environment that will protect wildlife.