Nothing is Perfect: Biodegradable Packing Material as Food and Transportation for a Museum Pest, *Lasioderma serricorne* (F.) (Coleoptera: Anobiidae)

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SCIENTIFIC NOTE

NOTHING IS PERFECT: BIODEGRADABLE PACKING MATERIAL AS FOOD AND TRANSPORTATION FOR A MUSEUM PEST, LASIODERMA SERRICORNE (F.) (COLEOPTERA: ANOBIIDAE)

Among an insect collection manager’s most dogged tasks is to keep museum pests at bay. The three main components of this responsibility are: 1) constant vigilance; 2) detection and elimination or mitigation of potential pest sources; and 3) fumigation if an infestation occurs. The second of these three is the trickiest, largely because pest sources are quite diverse and, if they are external of the collection, can fall outside the manager’s jurisdiction. As examples, pests are more likely to invade a collection located near a building entrance, or, as in the case of a well known museum in the northeastern United States, if the mammal department’s bone-cleaning room is located on the floor above. Here we report a recently recognized source of museum pests that has potential to affect collections worldwide: starch-based packing peanuts.

We were alarmed in January 2010 when small (2.4 mm), brown beetles, later identified as Lasioderma serricorne (F., 1792) (Anobiidae) (Fig. 1), began to appear on the floor of the insect collection room at the Smithsonian Tropical Research Institute (STRI) in Balboa, Ancon, Panama City, Panama. There were too many beetles for them to have entered the room one by one from outdoors, yet none of the specimen drawers had infestations. So from where were the beetles coming? The search lead to a large bag of packing peanuts accumulated from parcels received from other museums, and now stored, ready for re-use when we send specimens out. The bag contained mostly polystyrene peanuts, but mixed in were a few starch-based biodegradable peanuts; the beetles were associated with the starch-based peanuts (Figs. 2a, b).

Utilization by L. serricorne as a food source is an unexpected downside of a starch-based packing material designed to biodegrade easily so as not to persist for decades in garbage dumps and landfills. These new materials are so biodegradable that they “vanish” within minutes of being soaked in water. Their fatal flaw is that despite optimistic claims by their manufacturers that the nutritional value has been removed from the corn starch or sorghum used to make them, they are fodder for insect pests. As Ward Watt quipped (personal communication), “If they removed all food value, there wouldn’t be anything left to manufacture the packing peanuts from”. See the Wikipedia website (Wikipedia 2010) for a general history of packing peanuts and the materials used to make them.

According to David Stephan (in litt.), “In the US, L. serricorne can be as serious a pest in herbaria as Anthrenus dermestids are in insect collections.” The problem affects herbaria around the globe, and the beetles attack the labels, species cards, and genus covers as well as all parts of the plant specimens (Croat 1978; Retief and Nicholas 1988; Kabir et al. 1996). Thus, in retrospect, it should not be surprising that L. serricorne includes starch-based packing peanuts in its diet. Unfortunately, these beetles do not confine their attacks to plant material; Keith Philips (in litt.) discovered them destroying a student insect collection. We selected a few live adult beetles for observation and set them up with starch-based peanuts in a transparent plastic cup with a tightly fitting lid for observation over a period of five days. The bag of mixed packing peanuts was put into a large freezer for one week to terminate the infestation, after which we separated the two types of peanuts and discarded the biodegradable ones.

The defrosted rubble in the bottom of the bag was a jumble of tiny scraps of polystyrene and starch-based peanuts, dead L. serricorne adults (Fig. 1) and larvae, beetle parts, larval exuviae pertaining to at least three stadia, and shiny, spindle-shaped eggs (Fig. 3). From this rubble we point-mounted vouchers, which are deposited in the collections of STRI and MIUP (Museo de Invertebrados G. B. Fairchild de la Universidad de Panamá): 14 adults, nine larval exuviae, five dehydrated larvae, and a few eggs. We also saved loose samples of eggs and rubble in mounted gel caps, and pinned a packing peanut that had eggs on it.

Captive females laid their eggs, singly or in small clusters, on the surface or in crevices of the biodegradable packing peanuts. Mature larvae sequenced themselves within the peanut to pupate (Fig. 4), and teneral adults (Fig. 5) remained there with their larval exuviae for some days before emerging.

Fraga et al. (2009) reared two species of Coleoptera and one species of Lepidoptera from the same type of packing material in Brazil. They also found adults of three additional species of Coleoptera, including L. serricorne, in those products, but did not report evidence that they had bred there. Our findings confirm that L. serricorne indeed can and does breed in starch-based packing materials. From the point of view of a beetle, what could be better than a system that provides abundant food (though perhaps not the most appetizing) and automatic dispersal to all points of the globe? Curators beware.
We thank Keith Philips (Western Kentucky University) for identification of the beetle, and both him and David Stephan (North Carolina State University) for commenting on its pest status.

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Figs. 1–5. *Lasioderma serricorne* in starch-based packing peanuts. 1) Adults (2.4 mm long); 2) Two teneral adults in a whole peanut (a) and just below the peanut surface (b); 3) Eggs (0.17 mm long); 4) Pupa dissected from a peanut; 5) Teneral adult and its larval exuviae dissected from a peanut.