

SCIENTIFIC NOTE

AMORPHOSOMA PENICILLATUM (KLUG, 1827) (COLEOPTERA: BUPRESTIDAE: AGRILINAE): A FEARLESS JEWEL BEETLE IN PANAMA

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It all began late one afternoon on 27 June 1987 when I noticed what appeared to be a bird dropping on a leaf about 0.75 m from the ground on a 1-m tall plant of *Xylosma chlorantha* Donnell Smith (Salicaceae, previously of the now defunct Flacourtiaceae). The “dropping” had apparent bluish seeds embedded in it and a patch of white, suggestive of uric acid, on the sides. Nevertheless, the symmetry of the “dropping,” and the leaf damage next to it, alerted me that I was looking at an insect that was, to these human eyes, one of the best and most blatant bird dropping mimics I had ever seen. Having spent more than 40 years studying lepidopteran life histories, I was duped into thinking it to be a caterpillar, and I prepared to remove the leaf from the plant. At the first tilt of the leaf, the “caterpillar” rolled off it. I spent 20 minutes searching the leaf litter immediately below, piece by piece, but failed to find anything resembling the missing insect.

At every chance during the next two weeks, I revisited the *X. chlorantha* plant to see whether by some miracle the fascinating insect had returned. Despite the expectation, it gave me quite a jolt to see it there again (11 July 1987) on a partly eaten leaf very near to the original one. This time, I held a plastic bag beneath the leaf before touching it. The insect dropped in, and before reaching the bottom, it flew and landed on one side of the bag. It was a beetle, a buprestid! I dropped it into a vial with a leaf from the *X. chlorantha* plant. The beetle was bumpy and had tufts of setae in several places. I photographed it and found it to be quite docile. It never attempted to escape.

The beetle took well to captivity and readily ate the leaf placed in the vial with it. Two days later, Carl Hansen (Smithsonian photographer at that time) photographed it. Again, the photo session was revealing of the beetle’s behavior. We prodded it and picked it up many times as we worked, but it never once attempted to fly or escape. It kept its legs pulled in close against its body. After a few pictures,

we stopped and watched the beetle. It soon extended its legs, walked with a jerky motion to the highest point on the leaf, and stopped. Carl took several pictures of it while it was walking. The camera flashes did not seem to affect it. When we placed the beetle upside down on a textured surface, such as a leaf, it extended its legs to right itself and again walked to the highest point on the leaf, with no attempt to fly. When the substrate was very hard and smooth, the beetle opened its elytra part way and, typical of beetles in general, used them and its legs to right itself. The specimen is in the Smithsonian Tropical Research Institute, Synoptic Insect Collection in Panama, as STRI_ENT_0125159.

This unusual beetle proved to be *Amorphosoma penicillatum* Klug, 1827 (Buprestidae: Agrilinae) (Fig. 1B, C), which has an extensive range from Argentina (Bellamy 2008) to Paraguay (Bellamy 2003), Brazil, Nicaragua, Panama (Waterhouse 1887), and Mexico (Tamaulipas) (MacRae and Bellamy 2013). The genus *Amorphosoma* Laporte, 1835 has the unusual distribution between the Neotropics and Indo-Malaysia and Tasmania, and in the New World it currently includes six species. The 20 Old World species were placed in *Vanroonia* Obenberger, 1923 (Bellamy 2007, 2008), but Kubáň (2006, 2016) considered all but the Afrotropical species to be *Amorphosoma*. Whether Old World adults exhibit the same fearless behavior as *A. penicillatum*, I do not know.

Buprestid beetles have a reputation for being skittish and quick to fly, and thus challenging to capture. *Amorphosoma penicillatum* is an exception. It plays the bird dropping role to the extreme. When approached, the beetle moves to the midvein, pulls its legs in beneath the body and waits. You can just pick it up, but otherwise, if anything, even a little breeze jiggles that leaf, the beetle falls off, drops a short distance, and flies away. My encounters with this beetle and its surprising behavior took place in Panamá Oeste: Arraiján, Loma del Río (8.9407° N, 79.6568° W) on weekends and holidays between 27 June 1987 and 6 September 1998.

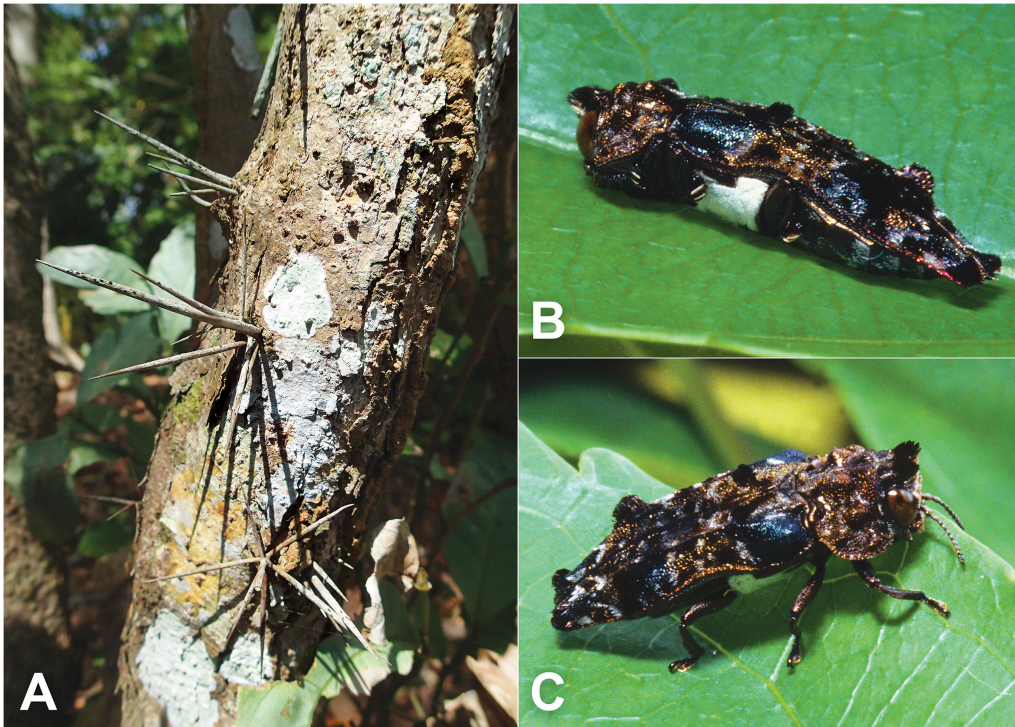


Fig. 1. A) *Xylosma chlorantha*, trunk with branched spines. *Amorphosoma penicillatum* adult: B) Bird dropping position with legs pulled in under the body, C) Walking.

My second encounter with this beetle took place on 1 August 1987, a drizzly afternoon, when I captured an individual (STRI_ENT_0125257) that showed signs of wear. It was missing the left meta-thoracic leg, its colors were not as bright as those of the previous or any subsequent individuals, but against the red-blotched and damaged leaf upon which it rested, it was so well camouflaged that without the experience with the previous individual, I never would have noticed it at all. Further experiences included observations on three beetles on the afternoon of 30 May 1988. The three were on separate but adjacent leaves, and all three pulled in their legs at my approach and remained on their leaves even when I ducked under their branch, picked up one beetle, replaced it on its leaf, and walked away. Upon my return five minutes later, all three beetles still were there. During the morning of 8 July 1989, I observed a mating pair of beetles on a shaded leaf. The morning of 17 June 1990, I sat from 10:16 am to 11:03 am and watched two beetles on separate leaves. They ate their leaf margins but moved to the midvein and pulled their legs in whenever disturbed by our passing dogs or my family members, then they soon walked about jerkily before returning to feed.

The beetles were associated with seven of thirteen *X. chlorantha* plants in the study area. Typically, *A. penicillatum* eats a large area out of one side of a leaf and deposits its dark fecula on the leaf along the cut edge. Even with the wind, the beetle fecula sticks to the leaf for several days, making it easy to know whether beetles have been active in the area recently. Sometimes, I brushed the fecula off the leaves in order to know whether and when more beetles had come to feed.

The genus *Xylosma* G. Forst., 1786 comprises about 100 species of mostly tropical and subtropical shrubs and trees. Panama is home to at least 10 species. *Xylosma chlorantha* is a dioecious tree whose trunk and larger branches are armed with branched spines (Fig. 1A). It is distributed from southern Mexico to northwestern Colombia. Four of the Arraiján plants surveyed in this study flowered in April 1988; two were females and two were males. On 28 May, I labelled and pressed a plant voucher (Aiello #1400), which is housed in the author's office at STRI. George Vogt (personal communication, June 1988) found a species of *Amorphosoma* on *Xylosma* (Vogt specimen #419, presumably at the USNM) in Burma (now Myanmar), and he claimed that the Burmese and the

Panamanian beetles are stem borers on that genus of plants.

Of the five beetles collected during this study, three (STRI_ENT_0125157, 0125258, and 0125259) are in the Synoptic Insect Collection at Smithsonian Tropical Research Institute (STRI), in Balboa, Ancon, Panama. One specimen (STRI_ENT_0109868) was donated to the Museo de Invertebrados G. B. Fairchild de la Universidad de Panamá (MIUP). One that was given to Henry Stockwell has disappeared from his collection. In addition to the five beetles collected, I observed possibly 15 more, but not wishing to destroy the feral colony, I did not collect them. That number is a maximum estimate because there is no way to know whether I was seeing the same individuals on subsequent days.

The “What me worry?” attitude of *A. penicillatum* is puzzling. Yes, it is an amazing mimic, which undoubtedly helps protect it from attack by birds. Nevertheless, once captured, why does the beetle not attempt to escape? Does it have a chemical defense that we did not detect? Is it such a hard object that a bird decides to reject it? Do the tufts of setae play any role in rejection? Does similar fearless behavior occur in other species of *Amorphosoma*? I have observed fearless behavior in a beetle that Henry Stockwell identified as “near *Agrilus* Curtis, 1825 (Buprestidae: Agrilinae).” That beetle was eating the base of a young leaf of *Casearia guianensis* (Aubl.) Urb., which also belongs to the Salicaceae. Like *A. penicillatum*, the *Agrilus* allowed me to pick it up. Once inside the vial, it attempted to fly several times, and I could see that the dorsal part of the abdomen was metallic blue. I donated it to Henry Stockwell, but that specimen also has disappeared from his collection, so we have no way to make an identification. However, R. Westcott (*in litt.*) suspects that it may have been *Pilotrulleum caseariae* Bellamy and Westcott, 1995 (Agrilinae), which occurs in Costa Rica, but though not recorded from Panama might be expected there. As its specific name implies, *P. caseariae* also is associated with plants of the genus *Casearia* Jacq. Chuck Bellamy was able to approach the beetle and obtain an excellent close-up photograph without it flying away (R. Westcott, *in litt.*), evidence that *P. caseariae* perhaps exhibits the same fearless behavior as the missing beetle and *Amorphosoma*. Hespeneheide and Westcott (2018) reported putative bird dropping mimicry in two species of *Agrilus*, but did not discuss their behavior. Possibly fearless behavior occurs elsewhere among the more than 14,700 species (Bellamy 2009) that comprise the Buprestidae worldwide, but in the case of such rare beetles as *Amorphosoma*, these questions are unlikely to receive answers any time soon.

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