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'Elepaio "anting" with a garlic snail and a *Schinus* fruit

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ABSTRACT. Anting is a widespread but poorly understood behavior in which birds apply ants or other organisms or objects to their plumage or skin. I observed two instances of active anting in the 'Elepaio (*Chasiempis sandwichensis*), a monarch flycatcher endemic to the Hawaiian Islands, one involving a garlic snail (*Oxychilus alliarius*) and the second involving a fruit of Brazilian pepper or Christmas berry (*Schinus terebinthifolius*). On both occasions the 'Elepaio held the object in its bill and wiped it on its body then preened, but did not eat the object. Chemical compounds contained in each species are known to have antibiotic properties, suggesting the purpose of the anting was to control parasites or pathogens. There are no native ants in Hawaii, and neither the garlic snail nor Brazilian pepper is native to Hawaii.

SINOPSIS. **Hormigamiento (anting) en *Chasiempis sandwichensis* con un caracol y una fruta de *Schinus***

El hormigarse (anting) es una conducta amplia pero no muy bien entendida en donde un ave toma hormigas u otros organismos u objetos y se las coloca sobre o las frota en su plumaje. Observe dos casos de esta conducta en el Elapaio (*Chasiempis sandwichensis*) el cual es un tipo de papamoscas endémico a islas de Hawaii. El primer caso, el ave se pasó, sobre su plumaje, un caracol (*Oxychilus alliarius*) y en el segundo una fruta de *Schinus terebinthifolius*. El ave no consumió al caracol o la fruta y una vez terminada su conducta comenzo a acicalarse. Se conoce que ambas especies contienen componentes químicos con propiedades antibióticas, lo que sugiere que el propósito de hormigarse fue como medio de control de patógenos o parásitos externos. En Hawaii, no hay hormigas nativas, y ni el caracol ni la fruta mencionada son nativas a estas islas.

Key words: anting, *Chasiempis sandwichensis*, chemical defense, 'Elepaio, Hawaii

Anting is an interesting but poorly understood behavior that has been observed in many bird species. In active anting, a bird grasps one or more ants in its bill and vigorously rubs or wipes them on its feathers or skin. In passive anting, a bird perches on an ant nest with its wings and tail spread, stimulating the ants to swarm over its body and among its feathers. Birds have been observed "anting" with many objects other than ants, including millipedes (Clunie 1976), caterpillars (Wenny 1998), flowers (Dennis 1985), citrus fruit (Clayton and Vernon 1993), mothballs (Dubois 1969; Clark et al. 1990), lawn chemicals (Nero 1996), and a variety of other substances (Whitaker 1957; Simmons 1966; Clark et al. 1990). The purpose of anting is not clear, but there is increasing evidence that chemicals contained in ants and these other objects have antibiotic properties that help to control ectoparasites or fungal or bacterial infections (Dennis 1985; Ehrlich et al. 1986; Clark et al. 1990; Clayton and Vernon 1993). Other possible functions that have been proposed for anting include soothing of irritated skin during feather molt (Potter 1970; Potter and Hauser 1974) and removal of unpalatable substances from food prior to consumption (Judson and Bennett 1992).

Here I report on two instances of anting in the 'Elepaio (*Chasiempis sandwichensis*), a nonmigratory monarch flycatcher endemic to the Hawaiian Islands, one involving a garlic snail (*Oxychilus alliarius*) and the second involving a fruit of Brazilian pepper or Christmas berry (*Schinus terebinthifolius*). These observations are noteworthy because they represent the first reports of anting in Hawaii, where there are no native ants, and because both of the species used for anting are alien to the Hawaiian Islands and are documented to have chemical properties that may help explain their use in anting.

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OBSERVATIONS

On 7 April 1998 in Pia Valley, southeastern Oahu, I was observing a female 'Elepaio as it foraged about 2 m above the ground in a small strawberry guava (*Psidium cattleianum*) tree. As I watched, the bird grasped in its bill a small snail with a flat, tightly coiled shell. The bird manipulated the snail in its bill for a few seconds, then wiped it several times on the underside of each wing and on the dorsal surface of the base of the tail. The bird "anted" with the snail for about 20 s, then dropped the snail and preened extensively for about 30 s, repeatedly preening the base of the tail near the uropygial gland. The bird did not make any attempt to eat the snail or extract it from the shell, as I have seen 'Elepaio do with other snails. I searched for the snail on the ground after it was dropped, but I was unable to find it in the dense leaf litter. Although I was not able to recover the snail, I am confident that it was a garlic snail based on the shape of the shell.

On 5 April 2000 I was watching a pair of 'Elepaio in Honouliuli Preserve, southwestern Oahu, when the female 'Elepaio grasped in its bill a fruit from the Christmas berry tree on which it was perched. The bird wiped the fruit on its breast feathers several times, then dropped the fruit, preened its breast for about 5 s, and flew off. It did not eat the fruit. This pair of 'Elepaio had a nest, which had just failed, in the same Christmas berry tree. A dead nestling was visible hanging on the rim of the nest.

DISCUSSION

The circumstances of these observations and the chemical properties of the objects used suggest that the function of these instances of anting was to control ectoparasites or infections, and not to soothe skin irritated by feather molt or to prepare food for consumption, though additional information to confirm this conclusion is desirable. 'Elepaio have a single annual prebasic molt that occurs from late May–August on Oahu (VanderWerf 1998). Both anting observations occurred in early April, so it is unlikely that either bird was molting, and thus unlikely that the objects were used to soothe skin irritated by molting feathers. 'Elepaio are known to eat snails (VanderWerf 1998), but when preying on snails they hold the snail in one foot, peck at the shell, and extract the body from the shell. The garlic snail was not handled in this manner, suggesting the 'Elepaio was not attempting to eat the snail.

The garlic snail is native to Europe and was introduced to Hawaii in the 1960s (R. Cowie pers. comm.). Garlic snails are so named because upon irritation they release volatile sulphurous compounds, principally n-propyl mercaptan (Lloyd 1970a). An extract of the garlic snail was shown by Lloyd (1970b) to repel predators, but not to inhibit bacterial growth. The most serious predator of 'Elepaio today is the introduced black rat (*Rattus rattus*; VanderWerf and Smith 2002), but whether rats are deterred by compounds like those produced by the garlic snail is unknown. The 'Elepaio observed anting with the garlic snail had a sore on one toe, probably caused by an infection of avian poxvirus (*Poxvirus avium*). Poxvirus is common in 'Elepaio and is a serious threat to many native forest birds in Hawaii (VanderWerf 2001; van Riper et al. 2002).

The Brazilian pepper, or Christmas berry as it is more commonly called in Hawaii, is native to southern South America, and was introduced to Hawaii in the early 1900s (Wagner et al. 1990). This species has become widely naturalized in Hawaii and Florida, often forming dense, monotypic stands, and is a serious threat to native ecosystems (Wagner et al. 1990; Ferriter 1997). Moreover, Christmas berry and other species of *Schinus* produce a variety of allelopathic compounds including phenols and terpenes that inhibit growth of other plants (Campello and Marsaioli 1974; Jain et al. 1995). Contact with Christmas berry sap can cause rashes, lesions, swelling, and itching, while ingestion of plant parts has caused paralysis in birds (Campello and Marsaioli 1974) and mortality in grazing animals (Morton 1978). Various parts of the plant have been used for ethnopharmacological purposes for many years (Morton 1978), and similar compounds in the closely related *Schinus molle* are documented to have antifungal and antibacterial properties, being used to treat fungal and bacterial infections (Dikshit 1986; Camano 1996). Given the complex phytochemistry of Christmas berry and its diverse antibiotic properties, it seems likely that it could help control

one or more parasites, pathogens, or feather-degrading bacteria that affect 'Elepaio (Burtt and Ichida 1999; Muza et al. 2000).

No ants are native to Hawaii, and the earliest record of ants in Hawaii is of seven species that were established by 1880 (Blackburn and Kirby 1880). 'Elepaio have evolved in the absence of ants for at least 5.1 million years, the age of Kauai, the oldest island currently inhabited by 'Elepaio (VanderWerf 1998). Furthermore, the Hawaiian flora and fauna are well known for their lack of poisons, stings, volatile oils, and other forms of chemical defense (Carlquist 1980; Howarth and Mull 1992). Despite their prolonged isolation from chemical compounds suitable for anting, the behavior exhibited by 'Elepaio in these two instances was very similar to anting behavior of birds in continental regions (Whitaker 1957; Potter 1970; Clark et al. 1990). Investigation, like that carried out by Clayton and Vernon (1993), of the chemical properties of the garlic snail and Christmas berry and their effects on ectoparasites and feather bacteria present in Hawaiian birds (van Riper and van Riper 1985) is needed to confirm the conclusion that anting in 'Elepaio may help control ectoparasites. Observers should be alert for additional instances of anting in other species of Hawaiian birds.

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