

bifurcation and elongation of the roots coincided with the expansion of cotyledons, which were equal, opposite and trinerved (fig. 5).

This isolated example of vivipary in a member of the Rubiaceae is unusual and not previously recorded. The degree of vivipary shown by this plant is that of the lowest order of specialization in development where the seedlings do not bore through the fruit wall. The other extreme cases where they do are seen in *Bruguiera*, *Ceriops*, and *Rhizophora*. *Avicennia* is the intermediate case where the seedlings are disseminated with or without being invested by the fruit wall (Goebel 1905).

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Acoustical Location of Calling Frogs by Philander Opossums

Although biologists have long suspected that predators might orient to the sounds of prey mating calls (Lutz 1924), documentation is rare and exists only for crickets (Walker 1964, Bell 1979). In the period 27 February to 27 April 1980, we observed a breeding chorus (averaged 153 per night, range, 5-425) of the small leptodactylid frog, *Physalaemus pustulosus*, at the Weir Pond, Barro Colorado Island, Panama.

A Javelin Model 221 night vision scope was used to observe predators, including philander opossums (*Philander opossum*), at distances of 2-4 m. We observed the pond for a total of 37 hrs. on 19 nights between 1830 and 2400 hrs., averaging 2 hrs./night.

Philander opossums were present 5.4 percent of the time between 1900 and 2400 hrs., and 39 captures of *P. pustulosus* were observed. The mean capture rate of 1.1 frogs/hr. of observation time (range, 0.0-4.4) indicated average before-midnight-catches of approximately six frogs. Since we often were distracted by observations of other predators, this is a minimum estimate.

Approaching opossums frequently stopped near the edge of the pond, listened briefly, then turned in the direction of calling *P. pustulosus*. At a distance of 1-2 m they often paused again, turning their heads slightly from side to side and rotated their ears back and forth, before rushing forward to attempt a capture. This behavior was especially apparent when only a few frogs were calling.

We suspected that opossums were locating individual calling frogs acoustically. To test this hypothesis, we recorded *P. pustulosus* advertisement calls (1 whine plus 3 chucks each) for playback, then hid a remote-controlled Olympus Pearlorder, Model D120, 2 m from the pond's edge at a place not normally visited by opossums. When a hunting philander opossum was sighted, we waited till few or no frogs were calling and the opossum was headed away from the speaker before activating the recorder.

In each of five trials the opossum immediately turned and approached the recorded call. In three trials the opossum pounced on the speaker, and in the other two our nearby presence frightened the opossum away after it had approached to within less than 1 m. Opossums were attracted from distances of 5, 4, 4, 3, and 1.5 m.

Responding opossums exhibited apparent listening behavior during their approaches. For example, the first opossum immediately turned toward the speaker, rose on its hind legs, turned its head slightly from side to side while rotating its ears back and forth, then ran to and pounced on the speaker, circling it thereafter at a distance of about 10 cm until the speaker was turned off.

Philander opossums hunted even on nights when it was impossible to form an image in our night-vision scope without an infrared light source. Langley (1979) already has shown that captive Virginia opossums (*Didelphis marsupialis*) prefer auditory over visual cues when finding crickets. Since *P. pustulosus* is only 3.5 cm in length and highly cryptic, hunting philander opossums likely depend heavily on acoustical cues.

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Stomach Contents of Rain Forest Peccaries (*Tayassu tajacu* and *T. pecari*)

Feeding habits of collared peccaries (*Tayassu tajacu*) in desert areas have been well documented (Jennings and Harris 1953, Neal 1959, Eddy 1961, Low 1970, Bissonette 1976), but there is little quantitative information available on the foraging habits of this species and of the larger white-lipped peccary (*T. pecari*) in neotropical rain forests (Enders 1935, Leopold 1959, Smythe 1970). Here I report results of an analysis of stomach contents from peccaries collected in Amazonian Peru.

In October 1976, I arranged with a resident of the community at the confluence of the Manu and Madre de Dios rivers (Department of Madre de Dios, Peru) to preserve stomachs of peccaries that he shot in the course of subsistence hunting. He was provided with plastic bags, labels, and 10 percent formalin for storing the stomachs whole. I later washed the contents and dried them in the sun. For each stomach, I sifted the dried contents, extracted all "large" items (arbitrarily defined as >5 mm in length), and sorted homogenized subsamples of the remaining material for 15 min into the following classes: plant reproductive parts (fragments of seeds, fruits and nuts), plant vegetative parts (pieces of leaves and stems), and animal parts (mostly insect body parts). Volumes of each category were measured after light tamping in a calibrated cylinder.

Between November 1976 and May 1977, 34 *T. pecari* and 17 *T. tajacu* stomachs were obtained. The