

Deimatic Behavior in *Pleurodema brachyops*

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Deimatic behavior consists of intimidating postures or actions that occur in animals which cannot flee very fast, or which have been caught by a pursuing predator (Edmunds, 1981). Puffing up the body, elevating the hindparts, and displaying bright colored marks, glands and eyespots are known deimatic displays in frogs (Sazima and Caramaschi, 1988). *Physalaemus nattereri* and *Physalaemus deimaticus* puff up the body and display glands that resemble eyes when disturbed (Edmunds, 1981; Sazima and Caramaschi, 1988). Seven of 12 known species of *Pleurodema* have a pair of prominent lumbar glands; these glands are generally black with other contrasting colors (Duellman and Veloso, 1977). Cei and Espina (1957) reported on the deimatic behavior in *Pleurodema thaul* and Cei (1962, fig. 46) found it in *Pleurodema bufonina*. Duellman and Veloso (1977) did not observe this behavior in the other five species of *Pleurodema* having lumbar glands (including *P. brachyops*). During a study of the reproductive biology of frogs inhabiting the savanna in northern Brazil, I observed deimatic behavior in *Pleurodema brachyops* under laboratory conditions.

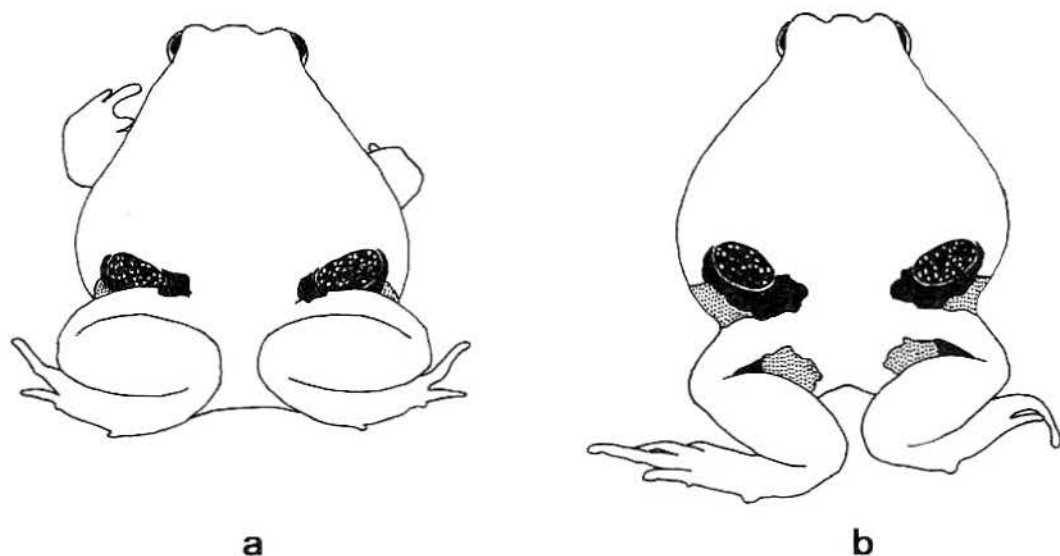


FIG. 1. *Pleurodema brachyops* with (a) body inflated (at night in the field) and (b) body inflated, hindparts elevated, and displaying noxious glands, eyespots, and bright colored markings (by day in laboratory). Glands are black with small white markings; area surrounding glands is black; bright colored markings are stippled. Drawn from color diapositives.

Field observations were made in 1986 in temporary and permanent ponds in the savanna around Boa Vista ($2^{\circ}48'N$, $60^{\circ}12'W$, 100 m elev.), Roraima, Brazil. More than ten *P. brachyops* males collected in these ponds at night were transported to the laboratory and tested separately in a plastic chamber ($50 \times 40 \times 8$ cm) the following morning. Each frog was tested just once. The tests consisted of inhibiting escape by the frog and stimulating it by tapping its back.

Pleurodema brachyops in Boa Vista has a reticulated, gray dorsum with smooth skin, lumbar glands black with small white markings, surrounded by an area of black. The inguinal region and hidden surfaces of the thighs are bright orange. In the field at night, *P. brachyops* males fled with a sequence of short jumps when approached. When caught and unable to jump, they inflated the body exposing only partially the lumbar glands and did not alter this posture when further stimulated (Fig. 1a). One juvenile exhibited the same behavior after several trials, and also remained immobile for a few seconds when I turned it upside down. I never found a *P. brachyops* by day in the field. In the laboratory, all *P. brachyops* males tested exhibited deimatic behavior when first stimulated (Fig. 1b). Their posture consisted of inflating the body and elevating the hindparts, thus displaying the lumbar glands, the orange spots of the inguinal region and posterior surfaces of the thighs. The head was lowered a little and the eyes were open. Glandular secretions were not observed. When re-stimulated, the posture was enhanced and when not, the posture was abandoned after a few seconds and the frog fled.

The deimatic behavior observed in *P. brachyops* consists of at least five types of displays: body inflation, hindparts elevation, noxious glands display, bright color display, and eyespots display. These displays are known in other frogs and are considered to be intimidating to potential predators (for a review, see Sazima and Caramaschi, 1986). *Physalaemus nattereri*,

P. deimaticus (Sazima and Caramaschi, 1986), *Pleurodema thaul* (Cei and Espina, 1957), and *P. bufonina* (Cei, 1962) exhibit all these displays, but they lack bright colored thighs, which are found in other frogs in which some of these displays occur (e.g., *Dendrobates flavopictus* and *Leptodactylus labyrinthicus*, I. Sazima, pers. comm.). *Pleurodema brachyops* is unique in presenting all of these displays. Although the deimatic behavior of these frogs can be considered a complex behavioral pattern, its evolution may have occurred in relatively simple steps (Sazima and Caramaschi, 1986) as each of its components alone or in combination is found in several frog families (Bufonidae, Dendrobatidae, Leptodactylidae, and Sooglossidae; Cott, 1940; Cei and Espina, 1957; Cei, 1962; Bajger, 1980; Sazima and Caramaschi, 1986; I. Sazima, pers. comm.; pers. obs.). The observations presented here and the visual nature of the deimatic displays observed in *P. brachyops* suggest that these displays occur only by day. This could explain the lack of observation of this behavior in natural field conditions (Duellman and Veloso, 1977; this paper). Although *P. brachyops* is a nocturnal breeding species (Staton and Dixon, 1977; Hoogmoed and Gorzula, 1979; pers. obs.), the combination of these five display components suggests that there is predation in possible diurnal activities and/or in its diurnal retreat.

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