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FIELD NOTE

A Note on Pyrrolizidine Alkaloid Sequestration by Milkweed Butterflies (Danainae) from Indian Heliotrope

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Abstract

Butterflies of the subfamily Danainae were observed communally sequestering pyrrolizidine alkaloids (PA) from *Heliotropium indicum* in Mysore, India. Multiple species tolerated close foraging, highlighting PA-driven defence, mating, and ecological interactions that support predator avoidance and butterfly community resilience.

Keywords: Pyrrolizidine alkaloids, Danainae, *Heliotropium indicum*, Sequestration behavior

Butterflies are phytophagous insects that have evolved to interact closely with the diverse array of secondary metabolites produced by plants as chemical defences against herbivores (Dennis et al. 2004). These insects are highly adapted to plant compounds, sequestering unpalatable or toxic substances from their host plants rather than synthesizing their own defensive chemicals, using them not only as cues to locate suitable host plants but also as defensive substances, often displayed through warning coloration (aposematism) and also serve as components of their sex pheromones (Nishida, 2002 & 2014).

During a nature walk on 23rd August 2025 at around 0830 hrs, the authors observed and recorded an ecological phenomenon of alkaloid sequestration of butterflies from the subfamily Danainae (milkweed butterflies) on *Heliotropium indicum* (Indian Heliotrope) at Marasettihalli Lake (12°24'09"N, 76°69'61"E), Mysore, Karnataka, India. The lake appeared to be shallow and seasonally flooded, with patches of emergent aquatic plants scattered across the water surface, including grasses and sedges, creating a mosaic of open water and plant patches ideal for wading birds. The surrounding landscape includes dense green vegetation and coconut groves, indicating a semi-rural setting with mixed wetland agricultural influence. A flutter of approximately 14 butterflies sequestering on the *H. indicum* was documented using a Nikon D3200 camera. The gathering included *Danaus chrysippus* (Plain Tiger or African Monarch), *Danaus genutia* (Common Tiger), *Tirumala septentrionis* (Dark Blue Tiger) and *Euploea core* (Common Crow) belonging to the sub family Danainae occupied the same feeding substrate simultaneously, engaging in mineral-uptake behaviour. Interactions were mostly neutral; individuals fed in close proximity with minimal displacement. Occasional gentle jostling occurred as butterflies repositioned themselves, and no aggressive encounters or territorial displays were noted. The observation suggests tolerant inter-specific coexistence at a shared, resource-rich

microhabitat, typical of communal sequestering events (Fig. 1).

The *Heliotropium indicum* (Indian Heliotrope) belongs to the family Boraginaceae, is an aromatic, erect herb found in pantropical moist habitats (Flowers of India, 2025), with rich source of Pyrrolizidine Alkaloids (PA) and other phytochemical compounds (Sarkar et al. 2021). PAs are a group of naturally occurring toxic compounds (secondary metabolites) found in many angiosperms, especially in families like, Boraginaceae (e.g., *Heliotropium*), Asteraceae (e.g., *Senecio*, *Eupatorium*, *Ageratum*), and Fabaceae (e.g., *Crotalaria*) (Koleva et al. 2012).

The four species of butterflies were seen (Fig.1) feeding on white flowers of Indian Heliotrope. The PAs are subsequently transferred from males to females, and further to the eggs, thereby providing protection to the offspring (Dussourd et al. 1989; Honda et al., 2018; Smith et al., 2019). Many butterfly species that sequester these alkaloids exhibit bright warning colouration (aposematism) (Dell'Aglio et al. 2016), signalling their toxicity to potential predators and offering protection that extends from the larval stage through to adulthood. By selectively foraging on PA-rich plants such as *Heliotropium indicum*, Danainae contribute to pollination networks, particularly in semi-arid, agricultural, and disturbed landscapes where such plants are abundant (Solomon Raju & Suvarna Raju, 2020). Thus, PA sequestration strengthens predator avoidance, enhances mating systems, promotes mimicry complexes, and

Figure 1. **A**. *Euploea core* (Common Crow); **B**. *Danaus genutia* (Common Tiger); **C**. *Danaus chrysippus* (Plain Tiger or African Monarch); **D**. *Tirumala septentrionis* (Dark Blue Tiger) sequestering on flowers of *Heliotropium indicum* (Indian Heliotrope)

maintains ecological interactions that support the resilience of butterfly communities.

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