Charismatic butterflies with bizarre etiquette: "Necrophagy and Kleptopharmacophagy"

Deeksha M G, Mritunjoy Barman and Himanshu Thakur

Butterflies are the exquisite diurnal creatures that makes nature so spectacular. Scientists and amateurs across the globe have been fascinated by their radiant colour patterns, ephemeral appearance, confounding life history, and immense diversity. Butterflies are the short-lived adult stage of the insect order 'Lepidoptera', which are spotted fluttering by plants to feed nectar from flowers and/or to lay eggs in 'host plants', where the caterpillar would be feeding

Adult butterflies exhibit some curious behaviour *viz*., basking, perching, patrolling, and puddling, these are unexplored knowledge to many common people. Basking is a warming up process of butterflies' wing muscles to take flight commonly observed in Nymphalidae and Pieridae family butterflies, as they are cold blooded organism and require around 24°C to 32°C to take flight, so this thermoregulation process help to initiate flight activity in butterflies (Akand *et al.*, 2018). Actions like patrolling and perching are adopted by the male butterfly during procreating, where they search the female butterfly by these actions. In case of patrolling male butterfly take a flight in the place where they are visiting flower for nectar collection or searching site for egg laying, once it finds the female of same species in began its courtship, this is commonly observed in Monarchs and Sulphurs. But in some butterfly like Black Swallowtail and Red Admiral males perch in the tall plants near the water source where the probability of female visitation is high, once it locates the female of same species the courting ritual starts (Krischik, 1996). Whereas, puddling is mainly performed by a male butterfly to procure the minerals from moist soil, this helps butterfly to mate successfully as male pass the obtained nutrients through sperm, it assists female in reproduction. Sometimes it aids in pheromone production by male to attract female (Cannon, 2019).

Other than this butterfly shows some acts like feeding on a dead organism, this behavior is known as "necrophagy" mainly to obtain some mineral salts and amino acids. This behavior mainly occurs when the nectar of the flower is unable to meet the nutrient requirement of the adult butterfly they find an alternative source like a dead organism, to accomplish their requirements for reproduction (Payne and King 1969; Gu *et al.*, 2014). In this article, the necrophage behaviour of butterfly observed in the place Madikeri of Kodagu district in Karnataka (12°24'04″ N, 75°43'36.1″ E) on 22 May 2021 is presented in Plate 1. Where *Mycalesis junonia* Butler (Malabar Glad-eye Bushbrown butterfly) of Nymphalidae family is spotted siphoning on the carcass of grasshopper. Though it's a surprising

proclivity of butterflies, they have developed this behaviour to derive the nutrients to complete the adult stage systematically.

Recently some neoteric studies on the "kleptopharmacophagy"- a neologism explaining the chemical theft between living organisms, this nature of the milkweed butterfly are gaining the attention of the biologist. The milkweed butterflies have a chemical thieving behavior, where they attack the caterpillar of own species to obtain the defensive chemicals from wounded caterpillars which feeds on the milkweed to get the phytochemical defense against its enemy, but the adult sucks the internal liquid of the caterpillar by wounding them to acquire the toxic alkaloids, thus inbuild their defence system, also these alkaloids act as a biochemical precursor of their mating pheromone synthesis. If same process is observed under the condition, where adults feed on dead caterpillar it is known as “necropharmacophagy” (Tea et al., 2021). Though, this recent study has many queries to be cleared, but has given foundational information to the biologist to work more, in order to decipher the accurate reason behind this behaviour in butterflies.

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AUTHORS

Deeksha M G *(corresponding author), Division of Entomology, ICAR- Indian Agricultural Research Institute, New Delhi-110012

Mritunjoy Barman, Department of Agricultural Entomology, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, West Bengal - 741252

Himanshu Thakur, Department of Entomology, C. S. K. Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh - 176062. *Email: deekshamudagadde@gmail.com

Plate 1. *Mycalesis junonia* feeding on the grasshopper cadaver