Melanism in Male White Butterfly Ascia monuste monuste (Linnaeus, 1764) (Pieridae: Pierinae) Under Controlled Rearing Conditions

Butterfly Sanctuary Mariposario Jardín Mágico, Puerto Vallarta, Jalisco, Mexico

ABSTRACT

The occurrence of melanism in males of Ascia monuste monuste reared at the Butterfly Sanctuary Mariposario Jardin Mágico in Puerto Vallarta, Mexico, is reported for the first time. Unlike the well - documented seasonal melanism in females of this species, male melanism has not been previously reported in the scientific literature or in publications associated with the butterfly farming industry. Over an 6-month period (January 2025 – June 2025), approximately 32% (n = 30) of the newly emerged males exhibited sepia-brown coloration with strongly melanized venation, instead of the typical white phenotype. No females exhibited melanism during the same period. The coloration differs qualitatively from the known female melanic “phileta” form, with especially pronounced darkening of the wing veins that creates a distinctive striated appearance. This report documents our observations, discusses potential causal factors relevant to butterfly exhibitors, and provides recommendations for managing captive breeding populations.

Keywords: Ascia monuste, white butterfly, melanism, captive breeding, butterfly house, color polymorphism, Puerto Vallarta, Mexico

INTRODUCTION

The white butterfly Ascia monuste monuste (Linnaeus, 1764) is a popular species in butterfly houses across the Americas due to its favorable display characteristics: easy rearing on common Brassicaceae plants (cabbage, kale, mustard), short life cycle (approximately 32 days from egg to adult), active low flight behavior appealing to visitors, year-round availability in tropical and subtropical regions, tolerance to varied rearing conditions, and high reproductive rate. It belongs to subfamily Pierinae (Pieridae: white and sulfur butterflies) and is distributed from the southern United States to Argentina, with at least seven recognized subspecies. A. m. monuste is the subspecies present from the southern United States to Suriname.

Known color variation in the species
Butterfly house operators working with A. m. monuste are familiar with the seasonal color variation that occurs exclusively in females, described as follows:

White form (dry season/short days): Typical white wings with black zigzag markings at the apex of the forewing; a small black spot in the discal cell; black triangles along the hindwing margin; and overall heavier black markings than in males.

Dark or melanic form (wet season/long days): Dark gray to gray-black wings; darkened wing veins creating a diffused appearance; marginal black markings present but with reduced contrast; also known as the "phileta" form.

This female-limited polymorphism is well documented and considered normal for the species. Its expression is known to be controlled by photoperiod during pupal development: long days (>12–14 h light) induce the melanic form, while short days produce the white form. The frequency of dark females varies geographically, being more common in populations from Florida (USA) and Mexico.

Males of A. m. monuste have consistently been reported as white throughout the scientific literature regardless of season, environmental temperature, photoperiod, geographic distribution, or rearing conditions. No previous reports exist of melanic males in wild populations or captive colonies documented in scientific publications or butterfly industry reports. However, from January 2025 to June 2025, at the Butterfly Sanctuary Mariposario Jardin Mágico we observed melanism occurring exclusively in males, with no dark females during the same period. This represents a complete inversion of the species' typical pattern and motivated the systematic documentation of our observations for the benefit of the international butterfly exhibition community and for scientific record.

FACILITIES AND METHODS

Location

The Butterfly Sanctuary Mariposario Jardín Mágico, located in Puerto Vallarta, Jalisco, Mexico (SEMARNAT Registration 08-031), is a semi-enclosed structure with shade mesh and native vegetation. The regional climate is warm sub-humid with summer rains, classified as Aw1(w)i' (Köppen-García). Minimum ambient temperatures average 19.9°C, maximum 31.4°C. Annual precipitation ranges from 1.5 to 370 mm per month. Average relative humidity is 68%. The region is strongly seasonal, with rains from June to October and a dry season from November to May.

Inside the butterfly house during the study period (Nov 2024–Jun 2025): daytime temperatures ranged 25–28°C and nighttime 22–24°C. Relative humidity remained 70–80% (maintained by vegetation and occasional misting during the dry season). Natural photoperiod (no supplemental lighting) varied seasonally according to latitude 20°37'N: November–December: 10.5–11 h; January–February: 11–11.5 h; March–April: 12–12.5 h; May–June: 13–13.5 h. Ventilation occurred through openings in the shade mesh.

RESULTS

Detailed description of the male melanic phenotype

Typical A. m. monuste males have entirely white or white-cream wings, with a black dentate zigzag pattern at the forewing apex, a small circular black discal cell spot, and a series of small black marginal triangles on the hindwing. Bright turquoise antennal clubs are a diagnostic species trait. Wingspan is 63 - 86 mm.

In contrast, melanic males displayed sepia-brown to dark gray-brown wing surfaces, with uniform melanization in both forewings and hindwings, dorsally and ventrally, without gradients or discrete markings. The most distinctive feature was intense melanization of longitudinal and transverse veins (nearly black), creating a highly prominent striated pattern against a medium brown background.

This male melanic phenotype differs qualitatively from the female melanic “phileta” form described in the literature: typical melanic females show uniform gray-black coloration with diffuse suffusion and veins not especially prominent, whereas melanic males at Butterfly Sanctuary Mariposario Jardín Mágico display sepia-brown coloration with strongly melanized veins forming a striking striated pattern. The species’ characteristic marginal markings remain present, but with greatly reduced contrast (dark brown on medium brown instead of black on white). The forewing discal spot is barely visible due to the dark background.

Among the 30 melanic males, variation was observed in overall intensity (from medium brown-gray to very dark sepia-brown, nearly black-brown), but vein melanization was consistent across all individuals, and no intermediate forms (white individuals with slight gray tinting) were found. Traits unchanged: turquoise antennal clubs; body size and wingspan; normal wing shape and proportions; normal scale texture; normal venation structure with pigmentation being the only altered component.

Behavioral observations

Melanic males showed active flight patterns similar to white males, including the characteristic low and erratic flight. They fed normally on nectar from flowers within the butterfly house, with similar floral preferences and intact ability to locate nectar resources. Courtship behaviors toward females were observed, though reproductive success was not systematically monitored, and no evidence of female rejection based on coloration was noted. Casual observation suggested similar longevity to white males.

DISCUSSION

Uniqueness of the finding

This study documents melanism in male Ascia m. monuste, a phenomenon not previously reported in scientific literature (surveyed from 1764–2025), industry publications, observation databases, or local wild populations. The species' known polymorphism is female-limited, genetically controlled but environmentally modulated, triggered by photoperiod during pupal development. Its expression is W-linked, occurring only in females.

Environmental and captivity factors

Puerto Vallarta's annual photoperiod (10.5–13.5 h light) may explain the absence of melanic females (threshold >14 h), but not the presence of melanic males, which do not normally respond to photoperiod cues. Stable temperature, humidity, and nutrition do not explain the sudden appearance of the trait.

Captive-breeding conditions provide the most plausible explanation: a small founding population without gene introduction allows strong genetic drift, enabling rare alleles to rise in frequency. Inbreeding exposes recessive alleles, such as the proposed male melanism trait. Lack of visual predators removes natural selection against conspicuous males, allowing the trait to reach high frequency (42%).

Future research needed

Questions requiring further investigation include controlled crosses, molecular analysis of pigmentation genes, hormonal profiles during pupation, mate preference studies, comparisons with wild populations, and long-term monitoring. Surveys at other butterfly houses may reveal similar undocumented cases.

CONCLUSIONS

We document for the first time male melanism in Ascia m. monuste, affecting 32% (n = 30) of males over six months at the Butterfly Sanctuary Mariposario Jardin Mágico. This inverts the normal species pattern in which only females exhibit seasonal melanism; no females showed melanism during the study. The male melanic phenotype is distinct from the female “phileta” form, characterized by sepia-brown coloration with prominently melanized wing veins producing a striated pattern.

The most probable explanation is interaction between genetic and environmental factors: a rare genetic variant (likely recessive, possibly Z-linked) increased in frequency due to genetic drift in a small captive population and absence of natural selection. The case illustrates evolutionary processes relevant to butterfly exhibitors maintaining closed colonies: genetic drift, expression of cryptic genetic variation, and phenotypic divergence from wild populations.

We recommend documenting unusual color variants, implementing genetic management strategies, and considering periodic introduction of wild genetic material. Further research is needed to understand the causes and implications of male melanism in A. m. monuste.

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Direct comparison between a typical white male (left) and a melanistic male (right) in dorsal view, highlighting the pronounced contrast in wing coloration. Note the pure white coloration of the typical phenotype versus the brown–sepia tones of the melanistic phenotype.

Melanistic male, dorsal view. The intense melanization of the longitudinal and transverse veins (nearly black) produces a prominent striated pattern against a brown background, a distinctive characteristic of the observed phenotype.

Melanistic male, ventral view. Uniform melanization extends across both wing surfaces, with no gradients or discrete spots.

Male with normal white phenotype.

Melanistic male feeding on nectar, exhibiting normal foraging behavior and the ability to locate floral resources.

Figure 1. Male melanism in Ascia monuste monuste reared at the Butterfly Sanctuary Mariposario Jardín Mágico, Puerto Vallarta, Mexico.