NATURAL HIBRIDIZATION OF HELICONIUS CYDNO DOUBLEDAY FROM WESTERN COLOMBIA

(Lepidoptera: Nymphalidae: Heliconiinae)

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ABSTRACT

Fifteen natural hybrid forms between *Heliconius cydno* Staudinger, *H. cydno zelinde* Butler and H. cydno weymeri Staudinger are presented from three hybrid zones from the vicinity of Cali, Dpto. Valle in the Western Cordillera of Colombia. the hybrids of the three eographically differentiated subspecies of *H. cydno* fall into three clearcut categories. Their main characteristics, compared with those of the parental taxa are illustrated and described. The hybrids are arranged by phenetic characters such as the background color and the shape of the forewing transverse band and by the presence or abscense of the yellow bind wing horizontal bar or the while submarginal band, with respect to each parental subspecies.

KEY WORDS, Colombia, Heliconninae, Hybrids, Western Cordillera, Neotropical, Nymphalidae, Valle, Cauca valley, Dagua, Calima, genetics, Cali, Digua, San Juan.

Heliconius butterflies are well-known for their aposematic wing patterns, Mullerian mimicry, and remarkable intraspecific geographical polymorphism. Amongst theme, *H. erato* (L), *H. melpomene* (L.) and *H. cydno* (Doubleday) have given rise to many detailed studies, both in the field of genetics (turner (and Crane, 1962; Emsley, 1964; turner, 1972; Woodruff, 1973; Descimon and Mast de Maeght, 1983; Brown, 1981; Linares, 1990, 1991; Brower, 1996) and that of evolutionary systematics (Emsley, 1965; Brown, Sheppard an Turner, 1974; Brown, 1979; Sheppard et. al, 1985; Mallet, 1986; Collins, 1991).

The taxonomic situation of H. cydno is especially complex in Colombia, where the species is represented by ten well-differenciated subspecies from the central valleys of Colombia (Brown, 1979; Takahashi and Torres, 1983), but such is the extreme variation in patterns within many of them that a multitud of varietal forms have been described. Some of

theme like *H. cydno emilitus* Weymer, *H. cydno wernickey* Weymer, *H. rubellius* Grose-Smith & Kirby, *H. cydno temerinda* Hewitson, *H. cydno lutescens* Kaye, *H. cydno alithea* Hewitson, *H. cydno confluens* Neustetter, *H. aventina* Oberthur, *H. cuydno azteka* Neustetter, *H. flavidor* Neustetter, *H. cydno albidor* Neustetter, *H. cydno broncus* Stichel and *H. cydno haenschi* Riffarth are all considered to be hybrid forms betweeen subspecies of *H. cydno* and in some cases between H. melpomene (Ackery and Smiles, 1976; D'Abrera, 1984; Posla-Fuentes, 1993; Salazar, 1993).

The purpose of this article is to show the extraordinary variation and polymorphism between three subspecies of H. cydno Doubleday that hybridize nataurally in "suture-zones" in the Departmen of Valle in Western Colombia. The Western Cordillera of Colombia is a presently imperfect barrier for the dispersion of many butterflies which inhabit the tropical forest on its inner and outer (seaward) slopes. Several well-differenciated subspecies from the central valleys and the pacific coastal regions of Colombia are known to meet locally and hybridize near lower passes (~1500 m) in the mountain chain between these warmer areas giving rise to all possible intermediate an recombined phenotypes (Holzinger and Holzinger, 1968; Brown and Benson, 1975). A good example of this is *H. cydno* Doubleday. In the Department of Valle, the species is represented by *H. cydno zelinde* Butler on the pacific slopes, *H. cydno weymeri* Staudinger from the Cauca valley and *H. cydno cydnides* Staudinger from the Cauca valley and *H. cydno cydnides* Staudinger from the upper parts of the Western Cordillera which meet together locally near lower passes (hybrid zones) in the upper Dagua, the upper Calima and the upper Digua-San Juan river valleys, west of Cali, Colombia. These subspecies are also involved in mullerian mimicry rings between. *H. eleuchia* Hewitson, *H. sapho chocoensis* Brown & Benson, *H. eleusinus* Staudinger and *H. erato chestertonii* Hewitson.

DESCRIPTION AND RESULTS

The hybrids of the three geographically differentiated subspecies of *H. cydno* fall into three categories. Their main characteristics, compared with those of the parental taxa are illustrated and described (see plate 1). The hybrids are arranged vertically by phenetic characters such as the back ground color and shape of the forewing transverse band which can be either yellow or white and by the presence or absence of the yellow hind wing horizontal bar or the white submarginal band, with respect to each subspecies (parental taxa). The three subspecies of *H. cydno* in plate 1 are abbreviated as follows (left to right): upper row-*H. cydno cydnides* (CC), *H. cydno zelinde* (CZ) and *H. cydno weymeri* (CW), with their respective hybrid forms (Figures 1-16): Plate 1.

1. CC x CZ: male, homozygote yellow form
2. CC x CZ: male, homozygote yellow form
3. CC x CZ: male, heterozygote yellow form
4. CC x CZ: male, homozygote yellow form

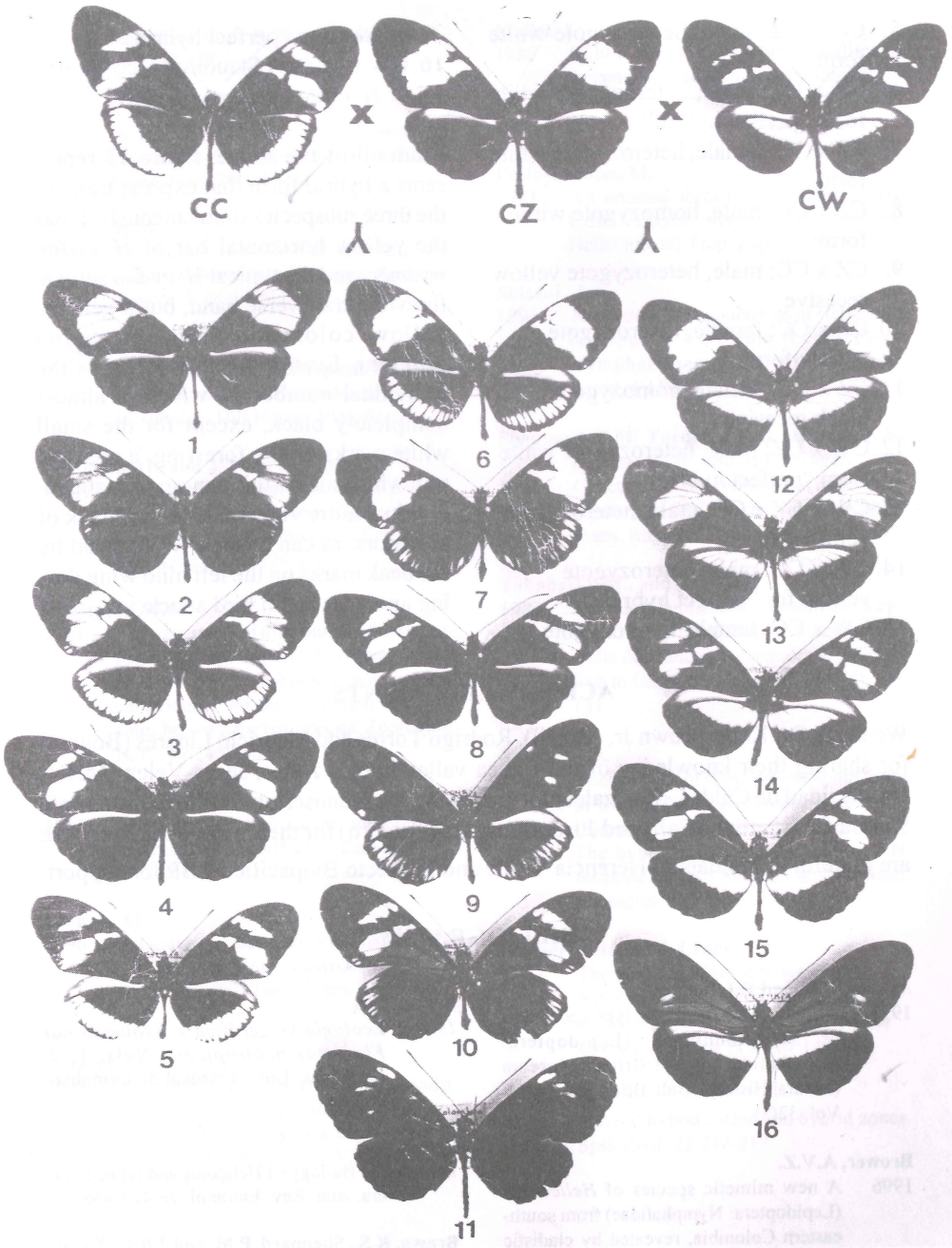

Plate 1

5. CC x CZ: male, heterozygote white form
6. CZ x CC: male, heterozygote white form "perfect hybrid"
7. CZ x CC: female, heterozygote white form
8. CZ x CC: male, homozygote white form
9. CZ x CC: male, heterozygote yellow recesive
10. CZ x CC: female, heterozygote yellow form
11. CZ x CC: female, homozygote black recesive
12. CW x CZ: male, heterozygote white form "perfect hybrid"
13. CW x CZ x CC: male, heterozygote yellow form
14. CW x CC: male, heterozygote yellow for "perfect hybrid"
15. CW x CC: female, heterozygote white form "perfect hybrid"
16. CW f. *gustavi* Staudinger, co-mode of *H. erato chestertonii* Hew.

From all of the above, figure 13 repre sents a hybrid form that express traits o the three subspecies simultaneously. It ha the yellow horizontal bar of *H. cydn wyemeri* and the typical *H. cydno zelind* forewing transverse band, but it gets th yellow coloration from *H. cydn cydnides*. Even more interesting is th individual number 11 which is almos completely black, except for the smal white marks on the forewing, a recesiv trait which makes this non-aposematic in dividual more vulnerable to the attack o predators, as can be clearly observed by the beak marks on the left hind wing dur ing an unsuccesful bird attack.

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