

AN ILLUSION OF ASSORTATIVE MATING IN *DYSDERCUS POECILUS*  
(HETEROPTERA: PYRRHOCORIDAE)

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**ABSTRACT.** The cotton stainer *Dysdercus poecilus* shows considerable within-population variation in the size of dark spots on the corium of the fore wings, which makes some individuals appear overall much darker than others. Adults spend much of the time exposed *in copula*. The author's repeated impression that darker individuals tend to pair with darker, and lighter individuals with lighter, is subjected to a statistical test. This shows no significant departure from randomness. The results do not support a genetic basis for color variation in *D. poecilus* and in turn call into question the use of such variation in classifying the species into subspecies.

INTRODUCTION

The cotton stainer *Dysdercus poecilus* (Herrich-Schäffer) is abundantly widespread in Southeast Asia and appears to be the commonest pyrrhocorid bug in disturbed habitats throughout the Philippines (pers. obs.). As is usual in this family, its body coloration is contrastingly orange (or red), black and white.

Many *Dysdercus* species show considerable color variation between individuals (Doesburg, 1968), and *D. poecilus* is among those in which subspecies have been recognized on this basis (Breddin, 1901; Hussey, 1929). At least within the Philippines, though, the geographic component of this variation is evidently weak and quite possibly insignificant. My observations on several of the islands suggest that most of the variation seen throughout the country is commonly found at any one locality.

Both female and male adult *D. poecilus* give the impression of varying considerably in overall darkness in dorsal view. Closer examination shows that this is almost entirely a function of the covarying sizes of two black spots on the corium (Fig. 1). Other parts of the dorsal color aspect are nearly constant. Accordingly, color variation within the species can be treated as one-dimensional, as in many New World *Dysdercus* species (Doesburg, 1968).

The sexual behavior of *D. fasciatus* has been described in detail and seems much the same as that of *D. poecilus* (Brunt, 1971). The courting behavior of males and the manner in which the pair becomes connected imply a strong role for female choice in pairing. As is usual in the genus (MacGill, 1935), pairs remain *in copula* for up to several days, spending much of the time exposed on plants. These factors make it very easy to study which phenotypes mate with which.

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In the course of casually observing some hundreds of *Dysdercus poecilus* pairs over several years, I formed a distinct impression of assortative pairing. That is to say, lighter females seemed to be found *in copula* with lighter males and darker females with darker males. If this were shown to be true, it would be consistent with the hypothesis that color variation within populations has a genetic basis and that assortative mating maintains the polymorphism. Such a hypothesis need not depend on the insects directly perceiving the dorsal color of potential mates, as individual odor differences are now known to have a genetic component in a diversity of animal species (Fletcher and Michener, 1987), and it is quite plausible that this should correlate with color.

I report here a test of the predicted assortative mating in *Dysdercus poecilus*.

### MATERIALS AND METHODS

All quantitative observations are from Mobo, Masbate, Philippines. To form a rank-scale of darkness, I examined a large sample of adult male *Dysdercus poecilus* and separated them into eight categories based on the corium spots. These relied solely on distinctness and ease of recognition, in ignorance of their frequency distribution. They are defined as follows (Fig. 1):

0. Corium entirely orange.
1. Anterior spot absent, posterior spot present as a very small point.
2. Anterior spot absent, posterior spot present as a compact dot which does not reach the edge of the corium.
3. Anterior spot absent, posterior spot reaching the edge of the corium.
4. Anterior spot present as a short, narrow bar at the edge of the corium, posterior spot reaching the edge of the corium, the two spots separate.
5. Anterior spot present as a larger, broader bar, posterior spot reaching the edge of the corium, the two spots separate.
6. The two spots connected by a narrow band which does not run along the edge of the corium.
7. The two spots connected by a broader band running along the edge of the corium, so that together they form a single large, unitary spot.

The same rank scale is applied to females, which appear identical to males in this respect. At some other localities, though not at Mobo, I found occasional individuals with the corium darkened beyond degree 7 (Fig. 1: variant *x*).

On 3 January 1987 I recorded the degree of darkness of partners in 100 pairs haphazardly collected from plants along a road and in a field. Eric Johnson and I collected the first few pairs, but the rest were then brought to us by the numerous local urchins who customarily joined our activities. As each pair was recorded I separated the partners and dropped them to the ground, so that none could be counted twice.

Any specimens collected in Mobo, Masbate during January 1987 and identified by C. K. Starr can be considered as vouchers. To date these are deposited in the National Museum of Natural History, Washington, USA and the Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.

## RESULTS

The frequency distribution of the 64 possible kinds of pairs is shown in Table 1. It departs hardly at all from the expected distribution based on random pairing (chi-square = 27.7;  $p > 0.75$ ). Combining degrees 0 to 3 and 4 to 7, to give just two larger degrees of darkness, produces a similar result.

Females and males in this sample did not differ significantly from each other in the frequency distribution of degrees of darkness (chi-square = 8.0;  $p > 0.25$ ).

Table 1. Frequency distribution of degrees of darkness (see Materials and Methods) in 100 mating pairs of *Dysdercus poecilus* at Mobo, Masbate, Philippines.

		Darkness of female								Total
		0	1	2	3	4	5	6	7	
Darkness of male	0	0	0	0	1	0	0	0	0	1
	1	0	0	1	1	0	0	1	0	3
	2	0	0	0	2	2	0	0	0	4
	3	0	3	3	13	11	4	2	2	38
	4	0	0	2	8	5	2	1	2	20
	5	0	1	0	8	5	5	3	2	24
	6	1	0	0	1	2	0	1	0	5
	7	0	0	1	1	2	0	0	1	5
Total	1	4	7	35	27	11	8	7	100	

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## DISCUSSION

The impression of assortative pairing among *D. poecilus* observed at various localities was evidently illusory. The data thus fail to support the larger hypothesis that the observed color variation has a genetic basis. It is not evident what environmental influence(s) during development might account for this. Seasonal climatic changes, rather than food, are inferred as the cause of color variation in the migratory *D. superstitosus* in West Africa (Golding, 1928), and temperature is known or believed to alter the degree of melanization in several Heteroptera

(Aldrich, 1986). There is no evidence, though, of any seasonal shift in the frequency distribution of darkness in *D. poecilus*. At least in the Philippines, microclimatic factors seem a more likely cause.

To plausibly account for the illusion itself is not nearly so difficult: It is apparently the product of wishful thinking in the face of a very attractive hypothesis.

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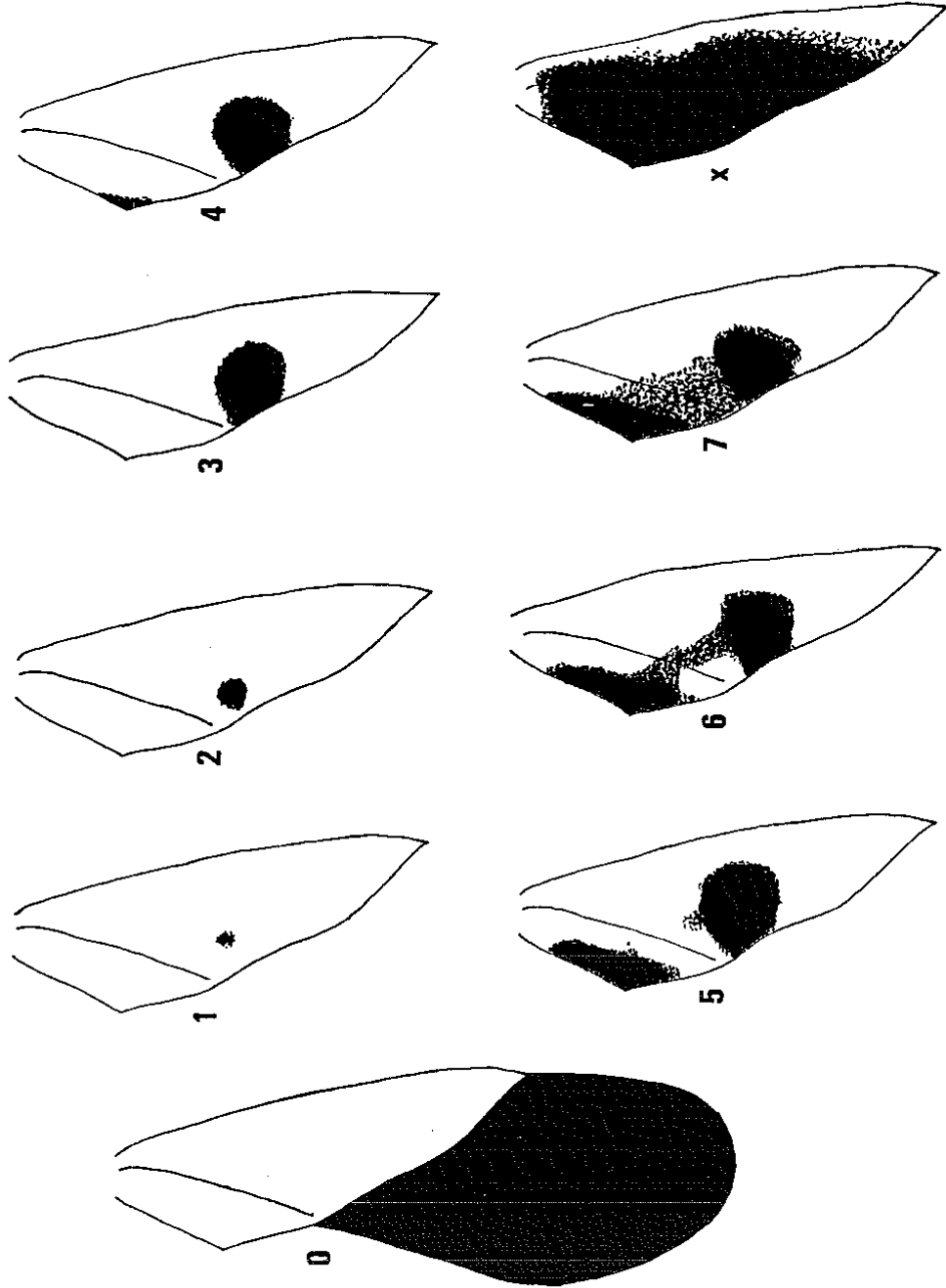


Fig. 1. Right fore wing of *Dysdercus poecilus* males, to show variation in darkness. The first variant (0) shows the entire wing, all others only the corium. Numbers 0 to 7 correspond to the degrees of darkness described in the text, while x exemplifies darker variants not observed at the study locality. Unshaded = orange, shaded = dark gray to black.

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