

**A MIGRATION OF *PANTALA FLAVESCENS* (FABRICIUS, 1798)
ALONG THE SHORE OF SANTA CATARINA, BRAZIL
(ANISOPTERA: LIBELLULIDAE)**

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A migration of *P. flavescens* (Fabr.) was observed on the coast of Santa Catarina, Brazil, in February, 1970. The passage took place during the morning hours, with a maximum between 8 and 9 a.m. Flight intensity decreased steadily within a week. A total of approximately half a million dragonflies involved in the migration was calculated. The start of the migration was not observed and the causes of the phenomenon are unknown.

INTRODUCTION

Migration of great numbers of dragonflies is a well known phenomenon since the past century (cf. WILLIAMS, 1961). For the region of South America there exists the impressive record of the flights of *Aeshna* (*Neureclipsa*) *bonariensis* Ramb. across the Pampa of Argentina given by HUDSON (1892). Those flights seem to be caused by the sudden outbreaks of a violent wind called the "Pampero". Although these flights during summer and autumn occur before the wind starts to blow, they cannot be classified correctly as migrations (cf. also FRASER, 1947).

The following description of the passage of more than half a million individuals of the well known libellulide migrant *Pantala flavescens* (Fabricius) might be somewhat closer to that term, but it also might be simply the departure of synchronously hatching imagines from the breeding grounds, which are perhaps located in the mangrove swamps of the coast.

OBSERVATIONS

The passage took place along the beach of Picarras ($48^{\circ} 40' \text{ W} / 26^{\circ} 45' \text{ S}$), Southern Brazil, between February 2nd and 10th, 1970. My wife and I were engaged in zoological studies in the coastal regions, when we noticed hundreds of thousands of dragonflies flying overhead along the shoreline for the first time on February 2nd. In an endless band of some 500 meters width the dragonflies rushed across the sand dunes at a height of 3 to 10 m. The unchanging flight direction was NNE. This is the typical behaviour of migration. No other features of behaviour could be observed. There was a complete lack of territorial and copulatory display.

The most striking aspect of the migration was its timing in the morning hours. Figure 1 shows a distinct pattern of distribution (presumably a normal distribution) over the early hours of the day. This picture was obtained by counting the passing dragonflies in a 50 m wide section in the dunes from sunrise to noon at intervals of 15 minutes. A comparable flight intensity was confirmed in the other sections of the flight route. Further counts in the following days at the same observation place and in the period of the most intense passage resulted in the values given in Table I. According to these results a marked decrease of the passing numbers occurred within a week, totalling altogether

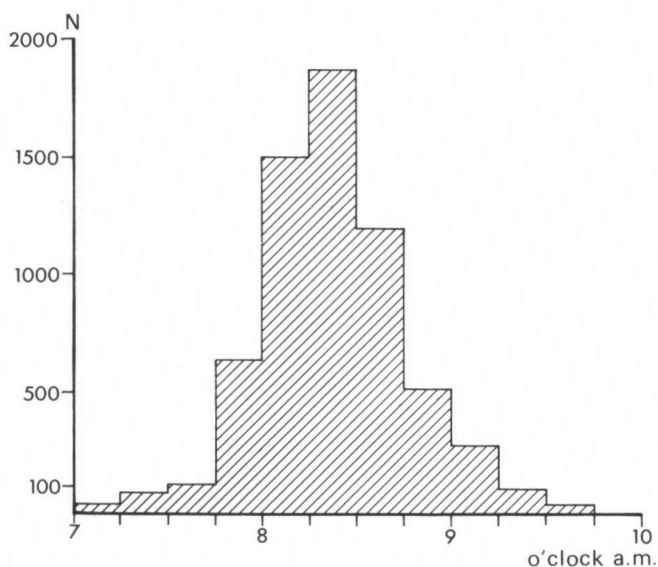


Fig. 1. Daytime distribution (February 6, 1970) of the *Pantala flavescens* (Fabr.) migration on the coast of Santa Catarina, Brazil. Numbers "N" represent the sum of the dragonflies passing in the 15 minute periods through a 50 m wide section between the dunes.

Table I
Calculated numbers of passing individuals of *Pantala flavescens* (Fabr.)

Date (February 1970)	4th	5th	6th	7th	8th	9th	10th	11th	12th
Approximate number	?	$4 \cdot 10^5$	$6 \cdot 10^4$	$2 \cdot 10^4$	$7,5 \cdot 10^3$	$1,5 \cdot 10^3$	$5 \cdot 10^2$	--	--

roughly half a million individuals. But there are no data concerning the onset of the migration in the days before our observations.

The sunny weather conditions remained fairly unchanged during the observation period. The mornings were without exception clear and sunny. Gentle winds blew from southeasterly directions and the temperatures rose to 33° C in the early afternoon. Thunderstorms with short but heavy rainfalls lowered temperatures again at dusk. Altogether it was the normal course of the weather of the southern tropics of coastal Brazil.

DISCUSSION

It might be supposed that no comparable weather-dependent environmental cues had been working as proximate factors stimulating the migration, as had been the case in the flights of *Aeshna bonariensis* and the "Pampero" wind (HUDSON, 1892). The passage took place too regularly and in a striking timing during the morning hours. The dragonflies showed also no return during the following days and weeks. The strict one-directional flight and the assumption that the imagines might have hatched synchronously over a week or so, and left their breeding grounds every day together in a high speed flight in north-northeast direction, compose the picture of a real long-distance migration. The shoreline obviously had the function of a guideline in this migration.

The phenomenon should be studied much more in detail before a sound interpretation and an attempt to evaluate the ecological significance of this behaviour can be presented. But many features certainly are in close accordance with the new theoretical view and model of DUMONT & HINNEKINT (1973) concerning causes and preconditions in the population dynamics of *Libellula quadrimaculata* L. for the mass migration investigated in Belgium and in The Netherlands in 1971. There may be more than a mere analogy in the behaviour of the species dealt with.

ACKNOWLEDGEMENTS

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