

Ecological aspects on urban blowflies in midwest Argentinean Patagonia (Diptera: Calliphoridae)

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□ **ABSTRACT.** Based upon their species composition and numerical trends, two blowfly taxocoenoses from a dense urban settlement (eusynanthropy) and an isolated dwelling (hemisynanthropy) at Esquel, province of Chubut (43°S, 71°W) were surveyed and sampled during Spring-Summer 1993-1994. Data show that despite the nearness of both study sites, their blowflies taxocoenosis exhibit different patterns of overall and species relative importance. Overall fly's capture was of 3,885 specimens. The highest number of flies was recorded in January at eusynanthropy, and from January to March at hemisynanthropy. In all cases, the second hourly sampling included more specimens than the remaining ones.

RESUMEN. Aspectos ecológicos de moscas verdeazuladas en el centro-oeste de la Patagonia argentina (Diptera: Calliphoridae). Sobre la base de su composición específica y tendencias numéricas se realizaron relevamientos y muestreos (primavera-verano 1993-1994) de dos taxocenosis de Calliphoridae (Diptera), localizadas en dos sitios con grado diferencial de sinantropía (zona de viviendas aisladas o hemisinantrópico y asentamiento urbano densamente poblado o eusinantrópico) en la ciudad de Esquel, provincia del Chubut. Los resultados obtenidos muestran que ambos sitios exhiben, a pesar de su proximidad, patrones diferenciales en sus variaciones numéricas totales y en la importancia relativa de cada especie registrada. El número total de especímenes coleccionados fue de 3885. La mayor abundancia fue registrada en enero en la eusinantropía, y desde enero hasta marzo en la hemisinantropía. En todos los casos el segundo muestreo horario fue el que presentó el mayor número de especímenes coleccionados. □

INTRODUCTION

Ecological investigations on blowflies from Argentina began a few years after the publication of their first comprehensive taxonomic revision (Mariluis, 1982). They largely dealt with taxocoenoses from dense urban settlements and isolated dwellings as well. Most of these sites were confined to the province of Buenos Aires, close to the western border of the Río de la Plata, in the so called "área platense" (Mariluis & Schnack, 1986; Schnack *et al.*, 1989) as well as in Greater Buenos Aires (Mariluis & Schnack, 1989; Schnack *et al.*, 1995). A further ecological study was carried out in Puerto Iguazú, in the northeastern subtropics of Argentina, in the border with Paraguay and Brazil (Mariluis *et al.*, 1990). Biogeographically, these locations include the Pampasic and Eastern Subtropical dominia. Lately, a research work conducted in an urban section and suburbs of San Carlos de Bariloche, province of Río Negro (41°S, 72°W) (Mariluis

& Schnack, 1996) offered the first ecological data on Patagonian calliphorids.

The aim of this paper is to give further information on the ecology of Patagonian blowflies, especially on hourly and seasonal numerical trends of the most conspicuous species in the area.

MATERIAL AND METHODS

Study sites comprised a dense urban settlement located downtown Esquel city, province of Chubut (43°S, 71°W) (eusynanthropic habitat, sensu Nuorteva, 1963) and a suburban area, ca. 500 m from the other sampling site (hemisynanthropic habitat, sensu Nuorteva, 1963), which were surveyed during Spring-Summer 1993-1994. Hourly, from 10.00 to 16.00, adult flies were captured each sampling date at the two above referred sites with a butterfly net while laying/feeding on a single bite composed by 1/4 kg rotten lung, after 15 minutes of bite's

exposure. Sampling dates extended within the adult flies' active period and samples were taken at monthly intervals. Chosen sampling dates were as referred in figure 1. Calliphorid flies were identified to species and sexed. Species were identified according to Mariluis (1981, 1982). Deviation of sex ratio from 1:1 was tested by the standard chi-square test; even though, the bite's sampling is female biased due to its condition of oviposition site. Shannon and Weaver's (1963) species diversity index was calculated for each date cumulative sample and averaged for the whole sampling period for both studied sites. The degree of association of the mean hourly changes in fly catch between the two study sites was estimated by using the product-moment correlation coefficient.

RESULTS

The following Calliphorid species were identified at the study area: *Calliphora vicina* Robineau-Desvoidy, *Chlorobrachycoma versicolor* (Bigot), *Compsoyiops fulvicrura* (Robineau-Desvoidy), *Phaenicia sericata* (Meigen), and *Sarconesiopsis magellanica* (Leguillou). *Chlorobrachycoma versicolor* and *S. magellanica* were not captured at the eusynanthropic habitat and due to their negligible occurrence at the hemisynanthropic habitat were not included either in tables or in figures. From the 3,885 calliphorid flies captured summing up the whole set of samples, 60.2 % corresponded to hemisynanthropy. The two study sites not only differed in their overall fly catch but also in their species relative importance. In the eusynanthropic habitat the dominant species *P. sericata* was more abundant than *C. vicina* and *C. fulvicrura*, respectively. Conversely, in the hemisynanthropy *P. sericata* and *C. fulvicrura* codominated and were almost equally abundant, while *C. vicina* represented less than 10 % of the whole catch. Sex ratios were significantly biased toward females for all tabulated species ($P < 0.001$) (Table I).

Temporal changes in flies catch did not show definite patterns in both studies sites where, nevertheless, a significant rise of the number of captures is evident during summer, especially in January at eusynanthropy and from January to March at hemisynanthropy (Fig. 1). At hemisynanthropy, *P. sericata* and *C. fulvicrura* exhibited almost the same relative fly catch and their numeric temporal trends were quite similar, both codominating over *C. vicina* (Fig. 1). Regarding the eusynanthropy, numerical trends in overall catch during the second half sampling period was mostly governed by its dominant species, *P. sericata* and, to a much lesser extent, by its subordinated *C. fulvicrura*. This site was dominated during the cooler period (October-Decem-

ber) by *C. vicina* (Fig. 1). Despite the observed differences of species composition and relative fly catch between the eusynanthropic and the hemisynanthropic habitats, mean species diversity indices were quite similar at both sites (H at eusynanthropy = 0.978 ± 0.143 S. D., Range = $1.15 - 0.76 = 0.39$, $N = 6$; H at hemisynanthropy = 0.998 ± 0.277 S. D., Range = $1.30 - 0.52 = 0.78$, $N = 6$).

Mean values of ambient temperature and fly catch hourly variations per sampling unit were not significantly correlated, neither at the eusynanthropy ($r = 0.273$, $P = 0.554$, $df = 5$) nor at the hemisynanthropy ($r = 0.054$, $P = 0.908$, $df = 5$). Nevertheless, ambient temperature and fly catch always displayed an increase from the first to the second hourly sampling. This increase was more evident for fly catch, exhibiting the first and second sampling the lowest and highest figures, respectively; the remaining captures showed little variations. On the other hand, ambient temperature showed a tendency expressed by a continuous rise until the last but one sampling (Fig. 2). Hourly changes in mean number of flies per sampling unit were significantly correlated at both sampling sites ($r = 0.851$, $P = 0.015$, $df = 5$) (Fig. 3).

DISCUSSION

The studied taxocoenoses had the same species richness than San Carlos de Bariloche, as it was formerly observed about 150 km northward (Mariluis & Schnack, 1996). A peninsular effect seems to occur if data from these Patagonian localities are compared to those given elsewhere further to the north, where the lowest and highest number of recorded species were 9 and 13, respectively (Mariluis & Schnack, 1989; Schnack *et al.*, 1989; Mariluis *et al.*, 1990).

Even though eusynanthropy and hemisynanthropy had a quite similar diversity pattern, they differed in their species composition and relative fly catch. *Chlorobrachycoma versicolor* and *S. magellanica* were only recorded within hemisynanthropy, and due to their low number it is difficult to evaluate their degree of synanthropy. Among the remaining species, *P. sericata*, which has been regarded as highly synanthropic in a worldwide scale (Baumgartner & Greenberg, 1986), is the most abundant in both sites, mostly dominant in the eusynanthropy habitat and codominating with *C. fulvicrura* in hemisynanthropy. Our data are in agreement with the above statement concerning *P. sericata*. *Calliphora vicina* showed a relatively low representation at both sites.

Within the period of fly's activity we suggest that the higher records during summer time are due to seasonal adaptations of insect populations operating in temperate areas (Tauber *et al.*, 1986). The

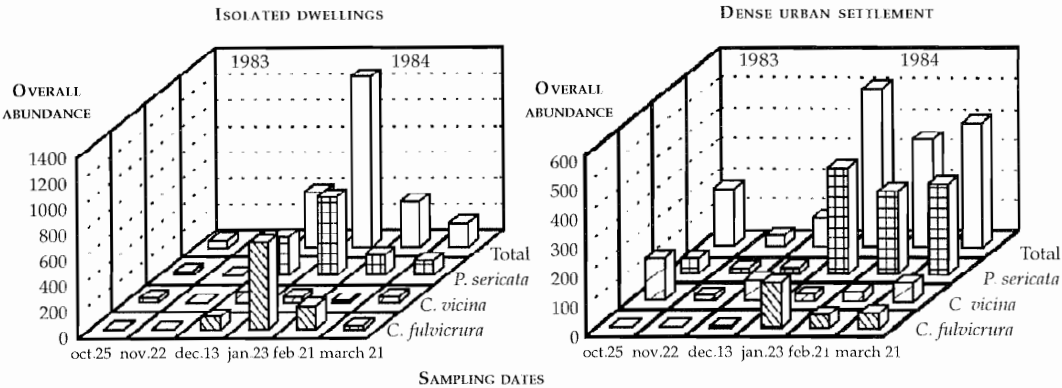


Fig. 1. Overall blowfly catch for each sampling date, for isolated dwellings and dense urban settlement.

Table I. Overall catch and sex ratio of the most representative blowfly species sampled at the study sites. *P<0.001.

Species	Dense urban settlement (DUS)				Isolated dwellings (ID)			
	number of females	number of males	total	X ²	number of females	number of males	total	X ²
<i>P. sericata</i>	794	168	962	407.4*	955	163	1118	561.1*
<i>C. vicina</i>	270	72	342	114.6*	175	28	203	106.4*
<i>C. fulvicrura</i>	178	65	243	52.5*	820	197	1017	381.6*
Total	1242	305	1547	567.2*	1950	388	2338	1043.6*

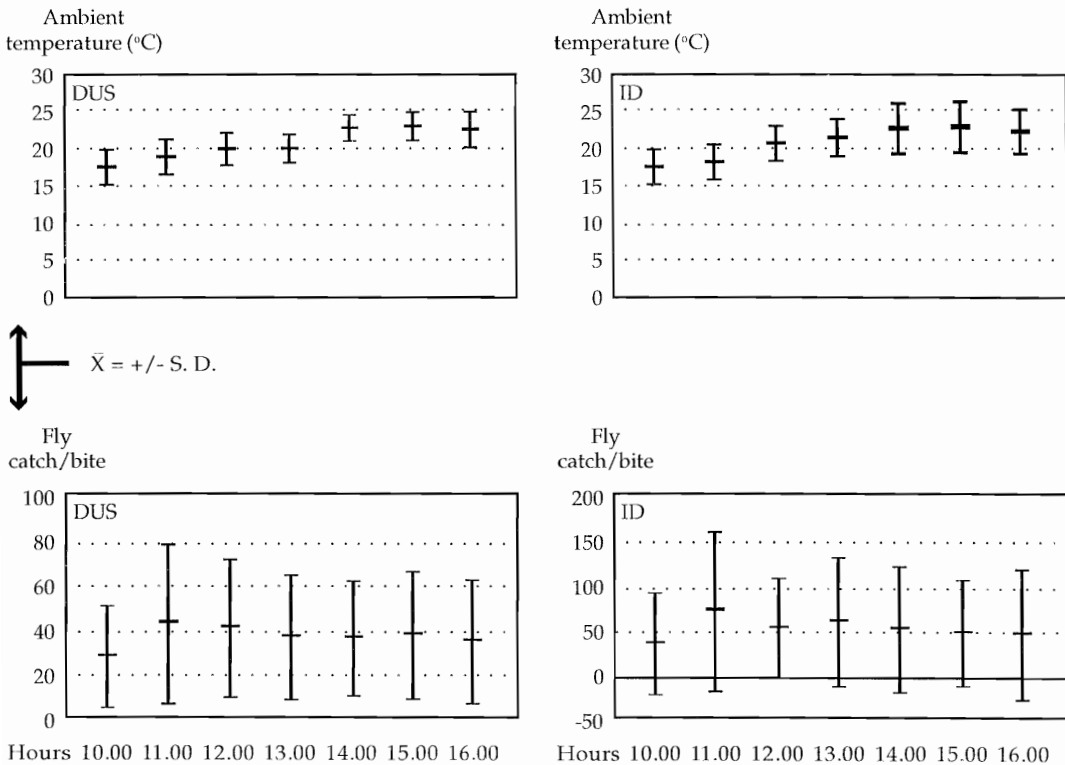


Fig. 2. Hourly changes in ambient temperature and fly catch.

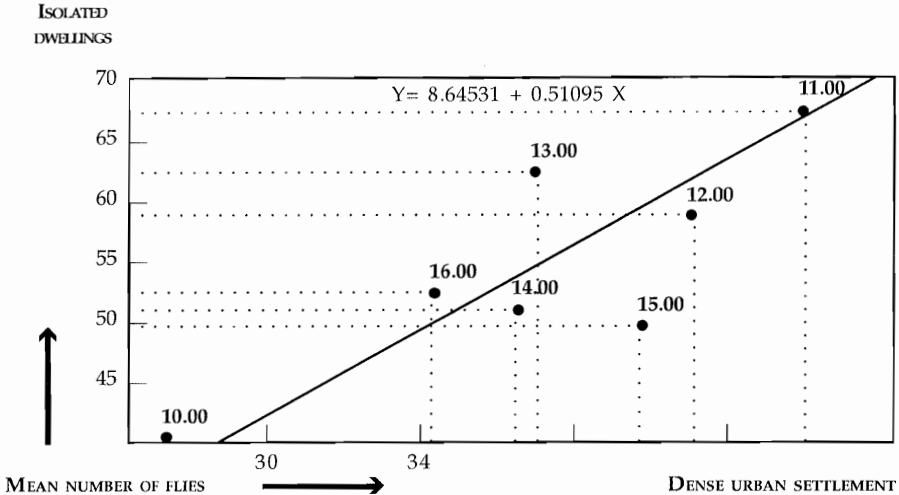


Fig. 3. Regression curve relating mean number of flies per time of day and sampling unit between both study sites.

observed increase of fly's catch in the second hourly sample might be attributed to a combined effect of two factors. Firstly, temperature increase would stimulate fly's activity once a thermal threshold is surpassed. Secondly, a progressive catch dilution would be due to previous sampling removal.

In a recent study carried out in Greater Buenos Aires (Schnack *et al.*, 1995) a synanthropic index (Nuorteva, 1963) calculated for *C. vicina* was negative, suggesting its choice for the wildness. Conversely, this species was formerly considered as synanthropic in the sense of Nuorteva in Hungary (Mihályi, 1967). These observations are not indeed contradictory but they suggest that synanthropy should be assessed at a local population scale instead than at the specific level.

ACKNOWLEDGEMENTS

This work was supported by a grant from the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina.

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Recibido: 29-XI-1995

Aceptado: 6-VIII-1997