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Synanthropy of Calliphoridae. A first approach in Argentina (Insecta, Diptera)

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Resumen

Sobre la base del uso de un índice, se estimó el grado de sinantropía de especies de Calliphoridae del Area Platense, provincia de Buenos Aires, Argentina. A intervalos horarios (10-16 h) y durante cinco días consecutivos, desde el 8 hasta el 12 de febrero de 1988, se realizaron muestreos simultáneos con tres secciones cuyas características fueron las siguientes: a) asentamiento urbano densamente poblado, b) área de viviendas aisladas, y c) área sin influencia humana. Las especies registradas fueron: *Chrysomya albiceps, Chrysomya megacephala, Cochliomyia macellaria, Phaenicia eximia, Phaenicia sericata, y Sarconesia chlorogaster.* Ninguna de las especies registradas es ostensiblemente dominante, si no se discriminan las tres secciones de muestreo. No obstante, *P. sericata* y *P. albiceps* podrían ser respectivamente catalogadas como eusinantrópica y hemisinantrópica, tal como lo sugiere el índice de sinantropía utilizado. Sólo en asinantropía se observa una correlación significativa entre las variaciones horarias en la temperatura y en la abundancia total de *Calliphoridae.* En todas las especies, excepto en *S. chlorogaster* se observó predominio de hembras sobre machos.

Summary

The degree of synanhropy was estimated for blow flies species occurring in the «Area Platense», Province of Buenos Aires, Argentina, based upon the use of a synanthropic index. Flies were sampled simultaneously and at hourly intervals (10.00-16.00 h) during five days, from February 8 to February 12, 1988, in three different sections whose characteristics are respectively summarized as follows: a) dense urban settlements, b) area of isolated dwellings, and c) country area. Recorded species were: *Chrysomya albiceps, Chrysomya megacephala, Cochliomyia macellaria, Phaenicia eximia, Phaenicia sericata,* and *Sarconesia chlorogaster.* None of them characterise the whole sampled areas, where *P. sericata* and *C. albiceps* co-dominate, being both respectively catalogued as eusynanthropic and hemisynanthropic, as the used synanthropic index suggests. Temperature and overall abundance hourly changes were only significantly correlated at asynanthropy. Sex ratio was female biased for all of the studied species, but *S. chlorogaster.*

INTRODUCTION

Synanthropy of muscoid flies is a well known phenomenon from the ecological and sanitary points of view (LINHARES, 1981; MIHÁLYI, 1976). Regardless their medical or economic importance, Finnish biologist NUORTEVA (1963) proposed a synanthropic index to estimate the degree of association of blow flies with man. The fly's synanthropy can be discriminated in three categories: «eusynanthropic» (strong preference for dense human settlements), «hemisynanthropic» (preference for isolated dwellings) and «asynanthropic» (preference for areas without human influence). These terms are used by extensión to describe the fly's habitat (BAUMGARTNER and GREENBERG, 1985).

The association of muscoid flies with man in the Neotropical Region has been treated by GREGOR (1972, 1975) in Cuba, FERREIRA (1978, 1979, 1983) and LINHARES (1981) in Brazil, and BAUMGARTNER and GREENBERG (1985) in Perú.

The ecology of blow flies in Argentina was firstly undertaken by MARILUIS and SCHNACK (1986) in a section of isolated dwellings of the «Area Platense» in the Province of Buenos Aires.

This study is focussed on synanthropy of six species occurring in the «Area Platense», where a dense urban settlement, a site of isolated dwellings, and a wild area were sampled simultaneously and the formerly referred index was used. Due to the fact captures were performed at different hours each sampling date, daily activity of the recorded species was also considered.

STUDY AREA

Three different sites within the «Area Platense» were relevated. The eusynanthropic selected habitat is located downtown Berisso (34° 52', 57° 50' W), while the remaining ones are placed in a settlement of isolated dwellings (hemisynanthropic) (34° 54' S, 57° 47' W) and in an open area (asynanthropic) 634° S, 57° 42' W). Being the urban settlement, located 12 km East La Plata, the remaining sampling places, situated farther from that city, are separated by 7 Km as it is between the eusynanthropic and the hemisynanthropic habitats. The extreme study sites are obviously distanced by 14 km and edging the Provincial road n.° 15.

METOHDS

Daily, from February 8 to February 12, 1988, samples were taken simultaneously in each of the three studied habitats. The everyday sampling program was performed at hourly intervals from 10.00 to 16.00 h. Specimens were netted while lying on the bait composed by 200 g of rotten liver beef, after its exposition at the shadow during 15 minutes. The whole programa on the field comprised 105 captures, and temperature was recorded in each occasion.

The synanthropic index (S.I.) was calculated as follows:

$$S.I. = \frac{2a + b - 2c}{2}$$

were:

a) percentage of individuals of a given species captured in a dense urban settlement.
b) percentage of the individuals of the same species collected in an area of isolated dwellings.
c) percentage of individuals of the same species collected at the wild.

The S.I. ranges from -100 (complete avoidance of human settlements) to +100 (strong preferrence for dense human setllements).

Sex ratio was tested by the chi-square method. Pearson product-moment correlations were used to analyze the relationships between mean density of flies and each species density, and mean temperature.

RESULTS

Six species were recorded:: *Chrysomya albiceps* (Wiedemann), *Chrysomya megacephala* (Fabricius), *Cochliomyia macellaria* (Fabricius), *Phaenicia eximia* (Wiedemann), *Phaenicia sericata* (Meigen), and *Sarconesia chlorogaster* (Wiedemann).

If the different study sites are not discriminated, only two species are well represented, summing up the whole set of captures: *C. albiceps* and *P. sericata* (fig. 1a). Even though both species seem to be equally represented in the whole studied area, they behave in a different way if eusynanthropic and hemisynanthropic habitats are discriminated, being *P. sericata* the dominant species in the former (fig. 1b) and *C. albiceps* in the latter (fig. 1c). This definitive trend is not as obvious in the asynanthropic habitat, where none species can be catalogued as indicator of this environmental situation (fig. 1d).

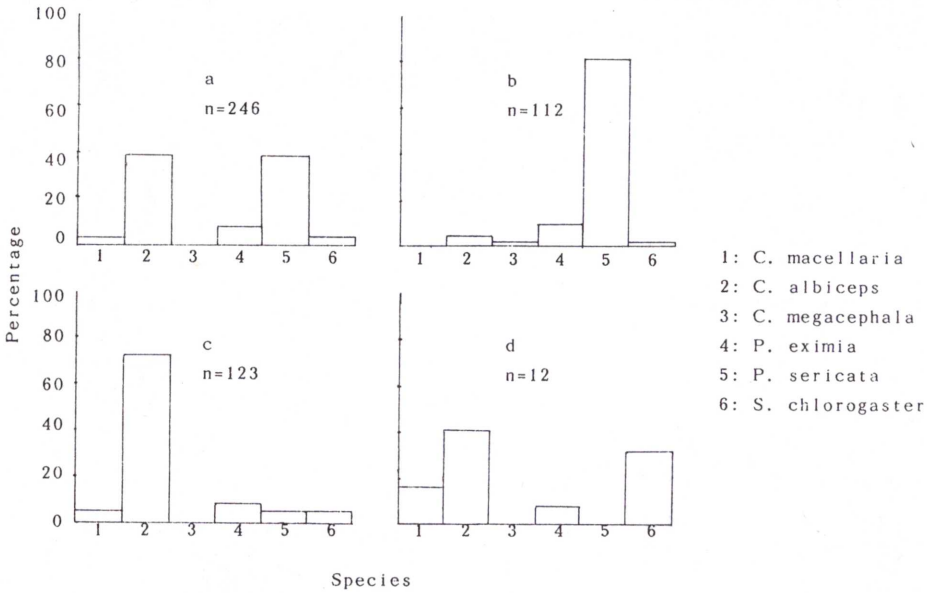

Fig. 1.—Relative importance of the six recorded species, averaging the three studied areas (a), and discriminating them as eusynanthropic (b), hemisynathropic (c), and asynanthropic (d).

The above statement is further reflected by the synanthropic index, as it is shown in fig. 2.

If diurnal activity is considered by the hourly numerical changes recorded, a certain correspondance would be observed between overall mean abundance and overaged temperatures (fig. 3a). Nevertheless, this relation is not detected within urban and semi-urban areas, although a high correlation is evident in the first three hours at eusynanthropy (figs. 3 b,c). A clear relation between the considered variables is evident in the wild section (fig. 3d), where overall mean abundance and overaged temperatures are strongly correlated ($r = 0.92$, $n = 7$, $p < 0.01$). The influence of *P. sericata* and *c. albiceps* upon overall abundance is respectively stressed in eusynanthropy and hemisynanthropy (figs. 4 and 5).

Sex ratio was female biased for most of the recorded species, though without statistical significance in *C. macellaria* and *C. megacephala*. *S. chlorogaster* showed a different sexual representation being only males recorded (table 1).

DISCUSSION

The low recorded number of species (6), plus the strong dominance only two species exhibited, i.e. *C. albiceps* and *P. sericata*, seem to contrast with the higher species density previously recorded in a neighbouring section from the same biogeographic area (MARILUIS and SCHNACK, 1986), where the listed

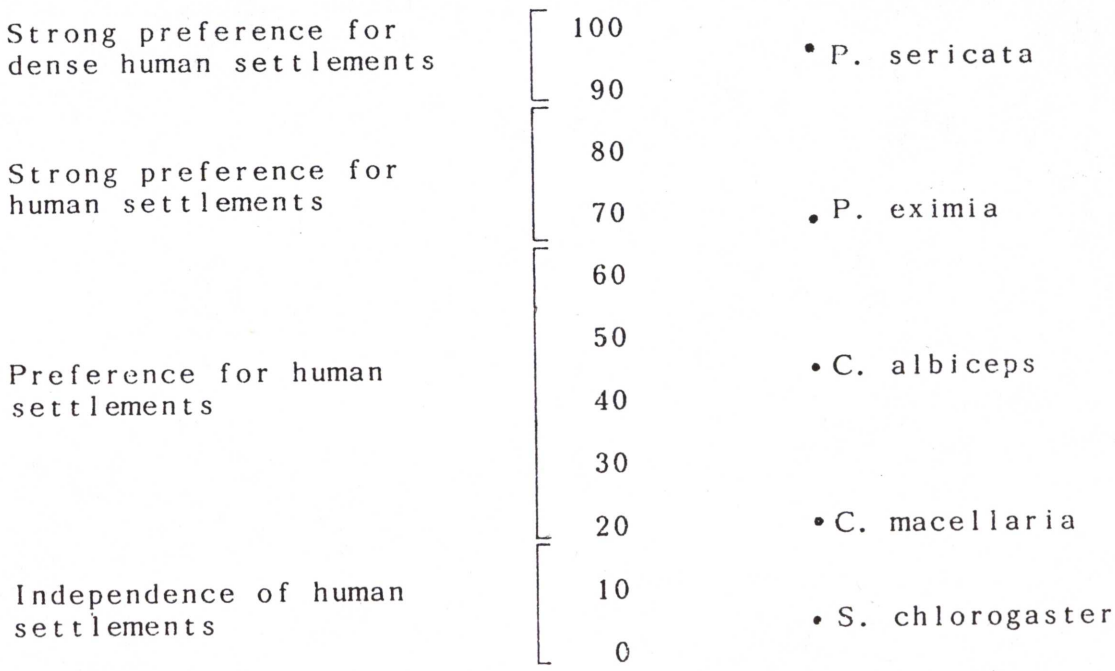

Fig. 2.—Synanthropy indices calculated for the recorded species and their, ecological interpretation (after Nuorteva, 1963).

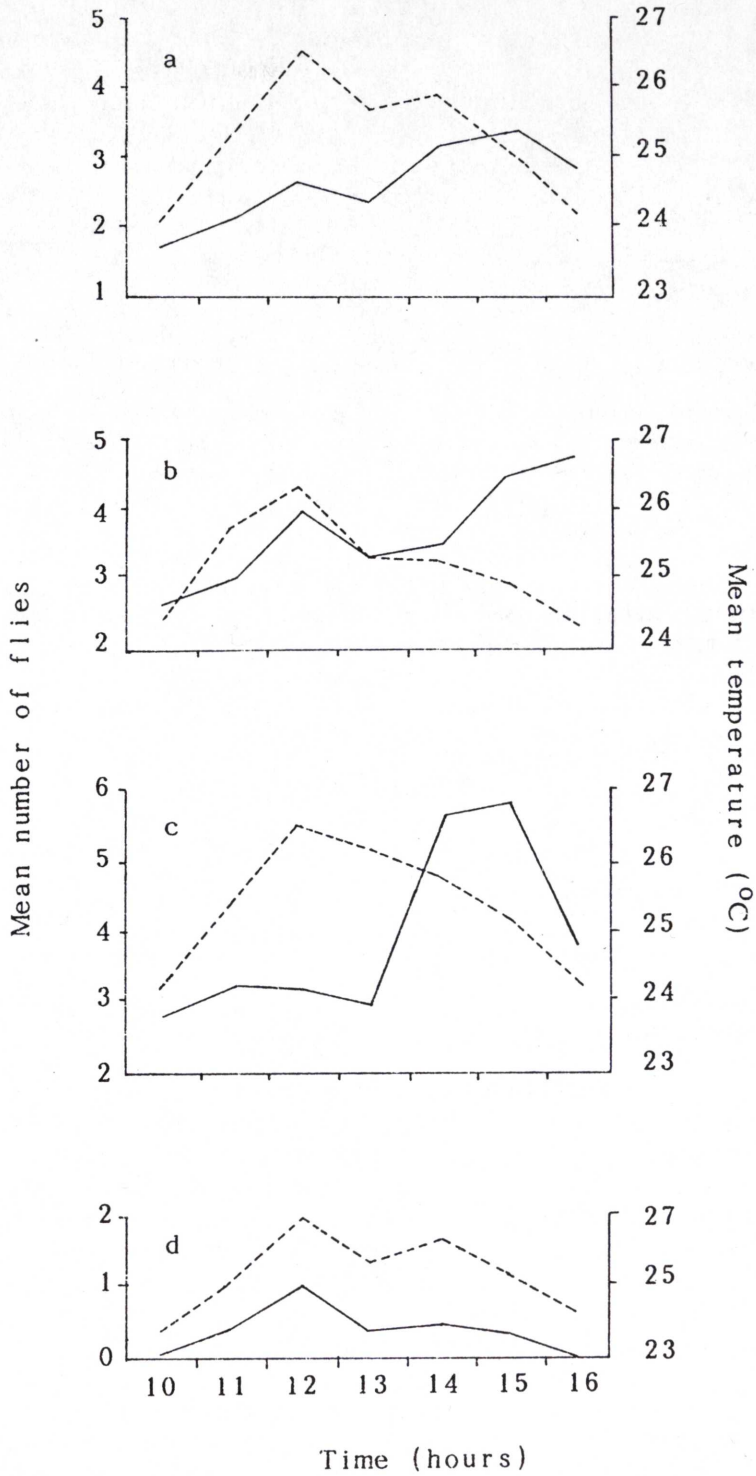

Fig. 3.—Hourly changes in mean overall abundance (continuous line) and overaged temperature (dashed line) for the whole studied area (a), eusynanthropy (b), hemisynanthropy (c), and asynanthropy (d).

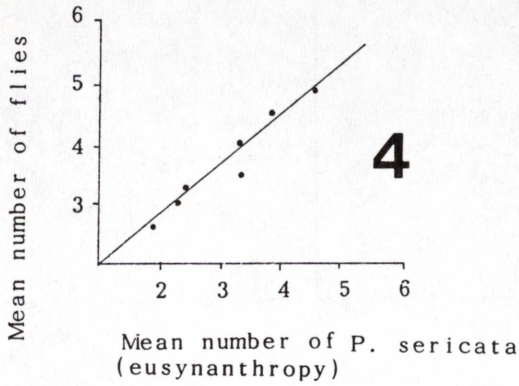

Fig. 4.—The observed correlation between overall flies and *P. sericata* abundances including hourly records (r=0.96, p<0.01).

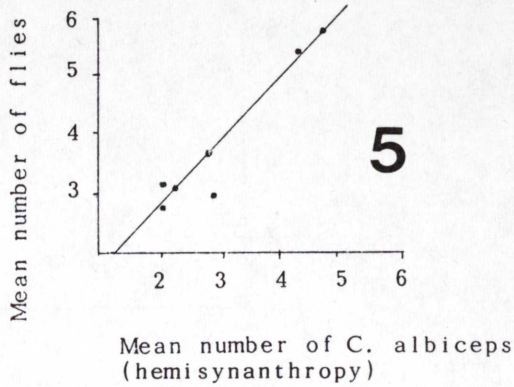

Fig. 5.—The observed correlation between overall flies and *C. albiceps* abundances including hourly records (r=0.96, p<0.01).

TABLE I. Fly abundance summing up the whole set of samples taken at the three studied environments. Data include chi-square values and their levels of significance from a null hypothesis of equal sex representation.

SPECIES			Total	X^2	l.s.+
C. albiceps	14	87	101	52.8	p<0.005
C. megacephala	0	1	1	1.0	N.S.++
C. macellaria	3	7	10	1.6	N.S.++
P. eximia	6	18	24	6.0	P<0.05
P. sericata	14	84	98	50.0	p<0.005
S. chlorogaster	12	0	12	12.0	p<0.005

\+ level of significance.
++ not significant.

species duplicate the number of species above referred. This lack of correspondance in species richness can be expected because the referred work was carried on during a whole year while the present study involves only five days within the summer season. Anyway we have non captured *Calliphora vicina* Robineau-Desvoidy and *Calliphora nigribasis* Macquart, it is known they occur in the studied area during the colder months, being displaced in summer by other species, like *C. albiceps* and *P. sericata* (MARILUIS and SCHNACK, 1986).

The strong preference for dense human settlements displayed by *P. sericata* and for areas of isolated dwellings shown by *C. albiceps* are in agreement with earlier observations. The endophily and sanitary importance of *P. sericata* have been recently pointed out by several authors (MARILUIS and GUARNERA, 1983; GREENBERG, 1984; BAUMGARTNER and GREENBERG, 1985; MARILUIS and SCHNACK, 1986). The affinity to hemisynanhropic environments shown by *C. albiceps* has also been emphasized in other studies (GREENBERG and POVOLNY, 1971; LINHARES, 1981).

It is evident that a clear trend is not observed in species preference at asynanthropy, where samples were either numerically poor or devoid of flies. This scanty flies occurrence can be attributed to the fact that the country sampled section was an open area, more influenced by winds and dryness than wooded sections. Moreover, it is remarkable that the «Area Platense» underwent an intense dryness by the time captures took place.

The influence of climatic factors upon fly abundance is probably stronger at asynanthropy, where hourly changes in temperature are significantly correlated with overall fly affluence. The lack of influence of temperature upon the hourly changes in overall abundance at eusynanthropy and, in a less extent, at hemisynathropy, could indicate that in the «anthropobiocoenosis» (*sensu* POVOLNY, 1971), human activities counterbalance the action of the climatic factors in their control upon flies species relative importance.

The prevalence of females on the bait is explained by the fact they usually lay eggs on it. This is not so in *S. chlorogaster*, perhaps by its mating system in which polyandry is known to occur (GREENBERG and SZYSKA, 1984).

Further studies are needed in order to attain a broader understanding of fly's synanthropy and its seasonal changes in the studied environments.

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