

# OVIPOSITION CAPACITY OF *DERMATOBIA HOMINIS* (DIPTERA: CUTEREBRIDAE) ON FOUR SPECIES OF MUSCIDAE AND TWO SPECIES OF CALLIPHORIDAE UNDER LABORATORY CONDITIONS.

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**SUMMARY:** The oviposition capacity of *Dermatobia hominis* eggs on four species of Muscidae (*Musca domestica*, *Sarcopromusca pruna*, *Haematobia irritans* and *Stomoxys calcitrans*) and two species of Calliphoridae (*Cochliomyia macellaria* and *Lucilia cuprina*) was studied under laboratory conditions. Five males and five females of *D. hominis* were caged together with 40 flies of each vector species. The dipterans carrying eggs of *Dermatobia* were collected and the number of eggs for vector was registered daily. Among the species of muscids captured and carrying *D. hominis* eggs in decreasing order were, *M. domestica* (25.0%), *S. pruna* (16.7%), *H. irritans* (12.5%) and *S. calcitrans* (11.7%). Between the species of calliphorids, *C. macellaria* was more captured (14.0 %) than *L. cuprina* (10.8 %). *M. domestica* was considered the most important vector because the highest average number of *Dermatobia* eggs per fly was 55.4.

**KEY WORD:** *Dermatobia hominis*, oviposition capacity; *Musca domestica*, *Sarcopromusca pruna*, *Haematobia irritans*, *Stomoxys calcitrans*, *Cochliomyia macellaria* and *Lucilia cuprina*.

## INTRODUCTION

The larvae of *Dermatobia hominis* (Linnaeus Jr., 1781) (Diptera: Cuterebridae), commonly known in Brazil as "berne" develop in the subcutaneous tissue of several hosts, mainly on cattle of the tropical and sub tropical regions of Latin America. Heavy infestations of *D. hominis* reduce the meat and milk production and hides may be worthless. The wounds produced by the larvae can be associated to secondary infections causing severe pain (CREIGHTON & NEEL, 1952; GUIMARÃES & PAPAVERO, 1966; MAIA & GUIMARÃES, 1985).

MORALES cited by NEIVA & GOMES (1917) was the first entomologist to observe that the eggs of the *D. hominis* are transported by mosquitos. To date, other insects in eight families of diptera (Culicidae, Fanniidae, Anthomyiidae, Simuliidae, Muscidae, Calliphoridae, Tabanidae and Trypetidae) have been reported as vectors of *Dermatobia* eggs (NEEL *et alii*, 1955; ARTIGAS & SERRA, 1965; MOYA BORJA, 1966 and GUIMARÃES *et alii*, 1983). The most interesting phenomenon

is the habit of *D. hominis* to lay her eggs on the abdomen of the other dipterans. The eggs are cemented to the ventral and lateral surface of the vector's abdomen by a substance secreted by the accessory glands. Under laboratory conditions, vectors are caught in fly and held closely by *Dermatobia* females while the eggs are stuck to the under surface of the abdomen. This act usually end upon the floor of the cage. Time required for oviposition on the vector is one second per egg (KOONE & BANEGAS, 1959).

The most important vectors of *Dermatobia* eggs found on cattle in the field are *Sarcopromusca pruna*, *Musca domestica*, *Stomoxys calcitrans*, *Haematobia irritans*, *Hydrotaea aenecens* and *Fannia spp.* Other dipterans like *Cochliomyia macellaria*, *C. hominivorax*, *Chrysomya albiceps* and *Ch. putoria* have been observed carrying *Dermatobia* eggs with less frequency. Under laboratory conditions the most common vectors are *M. domestica*, *S. calcitrans* and *Spruna*. (GUIMARÃES & PAPAVERO, 1999). In laboratory studies MOYA BORJA (1966) observed that *D. hominis* is able to lay her eggs on mediterranean fruit fly

(medfly), *Ceratitis capitata* (Trypetidae). BATES (1943) indicated that the characteristics of a vector of *Dermatobia* eggs are: (a). zoophilous habit; (b) diurnal flying period; (c) moderate size; and (d) moderately active habits.

This study was undertaken to obtain added information on oviposition capacity of *D. hominis* on four species of muscids and two species of calliphorids under laboratory conditions.

## MATERIALS AND METHODS

To study the oviposition capacity of *D. hominis* eggs on four species of Muscidae (*Musca domestica*, *Sarcopromusca pruna*, *Haematobia irritans* and *Stomoxys calcitrans*) and two species of Calliphoridae (*Cochliomyia macellaria* and *Lucilia cuprina*) a small colony of *D. hominis* was established collecting manually mature larvae from bovine's skin abated at the slaughterhouses of Rio de Janeiro. Soon after collection the larvae were placed on humid sawdust in cylindrical glass containers for pupation. The pupae were maintained at 27 °C and 85% RU until the adults' emergency. These flies were transferred to 30x30x30 cm cages. The bottom and back of each cage was made of plywood, the top and two sides were covered with a fine-mesh white nylon fabric and the front was covered with a glass. Each cage was lighted by a 60-w daylight bulb suspended over its top. All adults of the species of vectors used in this trial were coming from laboratory colonies, except for adults of *H. irritans*, which were captured on bovines in the field. Five males and five females of *D. hominis* were caged together with 40 flies of each vector species. The dipterans carrying eggs of *Dermatobia* were collected and the number of eggs per vector was registered daily. This trial was replicated three times with each vector specie. This study was carried out at the Laboratory of Entomology of the Institute of Biology, UFRRJ, Rio de Janeiro, Brazil at 27 °C and 70-80%. RU.

## RESULTS AND DISCUSSION

The oviposition capacity of *D. hominis* on various species of vectors are summarized and presented in Table 1. The data indicate that among the species of muscids captured and carrying eggs of *D. hominis* in decreasing order were, *M. domestica* (25.0%), *S. pruna* (16.7%), *H. irritans* (12.5%) and *S. calcitrans* (11.7%). Between the species of calliphorids, *C. macellaria* was more captured (14.0 %) than *L. cuprina* (10.8 %). The percentage of vectors of *L. cuprina* was 28.3 in other trial carried out by LIMA & MOYA BORJA (1997). *Dermatobia* females, in captivity, capture flies which are moderately active (BATES, 1943) In this experiment *M. domestica* *S. pruna* and *C. macellaria* moved slowly when confined in cages and seems therefore, that they were captured more frequently than *H. irritans*, *S. calcitrans* and *L. cuprina*. MOYA BORJA (1966) confirmed this premise placing in the same cage *D. hominis* adults together with an equal number of *M. domestica* and *C. capitata* and the results indicate that *Dermatobia* females show some preference to the *C. capitata* over the house fly for oviposition, probably due to the less activity of medfly. The percentage of captured adults of *C. capitata* (34.5) was greater than that of *M. domestica* (15.6).

In this study, the average number of eggs per vector in decreasing order was *M. domestica* (55.4), *L. cuprina* (52.0) *S. pruna* (36.0) *C. macellaria* (34.0), *S. calcitrans* (28.0) and *H. irritans* (18.5). It is interesting to mention that four adults of *M. domestica* and one adult of *L. cuprina* were observed with two masses of *Dermatobia* eggs, glued to the ventrolateral parts of the abdomen of the carrier. In similar conditions the average number of *Dermatobia*. eggs per fly of *M. domestica* was 36.2, in Costa Rica (MOYA BORJA, 1966) and 32, in Honduras (BANEGAS *et alii* 1967). The average number of eggs per vector of *S. pruna* collected in the field ranged from 28 (MOURIER & BANEGAS, 1970) to 29.5, in Costa Rica (NEEL *et alii*, 1955) and 22.5 in Brazil (Da SILVA *et alii*, 1989). In our experiment, the

Table 1 - Percentage of six species of vectors carrying eggs of *Dermatobia hominis* under laboratory conditions.

	Number of flies	Number of vector flies	Vector (%)	Eggs/Vector (Range)
A - Muscidae				
1- <i>Musca domestica</i>	120	30	25,0	55,4* (26-147)
2- <i>Sarcopromusca pruna</i>	120	20	16,7	36,0 (18-72)
3- <i>Haematobia irritans</i>	120	15	12,5	18,5 (08-27)
4- <i>Stomoxys calcitrans</i>	120	14	11,7	28,0 (07-32)
B- Calliphoridae				
1- <i>Cochliomyia macellaria</i>	120	17	14,2	34,0 (06-61)
2- <i>Lucilia cuprina</i>	120	13	10,8	52,0* (32-68)

\* Four adults of *Musca domestica* and one adult of *Lucilia cuprina* were observed with two masses of *Dermatobia* eggs glued to the abdomen.

mean number of *Dermatobia* eggs per *S. pruna* fly was higher (36.0). The average eggs load of *S. calcitrans* vectors was 28.0 in our experiment and correspond with the number of eggs load on *S. calcitrans* captured in the field by PINTO & FONSECA (1930). MOYA BORJA (1966) noted that there is a good positive correlation between the abdomen size of the vector and the number of *Dermatobia* eggs transported, because the abdomen of *M. domestica* is twice the size that *C. capitata* and the mean number of *Dermatobia* eggs per vector was 36.2 and 19.8, respectively. In our experiment, the smaller average number of *Dermatobia* eggs per vector (18.5) correspond with smaller size of *H. irritans*. The average egg load of *Fannia punctipennis* vectors captured by BRUM *et alii* (1996) in the field was 16.3. It is partially due to smaller size of *F. punctipennis* than *H. irritans*.

It is evident from the data that *M. domestica* is the most recommended vector of *Dermatobia* eggs because it is easy and cheap for rearing under laboratory conditions.

## SUMÁRIO

A capacidade de oviposição da *Dermatobia hominis* sobre quatro espécies de Muscidae (*Musca domestica*, *Sarcopromusca pruna*, *Haematobia irritans* e *Stomoxys calcitrans*) e duas espécies de Calliphoridae (*Cochliomyia macellaria* e *Lucilia cuprina*) foi estudado em condições de laboratório. Cinco machos e cinco fêmeas de *D. hominis* foram colocados em gaiolas junto com 40 moscas de cada espécie de vetor. Os dípteros carregando ovos de *Dermatobia* foram coletados e o número de ovos por vetor registrados diariamente. As espécies de muscideos capturadas e carregando ovos de *Dermatobia*, em ordem decrescente foram, *M. domestica* (25,0%), *S. pruna* (16,7%), *H. irritans* (12,5%) e *S. calcitrans* (11,7%). Entre as espécies de califorídeos, *C. macellaria* foi mais capturada (14,0%) que *L. cuprina* (10,8%). *M. domestica* foi considerada o mais importante vetor, onde o número médio de ovos/mosca foi 55,4. PALAVRAS-CHAVE: *Dermatobia hominis*, potencial de veiculação, *Musca domestica*, *Sarcopromusca pruna*, *Haematobia irritans*, *Stomoxys calcitrans*, *Cochliomyia macellaria* e *Lucilia cuprina*.

## REFERENCES

- ARTIGAS, P. de T. & SERRA, R.G. (1965). Portadores de ovos de *Dermatobia hominis* (Linnaeus Jr., 1781). Atualização da lista de foréticos, com a enumeração de novos agentes transmissores do "berne". *Ciência e Cultura*, 17(1):21-29.
- BANEGAS, A.D., MOURIER, H. & GRAHAM, O.H. (1967). Laboratory colonization of *Dermatobia hominis* (Diptera: Cuterebridae). *Annals of the Entomological Society of America*, 60(3):511-514.
- BATES, M. (1943). Mosquitoes as vectors of *Dermatobia* in eastern Colombia. *Annals of Entomological Society of America*, 36(1):21-24.
- BRUM, J.G.W., VIANNA, E.E.S, GENTILINI, F & PINTO, L.S. (1996). *Fannia punctipennis* (Diptera: Fannidae), vetor dos ovos da *Dermatobia hominis* (Oestridae: Cuterebrinae) em Pelotas, RS. *Revista Brasileira de Parasitologia Veterinária*, 5(1):59-60.
- CREIGHTON, J.T. & NEEL, W.W. (1952). Biología y combate del tórsalo o nucho, *Dermatobia hominis* (L. Jr.): Resenha bibliográfica. *Turrialba*, 2 (2):59-65.
- GUIMARÃES, J.H. & PAPAVERO, N. (1966). A tentative annotated bibliography of *Dermatobia hominis* (Linnaeus Jr., 1781)(Diptera:Cuterebridae). *Arquivos de Zoologia*, 14(4):223-94.
- GUIMARÃES, J.H. & PAPAVERO, N. (1999). Myiasis in man and animals in the Neotropical Região. Bibliographic database. São Paulo: Plêiade/FAPESP. 308 p.
- GUIMARÃES, J.H.; PAPAVERO, N. & PRADO, A.P. do. (1983). As miíases na região neotropical (identificação, biologia, bibliografia). *Revista Brasileira de Zoologia*, 1(4):239-416.
- KOONE, A.D & BANEGAS, A.D. (1959). Biology and control of *Dermatobia hominis* (L. Jr., 1781) in Honduras (Diptera:Cuterebridae). *Journal of Kansas Entomological Society*, 32(3):100-108.
- LIMA M.A.M. & MOYA BORJA, G.E. (1997). *Lucilia cuprina* (Wiedemann, 1830) vetor de ovos de *Dermatobia hominis* (Linnaeus Jr., 1781) no laboratório. *Revista Brasileira de Medicina Veterinária*, 19(4):148-150.
- MAIA, A.A.M. & GUIMARÃES, M.P. (1985). Distribuição sazonal de larvas de *Dermatobia hominis* (Linnaeus Jr., 1781) (Diptera: Cuterebridae) em bovinos de corte da região de Governador Valadares - Minas Gerais. *Arquivo Brasileiro de Medicina Veterinária e Zootecnia*, 37(5):469-475.
- MOURIER, H. & BANEGAS, A.D. (1970). Observations on the oviposition and ecology of the eggs of *Dermatobia hominis* (Diptera:Cuterebridae). *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening*, 33:58-68.
- MOYA BORJA, G.E. (1966). *Estudios sobre la biología, morfología y esterilización del tórsalo, Dermatobia hominis* (L. Jr., 1781). Tese M.S. Instituto Interamericano de Ciencias Agrícolas, Costa Rica. 63 p.
- NEEL, W.W.; URBINA, O.; VIALE, E. & ALBA, J. (1955). Ciclo biológico del tórsalo *Dermatobia hominis*, L. Jr.) en Turrialba, Costa Rica. *Turrialba*, 5(3):91-104.
- NEIVA, A. & GOMES, J.F. (1917). Biología da mosca do berne (*Dermatobia hominis*) observada em todas a suas fases. *Annaes Paulistas de Medicina e Cirurgia*, 8(9):197-209.
- PINTO, C. & FONSECA, F. (1930). Novos hospedeiros intermediários da *Dermatobia hominis*. *Revista de Medicina e Cirurgia*, 7:248-250
- SILVA, A. A.J., SMITH, D.H. & BARBOSA, S.A.S.J. (1989). *Sarcopromusca pruna* (Diptera: Muscidae) as an egg transport host of *Dermatobia hominis* (Diptera: Cuterebridae) in the cacau region of Bahia, Brazil. *Memórias do Instituto Oswaldo Cruz*, 84, suppl. 4:491-497.

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