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Biology of the European House Dust Mite,
*Dermatophagoides pteronyssinus* (Trouessart)

by Samia M. Saleh¹, Madiha M. Abdel-Hamid¹ and H. A. Rezk¹

**Abstract:** The house-dust mite, *D. pteronyssinus* (Trouessart) was reared in the laboratory at 25 ± 1°C, 75 ± 5 % R.H, and complete darkness on both media wheat bran and wheat bran with yeast powder. Biological aspects have been obtained on two diet for the four generations, complete development from egg to adult averaged 24.6 ± 0.3 and 18.4 ± 0.3 days for females and males on wheat bran and 37.6 ± 0.3 and 24.1 ± 0.4 days for females and males on wheat bran with yeast powder. Egg incubation period, larval, protonymphal and tritonymphal durations were studied. Hatching, mating and oviposition were investigated. The hypopus did not occur, no parthenogenesis was observed.

**Introduction**

Fain (1966, 1977) reported the pyroglyphids have 6 distinct life stages, egg, prelarva, larva, protonymph, tritonymph and adult for *D. pteronyssinus*. Spiëksma (1967) reared *D. pteronyssinus* on skin scale and powdered yeast at the optimum temperature (25°C). Koekkoek and Bronswijk (1972) reared *D. pteronyssinus* on dried Daphnia at room temperature (22°C) and at a relative humidity of 75 % R.H. Bronswijk and Sinha (1973) mentioned that *D. pteronyssinus* were reared successfully on dried Daphnia, human skin scales with yeast powder and wheat grain flakes with yeast powder. Arlian (1975) succeeded in culturing *D. pteronyssinus* on a medium consisting of a mixture of human hair, an baker's yeast at 75 % R.H and 25°C. Murton, Madden (1977) reared *D. pteronyssinus* using electric-razor shaving from human beard growth. Survival on dried fungal cultures and ingestion of viable spores were observed.

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**MATERIALS AND METHODS**

*D. pteronyssinus* tritonymphs were collected from wheat bran and reared in microcells of small petri-dish of pyrex glass 4 cm in diam. and 2.5 in depth. In each dish thin layer of sieved wheat bran was contaminated by the mites. Proposed to 20 newly emerged tritonymphs. Cultures were examined twice daily. Eggs were left in the microcells were counted daily. The durations of larval, protonymphal and tritonymphal stages were determined. Adult females were investigated for their copulation behaviour, pre, ovi and post oviposition periods, and longevities.

Another food using wheat bran and yeast powder was proposed to *D. pteronyssinus* in order to determine the effect of protein on the duration of different instars and biological behaviour.

In the present study, four successive generations of the so-called European house-dust mite *Dermatophagoides pteronyssinus* (Trouessart) were reared under the prevailing laboratory conditions of 25 ± 1°C and 75 ± 5% R.H. and in complete darkness.

**RESULTS AND DISCUSSION**

The incubation period on wheat bran in average, for the four generations was 7.5 ± 0.2 days for the female and 6.2 ± 0.2 days for the male (Table 1), on wheat bran with yeast powder 11.3 ± 0.2 days for the female and 7.4 ± 0.2 days for the males. The larval, protonymphal and tritonymphal durations obtained on the wheat bran for the four generations were 4.1 ± 0.2, 3.5 ± 0.6 and 9.6 ± 0.4 days for the females and 3.5 ± 0.6, 2.3 ± 0.1 and 6.3 ± 0.4 days for the males (Table 1) while on wheat bran with yeast powder 6.3 ± 0.2, 5.7 ± 0.2 and 14.4 ± 0.2 days for the females, 3.7 ± 0.2, 4.5 ± 0.2 and 8.5 ± 0.2 for the males (Table 1). In contrast to either, egg, larva, or protonymph, the tritonymph lasted a longer period to reach adult stages. All previously mentioned averages did not lie too far, if not nearly close, to that noticed by Spijksma, (1967) despite of different food.

In the wheat bran and wheat bran with yeast powder the egg-adult durations in average, were 24.6 ± 0.2 days and 37.6 ± 0.3 days for the females and 18.4 ± 0.3 days and 24.1 ± 0.4 days for the males, respectively (Table 1). This present average is very close to that 23-26 days at 26°C found by Spijksma (1967) and 23.6 days found by Bronswijk and Sinha (1971). This discussion may also declare the homolgy of the present data with those reported before by Spijksma (1967). Males longevity average 22.8 ± 0.4, 32.9 ± 0.3 days only in contrast 34.3 ± 0.3, 47.7 ± 0.4 days for the females grown on wheat bran and wheat bran with yeast powder significate differences between the female and male longevities.

The sex ratio values obtained in both media for the four generations were 1 : 0.5 and 1 : 0.8 on wheat bran and wheat bran with yeast powder, respectively.

Premating period averaged 1.32 ± 0.1 day on wheat bran and 2.17 ± 0.2 days on wheat bran with yeast powder.

During copulation the male and the female were

<table>
<thead>
<tr>
<th>Diet</th>
<th>Average duration in days</th>
<th>Females</th>
<th>Males</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Egg</td>
<td>Larva</td>
<td>Protonymph</td>
</tr>
<tr>
<td>Wheat bran</td>
<td>7.5±0.2</td>
<td>6.2±0.2</td>
<td>4.1±0.2</td>
</tr>
<tr>
<td>Wheat bran with yeast</td>
<td>1.3±0.3</td>
<td>7.4±0.2</td>
<td>6.3±0.2</td>
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</table>
The female refused any further contact with its partner. The male could copulate with more than one female in its life. SPIEKSMA (1967) and BRONSWIJK and SINHA (1971) reported that the male remains fertile during all its life.

The preoviposition, oviposition and post oviposition periods for the four generations lasted, 3.1 ± 0.1, 16.2 ± 0.2 and 13.8 ± 0.2 days on wheat bran, while on wheat bran and yeast powder 4.3 ± 0.2, 22.4 ± 0.3 and 20.5 ± 0.3 days respectively (Table 2). The oviposition pattern of the copulated female comprises two distinct periods of 8.6 and 7.6 days on wheat bran and 10.7 ± 0.3 and 11.6 ± 0.4 days on wheat bran with yeast powder, to the finding reported by SPIEKSMA, (1967). Through the oviposition period on wheat bran the female laid only 7.4 ± 0.3 eggs, on wheat bran with dry yeast powder 9.4 ± 0.3 eggs (Table 2). This might be due to the difference in diet used, specially the relative poverty of the nutritional value of wheat bran.

The obtained data of egg hatchability was 92.5 ± 2.3 % for the female fed on wheat bran (Table 2), on wheat bran with yeast powder 89.2 ± 2.9 % only. Statistical analysis proved the insignificant differences of hatchability percentage between the two means of diet. Statistical analysis proved that yeast prolonged all duration of the subject mite species.

Parthenogenesis was not observed. According to BRONSWIJK and SINHA, 1971, parthenogenesis is unknown for D. pteronyssinus (after SPIEKSMA, 1967).

Statistical analysis proved that the females exceeded always the male in longevity. The virgin females lived 37.4 ± 0.4 days on wheat bran and 49.8 ± 0.2 days on wheat bran with dry yeast powder (Table 3), noncopulated males 26.5 ± 0.4 days on wheat bran and 38.6 ± 0.4 days on wheat bran and yeast (Table 3). Statistical analysis proved that the copulation decreased significantly the longevity of the sexes in either diet.

In addition to its deterioration at the stored products D. pteronyssinus is considered as a major cause of allergy diseases and to its propagation. The importance of this species in Egypt can be determined from this last point of view, if we put in consideration the mode of life in the country as well as in the city and the little or no interest to the general hygiene; this can be noticed these days concerning the increasing percentage of allergic disease and especially in the popular districts.

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