LIFE HISTORY OF MACROCHELES AFRICANUS H., E. & N. (ACARI : MACROCHELIDAE) A PREDATOR OF FLIES.

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Abstract

The morphological characters of the developmental stagesof *Macrocheles africanus* and its biological aspects were described when reared on larvae of house and vinegar flies at 30 °C. Duration of female life cycle and longevity as well as its fecundity were nearly similar on the two preys averaging 4.50 & 4.32 ; 28.24 & 27.11 days and 24.60 & 19.94 eggs, respectively.

INTRODUCTION

Mites constitute a significant percentage of the arthropod species inhabiting animal dung.

Genus Macrocheles Latreille is the most important and most abundant predator worldwide that is asociated with pest flies which breed on poultry and livestock premises (Axtell, 1969).

Although certain predaceous macrochelid species can function as effective biological components in integrated fly control programs, yet their use has still been limited. This is because they are susceptible to insecticides as are flies. Thus frequent removal and procesesing of accumulated manure is an important compponent of the integrated management of pest flies (Anderson, 1985; Axtell, 1966 ; Loomis *et al.*, 1981).

In Egypt, some investigations were carried out on the biology and feeding habits of members of this genus (Mohamed, 1976). Hafez *et. al.,* (1985) studied four new macrochelid mites from Egypt.

The present work aims at describing the immature stages of *M. africanus* Hafez, *et al.,* (1985). Also feeding habits and biological observations are discussed.

MATERIALS AND METHODS

Samples of orgainc manure and compost were collected from the farm of the Faculty of Agriculture, Cairo University, Giza, and mites were extracted by using modified Tullgren funnel. Cultrues of *M. africanus* were reared on newly hatched larvae of the house fly *(Musca domestica* L.), and vinegar fly (*Drosophila melanogaster* Morgan). Newly emerged larvae were confined singly to plastic cells 2.8 cm in diameter and 2 cm in depth, with a mixture of plaster of Paris and charcoal at the bottom. The experiments were carrid out at 30 + 1^{o}C.

RESULTS

Description of immature stages

Egg (Fig. 1,A) : Oval , translucent whitish and measures 194.1 u long and 102.7 u wide.

Larva (Fig. 1, B & C) : Idiosoma, 214 u long , 143 u wide , weakly sclerotized, without distinct shields. Dorsum with 13 pairs of simple seatae . Ventrum holotrichous, with three pairs of sternal setae in the intercoxal region. The ventrianal region with weakly sclerotized anal valves , three pairs of opsthogastric setae , one pair of para - anal setae and one post - anal seta. Length of leg I 183.6 u, leg II 153 u, and leg III 122.4 u.

Protonymph (Fig. 2, A & B): Idiosoma, 290.7 u long, 198.9 u wide , weakly sclerotized, without distinct shields. Dorsum with 22 pairs of simple setae. Ventrum holotrichous, sternal shield indistinct, with 3 pairs of sternat setae. Metasternal setae absent . Genital setae subequal to sternal setae and on memberane . Two pairs

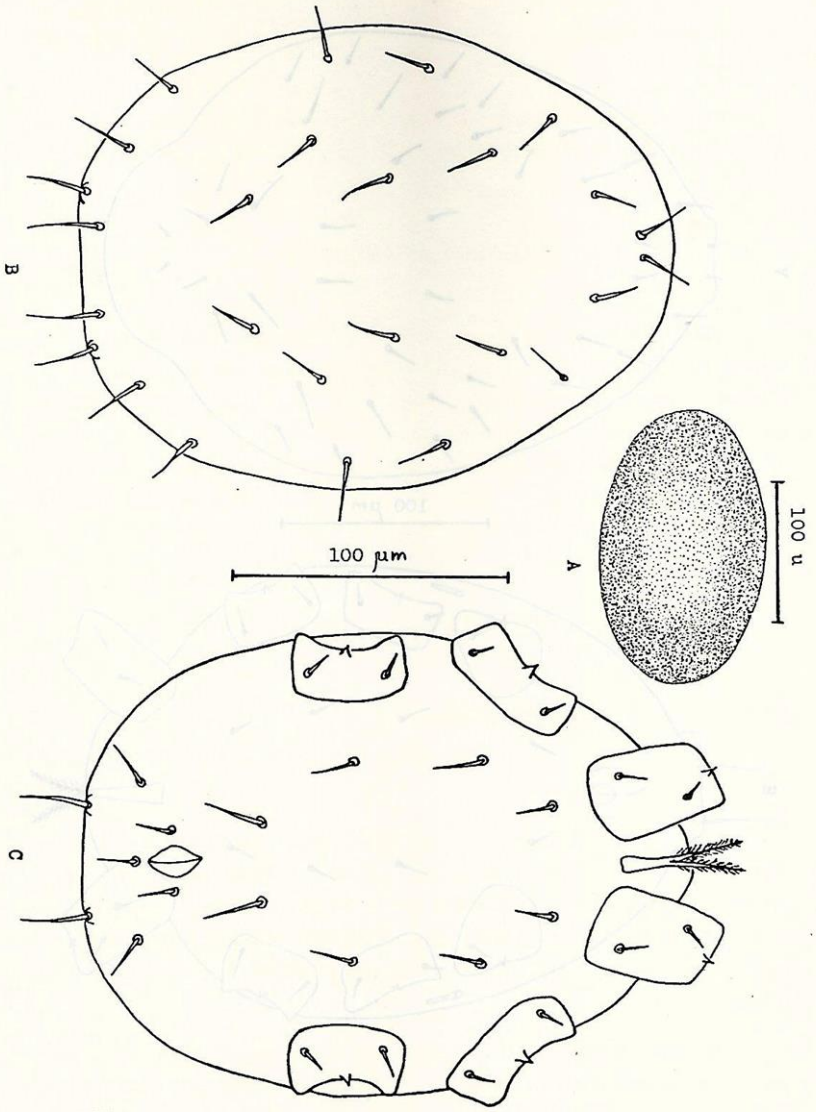

Fig. 1. *Marcrocheles africanus* - A. Egg, B. Larva dorsum , C. Larva ventrum.

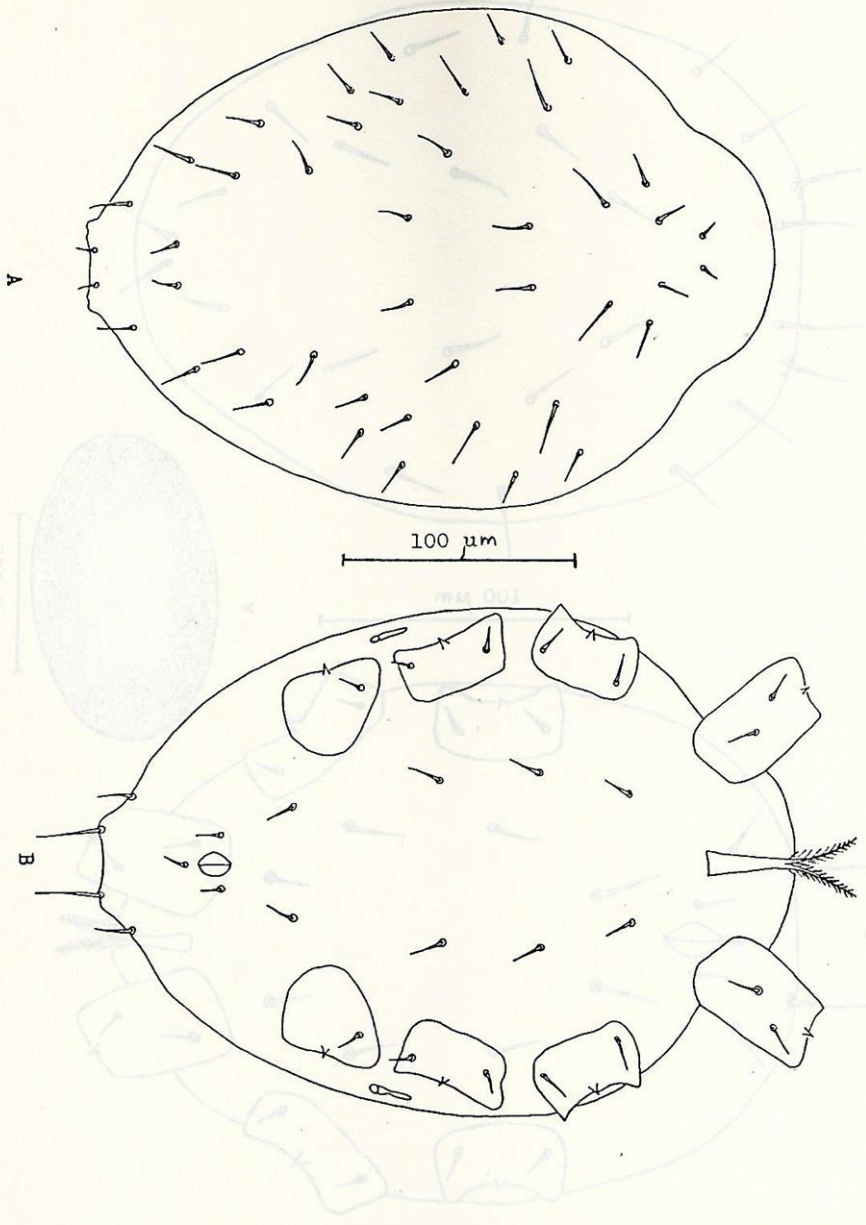

Fig. 2. *Marcrocheles africanus* - Protonymph, A. Dorsum, B. Ventrum.

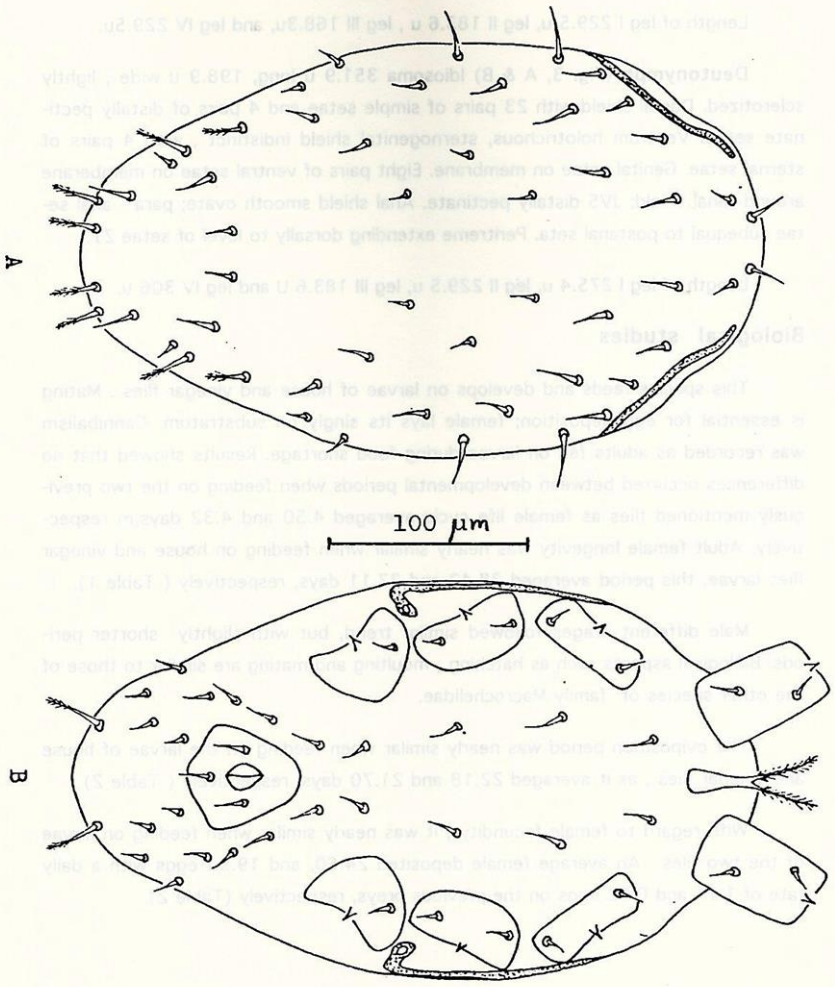

Fig. 3. *Marcrocheles africanus* - Deutonymph, A. Dorsum, B. Ventrum.

of opisthogastric setae behind anal plate. Anal plate ovate , para - anal setae subequal to postanal. Peritreme short and pritremal plate not formed.

Length of leg I 229.5 u, leg II 183.6 u , leg III 168.3u, and leg IV 229.5u.

Deutonymph (Fig. 3, A & B) Idiosoma 351.9 u long, 198.9 u wide , lightly sclerotized. Dorsal shield with 23 pairs of simple setae and 4 pairs of distally pectinate setae. Ventrum holotrichous, sternogenital shield indistinct , with 4 pairs of sternal setae. Genital setae on membrane. Eight pairs of ventral setae on memberane around anal shield; JV5 distally pectinate. Anal shield smooth ovate; para - anal setae subequal to postanal seta. Peritreme extending dorsally to level of setae Z1.

Length of leg I 275.4 u, leg II 229.5 u, leg III 183.6 U and leg IV 306 u.

Biological studies

This species feeds and develops on larvae of house and vinegar flies . Mating is essential for egg deposition; female lays its singly on substratum. Cannibalism was recorded as adults fed on larvae during food shortage. Results showed that no differences occurred between developmental periods when feeding on the two previously mentioned flies as female life cycle averaged 4.50 and 4.32 days,m respectively. Adult female longevity was nearly similar when feeding on house and vinegar flies larvae, this period averaged 28.42 and 27.11 days, respectively (Table 1).

Male different stages followed similar trend, but with slightly shorter periods. Biological aspects such as hatching , moulting and mating are similar to those of the other species of family Macrochelidae.

The oviposition period was nearly similar when feeding on the larvae of house and vinegar flies , as it averaged 22.18 and 21.70 days, respectively (Table 2) .

With regard to female fecundity , it was nearly similar when feeding on larvae of the two files . An average female deposited 24.60, and 19.94 eggs with a daily rate of 1.11 and 0.92 eggs on the previous preys, respectively (Table 2).

Table 1. Duration of *Macrocheles africanus* H., E. & N. fed on larvae of house and vinegar flies at 30 °C

	Sex	Average period in days	
		Larvae of House fly	Larvae of vinegar fly
Incubation period		0.29 ± 0.0	0.29 ± 0.1
Larva	Female	1.00 ± 0.1	1.00 ± 0.0
	Male	0.85 ± 0.1	1.00 ± 0.2
Protonymph	Female	1.07 ± 0.2	1.00 ± 0.1
	Male	1.00 ± 0.0	0.98 ± 0.1
Deutonymph	Female	2.16 ± 0.2	2.00 ± 0.2
	Male	1.75 ± 0.2	1.68 ± 0.1
Total immatures	Female	4.20 ± 0.2	4.00 ± 0.1
	Male	3.59 ± 0.1	3.62 ± 0.2
Life cycle	Female	4.50 ± 0.2	4.32 ± 0.2
	Male	3.85 ± 0.2	3.91 ± 0.3
Longevity	Female	28.42 ± 2.7	27.11 ± 3.4
	Male	22.84 ± 1.9	19.15 ± 2.6
Life span	Female	32.50 ± 1.6	31.39 ± 2.7
	Male	26.46 ± 2.3	23.40 ± 2.2

Table 2. Effect of prey species on female longevity and fecundity.

Prey larvae	Average periods in days			No. of eggs / female	
	Pre-oviposition	Ovi-position	Post - ovi position	Total average	Daily rate
House fly	3.00 ± 0.5	22.18 ± 1.5	3.38 ± 0.7	24.60 ± 3.8	1.11 ± 0.3
Vinegar fly	2.34 ± 0.5	21.70 ± 1.9	3.10 ± 0.4	19.94 ± 2.7	0.92 ± 0.4

DISCUSSION

Mcrocheles africanus H., E. & N. predates on larvae of flies. Filipponi (1960) stated that *M. muscaedomesticae* (Scopoli) was common as a phoretic on *Musca domestica, Stomoxys calcitrans*, and *Fannia canicularis*, and was recovered from 11 additional fly species by Petrova (1964). At least three other species of *Macrocheles* were recorded as occasional to fairly common phoretic on synanthropic flies.

This genus has potential for biological control of dung - breeding flies (Krantz 1983) . Consideration of the biological charactristics of *M. africanus* may clarify its potential as a biological control agent. Its relative short generation allowed the predator mite to increase.

This , with the mite's voracious feeding habit and other biological traits, indicate that the mite can be useful in the biological control of house fly and vinegar fly.

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تاريخ الحياه لمفترس الذباب *Macrocheles africanus*

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أجريت هذه الدراسة بغرض دراسة جميع المظاهر البيولوجية لهذا النوع المفترس من العناكب من سرعه التطور والتكاثر عند تغذيته علي اليرقات حديثه الفقس للذباب المنزلي وذبابة الخل (الدروسوفيلا) وأظهر البحث أن مدة الأطوار غيرالكاملة أستغرقت ٤,٢٠ و ٤,٠٠ يوما للأنثي أما مدة الطور البالغ فلقد أستغرقت ٢٨,٤٢ ، ٢٧,١١ يوما علي الترتيب عند تغذيته علي اليرقات الحديثه السن لكل من الذباب المنزلي والدروسوفيلا. وكان متوسط ما وضعته الأنثي من البيض طوال فترة حياتها ٢٤,٦٠ بيضه بمعدل ١,١١ بيضه يوميا عند التغذية علي يرقات الدروسوفيلا ، وقد أجريت هذه التجارب علي درجة حرارة ٣٠ م°، ويقوم هذا النوع بافتراس بيض ويرقات أنواع الذباب المختلفه ويمكن أن يلعب دوراً كبيرا وهاما في مجال المكافحة البيولوجيه . كذلك اشتمل هذا البحث علي رسم ووصف الاطوار غير الكامله لهذا النوع المفترس .