Dept. of Zoology,
Fac. of Science, Assiut Univ., Assiut, A.R.E.
Head of Dept. S.H. Esmail

SOME BIOLOGICAL OBSERVATIONS ON AEDES CASPIUS, CULEX PIPIENS MOLESTUS AND CULEX ANTENNATUS (DIPTERA: CULICIDAE).

(With 3 Tables)

By

A.A. ABDEL-AAL

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بعض الملاحظات البيولوجيه على بعوض الأيدس كاسبيس ، الكيولكس بيبينز موليستس والكيولكس أنتيناتس

عبد العال عبد المجيد عبد العال

الدراسه توضح أن بعوض الأيدس كاسبيس يفضل المصائد المعدنيه لوضع البيض داخل أو قريب من المنازل ويضع البيض على مسافه لا تزيد عن ٨٠ متر وبعوض الكيولكس بيبينز موليستس يفضل المصائد البلاستيكيه لوضع البيض بينما الكيولكس أنتيناتس لم يتضح أفضليته لأى من الأنواع الثلاثه لوضع البيض وكلا النوعين الأخيرين أفضليه فى وضع البيض خارج المنازل بمسافة ١٠٠ متر .

كما وجد فى هذا البحث علاقه سالبه غير معنويه بين كثافة يرقات وعذارى بعوض الأنواع الثلاثه السابقه وكثافة المفترسات المصاحبه لها فى عام ١٩٩٢ . كما وجد علاقه موجبه بين كثافة المفترسات ويرقات بعوض الكيولكس أنتيناتس فى عام ١٩٩٣ بينما لا يوجد أى ارتباط مع بعوض الكيولكس بينز موليستس وكانت سالبه غير معنويه .

SUMMARY

The present study showed that *Aedes caspius* preferred metal ovitraps inside or near houses but may breed as farout as 80 m. from houses. *Culex pipiens molestus* preferred plastic, ovitraps while *Culex antennatus* did not show any preference for any of the three types of containers (metal, glass, plastic) both species favord outdoor habitats and may breed as far as 100 m. from houses. Insignificant negative correlations were found between the density of larvae and pupae of culicine mosquitoes and the density of associated predaceous (in, 1992). Insignificant positive correlations were found between the density of predaceous and the density of the larvae of *Culex antennatus* (in 1993), wherease the relationship with *Culex pipiens molestus* was insignificantly negative.

Keywords: Biological observations, Aedes Caspius, Culex pipiens molestus, culex antennatus.

INTRODUCTION

Culex pipiens molestus and *Culex antennatus*, are the main mosquito vectors of filariasis in Assiut Governorate *(ABDEL-AAL, 1983)*. The oviposition preferences of different mosquitoes are generally influenced by various environmental factors. The physical and chemical factors in larval habitats include among others relative humidity, organic and inorganic components, light reflections, temperature, salinity, pH, color, as well as odor of the breeding water. For *Aedes aegypti* the factors found to exert the most influence on the selection of oviposition sites include texture, color and shape of containers, as well as odor and taste of the contents *(LEAHY, 1980; ROBERS, 1980 and REUBEN, 1980)*.

The present study was carried out to determine the distance from houses, these species may breed and the relative attractiveness of field-exposed containers utilized by the mosquitoes for oviposition. The fluctuation of the associated predators in different areas and their efficiency in devouring mosquito larvae in the laboratory and field have been studied during the present work.

There are several arthropods which are considered as predators to mosquito larvae. Among the natural enemies of mosquitoes are dragon flies and aquatic beetles *(JENKINS, 1964)* and *EL-RAYAH (1976)* in Sudan found that full grown nymphs of

the dragonfly *Trithemis annulata* showed intense predation to *Anopheles pharoensis* and *Aedes aegypti*.

MATERIAL and METHODS

Six areas in Assiut city corresponding to the faculty and staff residential areas were chosen. The last house in each area was taken as the first experimental station at a distance of 100 m and 20 m intervals was measured from the house. Thus each set-up is composed of six stations, one each at 0, 20, 40, 60, 80 and 100 m. These places were carefully selected so that no human or animal may stray to disturb the containers or to provide blood meals for the mosquitoes.

Three different types of artificial containers were used: metal, glass and plastic, the sizes of which may hold approximately 400-500 ml of water. These containers were placed side by side at each experiment station. At the first station, the containers were placed outside the house but within the 100 m. All the containers were filled with water to 2/3 capacity, inspected every 2-3 days, and refilled as needed. Once a month, the larvae were collected, placed in separate vials, and brought to the laboratory for identification. All collecting different larvae instars were allowed to pupate, while pupae were allowed to emerge as adults.

To study the correlation between mosquito population from one side and physical as well as biotic factors from the other side, weekly sampling of 10 dips were taken using a standard triangular net for every area. In the laboratory the number of culicine larvae and pupae were stimated/10 dipes. Moreover, all predators in addition to other fauna associated with the samples were identified and recorded. For determining the efficiency of predators to devour mosquito larvae and pupae, about 100 larvae or pupae associated with one predator were placed in a porcelain pot filled with 100 ml of water. After 24 hr. the number of larvae consumed by predator were recorded. These experiments were conducted with all predators which were found in the mosquito breeding places for several days.

RESULTS

Table (1) shows the range of nearest and /farthest distance of breeding habitats and the number of larvae collected per month for each of *Aedes caspius; Culex pipiens* molestus and *Culex antennatus*. Most of the larvae of *Aedes caspius* were found inside and near houses showing that the species is primarily a domestic breeder. However, a negligible

number occasionally occurred in containers as for as 80 m from houses. Only 16.84% of the total number of larvae collected were *Aedes caspius*. *Culex pipiens molestus* composed 54.46% of the total larvae collected, while the range was 0-100 m *Culex antennatus* composed 29.06% of the total larvae collected. It is range of breeding was 0-100 m from houses.

Table (2) shows the larval breeding preferences of the three species of mosquitoes using artifical ovitraps. Of the 445 *Aedes caspius* larvae, 46.07% were collected from metal containers, 20.90%, from glass, and 33.03% from plastic. Of 1471 *Culex pipiens molestus* larvae collected 62.07% were from plastic ovitraps, 23.99% from metal ovitraps and 13.94% from glass. For *Culex antennatus* 785 larvae were collected; 33.76% were from metal containers, 30.57% from glass, and 35.67% from plastic ovitraps. Using the Z-test for proportions with trinomial distribution as a model, the results showed that the preference of *Aedes caspius* and *Culex pipiens molestus* for metal and plastic ovitraps respectively was statistically significant. There was no significant difference in preference of *Culex antennatus* for any of the artificial ovitraps.

Data in table (3) show the simple correlation coefficient and corresponding regression coefficient between predators density and numbers of culicine larvae and pupae. Insignificant negative correlations were found between predator's density and the density of total culicine larvae and pupae, *Culex pipiens molestus, culex antennatus* and *Aedes caspius.*

Highly positive correlation coefficient was found between predator's density and *Aedes caspius* larvae density (in (1992). However, insignificant positive correlations were found between predator's density and *Culex antennatus* larvae density (in 1993), whereas the relationship with *Culex pipiens molestus* was insignificantly negative.

DISCUSSION

This study suggests that *Aedes caspius* is generally an indoor breeder in the study area but, in the absence of other breeding habitats, it is also capable of utilizing artificial breeding places located farther away from houses. This suggests that ordinary houshold control measures such as frequent changing of water in flower vases, covering of water containers, and spraying are inadequate.

In the case of *Culex pipiens molestus* which prefers to breed outdoors and much farther from houses.

Culex antennatus has different egg-laying habits compared with *Aedes caspius* and *Culex pipiens molestus.* Eggs are laid in

batches directly on the water surface and these do not require the rough surface needed by culicine mosquitoes. In the single-larva survay *Culex antennatus* was found mostly in scattered eartheware jars and ceramics *(Rifaat et al., 1970)*. No preference for any of the artificial ovitraps is shown in the present study.

In the single-larva survey conducted in the same residential areas *(Farghal, 1979)*, was shown that *Aedes caspius* preferred metal containers over plastic or glass. The same result is obtained in the present study. Rusting of the metal ovitraps occurred after some time, thus providing the rough surface necessary for the females to gain a strong foothold during ovipositions. The inner surface of the plastic container may also provide the necessary roughness but other unidentified physical and chemical factors affecting breeding preference might have made wood as the only second choice for *Aedes caspius*. According to *LEAHY and ROBERTS (1980)* the water temperature in glass containers after exceeeds 40°C, a level not tolerated by *Aedes aegypi*. The smoothness of glass also makes it unsuitable for breeding. Beingan outdoor breeder, *SURGEONER (1980)* found that *Culex sp.* preferred the plastic and metal containers over glass ovitraps. Again, the rough sides of these two types of ovitraps provided a suitable surface for egg laying of culicine mosquitoes.

Culex antennatus prefer to breed in polluted water in stagnant canals, cisterns, pools, etc. These habitats are usually located several meters from houses. Occasionally *Culex antennatus* may breed in the immediate surroundings of houses, but their number is minimal.

The foregoing results indicate that the biological control of culicine mosquitoes in their breeding places is faced by different limiting factors which ought to be considered. First of all, the diversity of these breeding habitats. In this concern the appropriate breeding sites of *Culex pipiens molestus* in association with *Theobaldia longiareolata* which tolerate comparatively high organic material are not infavour with other species. The phenomenon was also observed by previous workers in egypt from *KIRKPATRICK (1925)* till the present work. In addition to the effect of the breeding places factors on the species distribution in different ecological areas, it also affects the predators species distribution. In the present work, *Dytiscus sp. Chaoborus sp.*, Odonata nymphs and frog tadpoles were found.

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Table 1: Distance of larval habitats of *Aedes caspius*, *Culex pipiens molestus* and *Culex antennatus* from houses in Assiut city (October, 1992 - September, 1993)

Species	*Aedes caspius*				*Culex pipiens molestus*				*Culex antennatus*				Total No. of	% of
No. larvae month	% of Collected	Distance total	N.	F.	No. larvae Collected	% of total	Distance N.	F.	No. larvae collected	% of total	Distance N.	F.	Culicine mosquitoes	Total
1992														
Oct.	10	2.25	0	40	80	5.44	0	100	34	4.33	0	60	124	4.59
Nov.	15	3.37	0	20	93	6.32	20	40	52	6.62	20	80	160	5.92
Dec.	18	4.04	0	60	105	7.14	0	40	71	9.05	40	80	194	7.18
1993														
Janua.	63	14.16	0	80	220	14.96	0	100	36	4.59	20	100	319	11.81
Febr.	78	17.53	0	20	241	16.38	0	100	153	19.49	0	100	472	17.48
Mar.	143	32.13	0	20	181	12.30	20	80	162	20.67	-	-	486	17.99
Apr.	82	18.43	0	20	73	4.96	0	40	100	12.74	0	80	255	9.44
May	9	2.02	0	40	96	6.53	0	60	90	11.46	0	60	195	7.22
Jun.	0	-	-	-	50	3.39	0	40	58	7.39	0	100	108	3.99
Jul.	0	-	-	-	100	6.79	0	20	0	-	-	-	100	3.70
Aug.	20	4.49	0	40	142	9.65	0	60	0	-	0	40	162	5.99
Sep.	7	1.57	0	20	90	6.12	0	80	29	3.69	0	40	126	4.66
			Range				Range				Range			
	445	16.48	0-60		1471	54.46	0-100		785	29.06	0-100		2701	

N. = near F. = farth

Table 2: Larval breeding preference of *Aedes caspius*, *Culex pipiens molestus* and *Culex antennatus* using artificial ovitraps (October, 1992 - September, 1993).

Species	Total No. of larvae	Distribution of larvae in different artificial ovitraps		
		metal	glass	plastic
Aedes caspius	445 16.48%	205 46.07%	93 20.90%	147 33.03%
Culex pipens molestus	1471 54.46%	353 23.99%	205 13.94%	913 62.07%
Culex antennatus	785 29.06%	265 33.76%	240 30.57%	280 35.67%

Table (3): Simple correlation coefficients and regression coefficients between Predator's number and species of culicine mosquitoes (Larvae and pupae) in Assiut city (1992 - 1993).

Species	1992		1993	
	Simple correlation coefficient	Regression coefficient	Simple correlation coefficient	Regression coefficient
Culicine larvae	-0.367	-0.010	0.141	0.148
Culicine pupae	-0.316	-0.710	0.158	0.468
Culex pipiens molestus	-0.391	-2.153	-0.138	-0.691
Culex antennatus	-0.156	-1.432	0.140	0.863
Aedes caspius	-0.398	-2.513	0.738	4.018