Mosquitos’ species of Diyala province, Iraq

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Abstract—In the present study; the electrical mosquito’s killer collection method was used for adult mosquitoes. Two different stations for fixing electrical mosquito’s killer were chosen in the study area of veterinary college of medicine of Diyala University, Baquba, Al-muradia. Total number of 553 insects collected; total number of mosquitoes n = 70; Two genera Anopheles n=21 and Culex n= 49 adults were recorded with no significance difference P-Value = 0.565; Three spp. were identified and classified as follows: Cx. (Cux.) pipiens Linnaeus 1758, An. (Cel.) stephensi Liston 1901 and An. (Ano.) sacharovi Favre 1903.

There was significant difference p=0.010 between monthly distribution in favor of March 2017, were the total number of the insects (n=507) and the number of mosquitoes (n=64) and lowest number were in January and February (n=0) reported. Results revealed also significant difference p=0.248 between the monthly total number of mosquitoes and other insects and monthly total number of mosquitoes; Mosquitoes were captured indoors more Anopheles than outdoors; Culex recorded in November, December and March, while anopheline reported in March only in time of study.

Our present study entomological data calls the health authority to conduct further survey for Mosquito species in the province to its great role as vector of malaria.

Keywords—Mosquito, Anopheles, Culex, Diyala, Iraq.

1. INTRODUCTION

There are 3,500 named species of mosquito, of which only a couple of hundred bite or bother humans.

Mosquitoes are one of the deadliest animals in the world. Their ability to carry and spread disease to humans causes millions of deaths every year. In 2015 malaria alone caused 438,000 deaths. The worldwide incidence of dengue has risen 30-fold in the past 30 years, and more countries are reporting their first outbreaks of the disease. Zika, dengue, chikungunya, and yellow fever are all transmitted to humans by the Aedes aegypti mosquito. More than half of the world’s population lives in areas where this mosquito species is present.

Not only can mosquitoes carry diseases that afflict humans, they also transmit several diseases and parasites that dogs and horses are very susceptible to. These include dog heartworm, West Nile virus and Eastern equine encephalitis. In addition, mosquito bites can cause severe skin irritation through an allergic reaction to the mosquito’s saliva - this is what causes the red bump and itching.

Iraqi Culicinaemosquitoes had been studied by many workers since 1920, wrote on some Culicidae of the southerm Iraq; then in 1921 by Christopher and Shortt (4), have been recorded from Iraq genus Anopheles: algeriensis, martensi, claviger, sacharovi, maculipennis (typical form), hyrcanus, dihali, fluviatilis, multicolor (the inclusion of multicolor rests on the reputed capture of the an adult at Sedat-al-Hindiyeh in May 1943), superpictus, stephensi, pulcherrimus; (8); write an list of Culicinein the central region including Baghdad during August to November, 1954; (9) found Aedes aegypti in Baghdad; (10), and worked on keys for Iraqi culicine larvae in general.

The previous authors belive that the culicine mosquitoes are still improperly suted; only 12 species (Culex theleri, C. pusillus, C. tritaeniorychus, C. pipinespinoipes, C. pipinesfrigans, C. torrentium, Aedes capriscus, A. dorsalis, Theobaldiongariylareolata, Th. subochea, Th. annulata and Urrantiaeniugulae); have been reported from Iraq and half that number from Baghdad.

(13) Provided some notes on the bionics of An. Maculipennis and An. sacharovi from Iran and Iraq and examined the distribution of the two species in central and northern areas of Iran. (14) Recorded 15 species of Anopheles from Iran and provided a key for the identification of these species in both Iran and Iraq.

Of the almost 16 anopheline species so far recorded in Iraq (5, 14, 7, 15) only 3, Anopheles stephensi Liston, An. sacharovi Favre and An. superpictus Grassi are proven to be vectors of malaria. An. p.chirrimum Theobald has been suspected of being a vector in Najaf Province.

Mosquitoes records in Iraq shows Variation of species number reported; In 12 Iraqi provinces were collected and speciated. Four Anopheles (An. pulcherrimus, An. stephensi, An. superpictus, and An. sacharovi) and one Culex (Cx. pipiens).
puppiens) species were identified. *Anopheles pulcherimus* was found in 11 provinces, *An. stephensi* in 7, *An. superpictus* in 2, and *An. sacharovi* in one province, while *Cx. pipiens* was found in all the 12 provinces. Two peaks of mosquito density were found: the first from April–June and the other from September–October (17); while 10 species up to 37 species belong for 4 genera (*Anopheles*, *Culex*, *Aedes* and *Culiseta*) as shown in table (1) (18).

*Modified Table 1: Updated checklists of mosquito species from Afghanistan and Iraq* (after Rueda et al.2008).

| Species | Iraq |
|---------|------|
| Aedes (Aedemorphus) vexans (Meigen 1830) | R |
| Ae. (Ochlerotatus) caspius (Pallas1771) | A1, K, X |
| Ae. (Och.) dorsalis (Meigen1830) | I, K |
| Anopheles (Anopheles) algeriensis Theobald1903 | A2, G, P |
| An. (Ano.) claviger Meigen1804 | A2, G, P |
| An. (Ano.) hyrcanus (Pallas) 1771 | A2, G, K, P |
| An. (Ano.) maculipennis Meigen1818 | A2, G, K, P |
| An. (Ano.) marteri Senevet and Prunnelle1927 | A2, G, K, P |
| An. (Ano.) melanoon Hackett | G |
| An. (Ano.) sacharovi Favre 1903 | A2, G, K, P |
| An. (Cel.) apoci Marsh | A2, G, K |
| An. (Cel.) culicifacies Giles | A2, G, K |
| An. (Cel.) dthali Patton 1905 | A2, G, K, P |
| An. (Cel.) fluviatilis James 1902 | A2, G, K, P |
| An. (Cel.) multicolor Cambouliu1902 | A2, G, K, P |
| An. (Cel.) pulcherrimus Theobald 1902 | A2, G, K, P, X |
| An. (Cel.) sergentii (Theobald) 1907 | A2, G, K, X |
| An. (Cel.) stephensi Liston 1901 | A2, G, K, P, X |
| An. (Cel.) superpictus Grassi 1899 | A2, G, K, P |
| An. (Cel.) turkhudi Liston | A2, G |
| Culex (Barradius) modestus Ficalbi | A1, K |
| Cx. (Bar.) pusillus Macquart | A1, I, K |
| Cx. (Culex) mimeticus Noe | A1, I, H1, H2 |
| Cx. (Cux.) perexiguus Theobald | H2, X H1, H2 |
| Cx. (Cux.) pipiens Linneaus | A1, I, H1, H2, K, X |
| Cx. (Cux.) pseudovishnui Collens | H2 |
| Cx. (Cux.) quinquefasciatus Say | H2, I, K, X |
| Cx. (Cux.) theileri Theobald | A1, H1, H2, I, K, X |
| Cx. (Cux.) tritaeniorhynchus Giles | A1, H1, H2, I, K, X |
| Cx. (Mailloitia) deserticola Kirkpatrick | H1, I |
| Cx. (Mai.) hortensis Ficalbi | A1, I |
| Cx. (Neoculex) territans Walker | A1 |
| Culiseta (Allotheobaldia) longiareolata (Macquart) | A1, I, K, X |
| Cs. (Culicella) fumipennis (Stephens) | U |
| Cs. (Culiseta) annulata (Schrank) | I, K |
| Cs. (Cus.) subochrea (Edwards) | A1, I, K |
| Uranotaenia (Pseudoficalbia) unguiculata Edwards | A1, K |

Total number of species: 37
The aim of present study is to provide an up-to-date list of mosquitoes collected from internal girl’s residence and animal farm of veterinary college of medicine of Diyala University.

II. MATERIALS AND METHODS
In the present study; The electrical mosquitoes killer collection method was used for outdoor and semi-indoor resting mosquitoes. For the present entomological survey, 2 fixed stations of electrical mosquitoes killer were put in the internal girl’s residence and animal farm of veterinary college of medicine of Diyala university area, Al-muradia, and they were visited weekly to collect mosquitoes vector and other insects killed. The study time conducted from November 2016-March 2017. The vectors were monitored at adult stages from various habitats. Specimens were identified to species using keys and descriptions from pertinent literature (e.g., 24, 22, 28).

III. RESULTS
Total of 553 as shown in table (2); Two genera Anopheles n=21 and Culex n= 49 adult species of mosquitoes were recorded with no significance difference between total number of genera P-Value = 0.565, table (2); their spp. were identified and classified as follows:

| Month          | Total number of genera | Total number of mosq. | Total number of insects |
|----------------|------------------------|-----------------------|-------------------------|
| November 2016  | 4                      | 0                     | 4                       | 12                      |
| December 2016  | 2                      | 0                     | 2                       | 34                      |
| January 2017   | 0                      | 0                     | 0                       | 0                       |
| February 2017  | 0                      | 0                     | 0                       | 0                       |
| March 2017     | 43                     | 21                    | 64                      | 507                     |
| **total**      | **49**                 | **21**                | **70**                  | **553**                 |
Fig. 3: Monthly distribution of Mosq. and other insect

Fig. 4: Monthly distribution of Mosq. and other insects

Order Diptera
Family Culicidae
i. Sub family culicinae
   Cx. (Cux.) pipiens Linnaeus 1758
ii. Sub family Anophelinae
   An. (Cel.) stephensi Liston 1901
   An. (Ano.) sacharovi Favre 1903

Fig. 5: Cx. (Cux.) pipiens Linnaeus 1758

Fig. 6: An. (Cel.) stephensi Liston 1901

Fig. 7: Anopheles An. (Ano.) sacharovi Favre 1903
There was significant difference between monthly distribution in favor of March month p=0.010; Results revealed that the highest number of mosquitoes reported in March 2017 (n=70) and lowest in January and February (n=0) ; Results revealed also that the highest number of mosquitoes and other insect reported in March 2017 (n=507) and lowest in January and February (n=0) but with no significant difference p= 0.565 ; mosquitoes were captured indoors more Anopheles than indoors ; Culex recorded all over the time outdoors more than indoors resting places.

IV. DISCUSSION

There is growing evidence that the northern house mosquito, Culex pipiens (Diptera: Culicidae), is a major vector of avian malaria in the northern hemisphere. This mosquito, which can act as a vector of several other infectious diseases such as arboviruses(29),

Mosquitoes of Culex pipiens prevailing in November December and March both indoors and outdoors, this result agree with(30) in that, it is a highly adapted to all the different types of environments; the adults of C. pipiens group are thought to appear throughout the year31).

The study shows that 2 species Anopheles An. (Ano.) sacharovi Favre 1903 ; An. (Cel.) stephensi Liston 1901 the proven vectors of malaria were encountered in Diyala area.

The findings revealed that A. stephensi and A. sacharovi were present during March 2017 in indoors resting disagrees with(20) who found that A. stephensi adults were present during all months of the year except January and also disagree with (17) who recorded the presence of An. Pulcherrimusand An. Superpictus only in Diyala province, but our finding of C. pipiens identification agree with previously author.

Both the critical and normal thresholds were determined from the entomological data before, during and after the epidemic which is an important signal in malaria epidemiology and mosquitoes control.

In Iraq, increased Anopheles densities are not always associated with an epidemic disease but could be used as an indicator of epidemic risk. A.stephensi is the major malaria vector in the central and southern regions of Iraq. Indoor resting A. stephensi density was used as an indicator of epidemic risk when its density exceeded the critical level.

V. CONCLUSION

Our present study entomological data calls the health authority to conduct further survey for Mosquito species in the province to its great role as vector of malaria. 

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