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A Morphometrical Study of Varroa Mite, a Parasite Living on Syrian Honeybees *'Apis mellifera syriaca'*

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□ ABSTRACT □

One hundred and ninety eight samples of honeybee mites, infecting Syrian honeybee '*Apis mellifera syriaca'*, were from five different locations covering the main beekeeping regions of Syria and analyzed morphometrically in the laboratory of honeybee researches in Faculty of Agriculture, University of Damascus. The measurements taken were the body length and width (Anderson & Trueman 2000). The results were compared with those of *V. jacobsoni* and *V. destructor* reported by (Anderson & Trueman 2000) to confirm which species of mite is present on Syrian honeybee. No significant differences were shown between specimens coming from the five different Syrian regions. However, remarkable differences were present between Varroa mites infecting Syrian apiaries and both Varroa species already known (*destructor* and *jacobsoni*, Anderson and Trueman 2000).

Keywords: *Apis mellifera syriaca*, Morphometrical study, Varroa mite, *Varroa destructor*, *Varroa jacobsoni*.

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دراسة مورفومترية على الفاروا *Varroa sp.* المتطفل على نحلة العسل السورية *'Apis mellifera syriaca'*

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□ الملخّص □

تـم دراسـة مئـة وثمانيـة وتسـعين طفيـل فـاروا *Varroa sp.* مـتطفلاً علـى سـلالة نحـل العسـل السـورية *'Apis mellifera syriaca'* من خمس محافظات سورية، تمثل هذه المحافظات النشاط النحالي الأهم في سورية. درست هذه العينات مورفومترياً في مختبر بحوث نحل العسل في كلية الزراعة بجامعة دمشق عام 2005 ، حيث تم قياس كل من طول جسم الطفيل وعرضه (Anderson & Trueman 2000). تم مقارنة النتائج مع المعطيات المورفومترية لكلٍ من النوعين العالميين المعروفين لهذا الطفيل *V. destructor* و *V. jacobsoni* (Anderson & Trueman 2000) وذلك من أجل توصيف وتحديد نوع الفاروا الذي يصيب سلالة نحل العسل السورية.

لم تلاحظ خلال التحليل الإحصائي أية فروقات احصائية بين عينات الطفيل الأتية من المحافظات السورية الخمسة مما يثبت أنها تعود لنوع واحد. في حين أن الفروقات كانت معنوية بين كل من العينات المحلية لهذا الطفيل (باعتبارها نوعاً واحداً) وكل من النوعين العالميين الموصوفين مسبقاً.

الكلمات المفتاحية: نحلة العسل السورية، طفيل الفاروا، دراسة مورفومترية، *Varroa destructor*، *Varroa jacobsoni* .

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Introduction:

Varroa sp. (Acari: Mesostigmata: Varroidae) is a parasite mite which causes tremendous damage to honeybees worldwide. Varroa mite can kill honeybee colonies within 1-2 years if left untreated. Various chemicals have been used to control this mite, but unfortunately chemicals can potentially harm bees and also contaminate honey if not used carefully. This pest is also developing resistance to chemicals. It is well known that drone brood is 10-12 times more attractive to mites compared with worker brood. Once honeybee workers seal the immature drone cells, mites suck hemolymph from the brood and reproduce it in a safe environment where few chemicals can penetrate to reach them.

This study was conducted because of the presence of this parasitic mite as a major pest of honeybee around the world (Sammataro *et al*., 2000). It is well known that this pest now causes a lot of economical losses. This study was carried out in order to identify the *Varroa* species which is found in Syrian apiaries as well as to get necessary answers to control this serious worldwide pest (Delfinado 1963; De Jong *et al.*, 1982; Sammataro *et al.*, 2000). This parasite has been studied at molecular level (Kraus *et al.*, 1995; De Guzman *et al*., 1997; De Guzman *et al*., 1998; De Guzman, L.I. & Rinderer, T.E., 1999) and has been split into two species, *Varroa jacobsoni*, infecting *Apis cerana* and *Varroa destructor* infecting mainly '*Apis mellifera* L.' (Koeninger *et al.*, 1983; Anderson & Trueman 2000). The Varroa species infecting Syrian honeybee has not been fully studied; it is thought that this Varroa species is *V. jaco*bsoni (Daher Hjaij *et al.*, 2004) and there was no presence of other species. The aim of this research is to try to determine the Varroa species, infecting Syrian honeybee *'Apis mellifera syriaca.*' Therefore samples from five different locations, covering the main beekeeping regions of Syria, were taken out and analyzed morphometrically (Anderson and Trueman 2000). Body length and width of samples were compared with other existed references.

Importance and Purpose:

This study was done because of the presence of this worldwide pest (*Varroa sp*.) on honeybee. Since no morphometrical studies were done before on *Varroa* mite infecting Syrian honeybee, we tried first to see if there were any morphometrical differences between the mites specimen coming from the five Syrian regions showing an important beekeeping activity. Secondly, a comparison was made to prove whether the mite infecting Syrian honeybee belongs to *destructor* or *jacobsoni* species.

Materials and Methods:

This study was done in 2005 at the laboratory of honeybee researches in Faculty of Agriculture, University of Damascus. Samples were taken between May-July 2005 from Syrian honeybee colonies in five different regions in Syria (Kuneitra, Homs, Hama, Tartus and Lattakia) (figure1). The mite specimens were conserved in 70% alcohol without damaging their bodies. In total, one hundred eighty nine Varroa females from the five regions mentioned were examined morphometrically using light microscopy (the length and width of each female were measured individually). Measurements of mite specimens were made in micrometers (µm), the females examined were fixed on glass microslides using sucrose liquid.

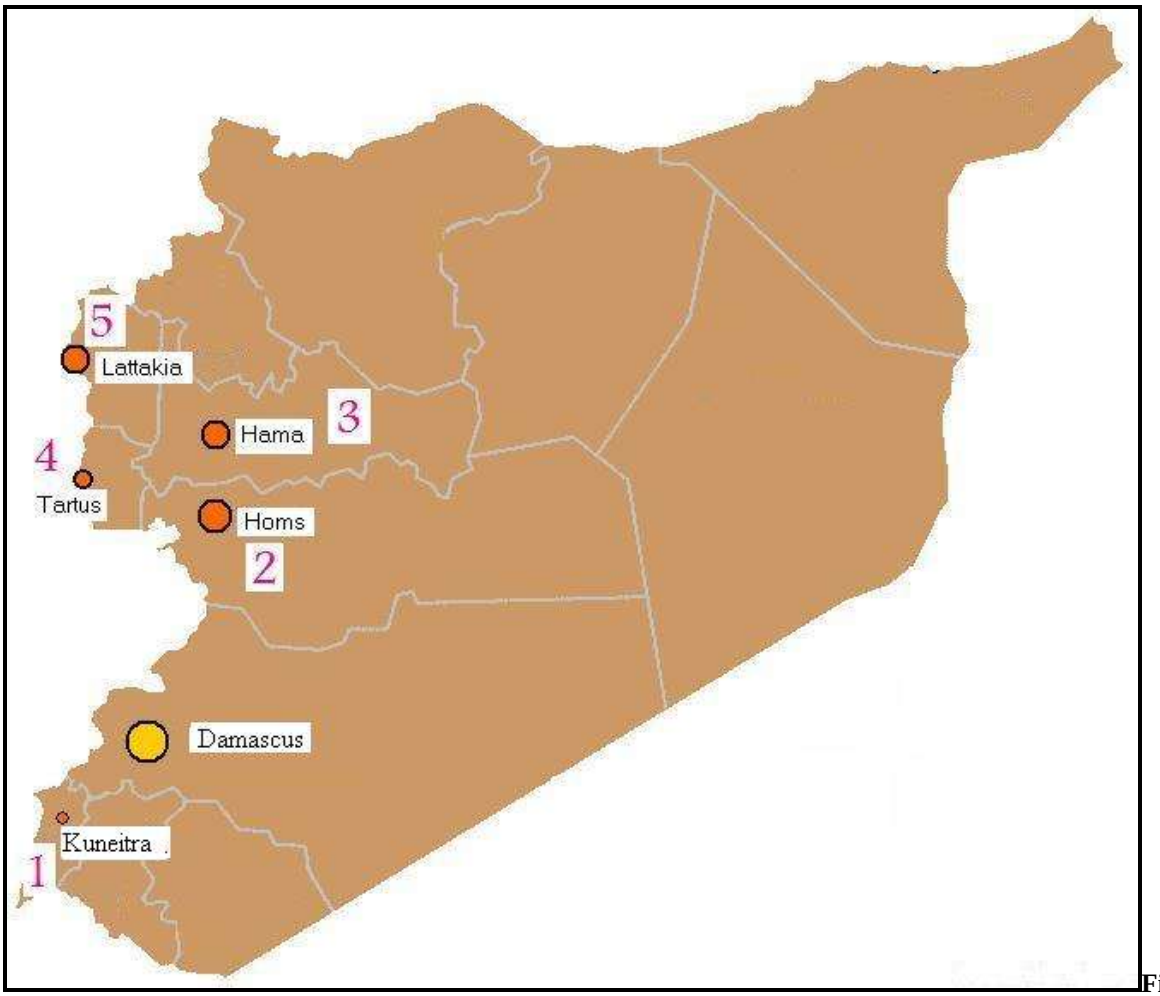

Fig. (1): Mite specimens taken from the five main Syrian beekeeping regions.

Results and Discussion:

The morphometric measurements, length and width of bodies are represented in table 1, along with the values reported by Anderson and Trueman (2000) of the two *Varroa* species (*destructor* and *jacobsoni*).

Table1. Body length and width (µm) of Varroa females coming from Syrian honeybee compared with those of *V. jacobsoni* from Flores-Java and *V. destructor* from Japan/Thailand-Vietnam reported by Anderson and Trueman (2000), N: number of specimens and SD: standard deviation.

Species	N	Body length		Body width	
		Mean	SD	Mean	SD
v. mites (Lattakia -Syria)*	33	1134.4	29.2	1664.4	33.4
v. mites (Homs-Syria)*	45	1121.2	31.0	1676.1	37.4
v. mites (Hama-Syria)*	39	1118.1	29.4	1660.3	54.1
v. mites (konaitera -Syria)*	40	1127.7	31.7	1659.8	46.7
v. mites (Tartus-Syria)*	41	1143.2	32.2	1679.1	39.1
v. destructor**	---	1167.3	26.8	1708.9	41.2
v. jacobsoni**	---	1063.0	26.4	1506.8	36.0

*** Data based on 33-45 mites.**

**** Data from Anderson and Trueman (2000).**

Table 2 presents the 95% confidence interval for body (length and width) of the specimens coming from the five Syrian regions.

Table 2. Body length and width (µm) of Varroa females coming from the five Syrian regions. N: number of specimens and Conf. Inter.: 95% confidence interval (µm).

Species	N	Body length		Body width	
		Mean	95% Conf. Inter.	Mean	95% Conf. Inter.
v. mites (Lattakia - Syria)*	33	1134.4	1073.3 - 1188.0	1664.4	1599.8 - 1721.3
v. mites (Homs-Syria)*	45	1121.2	1019.3 - 1174.5	1676.1	1579.5 - 1782.0
v. mites (Hama-Syria)*	39	1118.1	1046.3 - 1167.8	1660.3	1552.5 - 1849.5
v. mites (Konaitera -Syria)*	40	1127.7	1012.5 - 1174.5	1659.8	1552.5 - 1728.0
v. mites (Tartus-Syria)*	41	1143.2	1059.8 - 1208.3	1679.1	1586.3 - 1748.3

* Data based on 33-45 mites from each region.

Results were statistically analysed using SPSS program. One-way ANOVA test was used to analyze the results of mites' measurements. This test shows that no significant differences (between groups) were present among the mite specimens coming from the different Syrian regions; therefore they were grouped and considered as a one species (table 3).

Table 3. Body length and width (µm) of Varroa females coming from Syrian honeybee compared with those of *V. jacobsoni* from Flores-Java and *V. destructor* from Japan/Thailand-Vietnam reported by Anderson and Trueman (2000).

Species	N	Body length		Body width	
		Mean	SD	Mean	SD
v. mites (Syrian)*	198	1134.0	11.6	1675.5	22.9
v. destructor**	---	1167.3	26.8	1708.9	41.2
v. jacobsoni**	---	1063.0	26.4	1506.8	36.0

* Data based on 198 mites.

** Data from Anderson and Trueman (2000).

Based on the results of ANOVA test, we are now able to deal with two general measurements (1134.0, 1675.5) which represent both (length and width) of the Varroa's body infecting Syrian honeybee *'Apis mellifera syriaca'* (table 3).

Looking at results in table 3, it seems that Syrian mite specimens come closer to *V. destructor* than *V. jacobsoni*; therefore T-test was done to confirm whether significant differences are present or not between our results and the references of both (*V. destructor* and *V. jacobsoni*) reported by Anderson and Trueman (2000). Statistic analyses show that

significant differences are found between the references of both (*V. jacobsoni* & *V. destructor*) and Varroa mites present in Syrian apiaries, when $P < 0.05$ for all samples coming from the five Syrian regions.

Conclusion:

Varroa destructor is, no doubt, the most important species and the only one infecting European honeybee '*Apis mellifera*', in almost all European countries; and this Varroa species has been developing a certain resistance to chemical treatments during the time they were largely used in Europe (Sammarato *et al.*, 2000). However, this is not the case in Syria, because firstly, Syrian beekeepers are up till now maintaining and using traditional hives made from mud and no chemical treatments are usually used in such kind of hives. Secondly, beekeeping activity in Syria is quite closed; no remarkable exchanges or introductions of foreign honeybee species are present. This can probably explain why Varroa mite infecting Syrian apiaries, during long time, has created new haplotypes, or even probably a new Varroa species which differs from the two international Varroa species already known. This hypothesis is yet to be confirmed or rejected using more efficient tools like molecular analyses.

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