Short Communication

Morphometrical study on Syrian honeybee (*Apis mellifera syriaca*)

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Abstract: One hundred Syrian honeybee workers were taken from two different Syrian locations (Damascus and its surrounding), in an average of fifty workers from each location. The samples were morphometrically studied at the laboratory of honeybee researches in the Faculty of agriculture, University of Damascus in 2005. Six characteristics were studied: cubital index, color (pigment) of both second and third abdominal tergite, tomentum, length of the hairs on the fifth abdominal tergite (pilosity), Tongue length (proboscis) and Number of the hooks on both posterior wings. Statistical results showed that no significant differences were observed between the samples coming from both Syrian populations (Damascus and its surrounding). However, when the Syrian honeybee (as a single population) has been compared with other honeybee subspecies like '*Apis m. mellifera, A. m. intermissa, A. m. ligustica, A. m. caucasica* and *A. m. carnica*' significant differences were found for some characteristics and not for others. This primary study indicates that the Syrian honeybee, even in the presence of a strong introgression and random hybridizations with foreign honeybees, is still maintaining its unique characteristics. As a conclusion, it is necessary to establish a program of selection for this subspecies, which will enable us to protect the important aspects and specific characteristics of this local honeybee.

Key words: '*Apis mellifera syriaca*', Cubital Index, Morphometrical study, Proboscis, Tomentum.

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دراسة مورفولوجية على سلالة النحل السورية(syriaca *Apis mellifera*)

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الملخص: تم دراسة ست صفات مورفولوجية على مئة شغالة من سلالة النحل السورية (النحلة السورية المحلية) مأخوذة من منحلين مختلفين واقعين في منطقتين مختلفتين(دمشق وريفها) تتباعدان نحو 50 كيلومتراً ، بمعدل خمسين شغالة من كل منطقة. تضمنت هذه الدراسة قياس كل من: الدليل الزندي 'Cubital Index'، عرض الشريط اللوني على الحلقة الترجية الثانية والثالثة 'Pigment'، عرض الشريط الوبري على الحلقة الترجية الرابعة 'Tomentum'، طول الأوبار على الحلقة الترجية الخامسة 'Pilosity'، طول اللسان 'Proboscis' ، عدد الخطاطيف 'Number of hooks' على كل من الجناحين الخلفيين اليميني واليساري. أظهرت النتائج عدم وجود فروقات معنوية بين مجموعتي النحل المأخوذة من كل من دمشق وريفها، وكانت نسبة الارتباط بينهما شبه تامة، بيد أن الفروقات كانت معنوية بين كل من سلالة النحل السورية '.Apis m syriaca' وسلالات النحل الأخرى مثل: النحل الأوربي 'A. m. mellifera'، النحل الكرنيولي 'A. m. carnica'، النحل القوقازي 'A. m. caucasica' . أظهرت الدراسة الإحصائية عدم وجود فروقات معنوية بين كل من النحلة السورية والنحلة الإيطاليه'Apis m. ligustica' ، مما يشير إلى وجود تقارب وراثي بينهما أو تقارب ناتج عن عملية تهجين مطول بين هاتين السلالتين. هذه النتائج تؤكد أن النحلة السورية المحلية مازالت تختص بمواصفات خاصة بها رغم تعرض هذه السلالة

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وبشكل مستمر للعديد من التهجينات والإدخالات العشوائية لسلالات نحل أجنبي غريب عنها إلى بيئتها، وذلك طمعـا بإنتـاج أكبر من قبل النحالين، من الأهمية البدء بإطلاق برنامج انتخاب وتحسين وراثي لسلالة النحل السورية للمحافظة على هذه الثروة الحيوية من الضياع جراء ضغط التهجين العشوائي، مما قد يقود إلى انجراف وراثي خطير يحتم على نحلتنا المحلية فقدان العديد من صفاتها الخاصة المميزة، كقدرتها على تحمل الأمراض، تلاؤمها مع شروط المناخ المحلي وصفات سلوكية أخرى مهمة.

الكلمات المفتاحية: الخطاطيف، الدليل الزندي، دراسة مورفولوجية، سلالة النحل السورية.

Introduction

The honeybee is one of the most important social insects known in the world. Honeybees have been largely studied, especially during the last two decades. The importance of this insect is obvious and it plays a major role in the field of agriculture (pollination) and medicine (production of important substances like: honey, royal jelly, bee wax, propolis, pollen and bee venom). The first morphometrical study on the Syrian honeybee *'Apis m. syriaca'* was done by Ruttner in 1978, when he followed the distribution of various honeybee populations all over the world (Ruttner et al., 1985 and Ruttner 1988) leading to the creation of the four honeybee evolutionary lineages (Ruttner, 1978). Biometrical studies were also done on other honeybee species (Abdellatif et al., 1977; Cornuet et al., 1975; Cornuet et al., 1978; Cornuet et al., 1982; Cornuet et al., 1988 and Amssalu et al., 2003). Unfortunately, this kind of study on the Syrian honeybee is very rare, and most of the existing studies were done a long time ago. Nowadays, the morphometrical study is less applied due to the fast development of scientific technologies and especially biotechnology. The advantages of the morphometrical method (fast, easy, gives good indications and inexpensive), should certainly allow this kind of study to maintain its presence beside other recent techniques such as genetic analyses and molecular biology. The aim of this study is to estimate whether or not morphometrical differences are present between honeybees coming from the two studied localities, as well as the relationship of our samples with other honeybee subspecies.

Materials and Methods

Our study is a primary morph metrical study, applied to one hundred local honeybee workers expected to be Syrian honeybees. The sampling was done in the South West of Syria, where it is expected to find the pure subspecies of our interest *'Apis mellifera syriaca'* (non-published research) because by moving from the West to the North East of Syria, the presence of another honeybee subspecies *'A. m. meda'* becomes dominant (Ftayeh et al., 1994). Samples were taken of an average of fifty honeybees from each location, one bee from each hive. Honeybees were taken randomly from inside the hives, not from the doors and were preserved immediately in a mixture of ethanol 70% and 5% glycerin. The six morphometrical characteristics measured (Ruttner et al., 1978) were: cubital index, pigment or color of both second and third abdominal tergite, tomentum, length of fifth tergite hairs (pilosity), proboscis (tongue length) and number of hooks on both posterior wings. Wings of the honeybees were separated and fixed on a slide by using a saccharose liquid (Cornuet et al., 1989), cubital index was evaluated by the ratio between the two veins A and B (A/B) of the right posterior wing. The number of hooks on the hind wings was counted by

using a micrometer eyepiece under a binocular microscopy. The tongues were gently elongated and fixed on a mill metrical slide; their lengths were measured using microscopy, magnification 10 X. The larger of the color bands on both the second and third abdominal tergites as well as the larger of the hair on the fourth abdominal tergite (tomentum) were measured at the same time without changing the position of the samples already fixed on the polyester. A simple rotation of 90° around the axis of the samples allows the measurement of the length of the fifth abdominal tergite hairs (pilosity).

Results and Discussion

The results of the six measurements taken on the two Syrian honeybee populations are summarized in (Table 1). The results were analyzed by using the SPSS program. Firstly, a comparison was done to study the correlation between the six measured characteristics within both samples coming from the two different populations (Damascus and its surrounding). R-test values showed a very strong relationship between the two populations, correlation = 1,00 hence, no significant differences were found. This allows us to consider the two populations as a single population representing the Syrian honeybee and their grouping together with a new mean value for each measured characteristic under the name of (Syria), (Table 2). These new means were compared with the data available from "Oberursel, Frankfurt Germany", Ftayeh et al. 1994. (Table 2). Statistical analysis using T-test showed that there were no significant differences between the data bank and our results for the proboscis but significant differences exist for the cubital index and the hair lengths on the fifth abdominal tergite, (Table 2).

This indicates the presence of some alterations which have occurred during the evolution of this honeybee. Further comparisons were done between our results on the Syrian honeybee and the characteristics of certain other subspecies. T-tests show that there are significant differences between the Syrian honeybee and all other studied subspecies characteristics, apart for the cubital index with 'A. m. ligustica' and 'A. m. intermissa' and the tomentum with 'A. m. mellifera', for which no significant differences were observed, (Table 3). The pigment of the Syrian honeybee on the second abdominal tergite is a remarkable characteristic of this honeybee as it comes in the second position just after the Italian honeybee. It is important in the future in this kind of study, specially on the Syrian honeybee, to increase the number of samples as well as the number of the characteristics studied on each sample, as this will stabilize and give more reliability to the statistical analyses. As few earlier studies have been done on the Syrian honeybee, it is necessary to take samples from other Syrian areas and to enlarge the sample size. Taking these factors into consideration will provide more performance indications of the present morphometrical characteristics of the Syrian honeybee ' *Apis mellifera syriaca*' which will also help to start a selection and amelioration program for conserving the biodiversity of this important economical insect and genetic source.

Table 1. Comparison of the six measured characteristic values between the two Syrian honeybee populations.

| Characteristics | Apis mellifera syriaca | |
	Damascus (50 honeybees)	Surrounding (50 honeybees)
Cubital (I)	2.27 ± 0.32	2.07 ± 0.41
Proboscis (L)	6.18 ± 0.16	6.27 ± 0.12
Hair (L),T5	0.12 ± 0.04	0.15 ± 0.04
Tomentum (L),T4	0.68 ± 0.11	0.78 ± 0.11
Pigment (L),T3	1.65 ± 0.15	1.69 ± 0.15
Hooks (N)	22.2 ± 1.70	22.0 ± 1.81

Values are means and standard deviations of the samples, N=number of hooks, L=length (mm), T= Tergite, I=index, measurements taken according to (Ruttner et al., 1978).

Table 2. Comparison between Syrian honeybee characteristic values and the data bank.

| Characteristics | Apis mellifera syriaca | | T- test Signification |
	Syria	Data bank "Oberursel Frankfurt – Germany"	
Cubital (I)	2.17 ± 0.3	2.28 ± 0.27	0.008 *
Proboscis (L)	6.23 ± 0.15	6.26 ± 0.15	0.075 ⁻
Hair (L),T5	0.14 ± 0.03	0.23 ± 0.03	0.000 *
Tomentum (L),T4	0.73 ± 0.06	No data	------
Pigment (L),T3	1.67 ± 0.12	No data	------
Hooks (N)	22.1 ± 1.33	No data	------

Values are means and standard deviations of the samples, N=number of hooks, L=length (mm), T= Tergite, I=index, ⁻ = no significant differences, * = significant differences at 0.01 level. Measurements taken according to (Ruttner et al., 1978).

Table 3. Comparison between the Syrian honeybee charactersic values and those of other honeybee subspecies.

| Characteristics | Apis mellifera (Louveaux, 1994) | | | | | |
	syriaca	mellifera	ligustica	carnica	Caucasica	intermissa
Cubital (I)	2.17 ± 0.37	1.75	2.30 ⁻	2.60	2.00	2.20 ⁻
Proboscis (L)	6.23 ± 0.15	6.35	6.50	6.60	7.00	6.40
Hair (L),T5	0.14 ± 0.03	0.45	0.30	0.30	0.30	0.20
Tomentum (L),T4	0.73 ± 0.06	0.75 ⁻	0.85	0.90	1.00	0.60
Pigment (L),T3	1.67 ± 0.12	0.25	1.75	0.35	0.30	0.20

Values are means and standard deviations of the samples, L=length (mm), T= Tergite, I=index, ⁻= no significant differences, (Apisite.online.fr).

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