COMPARATIVE STUDIES ON CERTAIN HONEYBEE RACES AND THEIR HYBRIDS

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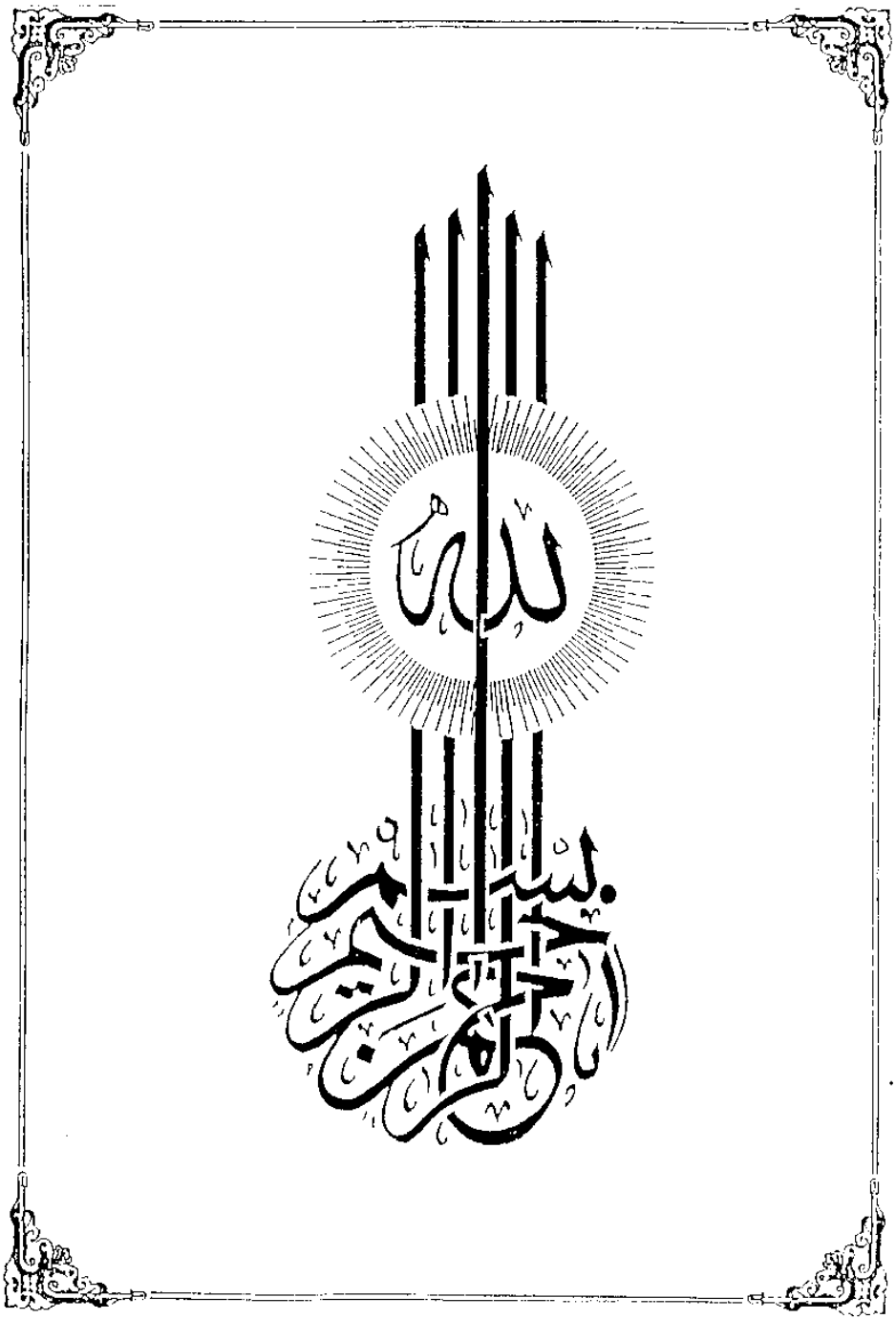

C O N T E N T S

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INTRODUCTION

The carniolan honeybee is the most popular imported race in the Arab Republic of Egypt. Certain isolated areas are devoted - by law - for breeding this race to ensure the improvement of honeybee production in Egypt. Many beekeepers allover the country rear queenbees from the brood of Carniolan Colonies and let them mate in their apiaries to produce the so-called F_1 Carniolan cross colonies. However, a few beekeepers prefer the Italian race and its F_1 cross. So, they try to keep Italian colonies as pure as possible in semi isolated areas to propagate this race.

In this piece of work it was decided to solve the problem and to find out the best race or cross to be reared under our environmental conditions. So, comparative investigations were carried out on both localized Carniolan and Italian races and their crosses with the Egyptian race as regards their biometrics, Queen ovarioles, nectar gathering, longevity, brood rearing and honey production.

Part -1-

BIOMETRICAL INVESTIGATIONS

BIOMETRICAL INVESTIGATIONS

The measurement of various parts of the body of the honeybee is important for the identification of various races for bee breeding.

In the present investigation it was decided to compare between the biometrics of the different important organs of the Egyptian and localized Italian honeybee races and their F_1 hybrid and backcross.

Review of Literature :

El-Banby 1954, found that the mean measurements of the Egyptian worker bees reared on comb foundation had increased than those of the workers reared in natural combs. These increases were due to the excess in the size of the cells in comb foundation (25 cells per inch^2) than those of the natural combs (31-34 cells per inch^2).

Elizabeth Carlisle 1955, stated that the different organs of a certain honeybee race differ in size when reared in different countries.

Sakai and Haseqawa 1956, found out considerable morphological differences between Japanese and European honeybee races especially in length of tongue and fore-wing and width of metatarsus and tomentum index.

Crane 1958, found out that the proboscis length of the worker is not related to nutrition after emergence, nor to age after emergence. The proboscis length of the worker was thus closely-negatively related to the volume of royal jelly imbibed in the early larval stage; royal jelly being the sole food of young larvae.

El-Banby 1958, reported that the Caucasion bee has a longer tongue than both Carniolan and Italian bees and

that the latter is the shortest-tongued. The Caucasian bee has the shortest and narrowest fore-wing, while the Carniolan bee has the longest, and the Italian bee has the broadest fore-wing. The Caucasian bee possesses the longest hind-leg and the Italian bee has the shortest leg. The Carniolan bee possesses the largest wax-mirror, while the Caucasian bee has the smallest wax-mirror.

Wafa et al 1967, reported significant coefficient of correlation between glossa length & total length of proboscis and distal & total length of the fore-wing in Egyptian honeybee workers in most Egyptian governorates, and positively significant correlation between mentum length & glossa length, proximal & distal length of the fore-wing and proximal & total length of it in samples from upper Egypt only.

El-Banby 1968, found that all the organs in the F_1 Carnio-Egyptian workers were smaller than those of the workers in the Carniolan mother colony. All the organs in the back-cross workers, unless the femur length, were smaller than those of the workers in the F_1 mother colony. The Egyptian workers have measurements smaller than the back-cross workers.

El-Banby & El-Samny 1969, found that most of the organs of workers reared from Carniolan origin decrease in size in the successive generations in Egypt whether the workers were grey-or yellow- coloured.

Material & Technique :

Three Italian queenbees reared from a strain kept in San-el-Hagar, Sharkia governorate, for several years, were produced to the experimental apiary and introduced into nuclei. Three virgin queebees were reared from their brood and were let to be mated in a native apiary of Egyptian honey-bees to produce F_1 colonies. Three queenbees each from one of these crossed queens were also mated in the same Egyptian apiary to produce back-cross colonies. Three Egyptian colonies were taken from the same paternal apiary and hived in nuclei on artificial combs, to be compared with Egyptianized Italian and hybrid colonies.

Samples of 50 workers each were taken from the three Italian mother colonies, the F_1 s, the back-cross and the Egyptians. The length of proboscis, the length of the right antenna and its flagellum, the length and width of the right fore-wing, the number of

hooks on the hind wing, the length of the different segments of the right hind-leg, the length of the second and third Sterna, and the dimensions of the first wax mirror were estimated.

The technique used by Alpatov (1929) was adopted. The bees were slightly anaesthetized by means of calcium cyanide, then dropped in boiling water to ensure the full extension of the proboscis. Dissected parts of each bee were mounted on a glass slide in a medium of glycerine jelly. A 7X ocular was used during all these investigations. A low objective No. 3 was used to allow measuring all the organs of the bee by the same power. The factor of these lenses was found to be 0.056 mm.

The data for each measured organ were statistically analysed by F test. The data of a character showing significant difference were reanalysed by L.S.D. test to compare the average measurements of the four bee groups with each other.

The average measurements for the different organs of the two pure strains (Italian and Egyptian) and their F_1 and backcross hybrids are listed in Table 1. The heterosis estimates are listed in Table 2.

The frequency distributions, the analyses of variance and the comparisons between the means are listed in the appendix (Tables 1 - 14) , for the different measured organs, respectively.

The frequency distributions for the measurements of the different organs are graphically illustrated in Figs. 1-14.

Results :

There were significant difference at 1% level within the four experimental groups as regards the length of proboscis, the length of antenna, the length and the width of fore-wing, the measurements of the hind leg segments, the 2nd & 3 rd sterna and the wax mirror. The number of hooks on the hind wing did not show any significant difference within the four experimental bee groups.

(1) The length of proboscis :

It was found out by statistical analysis that the length of proboscis in the workers of the F_1 colonies significantly surpassed those of their Italian mother colonies at 5% level. The Egyptian workers significantly possessed the least length of proboscis and were followed by the backcross, the Italians, and the F_1'S respectively.

The differences between the first three bee groups were significant at 1% level.

The average lengths of proboscides were 5.860± 0.6030 mm. in the Egyptian workers, 6.203± 0.6633 mm. in the backcross workers, 6.391± 0.7839 mm. in the Italian workers and 6.467± 0.8844 mm. in the F_1(It.xEg .)

(2) The length of flagellum :

There was no significant difference in flagellum length unless between Egyptian workers and both Italians and F_1's. The F_1's slightly (and insignificantly) surpassed the pure Italians.

The average length of the workers' flagella were 2.734± 0.2613 mm. in the Egyptian, 2.859± 0.2814 mm. in the backcross, 2.956± 0.4824 mm in the Italian and 2.958± 0.4422 mm in the F_1 workers.

(3) The length of antenna :

The F_1 workers had the longest antennas. They were descendingly followed by the Italians, backcross and the Egyptians. The differences were significant between the successive bee groups unless that between the pure Italian and their F_1's.

The average lengths of the workers' antennae were