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Miscellaneum.

Inter-specific Hybridization of Ticks of the Genus *Hyalomma*.

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The classification of ticks of the genus *Hyalomma* is the subject of much discussion among taxonomists. Recently ADLER & FELDMAN-MUHSAM (1, 2) suggested a key for the identification of Israeli *Hyalomma* species according to external morphological characters in the male and the chitinous armature of the genital aperture in the female.

Hyalomma species (particularly—*H. excavatum*, *H. marginatum* and *H. dromedarii*) which have been reared in our laboratory already for several years, are uniform in appearance and easily identifiable by ADLER-MUHSAM's key. Males of *H. excavatum* and *H. marginatum* are described in Fig. 1.

However, in the course of a survey of ticks parasitic on livestock in Israel, male specimens sent by Dr. BALI (District Veterinary Officer, Veterinary Field Services, Beer-Sheva) presented features of both *H. excavatum* and *H. marginatum* as they are described in the above-mentioned publications. This observation suggested the possibility of "inter-specific" crossings occurring in nature.

The following experiments were carried out in the laboratory to clear up this question. We give these results as a preliminary communication, further studies being on the way.

20 *H. excavatum* females and 20 *H. marginatum* males were put into a small linen bag which had been attached to a rabbit's ear with a specially prepared adhesive. After some days a number of males and females were noted in a position suggesting copulation. These females were marked with oil paint. Two fully engorged females were harvested 10 days after having been enclosed in the bag. Because of the premature death of the rabbit several other females were collected in a partially engorged state. Seven out of the females collected laid eggs, from 3 of which larvae hatched.

The observations mentioned further on were carried out with the offspring of one of the engorged females in which complete hatching took place.

The eggs laid by this female hatched normally and some of the resulting seed-ticks were reared on the ear of a rabbit while the others were bred on gerbils (*Meriones tristrami shawii*) according to the method published by HADANI, MER & CWILICH (3) for *Rhipicephalus secundus* on voles. Both methods were successful, the larvae and nymphs getting engorged normally and ultimately, after the usual period, developing into adult ticks. As only pre-imaginal stages of *H. excavatum* but not of *H. marginatum* could be reared successfully on the gerbil in the laboratory, it looks as if the offspring behave more like *H. excavatum* as far as the host is concerned. Among the adults thus obtained 301 males and 28 females were counted. This predominance of males (91.5%) is in striking contrast to the usual nearly equal ratio obtained under normal conditions of rearing.

Particular attention was paid to the males obtained from the descendants of the engorged female. The males were very pleomorphic and showed external morphological features of both *H. excavatum* and *H. marginatum*, well known from laboratory breeding (Fig. 2). For example: males having the

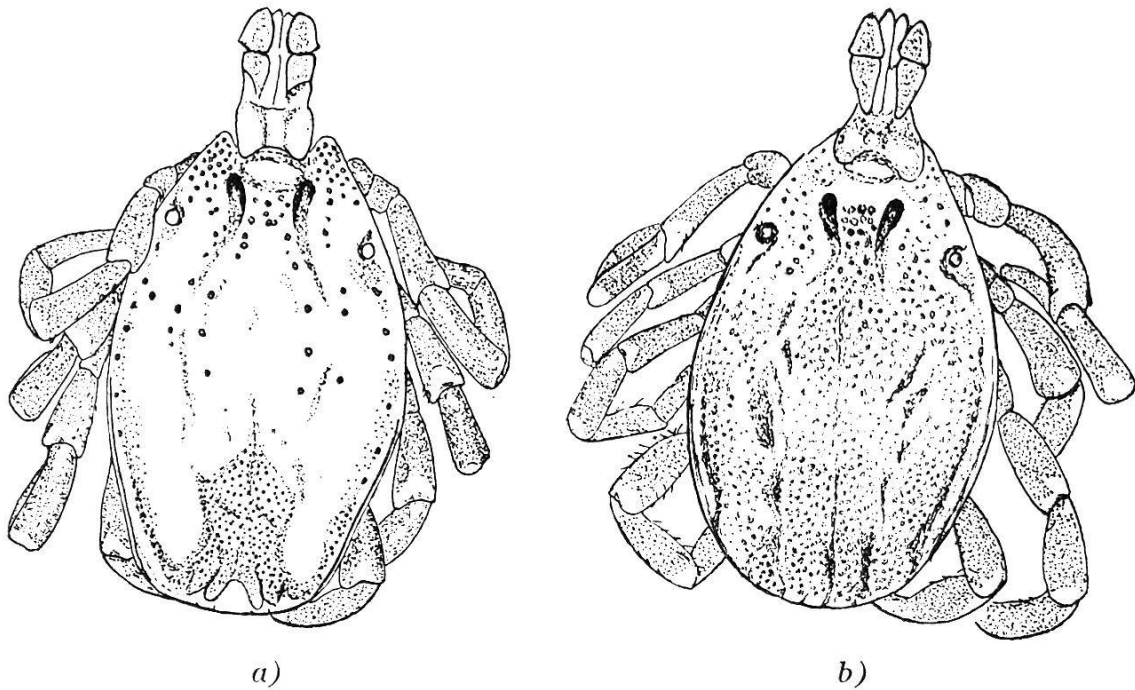


Fig. 1. Males from laboratory breedings used in hybridization trials (P):
a) ♂ *H. excavatum*, b) ♂ *H. marginatum*.

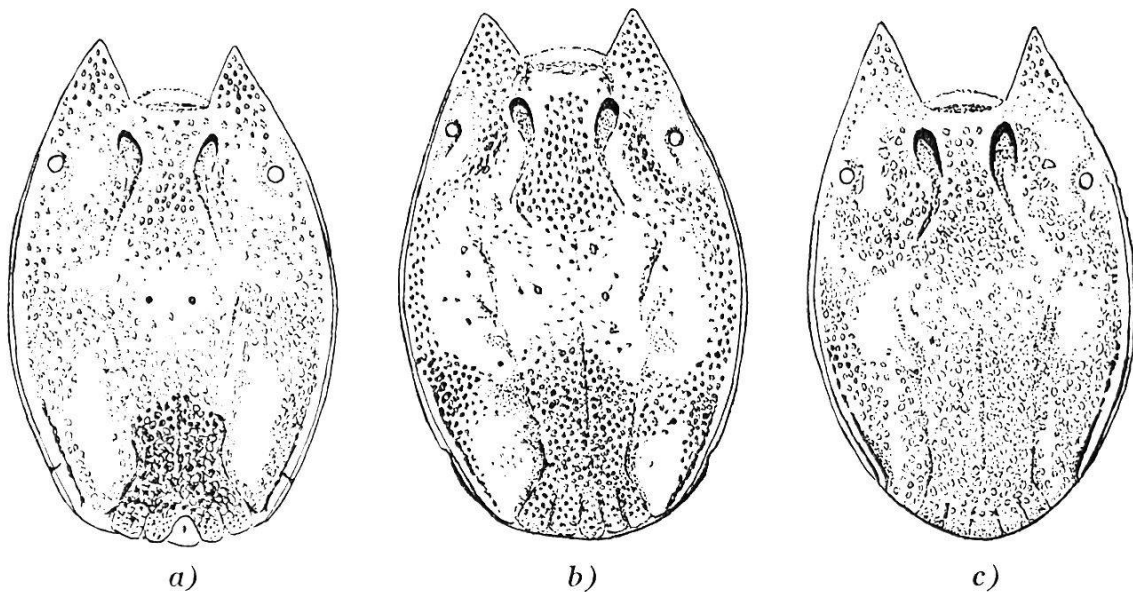


Fig. 2. Scuta of *Hyalomma* males obtained as a result of crossing *H. excavatum* females and *H. marginatum* males (F_1): a) Male type of *H. excavatum* with a typical *H. marginatum* punctation and with limited pigmentation of parma, b) *Hyalomma* male hybrid with completely pigmented parma (typical to *H. marginatum*) and a clearly defined depression in the posterior part of the scutum reminding *H. excavatum* male, c) Male type of *H. marginatum* with a superficial posterior depression on the scutum and fairly well defined festoons.

general appearance of *H. excavatum* had a dark parma, uniform scutal punctation or flat elevations above the scutal depression—all features characterizing *H. marginatum* (2) and, vice versa, males having a general appearance of *H. marginatum* showed clearly defined festoons characteristic for *H. excavatum*.

In order to determine whether parthenogenesis could occur in the case of

H. excavatum females, two additional experiments were carried out. In the first one 30 females were placed on a rabbit's ear. In a few days the females had attached themselves to the ear but didn't engorge and after 5 weeks detached themselves from the ear which was seriously inflamed.

In the second experiment a possible stimulating effect of the males' presence on engorgement of the females was examined. For this purpose 30 females and 30 males of *H. excavatum* were put on a rabbit's ear, the males being separated from the females by a double layer of muslin thus preventing copulation (a single muslin was insufficient). Both males and females attached themselves to the ear but no engorgement took place, and the females laid no eggs.

In a further experiment an attempt was made to cross *H. marginatum* females and *H. excavatum* males. Forty *H. marginatum* females and 40 *H. excavatum* males were placed on a rabbit's ear in a linen bag as previously described. Females attached themselves to the ear and remained in an un-engorged state for about 4 weeks, after which they detached themselves from the ear. Two of the females laid eggs which showed no development. The experiment should, however, be repeated.

Rearing of the hybrids obtained so far is being continued.

Species may be defined (4) as "groups of actually (or potentially) interbreeding natural populations which are reproductively isolated from other groups". The same author states: "Morphological species definitions, however, sooner or later ran into difficulties." The above described findings call for a revision of the genus *Hyalomma*, which is of particular importance due to the fact that the various species of this genus are blamed for transmitting several serious diseases of livestock.

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