Acarologia is proudly non-profit,
with no page charges and free open access

Please help us maintain this system by
encouraging your institutes to subscribe to the print version of the journal
and by sending us your high quality research on the Acari.

Subscriptions: Year 2019 (Volume 59): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2017): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme
( Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
HYALOMMAASIATICUMASIATICUM
SCHÜLZEANDSCHLOTTKE,1929.
ITS DISTRIBUTION, HOSTS, SEASONAL ACTIVITY, LIFE CYCLE,
AND ROLE IN TRANSMISSION OF BOVINE THEILERIOSISIN IRAN
BY
Z.MAZLUM

SUMMARY.

Hyalomma a. asiaticum is confirmed to be a distinct species which occurs in many parts of Iran except near the Caspian Sea. The main hosts of adults are sheep; cattle, horses, goats, and camels are also infested. Adults were collected in each season but their activity was found to be in spring, especially in May. This is strictly a three-host tick and a vector of Theileria annulata.

RéSUMÉ.

Il est confirmé que Hyalomma a. asiaticum est bien une espèce distincte, présente dans de nombreuses localités de l’Iran, les parages de la Mer Caspienne exceptés. Les moutons sont les hôtes principaux des adultes ; sont également infestés, le bétail, les chevaux, les chèvres, et les chameaux. Cette tique est strictement du type à trois hôtes ; elle est vectrice de Theileria annulata.

Non-Soviet workers have generally synonymised Hyalomma asiaticum under H. dromedarii Koch, 1844 (DELPY, 1949; HOOGSTRAAL, 1956; ANASTOS, 1957). Persons who followed the keys of these workers have also identified it as H. anatolicum subsp. (H. a. anatolicum Koch, 1844 and H. a. excavatum Koch, 1844). Recent exchange of numerous specimens between Russian workers and KAISER and HOOGSTRAAL (1963) has confirmed that H. asiaticum is a distinct species. ABBASSIAN-LINTZEN (1961) reported a single female specimen from southeastern Iran, near the Pakistan border. POMERANTZEV (1950) and SERDYUKOVA (1956) stated that this species is common in Iran. KAISER and HOOGSTRAAL have determined this tick from Iraq, Afghanistan (1963), and Pakistan (1964). Soviet workers (POMERANTZEV, 1950; SERDYUKOVA, 1956) consider that H. asiaticum consists of three subspecies (H. a. asiaticum, H. a. caucasicum, and H. a. kolzovi). The sub-

species *asiaticum* occurs in Iran and also in Kazakhstan, Turkmenia, Uzbekistan, Tadjikistan, Iraq, and Afghanistan.

In 1964, the writer first identified *H. a. asiaticum* in a batch of ticks from Zabol and, thenceforth, from several other areas of Iran. In this paper, findings on identification, distribution, hosts, seasonal activity and life cycle of *H. a. asiaticum* and on transmission of *Theileria annulata* are presented.

**Identification.**

*H. a. asiaticum* has been described by Kaiser and Hoogstraal (1963), Serdyukova (1956), and Pomerantzev (1950). Because of the previous confusion in identification, comparative features to permit differentiation among *H. anatolicum* subspp., *H. dromedarii*, and *H. a. asiaticum* are presented in Table 1.

**Distribution in Iran.**

Between 27 June 1964 and 9 July 1967, 102 collections (indicated in parantheses below) of *H. a. asiaticum* [318 ♂♂, 396 ♀♀, 1N (reared to adult)] were made from the following localities: Kerman : Bam (1), 9 ♀♀, 1 ♂. Sistan and Baluchistan : Zabol, Zahidan, and Iranshahr (35), 60 ♀♀, 55 ♂♂, 1N. Khorassan : Torbat-Heidarieh and Kashmar (8), 22 ♀♀, 34 ♂♂. Teheran : Menjil and Mahallat (2), 22 ♂♀, 20 ♂♂. Azarbaijan : Maku, Ahar, Rezaieh, Khoy, Tabriz and Mahabad (15),
**Table I: Comparison between**

_Hyalomma a. asiaticum, H. dromedarii and H. anatolicum_ subspp.

<table>
<thead>
<tr>
<th></th>
<th><em>H. a. asiaticum</em></th>
<th><em>H. anatolicum</em> subssp.</th>
<th><em>H. dromedarii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>H. a. anatolicum</strong></td>
<td><strong>H. a. exca vatum</strong></td>
<td></td>
</tr>
<tr>
<td>Average length of scutum</td>
<td>medium, 4.1 mm.</td>
<td>small, 3.5 mm.</td>
<td>large, 5.7 mm.</td>
</tr>
<tr>
<td>Color</td>
<td>yellowish brown</td>
<td>light to reddish brown</td>
<td>yellowish brown</td>
</tr>
<tr>
<td>Subanal shields</td>
<td>in line with axis of adanal shields</td>
<td>in line with axis of adanal shields</td>
<td>exterior of axis of adanal shields</td>
</tr>
<tr>
<td>Posteromedian groove</td>
<td>does not reach parma</td>
<td>does not reach parma</td>
<td>reaches parma</td>
</tr>
<tr>
<td>Shape of parma</td>
<td>subtriangular</td>
<td>suboval</td>
<td>subrectangular</td>
</tr>
<tr>
<td>Cervical grooves</td>
<td>deep, long, furrow-like</td>
<td>shallow, short, not furrow-like</td>
<td>deep, long, furrow-like</td>
</tr>
<tr>
<td>Posterior margin of basis capituli</td>
<td>deeply concave, usually angular</td>
<td>slightly concave</td>
<td>deeply concave, usually angular</td>
</tr>
<tr>
<td>Genital apron (operculum)</td>
<td>longitudinally oval, not bordered by an elevated fold, bulging in profile</td>
<td>knoblike or transversally oval, bulging in profile</td>
<td>V-shaped, bordered by a narrow elevated integumental fold, not bulging in profile</td>
</tr>
<tr>
<td>Scutum</td>
<td>longer than wide</td>
<td>longer than or at least as long as wide</td>
<td>usually wider than or at least as wide as long</td>
</tr>
<tr>
<td>Number of hosts of the offspring of a single female on rabbit</td>
<td>strictly three</td>
<td>three and two</td>
<td>three, two and a few even one</td>
</tr>
</tbody>
</table>

1. Pomerantzev (1950) gives 6 to 7 mm. as the size range of male. Iranian specimens, like those of Afghanistan (Kaiser and Hoogstraal, 1963), are smaller; average length 4.1 mm., range 3.6 mm. to 4.6 mm.

Thus, H. a. asiaticum is present in many parts of Iran except along the Caspian Sea. Collections were not received from the Persian Gulf littoral, where this tick may also occur.

HOSTS.

Of 715 (100 %) specimens of H. a. asiaticum collected during the survey period, 530 (74 %) were from sheep, 89 (12.5 %) from goats, 54 (7.5 %) from cattle, 41 (6 %) from camels, and 1 from horse. Percentages according to host of specimens of Hyalomma ticks, other than H. a. asiaticum, sent to us from all parts of Iran during the surveying period were: 44 % sheep, 7 % goats, 46 % cattle, 1.5 % camels and 1.5 % horses, it can be concluded that the main host of H. a. asiaticum in Iran is the sheep.

SEASONAL ACTIVITY.

H. a. asiaticum was collected during each season but its activity was found to be mainly in spring, especially in May, as 61 % of the specimens were collected in spring and 77 % of the specimens received in spring were those collected in May. The percentages of the collected material during the other seasons were: summer, 10 %; autumn, 14 %; and winter, 15 %.

LIFE CYCLE.

Reared, several times, in the laboratory on rabbits, H. a. asiaticum completed its life cycle strictly as a three host tick. Whereas the offspring of a single female of H. dromedarii, H. a. anatolicum, and H. a. excavatum i.e. the three species and subspecies which were in confusion previously with H. a. asiaticum, undergo either a two-host or three-host type of life cycle. Although not encountered by the writer, some of the workers such as Feldman-Muhsam and Muhsam (1966) in their experiments on H. dromedarii have even noticed one-host type life cycle among a few of the offspring obtained from single H. dromedarii female. The developmental periods of H. a. asiaticum are summerised in Table 2.

1. In the distribution map, one collection site appears to be quite close to the Caspian Sea. It might be necessary to call the attention of the reader to this point that the marked place on the map is called Menjil which actually is separated, by the Alborz Mountains range, from the Caspian Sea area.
TABLE 2:
LIFE CYCLE OF H. a. asiaticum, REARED ON RABBITS AT 32°C AND 75-80 % R. H.

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>DAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoviposition</td>
<td>2-74</td>
</tr>
<tr>
<td>Beginning of oviposition to beginning</td>
<td></td>
</tr>
<tr>
<td>of hatching</td>
<td>16-21</td>
</tr>
<tr>
<td>Larval prefeeding period</td>
<td></td>
</tr>
<tr>
<td>Larva feeds</td>
<td>3-5</td>
</tr>
<tr>
<td>Premolting period of larva</td>
<td>5-7</td>
</tr>
<tr>
<td>Nymphal prefeeding period</td>
<td></td>
</tr>
<tr>
<td>Nymph feeds</td>
<td>6-7</td>
</tr>
<tr>
<td>Premolting period of nymph</td>
<td>13-14</td>
</tr>
<tr>
<td>Adult prefeeding period</td>
<td>5-7</td>
</tr>
<tr>
<td>Adult (female) feeds</td>
<td>7-9</td>
</tr>
</tbody>
</table>

TRANSMISSION OF THEILERIOSIS.

To determine the transmissibility of Theileria annulata (Dschunkowsky and Luhs, 1904) by this tick, the following experiment was conducted in cooperation with Drs. P. Hooshmand and R. Fesharky.

We allowed 150 nymphs of H. a. asiaticum to engorge on a calf infected with T. annulata (strain No. 11) in which the rate of gametocyte-infected red blood cells was 5 per 1000. The adult ticks, obtained after molting, were put on a healthy calf to feed. After an incubation period of 9 days, this calf showed pyrexia and T. annulata schizonts could be detected in lymph nodes and liver biopsy smears. Blood smears also showed gametocytes. This case became very grave, to the point that 600 per 1000 of red blood cells were infected with T. annulata gametocytes.

Although it was shown, experimentally, that H. a. asiaticum can transmit T. annulata, but in nature due to the tendency of this tick to feed mainly on sheep its role in transmission of bovine theileriosis is negligible in Iran.

ACKNOWLEDGMENTS

The author is grateful to Dr. G. Maghami, Head of the Parasitology Department of Razi Institute, for his kind guidance in tick rearing. He also thanks Dr. H. Hoostraal, Head of the Department of Medical Zoology, U.S. Naval Medical Research Unit No. 3, Cairo, Egypt, for valuable editorial suggestions on the manuscript. The help of all the members of the Veterinary Department of the Ministry of Agriculture for collecting and sending tick specimens is acknowledged.

Department of Parasitology
Razi Institute, Karaj-Hessarak, Iran.
REFERENCES


—, 1964. — The Hyalomma ticks (Ixodoidea, Ixodidae) of Pakistan, India, and Ceylon with keys to subgenera and species. — Acarologia, 6 : 257-286.
