

The geographical distribution and animal hosts of *Rhipicephalus bursa* (Canestrini and Fanzago, 1877) in Israel

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RÉSUMÉ

YERUHAM (I.), HADANI (A.), GALKER (KRONTHAL) (F.), MAUER (E.), RUBINA (M.), ROSEN (S.). — La distribution géographique et les mammifères hôtes de la tique *Rhipicephalus bursa* (Canestrini et Fanzago, 1877) en Israël. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (2) : 173-179.

La distribution géographique de *Rhipicephalus bursa* en Israël et ses hôtes sont décrits. Les observations et les récoltes de tiques ont été réalisées pendant les années 1953-1984. *R. bursa* a été trouvé principalement dans la zone phytogéographique méditerranéenne, envahissant à l'est et au sud la zone irano-touranienne. La végétation et le climat sont aussi de type méditerranéen. Les tiques ont été trouvées surtout entre les isohyètes 400-600 mm, dans des régions de collines, couvertes de batha et de garrigue. Les types dominants des sols sont terra rossa et rendzines sur le lit rocheux, chaux, marne ou nari. Les hôtes préférés sont les moutons, les chèvres et les bovins et ensuite beaucoup plus rarement les équidés, les chiens et les gazelles (*Gazella gazella*). Par contre, le lièvre peut être parfois abondamment infesté. La biologie de *Rhipicephalus bursa* dépend largement des conditions naturelles et pourrait avoir une seule génération par an.

Mots clés : *Rhipicephalus bursa* - Hôte - Répartition géographique - Israël.

SUMMARY

YERUHAM (I.), HADANI (A.), GALKER (KRONTHAL) (F.), MAUER (E.), RUBINA (M.), ROSEN (S.). — The geographical distribution and animal hosts of *Rhipicephalus bursa* (Canestrini and Fanzago, 1877) in Israel. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (2) : 173-179.

The geographical distribution of *Rhipicephalus bursa* and its animal hosts in Israel are described.

Observations and tick collections were carried out in the years 1953-1984. *Rhipicephalus bursa*, in Israel, is largely limited to the mediterranean phytogeographical zone, invading on the east and the south the irano-turanian zone. The vegetation and climate are of the mediterranean type. *Rhipicephalus bursa* ticks were found on hilly areas with batha scrub or garigue, mostly between the 400-600 mm isohyets. The dominant types of soils are terra rossa and rendzinas on a bedrock of dolomite, chalk, marl or nari. Sheep and goats are by far the preferred animal hosts and in a decreasing order, cattle, equines, dogs and gazelles (*Gazella gazella*). The hare, however, might be occasionally heavily infested. The life cycle of *Rhipicephalus bursa* largely depends on the environmental conditions and would have a single generation year⁻¹.

Key words : *Rhipicephalus bursa* - Animal host - Geographical distribution - Israel.

INTRODUCTION

Rhipicephalus bursa (Canestrini and Fanzago, 1877) is widely distributed in the mediterranean zone of the palearctic region between the 31-45° parallels North including the mediterranean basin (5, 7, 9, 11, 16, 19), the Balkans (4, 13, 14), southern USSR (3, 21), Iraq (18) and Iran (10, 17). This species has been

reported also from Switzerland (1). *R. bursa* has not been found in the southern hemisphere. Despite its considerable economical importance to sheep breeding, *R. bursa* has not been studied thoroughly and the information concerning its behaviour, life cycle and ecological interrelationships is meagre.

FELDMAN-MUHSAM (5) reported on *R. bursa* in Israel and gave some information

about its distribution and hosts. *R. bursa* has been included in various tick surveys (4, 10, 11, 14, 18, 21). Its seasonal distribution (12, 13) and relation to outbreaks of ovine babesiosis (7, 15) have also been described. Observations on *R. bursa* were carried out in Israel during the last 31 years (1953-1984) and the results are summarized in the present communication.

MATERIALS AND METHODS

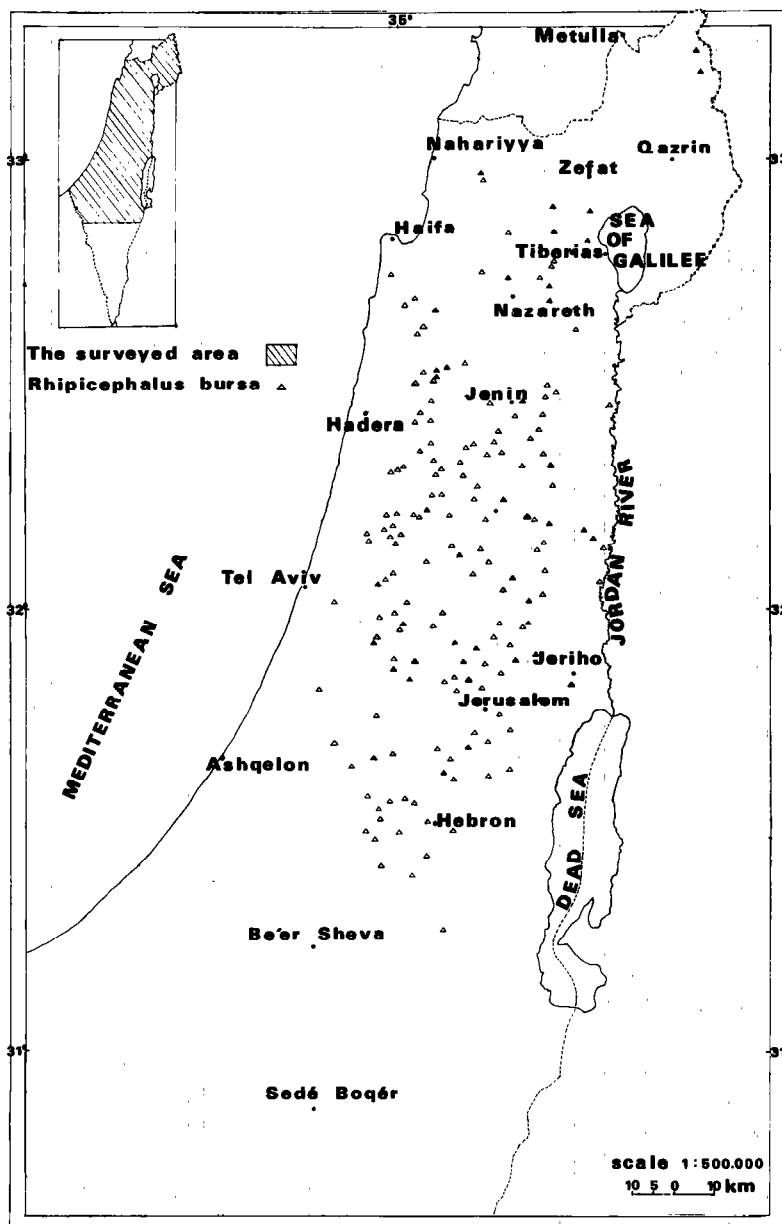
Tick collections were carried out by the district veterinary officers, the practitioners of the « Hahaklait » (*) and the members of the

Department of Entomology of the Kimron Veterinary Institute. Information obtained in a multi-year study of the bio-ecology of *R. bursa* in Israel, started in 1983, is also included.

Varying numbers of bovines, ovines and goats were monthly examined at random throughout the country. Equines and dogs were occasionally checked. Gazelles and one hare are also included.

The ticks collected were classified according to FELDMAN-MUHSAM (5) and HOOGSTRAAL (8).

(*) Livestock Insurance Company and Veterinary Assistance, Haifa, Israel.



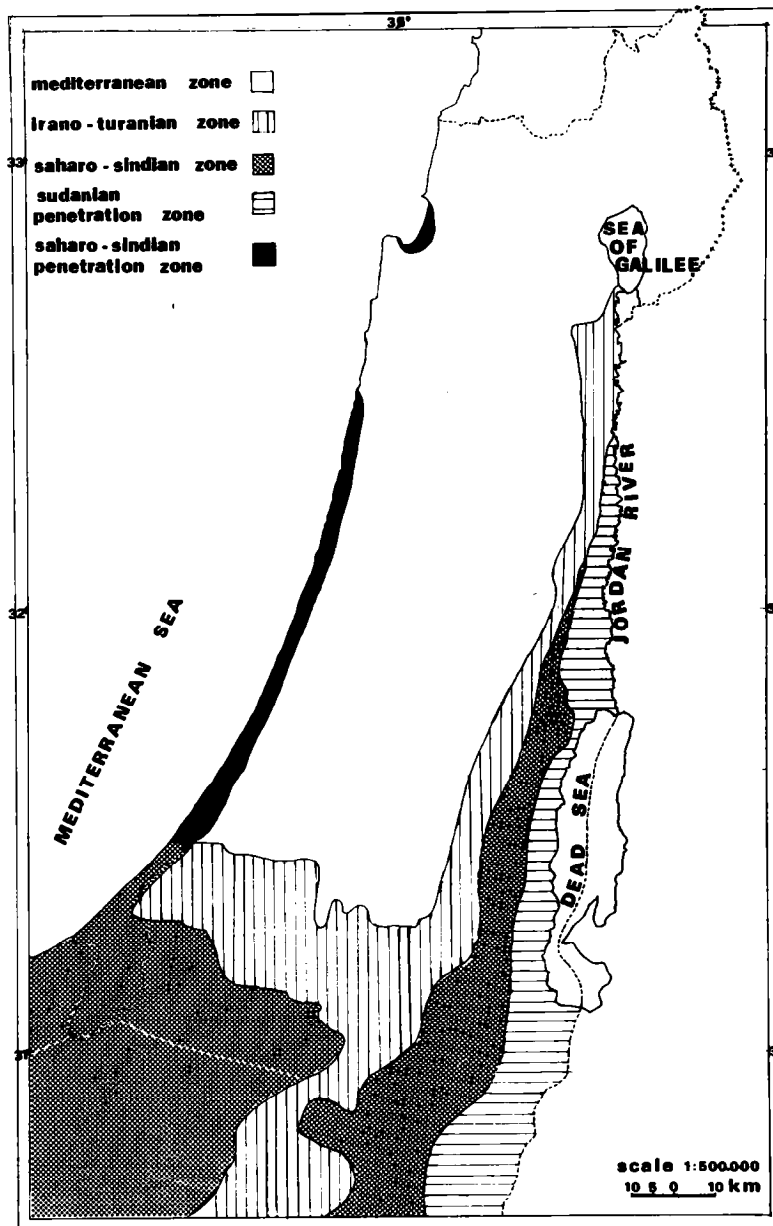
Map N° 1. The geographical distribution of *Rhipicephalus bursa* in Israel.

RESULTS AND DISCUSSION

The distribution of *R. bursa* in Israel is shown in map No. 1. The tick is widely distributed in the western and eastern slopes of the hilly Lower Galilee, Samaria and Judea. In the south, the tick extends until Tel-Arad south of the hills of Hebron.

An isolated focus was detected in the northern part of the Golan Heights (the villages of Masaada and Bokabta).

Phytogeographically (map No. 2) *R. bursa* is largely limited to the mediterranean zone including the northern and western margins of the irano-turanian zone. The tick's habitat consists of a rocky batha scrub and garigue with sparse maqui. The typical plant society includes : *Sarcopoterium spinosum*, *Calycotome villosa*, *Hyparrhenia hirta*, *Cistus incanus*, *C. salvifolius*, *Salvia fruticosa*, *Coridothymus capitatus* and *Majorana syriaca*. The dominating tree species are : *Ceratonia siliqua*, *Pistacia palaestina*,

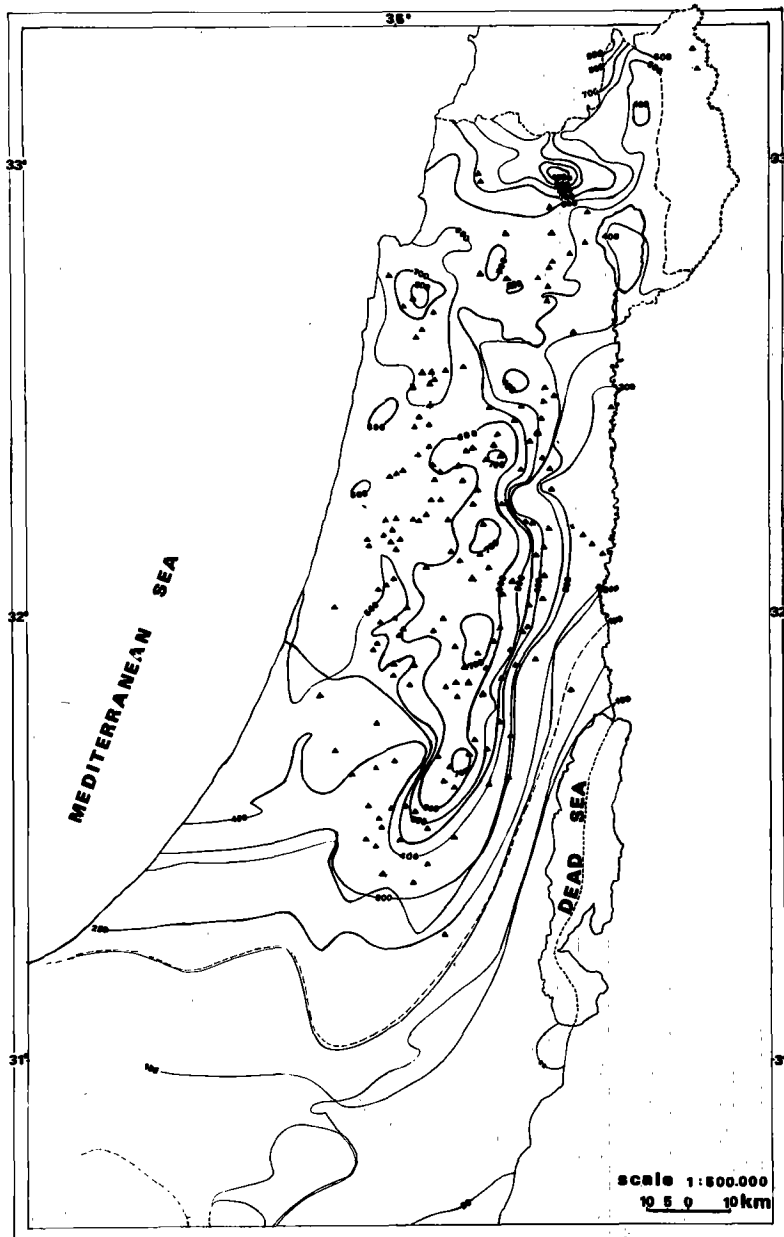


Map N° 2. The phytogeographical zones in Israel.

Crataegus aronia, *Phillyrea media*, *Rhamnus palaestinus* and *Styrax officinalis* (20).

The climate in the *R. bursa* distribution area is mediterranean with a long dry summer and humid, cold winter. Annual rainfall (map No. 3) averages between 400-600 mm. Few foci of *R. bursa* were found beyond these isohyets. *R. bursa* has not been found in the northern part of the Western Galilee which has a higher annual rainfall. Similar ecological requirements have been reported elsewhere (11, 12). In fact

relative humidity has been found to affect various other species of *Rhipicephalus* (8). *R. bursa* ticks were collected from sheep on the eastern slopes of the hills of Samaria and Judea as well as those of the southern part of Hebron. These areas are characterized by a semi-arid climate changing into an arid one when approaching the Jordan Valley. The average annual temperature in the mediterranean zone in Israel ranges between 15-20 °C. January is the coldest month and August the hottest one with tempe-



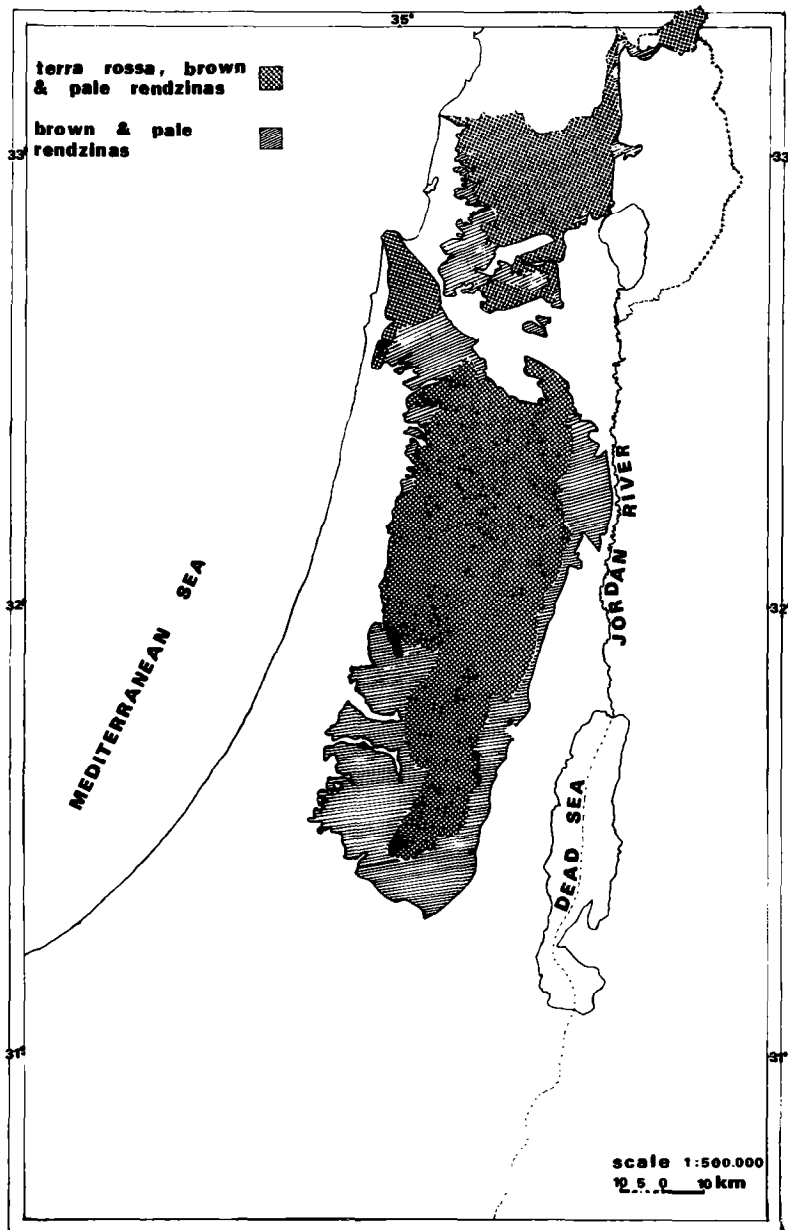
Map N° 3. Distribution of annual precipitation (isohyets) in Israel.

ratures ranging between 2-6 and 22-27 °C respectively. The temperature in the distribution zone of *R. bursa* in Israel, rarely descends below 10 °C which is considered the critical minimum for the development of the tick (4).

Adult ticks become active in the field when the average day and night temperatures exceed 18 and 12 °C respectively (2). Climatic conditions in the mediterranean zone in Israel would thus permit development of *R. bursa* during most of the year.

Dominant types of soils in the distribution area of *R. bursa* (map N° 4) are terra rossa on a dolomitic or limestone bedrock and pale and brown rendzinas on a bedrock of marl, nari or hard chalk. The soils are well drained. In the northern part of the Golan Heights, the soil is basaltic, brown with basaltic lithosols (20).

R. bursa has been mainly reported from artiodactylic animals and lagomorphs (10, 14). In our study (Table I), the tick was found on sheep, goats and cattle and much less so on



Map N° 4. Distribution of terra rossa and rendzinas type of soils in Israel.

TABLE N°1—The occurrence of *Rhipicephalus bursa* (Canestrini and Fanzago, 1877) on animal hosts in Israel (1953-1984)

Hosts	Sheep	Goat	Cattle	Gazelle (Gazella gazella)	Horse	Donkey	D o g	Human	Hare
Larvae	528	86	-	1	-	1	-	-	-
Nymphs	2 053	235	6	-	-	-	-	-	-
Adults	7 402	4 188	449	-	2	-	2	3	45
Total	9 983	4 509	455	1	2	1	2	3	45

equines, dogs and gazelles (*Gazella gazella*). Few adults were found on humans. The hare seems an efficient natural host as 45 adult *R. bursa* were found on a single animal. The rabbit is used for the breeding of *R. bursa* in the laboratory (6).

Gazelles and hares are widespread in the distribution area of the tick and might maintain its population in the absence of livestock.

In a bio-ecological study carried out in Israel (22) *R. bursa* has been found to have highly specific requirements, related to the vegetation and the climatic and edaphic conditions. These

requirements largely determine the distribution and the type of the ecological shelters of *R. bursa* in Israel.

On the whole the life cycle of *R. bursa* being a « field tick » (*), would largely depend on the environmental conditions. Further studies should define its life cycle under field conditions and particularly the role of physiological mechanisms such as photoperiodism and diapause which ensure its survival.

(*) « Tique rupicole » according to the nomenclature of SERGENT *et al.* (19).

RESUMEN

YERUHAM (I.), HADANI (A.), GALKER (KRONTHAL) (F.), MAUER (E.), RUBINA (M.), ROSEN (S.). — La distribución geográfica y los hospedadores mamíferos de la garrapata *Rhipicephalus bursa* (Canestrini y Fanzago, 1877) en Israel. *Rev. Elev. Méd. vét. Pays trop.*, 1985, 38 (2) : 173-179.

Se describen la distribución geográfica y los hospedadores mamíferos de *Rhipicephalus bursa*. Las observaciones y la recolección de las garrapatas se realizaron durante los años 1953 a 1984. *Rhipicephalus bursa*, en Israel, se encontró principalmente en la región fitogeográfica mediterránea, penetrando también hacia el este y el sur, en la región irano-turania. La vegetación y el clima son de tipo mediterráneo. Las garrapatas se encontraron en su mayoría

entre las isoyetas de 400 y 600 milímetros, en zonas de colinas cubiertas de batha o matorral. Los tipos de suelo predominantes son terra rossa y rendzinas, sobre un basamento rocoso, dolomítico, calcáreo, nari o marga.

Los hospedadores preferidos son ovejas, cabras y bovinos, y luego - en orden decreciente - equinos, perros y gacelas (*Gazella gazella*).

La fiebre, sin embargo, puede estar ocasionalmente infestada en forma abundante. El ciclo biológico de *Rhipicephalus bursa* depende estrictamente de las condiciones ambientales y probablemente habría una sola generación anual.

Palabras claves: *Rhipicephalus bursa* - Huesped - Reparición geográfica - Israel.

REFERENCES

1. AESCHLIMANN (A.), DIEHL (P. A.), EICHENBERGER (G.), IMMLER (R.), WEISS (N.). Les tiques (*Ixodoidea*) des animaux domestiques au Tessin. *Rev. Suisse Zool.*, 1968, 75 : 1039-1050.
2. BADESCU (C.), POPOVICI (I.), MIHAI (S.). Ecology of the Ixodidae of the Mihai Bravu pasture in the district of Giurgiu (Rumania). *Lucr. Stiint. Inst. Agron. N. Balcescu* (C.), 1968, 11 : 311-325.
3. DYAKONOV (L. P.). Development of *Babesia ovis* in ticks and in vertebrate hosts. *Trudy Vses. Instit. Eksp. Vet.*, 1970, 38 : 27-35.
4. FEIDER (Z.), RAUCHBACH (C.), MIRONESCU (I.). The ticks of Rumania. *Ceskosl. Parasit.*, 1958, 5 : 71-87.
5. FELDMAN-MUHSAM (B.). *Rhipicephalus bursa* in Israel. *Bull. Res. Coun. Israel*, 1953, 3 : 201-206.
6. HADANI (A.), CWILICH (R.), RECHAV (Y.), DINUR (Y.). Some methods for the breeding of ticks in the laboratory. *Refuah Vet.*, 1969, 26 : 87-100.
7. HOFFMANN (G.), HORCHNER (F.), SCHEIN (E.), GERBER (H. C.). Seasonal occurrence of ticks and piroplasms in domestic animals in the asiatic pro-

- vines of Turkey. *Berl. Munch. Tierarztl. Wschr.*, **84** : 152-156.
8. HOOGSTRAAL (H.). African Ixodoidea. Vol. I. Ticks of the Sudan. Cairo, Egypt, Dept. Med. Res. Unit, 1956 (3) : 1-1101.
 9. HOOGSTRAAL (H.). The epidemiology of tick borne crimean - congo hemorrhagic fever in Asia, Europe, and Africa. *J. med. Ent.*, 1979, **15** : 307-417.
 10. HOOGSTRAAL (H.), VALDEZ (R.). Ticks (Ixodoidea) from wild sheep and goats in Iran and medical and veterinary implications. *Fieldiana : Zoology*, 1980, *New Series*, **6** : 1-16.
 11. LE RICHE (P. D.), ALTAN (Y.), CAMPBELL (J. B.), EFSTATHIOU (G. C.). Ticks (Ixodoidea) of domestic animals in Cyprus. *Bull. ent. Res.*, 1974, **64** : 53-63.
 12. LIEBISCH (A.), ZUKARI (M.). Biological and ecological studies on ticks of the genera *Boophilus*, *Rhipicephalus* and *Hyalomma* in Syria. In : Wilde (J. K. H.), ed. Tick borne diseases and their vectors, University of Edinburgh. Center for Tropical Veterinary Medicine, 1978. Pp. 150-162.
 13. MONOV (M.), PETROV (D.), MILOUSHEV (I.). Occurrence, species composition and seasonal activity of Ixodidae family ticks in northwest Bulgaria. *Vet. Nauki*, 1977, **14** : 48-54.
 14. OSWALD (B.). On Yugoslavian (Balkan) ticks (Ixodoidea). *Parasitology*, 1939, **31** : 271-280.
 15. OZKOC (U.), ONAR (E.), DOGRU (C.). An investigation on the relation of seasonal activity of *Rhipicephalus bursa* (Ixodoidea) with *Babesia ovis* infection in sheep in Marmara region. *Pendik Vet. Mikrob. Enstit. Dergisi*, 1982, **14** : 44-52.
 16. PIGOURY (C.). Piroplasmes et piroplasmoses en Syrie et au Liban. *Bull. Soc. Path. exot.*, 1937, **30** : 767-772.
 17. RAK (H.). Tick borne diseases and their vectors in Iran. In : Wilde (J. K. H.). Tick borne diseases and their vectors. University of Edinburgh, Center for Tropical Veterinary Medicine, 1978. Pp. 163-165.
 18. ROBSON (J.), ROBB (J. M.), AL-WAHAYYIB (T.). Ticks (Ixodoidea) of domestic animals in Iraq. Part 2 : Summer infestations in the Liwas of Hilla, Karbala, Diwaniya and Nasiriya. *J. med. Ent.*, 1968, **5** : 27-31.
 19. SERGENT (E.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.). Etudes sur les piroplasmoses bovines. Alger, Inst. Pasteur d'Algérie, 1945. Pp. 38-52.
 20. WAISEL (Y.), POLLAK (G.), COHEN (Y.). The ecology of vegetation of Israel. Tel-Aviv University, 1978. p. 460.
 21. YAKIMOFF (W. L.). A propos des ixodidés de Russie. *Parasitologie*, 1923, **15** : 253.
 22. YERUHAM (I.) *et al.* Unpublished data, 1984.