

UDC 595.421(477)

DISTRIBUTION OF THE TICK *HAEMAPHYSALIS PUNCTATA* (ACARI, IXODIDAE) IN UKRAINE

I. A. Akimov, I. V. Nebogatkin

Schmalhausen Institute of Zoology of the NAS of Ukraine,
B. Chmielnicky str., 15, Kyiv, 01601 Ukraine
E-mail: iz@izan.kiev.ua, niv_zoo@ua.fm

Received 20 October 2011

Accepted 28 May 2012

Distribution of Tick *Haemaphysalis punctata* (Acari, Ixodidae) in Ukraine. Akimov I. A., Nebogatkin I. V. — The northern boundary of *H. punctata* range was studied. This boundary of its native range (where this species is common and its mass reproductions are periodically recorded) was found to go through Odesa, Mykolaiv, Kherson, Zaporizhia, Donetsk and Lugansk oblasts. Clarified that the boundary of its temporary range (where this species occurs periodically and is dependent on human factors totally) was clarified to go through Volyn, Rivne, Zhytomyr, Kyiv, Chernihiv and Sumy regions. The range of *H. punctata* is fully subjected to anthropogenic factors in areas where this species dwelt in historically recent times only, and in ancestral areas of distribution such factors affects only dynamics and indices of abundance.

Key words: *Haemaphysalis punctata*, distribution, Ukraine.

Распространение иксодового клеща *Haemaphysalis punctata* (Acari, Ixodidae) в Украине. Акимов И. А., Небогаткин И. В. — Изучали северную границу ареала *H. punctata*. Выяснено, что граница коренного (вид обычен и периодически фиксируются массовые размножения) ареала проходит по Одесской, Николаевской, Херсонской, Запорожской, Донецкой и Луганской областях. Уточнено, что граница временного (вид встречается периодически и полностью зависит от антропогенных факторов) ареала этого вида, проходит по Волынской, Ровенской, Житомирской, Киевской, Черниговской и Сумской областях. Ареал *H. punctata* полностью подчинен антропогенным факторам только на территориях, где этот вид находился в исторически недавнее время, а на исконных участках распространения антропогенные факторы влияют только на величину и динамику индексов обилия.

Ключевые слова: *Haemaphysalis punctata*, распространение, Украина.

Introduction

The northern borders of the natural habitat of a tick species from the genus *Haemaphysalis* — *H. punctata* Canestrini at Fanzago, 1877 are established on the territory of Ukraine (Filippova, 1997; Akimov, Nebogatkin, 1997; Kolonin, 2009). Throughout the whole natural habitat, the tick serves as a primary vector and keeper for *Rickettsia* and *Babesia* (Rahbar et al., 2007; Portillo et al., 2008). The borders of present distribution of *H. punctata* in Ukraine are to be clarified in a way we have shown for the genus *Dermacentor* (Akimov, Nebogatkin, 2011 a) and the species *Hyalomma marginatum* Koch (Akimov, Nebogatkin, 2011 b).

Material and methods

To precise the ranges of natural habitats of species from this genus on the territory of Ukraine, we used the material collected in 1977 to 2009 made in Crimea, 22 oblasts and some big cities (Kyiv and Sevastopol). Totally we examined about ticks collected on flag, collector, and during examination of about 2,400 heads of large and small cattle, pets, and birds. Also, materials of short-term (half-year) prognoses and reviews from 25 oblasts, Kyiv, Alushta, Mariupol and Sevastopol city SES of Ukraine, private archive of E. F. Litvinenko and E. M. Emchuk (1960) since 1953 were used. Archived materials (1953–2001) from the Laboratory on especially dangerous infections of the Central SES (table 1) were analyzed. For cartography of tick distribution, formal administrative and territorial division was used (Akimov, Nebogatkin, 2011 a). When analyzing this material, we used the following quantitative measures: index of abundance (IA), and infection index (II) (Tularemia, 1954)

Table 1. Amount of investigational individuals (thousand samples) of *H. punctata* (own and archived data) in the different landscape-geographical zones of Ukraine

Таблица 1 Количество исследованных особей (тыс. экз.) *H. punctata* (собственные и архивные данные) в различных ландшафтно-географических зонах Украины

Zone	Archive	Our Data	
	1953–2000	1977–2001	2001–2010
Polissya	107.2	4	0
Western Forest-Steppe	25.1	0.9	0
Forest-Steppe	128.6	4.5	0.02
Steppe	77.1	2.9	0.03
Azov-Black Sea Steppe	138.8	5.1	0.05
Crimea	70.1	2.1	0.02
TOTAL	546.9	19.5	0.12

Results and discussion

Larval stages of *H. punctata* parasitize birds, occasionally small mammals, predators, and very rarely reptiles, and mature ticks live on wild and domestic ungulates, carnivores, rarely on birds (table 2).

Table 2. The hosts of all stages of development of *H. punctata* in Ukraine (from our data)

Таблица 2. Прокормители всех стадий развития *H. punctata* в Украине (по нашим данным)

Host	♀, ♂	L	N
Mammalia			
<i>Erinaceus concolor</i> Mart.		x	
<i>Sorex araneus</i> L.	x		x
<i>S. minutus</i> L.	x		
<i>Crocidura suaveolens</i> Pall.	x		
<i>C. leucodon</i> Her.			
<i>Mycromys minutus</i> Pall.	x		
<i>Sylvarum flavicollis</i> Melch.	x	x	xx
<i>S. tauricus</i> L.	x	x	xx
<i>S. agrarius</i> Pall.	x	x	x
<i>Rattus norvegicus</i> Berc.		x	x
<i>M. musculus</i>		x	
<i>Cricetus cricetus</i> L.			x
<i>C. glareolus</i> Schr.			x
<i>Ondatra zibethicus</i> L.		x	x
<i>Arvicola terrestris</i> L.			x
<i>M. arvalis</i> Pall.	x		
<i>M. oeconomus</i> Pall.			x
<i>M. (Pitymus) subterraneus</i> Sel.-Lon.			x
<i>Vulpes vulpes</i> L.	x		
<i>Capreolus capreolus</i> L.			x
<i>Camelus bactrianus</i> Pall.	x		
Stray dogs		x	x
Stray cats		x	x
Large cattle	xx		
Small cattle	xx		
Aves			
<i>Parus major</i> L.			x
<i>Turdus merula</i> L.			x
<i>Corvus frugilegus</i> L.	x	x	x
<i>Passer domesticus</i> L.			x
<i>Fringilla coelebs</i> L.			
Reptilia			
<i>Lacerta agilis</i> L.			x

x — ordinary host; xx — mass host.

According to table 2, passerine birds are not the main feeders for *H. punctata*, and this contradicts the data of E. M. Emchuk (1960), but agrees with the data of other authors (Nosek, 1971; Rahbar et al., 2007).

Since the mid 1960s, *H. punctata* was found regularly on cattle and collected on flag in all geographical areas (Emchuk, 1960) (fig. 1).

In Ukraine, the natural habitats of *H. punctata* may be divided into four zones.

1) Areas where this tick is abundant with places of periodic outbreaks of mass reproduction.

2) Areas where this tick is common, however its mass reproductions are very rare and due to natural and anthropogenic reasons.

3) Areas where this tick is found regularly (once per 2–3 years), however its mass reproduction was not recorded even under favorable conditions.

4) Areas where this tick is found very rarely and not regularly, few times per 10–20 years.

Later, in 1970–1980s, when cattle became treated with acaricides, and the beginning of the pasture season was delayed until late May, the ticks gradually disappeared from Polissya, Western Forest-Steppe, Forest-Steppe and the most part of Steppe. Its particular foci of reproduction remain in the Azov-Black Sea Steppe and Crimea, where IA values are almost unchanged as compared to that in 1950–1960s.

In the beginning of the 1980s, *H. punctata* was common in southern Steppe, the Azov-Black Sea Steppe and in Crimean coastal regions. In the rest of territory, only particular, few small foci of reproduction are known, located in protected areas and hunting areas in the Carpathians, Olevsk district of Zhytomyr oblast and Vyshgorod dis-

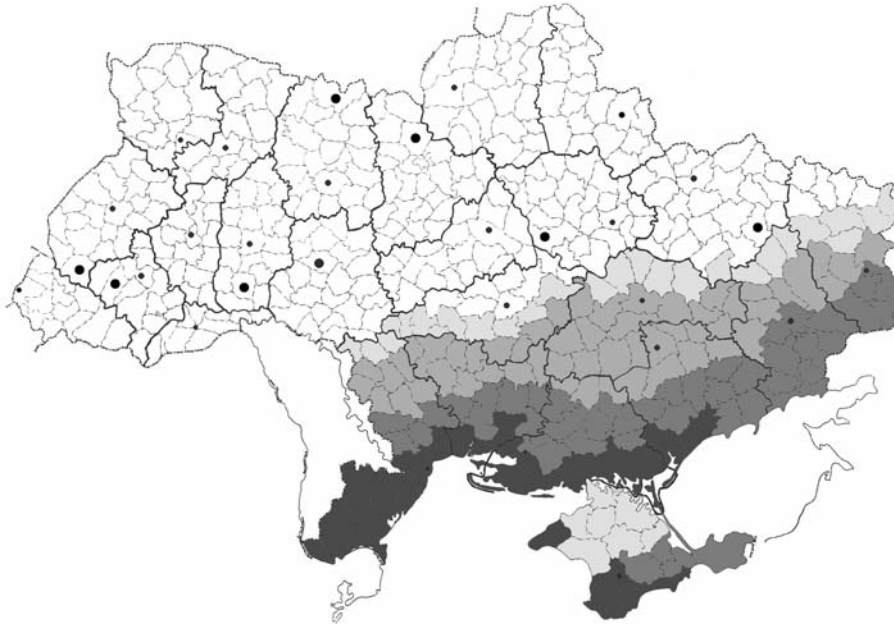


Fig. 1. Distribution of *H. punctata* in Ukraine in 60th.

Рис. 1. Распространение *H. punctata* в Украине в 60-х гг.

tract of Kyiv oblast. These findings could be attributed to birds that are parasitized with larval tick stages which may be brought to these areas (fig. 2).

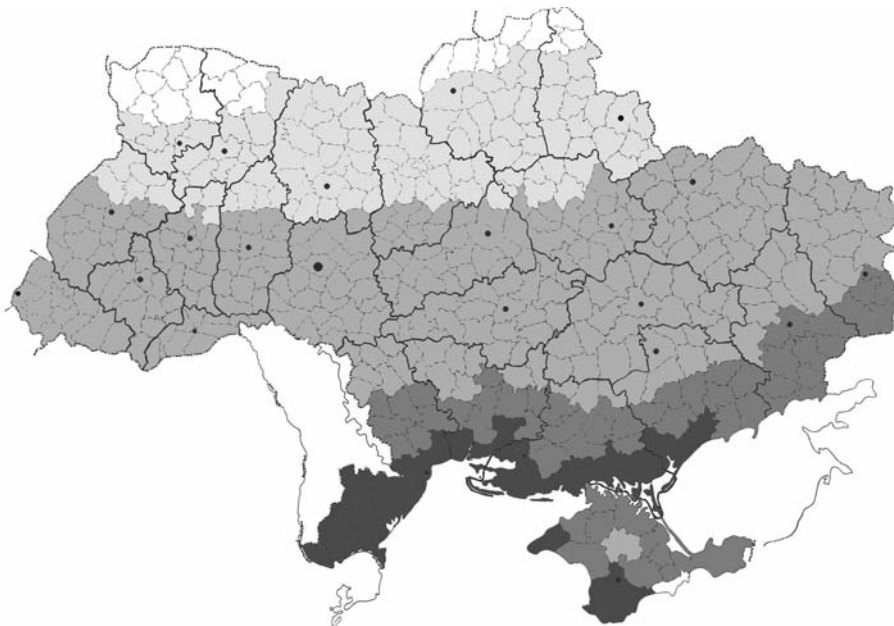
Since the mid-eighties, due to changes in socio-ecological conditions, in the country there are favorable environmental conditions for pasture ticks because of:



Symbol legend as on fig. 1. Обзначения как на рис. 1.

Fig. 2. Distribution of *H. punctata* in Ukraine in 80th.

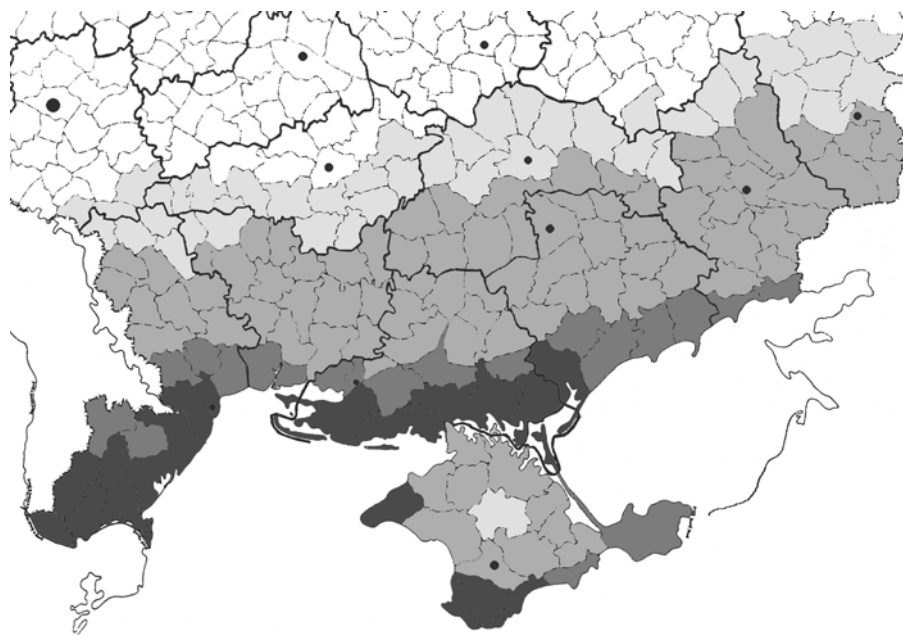
Рис. 2. Распространение *H. punctata* в Украине в 80-х гг.



Symbol legend as on fig. 1. Обзначения как на рис. 1.

Fig. 3. Distribution of *H. punctata* in Ukraine in the end XX century.

Рис. 3. Распространение *H. punctata* в Украине в конце XX ст.



Символ легенды как на рис. 1. Обозначения как на рис. 1.

Fig. 4. Distribution of *H. punctata* in Ukraine at the beginning XXI century.

Рис. 4. Распространение *H. punctata* в Украине в начале XXI ст.

- increased number of livestock grazing since the early spring and is not treated with acaricides at all;
- increased number of uncontrolled recreation areas, plantings, artificial reservoirs, rapid development of suburban areas;
- dramatically increased number of stray dogs and cats.

In this regard, in late 1980s, the first findings of *H. punctata* on cattle were in the Carpathians and in Polissya. By the end of 1990s, the tick's natural habitat was completely renewed in range of 1960s. The number of sites where this species was abundant increased greatly (fig. 3).

Based on the aforesaid the habitat of this species on the territory of Ukraine can also be divided on aboriginal zones where this bloodsucker is common with periodical mass reproductions and its northern boundary runs along Odesa, Mykolayiv, Kherson, Zaporizhia, Donetsk and Lugansk oblasts (fig. 4); and temporary zones where *H. punctata* occurs periodically and is totally dependent on anthropogenic factors.

We can conclude that initial colonization of new landscapes, geographic zones and subzones begins when ticks brought by birds find favorable living conditions, namely, the feeders for all developmental stages and favorable abiotic conditions.

Conclusions

1. Anthropogenic factors may completely effect the natural habitat of *H. punctata* only in areas colonized by this species in historically recent times, whereas in aboriginal areas of distribution, anthropogenic factors affect IE value and dynamics only.
2. The boundary of aboriginal habitat where this species is common and its mass reproduction takes place periodically runs along Odesa, Mykolayiv, Kherson, Zaporizhia, Donetsk and Lugansk oblasts.
3. The boundary of the temporary habitat of *H. punctata* is changeable, entirely dependent on anthropogenic factors, and runs along Volyn, Rivne, Zhytomyr, Kyiv, Chernihiv and Sumy oblasts.

4. Reintroduction to previously colonized areas is both due to bringing of ticks with birds from traditional areas of habitat, and due to the populations existed in protected and secure areas, such as refuges (“survival zones”).

- Akimov I. A., Nebogatkin I. V.* Composition of tick species (Acarina, Ixodidae) in Ukraine // *Vestnik zoologii*. — 1997. — **31**, N 3. — P. 75–77. — Russian: *Акимов И. А., Небогаткин И. В.* Видовой состав иксодовых клещей (Acarina, Ixodidae) Украины.
- Akimov I. A., Nebogatkin I. V.* Distribution of ticks of the genus *Dermacentor* (Acari: Ixodidae) in Ukraine // *Vestnik zoologii*. — 2011 a. — **45**, N 1. — P. 35–40.
- Akimov I. A., Nebogatkin I. V.* Distribution of the Ixodidae Tick *Hyalomma marginatum* Koch (Acari, Ixodidae) within Ukraine // *Vestnik zoologii*. — 2011 b. — **45**, N 4. — P. 371–374.
- Emchuk E. M.* Fauna of Ukraine. Vol. 25. Ticks. Is. 1. — Kyiv: Izd-vo AN USSR, 1960. — 163 p. — Russian: *Емчук Е. М.* Фауна Украины. Т. 25. Иксодовые клещи. Вып. 1.
- Tularemia* (organizational and teaching materials). — M.: Medgiz, 1954. — 184 p. — Russian: Туляремия (организационно-методические материалы).
- Filippova N. A.* Ticks of subfamily Amblyominae // *Arachnids*. — (Fauna of Russia and neighboring countries; Vol. 4. Is. 5). — SPb: Nauka, 1997. — 436 p. — Russian: *Филиппова Н. А.* Иксодовые клещи подсемейства Amblyominae // Паукообразные.
- Kampen H., Poltz W., Hartelt H. et al.* Detection of a questing *Hyalomma marginatum marginatum* adult female (Acari, Ixodidae) in southern Germany // *Exp. Appl. Acarol.* — 2007. — **43**, N 3. — 227–231.
- Kolonin G. V.* Fauna of ixodid ticks of the world (Acari, Ixodidae). — 2009 <http://www.kolonin.org/>
- Nosek J.* The Ecology, Bionomics and Behaviour of *Haemaphysalis (Aboimisisalis) punctata* Tick in Central Europe // *Z. Parasitenk.* — 1971. — **37**. — P. 198–210.
- Portillo A., Santibáñez P., Santibáñez S. et al.* Detection of *Rickettsia* spp. in *Haemaphysalis* ticks collected in La Rioja, Spain // *Vector Borne Zoonotic Dis.* — 2008 Oct. — **8** (5). — P. 653–658.
- Rahbari S., Nabian S., Shayan P.* Status of *Haemaphysalis* tick infestation in domestic ruminants in Iran // *Korean J. Parasitology*. — 2007. — **45**, N 2. — P. 129–132.