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DISTRIBUTION OF TICKS OF THE GENUS *DERMACENTOR* (ACARI, IXODIDAE) IN UKRAINE

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Distribution of Ticks from of the Genus *Dermacentor* (Acari, Ixodidae) in Ukraine. Akimov I. A., Nebogatkin I. V. — The northern border of present range of the tick species *Dermacentor marginatus* is determined on the territory of Ukraine in Volyn, Rivne, Khmelnytsky, Zhytomyr, Kyiv, Cherkasy, Poltava and Sumy oblasts. *D. reticulatus* species was revealed to be adapted for living in urbanized areas as parasitizing domestic and stray animals, small mammals. It also inhabits shores of artificial reservoirs and occurs in the steppe zone, except for arid areas. *D. reticulatus* preimaginal stages are found for the first time on birds (*Anas platyrhynchos*, *Sturnus vulgaris*, *Turdus merula*, *T. viscivorus*).

Key words: ticks, Acari, Ixodidae, *Dermacentor*, *D. marginatus*, *D. reticulatus*, urbanized areas, Ukraine.

Распространение иксодовых клещей рода *Dermacentor* (Acari, Ixodidae) в Украине. Акимов И. А., Небогаткин И. В. — Установлена северная граница современного ареала *D. marginatus* на территории Украины, проходящая по Волынской, Ровненской, Хмельницкой, Житомирской, Киевской, Черкасской, Полтавской и Сумской областям. Выявлено, что вид *D. reticulatus*, приспособился к обитанию в урбанизированных ландшафтах, паразитирует на домашних и бродячих животных, мелких млекопитающих, и заселяет берега искусственных водоемов. Это вид стал встречаться на всей территории современной степи, избегая аридных участков. Обнаружены первые достоверные находки преимагинальных стадий *D. reticulatus* на птицах (*Anas platyrhynchos*, *Sturnus vulgaris*, *Turdus merula*, *T. viscivorus*).

Ключевые слова: иксодовые клещи, Acari, Ixodidae, *Dermacentor*, *D. marginatus*, *D. reticulatus*, урбанизированные ландшафты, Украина.

Introduction

Through the territory of Ukraine, the ranges of natural habitats of two tick species from the genus *Dermacentor* are going as follows: the northern border of *Dermacentor marginatus* Sulzer range and, partly in the southern areas, there is disjunction between the southern border of *Dermacentor reticulatus* Fabricius range and the range of its Crimean enclave (Filippova, 1997; Kolonin, 2009). Reports on distribution of these species throughout the territory of the former USSR were published by I. L. Kulik and N. S. Vinokurova (1982, 1983). The ticks from this genus are rather harmful for cattle because they serve as vectors and sources of pyroplasmiasis and other zoonoses in domestic animals. The aim of this work was to identify tendencies in distribution of these ticks through the territory of Ukraine and updating ranges of their present natural habitats.

Material and methods

To specify ranges of distribution ticks from the genus *Dermacentor*, we used our collections for the period from 1977 till 2009 made in Crimea, 22 oblasts of Ukraine, 177 districts and cities of regional and republican submission (Alushta, Kyiv and Sevastopol). Collections were made on flag, collector, by tamponing burrows, examination of nest substrates, during examination of about 2,000 heads of large and small cattle, horses, camels, domestic animals, and during combing of about 30,000 captured small mammals. Totally, about

9,000 ticks were obtained and examined. Also, materials of short-term (half-year) prognoses and reviews from 25 oblasts, Alushta, Kyiv, Mariupol and Sevastopol city SES of Ukraine, a private archive of E. F. Litvinenko and E. M. Emchuk since 1963 were used. Totally, except for our findings, more than 2 million ticks of these two species were examined. For cartography of tick distribution, formal administrative and territorial division was used with administrative districts as minimum zoogeographical region (point) where the exact group of species was found (Dubrovskiy et al., 1980). We preferred this method as compared to the method of the formal grade fields when the size of square side, depending of working objectives, is chosen from 5–10 km to some grades of a grid (Neronov, 1976; Dubrovskiy et al., 1980). It was made due to the uniform distribution of oblasts and districts in administrative and territorial division of Ukraine, and areas of districts are 1.11 ± 0.04 thousand of square km on average.

Results and discussion

1. The ornate sheep tick — *Dermacentor marginatus* Sulzer

According to the obtained data *D. marginatus* actively moved to the north in 1960th. The foci of its mass reproduction were related to its parasitizing cattle (fig. 1, grey marking). Switching in 1970th to confinement of cattle and its treatment with acaricides before pasture undermined sheep tick populations, and it is almost completely absent in large collections after 1980th (table 1). After 1970th, the range of *D. marginatus* is practically coinciding with the northern border of the steppe zone (fig. 1, dark marking).

As regards to findings in Belarus, in Dnipro and Prypyat valleys (Kulik, Vinokurova, 1982), it may be either incorrect diagnostics (most probably), or isolated reproduction foci disappeared with time similarly to those of *Ripicephalus rossicus* Jak. et K-Jak. which we described in Kyiv environs (Nebogatkin, 1996). During extensive studies in the northern areas of Zhytomyr, Kyiv and Chernihiv oblasts, and Kyiv city in 1977–2009, *D. marginatus* was not found out.

During the studies in Zhytomyr, Rivne and Vynnytsya oblasts in 2001–2009, isolated specimens of the sheep tick were found out (fig. 1, dark squares). Those data allowed us to keep the northern range of *D. marginatus* natural habitat as follows: along the borders of Ivanichev, Gorokhiv districts of Volyn oblast, Demydiv, Mlyniv, Dubny, Zdolbuniv, Ostrog districts of Rivne oblast, Slavuta district of Khmelnytsky oblast, Baraniv, Romaniv, Zhytomyr, Andrushivka, Popelnya districts of Zhytomyr oblast, Skvyra, Bila Tserkva, Kaharlyk, Pereyaslav-Khmelnytsky districts of Kyiv oblast, Drabiv district of Cherkasy oblast, along the northern border of Poltava oblast, and Akhtyrka,

Table 1. Indices of abundance of *D. marginatus* (accounting for cattle) in the northern regions of Ukraine by archival data

Таблица 1. Индексы обилия *D. marginatus* (по учетам на КРС) в северных областях Украины по архивным данным

Oblasts	Year									
	1963	1964	1965	1966	1967	1968	1969	1970	1971	
Vynnytsya	–	–	–	–	25,6	–	12,3	3,2	2,6	
Rivne	2,6	–	12,6	–	–	15,7	4,5	3,6	4,3	
Zhytomyr	–	31,0	36,9	33,6	61,4	62,5	10,9	2,1	6,3	
Kyiv	57,3	43,5	30,6	36,4	78,2	62,3	21,8	15,6	0,0	
Chernihiv	32,6	38,2	25,4	26,5	38,4	41,2	32,0	21,0	16,5	
Sumy	–	–	–	15,3	7,2	–	–	0,2	0,0	
Oblasts	Year									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Vynnytsya	0,1	2,1	0,0	5,3	1,5	0,0	0,0	0,0	0,0	0,0
Rivne	2,0	0,0	0,0	5,6	2,3	0,0	0,0	0,0	0,4	0,0
Zhytomyr	3,6	4,4	0,4	7,0	7,2	0,0	0,0	3,6	0,0	0,3
Kyiv	5,4	3,0	2,0	3,2	4,2	0,4	0,0	0,0	0,4	0,6
Chernihiv	3,2	2,3	1,5	2,5	3,9	1,2	0,4	0,0	0,0	0,0
Sumy	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0



■ — territories were ticks occurs constantly; ■ — finds in 1960–70s; ■ — finds in XXI century.

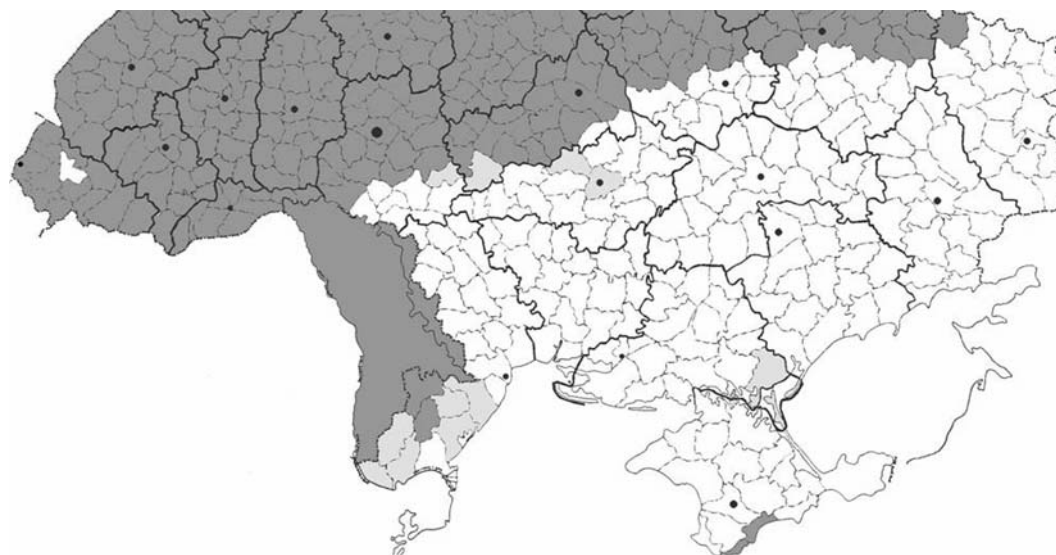
Fig. 1. Northern range of *D. marginatus* natural habitat on the territory of Ukraine.

Рис. 1. Северная граница ареала *D. marginatus* на территории Украины.

Velyka Pysarivka districts of Sumy oblast. Among the reasons of returning this tick species to the areas where it lived more than 50 years ago, may be either general warming of climate, or no tick control and acaricides treatment of cattle as well as pasture of private cow herds on inarable land and forest bells, or collection of factors.

2. The ornate cow tick — *Dermacentor reticulatus* Fabricius

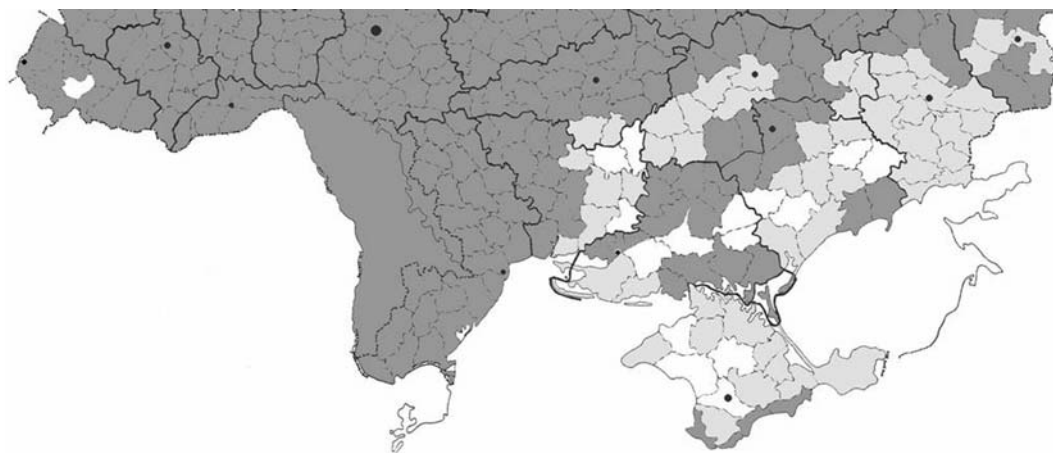
According to the literary data, in Ukraine, ornate cow tick has disjuncted natural habitat, because there is a separate enclave in Crimean mountains (Emchuk, 1960; Kulik, Vinokurova, 1983; Filippova, 1997; Kolonin, 2009). Figure 2 shows the natural habitat of this tick in Ukraine according to data of E. Emchuk, I. Kulik and N. Vinokurova, G. Kolonin with our precisions (grey markings), places of findings made by



■ — basic natural habitat; ■ — territories, were *D. reticulatus* dwelt from data of sanitary of detachments.

Fig. 2. Natural habitat of *D. reticulatus* in Ukraine according to literary data (main data by the middle of 1980th).

Рис. 2. Ареал *D. reticulatus* в Украине составленный по литературным данным (основные данные по состоянию на середину 80-х гг. XX века).



■ — nidi of mass reproduction; ■ — territories, where *D. reticulatus* occurs sporadically.

Fig. 3. Range of *D. reticulatus* natural habitat in Ukraine.

Рис. 3. Современный ареал *D. reticulatus* в Украине.

sanitary-and-epidemiologic institutions (Kompantsev, 1969) and places with high probability of ticks occurrence not recorded by the aforementioned authors.

According to our data, range of *D. reticulatus* extends from the north to the south, and its distribution is similar to that of *I. ricinus* Linnaeus. Ornate cow tick is adapted to dwelling in urbanized areas parasitizing domestic and nomadic animals, small mammals. Also, it inhabits shores of artificial reservoirs. In 2005 and 2009, in Kyiv's park, we took off 2 nymphs and one larva of *D. reticulatus* from injured starling (*Sturnus vulgaris* Linnaeus), from dead blackbird (*Turdus merula* L Linnaeus) and missel (*Turdus viscivorus* Linnaeus). The finding of 2005 seemed to be casual artifact, because it was the first finding of preimaginal stage of this tick on birds. The finding of 2009 made us be more attentive. In archival information we found out a record about the finding of preimaginal stage of tick from the genus *Dermacentor*, taken off from a wild duck (*Anas platyrhynchos* Linnaeus) bagged in Chernobyl district of Kyiv oblast in 1981. Similar data are known for the USA (Hyland et al., 2000). Parasitizing birds, cow tick both survived in severe conditions, including urbanized areas, and increases capacity to colonization of new territories with similar conditions.

Taking into account that *D. reticulatus* is one of the main vectors of tularemia in Ukraine, we may suggest that natural sources of this disease can serve as some indirect evidence of possible sources of mass reproduction of this tick and we can include such areas into the general natural habitat.

Consequently, findings of *D. reticulatus* in cities and towns in the southern oblasts of Ukraine gave us the new vision of the range of the natural habitat of this tick. Being distributed in settlements and intrazonal wet areas, today ticks occur everywhere in steppe zone avoiding hard arid areas where other tick species do not live as well. In fact, in Ukraine, *D. reticulatus* is absent in some steppe areas only, and the majority of such territories were not examined carefully (fig. 3). The same situation is also recorded in Hungary (Sréter et al., 2005).

3. Areas of cohabitation ticks of the genus *Dermacentor*.

In 1988, 1990–1992, 2008 and 2009, we examined some areas of cohabitation of both aforementioned tick species in Karadah natural reserve. As a result, we revealed that *D. reticulatus* is drawn towards urbanized areas (fig. 4) parasitizing domestic and farm animals, and its preimaginal stages were collected from murine rodents captured in countryside. At the same time, *D. marginatus* was found in natural habitats and near

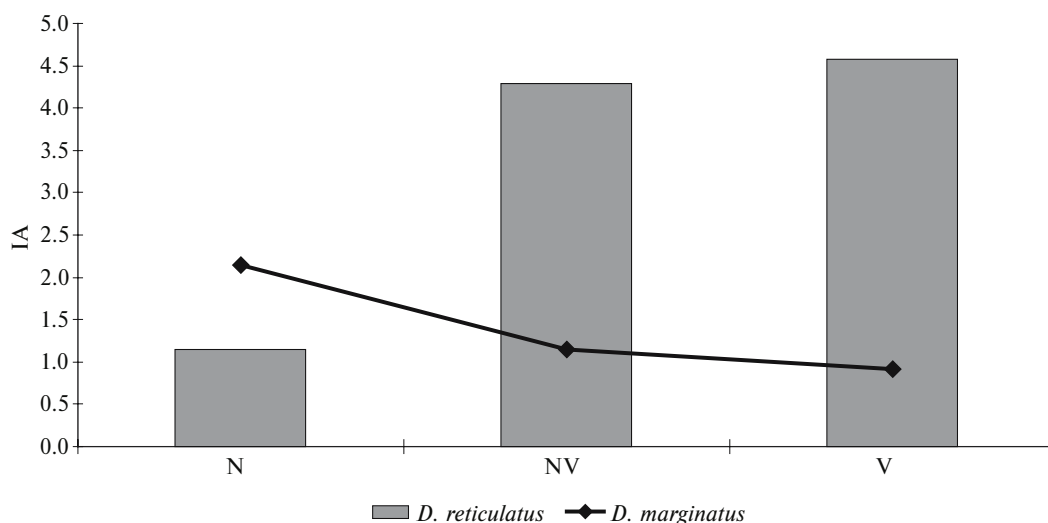


Fig. 4. Indices of abundance of ticks of the genus *Dermacentor* in the Karadagh Natural Reserve by the gradient of urbanization: N — nature; NV — near the village; V — the village.

Рис. 4. Индексы обилия клещей рода *Dermacentor* в Карадагском природном заповеднике по градиенту урбанизации: N — природа; NV — рядом с поселком; V — поселок.

villages including those from white toothed shrew (*C. leucodon* Herm) and the only tick specimen was collected from cow on village territory.

These findings support our observations on gradual adaptation of ticks from the genus *Dermacentor* to urbanized areas in the southern areas of Ukraine, but in the northern areas *D. marginatus* can take place of *D. reticulatus*, namely inhabit city parks. Having come upon “new” areas, ticks use all possible biological potential for anchoring there and first of all, capacity for mass reproduction. This explained enormous, as compared to natural habitats, IA values for ornate sheep tick in 1960th (table 1), and their drastic decrease under strong anthropogenic pressure. In this connection we can not exclude possible mass reproduction of ornate cow tick in the southern areas of Ukraine at the first opportunity, as well as probable epizootologic consequences.

Conclusions

1. The northern range of *D. marginatus* natural habitat is as follows: along the borders of Ivanichev, Gorokhiv districts of Volyn oblast, Demydiv, Mlyniv, Dubny, Zdolbuniv, Ostrog districts of Rivne oblast, Slavuta district of Khmelnytsky oblast, Baraniv, Romaniv, Zhytomyr, Andrushivka, Popelnya districts of Zhytomyr oblast, Skvyra, Bila Tserkva, Kaharlyk, Pereyaslav-Khmelnytsky districts of Kyiv oblast, Drabiv district of Cherkasy oblast, along the northern border of Poltava oblast, and Akhtyrka, Velyka Pysarivka of Sumy oblast.

2. *D. reticulatus* is adapted to dwelling in urbanized areas parasitizing domestic and nomadic animals, small mammals. Also, it inhabits shores of artificial reservoirs and occurs in the steppe zone, except for its arid areas.

3. For the first time, preimaginal stages of *D. reticulatus* were found out on birds (*A. platyrhynchos*, *S. vulgaris*, *T. merula*, *T. viscivorus*).

4. In the southern regions of Ukraine, in cohabitation areas, *D. reticulatus* is drawn towards urbanized areas, and *D. marginatus* — to natural habitats.

Dubrovskiy Yu. A., Burdelov A. S., Zhernovov I. V. et al. Mapping of natural habitat of great gerbille in the Central Asia and Kazakhstan by the method of grade fields // Modern problems of zoogeography. — Moscow : Nauka, 1980. — P. 167–180. — Russian : Дубровский Ю. А., Бурделов А. С., Жерно-

- вов И. В. и др. Составление карты ареала большой песчанки в Средней Азии и Казахстане методом градусных полей // Современные проблемы зоогеографии.
- Emchuk E. M.* Fauna of Ukraine. Ixodid ticks. — Kyiv : Izd. AN Ukraine, 1960. — Vol. 25, is. 1. — 163 p. — Russian : *Емчук Е. М.* Фауна Украины. Иксодовые клещи.
- Filippova N. A.* Ixodid ticks of Amblyominae subfamily // Arachnids. — SPb. : Nauka, 1997. — 436 p. — (Fauna of Russia and neighboring countries; Vol. 4. Is. 5). — Russian : *Филиппова Н. А.* Иксодовые клещи подсемейства Amblyominae // Паукообразные. — (Фауна России и сопредельных стран ; Т. 4., вып. 5).
- Hyland K. E., Bernier J., Markowski D. et al.* Records of ticks (Acari: Ixodidae) parasitizing birds (Aves) in Rhode Island, USA // International J. Acarology. — 2000. — **26**, N 2. — P. 183–192.
- Kompantsev N. F.* Epidemiological description of some especially dangerous infections in the Ukrainian SSR and experience of prophylactic measures. Kyiv, 1969. — 48 p. — Russian : *Компанцев Н. Ф.* Эпидемиологическая характеристика некоторых особо опасных инфекций в Украинской ССР и опыт организаций профилактических мероприятий.
- Kulik I. L., Vinokurova N. S.* Natural habitat of Dermacentor marginatus tick in the USSR // Med. paras. and paras. diseases. 1982. — **40**, N 3. — P. 16–23. — Russian : *Кулик И. Л., Винокурова Н. С.* Ареал клеща Dermacentor marginatus в СССР // Мед. пар. и пар. болезни.
- Kulik I. L., Vinokurova N. S.* Natural habitat of the meadow tick Dermacentor pictus in the USSR (Ixodidae) // Parasitology. — 1983. — **3**, N 17. — P. 207–213. — Russian : *Кулик И. Л., Винокурова Н. С.* Ареал лугового клеща Dermacentor pictus в СССР (Ixodidae) // Паразитология.
- Kolonin G. V.* Fauna of ixodid ticks of the world (Acari, Ixodidae). — 2009. — <http://www.kolonin.org/>
- Neronov V. M.* Zoogeographical analysis of Rodent Fauna of Iran // Bull. MOIP. Dep. Biol. — 1976. — **81**, is. 2 — P. 32–47. — Russian : *Неронов В. М.* Зоогеографический анализ фауны грызунов Ирана // Бюл. МОИП. Отд. Биол.
- Sréter T, Széll Z, Varga I.* Spatial distribution of Dermacentor reticulatus and Ixodes ricinus in Hungary: evidence for change? // Vet Parasitol. — 2005. — **128**, N 3–4. — P. 347–351.