

RICKETTSIAE OF THE SPOTTED FEVER GROUP IN SLOVAKIA

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The investigations on the ecology of rickettsiae of the spotted fever group in Slovakia resulted in the demonstration of vectors and reservoirs of these pathogens (Řeháček et al., 1972). A serological survey of small rodents indicated that these rickettsiae are spread throughout the whole country. Because this hypothesis arose only from serological findings we suggested that the demonstration of tick infection with the rickettsiae in various areas of Slovakia would be more than desirable.

This paper reports the results of tick infection with the rickettsiae of the SF group in four different areas of Slovakia, in which a high prevalence of small rodents, ticks and various rickettsiae was previously noted. The results of tick infection with rickettsiae are summarized in Table.

The first area of our investigations is in the vicinity of Bratislava. It is situated on the slopes of the southern branches of the Lesser Carpathian Mountains. The most abundant tick species in this area is *Ixodes ricinus*. In a few localities in woods and pastures along the Danube river the tick *Dermacentor reticulatus* is common everywhere, but the tick *Haemaphysalis concinna* rarely occurs. In spring 1975 we succeeded in collecting over 1000 adults of *I. ricinus* in 9 various localities of this area. Their infection with the rickettsiae of the SF group, as evidenced by the haemocyte test, was in 9.7% of both male and female. From these ticks, however, no rickettsial strain was isolated.

The second area is spread over the southern slopes of the Tribeč Mountains near the town of Zlaté Moravce, Nitra district. The most abundant tick species in this area are *I. ricinus* and *Haemaphysalis inermis*. In some localities, *Dermacentor marginatus* and *Haemaphysalis punctatus* ticks occur, but in lesser numbers.

TABLE
Rickettsiae of the spotted fever group in ticks in Slovakia

Area and district in Slovakia	Ticks collected in	Tick species	Number of ticks collected			Percentage of ticks infected		
			females	males	both	females	males	both
South-West Bratislava (7 localities)	spring 1975	<i>I. ricinus</i>	714	520	1234	9.2	10.2	9.7
West-Central Nitra (1 locality)	spring 1974	<i>I. ricinus</i>	449	406	855	8.2	4.7	6.5
		<i>H. inermis</i>	116	56	172	20.7	3.6	15.1
	summer 1974	<i>I. ricinus</i>	524	417	941	2.8	1.2	2.1
		<i>H. punctata</i>	46	32	78	0	0	0
	autumn 1974	<i>I. ricinus</i>	30	18	48	3.3	5.6	4.2
		<i>H. inermis</i>	136	159	295	14.0	0	6.4
	winter 1974	<i>I. ricinus</i>	83	93	176	7.2	4.3	5.7
<i>H. inermis</i>		392	190	582	11.0	16.8	12.9	
South-Central V. Krtíš (2 localities)	spring 1974	<i>D. marginatus</i>	415	357	772	12.3	16.8	14.4
East Košice (5 localities)	spring 1974	<i>I. ricinus</i>	77	69	146	5.2	4.3	4.8
		<i>D. marginatus</i>	371	311	683	17.3	15.8	16.3

The infection of ticks with rickettsiae was investigated in only one locality at 2-3 week intervals throughout the whole of 1974. The highest infection with rickettsiae was found in *H. inermis* ticks collected in spring and in winter, being 15.1% or 12.9%, respectively. No marked seasonal difference in the infection with rickettsiae of *I. ricinus* ticks was observed — in spring, this was 6.5%, in autumn — 4.2% and in winter 5.7%. The results with *I. ricinus* and *H. inermis* ticks showed about the same rate of rickettsial infections during the whole of a one-year period, with the exception of summer, when the rickettsiae were demonstrated only in *I. ricinus* ticks (2.1%). No rickettsiae were detected in *H. punctata* ticks collected in the same locality.

All attempts to isolate rickettsiae from *I. ricinus* and *H. inermis* ticks were negative. The infection of both tick species with rickettsiae was demonstrated by the haemocyte test with immunofluorescence technique and by development of antibodies in mice injected with suspensions from examined ticks.

As for *D. marginatus*, the rarest tick in this area, only 6 specimens (4 females and 2 males) were collected in April 1975, but all of them contained rickettsiae as detected by the haemocyte test. These ticks were

fed on a guinea pig in the laboratory, then divided into three groups, each consisting of two specimens, triturated and their suspensions inoculated into the yolk sacs of embryonated hen eggs. From all tested samples the strains of rickettsiae belonging to the SF group were isolated. The guinea pig, on which these ticks gorged, developed antibodies against the rickettsiae of the SF group.

The third area investigated is located on the slopes of the Krupina Hills, in V. Krtiš district, in South-Central Slovakia. This arid area consisting mostly of pastures is a typical biotope of *D. marginatus*, which is here the most common tick species. The ticks *H. punctata* and *I. ricinus* are less abundant, the latter occurring mainly in the forests. The infection with rickettsiae of *D. marginatus* ticks collected in 2 localities in April 1974 reached 14.4%, which was much lower than previously noted, e.g. 45% in May 1970 (Řeháček et al., 1971).

In 1974 the infestation of ticks with rickettsiae was demonstrated only by means of the haemocyte test with immunofluorescence technique. We did not consider it necessary to perform isolation experiments, since it is no problem to isolate rickettsiae from *D. marginatus* ticks, as proved in our previous studies (Řeháček et al., 1972).

The last area of the 5 localities studied is situated in East Slovakia about 30 km to the South-West of the town of Košice, close to the Hungarian border. In this area *D. marginatus* is the most common tick species, *I. ricinus* is less common and *H. punctata* very rare.

Investigations carried out in this area in spring 1974 demonstrated that 16.3% of *D. marginatus* ticks were infected, and 4.8% of the tick *I. ricinus*. Altogether 24 strains of the SF group rickettsiae were isolated from *D. marginatus* ticks.

These results on the infection of ticks with the rickettsiae of the SF group fully confirmed our previous conclusion, arising from serological surveys of small mammals, that almost the whole of Slovakia is a focus of the SF group rickettsiae. The principal vector of these rickettsiae is considered to be *D. marginatus*, the less efficient vectors being *I. ricinus* and *H. inermis* ticks. Because so far no rickettsiae have been demonstrated in *H. punctata* and *D. reticulatus* ticks, we presume that these two species do not play any important role in the circulation of the SF group rickettsiae in Slovakia.

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RIKETSJE Z GRUPY GORĄCZEK PLAMISTYCH U KLESZCZY W SŁOWACJI

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Poprzednio prowadzone badania na obecność przeciwciał przeciw riketsjom z grupy gorączek plamistych w surowicy drobnych gryzoni złowionych w różnych częściach Słowacji wykazały, że cały kraj uznać należy za ognisko tych riketsji.

Obecnie przedstawiamy wyniki badań nad zakażeniem kleszczy wspomnianymi riketsjami w 4 różnych regionach Słowacji reprezentujących najważniejsze obszary utrzymywania się riketsji w kraju.

Obecność riketsji w kleszczach badano metodą testu hemocytarnego i techniką immunofluorescencyjną, dalej metodą izolowania riketsji z kleszczy i przez pobudzenie myszy do produkcji przeciwciał po wprowadzeniu zawiesiny z kleszczy.

Riketsje wykryto w zachodniej Słowacji wiosną 1975 r. u 9,7% *I. ricinus*, wiosną-zimą 1974 r. w środkowo-zachodniej Słowacji u 2,1-6,5% *I. ricinus* i u 6,4-15,1% u *H. inermis*, w środkowej Słowacji wiosną 1974 r. u 14,4% *D. marginatus* i we wschodniej Słowacji wiosną 1974 r. u 4,8% *I. ricinus* i 16,3% *D. marginatus*. Regularnie izolowano riketsje z kleszczy *D. marginatus*.

Przedstawione badania ujawniły wysoki stopień zakażenia kleszczy riketsjami z grupy gorączek plamistych we wszystkich badanych terenach. Uważa się, że *D. marginatus* jest najistotniejszym wektorem tych riketsji w Słowacji. Zarówno *I. ricinus*, jak i *H. inermis* nie są tak ważne i odgrywają rolę wektora głównie w okolicach, gdzie *D. marginatus* występuje zbyt rzadko.