

Ticks (Ixodida) from the collection of the Natural History Department, Museum of Upper Silesia in Bytom, Poland – A contribution to knowledge on tick fauna and the first record of *Hyalomma marginatum* presence in Poland

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Abstract

There is no doubt that museum collections provide a wide variety of information on ticks. The tick collection at the Natural History Department of the Museum of Upper Silesia in Bytom consists only of 37 specimens as the department is focused mainly on building collections of insects and birds. However, this does not mean that such collection cannot contribute to our knowledge about these arthropods. The most valuable results of studies on the museum's tick collection concerned Polish fauna. There are specimens of *I. ricinus* dating back as far as 1930–1948, which are the first known records of the presence of this tick in the Upper Silesia. Two specimens collected *in copula* in 1941 might be the earliest record of the mating behaviour of this species in Poland. The most important result was the detection of 2 cases of *H. marginatum* presence in Poland, which by far are the oldest documented cases of its presence in this country.

Key words

ticks, Ixodida, museum collection, first record, *Hyalomma marginatum*

INTRODUCTION

Tick collections stored in museums worldwide undoubtedly provide reliable and extensive information on these parasites. This wide variety includes information on tick systematics and taxonomy and stored specimens can be used for revisions, molecular studies, description of a new species for a particular region, etc. When properly labelled they can provide additional information on hosts, distribution, environment requirements and activity periods, to name just a few. They can also provide information on tick-borne pathogens, their present and past epidemiology, ranging as far back as over 100 years ago [1, 2]. Some museum collections consist of thousands of specimens and these contribute the most to our knowledge, although even small collections may provide crucial information, thus they should be taken into consideration too.

The Museum of Upper Silesia is located in Bytom in a region historically called Upper Silesia, within the administrative borders of the Silesian Province of Poland. Its history dates back to 1910, when a group of Bytom history enthusiasts established a local museum based mainly on private collections. Throughout the years, the significance of the facility increased and in 1928 it was officially recognised by the local government. The museum was liquidated during World War II, but most of the collections luckily survived and the facility was reopened to visitors in 1946. At present, there are 5 main departments: Archeology, Ethnography,

Borderlands and Borderland Culture, Natural History and Art [3].

The collection of the Natural History Department consists in total of over 500,000 specimens, mainly focused on entomology and ornithology [3]. Therefore, its tick collection is very small consisting of only 37 specimens collected mainly accidentally or by occasion (Tab. 1). The specimens were examined in September 2013 using a stereomicroscope with identification keys by Hoogstraal [4], Kohls [5], Siuda [6], Baker [7] Walker et al. [8] and Nowak [9]. The specimens were stored dry, glued to the labels; therefore, in some cases it was possible to determine only a genus. Table 1 presents the results of the examination.

Tick specimens were mostly from the Ixodidae family – 32 individuals. A total of 5 individuals were from the Argasidae family and determined as *Argas* sp. Most probably they belonged to *Argas reflexus* because this is the most common among the total of 3 species from this family occurring in Poland [6, 9]. It was not possible to determine the species accurately as *A. polonicus*, although far less frequent, was very similar and difficult to distinguish on the basis of applied methods [6]. In general, the collection contained mainly adult individuals (33), 3 nymphs and no larvae. There was one fully-fed *I. ricinus* female, while other specimens were either partially fed or unfed. Apart from one couple of *I. ricinus* found *in copula*, the specimens were separate individuals. The majority of the collection, 21 individuals, came from Poland, the remaining 16 from different locations in Europe, Africa and Asia. The oldest specimen dated back to 1930, and the most recent was collected in 2008.

Information was provided for each specimens which included the collection date and location, but additional

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Table 1. Ticks (Ixodida) from the collection of the Natural History Department of the Museum of Upper Silesia in Bytom, Poland

Species/genus	No. of specimens	Life cycle stage	Location	Date	Additional information
<i>Argas sp.</i> Latreille, 1796	2	adult	Katowice, Poland	28.04.1996	collected in a flat (?), unfed
	2	adult	Katowice, Poland	11.02.1998	collected in a flat (?), unfed
	1	nymph	Katowice, Poland	12.10.2004	collected in a flat (?), unfed
<i>Ixodes ricinus</i> (Linnaeus, 1758)	1	nymph	Brzeszcze, Poland	24.07.2003	collected from vegetation in the vicinity of fish ponds, UTM: CA63, unfed
	1	male	Wigry National Park, Słupiańska Bay, Poland	29.06.2003	lake shore, UTM: FE38, unfed
	1	male	Bytom, Poland	06.07.1944	unfed
	2	male and female	Bytom, Poland	15.06.1941	<i>in copula</i> , unfed
	2	female	Bytom, Poland	06.07.1944	
	1	female	Tworków, Poland	27.04.1948	fully fed, no data on host
	2	female	Polichno Nature Reserve, Poland	15.06.1995	UTM: DA69, unfed
	1	female	Zawadzka, Poland	04.06.1930	unfed
	1	female	Pogorzała, Poland	09.06.1961	unfed
	<i>Hyalomma marginatum</i> Koch, 1844	1	male	Bytom, Poland	20.06.1935
3		male	Bytom, Poland	06.06.1943	unfed
1		male	Carevo, Bulgaria	02.07.2006	collected from the environment, fallow lands, unfed
<i>Hyalomma rufipes</i> Koch, 1844	8	2 females and 6 males	Namibia	08.1998	collected from common land <i>Taurotragus oryx</i> , partially fed
<i>Hyalomma sp.</i> Koch, 1844	1	female	MtoWaMbu, Tanzania	16–20.04.1997	unfed
<i>Rhipicephalus sanguineus</i> complex(Latreille, 1806)	1	female	Carevo, Bulgaria	03.07.2008	collected from the environment, roadsides, unfed
	2	male and female	MtoWaMbu, Tanzania	16–20.04.1997	unfed
<i>Rhipicephalus sp.</i> Koch, 1844	1	nymph	French Guiana	04–10.03.1996	unfed
<i>Amblyomma sp.</i> Koch, 1844	1	nymph	Sabah, Malaysia, Borneo	22–24.05.1995	unfed
	1	male	Sabah, Malaysia, Borneo	06–21.05.1996	Mt. Crocker 500–1900 m a.s.l., unfed
In total	37	3 nymphs, 13 males, 17 females, 4 unknown gender	21 Poland, 2 Bulgaria, 8 Namibia, 3 Tanzania, 1 French Guiana, 2 Borneo	04.06.1930 – 03.07.2008	28 unfed, 1 fully fed, 8 partially fed

data, e.g. hosts or environment were quite poor. Despite this, it was possible to derive some interesting observations from this material as the documentation was very accurate and reliable. The most valuable information was derived from the specimens collected in Poland. With the exception of a few short notes in books published in 1802 and 1825 and a paper printed in 1911, most of the documented research in Poland on *I. ricinus* was carried out in the 1950s and for a few years later [11]. Some specimens of *I. ricinus* from the museum collection dating back as far as 1930–1948 might be one of the oldest documented records of the presence of this tick in Poland, and without doubt are the first records of this tick in Upper Silesia. Additionally, individuals from 1941 found *in copula* might be one of the oldest known records of mating behaviour of this species in Poland. Both specimens were unfed, which implies they might have been collected from vegetation, although there was no such information provided. *I. ricinus*, as other members of Ixodinae subfamily, is known to copulate usually on hosts while feeding, but unfed individuals can also copulate in the environment [6, 11].

The most important discovery however, concerned 4 specimens of *Hyalomma marginatum* which has a distribution

range covering southern Europe and Russia, Ukraine, North Africa and the Near East [10]. It is quite frequently dragged to central Europe, and occasionally to Poland, usually on migrating birds [12], although it is not a permanent element of Polish tick fauna [9]. To-date, there have been only 2 documented cases of the presence of this tick in Poland. The first was described in 1979 by Siuda and Dutkiewicz and the second in 2010 by Nowak and Solarz [9]. In both cases, ticks were collected from migrating birds: *Motacilla flava* and *Acrocephalus schoenobaenus*, respectively [9]. The specimens from the museum's collection were males, one collected in 1935 and three in 1943. Unfortunately, there was no information provided whether they were collected from the host or from vegetation. Nevertheless, these are the oldest documented cases of the presence of this tick species in Poland and the third known case, generally.

Specimens from outside Poland were determined as: *Hyalomma*, *Rhipicephalus* and *Amblyomma*. *H. rufipes* is a species widely distributed in Sub-Saharan Africa, occasionally introduced to northern areas of Africa, southern Europe and the Near East [10]. Hosts of adult stages include ungulates, carnivores, elephants and larger birds [8, 9]. The

individuals from the museum's collection were collected from an antelope in Namibia, south-west Africa, which confirms both host preferences and distribution of this species. A female of *Hyalomma* sp. collected in Tanzania, east Africa, was most presumably *H. truncatum*, but due to the lack of access to the ventral side of the individual it was impossible to confirm this. Species of *Rhipicephalus* genus are very difficult to determine and require careful examination of all sides (ventral, lateral and dorsal) [4, 8]. Therefore, it was only possible to determine that specimens from Bulgaria and Tanzania belonged to *R. sanguineus* complex, which consists of a group of morphologically similar species spread worldwide [8, 9]. Nymphs collected in French Guiana presumably belonged to *R. (Boophilus) microplus* species, but it was impossible to determine this for certain; the same applied to individuals of *Amblyomma* sp. collected in Borneo.

Monitoring the distribution of ticks is important due to the fact that they are vectors of many diseases affecting humans and animals, the most commonly known being borreliosis (Lyme disease) [1, 2, 6, 9]. *I. ricinus* is the main vector of borreliosis in Europe, but it can transmit a wide variety of other diseases, such as, babesiosis, tick-borne encephalitis, anaplasmosis, etc. [9]. *A. reflexus* (as well as *I. ricinus*) bites may cause multiple symptoms in humans and pigeons including nausea, headaches, and sometimes even paralysis and death [6, 9, 13]. It is also a vector of some diseases, such as tick-borne encephalitis, borreliosis, rickettsioses, etc. [6, 9]. Although ticks themselves are not very mobile, while attached to their hosts (such as pigeons, as well as other birds and big mammals), they can be transported to great distances, spreading diseases along the way [9]. Ticks like *Hyalomma marginatum* which parasitize migratory birds can even be transported between continents [6, 9]. It is regarded as the main vector and reservoir of Crimean-Congo haemorrhagic fever, and it also transmits such pathogens as Dhori virus, *Coxiella burnetii* and *Babesia equi* [9].

The presented study confirms the importance of examination of even the smallest museum collections consisting of specimens collected accidentally or by the occasion. The Museum of Upper Silesia in Bytom not only preserves knowledge on the art, traditions and culture of the Upper Silesia, but also provides a reliable source of information on its natural world. Although the tick collection is focused mainly on Polish specimens, there is also additional material collected from all over the world.

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