SHORT COMMUNICATION

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New records of *Haemaphysalis concinna* ticks on Usedom Island, NW Poland

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Abstract

Introduction. *Haemaphysalis concinna* (*Acari: Ixodidae*) is an important vector of tick-borne diseases in the Palearctic zone, constantly increasing its range of occurrence. Extensive data exist regarding the species distribution of throughout Eurasia, including countries adjacent to Poland; however, records of this species in Poland remain scarce.

Materials and Method. Faunistic studies by flagging method were conducted in 2019, 2022 and 2025 in the recreational area of Usedom Island NW Poland.

Results. Of the 139 host-seeking ticks collected, *Ixodes ricinus* represented 98.5% (137/139), and *H. concinna* comprised 1.5% (2/139) of the specimens. *Haemaphysalis concinna* was noted twice – in 2019 and 2022.

Conclusion. Considering that *H. concinna* is a proven vector for the tick-borne encephalitis virus and *Francisella tularensis*, and since its feeding on humans is documented, it remains essential to continually update information on its distribution and spread. The obtained data revealed that Usedom Island may be a potential new locality of *H. concinna* occurrence, but further extended studies are necessary to confirm its status in this location.

Key words

Poland, ticks, tick expansion, *Haemaphysalis concinna*, arthropod vectors

INTRODUCTION

Progressive climate changes and dynamic anthropopressure are factors contributing to the colonization of new areas by epidemiologically important arthropod vectors, e.g., ticks [1–2]. Consequently, tick-borne pathogens (TBPs) transmitted by newly introduced tick species may pose an emerging threat to public health in addition to TBPs transmitted by indigenous ixodofauna. *Haemaphysalis concinna*, first described in 1844 by the German entomologist and asrachnologist Carl Ludwig Koch, is widely distributed throughout areas in Eurasia with a temperate climate, where it parasitizes a wide range of both wild and domesticated animals, e.g., mammals, birds, and reptiles [3–5]. Additionally, humans may serve as incidental hosts for both nymphal and adult forms of *H. concinna* [6–8]. This species primarily inhabits sparse, humid or swampy deciduous and mixed forests with dense undergrowth, as well as forest steppes, humid steppe environments, and areas surrounding lakes and river valleys. Its preferred habitats are typically situated at forest edges, clearings, and thickets of reeds, rushes, and sedges within the warm temperate climate of the Palearctic region [3, 5]. As *H. concinna* is a proven vector for tick-borne encephalitis virus [9] and *Francisella tularensis* [10], it is essential to continually update information on its distribution and spread. Although *H. concinna* is present in neighbouring countries, its occurrence in Poland is rarely documented.

A primary aim of the research was to conduct a faunistic study using tick sampling in one of the most attractive tourist areas in Poland. The unexpected appearance and discovery of *H. concinna* are significant, as they provide new insights into the region's tick fauna, allowing these cases to be described in the context of the *I. ricinus* collection.

MATERIALS AND METHOD

Study area. The collection site was located in north-west Poland, within the Nature 2000 area, which aims to protect valuable naturally endangered components of Europe's biodiversity, and includes Special Protection Areas for Birds and Special Areas of Conservation for Habitats. It comprises an area where numerous animal species occur, including several dozen species of birds under legal protection [11]. The collection site was on Usedom Island, located within the city limits of Świnoujście (53.9135°N; 14.2273°E), on the border of the Pomeranian (acidophilous) beech-oak forest (*Fago-Quercetum*) in the close vicinity of human dwellings (Fig. 1).

Tick collection. Ticks were collected from vegetation on Usedom Island in mid-April 2019, 2022, and 2025 using the

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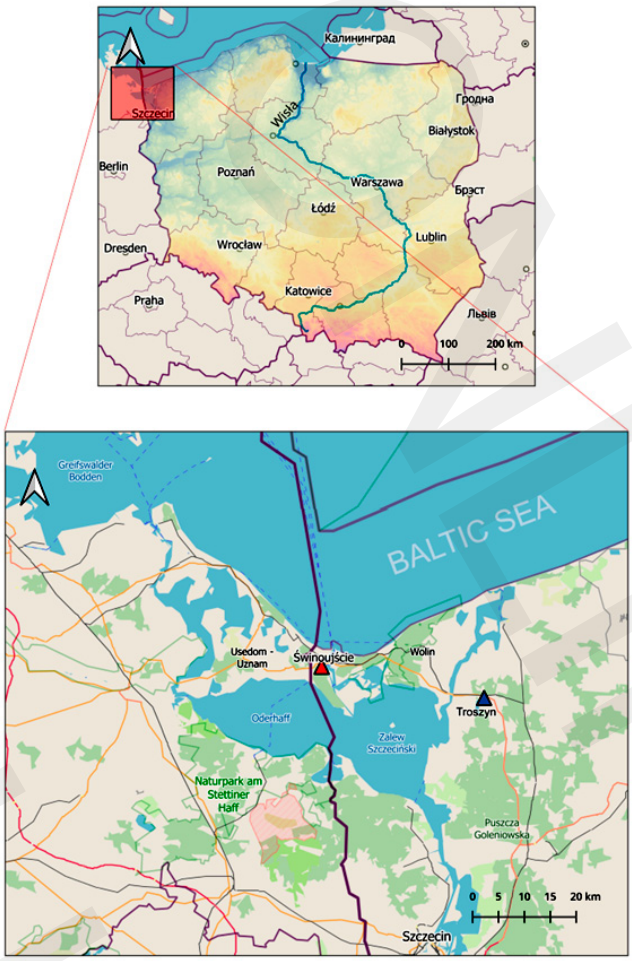

Figure 1. The geographical location in north-west Poland (53.9135°N 14.2273°E) where specimens of *Haemaphysalis concinna* ticks were collected from vegetation in 2019 and 2022, marked as a red triangle; finding from Lachmajer et al. In 1956, marked as a blue triangle.
Source: MarcinWasilewski, marcinwasilewski.eu on the basis of the OpenStreetMap; Copyright © authors OpenStreetMap

flagging method [12]. Field sampling was conducted once per year for one hour by a single person between 10:00 a.m. and 1:00 p.m. on sunny days without precipitation. The collected ticks were placed in sterile polypropylene tubes and preserved in 70% ethyl alcohol until further analysis. To determine the species, the developmental form and gender of collected specimens were identified and morphological studies were conducted under a light microscope – Olympus SZ-40 (Olympus, Tokyo, Japan), according to the tick identification keys compiled by Nowak-Chmura [13], and Estrada-Peña et al. [14]. The Supergan and Karbowiak scale was applied to assess tick attack risk at each site. Risk was classified as very high (>50 ticks/person/hour), high (26–50 ticks/person/hour), or moderate (11–25 ticks/person/hour) [15].

Statistical characteristics. To verify the significance of differences in the number of ticks in different comparison groups, the Yates correction to the χ^2 test (Chi-square test with Yates correction) was used. Additionally, in order to confirm a difference between two examined groups, a *post-hoc* Φ power analysis (with α =.01 probability of type I error) was conducted. Calculations were performed using the STATISTICA 10 PL software (TIBCO Software, CA, USA).

RESULTS AND DISCUSSION

A total of 139 ticks were collected during the research in spring 2019, 2022, and 2025. Two species were represented: *Ixodes ricinus* (Linnaeus, 1758) (n = 137; 98.5% of tick collected) and *H. concinna* (n = 2; 1.5%, respectivelly). *Ixodes ricinus* ticks were collected in all study years: 67 specimens (5F, 1M, 61N) in 2019, 39 (4F, 1M, 34N) in 2022, and 31 (0F, 2M, 29N) in 2025. In the case of *H. concinna*, one nymph (Fig. 2) and one male (Fig. 3) were found in 2019 and 2022, respectively, at the edge of the forest along a residential road in an estate of single-family houses (Fig. 4). Following the criteria defined by Supergan and Karbowiak [15], in mid-April, the sampling site can be classified as a locality with a high or very high risk of tick infestation.

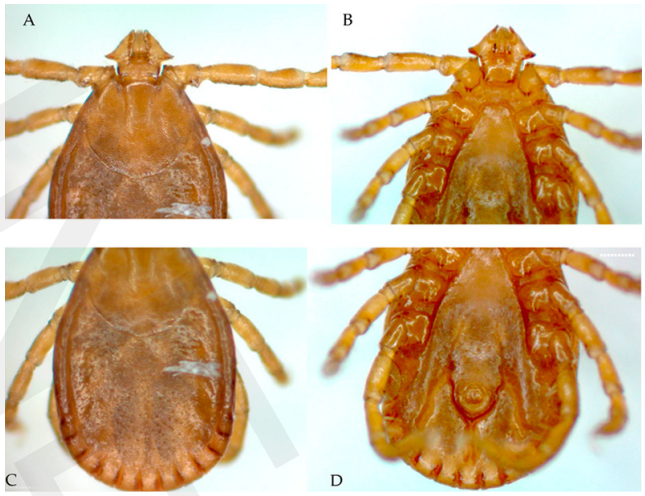

Figure 2. Morphology of *Haemaphysalis concinna* nymph collected in Świnoujście, north-west Poland; dorsal view (A, C), ventral view (B, D)

Figure 3. Dorsal anterior section of *Heaemaphysalis concinna* male. Arrow in upper right corner indicates palp-like pincers, with article II projecting laterally half its length beyond the lateral margin of the base; arrow in upper left corner indicates pointed palpal segments III, which when folded, overlap like scissors arms. Arrows in the lower left and right corners indicate trochanter I with a prominent posteriorly directed spur

RESULTS

The results of the χ^2 test indicated no statistically significant differences in the proportion of the two tick species collected in 2019 and 2022 (χ^2 (1, N = 108) = 1.266; p-value =.722), confirmed by a *post-hoc* power test (Φ (6.099) = 1). Among the 137 *I. ricinus* ticks, 13 were adults and 124 were nymphs. This corresponds to 9.5% and 90.5% of collected specimens, respectively. Statistical analysis did not indicate

Figure 4. *Haemaphysalis concinna* collection site on Usedom Island, Świnoujście, north-west Poland; the edge of the forest along a residential road in an estate of single-family houses

any statistically significant differences in the proportions between the developmental stages collected in 2019, 2022, and 2025 (Tab. 1).

Table 1. Results of χ^2 tests between the number of *Ixodes ricinus* ticks collected in particular years on Usedom Island

Year of collection		*p-value*		
		2019	2022	2025
χ^2	2019		.765	.981
	2022	.089		.63
	2025	.001	.232	

Among the 13 *I. ricinus* adults, nine were females and four were males (69% and 31% of mature ticks, respectively). The χ^2 test showed no statistically significant differences in the proportion of adults and nymphs collected in 2019 and 2022 (χ^2 (1, N = 106) =.412; p-value =.521) and the results were confirmed by a *post-hoc* power analysis (Φ (5.053) = 1). It should be mentioned that non-significant findings should be interpreted with caution, as they may reflect limited statistical power. Avian species, abundant in the study area, may serve as long-distance tick dispersal hosts [16]. The role of birds in the spread of *H. concinna* seems highly probable, as its juvenile forms are commonly found feeding on birds throughout Europe [17–19]. Although *H. concinna* is common in Europe, its occurrence is still very rare in Poland. The single female of this tick species was detected for the first time in Poland in Troszyn (north-west Poland) in 1956 [20]. Since then, in 2018 this species of tick has been reported in several new locations in Poland, including an area near Wolsztyn in Nowy Młyn (western Poland) [21], Lower Silesia (south-west Poland) [22], and a site near Nowa Dęba (south-east Poland) [23]. In 2024, *H. concinna* nymphs were identified on great reed warbler (*Acrocephalus arundinaceus*) in the Milicz Fishponds Nature Reserve (south-west Poland). This observation indicates that avian hosts may facilitate the dispersal of *H. concinna* across different regions [24]. In a study involving juvenile specimens of *H. concinna* collected from rodents near Wolsztyn (western Poland), DNA of *Rickettsia* spp., *Borrelia burgdorferi* s.l., and *Babesia* spp. was identified in 2.9%, 38.2%, and 7.4% of samples collected from tundra vole (*Alexandromys oeconomus*) [25]. Additionally, *Borrelia burgdorferi*–positive *H. concinna* juveniles were detected in several ticks collected from field voles (*Microtus agrestis*) [25]. Nevertheless, the contribution of *H. concinna* to the circulation of these tick-borne pathogens under natural conditions, as well as role of rodents in maintaining populations of this tick species, requires further investigation.

In the present study, *H. concinna* specimens were discovered in the immediate vicinity of human settlements. The occurrence of *H. concinna* in areas with a high degree of anthropopressure (urban and suburban environments) has also been noted in Hungary [26], Slovakia [27, 28], Czech Republic [28], Austria [29], and Germany [30].

In the above-mentioned studies, as well as our records, *H. concinna* were found occur sympatrically with *I. ricinus*. In most cases, *H. concinna* individuals constituted a small percentage of the tick collection, with abundance range from 1.3% – 17.8% [26–29]. The absence of the *H. concinna* specimens in the tick collection performed in 2025 may be the result of the small number of these ticks in the studied area, or may indicate that the studied ticks did not come from the local population but were probably episodically imported to Usedom Island by migrating animals, or cross-border traffic of breeding and companion animals as a part of the island is German territory [16, 31].

The results obtained may indicate the possibility of *H. concinna* spreading on its bird hosts to isolated areas of Usedom Island from another location in Poland, or from nearby locations in neighbouring Germany [32]. In turn, progressive climate changes may create favourable conditions for this tick species to develop a new, stable population(s) in the future. Hence, further monitoring of this area and more detailed studies are necessary to investigate the possible development of the *H. concinna* population in the study areas.

CONCLUSIONS

The results of the research indicate the possibility of *H. concinna* introduction to the areas of the isolated region of Usedom Island, probably by migrating animal hosts. Further studies covering a larger area and time range are necessary to assess whether *H. concinna* is beginning to colonize Usedom Island as a result of dispersion from other existing populations. The study confirms the *H. concinna* finding from Lachmajer et al. made in 1956 [20], which was documented in the eastern part of the Szczecin Lagoon (30 km away in Troszyn).

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