

Toxoplasma gondii in the alpine ecosystem:

is the Pyrenean chamois (*Rupicapra pyrenaica*) highly susceptible to the parasite?

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Background and objectives

Toxoplasma gondii (*T. gondii*) is a protozoan parasite of global distribution that has the potential to infect any warm-blooded animal species [1]. The objectives of this study were to define the epidemiology of *T. gondii* in the alpine ecosystem, to analyze its prevalence through time in the Pyrenean chamois population and to determine and quantify the risk factors of the *T. gondii* circulation in chamois.

Category		Positive/Examined (%)
Year	2012	6/75 (7.1)
	2013	11/95 (11.6)
	2014	3/65 (4.6)
	2015	11/85 (13.1)
	2016	12/164 (7.3)
	2017	4/27 (14.8)
Sampling area	RNC Alt Pallars - Aran	10/65 (15.4)
	RNC Cadí	17/147 (11.6)
	RNC Cerdanya - Alt Urgell	5/38 (13.2)
	RNC Freser - Setcases	15/269 (5.6)
Sex	Male	21/261 (8.1)
	Female	21/231 (9.1)
Age	Sub-adult	1/39 (2.6)
	Adult	17/233 (7.3)
	Senescent	21/203 (10.3)

Table 1. *T. gondii* seroprevalence (MAT ≥ 1:25) by categories

Discussion

The seroprevalence observed in the Pyrenean chamois was lower than previous data on terrestrial mammals in the Iberian Peninsula . This can be attributed to the high- altitude conditions of the alpine ecosystem, with low densities of felids and therefore less oocysts in the environment. The increase in prevalence as the chamois get older seems to indicate that the horitzontal transmission of *T. gondii* is the most common. Species poorly exposed to *T. gondii* are susceptible to he parasite. In fact, a case of fatal toxoplasmosis was described in a Pyrenean Chamois [3].

Conclusions

1. Low seroprevalences found in the Pyrenean chamois may indicate that *T. gondii* oocysts contamination in the alpine ecosystem is low.
2. As the Pyrenean chamois is a cinegetic species, we cannot ignore its potential zoonotic risk.
3. *T. gondii* prevalences in the populations studied remain stable over the years
4. Sex, age or habitat don't appear to be risk factors for *T. gondii* infections in the populations studied.
5. The low prevalences added to the clinical case suggest that the Pyrenean chamois could be susceptible to *T. gondii*.

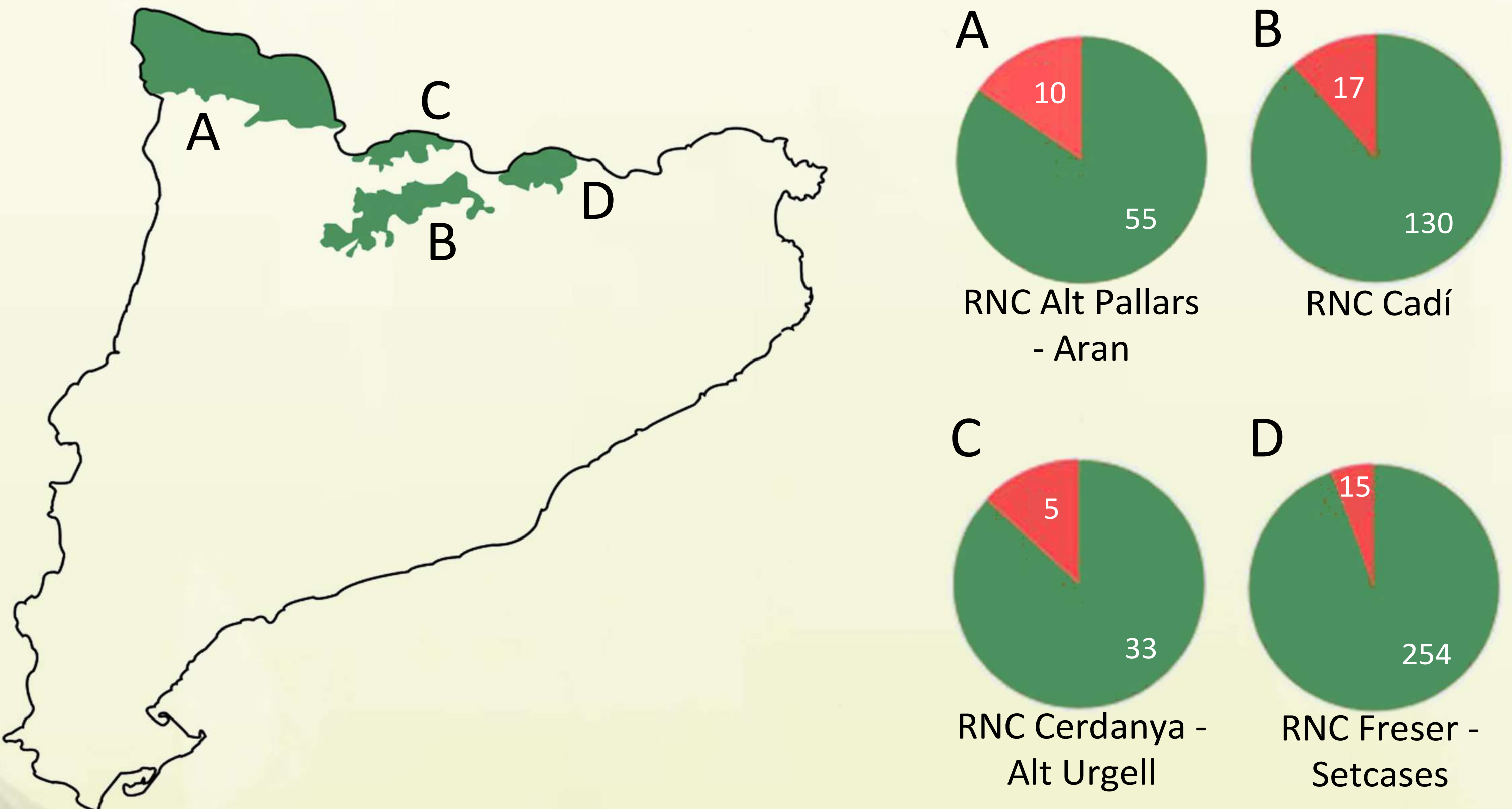


Figure 1. Sampling areas and positive (red) or negative (green) results of the MAT.

Materials and Methods

Sera from 519 Pyrenean chamois were collected from four hunting areas in the Catalan Pyrenees (Figure 1) from 2012 to 2017. The presence of antibodies against *T. gondii* has been tested by a modified agglutination test (MAT titers ≥ 1:25)[2].

Results

Titers of 1:25 or higher were found in 47 out of 519 Pyrenean chamois. An overall 9.1% seroprevalence was detected (IC₉₅%: 6.8 to 11.8). No statistical differences were observed by year, sampling area, sex or age. Serological results by categories are shown in table 1.

References

1. Dubey JP. 2010. Toxoplasmosis of Animals and Humans, Second Edition. CRC Press. Boca Raton, Florida. pp:313
- 2.. Dubey JP, Desmonts G. 1987. Serological responses of equids fed Toxoplasma gondii oocysts. Equine Veterinary Journal. 19:337–339.
3. Marco I, Velarde R, López-Olvera JR, Cabezón O, Pumarola M, Lavín S. 2009. Systemic toxoplasmosis and Gram-negative sepsis in a southern chamois (*Rupicapra pyrenaica*) from the Pyrenees in northeast Spain. Journal of Veterinary Diagnostic Investigation. 21:244–247.

