Questing *Dermacentor reticulatus* harbouring *Babesia canis* DNA, associated with outbreaks of canine babesiosis in the Swiss Midlands

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INTRODUCTION

There are only few reports of canine babesiosis in Switzerland, except around Lake Geneva (Fig. 1). In 2011 and 2012, two outbreaks of this tick-borne disease occurred in two non-endemic areas (A, B; Fig. 1). Aim of this study was to describe the outbreaks and to assess possible infection sources for the dogs.

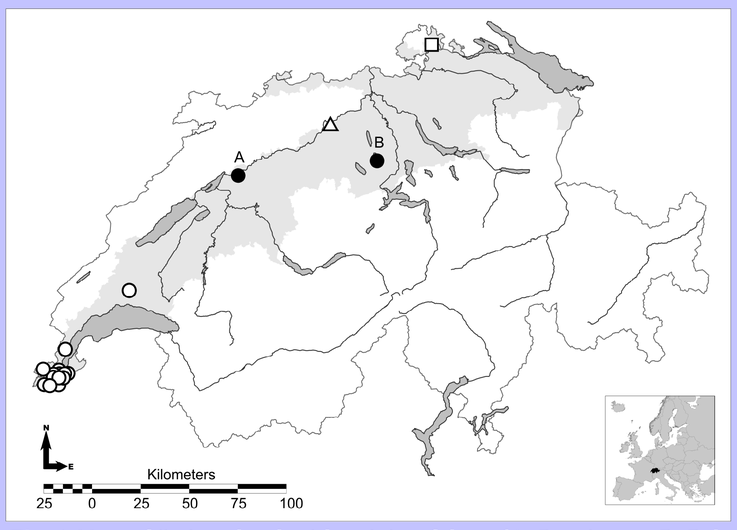

Fig. 1 Map of Switzerland with origin of dogs (A: Dotzingen, B: Baldegg) and former reports of canine babesiosis (white forms), shaded area represents the bioregion Swiss Midlands.

MATERIALS AND METHODS

28 diseased dogs were included in this study. We collected clinical history and laboratory results of each dog (Fig. 2, Table 1). In addition we assessed the presence of ticks by flagging in both areas A and B (Fig. 1, 3). Sequencing was performed to compare *Babesia* from both dogs and ticks.

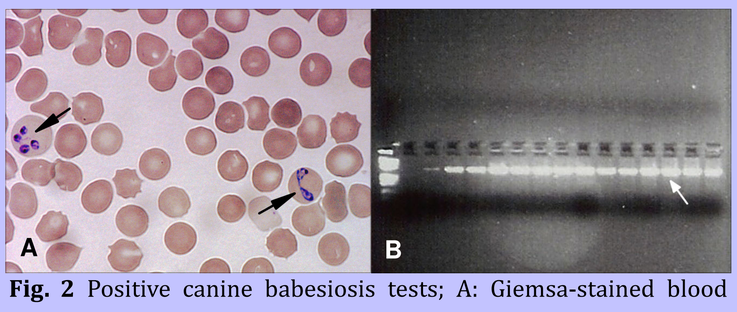

Fig. 2 Positive canine babesiosis tests; A: Giemsa-stained blood smear with large *Babesia* species (arrows); B: *Babesia* sp. PCR showing a series of positive dog samples.

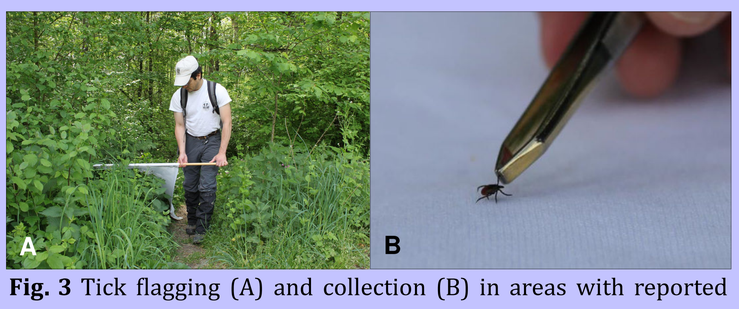

Fig. 3 Tick flagging (A) and collection (B) in areas with reported outbreaks of canine babesiosis.

RESULTS

Dogs

All dogs showed symptoms of canine babesiosis and four of them died (data not shown). The first affected dog died undiagnosed and in the second dog, diagnosis was delayed. At the beginning of the outbreak, adequate treatment (imidocarbdiproprionat) was absent from the local veterinarians' pharmacies. Therapy therefore was postponed in some cases.

No dog had a recent travel history and no dog was vaccinated against canine babesiosis (Table 1). Tick prophylaxis was commonly applied.

Table 1 Summary information on clinical history and laboratory results of dogs involved in both outbreaks of canine babesiosis.

Clinical history	Number of dogs	Comment
Vaccination	0/28	
Tick prophylaxis	15/28	imidacloprid/permethrin, fipronil or deltametrin
Travel history	3/28	Travels occurred at least 6 months before onset of symptoms
Laboratory results		
Blood smear	19/27	Large *Babesia* species
PCR	27/27	*Babesia* sp.
Sequencing	18/18	*Babesia canis*, GenBank accession number JX678979
Follow up serology	14/15	Seroconversion or increased titre

Ticks

23 questing *Dermacentor reticulatus* ticks were collected in area B. Of these, 19 tested positive in the *Babesia* PCR (Table 2). One *D. reticulatus* tick collected on a diseased dog was positive for *Babesia canis* DNA (data not shown).

Table 2 Ticks collected in both Swiss areas affected by the outbreaks of canine babesiosis.

	Ixodes	*Dermacentor*
Dotzigen	238	0
Baldegg	0	23
***Babesia* PCR+**	0	19

Sequence comparison

Sequencing was performed for 9 ticks and 18 dogs. All sequences were 100% identical, including two unresolved positions indicating double infection or heterogeneity (Fig. 3).

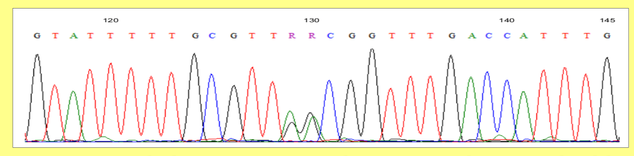

Fig. 3 Partial chromatogram of *B. canis* showing double peaks at positions 129/130 of the 28sRNA gene.

Possible origin of the *Babesia canis*

A retrospectively assessed dog from area B suffered from babesiosis after travels to Hungary 18 months prior to the outbreak. The same *B. canis* sequence was found in this dog.

Follow up

After identification of the disease, local veterinarians alerted their colleagues through a professional mailing list. Practitioners held informative meetings for dog owners, and press reports were published in local newspapers (Fig. 4), thus increasing disease awareness. In both areas, no further cases have been reported until today.

Fig. 4 Examples of information from veterinarians (A) or newspapers (B) to sensitize about canine babesiosis.

CONCLUSIONS

We report two outbreaks of canine babesiosis in a new area. Before first outbreak, disease awareness was missing, the dogs were not vaccinated and the necessary drug was not readily at hand. However, reaction of practitioners was rapid after identification of the disease, thus allowing quicker diagnosis and treatment of following cases.

Questing *D. reticulatus* ticks harbouring the same *B. canis* sequence strongly indicate presence of a local cycle, thus explaining the infection in dogs without recent travel history. Tick prophylaxis could not prevent canine babesiosis in 15 dogs. The former case of a dog, that travelled to an endemic area indicates a possible route of disease introduction.

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