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Schistosoma haematobium infections acquired in Corsica, France, August 2013

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A 12 year-old boy in Germany developed urinary schistosomiasis in January 2014. He had bathed in rivers in south-eastern Corsica five months earlier. Before this case, human schistosomiasis had not been reported on the island, although its vector, the snail *Bulinus truncatus*, locally transmitted the zoonotic *Schistosoma bovis*. The boy's father excreted *S. haematobium* ova that were not viable; the boy's three siblings had a positive serology against schistosomes.

Schistosomiasis cases reported in Germany in 2014

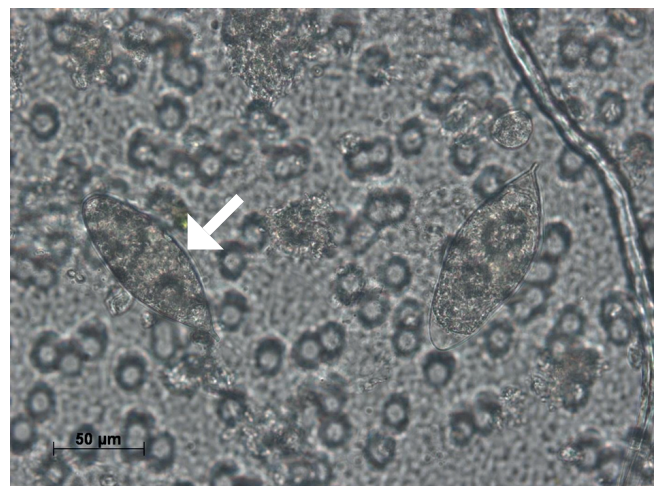
In January 2014, a 12 year-old German boy noticed painless excretion of bloody urine. He was referred by his paediatrician to a nearby urological hospital where ultrasonography showed focal thickening of the bladder wall. Since no bacterial infectious agent was detected, cystoscopy was performed, as a result of which severe cystitis was detected. Histological examination of a biopsy taken from the bladder wall showed granulomatous inflammation and schistosomiasis was suspected. As the boy had had no exposure in known schistosomiasis-endemic regions, his family took him to the Tropical Diseases Service in Düsseldorf, Germany.

Microscopy of a 24-hour urine sample collected from on the first day he presented until the following day and filtered through a nuclepore microfilter revealed viable ova of *Schistosoma haematobium* (Figure).

The boy was treated with a single standard dose of praziquantel (40mg/kg body weight) and re-treated three weeks later with the same dose, to be sure to achieve complete cure of the infection. During 24 days after therapy, he had various attacks of haematuria, sometimes with temporary large blood clots inside the bladder. Upper urinary tract infection was not observed. Bacterial coinfections including tuberculosis

FIGURE

Ova of *Schistosoma haematobium* seen by microscopy of a microfiltrate of urine from a boy with urinary schistosomiasis, Germany, March 2014



Ova are indicated by arrows.

were ruled out by urine cultures, PCR and interferon-gamma release assay.

Investigations of the boy's five family members revealed non-viable *S. haematobium* ova in the urine of his father. Repeated examinations of enriched stool samples were negative for all family members. On the other hand, schistosomiasis serology against cercarial and adult antigens (by enzyme-linked immunosorbent assay (ELISA), immunofluorescence test (IFT)) was highly positive in all four children (including the boy) and the father, but not the mother.

Detailed history again confirmed that the boy and his family had never travelled outside Europe. His most

southerly travel was to Spain, where he had not bathed in surface fresh water, and southern France including south-eastern Corsica, where the boy had spent his holidays together with his family in August 2013 and bathed frequently in various rivers. The only place where the mother did not bathe together with her family was Cavu River.

Background

Schistosomiasis is endemic in 78 countries of the tropical and subtropical world [1]. The World Health Organization in 2012 estimated that 249 million people required preventive antiparasitic therapy for schistosomiasis [1]. One of the six *Schistosoma* species, i.e. *S. haematobium*, causes urinary schistosomiasis and is endemic in Africa and the Arabian Peninsula [2].

The life cycle of this helminth involves man and freshwater snails [2]. Humans constitute the definitive host, the freshwater snail of the genus *Bulinus* spp. the intermediate host. The habitat of the snail is shallow waters of rivers or lakes, where the snail usually lives attached to water plants. The snail releases mobile worm larvae called cercariae, which actively reach the definitive host and penetrate their skin. The larvae reach the bloodstream and end up in the portal system, where the worm larvae grow and mature to female and male adult worms. The adult worms mate and descend to the plexus vesicalis, where the female worms start to lay their ova into the urinary bladder mucosa. The ova are excreted into the urine of the definitive host. When the ova reach fresh water, the intraovular larvae called miracidia hatch and swim towards the snails, where the cycle is completed. The bladder mucosa is damaged by the inflammatory response to the intraovular antigens resulting in ulcerations, papillomata and polyps of the bladder wall. Complications include bladder carcinoma, upper urinary tract infection and involvement of the reproductive tract [2].

Discussion

To the best of our knowledge, this is the first report in the scientific literature of autochthonous human schistosomiasis acquired in Europe since its elimination in the 1960s [2]. Similar cases among French tourists visiting the same sites in Corsica have been reported recently [3,4].

As the family had never travelled to known schistosomiasis-endemic areas, the most likely location for acquiring schistosomiasis was south-eastern Corsica, as supported also by the French tourists who were presumably infected in the same area [3,4]. Schistosomiasis has not been described as endemic in Corsica so far; however, *Bulinus truncatus*, the vector (snail) of *S. haematobium* is known to be endemic in some areas of south Europe, including Corsica, where it transmitted zoonotic *S. bovis*, which in humans may cause skin irritation (cercarial dermatitis) due to the unsuccessful skin penetration of zoonotic cercariae [5-7]. Generally, *Bulinus* spp. snails are very tolerant to

temperature change as they can survive temperatures between 2 °C and 40 °C [8,9]. Malacological investigations have shown that *S. haematobium* can develop in *Bulinus* spp. at temperatures around 20 °C [9]; however, the optimum temperature for infection of *Bulinus* spp. with *S. haematobium* miracidia is between 20 °C and 30 °C [9,10]. Cercarial shedding is also temperature dependent, with more cercariae shed at higher temperatures than at lower temperatures [11]; however, cercarial shedding can occur between 10 °C and 30 °C [12].

Physicians, especially urologists, should be alerted to the potential risk of schistosomiasis in individuals with haematuria or unclear genital symptoms who have never visited known schistosomiasis-endemic areas. Besides Corsica, schistosomiasis might be reintroduced to other endemic or formerly endemic areas for *Bulinus* snails, including southern Portugal, Sardinia, Sicily, Cyprus and Greece [11,13-16]. Since schistosomiasis is a chronic disease that may start with mild non-specific pruriginous cutaneous, urinary or genital tract symptoms [2,17,18], people who experience such symptoms and were exposed to surface fresh water in southern Corsica during past summers should be investigated [4].

Further studies are needed to identify the location of transmission sites, the focus and seasonality of transmission of *S. haematobium* in southern Corsica and to determine the origins of its introduction. Results of molecular genetic studies to identify the origin of the parasite and malacological studies to study the biology of the vector snails as well as the parasite's presence in the vector snails are pending.

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Conflict of interest
None declared.

Authors' contributions

JR and IMS took clinical care of the patients. MH, HM and GM performed the parasitological investigations. JR, MH, HM and GM looked for infected snails in Cavu River. All authors participated in writing the manuscript.

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