Local and International Implications of Schistosomiasis Acquired in Corsica, France


We report 11 cases of schistosomiasis in international travelers who had bathed in rivers in Corsica, France, during 2012–2014. The infections were diagnosed in 2014 and reported to the GeoSentinel Surveillance Network and European Travel Medicine Network. Travelers can be sentinels for emerging infections; thus, this situation warrants a concerted human and veterinary epidemiologic response.

In 2014, reports were received of several cases of Schistosoma haematobium trematode infection acquired in Corsica, a Mediterranean French island. The first patient was a child from Germany who had traveled to southern Corsica in August 2013 and had no other known exposures. Medical examination showed that the child had gross hematuria; he received a diagnosis of urinary schistosomiasis (1). Serologic test results were positive for 4 of 5 asymptomatic family members who had also traveled to Corsica and bathed in the Cavu River, near Porto-Vecchio. Eleven additional cases of urinary schistosomiasis were reported among mainland French tourists who bathed in the Cavu River during August 2011–August 2013 (2–4). All cases were identified during the chronic phase of the disease.

Additional members of the GeoSentinel Surveillance Network who also contributed data are listed at the end of this article.

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recent infections were acquired after exposure in July or August 2014.

Eosinophilia was recorded for 4 patients (Table). Most diagnoses relied on serologic testing, including the diagnoses for 2 patients who were suspected to have schistosomiasis because of repeated borderline seropositive test results or borderline results plus being part of a familial cluster. Parasite eggs were identified in only 1 patient.

Conclusions
We document 11 cases of schistosomiasis in international travelers who had freshwater river exposure in Corsica during 2012–2014. Of note, 4 of the persons did not report bathing in the Cavu River (the source of all cases of *S. haematobium* trematode infection among French patients so far), but they did bathe in other Corsica rivers.

Corsica has a population of 316,000 persons, but in 2012, the island was visited by 2.7 million tourists, primarily from mainland France, followed by Italy, Belgium, Germany, and Switzerland (online Technical Appendix Table 2). Local data from the Porto-Vecchio community (≈10,000 inhabitants) confirm the predominance of French nationals among the ≈100,000 tourists who visited the area in 2011; much smaller numbers of tourists visited from other parts of Europe and North America (online Technical Appendix Table 2). Because tourists outnumber residents, it is not surprising that most persons who acquired urinary schistosomiasis in Corsica were tourists (online Technical Appendix Figure). French travelers are not represented in GeoSentinel data because travel across an international border is required for inclusion in the database (5). The predominance of German travelers in our cohort may reflect the high proportion of Germans among international travelers to Corsica and the strong representation of German travelers in the GeoSentinel database.

Our report has limitations. All patients identified through the Surveillance Network were asymptomatic at the time of diagnosis. Only 1 traveler had parasitologic proof of infection. In these patients, a diagnosis of schistosomiasis was made on the basis of only 1 positive serologic test result; in some cases, the results were borderline or weakly positive. Serum samples were examined by using in-house
or commercial assays and were not tested side by side in a reference laboratory or confirmed by Western blot. We cannot completely exclude that the case definition in our study generated false-positive cases; diagnosis of schistosomiasis in a setting where the disease is not endemic is extremely challenging (6). Symptoms of acute schistosomiasis (corresponding to larval migration) may be absent (as in our cases) or nonspecific, but chronic infection (presence of adult worms) due to *S. haematobium* is symptomatic in \( \geq 66\% \) of cases with detectable egg excretion (often of light intensity however) (7). In acute and chronic infections in travelers, sensitivity of egg detection is notoriously poor, and serologic test performance is far from optimal.

Schistosomiasis has never been established in Europe. However, sporadic autochthonous cases of human urinary schistosomiasis were reported in Greece, Cyprus, Spain, and Portugal in the 1920s (8); the last cases were reported in Portugal in 1965 (9). Autochthonous transmission of urinary schistosomiasis to humans has only recently been described in France (10). The intermediate host snail, *B. truncatus*, is widely distributed in Africa, the Middle East, and the Mediterranean Basin as far north as Portugal, Spain, Sardinia, and Corsica (11). Because the intermediate host is present and climatic conditions are suitable, the risk for autochthonous transmission of *S. haematobium* in the region of Porto-Vecchio was predicted as early as 1928 (12). Animal schistosomiasis caused by *S. bovis* was described in cattle in Corsica in 1929; *B. truncatus* snails were identified as the intermediate host. The last cases of animal schistosomiasis in Corsica were documented in 1966 (13). The discovery of human cases of schistosomiasis proves that a human–*Bulinus* parasitic cycle exists in Corsica and suggests that a cattle–*Bulinus* cycle may also exist (13). Furthermore, hybridization between schistosome species can occur, specifically hybridization of *S. bovis* and *S. haematobium*, as described in Senegal and elsewhere (14). Hybridization results in heterosis, thereby producing offspring that have higher fecundity, faster maturation, and a wider intermediate host spectrum.

The situation in Corsica is of significance for One Health medicine and disease epidemiology and, thus, requires a concerted public health and veterinary epidemiologic response. Because a competent intermediate host is present and schistosomes can be imported by migrants and travelers returning (primarily) from sub-Saharan Africa, autochthonous foci of schistosomiasis could become established throughout susceptible Mediterranean areas in southern Europe. The latest data from EuroTravNet indicate that among the >32,000 travelers who returned home ill during 2008–2012, schistosomiasis ranked twelfth among all diagnoses (15), and travelers were infected almost exclusively in Africa; none were infected in Europe. We hypothesize that the schistosomiasis outbreak in Corsica began with importation of *S. haematobium* trematodes and subsequent establishment of an autochthonous transmission cycle.

Additional members of the GeoSentinel Surveillance Network who contributed data are Gundel Harms-Zwingenberger (Charité—Universitätsmedizin Berlin, Berlin, Germany), Jakob Cramer (University Clinic Hamburg–Eppendorf), and Brian Ward (McGill University, Montreal, Quebec, Canada).

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**References**


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Technical Appendix

Technical Appendix Table 1. Summary public health measures in France regarding the emergence of schistosomiasis in Corsica*

<table>
<thead>
<tr>
<th>Date initiated–date ended</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2014</td>
<td>Prohibition bathing in or having other contact with water from the Cavu River and urinating in certain Corsican rivers to disrupt the infection cycle</td>
</tr>
<tr>
<td>June–November 26, 2014</td>
<td>Serologic screening of ≈20,000 exposed persons and subsequent treatment for those who tested positive (n = 90) with praziquantel†</td>
</tr>
<tr>
<td>November 27, 2014–March 25, 2015</td>
<td>Identification of 20 additional cases No case was acquired after exposure in 2014‡</td>
</tr>
<tr>
<td>May–September 2014</td>
<td>Malacologic investigation in 38 sites in Corsica (20 rivers) with identification of Bulinus truncatus snails in the Cavu, Solenzara, Tarcu, and Osu rivers (none was found infected with Schistosoma spp.)</td>
</tr>
</tbody>
</table>

Ongoing
Screening of cattle for Schistosoma bovis infection.

*Data sources (1–4).
†Of the 90 local cases, 20 had parasite eggs in urine samples, 24 had urinary or gynecologic symptoms that could be attributed to schistosomiasis. Half of the cases were in persons under 16 years of age, and many were familial clusters. Nineteen cases were in persons living in Corsica, 17 in residents of Provence-Alpes-Côte d’Azur region in southern mainland France, 54 in 13 other regions of mainland France.
‡Including 6 cases with parasite eggs in urine.

Technical Appendix Table 2. Tourism statistics for Corsica, France

<table>
<thead>
<tr>
<th>Country of origin</th>
<th>% of total tourists Corsica (May–September 2012), N = 2,700,000*</th>
<th>Porto-Vecchio (January–December 2011), N = 99,565†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continental France</td>
<td>70.0</td>
<td>82.8</td>
</tr>
<tr>
<td>Italy</td>
<td>11.0</td>
<td>5.6</td>
</tr>
<tr>
<td>Belgium</td>
<td>5.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Germany</td>
<td>5.0</td>
<td>3.4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5.0</td>
<td>0.5</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1.9</td>
<td>2.5</td>
</tr>
<tr>
<td>United States and Canada</td>
<td>Not documented</td>
<td>1.2</td>
</tr>
<tr>
<td>The Netherlands</td>
<td>Not documented</td>
<td>0.9</td>
</tr>
<tr>
<td>Spain</td>
<td>Not documented</td>
<td>0.7</td>
</tr>
<tr>
<td>Other</td>
<td>1.2</td>
<td>1.4</td>
</tr>
</tbody>
</table>

*Data source (5).
†Data source (6).
Technical Appendix Figure. Epidemiologic tracking for cases of schistosomiasis diagnosed during 2013–2014 in international travelers and French residents who bathed in various rivers in Corsica, France. Solid red arrows indicate cases identified through the GeoSentinel Surveillance Network and European Travel Network among international travelers (i.e., 11 patients described in this study [9 from Germany, 1 from Canada, 1 from Belgium]). Black arrow indicates cases detected by public health screening among French nationals from mainland France (91 cases). Dashed red arrow indicates international cases reported in the literature (5 from Germany).

References

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2. Ministère des Affaires Sociales et de la Santé. Communiqué de presse. Recommandations pour les personnes potentiellement exposées à la bilharziose après une baignade dans la rivièvre Cavu

