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.

Author affiliations: Institut Hospitalo-Universitaire Méditerranée Infection, Marseille, France (P. Gautret, P. Parola); Aix Marseille Université, Marseille (P. Gautret, P. Parola); Charité–Universitätsmedizin Berlin, Berlin, Germany (F.P. Mockenhaupt); University of Munich, Munich, Germany (F. von Sonnenburg); University Clinic Hamburg–Eppendorf, Hamburg, Germany (C. Rothe); McGill University, Montreal, Quebec, Canada (M. Libman); University Hospital, Ghent, Belgium (K. Van De Winkel); Institute of Tropical Medicine, Antwerp, Belgium (E. Bottieau); University of Amsterdam, Amsterdam, the Netherlands (M.P. Grobusch); Boston Medical Center, Boston, Massachusetts, USA (D.H. Hamer); Centers for Disease Control and Prevention, Atlanta, Georgia, USA (D.H. Esposito); University of Zürich Centre for Travel Medicine, Zurich, Switzerland (P. Schlagenhauf)

DOI: http://dx.doi.org/10.3201/eid2110.150881

Following a national screening campaign in France, ≈100 additional schistosomiasis cases were described over 2 years among Corsica residents and visitors from other parts of France. In addition, a competent intermediate host snail, Bulinus truncatus, was identified in rivers in Corsica (online Technical Appendix Table 1, http://wwwnc.cdc.gov/EID/article/21/10/15-0881-Techapp1.pdf). To elude the epidemiologic characteristics of schistosomiasis in Corsica, we determined the number of and clinical findings for urinary schistosomiasis cases among international travelers to Corsica.

The Patients

To find cases, we searched the GeoSentinel Surveillance Network database (5) for urinary schistosomiasis diagnoses for international travelers with freshwater (river) exposure in Corsica during 1996 through March 2015. We also informally extended the search to members of the European Travel Medicine Network (EuroTravNet, http://www.istm.org/eurotravnet). GeoSentinel’s data-collection protocol is for public health surveillance, so human subjects’ review board clearance was not needed. According to local institutional review boards at sites in Berlin and Munich, Germany, our use of supplemental data not available in the GeoSentinel database conforms to the human subject protection guidelines at these sites. Individual patient consent was obtained at sites in Hamburg, Germany; Ghent, Belgium; and Montreal, Quebec, Canada.

We identified 11 records with diagnoses of schistosomiasis acquired in Corsica during 1996–March 2015 (Table). Patients resided in Germany, Belgium, or Canada and had traveled to Corsica during 2012–2014; some had also traveled to Corsica before 2012. No patients reported other exposure to freshwater in any other country where schistosomiasis is known to be endemic. All 11 patients reported bathing in rivers in Corsica: 7 persons (6 from Germany, 1 from Canada) bathed in the Cavu River; a familial cluster of 3 persons from Berlin bathed in the Gaglioli, Solenzara, and Restonica Rivers; and a Belgian tourist bathed in the Osu River.

All infections were in asymptomatic persons who sought screening in 2014 after seeing/hearing public health warnings regarding the risk for acquiring schistosomiasis after freshwater exposure in Corsica. Four cases were in children <15 years of age; 1 was in a 17-year-old girl. Two

1Additional members of the GeoSentinel Surveillance Network who also contributed data are listed at the end of this article.

Local and International Implications of Schistosomiasis Acquired in Corsica, France


DOI: http://dx.doi.org/10.3201/eid2110.150881
Table. Characteristics for 11 international travelers with urinary schistosomiasis diagnosed in 2014 and acquired in Corsica, France*

<table>
<thead>
<tr>
<th>Patient age, y/sex</th>
<th>Reporting site</th>
<th>Travel to Corsica 2014</th>
<th>First clinic visit, 2014</th>
<th>Eosinophils, cells/μL</th>
<th>Serologic test result</th>
<th>Eggs in urine</th>
<th>Infection status†</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/M</td>
<td>Berlin, Germany</td>
<td>None 2013</td>
<td>Jun 5</td>
<td>1,415</td>
<td>Pos (26.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
<tr>
<td>52/M</td>
<td>Berlin</td>
<td>None 2012</td>
<td>Jul 18</td>
<td>192</td>
<td>Borderline (11.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
<tr>
<td>29/F</td>
<td>Ghent, Belgium</td>
<td>None 2013</td>
<td>Aug 29</td>
<td>560</td>
<td>Pos (1.1)‖</td>
<td>IHA Neg#</td>
<td>Neg</td>
</tr>
<tr>
<td>17/F</td>
<td>Hamburg, Germany</td>
<td>July–August None</td>
<td>Sep 8</td>
<td>45</td>
<td>Weak Pos**</td>
<td>IIFT Neg</td>
<td>NT</td>
</tr>
<tr>
<td>11/M</td>
<td>Munich, Germany</td>
<td>None 2013</td>
<td>Sep 22</td>
<td>770</td>
<td>Pos††</td>
<td>IIFT Pos</td>
<td>Pos</td>
</tr>
<tr>
<td>35/F‡‡</td>
<td>Berlin</td>
<td>July 2011–2013</td>
<td>Sep 23</td>
<td>202</td>
<td>Pos (17.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
<tr>
<td>35/M‡‡</td>
<td>Berlin</td>
<td>July–August 2012–2013</td>
<td>Oct 7</td>
<td>359</td>
<td>Pos (29.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
<tr>
<td>11/M‡‡</td>
<td>Berlin</td>
<td>July–August 2012–2013</td>
<td>Oct 7</td>
<td>152</td>
<td>Borderline (9.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
<tr>
<td>45/F</td>
<td>Montreal, Quebec, Canada</td>
<td>July None</td>
<td>Dec 5</td>
<td>0</td>
<td>Pos (0.37)§§</td>
<td>ND</td>
<td>Neg</td>
</tr>
<tr>
<td>6/F</td>
<td>Berlin</td>
<td>None 2011–2012</td>
<td>Dec 22</td>
<td>950</td>
<td>Pos (32.0)‡</td>
<td>ELISA and IHA Neg§</td>
<td>Neg</td>
</tr>
</tbody>
</table>

*All patients were detected through a search of the GeoSentinel Surveillance Network (5). The patient from Montreal had microscopic hematuria; none of the other patients showed signs or symptoms of disease, and their infections were found during screening. IHA, indirect hemagglutination assay; IIFT, indirect immunofluorescence test; Neg, negative; ND, not done; NT, not tested; Pos, positive.
†Suspected, borderline result from 1 serologic testing method; probable, positive result from 1 serologic testing method; confirmed, positive result from 2 serologic testing methods and/or parasite eggs in urine.
‡As determined by using an S. mansoni IgG ELISA (DRG Diagnostics, Marburg, Germany); negative, <9; borderline, 9–11; positive, >11.
§As determined by using an S. mansoni adult or egg IgG ELISA; IHA, Cellognost Schistosomiasis H (Siemens, Erlangen, Germany).
‖As determined by using an in-house S. mansoni IgG ELISA using egg antigen extract mixed with S. mansoni adult worm extract imported from Egypt (positive at an optical density >1).
#As determined by using an in-house IHA with an S. mansoni adult worm extract (Fumouze SA, Levallois-Perret, France), with titration and cut-off set at 1/80 (positive at ≥1/160).
**As determined by using an in-house S. mansoni cercariae IgG ELISA.
††As determined by using an in-house S. mansoni IgG ELISA.
‡‡Familial cluster.
§§As determined by using an in-house S. mansoni–S. haematobium combined IgG ELISA (negative, <0.3; borderline, 0.3–0.35; positive, >0.35).

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
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).

Acknowledgments

We thank Jean Vincellette and Jo-Anne Hudon for helpful discussions. We acknowledge the help of Walter Schmid, University of Zurich, in formatting the figure in the technical appendix.

GeoSentinel, the Global Surveillance Network of the International Society of Travel Medicine (ISTM), is supported by Cooperative Agreement U50/CCU412347 from the Centers for Disease Control and Prevention and by ISTM.

Dr. Gautret is a physician, parasitologist, and director of the Rabies Treatment Center and of the Travel Clinic at Marseille University Hospital. He collaborates with the Epidemic Intelligence and Response program of EuroTravNet and with the Tracking and Communications Working Group of GeoSentinel. His professional interests include zoonoses, tropical and travel medicine, Hajj medicine, and medical parasitology.

References


Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 21, No. 10, October 2015


Address for correspondence: Philippe Gautret, CHU Nord, Chemin des Bourrely, 13915 Marseille, France; email: philippe.gautret@club-internet.fr