may also lead to an increased risk for resistance selection (*10*). Because the Q118K mutation has not been previously described, this new mutation was probably selected by the current or antecedent treatments rather than by an infection with a resistant widely disseminated clone.

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Spring Scrub Typhus, People's Republic of China

To the Editor: Pingtan Island, in the eastern Fujian Province, People's Republic of China, has been a traditional focus of summer scrub typhus. In the early 1950s, the health of the residents was compromised by scrub typhus, with an incidence of 1,000 cases/100,000 population and a case-fatality rate of 13.6%. With the understanding of the pathogen and application of effective treatments (*1,2*), the epidemic was brought under control. Documentation showed that from 1960 through 1990, the annual incidence of scrub typhus maintained a level of 50–100 cases/year. Since 1990, cases have decreased sharply.

The usual epidemic season for scrub typhus on the island was summer. The first outbreak of spring scrub typhus occurred in 2000 in the town of Beicuo; 10 cases were reported. Beicuo, population 10,000, is located in southwestern Pingtan Island. The first patient visited the local hospital on April 6, 2000, with a high fever, cough, and headache. The initial exclusion of scrub typhus because of the spring time frame made the diagnosis difficult until a typical black eschar was found on the patient's waist. This case called attention to spring scrub typhus and led to the timely diagnosis and treatment of the subsequent cases. By 2005, a total of 28 spring cases were on file. An indirect immunofluorescence antibody method with Gilliam strain antigen, as described (*3,4*), was applied to the above samples for serologic analysis. Samples with antibody titers $\geq$64 were considered diagnostic. All 28 case-patients were identified as having antibodies to *Orientia tsutsugamushi* 8–20 days after the onset of the disease (Table).

The number of cases of spring scrub typhus from 2000 to 2005 were

Table. Clinical manifestations of spring scrub typhus, 2000–2005, Pingtan Island, People's Republic of China

Characteristic	No. patients (%)
Male	24 (86)
Female	4 (14)
Symptom	
Fever	28 (100)
Eschar	25 (89.2)
Node	28 (100)
Rash	25 (89)
Cough	19 (68)
Headache	13 (46)
Chill	15 (53)
Fatigue	16 (57)
Myalgia	10 (35)
Vomiting	8 (29)
Serologic titer	
IgG titer of IFA,* median (range)	1,280 (320–2,560)
Age, y	
Median (range)	21.5 (7–59)

*IFA, indirect immunofluorescence assay; IgG, immunoglobulin G.

10, 7, 9, 0, 0, and 2, respectively. The disease was prominent in farm workers aged 40 to 49 years (10 cases). Most younger persons aged 20–40 years, had left the area for better income, so their case number was relatively low (4 cases). Five patients were military personnel, of which 4 were susceptible new recruits from various regions where scrub typhus was not found. Eight cases were associated with children who often played in the grassland and woods. The chance of getting infected with the scrub typhus agent is increased by frequent exposure to the vector mites, which inhabit areas rich in vegetation.

We performed an investigation on the possible hosts and vectors of spring scrub typhus since 2002. Rodents were trapped in April and May 2002. Of 246 captured rodents, *Rattus losea* comprised 32.5% of the collection and had a high mite-carrying rate and mite-carrying index (87.5% and 19.9%, respectively). Mites were collected from the captured rodents. Among these mites, 2,100 *Leptotrombidium deliense* accounted for 94.1% of all the mites.

O. tsutsugamushi was isolated by peritoneally injecting mice of KM species with the patient's untreated blood, the triturated viscera of the rats (*R. losea*), and the triturated mites (*L. deliense*). This process resulted in 3 identification of *O. tsutsugamushi* strains, which we named Ptan, Ptan2, and Ptan3 (GenBank accession nos. DQ517961, DQ517962, and DQ517963). PCR was performed as previously described (*5*), and the sequences of the gene encoding the 56-kDa protein from the 3 *O. tsutsugamushi* isolates shared >99.8% homology. They also shared 96% homology with *O. tsutsugamushi* Karp strain.

This study verified Pingtan Island as a focus of spring scrub typhus by demonstrating the existence of the pathogen among patients, a rodent host *R. losea*, and the vector *L. deliense*. As demonstrated by Yu et al. in 1953 (*6*), *R. losea* and *L. delinese* were also the host and vector of summer scrub typhus on the island. *L. delinese* formerly appeared in late May and now can be found in March. The earlier appearance of these mites might be related to the warming weather. The local meteorologic data showed that between 1953 and 1996, the average March temperature never exceeded 12.7ºC. However, since 1997, temperature increases have been recorded. During 2000–2002, the average March temperatures were 13.8°C, 15.1°C, and 16.4°C, for each year, respectively. The earlier appearance of the vector mites might explain the spring cases of scrub typhus. No cases of scrub typhus were reported in 2003 and 2004. This finding might be due to the successful preventive measures, including education about scrub typhus and instructions for using personal protective gear against mite bites when working in the fields. Also in 2003, an unusually low amount of precipitation limited the growth of vegetation, which subsequently restricted the habitat of the mites.

When we compared the patients with spring and summer scrub typhus, we observed similar epidemiologic characteristics, including clinical symptoms, pathogen hosts and vectors, and epidemic pathway. The local meteorologic records confirmed an increase in average March temperature since 1997. We suspect that these reports of spring cases represent a widening of the epidemic season of summer scrub typhus because of the increase in local temperature. We plan to seek confirmation by comparing the genetic relatedness of this spring scrub typhus isolate with that of the summer isolate, serologically identified by Yu et al. (*7*) as Gilliam type.

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Early Neuroschistosomiasis Complicating Katayama Syndrome

To the Editor: Neurologic complications of schistosomiasis may occur early as well as late in the course of infection; they result when a pair of worms becomes lodged in the vasculature, and their eggs become trapped in the microcirculation of the brain or spinal cord. There, they elicit a strong inflammatory response, which causes the clinical manifestations (*1*–*3*). Magnetic resonance and computed tomographic images of the brain show nonspecific, contrast-enhancing infiltrates, which suggests brain tumors (*4*). Definitive diagnosis requires finding *Schistosoma* eggs in feces, urine, rectal biopsy specimen, or biopsy specimen of central nervous system lesions (*5*), while a positive antibody test result provides a probable diagnosis only. To prevent irreversible damage, early treatment with corticosteroids is essential, after which the adult worms can be eliminated with praziquantel (*3*,*4*). A high degree of suspicion is therefore needed to avoid treatment delay.

Neuroschistosomiasis has been reported in persons living near Lake Malawi, in Malawi (*6*). Four members of a Belgian expatriate family (both parents and 2 children, a 12-year-old boy and a 7-year-old girl) went swimming in Lake Malawi in September 1998. On the advice of a physician, they took praziquantel 2 weeks afterward as postexposure prophylaxis. Nevertheless, fever, hypereosinophilia, cough, and abdominal discomfort developed in the mother and both children 6–8 weeks after they had been swimming; these symptoms were indicative of Katayama syndrome. The father remained asymptomatic but had a moderately raised eosinophil count (760 cells/mm³) and tested positive for *Schistosoma* antibodies. *Schistosoma hematobium* eggs were found in feces and urine of the mother and girl. All family members tested negative for schistosomiasis on a screening visit the previous year. The boy was admitted to a Zambian hospital because of high fever, cough, and a pulmonary infiltrate. He did not improve on antimicrobial drugs given for suspected pneumonia, and a gradually worsening neurologic syndrome developed, with left-sided hemiparesis, slurred speech, and slow movements.

The boy's condition prompted repatriation ≈10 weeks after the exposure. On admission at the University Hospital of Antwerp, his symptoms included fever, left-sided paresis with left-sided Babinski sign, and high eosinophil count (3,080 cells/mm³). An ELISA for *Schistosoma* antibodies was weakly positive. Examination of spinal fluid showed normal cell and protein content and a slightly lowered glycorrachia. A nuclear magnetic resonance (NMR) image of the brain showed multiple, small, contrast-enhanced white matter lesions around the semiovale center (cranially from the lateral ventricles) bilaterally and in the right parietal cortex. A tentative diagnosis of acute neuroschistosomiasis was made, and the patient was given corticosteroids with praziquantel, 750 mg twice a day for 14 days. At the end of this treatment, his condition had markedly improved; discrete hemiparesis was the only residual symptom. One month later, the patient had returned to normal, apart from left leg hyperreflexia. An NMR of the brain still showed residual lesions around the semiovale centers. Ten months later, results of clinical and neurologic examinations were normal, but NMR of the brain still showed minor residual lesions around the semiovale center on the right side. During follow-up, a serologic shift (indirect hemagglutination schistosomal antibody test) was seen, and eosinophil count decreased gradually to normal (Table). Although the boy never excreted eggs, *S. hematobium* infection was presumptively diagnosed on the basis of active infection in his relatives and the response to treatment.

When neurologic symptoms appear soon after primary infection with *Schistosoma* flukes, confirming the diagnosis may prove difficult, and schistosomiasis should be suspected when the patient has bathed in poten-