



Leeches as further potential vectors for rickettsial infections

We were very interested in the discovery and comprehensive investigation by Dieme et al. (1) of mosquitos as potential vectors for *Rickettsia felis*. We would like to draw attention to another ectoparasite that we encountered as a possibly overlooked potential vector for rickettsial infections: the leech. In 2008, a 39-y-old diabetic woman was admitted to a hospital in Northern Laos with a 7-d history of fever, headaches, limb pains, chills, and 2 d of nausea and vomiting. She had a typical eschar on her right anteromedial thigh (7 × 4 mm) (Fig. 1). She remembered being bitten by a terrestrial leech (*Haemadipsida* spp.), while working in a rice field, exactly at the eschar site 5 d before onset of fever. No tick or other ectoparasite was observed at this site until eschar manifestation. Molecular characterization of eschar biopsy revealed amplicons of 100% identity to the *Rickettsia felis*-URRWXCa2 strain (2). The patient responded promptly to treatment with oral doxycycline.

Balcells et al. (3) reported rickettsiosis from Chile with a characteristic eschar at the site of a bite by a terrestrial leech (*Xerobdellidae*). Molecular analysis of eschar and skin biopsy revealed 97% sequence similarity with isolates of *Orientia tsutsugamushi*. Closely related *Rickettsia* species have been described in leeches (*Glossiphoniidae*) of frogs and fish in Japan with nearly 100% vertical transmission (4).

Leech bites are uncommon in urban environments but might play a considerable role in endemic rural areas. In a household survey in the patient's village in

2010, 146 (75.3%) of 194 villagers aged ≥15 y reported that they had been bitten by leeches in the previous year. Leech bites were associated in multivariate analysis with being a farmer and younger age (both $P < 0.001$), and correlated with frequency of field visits (Pearson's correlation coefficient $r = 0.15$, $P = 0.04$). Bites were noted mainly during the raining season (*Haemadipsida* spp.: 5.17 bites per month vs. 0.58 per month during the dry season, $P < 0.001$). Of the villagers, 113 of 194 (58.2%) associated health problems with leech bites; 85 (43.8%) had itching, 30 (15.5%) a rash, 25 (12.9%) bleeding, 16 (8.2%) scratches/wounds, 8 (4.1%) pain, and 7 (3.6%) infection, including 2 (1.0%) with febrile illnesses. Three villagers (1.5%) reported seeking hospital treatment after leech bites.

No data of *Rickettsia* spp. within Laos leeches are yet available. So far, global research has focused mainly on nosocomial *Aeromonas* infections by medicinal leeches. Recent studies of leeches' digestive tract microbiota suggest more diverse potential infection transmission by leeches (5). Transmission might not only occur via the bite per se, but could be exacerbated during removal by human manipulation, such as squeezing, dropping salt solutions on leeches, or burning them. The wound could also be inoculated with regurgitated blood from previous hosts. Further parasitological and microbiological research is needed to clarify the role of leeches as potential vectors for infectious diseases.

Günther Slesak^{a,1}, Saythong Inthalath^b, Sabine Dittrich^{c,d}, Daniel H. Paris^{c,d}, and Paul N. Newton^{c,d}

^aDepartment of Tropical Medicine, Tropenlinik Paul-Lechler-Krankenhaus, 72076 Tübingen, Germany; ^bLuang Namtha Provincial Health Department, Luang Namtha, Lao People's Democratic Republic; ^cDepartment of Microbiology, Lao-Oxford-Mahosot Hospital-Wellcome Trust Research Unit, Mahosot Hospital, Vientiane, Lao People's Democratic Republic; and ^dNuffield Department of Clinical Medicine, Centre for Tropical Medicine & Global Health, University of Oxford, OX3 7FZ Oxford, United Kingdom

1 Dieme C, et al. (2015) Transmission potential of *Rickettsia felis* infection by *Anopheles gambiae* mosquitoes. *Proc Natl Acad Sci USA* 112(26):8088–8093.

2 Dittrich S, et al. (2014) *Rickettsia felis* infections and comorbid conditions, Laos, 2003–2011. *Emerg Infect Dis* 20(8):1402–1404.

3 Balcells ME, et al. (2011) Endemic scrub typhus-like illness, Chile. *Emerg Infect Dis* 17(9):1659–1663.

4 Kikuchi Y, Fukatsu T (2005) *Rickettsia* infection in natural leech populations. *Microb Ecol* 49(2):265–271.

5 Whitaker IS, Maltz M, Siddall ME, Graf J (2014) Characterization of the digestive tract microbiota of *Hirudo orientalis* (medicinal leech) and antibiotic resistance profile. *PLoS One* 9(3):e91848.

Author contributions: G.S. and S.I. designed research; G.S., S.I., S.D., D.H.P., and P.N.N. performed research; S.D., D.H.P., and P.N.N. contributed new reagents/analytic tools; G.S. analyzed data; and G.S., S.D., D.H.P., and P.N.N. wrote the paper.

The authors declare no conflict of interest.

All data used in this letter are available upon request from the authors.

¹To whom correspondence should be addressed. Email: slesak@tropenlinik.de.



Fig. 1. Typical eschar at the right anteromedial thigh at the site of a leech bite in the patient with *R. felis* infection.