Reviewing the puzzling world of human and animal pathogenic treponemes

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Bacteria of the genus *Treponema* belong to a group of spirochetes of which some are highly pathogenic for humans and animals. In humans, *T. pallidum* causes syphilis (subsp. *pallidum*), bejel (subsp. *endemicum*) and yaws (subsp. *pertenue*). The latter is currently subject to global eradication efforts and has reemerged in Western Africa, Southern Asia, and the Pacific region. Last reports of yaws from Australia originate from an aboriginal population in the Northern Territory in 1972. The success of disease eradication is linked to the absence of a disease reservoir and reports are accumulating that in Africa, nonhuman primates (NHPs) are infected with yaws-causing *pertenue* strains. There is therefore a strong potential for NHPs to act as a reservoir for human infection. The closely related *T. paraluisleporidarum* infects rabbits (ecovar Cuniculus) and hares (ecovar Leporis), but not humans. Clinical signs are reported to cause genital (rabbit syphilis) or facial lesions. *T. medium*, *T. vincentii*-like, and *T. phagedensis*-like species have long been reported to cause digital dermatitis in cattle and sheep and are also described to cause hoof lesions in wild North American Elk (*Cervus elaphus*). These treponemes are related to the facultative human pathogen *T. denticola*, which plays a role in periodontal disease. Digital dermatitis treponemes have been reported in Australian livestock and recently, related treponemes were described to infect the genitals of the critically endangered Gilbert's potoroo (*Potorous gilbertii*). We discuss the different treponemes in the context of their natural ecosystems, their host specificity, and the clinical manifestations they cause. Furthermore, we provide some updated information on the infection in potoroos. Our understanding of the biology of this group of ancient pathogens will only improve when we understand the ecological landscape in which the diseases emerge as well as the genetic mechanisms that impact host specificity and virulence.

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