

An Exotic Hitchhiker: A Case Report of Importation into Connecticut from Africa of the Human Parasitizing Tick, *Hyalomma truncatum* (Acari: Ixodidae)

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ABSTRACT: We report the importation into Connecticut, U.S.A., of an exotic tick, *Hyalomma truncatum* (Koch) (Acari: Ixodidae), on a human with recent travel history to Africa. The tick was identified using key morphological characters and through DNA sequencing. This case report highlights continuing risk associated with the importation of exotic tick vectors of medical and veterinary significance on international travelers returning to the United States from abroad.

Globalization, travel, and expansion of the animal trade (legal and illegal) have substantially augmented the importation and potential establishment of exotic tick vectors and associated pathogens of public health and veterinary importance into the United States (Keirans and Durden, 2001; BurrIDGE, 2011). Ticks are hosts to a broad range of disease-causing pathogens with global distribution including bacteria, protozoa, filarial parasites, and arboviruses. Travel associated tick-borne diseases have emerged as an increasing threat to public health. Of the approximately 140 tick species introduced into the United States, 63 are reported to feed on humans and 23 are recognized vectors of human disease-causing pathogens (Keirans and Durden, 2001; BurrIDGE, 2011). Most recently in late 2017, the New Jersey Department of Agriculture reported on the finding and potential establishment of an exotic East Asian tick, *Haemaphysalis longicornis*, the cattle tick (also known as the scrub or bush tick or the longhorned tick) on a farm in Hunterdon County, New Jersey (<http://www.nj.gov/agriculture/news/press/2017/approved/press171121.html>). *Haemaphysalis longicornis* is not native to the United States, but records exist of previous collections on animals and imported materials at the ports of entry into the United States (Wilson and Bram, 1998; Keirans and Durden, 2001; BurrIDGE, 2011). As a serious livestock pest, particularly in New Zealand, *H. longicornis* is a competent vector of bovine theileriosis (*Theileria orientalis*) in Australia and New Zealand (Hoogstraal et al., 1968; Heath, 2002), has been associated with *Theileria sergenti* and *Theileria buffeli* (Heath, 2002), and its involvement in transmission of several other tick-borne pathogens of public health and veterinary importance has been documented (Lu et al., 2017; Noh et al., 2017; Zhang et al., 2017).

Exotic ticks have tested positive for a number of pathogens capable of causing human and veterinary diseases in the United States; for instance, *Cowdria ruminantium* infection (heartwater), a lethal disease of cattle, sheep, goats, and deer, in *Amblyomma sparsum* collected from tortoises imported into Florida from

Africa (BurrIDGE et al., 2000a, 2000b; BurrIDGE, 2001), and *Rickettsia* sp. in *Amblyomma exornatum* in a reptile facility in Alabama (Reeves et al., 2006).

A 70-yr-old male resident of Cheshire, Connecticut, with a history of travel to southern Africa in March 2017, discovered a tick on his toe upon returning to the United States. The tick was initially examined by a primary care physician and was later submitted on March 24, 2017 to the Connecticut Agricultural Experiment Station Tick Testing Laboratory for species identification, engorgement status, and pathogen testing. The resident's African trip included a safari with visits to Seba and Tubu Tree Camps and the Vumbara Plains located on the Okavango Delta and the Kalahari Plains situated on the Kalahari plain in Botswana, Africa (Fig. 1A).

On morphological examination, the specimen was determined to be a male tick. Initial species identification was determined using a dichotomous morphological key to “The Ixodid Ticks of Uganda” (Matthysse and Colbo, 1987). This was followed by capturing ventral and dorsal images of the specimen using an AXIO Scope.A1 (Zeiss, Göttingen, Germany) with an attached RT3 camera system (SPOT Imaging, Sterling Heights, Michigan) (Fig. 1B, C). Scanning electron microscopy (SEM) images produced with a Hitachi Tabletop Microscope TM3030Plus (Hitachi High-Technologies Corporation, Tokyo, Japan) were used to corroborate morphological identification by light microscopy (Fig. 1D–F). Digital images of the specimen were submitted to the United States National Tick Collection at the Georgia Southern University for confirmatory identification. For genetic analysis, DNA was extracted from the tarsi and tibiae of the specimen using DNAzol BD (Molecular Research Center, Cincinnati, Ohio) according to manufacturer's recommendations, with modification. The identity of the specimen was confirmed by amplification of the mitochondrial 16S region (Ushijima et al., 2003), sequencing of the PCR products, and comparison to the DNA sequence database (https://blast.ncbi.nlm.nih.gov/Blast.cgi?PROGRAM=blastn&PAGE_TYPE=BlastSearch&LINK_LOC=blasthome).

The specimen was identified as *Hyalomma truncatum* Koch, 1844 (Acari: Ixodidae), known as the “small smooth bont-legged tick” or “shiny hyalomma.” Found throughout tropical Africa, this species is a 2- to 3-host tick with a wide host range that includes ungulates, rodents, lagomorphs, carnivores, reptiles, birds, and humans (BurrIDGE, 2011; Mathison et al., 2015). *Hyalomma truncatum* has been reported to aggregate on the lower legs and feet in sheep in addition to the anogenital and inguinal regions (Kok and Fourie, 1995; Fourie and Kok, 2005).

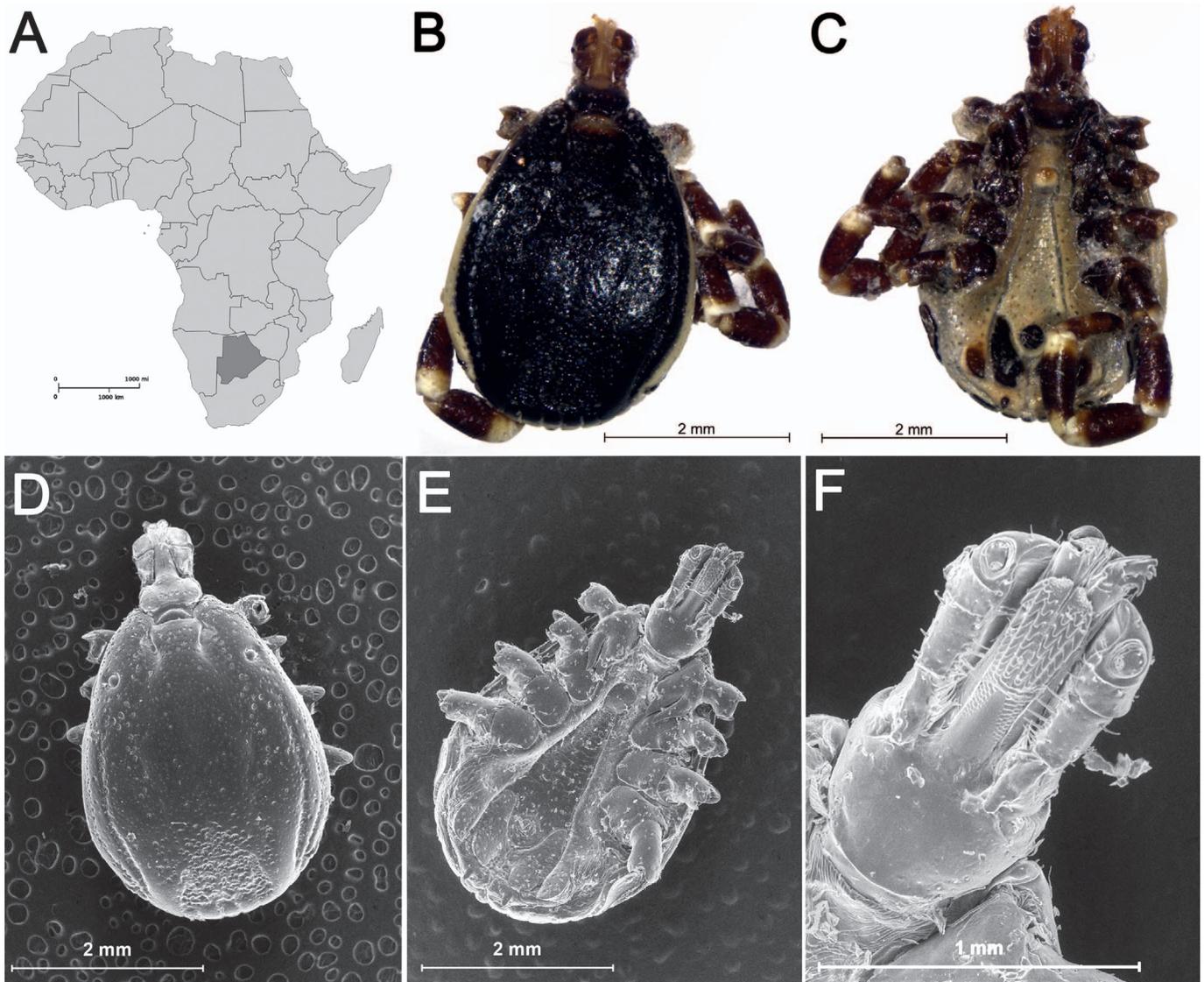


FIGURE 1. Map of Africa with Botswana highlighted in dark grey (A). Dissecting microscope images: (B) dorsal and (C) ventral. Electron microscopy images: (D) dorsal, (E) ventral, and (F) ventral image of the hypostome of the imported tick, *Hyalomma truncatum*. Color version available online.

Therefore, not surprisingly, the tick in the present report was removed from the foot.

Hyalomma truncatum is a competent vector of Crimean-Congo hemorrhagic fever (CCHF) virus (Hoogstraal, 1979) and *Babesia caballi* (de Waal, 1990). *Rickettsia sibirica mongolitimonae*, the cause of lymphangitis-associated rickettsiosis, has additionally been detected in this tick, and it can cause tick paralysis in humans (Parola and Raoult, 2001).

According to the published records and the United States Department of Agriculture, National Veterinary Services Laboratories, there have been about 25 cases of introduction of *H. truncatum* into the United States since 1970 (Keirans and Durden, 2001; BurrIDGE, 2011; J. L. Schlater, pers. comm.), of which 7 were presumably identified at the New York Animal Import Center. All reported introductions originated from localities in Africa including Angola, Botswana, Namibia, South Africa, Swaziland, Zimbabwe, and several unknown countries (J. L. Schlater, pers.

comm.). The most recently reported into the United States was on a human in Oregon with a travel history to Ethiopia (Mathison et al., 2015). To the best of our knowledge, our report is the first evidence of the importation of the human-parasitizing *H. truncatum* into New England. Prior reports of exotic ticks identified from humans and pets in Connecticut included *Amblyomma cajennense*, *Amblyomma hebraeum*, *Amblyomma dissimile*, *Rhipicephalus simus*, *Rhipicephalus pulchellus*, *Hyalomma marginatum*, *Aponoma quadricavum*, *Aponoma latum*, and *Haemaphysalis leachi* (Anderson et al., 1981a, 1981b, 1984; Keirans and Durden, 2001; Stafford, 2007).

Hyalomma truncatum is mainly reported from locations of 900–1,800 m altitude in Tanzania (Yeoman and Walker, 1967; Matthysee et al., 1987), but it has also been collected from sea level to just over 2,400-m altitudes in Kenya (Walker, 1974). *Hyalomma truncatum* has been mostly reported from regions with a long, continuous dry season of over 3–7 mo and 650–1,300 mm

mean annual rainfall in Africa (Matthysee et al., 1987); however, a study from Nigeria indicates that this species can also tolerate more-moist conditions (Strickland, 1961). Considering its native geographic distribution and tolerance range for the environmental conditions, *H. truncatum* might be able to survive in some arid areas of the southern and western United States south of about 35 degrees north latitude.

Importation of *H. truncatum*, a vector of CCHF virus and a number of other pathogens, highlights the risk associated with importation and potential establishment in the United States of exotic ticks and the need for prompt and accurate identification of ticks intercepted on travelers returning from other areas of the globe. Because many exotic tick species could easily be misidentified or overlooked, it is important that public health officials and veterinarians be properly trained on morphological identification of native tick species to differentiate potential exotic species and also to be familiar with exotic tick-borne pathogens. Prompt interception and identification of exotic ticks and pathogens, as well as the implementation of efficient eradication and preventive measures, might prove vital to curtail geographic expansion of exotic ticks and prevent the spread of infection in humans and livestock.

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