Distribution of the Medically-implicated Hobo Spider (Araneae: Agelenidae) and a Benign Congener, *Tegenaria duellica*, in the United States and Canada

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ABSTRACT The hobo spider, *Tegenaria agrestis* (Walckenaer), and the related *Tegenaria duellica* Simon are very similar European spiders that have become well established in the northwestern United States and British Columbia. The hobo spider is considered to be medically important; *T. duellica* is considered harmless but is often misidentified as the hobo spider. The current distribution of the hobo spider includes southern British Columbia, Washington, Oregon, Idaho, northern Utah, the western half of Montana, western Wyoming, and two small, isolated populations in Colorado. *T. duellica* is found mostly west of the Cascade and Coastal mountain ranges from southern British Columbia to central Oregon. In large human population centers where both species are sympatric, *T. duellica* is usually more common than the hobo spider. Data from a total of 1,232 hobo spiders and 395 *T. duellica* are included in this study.

KEY WORDS Tegenaria agrestis, Arachnida, range expansion, non-native

Two European agelenid spiders became established in western North America early in the 20th century. The hobo spider, *Tegenaria agrestis* (Walckenaer), was first found in Puget Sound ports in the 1930s (Crawford and Vest 1989). *T. duellica* Simon (also colloquially known as the giant house spider) became established somewhat earlier on southern Vancouver Island, BC. Both species have subsequently expanded their ranges in North America and occur sympatrically in some areas.

[Taxonomic note: confusion exists concerning the correct scientific name of *Tegenaria duellica*. Some publications refer to it as *T. gigantea* Chamberlin and Ivie (Crawford and Locket 1976, Crawford and Vest 1989, Leech and Steiner 1992, Buckle and Randell 1995) while others as *T. saeva* Blackwall (Roth 1968). However, *T. gigantea* is a junior synonym of *T. duellica* (Brignoli 1978, Platnick 1993). Although both *T. du-*

ellica and T. saeva are believed to occur in western North America, all specimens of the duellica-saeva type morphology examined critically by us in the course of this study agree with the published descriptions of T. duellica, the name which we will use here.]

Starting in the late 1980s, medical professionals began to blame the hobo spider for cases of apparent necrotic arachnidism in the northwestern United States (Vest 1987a, b, 1989, Akre and Myhre 1991, Fisher et al. 1994, Vest et al. 1996) and British Columbia. Before this time, such cases in that area were blamed on the brown recluse spider, Loxosceles reclusa Gertsch & Mulaik (Lee et al. 1969, Wand 1972). No populations of brown recluses or other Loxosceles spiders were known from the Pacific Northwest at that time and verified specimens of Loxosceles species have been extremely rare, isolated cases since then (Gertsch and Ennik 1983, Crawford and Vest 1989, R. S. V. et al. unpublished data). The hobo spider is previously recorded from Washington, Oregon, Idaho, Montana, Utah, and southern British Columbia. Recently, Baird and Stoltz (2002) report its expansion into Wyoming. In earlier publications on hobo spider range, Baird and Akre (1993) indicate distribution by state, not by actual localities, hence, the Utah and Montana distribution could be overestimated and publications by Roe (1994, 2000) and Baird and Stoltz (2002) were regional in scope. Little has been published on the North American distribution of T. duellica.

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Tegenaria spiders are difficult to identify without experience. The species in North America are generally similar-looking, medium-sized brown spiders. A variety of other common North American spiders (lycosids, amaurobiids, and other agelenids) are often misidentified as hobo spiders which are 7-14 mm in body length. In the central Pacific coast region of North America, T. duellica (12–18 mm body length) is commonly confused with the hobo spider. In addition, a cosmopolitan spider, T. domestica (Clerck) (7-11 mm body length) is very common throughout the North American range of the hobo spider and may be confused with it. Although there are general differences in size, coloration and patterning among the Tegenaria species mentioned here, individuals of all three species show considerable variation of these traits which can overlap between species. Diagnostic species identification of Tegenaria spiders is most reliably accomplished through microscopic examination of genitalic characters as shown in Vetter and Antonelli (2002).

Possibly because of the hobo spider's relatively recent implication as a spider of potential medical importance, much misinformation exists among the general public, medical professionals and news media, regarding its identification, distribution and toxicology of its venom. For example, hobo spiders are not known from California, but throughout the state, harmless spiders have been misidentified as such by nonarachnologists and at least two California physicians have implicated the hobo spider as the unsubstantiated etiologic agent of dermatologic lesions (Vetter 2001). We have also been contacted by people from the eastern and central United States who erroneously believe that hobo spiders are part of their arachnid fauna, usually because of misidentifying common, endemic agelenid spiders. These examples mirror the misidentifications of Loxosceles spiders and the misdiagnoses of their bites in areas of North America which lack recluses (Vetter 2000a, b, Vetter and Bush, 2002a, b).

This study was undertaken to determine: (1) the current distribution of the hobo spider and *T. duellica* in the United States and Canada, and (2) the percentage of hobo spiders in comparison to *T. duellica* in human population centers with sympatric spider populations.

Materials and Methods

Hobo and *T. duellica* spiders and relevant data were collected by various means. Several of us regularly identify arthropods for the general public as part of our professional duties; we recorded all hobo and *T. duellica* spiders submitted for identification. Requests for spiders were made to pest control personnel during professional continuing-education seminars in California, Oregon, and Washington, through hobo spider identification workshops in Oregon, an article in a national pest control magazine (Vetter and Hedges 2001), and contacts with the Washington State Pest Control Association, the Oregon Pest Control Association

ciation, Oregon cooperative extension offices, county entomologists, Department of Agriculture entomologists, Master Gardener programs, the California Department of Food and Agriculture, the arachnological curator at the California Academy of Sciences, all 59 California county agricultural commissioners' offices as well as other state and university authorities who were likely to collect or receive spider submissions for identification. Utah data includes all specimens submitted to the Plant Pest Diagnostic Lab at Utah State University since 1986 (where the first hobo spider was documented in 1990), with many submitted in 1993 following hobo spider news releases which incited public concern. RGB reviewed Tegenaria specimens in the collections of Agriculture and Agri-Food Canada (Lethbridge, AL and the Canadian National Collection, Ottawa), the Spencer Entomological Museum (University of British Columbia, Vancouver), and the Royal British Columbia Museum (Victoria) and identified recently collected spiders from across southern British Columbia. In Colorado, an on-going, extensive statewide survey of all spider fauna supervised by PEC has provided relevant data. Finally, an internet Website on the University of California-Riverside spider page (spiders.ucr.edu) and a University of California publication aimed at the general public (Vetter 2001) encouraged people to send spiders to RSV. Spiders were identified to species based on genitalia morphology (for adults) and secondarily with other morphological features such as the presence or absence of sternal maculation (Roth 1968) and the number and size of teeth on the cheliceral retromargin fang furrow (Akre and Myhre 1991).

Collection date and locality for each spider were recorded as often as possible although many specimens submitted by the general public lacked complete data. From Utah and Idaho, we used databases that recorded hobo spiders starting from 1990 and 1991, respectively. For Oregon, Washington, and Montana, almost all of the spiders were collected during the 1999-2001 seasons. Most Canadian data came from 2000 and 2001 with additional museum records dating back to 1931. Solid dots on distribution maps indicate known, well-established populations of spiders. Open circles indicate singleton collections of probable transient nature at or beyond the periphery of known distribution. Hobo spider phenology data are graphed for the Pacific states/province (combined data from British Columbia, Washington, and Oregon), Utah and Idaho because we had sufficient sample size with both date of collection and sex for these geographic regions. Phenology comparisons of *T. duellica* and hobo spiders used the subset of data from localities with widespread sympatric overlap (west of the Cascade Mountains in Washington and Oregon and the Coastal Mountains in British Columbia).

The sympatric species composition of hobo and *T. duellica* spiders is presented for the following Pacific coast human population centers: in Oregon [Corvallis (plus Philomath, Albany), Salem (plus Independence, Monmouth, Dallas), Portland (plus many suburbs)], in Washington [Tacoma (plus Puyallup, Graham, Or-

Table 1. Numbers of hobo spiders and T. duellica spiders collected in British Columbia and western American states, represented in this study

	Hobo Spider	T. duellica
British Columbia	102	143
California	0	0
Colorado	11	0
Idaho	221	1
Montana	119	0
Nevada	2	0
Oregon	153	107
Utah	511	1
Washington	98	143
Wyoming	15	0

ting, Spanaway), Puget Sound (many widespread locations), Bellingham (plus Custer, Ferndale)], in British Columbia [Victoria (plus many suburbs)]. At each of these localities, a combined total of at least 35 mature specimens of both species were recorded during the years 1999–2001.

Data collection was ad hoc in nature and results cannot be interpreted as a completely accurate reflection of the true distribution and abundance of hobo and *T. duellica* spiders in North America. Many of the participants in this study were home owners and pest control personnel living in major population centers, thus the results are biased toward urban areas; large parts of the study area (primarily sparsely populated regions) remain under- or unsurveyed. However, these spiders are synanthropic and, therefore, we feel that our results present a reasonably accurate assessment of the potential risk of exposure of the human population to a medically implicated spider.

Results

Data from a total of 1,627 spiders of both species were submitted from the following: Utah (512), Oregon (260), British Columbia (245), Washington (241), Idaho (222), Montana (119), Wyoming (15), Colorado (11), Nevada (2) (Table 1). Neither species was found in California during the course of study and there are no historic records of either from the state (D. Ubick, CA Academy of Sciences, personal communication, R. Gill, CA Department of Food and Agriculture, personal communication).

Hobo Spider. Hobo spiders (N=1,232) were distributed from southern British Columbia to central Montana, through western Wyoming, northern Utah (east of the Great Salt Lake) to southern Oregon (Fig. 1). Washington and Idaho are considered entirely within the hobo spider range. Two apparently isolated populations of hobo spiders are reliably associated with single homes in each of Golden and Boulder, CO.

Male hobo spider peak capture occurred in August for Utah and the Pacific states/province while in Idaho, male peak collection occurred in August and September; hobo spider male collections dropped to zero by November (Fig. 2). Peak captures of females occurred in September for Utah and Idaho and captures in the Pacific states/province were fairly uni-

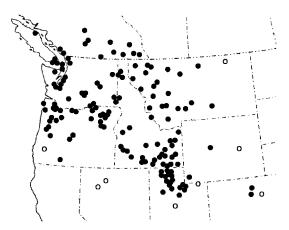


Fig. 1. Distribution of the hobo spider in the United States and Canada. Solid dots represent reliable populations, open circles represent singleton collections on the margins of the range which are considered itinerants.

form from August to October; females could still be collected in November with a few found in December (Fig. 3). Males represented 70.1% of the total mature hobo spiders (N = 968) for which we had gender data.

Tegenaria duellica. T. duellica spiders (N = 395) were found almost exclusively in British Columbia, Washington, and Oregon, primarily west of the Cascade (in the United States) and Coastal (in British Columbia) mountain ranges (Fig. 4). Several populations occur east of the Coastal Mountain range in southeastern British Columbia, all associated with individual towns.

In the Pacific coast areas, west of the mountain ranges, male T. duellica spiders were collected from July to October with a peak in September (Fig. 5). Female T. duellica spiders were collected from May through December (Fig. 5). T. duellica spiders were more commonly collected on the Pacific coast than were hobo spiders and the phenologies of the two species were similar (Fig. 5). Males represented 62.1% of the total mature T. duellica (total N=291) for which we had gender data.

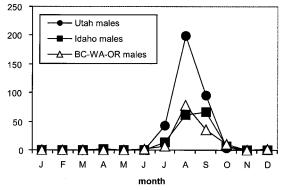


Fig. 2. Collection phenology of male hobo spiders in Utah, Idaho, and the Pacific Coast states/province (British Columbia, Washington, Oregon).

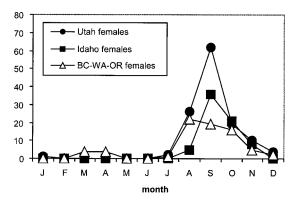


Fig. 3. Collection phenology of female hobo spiders in Utah, Idaho, and the Pacific Coast states/province (British Columbia, Washington, Oregon).

Percentage of Hobos in Sympatric Pacific Coast Cities. During 1999–2001 in the Pacific coast region in human populations centers with sympatric spider populations, *T. duellica* was more commonly collected than was the hobo spider in most localities except for the Portland area (Fig. 6). For each of the areas, hobo spiders constituted the following percentages of the two species: in Oregon (Corvallis [8.5%], Salem [28.6%], Portland [82.9%]), in Washington (Puget Sound [9.1%], Bellingham [22.7%], Tacoma [30.4%]), in British Columbia (Victoria [43.2%]). Sample sizes for each locality can be found in Fig. 6.

Discussion

The hobo spider currently is distributed from extreme southwestern and south-central British Columbia to central Montana, western Wyoming, northern Utah to southern Oregon, with isolated populations in Colorado. In southern Oregon, the hobo spider is more common inland than on the coast; many specimens were found at Klamath Falls (elevation 1400 m) but

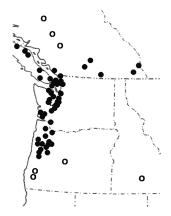


Fig. 4. Distribution of *T. duellica* in the United States and Canada. Solid dots represent reliable populations, open circles represent singleton collections on the margins of the range which are considered itinerants.

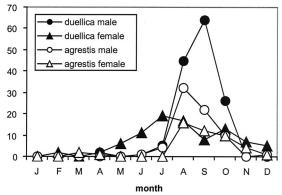


Fig. 5. Collection phenology of hobo and *T. duellica* spiders from localities west of the Cascade Mountains in Washington and Oregon and the Coastal Mountains in British Columbia.

only a single specimen was found at Roseburg (average elevation 140 m). This species is not yet established in eastern Montana, eastern Wyoming or California. In Colorado, the hobo spider is rare; >24,000 spiders were collected during the statewide spider survey and only 11 were hobo spiders, originating from two homes and two singleton collections. Two hobo spiders (collected in 1995) are known from northern Nevada. Although reasonably common in eastern Utah, they are rare west of the Great Salt Lake that is the start of the high-elevation Great Basin desert. The hobo spider will probably continue to spread eastward as new localities in Montana and Wyoming register its presence every year. Because of the recent finds in Colorado, it is too early to determine whether these will remain isolated populations or the spider will become more widespread in the state. However, con-

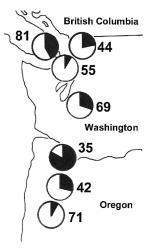


Fig. 6. Percentage comparison of hobo spiders (black) to *T. duellica* spiders (white) from Pacific Coast human population centers. The number next to each pie graph represents the sample size for that area. Data were limited to spiders collected from 1999 to 2001.

sidering the extensive database we have for Utah and the clustering of hobo spiders in the northern portion of the state, this will probably be the limits of its spread southward in Utah. There is not sufficient data from Oregon to predict if the spider will continue spreading south, reaching California.

T. duellica currently is distributed from southern British Columbia south to mid-coastal Oregon. Populations are concentrated and broadly distributed west of the Coast and Cascade Mountains with a few isolated populations existing in south-central and southeastern British Columbia. Published accounts record them in Edmonton (Leech and Steiner 1992) and Lethbridge, AL and near Saskatoon, SK (Buckle and Randell 1995) but these likely are isolated and highly synanthropic populations. Corroborating this, T. duellica is common in Penticton (a south-central British Columbia town) but has never been collected in extensive pitfall trapping in grasslands and other habitats immediately due south (Blades and Maier 1996, G. G. E. Scudder, University of British Columbia, personal communication).

In our study, in human population centers where the species are sympatric, T. duellica was often more common than the hobo spider (Fig. 6); only in Portland was the hobo spider more abundant. Relative abundance was variable and unpredictable with the hobo spider comprising 8-43% (83% in Portland) of the total for the two species at any locality. This information should be of interest to public health officials, the medical community and the pest control industry who deal with the public and their perceptions of spiders as health threats. Except for Portland, a large *Tegenaria* spider is more likely to be benign *T*. duellica than the hobo spider yet in each area, hobo spiders do exist to some degree. Crawford and Vest (1989) state that T. duellica may partially or wholly exclude the hobo spider from buildings. In outdoor settings, extensive sampling in southwestern British Columbia shows many specimens of both species seemingly co-existing under driftwood with T. duellica widely distributed and usually abundant whereas the hobo spider occurs unpredictably and is less common. In addition, from one rural property in Tacoma, WA, many specimens of both species were submitted.

Finally, although the hobo spider has been implicated in necrotic wounds since the late 1980s, recent research is reexamining whether its venom is toxicologically active. The hobo spider is considered medically benign in Europe. Binford (2001) showed no significant difference between hobo spider venom from North American (nonendemic) and European (native) populations and suggests that the hobo spider may be wrongly accused of causing dermonecrotic lesions. Hobo spider venom should undergo an interesting reanalysis in the next few years. Although the hobo spider may still be an occasional causative agent of necrosis (possibly vectoring an infection during a bite, not via venom toxicity), the medical community and the general public would benefit from realizing that there are ≈30 etiologies which have necrotic dermatologic manifestations (Russell and Gertsch

1983, Vetter and Visscher 1998, Vetter 2000b, Vetter and Bush 2002a,b,c, Osterhoudt et al. 2002). Physicians often use "spider bite" as a catch-all diagnosis when many causes are actually nonspider or nonarthropod in nature. Some conditions (Lyme disease, lymphoma, pernicious bacterial infection, cutaneous anthrax) can be permanently debilitating, disfiguring, or fatal if treatment is incorrect or delayed. Considering the overreliance on spiders as the etiologic agent of unproven dermatologic lesions (Russell and Gertsch 1983; Vetter 2000b, Vetter and Bush 2002a,b), it should behoove those who work with spiders and their medical aspects to be more persistent in documenting verified bites from hobo spiders to more accurately determine the effects of envenomation.

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