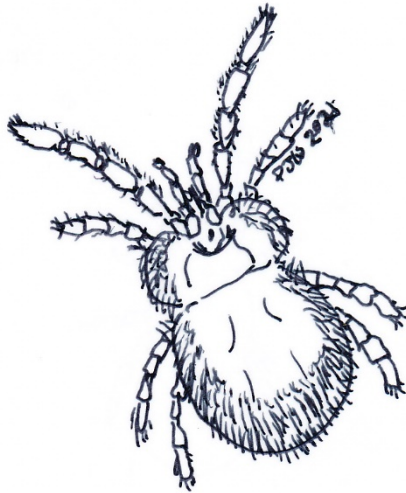


**Comprehensive Catalog of Chiggers
(Arachnida, Acari)
Reported from North American Amphibians**



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Cover Image: *chigger*

Introduction

Chiggers are minute larval ‘harvest mites’ that occur primarily as short-term ectoparasites on vertebrate, and occasionally arthropod, hosts. Historically chiggers were placed in the single large family Trombiculidae, but biologists now generally consider them to belong to two families, Leeuwenhoekiidae and Trombiculidae. Twelve genera are currently recognized in the Leeuwenhoekiidae and 35 in the Trombiculidae in North America north of Mexico (Walters et al., 2011). Watermolen (2015, 2020) tabulated reports of chiggers from North American amphibians, overviewed their feeding behaviors, and discussed the effects they may have on their hosts’ fitness. Members of three chigger genera are recorded from amphibian hosts in the United States and Mexico. Nearly all 27 members of the genus *Hannemania*, which Silva-de la Fuente et al. (2016) recently reviewed, are reported exclusively from amphibians (Wharton and Fuller, 1952; Walters et al., 2011). *Eutrombicula* spp. and *Trombicula* spp. have been reported from various reptiles, birds, and mammals, as well as amphibians (Radford, 1954; Loomis, 1956; Walters et al., 2011). This current report builds on Watermolen’s (2015, 2020) synopses, incorporates several corrections and additions, and provides a more accessible and comprehensive catalog of published reports of chiggers parasitic on North American amphibians.

The catalog is comprised of three parts. The host-parasite list in Part 1 lists amphibian hosts and their chigger parasites along with geographic distribution records. Loomis (1956) lists *Hannemania penetrans* as a synonym of *H. dunni*, and Hyland (1956) and McAllister et al. (2013) suggest the same. Walters et al. (2011) and Silva-de la Fuente et al. (2016), however, treat *H. penetrans* as a distinct species. A similar situation exists with *H. multifemoralis*, which Hyland (1961) considered a synonym of *H. hegneri* (misspelled *hegneri* by some authors). Bennett et al. (2014) recently advocated *Eutrombicula cinnabaris* as a replacement for *E. alfreddugesi* (= *Trombicula irritans*) but noted that the common North American chiggers in this genus will likely prove to be a complex of species. I have made no attempt to sort out these inconsistencies and report the species of *Hannemania* and *Eutrombicula* as the cited authors did. As a result, what are reported as records for two different chigger species in some cases may actually apply to only a single species. Some initial reports of unidentified “chiggers,” “chigger mites,” or “mites” have been considered *Hannemania* sp. by subsequent authors, a mostly reasonable but potentially inaccurate assumption. In these cases, I have simply listed the original reports in the catalog as “unidentified chiggers.” Part 2 provides the same information as Part 1, but in the form of a parasite-host checklist. Part 3 provides a list of chigger parasites and their amphibian hosts for each state from which records have been published. Although I searched for reports from all North American countries, including those in Central America and the adjacent Caribbean islands, only reports from the United States and Mexico are included in the catalog. Reports of chiggers in other nations (e.g., Fairchild, 1943; Brennan and Dalmat, 1960; Wenzel and Tipton, 1966; Daniel and Stekol’nikov, 2004; Torre Santana and Cuervo Pineda, 2019) are quite limited and I found no records of chigger parasites from amphibian hosts in these countries.

The literature regarding chiggers and their varied hosts is scattered throughout myriad sources, including some relatively obscure titles. To produce this catalog, I consolidated information from previously published checklists (Paredes-León et al., 2008; Walters et al.,

2011; Watermolen, 2015; Watermolen, 2020) and searched for additional host-parasite records using Web of Science and Google Scholar, applying search terms like: chigger/mite/Acari AND amphibian/frog/salamander, *Hannemania/Eutrombicula* AND amphibian/frog/salamander. The final section, “Literature Cited,” provides a comprehensive bibliography of works addressing chiggers parasitic on North American amphibians. Aids for herpetologists seeking to identify chigger parasites include the key to genera by Brennan and Goff (1977) and keys to North American species by Brennan and Jones (1959) and Mexican species by Hoffman (1990). Silva-de la Fuente et al. (2016) provide a table of diagnostic characters for all described species of *Hannemania*. Goff et al. (1982) present a useful glossary of chigger terminology, and Goff et al. (1986) present a bibliography of works addressing the entire group through 1984. Walters et al. (2011) provide host and distribution lists for all chigger mites reported in North America.

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Part 1. Host-Parasite Checklist

This section of the catalog lists amphibian hosts and their chigger parasites along with geographic distribution records. Host names are listed alphabetically by family, genus, and species. Chigger names are listed alphabetically and preceded by an “L” or “T” indicating the family to which the species belong, *Leeuwenhoekiiidae* and *Trombiculidae*, respectively. References for each state’s records are listed chronologically.

Anura

Bufonidae

Dwarf American Toad (*Anaxyrus americanus charlesmithi*)

L: *Hannemania dunnii* – Arkansas: Connior et al., 2016b; Oklahoma: McAllister and Durden, 2014

Unidentified chiggers – Virginia: Gibson, 2015b

Great Plains Toad (*Anaxyrus cognatus*)

L: *Hannemania penetrans* – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

Green Toad (*Anaxyrus debilis*)

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

Fowler’s Toad (*Anaxyrus fowleri*)

L: *Hannemania dunnii* – Louisiana: Connior et al., 2016a

L: *Hannemania penetrans* – North Carolina: Brandt, 1936; Virginia: Campbell, 1967; Campbell, 1968

T: *Trombicula irritans* – Middle Atlantic States: Ewing, 1929

Unidentified chiggers – Virginia: Watson and Gibson, 2010

Arizona Toad (*Anaxyrus microscaphus*)

L: *Hannemania bufonis* – New Mexico: Ryan et al., 2016

L: *Hannemania hegneri* – Utah: Parry and Grundmann, 1965

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973; Ryan et al., 2015.

Red-spotted Toad (*Anaxyrus punctatus*)

L: *Hannemania bufonis* – Arizona: Loomis and Welbourn, 1969; California: Loomis and Welbourn, 1969; Welbourn and Loomis, 1975; Texas: Loomis and Welbourn, 1969; Loomis et al., 1972; Loomis and Wrenn, 1973; Utah: Loomis and Welbourn, 1969; Sonora, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

L: *Hannemania hegneri* – Utah: Parry and Grundmann, 1965

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975; Texas: Jung et al., 2001

Texas Toad (*Anaxyrus speciosus*)

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

Southern Toad (*Anaxyrus terrestris*)

L: *Hannemania hegneri* – Florida: McAllister et al., 2015

L: *Hannemania multifemorala* – Arkansas: Loomis, 1956 (Host is likely misidentified; *A. terrestris* is not known to occur in Arkansas.)

T: *Eutrombicula alfreddugesi* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952

Woodhouse's Toad (*Anaxyrus woodhousii*)

L: *Hannemania dunnii* – Oklahoma: Loomis, 1956

L: *Hannemania eltoni* – Kansas: Loomis, 1956

L: *Hannemania multifemorala* – Kansas and Oklahoma: Loomis, 1956

L: *Hannemania penetrans* – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

T: *Eutrombicula alfreddugesi* – Nebraska: Wolfenbarger, 1952

T: *Eutrombicula lipovskyana* – Kansas: Loomis, 1956

Unidentified Toad (*Anaxyrus* sp.)

T: *Eutrombicula alfreddugesi* – Virginia: Ewing, 1944; eastern United States: Wharton and Fuller, 1952

Sinaloa Toad (*Incilius mazatlanensis*)

L: *Hannemania bufonis* – Sonora, Mexico: Goldberg et al., 2002; Paredes-León et al., 2008

L: *Hannemania hylae* – Sonora, Mexico: Goldberg et al., 2002

Craugastoridae

Northern Rain Frog (*Craugastor* sp.)

L: *Hannemania hylae* – Morelos, Mexico: Hoffmann, 1969

Hylidae

Eastern Cricket Frog (*Acris crepitans*)

L: *Hannemania eltoni* – Texas: Block, 1968

L: *Hannemania hegneri* – Georgia: Crossley and Proctor, 1971

L: *Hannemania penetrans* – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Morrison, 1967

Unidentified chiggers – Nebraska and South Dakota: McCallum and Trauth, 2004

Southern Cricket Frog (*Acris gryllus*)

L: *Hannemania dunni* – Kansas and Oklahoma: Loomis, 1956

L: *Hannemania eltoni* – Kansas: Loomis, 1956; Crossley, 1960

L: *Hannemania multifemorala* – Arkansas, Kansas, and Oklahoma: Loomis, 1956

L: *Hannemania* sp. – eastern United States: Wharton and Fuller, 1952

T: *Eutrombicula alfreddugesi* – Kansas: Loomis, 1956

T: *Eutrombicula lipovskyana* – Kansas: Loomis, 1956

Canyon Treefrog (*Hyla arenicolor*)

L: *Hannemania anurae* – Nayarit and Sinaloa, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

L: *Hannemania hegneri* – Utah: Parry and Grundmann, 1965

L: *Hannemania hylae* – unspecified: Radford, 1954; Wharton and Fuller, 1952; Arizona: Loomis and Welbourn, 1969; California: Ewing, 1925; Ewing, 1926; Ewing, 1931; Radford, 1942; Gould, 1956, Hyland, 1956; Texas: Loomis and Welbourn, 1969; Loomis et al., 1972; Jung et al., 2001; Utah: Loomis and Welbourn, 1969; Sonora, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

L: *Hannemania* sp. – Colorado: Finley, 1953; New Mexico: Duszynski and Jones, 1973; Grover et al., 1975; North Carolina (Hosts were zoo animals of uncertain origin.): Sladky et al., 2000

Bird-voiced Treefrog (*Hyla avivoca*)

T: *Eutrombicula cinnabaris* – Arkansas: Connior et al., 2016b

Mountain Treefrog (*Hyla eximia*)

L: *Hannemania anurae* – Nayarit, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

L: *Hannemania monticola* – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Squirrel Treefrog (*Hyla squirella*) (?)

T: *Eutrombicula masoni* – Florida: Farner and Seaman, 1946; southeastern United States: Jenkins, 1948

L: *Eutrombicula splendens* – unspecified: Wharton and Fuller, 1952

California Treefrog (*Pseudacris cadaverina*)

L: *Hannemania hylae* – California: Loomis and Welbourn, 1969; Welbourn and Loomis, 1975; Baja California Norte, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

Spotted Chorus Frog (*Pseudacris clarkii*)

L: *Hannemania* sp. – Texas: McAllister, 1991

LeptodactylidaeSpotted Chirping Frog (*Eleutherodactylus guttilatus*)

L: *Hannemania hylae* – Texas: Loomis et al., 1972; Jung et al., 2001

L: *Hannemania* sp. – Texas: Lynch, 1970; Coahuila, Guanajuato, Nuevo León, San Luis Potosí, and Tamaulipas, Mexico: Lynch, 1970

Long-footed Robber Frog (*Eleutherodactylus longipes*)

L: *Hannemania hylae* – Queretaro, Mexico: Espino del Castillo et al., 2011

Cliff Chirping Frog (*Eleutherodactylus marnockii*)

L: *Hannemania monticola* – Texas: Malone and Paredes-León, 2005

L: *Hannemania* sp. – Texas: Lynch, 1970; Malone and Paredes-León, 2005

Unidentified chiggers – Texas: Gaige, 1931

Pale Chirping Frog (*Eleutherodactylus pallidus*)

L: *Hannemania anurae* – Nayarit and Sinaloa, Mexico, Welbourn and Loomis, 1970; Paredes-León et al., 2008

L: *Hannemania* sp. – Nayarit, Mexico: Lynch, 1970

Marbled Robber Frog (*Eleutherodactylus saxatilis*)

L: *Hannemania monticola* – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

L: *Hannemania saxicola* – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Big-eared Chirping Frog (*Eleutherodactylus verrucipes*)

L: *Hannemania* sp. – Hidalgo, Queretaro, and San Luis Potosí, Mexico: Lynch, 1970

Sabinal Frog (*Leptodactylus melanonotus*)

L: *Hannemania hylae* – Jalisco, Mexico: Jacinto-Maldonado et al., 2013

MicrohylidaeGreat Plains Narrow-mouthed Toad (*Gastrophryne olivacea*)

L: *Hannemania dunnii* – Texas: Loomis, 1956

L: *Hannemania multifemorata* – Texas: Loomis, 1956; Crossley, 1960; Oyervides et al., 2016

L: *Hannemania penetrans* – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

L: *Hannemania* sp. – Texas: Oyervides et al., 2015

RanidaeRio Grande Leopard Frog (*Lithobates berlandieri*)

L: *Hannemania anurae* – Jalisco, Nayarit and Sinaloa, Mexico: Paredes-León et al., 2008

L: *Hannemania dunnii* – Texas: McAllister et al., 2017

L: *Hannemania hylae* – Morelos, Mexico: Hoffmann, 1969

L: *Hannemania mexicana* – San Luis Potosí, Mexico: Hoffmann, 1965 (Host reported as *L. pipiens.*); Paredes-León et al., 2008; Puebla, Mexico: Paredes-León et al., 2008; Veracruz, Mexico: Jacinto-Maldonado et al., 2016

L: *Hannemania pelaezi* – Morelos, Mexico: Hoffmann, 1965 (Host reported as *L. pipiens.*); Paredes-León et al., 2008

L: *Hannemania* ca. *mexicana* – Coahuila, Mexico: Paredes-León, 2019

L: *Hannemania* ca. *saxicola* – Coahuila, Mexico: Paredes-León, 2019

L: *Hannemania* sp. – Texas: Jung et al., 2001 (Chigger is referred to as an “unidentified new species similar to *H. anurae.*”)

Plains Leopard Frog (*Lithobates blairi*)

L: *Hannemania dunnii* – Texas: McAllister et al., 2017

Central American Water Frog (*Lithobates brownorum*)

L: *Hannemania mexicana* – Veracruz, Mexico: Jacinto-Maldonado et al., 2016

American Bullfrog (*Lithobates catesbeianus*)

L: *Hannemania penetrans* – North Carolina: Brandt, 1936; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Virginia: Campbell, 1967; Campbell, 1968

Unidentified chiggers – Oklahoma: Trowbridge and Hefley, 1934

Green Frog (*Lithobates clamitans*)

L: *Hannemania dunnii* – North Carolina: Murphy, 1965; Virginia: Loomis, 1956

L: *Hannemania penetrans* – Virginia: Ewing, 1931; Hyland, 1956; Campbell, 1967; Campbell, 1968

Forrer's Grass Frog (*Lithobates forreri*)

L: *Hannemania* sp. – Guerrero, Mexico: Monroy-Vilchis et al., 2015

Moore's Frog (*Lithobates johni*)

L: *Hannemania mexicana* – San Luis Potosí, Mexico: Hoffmann, 1965; Hoffmann, 1969 (Host reported as *L. moorei*.); Paredes-León et al., 2008

Montezuma Leopard Frog (*Lithobates montezumae*)

L: *Hannemania anurae* – Jalisco, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Pickerel Frog (*Lithobates palustris*)

L: *Hannemania dunni* – Arkansas: Connior et al., 2016b; North Carolina: Murphy, 1965; Virginia: Loomis, 1956; Virginia: Gibson and Welbourn, 2018

L: *Hannemania hegneri* – laboratory experiment (Florida?): Hyland, 1961 (Host was referred to as “green frog.”)

L: *Hannemania* sp. – Arkansas: McAllister et al., 1995c; Virginia: Mitchell, 2004

T: *Eutrombicula alfreddugesi* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952

Unidentified chiggers – Virginia: Watson and Gibson, 2010; Gibson, 2015a; Gibson, 2015b; Sattler and Gibson, 2016

Northern Leopard Frog (*Lithobates pipiens*)

L: *Hannemania anurae* – Jalisco, Nayarit, and Sinaloa, Mexico: Welbourn and Loomis, 1970 (Host is more likely *L. berlandieri*.)

L: *Hannemania dunni* – Oklahoma: Loomis, 1956

L: *Hannemania eltoni* – Kansas: Loomis, 1956; Crossley, 1960; Texas: Loomis, 1956; Crossley, 1960

L: *Hannemania hegneri* – Florida: Hyland, 1961; Georgia: Crossley and Proctor, 1971; Utah: Parry and Grundmann, 1965

L: *Hannemania hylae* – Morelos, Mexico: Hoffmann, 1969 (Host is more likely *L. berlandieri*.)

L: *Hannemania mexicana* – Texas: Loomis et al., 1972; Loomis and Wrenn, 1973; San Luis Potosí, Mexico: Hoffmann, 1965; Hoffmann, 1969 (Host is more likely *L. berlandieri*.)

L: *Hannemania multifemorala* – Arkansas, Kansas, and Missouri: Loomis, 1956; Nebraska: Loomis, 1956; Crossley, 1960; Oklahoma and Texas: Loomis, 1956

L: *Hannemania pelaezi* – Morelos, Mexico: Hoffmann, 1965; Hoffmann, 1969 (Host is more likely *L. berlandieri*.)

L: *Hannemania penetrans* – unspecified: Radford, 1954; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Virginia: Ewing, 1931 (Chigger was reported as *H. dunni* by Loomis, 1956.); Radford, 1942; Goff, 1989

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975

T: *Eutrombicula alfreddugesi* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952; Kansas: Loomis, 1956; Mexico: Hoffmann, 1969

T: *Eutrombicula lipovskyana* – Kansas: Loomis, 1956

White-striped Frog (*Lithobates pustulosus*)

L: *Hannemania anurae* – Sinaloa, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Southern Leopard Frog (*Lithobates sphenoccephalus*)

L: *Hannemania dunnii* – Alabama: Birkhead et al., 2007; Arkansas: Connior et al., 2016b; North Carolina: Murphy, 1965

L: *Hannemania eltoni* – unspecified: Radford, 1954; Texas: Sambon, 1928 (Host reported as *L. pipiens.*); Ewing, 1931; Radford, 1942; Hyland, 1956

L: *Hannemania hegneri* – Florida: Hyland, 1956; Hyland, 1961; Goff, 1989

L: *Hannemania penetrans* – North Carolina: Brandt, 1936; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

Unidentified chiggers – Louisiana: Hubert, 1927; Oklahoma: Trowbridge and Hefley, 1934

Tarahumara Frog (*Lithobates tarahumarae*)

L: *Hannemania anurae* – Jalisco, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

L: *Hannemania monticola* – Sonora, Mexico: Goldberg et al., 2002

Common Marshfrog (*Lithobates vaillanti*)

L: *Hannemania mexicana* – Veracruz, Mexico: Jacinto-Maldonado et al., 2016

Scaphiopodidae

Couch's Spadefoot (*Scaphiopus couchii*)

L: *Hannemania hylae* – Sonora, Mexico: Hoffmann, 1969

Plains Spadefoot (*Spea bombifrons*)

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

T: *Eutrombicula alfreddugesi* – Texas, Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)

Western Spadefoot (*Spea hammondii*)

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973

Mexican Spadefoot (*Spea multiplicata*)

T: *Eutrombicula alfreddugesi* – Texas: Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)

Caudata

Ambystomatidae

Spotted Salamander (*Ambystoma maculatum*)

L: *Hannemania dunnii* – North Carolina: Rankin, 1937

Marbled Salamander (*Ambystoma opacum*)

L: *Hannemania dunnii* – North Carolina: Rankin, 1937

Tarahumara Salamander (*Ambystoma rosaceum*)

L: *Hannemania monticola* – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Eastern Tiger Salamander (*Ambystoma tigrinum*)

L: *Hannemania eltoni* – Kansas: Loomis, 1956

L: *Hannemania* sp. – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975

PlethodontidaeGreen Salamander (*Aneides aeneus*)

L: *Hannemania dunnii* – Georgia: Loomis, 1956

Ouachita Dusky Salamander (*Desmognathus brimleyorum*)

L: *Hannemania dunnii* – Arkansas: Winter et al., 1986; Connior et al., 2016b; Oklahoma: Anthony et al., 1994

L: *Hannemania* sp. – Arkansas and Oklahoma: McAllister et al., 1995a

Dusky Salamander (*Desmognathus fuscus*)

L: *Hannemania dunnii* – unspecified: Radford, 1954; U.S.A.: Radford, 1942; eastern United States: Sambon, 1928; Ewing, 1931; Hyland, 1956; Arkansas: Loomis, 1956 (Host reported as *D. brimleyorum* by Connior et al., 2016b.); North Carolina: Mann, 1932; Rankin, 1937; Westfall et al., 2008; Oklahoma and Texas: Loomis, 1956; laboratory experiment: Hyland, 1961

L: *Hannemania hegneri* – laboratory experiment: Hyland, 1961

L: *Hannemania* sp. – Tennessee: Regester, 2001

Unidentified chiggers – Virginia: Sattler and Gibson, 2016

Northern Two-lined Salamander (*Eurycea bislineata*)

L: *Hannemania dunnii* – North Carolina: Loomis, 1956; West Virginia: Shoemaker and Clark, 1975

Southern Two-lined Salamander (*Eurycea cirrigera*)

L: *Hannemania dunnii* – Alabama: Hribar and Tyler, 1989 (Host reported as *E. bislineata*.); North Carolina: Mann, 1932; Westfall et al., 2008; laboratory experiment: Hyland, 1961

L: *Hannemania hegneri* – laboratory experiment: Hyland, 1961

L: *Hannemania* sp. – Tennessee: Regester, 2001; Virginia: Mitchell, 2004

Three-lined Salamander (*Eurycea guttolineata*)

L: *Hannemania dunnii* – North Carolina: Rankin, 1937

Oklahoma Salamander (*Eurycea tynerensis*)

L: *Hannemania* sp. – Arkansas: McAllister et al., 1995b

Western Slimy Salamander (*Plethodon albagula*)

L: *Hannemania dunni* – Arkansas and Missouri: Anthony, 1995 (“Chiggers have rarely been observed on individuals of this species,” Anthony et al., 1994.)

Ozark Zig-zag Salamander (*Plethodon angusticlavius*)

L: *Hannemania dunni* – Arkansas: McAllister et al., 2013; Connior et al., 2016b

L: *Hannemania eltoni* – Arkansas: Maksimowich and Mathis, 2000; Maksimowich and Mathis, 2001; Missouri: Maksimowich, 1998; Dalton and Mathis, 2014

Caddo Mountain Salamander (*Plethodon caddoensis*)

L: *Hannemania dunni* – Arkansas: Loomis, 1956; Crossley, 1960; Duncan and Highton, 1979; Saugey et al., 1985; Winter et al., 1986; Anthony et al., 1994; Connior et al., 2016b; Oklahoma: Duncan and Highton, 1979

L: *Hannemania* sp. – Arkansas and Oklahoma: McAllister et al., 2002

White-spotted Slimy Salamander (*Plethodon cylindraceus*)

L: *Hannemania dunni* – North Carolina: Westfall et al., 2008

Unidentified chiggers – Virginia: Watson and Gibson, 2010

Fourche Mountain Salamander (*Plethodon fourchensis*)

L: *Hannemania dunni* – Arkansas: Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b; Oklahoma: Duncan and Highton, 1979

Northern Slimy Salamander (*Plethodon glutinosus*)

T: *Eutrombicula lipovskyana* – Illinois: Landewe, 1960

L: *Hannemania dunni* – Arkansas: Duncan and Highton, 1979; North Carolina: Mann, 1932; Rankin, 1937; Oklahoma: Duncan and Highton, 1979

L: *Hannemania* cf. *dunni* – Alabama: Bakkegard et al., 2019

L: *Hannemania hegeneri* – Illinois: Landewe, 1960

L: *Hannemania* sp. – North Carolina: Mann, 1932

Kiamichi Slimy Salamander (*Plethodon kiamichi*)

L: *Hannemania dunni* – Arkansas and Oklahoma: Anthony et al., 1994¹

L: *Hannemania* sp. – Arkansas and Oklahoma: McAllister et al., 2002

Southern Gray-cheeked Salamander (*Plethodon metcalfi*)

L: *Hannemania* sp. – Georgia: Brown et al., 2006

¹ Although the abstract for Anthony et al.’s (1994) paper indicates that *Hannemania dunni* parasitizes *Plethodon kiamichi* in the Ouachita Mountains, the paper includes no records/further mention of this relationship, and I have been unable to find any prior reports of it. McAllister et al. (2002) suggest their much later report of *Hannemania* sp. is the first from this host and that appears to be accurate.

Rich Mountain Salamander (*Plethodon ouachitae*)

L: *Hannemania dunnii* – Arkansas: Loomis, 1956; Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b; Oklahoma: Anthony et al., 1994; Duncan and Highton, 1979
 L: *Hannemania* sp. – Arkansas and Oklahoma: McAllister et al., 2002
 Unidentified chiggers – Arkansas: Dunn and Heinze, 1933 (Chiggers were identified as *H. dunnii* by Duncan and Highton, 1979.); Pope and Pope, 1951

Southern Red-backed Salamander (*Plethodon serratus*)

L: *Hannemania dunnii* – unspecified (Arkansas or Oklahoma?): Duncan and Highton, 1979 (“Chiggers are rarely seen on” this species.)

Yonahlossee salamander (*Plethodon yonahlossee*)

L: *Hannemania hegeneri* – North Carolina: Adler and Dennis, 1962 (Host reported as *P. longicrus*.)

Mud Salamander (*Pseudotriton montanus*)

L: *Hannemania dunnii* – Kentucky: McAllister et al., 2010; North Carolina: Rankin, 1937

Unidentified Salamander (*Plethodon* sp.)

L: *Hannemania eltoni* – Georgia: Crossley and Proctor, 1971

Salamandridae

Eastern Newt (*Notophthalmus viridescens*)

L: *Hannemania hegeneri* – laboratory experiment (Florida?): Hyland, 1961 (Chiggers experimentally infected the “host not found infested in nature.”)

Part 2. Parasite-Host Checklist

This section of the catalog lists chigger parasites and their amphibian hosts along with geographic distribution records. Chiggers are listed alphabetically by family, with hosts listed alphabetically by genus and species and references listed chronologically.

Leeuwenhoekiiidae

Hannemania anurae

Eleutherodactylus pallidus – Nayarit and Sinaloa, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hyla arenicolor – Nayarit and Sinaloa, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hyla eximia – Nayarit, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Lithobates berlandieri – Jalisco, Nayarit, and Sinaloa, Mexico: Paredes-León et al., 2008

Lithobates pipiens – Jalisco, Nayarit, and Sinaloa, Mexico: Welbourn and Loomis, 1970 (Host is more likely *L. berlandieri*.)

Lithobates montezumae – Jalisco, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Lithobates pustulosus – Sinaloa, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Lithobates tarahumarae – Jalisco, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania bufonis

Anaxyrus microscaphus – New Mexico: Ryan et al., 2016

Anaxyrus punctatus – Arizona: Loomis and Welbourn, 1969; California: Loomis and Welbourn, 1969; Welbourn and Loomis, 1975; Texas: Loomis and Welbourn, 1969; Loomis et al., 1972; Loomis and Wrenn, 1973; Utah: Loomis and Welbourn, 1969; Sonora, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

Incilius mazatlanensis – Sonora, Mexico: Goldberg et al., 2002; Paredes-León et al., 2008

Hannemania dunnii

Acris gryllus – Kansas and Oklahoma: Loomis, 1956

Ambystoma maculatum – North Carolina: Rankin, 1937

Ambystoma opacum – North Carolina: Rankin, 1937

Anaxyrus americanus charlesmithi – Arkansas: Connior et al., 2016b; Oklahoma: McAllister and Durden, 2014

Anaxyrus fowleri – Louisiana: Connior et al., 2016a

Anaxyrus woodhousii – Oklahoma: Loomis, 1956

Aneides aeneus – Georgia: Loomis, 1956

Desmognathus brimleyorum – Arkansas: Winter et al., 1986; Connior et al., 2016b; Oklahoma: Anthony et al., 1994

Desmognathus fuscus – unspecified: Radford, 1954; U.S.A.: Radford, 1942; eastern United States: Sambon, 1928; Ewing, 1931; Hyland, 1956; Arkansas: Loomis, 1956 (Host reported

as *D. brimleyorum* by Connior et al., 2016b.); North Carolina: Mann, 1932; Rankin, 1937; Westfall et al., 2008; Oklahoma and Texas: Loomis, 1956; laboratory experiment (Florida?): Hyland, 1961

Eurycea bislineata – North Carolina: Loomis, 1956; West Virginia: Shoemaker and Clark, 1975

Eurycea cirrigera – Alabama: Hribar and Tyler, 1989 (Host reported as *E. bislineata*.); laboratory experiment (Florida?): Hyland, 1961; North Carolina: Mann, 1932; Westfall et al., 2008

Eurycea guttolineata – North Carolina: Rankin, 1937

Gastrophryne olivacea – Texas: Loomis, 1956

Lithobates berlandieri – Texas: McAllister et al., 2017

Lithobates blairi – Texas: McAllister et al., 2017

Lithobates clamitans – North Carolina: Murphy, 1965; Virginia: Loomis, 1956

Lithobates palustris – Arkansas: Connior et al., 2016b; North Carolina: Murphy, 1965; Virginia: Loomis, 1956; Gibson and Welbourn, 2018

Lithobates pipiens – Oklahoma: Loomis, 1956

Lithobates sphenoccephalus – Alabama: Birkhead et al., 2007; Arkansas: Connior et al., 2016b; North Carolina: Murphy, 1965

Plethodon albagula – Arkansas and Missouri: Anthony, 1995 (“Chiggers have rarely been observed on individuals of this species,” Anthony et al., 1994.)

Plethodon angusticlavius – Arkansas: Connior et al., 2016b; McAllister et al., 2013

Plethodon caddoensis – Arkansas: Loomis, 1956; Crossley, 1960; Duncan and Highton, 1979; Saugey et al., 1985; Winter et al., 1986; Anthony et al., 1994; Connior et al., 2016b; Oklahoma: Duncan and Highton, 1979

Plethodon cylindraceus – North Carolina: Westfall et al., 2008

Plethodon fourchensis – Arkansas: Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b; Oklahoma: Duncan and Highton, 1979

Plethodon glutinosus – Arkansas: Duncan and Highton, 1979; North Carolina: Mann, 1932; Rankin, 1937; Oklahoma: Duncan and Highton, 1979

Plethodon kiamichi – Arkansas and Oklahoma, Anthony et al., 1994 (See Footnote no. 1.)

Plethodon ouachitae – Arkansas: Loomis, 1956; Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b; Oklahoma: Anthony et al., 1994; Duncan and Highton, 1979

Plethodon serratus – unspecified (Arkansas or Oklahoma?): Duncan and Highton, 1979 (“Chiggers are rarely seen on” this host.)

Pseudotriton montanus – Kentucky: McAllister et al., 2010; North Carolina: Rankin, 1937

Hannemania cf. *dunni*

Plethodon glutinosus – Alabama: Bakkegard et al., 2019

Hannemania *eltoni*

Acris crepitans – Texas: Block, 1968

Acris gryllus – Kansas: Loomis, 1956; Crossley, 1960

Ambystoma tigrinum – Kansas: Loomis, 1956

Anaxyrus woodhousii – Kansas: Loomis, 1956

Lithobates pipiens – Kansas: Loomis, 1956; Crossley, 1960; Texas: Loomis, 1956; Crossley, 1960

Lithobates sphenoccephalus – unspecified: Radford, 1954; Texas: Sambon, 1928 (Host reported as *L. pipiens*.); Ewing, 1931; Radford, 1942; Hyland, 1956

Plethodon angusticlavius – Arkansas: Maksimowich and Mathis, 2000; Maksimowich and Mathis, 2001; Missouri: Maksimowich, 1998; Dalton and Mathis, 2014

Unidentified salamander (*Plethodon* sp.) – Georgia: Crossley and Proctor, 1971

Hannemania hegeneri

Acris crepitans – Georgia: Crossley and Proctor, 1971

Anaxyrus microscaphus – Utah: Parry and Grundmann, 1965

Anaxyrus punctatus – Utah: Parry and Grundmann, 1965

Anaxyrus terrestris – Florida: McAllister et al., 2015

Desmognathus fuscus – laboratory experiment (Florida?): Hyland, 1961

Eurycea cirrigera – laboratory experiment (Florida?): Hyland, 1961

Hyla arenicolor – Utah: Parry and Grundmann, 1965

Lithobates palustris – laboratory experiment: Hyland, 1961 (Host referred to as “green frog.”)

Lithobates pipiens – Georgia: Crossley and Proctor, 1971; Utah: Parry and Grundmann, 1965; laboratory experiment: Hyland, 1961

Lithobates sphenoccephalus – Florida: Hyland, 1956; Goff, 1989; laboratory experiment (Florida?): Hyland, 1961

Notophthalmus viridescens – laboratory experiment: Hyland, 1961 (Chiggers experimentally infested the “host not found infested in nature.”)

Plethodon glutinosus – Illinois: Landewe, 1960

Plethodon yonahlossee – North Carolina: Adler and Dennis, 1962 (Host reported as *P. longicrus*.)

Hannemania hylae

Craugastor sp. – Morelos, Mexico: Hoffmann, 1969

Eleutherodactylus guttilatus – Texas: Loomis et al., 1972; Jung et al., 2001

Eleutherodactylus longipes – Queretaro, Mexico: Espino del Castillo et al., 2011

Hyla arenicolor – unspecified: Radford, 1954; Arizona: Loomis and Welbourn, 1969; California: Ewing, 1925; Ewing, 1926; Ewing, 1931; Radford, 1942; Gould, 1956; Hyland, 1956; Texas: Loomis and Welbourn, 1969; Loomis et al., 1972; Jung et al., 2001; Utah: Loomis and Welbourn, 1969; Sonora, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

Incilius mazatlanensis – Sonora, Mexico: Goldberg et al., 2002

Leptodactylus melanonotus – Jalisco, Mexico: Jacinto-Maldonado et al., 2013

Lithobates berlandieri – Morelos, Mexico: Hoffmann, 1969

Lithobates pipiens – Morelos, Mexico: Hoffmann, 1969 (Host is more likely *L. berlandieri*.)

Lithobates sp. – San Luis Potosi, Mexico: Hoffman and López-Campos, 2000

Pseudacris cadaverina – California: Loomis and Welbourn, 1969; Welbourn and Loomis, 1975; Baja California Norte, Mexico: Loomis and Welbourn, 1969; Paredes-León et al., 2008

Scaphiopus couchii – Sonora, Mexico: Hoffmann, 1969

Hannemania mexicana

Lithobates berlandieri – Puebla, Mexico: Paredes-León et al., 2008; San Luis Potosí, Mexico: Hoffmann, 1965 (Host reported as *L. pipiens.*); Paredes-León et al., 2008; Veracruz, Mexico: Jacinto-Maldonado et al., 2016

Lithobates brownorum – Veracruz, Mexico: Jacinto-Maldonado et al., 2016

Lithobates johni – San Luis Potosí, Mexico: Hoffmann, 1965; Hoffmann, 1969 (Host reported as *L. moorei.*); Paredes-León et al., 2008

Lithobates pipiens – Texas: Loomis et al., 1972; Loomis and Wrenn, 1973

Lithobates vaillanti – Veracruz, Mexico: Jacinto-Maldonado et al., 2016

Hannemania ca. mexicana

Lithobates berlandieri – Coahuila, Mexico: Paredes-León, 2019

Hannemania monticola

Ambystoma rosaceum – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Eleutherodactylus marnockii – Texas: Malone and Paredes-León, 2005

Eleutherodactylus saxatilis – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hyla eximia – Durango, Mexico: Welbourn and Loomis, 1970; Paredes-León et al., 2008

Lithobates tarahumarae – Sonora, Mexico: Goldberg et al., 2002

Hannemania multifemorala

Acris gryllus – Arkansas, Kansas, and Oklahoma: Loomis, 1956

Anaxyrus terrestris – Arkansas: Loomis, 1956 (Host is likely misidentified; *A. terrestris* is not known to occur in Arkansas.)

Anaxyrus woodhousii – Kansas and Oklahoma: Loomis, 1956

Gastrophryne olivacea – Texas: Loomis, 1956; Crossley, 1960; Oyervides et al., 2016

Lithobates pipiens – Arkansas, Kansas, and Missouri: Loomis, 1956; Nebraska: Loomis, 1956; Crossley, 1960; Oklahoma, and Texas: Loomis, 1956

Hannemania pelaezi

Lithobates berlandieri – Morelos, Mexico: Hoffmann, 1965; Hoffmann, 1969 (Host reported as *L. pipiens.*); Paredes-León et al., 2008

Hannemania penetrans

Acris crepitans – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Morrison, 1967

Anaxyrus cognatus – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

Anaxyrus fowleri – North Carolina: Brandt, 1936; Virginia: Campbell, 1967; Campbell, 1968

Anaxyrus woodhousii – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

Gastrophryne olivacea – Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

Lithobates catesbeianus – North Carolina: Brandt, 1936; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Virginia: Campbell, 1967; Campbell, 1968

Lithobates clamitans – Virginia: Ewing, 1931; Hyland, 1956; Campbell, 1967; Campbell, 1968

Lithobates pipiens – unspecified: Radford, 1954; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944; Virginia: Ewing, 1931 (Chigger reported as *H. dumni* by Loomis, 1956.); Radford, 1942; Goff, 1989

Lithobates sphenoccephalus – North Carolina: Brandt, 1936; Oklahoma: Kuntz, 1941; Kuntz and Self, 1944

Hannemania saxicola

Eleutherodactylus saxatilis – Durango, Mexico: Welbourn and Loomis, 1970

Hannemania ca. saxicola

Lithobates berlandieri – Coahuila, Mexico: Paredes-León, 2019

Hannemania sp.

Acris gryllus – eastern United States: Wharton and Fuller, 1952

Ambystoma tigrinum – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975

Anaxyrus cognatus – New Mexico: Duszynski and Jones, 1973

Anaxyrus debilis – New Mexico: Duszynski and Jones, 1973

Anaxyrus microscaphus – New Mexico: Duszynski and Jones, 1973; Ryan et al., 2015

Anaxyrus punctatus – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975; Texas: Jung et al., 2001

Anaxyrus speciosus – New Mexico: Duszynski and Jones, 1973

Anaxyrus woodhousii – New Mexico: Duszynski and Jones, 1973

Desmognathus brimleyorum – Arkansas and Oklahoma: McAllister et al., 1995a

Desmognathus fuscus – Tennessee: Regester, 2001

Eleutherodactylus guttillatus – Texas: Lynch, 1970; Coahuila, Guanajuato, Nuevo León, San Luis Potosí, and Tamaulipas, Mexico: Lynch, 1970

Eleutherodactylus marnockii – Texas: Lynch, 1970; Malone and Paredes-León, 2005

Eleutherodactylus pallidus – Nayarit, Mexico: Lynch, 1970

Eleutherodactylus verrucipes – Hidalgo, Queretaro, and San Luis Potosí, Mexico: Lynch, 1970

Eurycea cirrigera – Tennessee: Regester, 2001; Virginia: Mitchell, 2004

Eurycea tynerensis – Arkansas: McAllister et al., 1995b

Gastrophryne olivacea – Texas: Oyervides et al., 2015

Hyla arenicolor – Colorado: Finley, 1953; New Mexico: Duszynski and Jones, 1973; Grover et al., 1975; North Carolina (Hosts were zoo animals of uncertain origin.): Sladky et al., 2000

- Lithobates berlandieri* – Texas: Jung et al., 2001 (Chiggers are referred to as an “unidentified new species similar to *H. anurae*.”)
- Lithobates forreri* – Guerrero, Mexico: Monroy-Vilchis et al., 2015
- Lithobates palustris* – Arkansas: McAllister et al., 1995c; Virginia: Mitchell, 2004
- Lithobates pipiens* – New Mexico: Duszynski and Jones, 1973; Grover et al., 1975
- Plethodon caddoensis* – Arkansas and Oklahoma: McAllister et al., 2002
- Plethodon glutinosus* – North Carolina: Mann, 1932
- Plethodon kiamichi* – Arkansas and Oklahoma: McAllister et al., 2002
- Plethodon metcalfi* – Georgia: Brown et al., 2006
- Plethodon ouachitae* – Arkansas and Oklahoma: McAllister et al., 2002
- Pseudacris clarkii* – Texas: McAllister, 1991
- Spea bombifrons* – New Mexico: Duszynski and Jones, 1973
- Spea hammondii* – New Mexico: Duszynski and Jones, 1973

Trombiculidae

Eutrombicula alfreddugesi

- Acris gryllus* – Kansas: Loomis, 1956
- Anaxyrus terrestris* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952
- Anaxyrus woodhousii* – Nebraska: Wolfenbarger, 1952
- Anaxyrus* sp. – Virginia: Ewing, 1944
- Lithobates palustris* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952
- Lithobates pipiens* – eastern United States: Jenkins, 1948; Wharton and Fuller, 1952; Kansas: Loomis, 1956
- Spea bombifrons* – Texas: Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)
- Spea multiplicata* – Texas: Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)

Eutrombicula cinnabaris

- Hyla avivoca* – Arkansas: Connior et al., 2016b

Eutrombicula lipovskyana

- Acris gryllus* – Kansas: Loomis, 1956
- Anaxyrus woodhousii* – Kansas: Loomis, 1956
- Plethodon glutinosus* – Illinois: Landewe, 1960

Eutrombicula masoni

- Hyla squirella* (?) – Florida: Farner and Seaman, 1946; southeastern United States: Jenkins, 1948

Eutrombicula splendens

- Hyla squirella* – unspecified: Wharton and Fuller, 1952

Trombicula irritans

Anaxyrus fowleri – Middle Atlantic States: Ewing, 1929

Unidentified Chiggers

Anaxyrus americanus charlesmithi – Virginia: Gibson, 2015b

Anaxyrus fowleri – Virginia: Watson and Gibson, 2010

Acris crepitans – Nebraska and South Dakota: McCallum and Trauth, 2004

Desmognathus fuscus – Virginia: Sattler and Gibson, 2016

Eleutherodactylus marnockii – Texas: Gaige, 1931

Lithobates catesbeianus – Oklahoma: Trowbridge and Hefley, 1934

Lithobates palustris – Virginia: Watson and Gibson, 2010; Gibson, 2015a; Gibson, 2015b; Sattler and Gibson, 2016

Lithobates sphenoccephalus – Louisiana: Hubert, 1927; Oklahoma: Trowbridge and Hefley, 1934

Plethodon cylindraceus – Virginia: Watson and Gibson, 2010

Plethodon ouachitae – Arkansas: Dunn and Heinze, 1933; Pope and Pope, 1951

Part 3. Geographic Records

This section of the catalog provides a list of chigger parasites and their amphibian hosts for each state from which records have been published². States, chiggers, and hosts (names in parentheses) are listed alphabetically. References are presented chronologically. Figures 1 and 2 depict the U.S. and Mexican states, respectively, from which chiggers have been reported as amphibian parasites.

United States

Alabama

Hannemania dunni (*Eurycea cirrigera*) – Hribar and Tyler, 1989 (Host reported as *E. bislineata*.)

Hannemania dunni (*Lithobates sphenoccephalus*) – Birkhead et al., 2007

Hannemania cf. *dunni* (*Plethodon glutinosus*) – Bakkegard et al., 2019

Arizona

Hannemania bufonis (*Anaxyrus punctatus*) – Loomis and Welbourn, 1969

Hannemania hylae (*Hyla arenicolor*) – Loomis and Welbourn, 1969

Arkansas

Eutrombicula cinnabaris (*Hyla avivoca*) – Connior et al., 2016b

Hannemania dunni (*Anaxyrus americanus charlesmithi*) – Connior et al., 2016b

Hannemania dunni (*Desmognathus brimleyorum*) – Winter et al., 1986; Connior et al., 2016b

Hannemania dunni (*Desmognathus fuscus*) – Loomis, 1956 (Host reported as *D. brimleyorum* by Connior et al., 2016b.)

Hannemania dunni (*Lithobates palustris*) – Connior et al., 2016b

Hannemania dunni (*Lithobates sphenoccephalus*) – Connior et al., 2016b

Hannemania dunni (*Plethodon albagula*) – Anthony, 1995 (“Chiggers have rarely been observed on individuals of this species,” Anthony et al., 1994.)

Hannemania dunni (*Plethodon angusticlavius*) – McAllister et al., 2013; Connior et al., 2016b

Hannemania dunni (*Plethodon caddoensis*) – Loomis, 1956; Crossley, 1960; Duncan and Highton, 1979; Saugey et al., 1985; Winter et al., 1986; Anthony et al., 1994; Connior et al., 2016b

Hannemania dunni (*Plethodon fourchensis*) – Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b

Hannemania dunni (*Plethodon glutinosus*) – Duncan and Highton, 1979

Hannemania dunni (*Plethodon kiamichi*) – Anthony et al., 1994 (See Footnote no. 1.)

² Walters et al.’s (2011) reports of *Hannemania multifemorala* from amphibians in Alaska (AK) and New Brunswick (NB) are omitted as they appear to represent typographical errors, likely duplicating reliable reports from Arkansas (AR) and Nebraska (NE).

Hannemania dunnii (*Plethodon ouachitae*) – Loomis, 1956; Duncan and Highton, 1979; Winter et al., 1986; Connior et al., 2016b

Hannemania eltoni (*Plethodon angusticlavius*) – Maksimowich and Mathis, 2000; Maksimowich and Mathis, 2001

Hannemania multifemorala (*Acris gryllus*) – Loomis, 1956

Hannemania multifemorala (*Anaxyrus terrestris*) – Loomis, 1956 (Host is likely misidentified; *A. terrestris* is not known to occur in Arkansas.)

Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956

Hannemania sp. (*Desmognathus brimleyorum*) – McAllister et al., 1995a

Hannemania sp. (*Eurycea tynnerensis*) – McAllister et al., 1995b

Hannemania sp. (*Lithobates palustris*) – McAllister et al., 1995c

Hannemania sp. (*Plethodon caddoensis*) – McAllister et al., 2002

Hannemania sp. (*Plethodon kiamichi*) – McAllister et al., 2002

Hannemania sp. (*Plethodon ouachitae*) – McAllister et al., 2002

Unidentified chiggers (*Plethodon ouachitae*) – Dunn and Heinze, 1933 (Chiggers identified as *H. dunnii* in Duncan and Highton, 1979.); Pope and Pope, 1951

California

Hannemania bufonis (*Anaxyrus punctatus*) – Loomis and Welbourn, 1969; Welbourn and Loomis, 1975

Hannemania hylae (*Hyla arenicolor*) – Ewing, 1925; Ewing, 1926; Ewing, 1931; Radford, 1942; Gould, 1956; Hyland, 1956

Hannemania hylae (*Pseudacris cadaverina*) – Loomis and Welbourn, 1969; Welbourn and Loomis, 1975

Colorado

Hannemania sp. (*Hyla arenicolor*) – Finley, 1953

Florida

Eutrombicula masoni (*Hyla squirella*) (?) – Farner and Seaman, 1946

Hannemania dunnii (*Eurycea cirrigera*) – Hyland, 1961

Hannemania hegeneri (*Anaxyrus terrestris*) – McAllister et al., 2015

Hannemania hegeneri (*Lithobates pipiens*) – Hyland, 1961

Hannemania hegeneri (*Lithobates sphenoccephalus*) – Hyland, 1956; Hyland, 1961; Goff, 1989

Georgia

Hannemania dunnii (*Aneides aeneus*) – Loomis, 1956

Hannemania eltoni (*Plethodon* sp.) – Crossley and Proctor, 1971

Hannemania hegeneri (*Acris crepitans*) – Crossley and Proctor, 1971

Hannemania hegeneri (*Lithobates pipiens*) – Crossley and Proctor, 1971

Hannemania sp. (*Plethodon metcalfi*) – Brown et al., 2006

Illinois

Eutrombicula lipovskyana (*Plethodon glutinosus*) – Landewe, 1960

Kansas

Eutrombicula alfreddugesi (*Acris gryllus*) – Loomis, 1956
Eutrombicula alfreddugesi (*Lithobates pipiens*) – Loomis, 1956
Eutrombicula lipovskyana (*Acris gryllus*) – Loomis, 1956
Eutrombicula lipovskyana (*Anaxyrus woodhousii*) – Loomis, 1956
Eutrombicula lipovskyana (*Lithobates pipiens*) – Loomis, 1956
Hannemania dunni (*Acris gryllus*) – Loomis, 1956
Hannemania eltoni (*Acris gryllus*) – Loomis, 1956; Crossley, 1960
Hannemania eltoni (*Ambystoma tigrinum*) – Loomis, 1956
Hannemania eltoni (*Anaxyrus woodhousii*) – Loomis, 1956
Hannemania eltoni (*Lithobates pipiens*) – Loomis, 1956; Crossley, 1960
Hannemania multifemorala (*Acris gryllus*) – Loomis, 1956
Hannemania multifemorala (*Anaxyrus woodhousii*) – Loomis, 1956
Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956

Kentucky

Hannemania dunni (*Pseudotriton montanus*) – McAllister et al., 2010

Louisiana

Hannemania dunni (*Anaxyrus fowleri*) – Connior et al., 2016a
 Unidentified chiggers (*Lithobates sphenoccephalus*) – Hubert, 1927

Missouri

Hannemania dunni (*Plethodon albagula*) – Anthony, 1995 (“Chiggers have rarely been observed on individuals of this species,” Anthony et al., 1994.)
Hannemania eltoni (*Plethodon angusticlavius*) – Maksimowich, 1998; Dalton and Mathis, 2014 (laboratory study)
Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956

Nebraska

Eutrombicula alfreddugesi (*Anaxyrus woodhousii*) – Wolfenbarger, 1952
Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956; Crossley, 1960

New Mexico

Hannemania bufonis (*Anaxyrus microscaphus*) – Ryan et al., 2016
Hannemania sp. (*Ambystoma tigrinum*) – Duszynski and Jones, 1973; Grover et al., 1975
Hannemania sp. (*Anaxyrus cognatus*) – Duszynski and Jones, 1973
Hannemania sp. (*Anaxyrus debilis*) – Duszynski and Jones, 1973
Hannemania sp. (*Anaxyrus microscaphus*) – Duszynski and Jones, 1973; Ryan et al., 2015
Hannemania sp. (*Anaxyrus punctatus*) – Duszynski and Jones, 1973; Grover et al., 1975
Hannemania sp. (*Anaxyrus speciosus*) – Duszynski and Jones, 1973

- Hannemania* sp. (*Anaxyrus woodhousii*) – Duszynski and Jones, 1973
Hannemania sp. (*Hyla arenicolor*) – Duszynski and Jones, 1973; Grover et al., 1975
Hannemania sp. (*Lithobates pipiens*) – Duszynski and Jones, 1973; Grover et al., 1975
Hannemania sp. (*Spea bombifrons*) – Duszynski and Jones, 1973
Hannemania sp. (*Spea hammondi*) – Duszynski and Jones, 1973

North Carolina

- Hannemania dunni* (*Ambystoma maculatum*) – Rankin, 1937
Hannemania dunni (*Ambystoma opacum*) – Rankin, 1937
Hannemania dunni (*Desmognathus fuscus*) – Mann, 1932; Rankin, 1937; Westfall et al., 2008
Hannemania dunni (*Eurycea bislineata*) – Loomis, 1956
Hannemania dunni (*Eurycea cirrigera*) – Mann, 1932; Westfall et al., 2008
Hannemania dunni (*Eurycea guttolineata*) – Rankin, 1937
Hannemania dunni (*Lithobates clamitans*) – Murphy, 1965
Hannemania dunni (*Lithobates palustris*) – Murphy, 1965
Hannemania dunni (*Lithobates sphenoccephalus*) – Murphy, 1965
Hannemania dunni (*Plethodon cylindraceus*) – Westfall et al., 2008
Hannemania dunni (*Plethodon glutinosus*) – Mann, 1932; Rankin, 1937
Hannemania dunni (*Pseudotriton montanus*) – Rankin, 1937
Hannemania dunni (No host identified.) – Hyland, 1950
Hannemania hegneri (*Plethodon yonahlossee*) – Adler and Dennis, 1962 (Host reported as *P. longicrus*.)
Hannemania penetrans (*Anaxyrus fowleri*) – Brandt, 1936
Hannemania penetrans (*Lithobates catesbeianus*) – Brandt, 1936
Hannemania penetrans (*Lithobates sphenoccephalus*) – Brandt, 1936
Hannemania sp. (*Hyla arenicolor*) – Sladky et al., 2000 (Hosts were zoo animals of uncertain origin; *H. arenicolor* is not known to occur in North Carolina.)
Hannemania sp. (*Plethodon glutinosus*) – Mann, 1932

Oklahoma

- Hannemania dunni* (*Acris gryllus*) – Loomis, 1956
Hannemania dunni (*Anaxyrus americanus charlesmithi*) – McAllister and Durden, 2014
Hannemania dunni (*Anaxyrus woodhousii*) – Loomis, 1956
Hannemania dunni (*Desmognathus brimleyorum*) – Anthony et al., 1994
Hannemania dunni (*Desmognathus fuscus*) – Loomis, 1956
Hannemania dunni (*Lithobates pipiens*) – Loomis, 1956
Hannemania dunni (*Plethodon caddoensis*) – Duncan and Highton, 1979
Hannemania dunni (*Plethodon fourchensis*) – Duncan and Highton, 1979
Hannemania dunni (*Plethodon glutinosus*) – Duncan and Highton, 1979
Hannemania dunni (*Plethodon kiamichi*) – Anthony et al., 1994 (See Footnote no. 1.)
Hannemania dunni (*Plethodon ouachitae*) – Anthony et al., 1994; Duncan and Highton, 1979
Hannemania multifemorala (*Acris gryllus*) – Loomis, 1956

- Hannemania multifemorala* (*Anaxyrus woodhousii*) – Loomis, 1956
Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956
Hannemania penetrans (*Acris crepitans*) – Kuntz, 1941; Kuntz and Self, 1944; Morrison, 1967
Hannemania penetrans (*Anaxyrus cognatus*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania penetrans (*Anaxyrus woodhousii*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania penetrans (*Gastrophryne olivacea*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania penetrans (*Lithobates catesbeianus*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania penetrans (*Lithobates pipiens*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania penetrans (*Lithobates sphenoccephalus*) – Kuntz, 1941; Kuntz and Self, 1944
Hannemania sp. (*Desmognathus brimleyorum*) – McAllister et al., 1995a
Hannemania sp. (*Plethodon caddoensis*) – McAllister et al., 2002
Hannemania sp. (*Plethodon kiamichi*) – McAllister et al., 2002
Hannemania sp. (*Plethodon ouachitae*) – McAllister et al., 2002
Unidentified chiggers (*Lithobates catesbeianus*) – Trowbridge and Hefley, 1934
Unidentified chiggers (*Lithobates sphenoccephalus*) – Trowbridge and Hefley, 1934

Tennessee

- Hannemania* sp. (*Desmognathus fuscus*) – Regester, 2001
Hannemania sp. (*Eurycea cirrigera*) – Regester, 2001

Texas

- Eutrombicula alfreddugesi* (*Spea bombifrons*) – Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)
Eutrombicula alfreddugesi (*Spea multiplicata*) – Mertins et al., 2011 (Chiggers were misidentified as *Hannemania* sp. by Torrence et al., 2007.)
Hannemania bufonis (*Anaxyrus punctatus*) – Loomis and Welbourn, 1969; Loomis et al., 1972; Loomis and Wrenn, 1973
Hannemania dunni (*Desmognathus fuscus*) – Loomis, 1956
Hannemania dunni (*Gastrophryne olivacea*) – Loomis, 1956
Hannemania dunni (*Lithobates berlandieri*) – McAllister et al., 2017
Hannemania dunni (*Lithobates blairi*) – McAllister et al., 2017
Hannemania eltoni (*Acris crepitans*) – Block, 1968
Hannemania eltoni (*Lithobates pipiens*) – Loomis, 1956; Crossley, 1960
Hannemania eltoni (*Lithobates sphenoccephalus*) – Sambon, 1928 (Host reported as *L. pipiens*.); Ewing, 1931; Radford, 1942; Hyland, 1956
Hannemania hylae (*Eleutherodactylus guttillatus*) – Loomis et al., 1972; Jung et al., 2001
Hannemania hylae (*Hyla arenicolor*) – Loomis and Welbourn, 1969; Loomis et al., 1972; Jung et al., 2001
Hannemania mexicana (*Lithobates pipiens*) – Loomis et al., 1972; Loomis and Wrenn, 1973
Hannemania monticola (*Eleutherodactylus marnockii*) – Malone and Paredes-León, 2005
Hannemania multifemorala (*Gastrophryne olivacea*) – Loomis, 1956; Crossley, 1960; Oyervides et al., 2016
Hannemania multifemorala (*Lithobates pipiens*) – Loomis, 1956

- Hannemania* sp. (*Anaxyrus punctatus*) – Jung et al., 2001
Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970
Hannemania sp. (*Eleutherodactylus marnockii*) – Lynch, 1970; Malone and Paredes-León, 2005
Hannemania sp. (*Gastrophryne olivacea*) – Oyervides et al., 2015
Hannemania sp. (*Lithobates berlandieri*) – Jung et al., 2001 (Chigger is referred to as an “unidentified new species similar to *H. anurae*.”)
Hannemania sp. (*Pseudacris clarkii*) – McAllister, 1991
Unidentified chiggers (*Eleutherodactylus marnockii*) – Gaige, 1931

Utah

- Hannemania bufonis* (*Anaxyrus punctatus*) – Loomis and Welbourn, 1969
Hannemania hegneri (*Anaxyrus microscaphus*) – Parry and Grundmann, 1965
Hannemania hegneri (*Anaxyrus punctatus*) – Parry and Grundmann, 1965
Hannemania hegneri (*Hyla arenicolor*) – Parry and Grundmann, 1965
Hannemania hegneri (*Lithobates pipiens*) – Parry and Grundmann, 1965
Hannemania hylae (*Hyla arenicolor*) – Loomis and Welbourn, 1969

Virginia

- Eutrombicula alfreddugesi* (*Anaxyrus* sp.) – Ewing, 1944
Hannemania dunni (*Lithobates clamitans*) – Loomis, 1956
Hannemania dunni (*Lithobates palustris*) – Loomis, 1956; Gibson and Welbourn, 2018
Hannemania penetrans (*Anaxyrus fowleri*) – Campbell, 1967; Campbell, 1968
Hannemania penetrans (*Lithobates catesbeianus*) – Campbell, 1967; Campbell, 1968
Hannemania penetrans (*Lithobates clamitans*) – Ewing, 1931; Hyland, 1956; Campbell, 1967; Campbell, 1968
Hannemania penetrans (*Lithobates pipiens*) – Ewing, 1931 (Chigger reported as *H. dunni* by Loomis, 1956.); Radford, 1942; Goff, 1989
Hannemania sp. (*Eurycea cirrigera*) – Mitchell, 2004
Hannemania sp. (*Lithobates palustris*) – Mitchell, 2004
Unidentified chiggers (*Anaxyrus americanus*) – Gibson, 2015b
Unidentified chiggers (*Anaxyrus fowleri*) – Watson and Gibson, 2010
Unidentified chiggers (*Desmognathus fuscus*) – Sattler and Gibson, 2016
Unidentified chiggers (*Lithobates palustris*) – Watson and Gibson, 2010; Gibson, 2015a; Gibson, 2015b; Sattler and Gibson, 2016
Unidentified chiggers (*Plethodon cylindraceous*) – Watson and Gibson, 2010

West Virginia

- Hannemania dunni* (*Eurycea bislineata*) – Shoemaker and Clark, 1975

Eastern United States

- Eutrombicula alfreddugesi* (*Anaxyrus terrestris*) – Jenkins, 1948; Wharton and Fuller, 1952
Eutrombicula alfreddugesi (*Lithobates palustris*) – Jenkins, 1948; Wharton and Fuller, 1952
Eutrombicula alfreddugesi (*Lithobates pipiens*) – Jenkins, 1948; Wharton and Fuller, 1952
Hannemania dunni (*Desmognathus fuscus*) – Sambon, 1928; Ewing, 1931; Hyland, 1956

Hannemania sp. (*Acris gryllus*) – eastern United States: Wharton and Fuller, 1952

Middle Atlantic states

Trombicula irritans (*Anaxyrus fowleri*) – Ewing, 1929

Southeastern United States

Eutrombicula masoni (*Hyla squirella?*) – Jenkins, 1948

Mexico**Baja California Norte**

Hannemania hylae (*Pseudacris cadaverina*) – Loomis and Welbourn, 1969; Paredes-León et al., 2008

Coahuila

Hannemania ca. mexicana (*Lithobates berlandieri*) – Paredes-León, 2019

Hannemania ca. saxicola (*Lithobates berlandieri*) – Paredes-León, 2019

Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970

Durango

Hannemania monticola (*Ambystoma rosaceum*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania monticola (*Eleutherodactylus saxatilis*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania monticola (*Hyla eximia*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania saxicola (*Eleutherodactylus saxatilis*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Guanajuato

Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970

Guerrero

Hannemania sp. (*Lithobates forreri*) – Monroy-Vilchis et al., 2015

Hidalgo

Hannemania sp. (*Eleutherodactylus verrucipes*) – Lynch, 1970

Jalisco

Hannemania anurae (*Lithobates berlandieri*) – Paredes-León et al., 2008

Hannemania anurae (*Lithobates montezumae*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania anurae (*Lithobates pipiens*) – Welbourn and Loomis, 1970 (Host is more likely *L. berlandieri*.)

Hannemania anurae (*Lithobates tarahumarae*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania hylae (*Leptodactylus melanonotus*) – Jacinto-Maldonado et al., 2013

Morelos

Hannemania hylae (*Craugastor* sp.) – Hoffmann, 1969

Hannemania hylae (*Lithobates pipiens*) – Hoffmann, 1969 (Host is more likely *L. berlandieri*.)

Hannemania pelaezi (*Lithobates berlandieri*) – Hoffmann, 1965; Hoffmann, 1969 (Host reported as *L. pipiens.*); Paredes-León et al., 2008

Nayarit

Hannemania anurae (*Eleutherodactylus pallidus*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania anurae (*Hyla arenicolor*) – Welbourn and Loomis, 1970

Hannemania anurae (*Hyla eximia*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania anurae (*Lithobates berlandieri*) – Paredes-León et al., 2008

Hannemania anurae (*Lithobates pipiens*) – Welbourn and Loomis, 1970 (Host is more likely *L. berlandieri.*)

Hannemania sp. (*Eleutherodactylus pallidus*) – Lynch, 1970

Nuevo León

Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970

Queretaro

Hannemania hylae (*Eleutherodactylus longipes*) – Espino del Castillo et al., 2011

Hannemania sp. (*Eleutherodactylus verrucipes*) – Lynch, 1970

Puebla

Hannemania mexicana (*Lithobates berlandieri*) – Paredes-León et al., 2008

San Luis Potosí

Hannemania hylae (*Lithobates* sp.) – Hoffman and López-Campos, 2000

Hannemania mexicana (*Lithobates berlandieri*) – Hoffmann, 1965 (Host reported as *L. pipiens.*); Paredes-León et al., 2008

Hannemania mexicana (*Lithobates johni*) – Hoffmann, 1965; Hoffmann, 1969 (Host reported as *L. moorei.*); Paredes-León et al., 2008

Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970

Hannemania sp. (*Eleutherodactylus verrucipes*) – Lynch, 1970

Sinaloa

Hannemania anurae (*Eleutherodactylus pallidus*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania anurae (*Hyla arenicolor*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Hannemania anurae (*Lithobates berlandieri*) – Paredes-León et al., 2008

Hannemania anurae (*Lithobates pipiens*) – Welbourn and Loomis, 1970 (Host is more likely *L. berlandieri.*)

Hannemania anurae (*Lithobates pustulosus*) – Welbourn and Loomis, 1970; Paredes-León et al., 2008

Sonora

Hannemania bufonis (*Anaxyrus punctatus*) – Loomis and Welbourn, 1969; Paredes-León et al., 2008

Hannemania bufonis (*Incilius mazatlanensis*) – Goldberg et al., 2002

Hannemania hylae (*Hyla arenicolor*) – Loomis and Welbourn, 1969

Hannemania hylae (*Incilius mazatlanensis*) – Goldberg et al., 2002

Hannemania hylae (*Scaphiopus couchii*) – Hoffmann, 1969

Hannemania monticola (*Lithobates tarahumarae*) – Goldberg et al., 2002

Tamaulipas

Hannemania sp. (*Eleutherodactylus guttilatus*) – Lynch, 1970

Veracruz

Hannemania mexicana (*Lithobates berlandieri*) – Jacinto-Maldonado et al., 2016

Hannemania mexicana (*Lithobates brownorum*) – Jacinto-Maldonado et al., 2016

Hannemania mexicana (*Lithobates vaillanti*) – Jacinto-Maldonado et al., 2016

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