THERYA, 2026, Vol. 17(2):163-170 DOI: 10.12933/therya.2026.6247 ISSN 2007-3364

Parasitic metazoans of wild rodents (Mammalia) from Mexico. Geographic distribution and host spectrum

Carmen Guzmán-Cornejo[1], Angel Herrera-Mares[1,2], Roxana Acosta[3], Ricardo Paredes-León[4], Rosario Mata-López[5], and Luis García Prieto[6*]

[1]Laboratorio de Acarología, Departamento de Biología Comparada, Facultad de Ciencias, Universidad Nacional Autónoma de México, C.P. 04510, Ciudad de México, México. E-mail: carguzmancornejo@gmail.com (CG-C)
[2]Laboratorio de Ecología de Enfermedades y Una Salud, Departamento de Etología, Fauna Silvestre y Animales de Laboratorio, Facultad de Medicina Veterinaria y Zootecnia, Universidad Nacional Autónoma de México, C.P. 04510, Ciudad de México, México. E-mail: angelmares@ciencias.unam.mx (AH-M)
[3]Museo de Zoología "Alfonso L. Herrera", Departamento de Biología Evolutiva, Facultad de Ciencias, Universidad Nacional Autónoma de México, C.P. 04510, Ciudad de México, México E-mail: roxana_a2003@ciencias.unam.mx (RA-G)
[4]Colección Nacional de Ácaros, Instituto de Biología, Universidad Nacional Autónoma de México, Ciudad de México, México. E-mail: rparedes@ib.unam.mx (RP-L)
[5]Laboratorio de Sistemática y Evolución de Helmintos de Vertebrados Silvestres, Departamento de Biología Evolutiva, Facultad de Ciencias, Universidad Nacional Autónoma de México, C.P. 04510, Ciudad de México, México. E-mail: rmatalopez@ciencias.unam.mx (RM-L)
[6]Colección Nacional de Helmintos, Instituto de Biología, Universidad Nacional Autónoma de México, C.P. 04510, Ciudad de México, México.
[*]Corresponding author: luis.garcia@ib.unam.mx

Among the most common animal lifestyles, parasitism stands out, often occurring in groups that also include free-living organisms. Among metazoans, helminths and arthropods include a large number of parasitic species. The objective of the present study was to compile, update and list for the first time all nominal species of metazoans that infect and infest wild rodents, analyzing their geographic distribution, defining the state of the art, and suggesting possible avenues of research that will allow us to complete the knowledge of the group. A total of 3,909 records of metazoan parasites of 204 rodent species were obtained from the 32 states of Mexico. Estado de México (Mexico) and Oaxaca were the states with the greatest parasite richness. At a national level, this richness is composed of 70 nominal species of helminths, 204 of mites, 40 of anoplurans, 67 of chewing lice, and 136 species of fleas.

Keywords: ectoparasites, endoparasites, helminths, parasitic arthropods, wild rodents

Entre los estilos de vida animal más comunes, destaca el parasitismo, que a menudo se presenta en grupos que también incluyen organismos de vida libre. Entre los metazoarios, los helmintos y los artrópodos contienen gran cantidad de especies parásitas. El objetivo del presente estudio fue recopilar, actualizar y listar por primera vez todas las especies nominales de metazoos que infectan e infestan roedores silvestres, analizando su distribución geográfica, definiendo el estado del arte y las posibles líneas de investigación que permitan completar el conocimiento del grupo. Se obtuvieron un total de 3,909 registros de parásitos metazoarios de 204 especies de roedores de los 32 estados de la República Mexicana. El Estado de México y Oaxaca fueron los estados con la mayor riqueza parasitaria. A nivel nacional, la riqueza está conformada por 70 especies nominales de helmintos, 204 de ácaros, 40 de anopluros, 67 de piojos masticadores y 136 especies de pulgas.

Palabras clave: artrópodos parásitos, ectoparásitos, endoparásitos, helmintos, roedores silvestres

Among the most common animal lifestyles, parasitism stands out, often occurring in groups that also include free-living organisms. Among metazoans, helminths and arthropods include a large number of parasitic species (Goater *et al.* 2014). Helminths, which constitute a non-natural grouping, comprise organisms belonging to four phyla that are characterized by being worm-like and parasitic: Platyhelminthes (dorsoventrally flattened worms), Rotifera-Acanthocephala (worms with the proboscis armed with hooks), Nematoda (roundworms) and Annelida-Hirudinea (ringed worms). On the other hand, Arthropoda is the phylum that includes the largest number of animals on Earth; they are characterized by the presence of articulated legs, segments fused into tagmas and appendages formed by segments (Brusca *et al.* 2022).

The systematic study of parasites from both groups in Mexico began asynchronously; the first helminth recorded in the country was the nematode *Litomosoides sigmodontis*, a parasite of the Hispid Cotton Rat *Sigmodon hispidus* Say and Ord, 1825 in Jalisco and Michoacán (Ochoterena and Caballero y Caballero 1932). Regarding arthropods, the chewing louse *Eutrichophilus mexicanus* was reported by Rudow (1866) on the Mexican Hairy Porcupine (*Coendou mexicanus* (Kerr, 1972)) from an undetermined locality in Mexico. Since then, both lines of research have been addressed by national and international researchers from

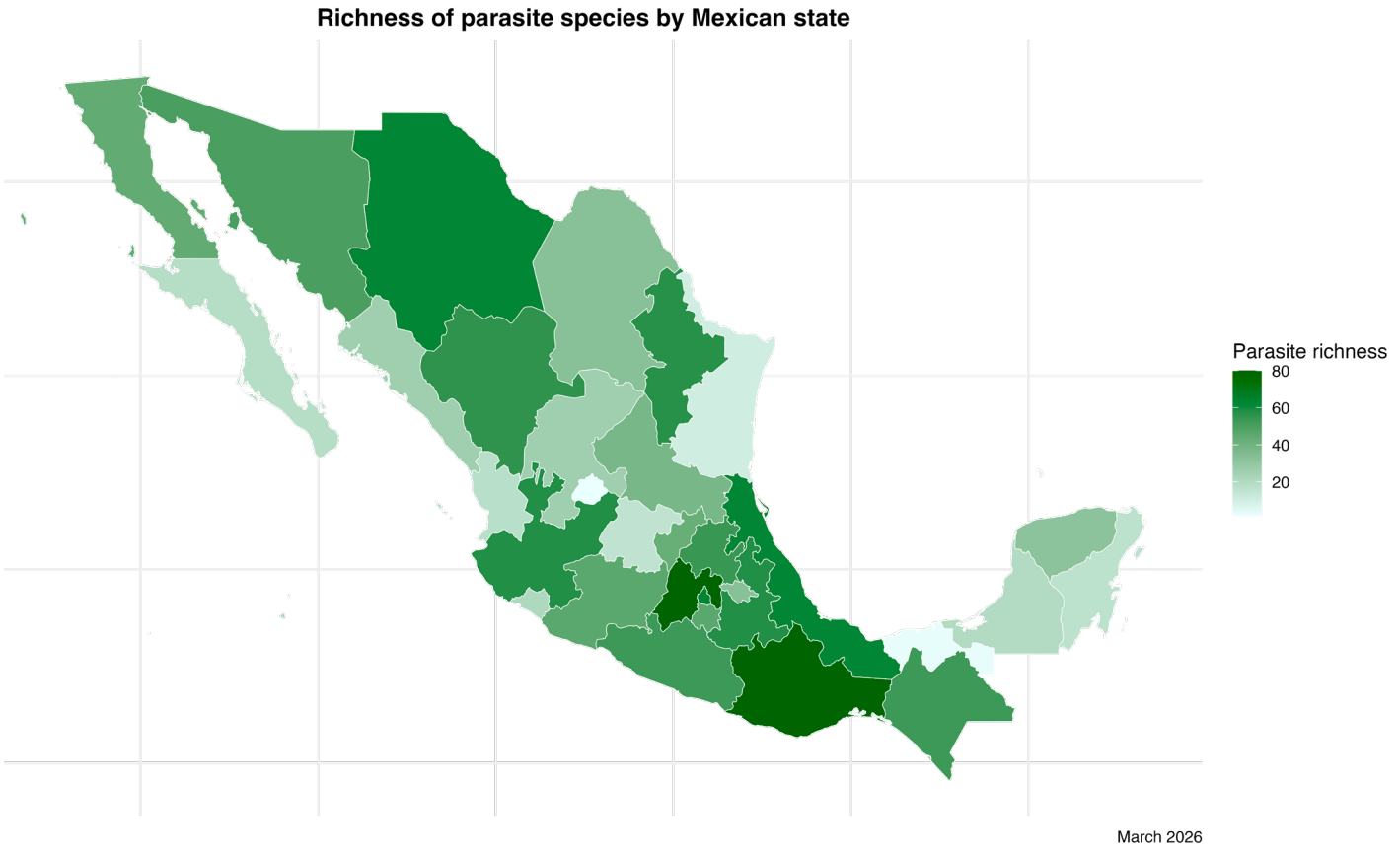

Figure 1. Richness of parasitic metazoan associated with wild rodents by Mexican state.

various institutions, with the most notable being the Instituto de Biología, Universidad Nacional Autónoma de México (UNAM), in Mexico, for both groups (helminths and arthropods), and Facultad de Ciencias, UNAM, and Instituto Politécnico Nacional for arthropods.

The first attempt to quantify the richness of helminths associated with rodents in Mexico was made by García-Prieto *et al.* (2012); however, these authors considered both wild and synanthropic rodents. In the case of arthropods, Whitaker and Morales-Malacara (2005) gathered published information related to ectosymbionts of wild rodents in a single study. Based on the above, the objective of the present study was to compile, update and list for the first time all nominal species of metazoans that infect and infest wild rodents and analyze their geographic distribution, defining the state of the art and suggesting possible lines of research that will allow us to complete the knowledge of the group.

Materials and methods

Systematic searches were carried out in electronic databases such as BioOne (https://bioone-org), CAB Abstracts (https://www.cabidigitallibrary.org), Clarivate Analytics (https://www.webofscience.com) and Google Scholar (https://scholar.google.com) between 1913 and 2025. In addition, some faunal lists were consulted, such as: Whitaker and Morales-Malacara (2005); García-Prieto *et al.* (2012); Sánchez-Montes *et al.* (2013; 2018); Light *et al.* (2020); Herrera-Mares *et al.* (2022).

The keywords for the searches were combined in Spanish and English: helminths, flatworms, Platyhelminthes, nematodes, Nematoda, acanthocephalans, Acanthocephala, leeches, Hirudinea, parasitic arthropods, ectoparasites, mites, Acari, fleas, Siphonaptera, ticks, Argasidae, Ixodidae, lice, chiggers, Trombiculidae, Phthiraptera, rodents, Rodentia, Mexico. The classification and nomenclature of parasitic metazoans was updated based on keys and specialized literature. For the nomenclature of rodents we follow The Mammal Diversity Database (2025) V.2.0 (MDD2).

All metazoan records were entered into an Excel spreadsheet, including the following fields for both groups, parasites and hosts: family, genus, and species. The state, bibliographic reference and full citation were included for each record. For the total count of parasitic and host species, only nominal species (identified at the species level) were used. The numbers of metazoan parasites were represented in a choropleth map. The present study is a bibliographic compilation; therefore, it was not required to follow the guidelines of the American Society of Mammalogists or the approval of the Committee for the Care and Use of Animals in Research-Experimentation.

Results

The knowledge of metazoan parasites of rodents in Mexico consists of 3,909 records obtained from all the 32 states; these records correspond to 518 species, from 155 genera and 50 families (Table 1; Figure 1), associated with 204

rodent species classified into 58 genera and eight families. The states with the greatest parasite richness are Estado de México and Oaxaca, with 80 species, associated with 31 and 36 host species, respectively. The most complete record of metazoan parasites was achieved in the states of Jalisco, Nuevo León, and Hidalgo, with seven of the eight groups of metazoans considered in this study associated with rodents. On the other hand, in the state of Aguascalientes, only two species of Ischnocera have been reported. The highest number of studied hosts has been recorded in the states of Chihuahua (38) and Oaxaca (36), whereas in Aguascalientes and Tabasco, only one and two species of rodents have been sampled, respectively. Asymmetric knowledge among metazoan parasitic groups is also evident, with helminths being the most neglected (Table 2).

Table 1. Number of species, genera and families of parasites by metazoan parasitic group.

Parasite taxa	Number of families	Number of genera	Number of species
Trematoda	3	4	5
Cestoda	5	7	11
Acanthocephala	1	1	1
Nematoda	13	29	53
Acari	16	58	204
Anoplura	2	6	40
Ischnocera	1	3	67
Siphonaptera	9	49	136

The eight families of wild rodents examined have at least one species of parasitic metazoan, highlighting that Cricetidae and Heteromyidae are parasitized by six groups of metazoans except for Ischnocera, which only infests Geomyidae and Erethizontidae (Figure 2).

The most widely distributed parasitic metazoan species in the country are the flea *Jellisonia breviloba breviloba* Traub, 1950 and the chewing louse *Geomydoecus* (*Geomydoecus*) *welleri* Price and Hellenthal, 1981 in 15 states each, followed by the mesostigmate mite *Steptolaelaps liomydis* in 13 states.

Table 2. Richness of parasitic metazoans in rodent species by Mexican state. Tre = Trematoda; Ces= Cestoda; Acn = Acantocefala; Nem = Nematoda; Aca = Acari; Ano = Anoplura; Isc= Ischnocera; Sip = Siphonaptera.

State	Tre	Ces	Acn	Nem	Aca	Ano	Isc	Sip	Total parasite richness	Richness of hosts studied
Aguascalientes	0	0	0	0	0	0	2	0	2	1
Baja California	0	0	0	0	27	2	5	10	44	27
Baja California Sur	0	0	0	0	15	2	2	0	19	13
Campeche	0	1	0	4	11	0	2	2	20	12
Chiapas	1	0	0	2	26	5	1	18	53	31
Chihuahua	0	0	0	6	5	8	11	31	61	38
Ciudad de México	0	0	0	0	19	4	5	36	64	23
Coahuila	0	0	0	3	8	4	14	4	33	15
Colima	0	1	0	1	14	2	3	0	21	15
Durango	0	0	0	1	27	3	10	15	56	31
Estado de México	0	2	0	5	20	5	11	37	80	31
Guanajuato	0	0	0	8	0	1	4	3	16	10
Guerrero	0	0	0	0	17	5	0	31	53	26
Hidalgo	1	4	0	13	7	2	6	21	54	30
Jalisco	2	0	1	3	19	8	13	12	58	20
Michoacán	0	0	0	3	14	1	6	22	46	25
Morelos	0	0	0	7	10	4	2	23	46	18
Nayarit	0	0	0	1	7	5	4	1	18	9
Nuevo León	1	2	0	2	10	6	5	31	57	30
Oaxaca	0	0	0	1	35	9	3	32	80	36
Puebla	1	0	0	2	18	3	11	23	58	29
Querétaro	0	0	0	0	0	1	2	40	43	30
Quintana Roo	0	0	0	4	11	0	1	1	17	11
San Luis Potosí	0	0	0	7	19	2	7	3	38	24
Sinaloa	0	0	0	0	13	5	5	3	26	20
Sonora	0	0	0	1	32	2	6	9	50	30
Tabasco	0	0	0	0	0	2	1	0	3	2
Tamaulipas	0	0	0	0	2	3	6	0	11	9
Tlaxcala	1	0	0	2	0	0	8	22	33	24
Veracruz	0	1	0	9	20	8	10	15	63	31
Yucatán	0	2	0	6	16	3	2	3	32	13
Zacatecas	0	0	0	6	6	4	9	1	26	16

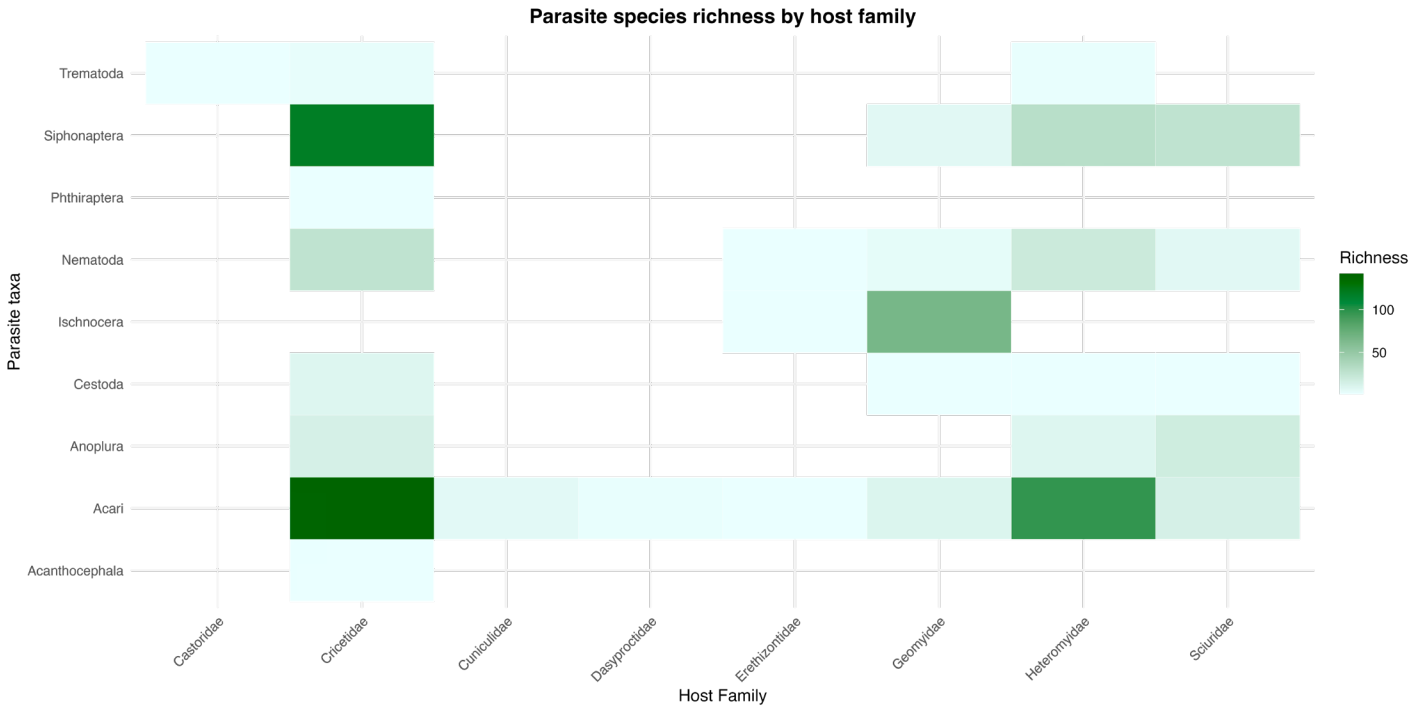

Figure 2. Graphical representation of the richness of parasitic metazoan by rodent family.

The hosts with the greatest parasite richness correspond to species of the Cricetidae family: *Peromyscus difficilis* (J. A. Allen, 1891) (73 species), *Peromyscus maniculatus* (J. A. Wagner, 1844) (60), *Microtus mexicanus* (de Saussure, 1861) (49) and *Peromyscus melanotis* J. A. Allen and F. M. Chapman, 1897 (47), followed by the heteromyid (Heteromyidae) *Heteromys pictus* O. Thomas, 1893 (41 species).

To date, the helminthological record for wild rodents in Mexico consists of 70 nominal species, which parasitize 49 host species belonging to five families, among which Cricetidae and Heteromyidae stand out for hosting the largest number of helminth species (38 and 21, respectively). These hosts have been collected in 23 states. Individually, the phylum Nematoda is the most represented (53 species), followed by Platyhelminthes (with 16) and Acanthocephala with one, with no species of Annelida having been recorded to date associated with this group of mammals (Figure 3).

The first helminth described for a Mexican wild rodent is *Micropleura sigmodontis* Ochoterena and Caballero y Caballero, 1932 (currently *Litomosoides sigmodontis* (Chandler, 1931)), in the cricetid *S. hispidus* from Jalisco and Michoacán. The nematode *Vexillata vexillata* (Hall, 1916) represents the helminth with the widest geographic distribution, having been collected in six states, followed by the nematodes *Heteromyoxyuris longejector* Quentin, 1973 and *Vexillata liomyos* Falcón-Ordaz, Gardner and Pérez-Ponce de León, 2001, each in five states. The most extensive helminthological record is harbored by the cricetid *P. difficilis*, which comprises 13 helminth species.

Mites (Parasitiformes and Acariformes) that are parasitic on rodents in Mexico are represented by 204 species classified in 58 genera from 16 families. These species are widely distributed among rodents throughout Mexico,

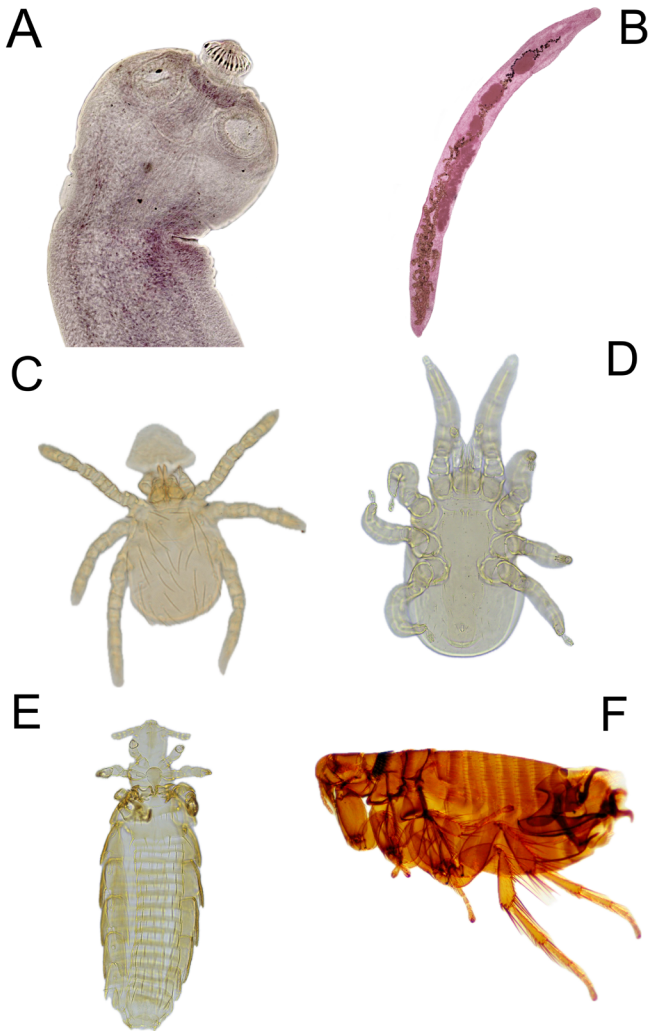

Figure 3. Some representative species of metazoan parasites of wild rodents in Mexico. A) *Rodentolepis nana* (Cestode). B) *Caballerolecythus ibunami* (Trematode). C) *Hoffmannina* sp. (Acari: Acariformes). D) *Echinonyssu liomys* (Acari: Parasitiformes). E) *Hoplopleura reithrodontomydis* (Phthiraptera). F) *Dactylospylla samalayucae* (Siphonaptera).

except for the states of Aguascalientes, Guanajuato, Querétaro, Tabasco, and Tlaxcala. The first records of rodent mites in Mexico correspond to *Ornithodoros nicollei* (Parasitiformes: Argasidae) in the nests of rats of the genus *Hodomys* (Brumpt *et al.* 1939) and *Eutrombicula alfreddugesi* (Oudemans, 1910) (Acariformes: Trombiculidae) in the ground squirrel *Otospermophilus variegatus* (Erxleben, 1777) (Islas 1943). The most widely distributed mite species are *Steptolaelaps liomydis* (Grant, 1947), *Androlaelaps fahrenholzi* (Berlese, 1911), and *E. alfreddugesi*, found in rodents from 13, 12, and 10 states, respectively.

These mite species parasitize 132 rodent species from 37 genera and seven families (Cricetidae, Cuniculidae, Dasyproctidae, Erethizontidae, Geomyidae, Heteromyidae, and Sciuridae). The host with the greatest richness is *Heteromys pictus* (Cricetidae) with 29 associated mite species, followed by *Peromyscus difficilis* with 19 and *H. irroratus* with 18. The most studied host, that is, the one with the greatest number of records, is also *H. pictus*.

Among insects, anoplurans are represented by 40 species belonging to six genera and two families, distributed across 28 states in Mexico. Among the first records of anoplurans in the country are those of *Enderleinellus extremus* Ferris, 1919 and *Enderleinellus suturalis* (Osborn, 1891), in squirrels of the genera *Sciurus* (Chiapas, Oaxaca, Tamaulipas, and Veracruz) and *Callospermophilus* (Chihuahua), respectively. The most widespread species of sucking lice are *Polyplax auricularis* Kellogg and Ferris, 1915 and *Neohaematopinus sciurinus* (Mjöberg, 1910) in eight Mexican states, followed by *Fahrenholzia ehrlichi* Johnson, 1962 in seven, and *Fahrenholzia pinnata* Kellogg and Ferris, 1915, and *Hoplopleura hirsuta* Ferris, 1916 in six states. These lice species are associated with 65 rodent species from 26 genera and three families (Cricetidae, Heteromyidae, and Sciuridae).

The host with the greatest richness is *Sciurus aureogaster* F. Cuvier in É. Geoffroy Saint-Hilaire and F. Cuvier, 1829 with four associated species (*Enderleinellus deppei* Kim, 1966, *E. extremus, Enderleinellus mexicanus* Werneck, 1948 and *N. sciurinus*); the most studied host is *Heteromys irroratus* J. E. Gray, 1868 with records in nine states of Mexico.

Regarding chewing lice, the national record includes 67 species and 21 subspecies (Ischnocera), belonging to three genera and one family (Trichodectidae); the oldest record for this group is *Eutrichophilus mexicanus* (Rudow 1866) associated with *C. mexicanus*. The most widely distributed species in the country is *G.* (*Geomydoecus*) *welleri* in 15 states, followed by *Thomomydoecus* (*Thomomydoecus*) *zacatecae* (Price and Hellenthal, 1980) in seven.

Chewing lice are associated with 21 rodent species from eight genera and two families. The host with the greatest number of associated species is *Megascapheus umbrinus* (J. Richardson, 1829) (=*Thomomys umbrinus*, which included several subspecies), with 22 species and three subspecies. It is also the most studied host in 18 states of Mexico.

Finally, Siphonaptera (fleas) is represented by 136 species belonging to 49 genera and nine families, distributed in 27 states. The first record of flea species (*Pleochaetis mundus* Jordan and Rothschild, 1922) in wild rodents of Mexico was made in two species of rodents: *Reithrodontomys megalotis* (S. F. Baird, 1857) and *P. difficilis*. The most widely distributed species of fleas are *J. breviloba breviloba* and *Plusetis mathesoni* in 15 and 12 states of Mexico respectively, followed by *Jellisonia weismani* Eads, 1951 and *Plusaetis sibynus* (Jordan, 1925), in 11 states. Flea species are associated with 101 species of rodents from 32 genera and four families (Sciuridae, Cricetidae, Heteromyidae and Geomyidae). The host with the greatest richness is *P. maniculatus* with 45 flea species, while the most studied is *P. difficilis* with 166 records.

Discussion

This work represents the first approach towards a comprehensive understanding of the richness of metazoan parasites (helminths and arthropods) in wild rodents in Mexico. The results of this study reveal a significant asymmetry in knowledge between the two groups. An important explanation for these differences can be found in the greater adaptive radiation shown by arthropods compared to any other animal group, since we are dealing with the most diverse group on the planet (Brusca *et al.* 2022). Another possible reason for this is the different start dates for the study of each group, with the study of helminths in rodents beginning in 1932 (Ochoterena and Caballero y Caballero 1932) and that of arthropods in 1866 (Rudow 1866).

However, this pattern may also be explained by other factors, such as the requirement to euthanize hosts to obtain helminths, in contrast to arthropod collection, which does not require euthanasia and thus facilitates their capture in larger numbers. Additionally, there is a bias toward the study of helminths infecting synanthropic rodents (Panti-May *et al.* 2018), as well as challenges related to the morphological complexity of some parasite groups, particularly trichostrongylid nematodes, which frequently infect these hosts. Furthermore, some helminth groups, such as Acanthocephala, exhibit relatively low richness, reducing the likelihood of their detection in wild rodents. Supporting this, our electronic literature search conducted to compile the information analyzed in this study yielded eight records of acanthocephalans, of which only one was associated with wild rodents (Lynggaard *et al.* 2021).

From a biological point of view, the differences in intra-group (metazoan groups) and inter-group (helminths vs. arthropods) richness could be attributed to the intrinsic nature of each one, that is, its particular richness and abundance, as well as the geographical distribution and host specificity they exhibit, their ability to evade the immune response, and the characteristic overdispersed distribution exhibited by the parasites.

Additionally, the process for the study of arthropods is relatively easier, so it requires less time. The processing of helminths applies particular techniques for each group, such as heat fixation, staining of specimens, clearing and

mounting in Canada balsam (turpentine) or, in the case of nematodes, cross-sections of the body and clearing with Amman lactophenol (Guzmán-Cornejo *et al.* 2012).

Another issue we identified is that some records of ectoparasitic arthropods were attributed to Mexico by Guzmán-Torres and Cano-Santana (2021) (e.g., *Enderleinellus suturalis* from Chihuahua). However, this record was originally cited by Ritzi (2014) in a study on ectoparasites of mammals from the northern extent of the Chihuahuan Desert in the United States. Therefore, such records were excluded from this manuscript.

On the other hand, in the initial stage of knowledge about Mexican arthropods, the contribution of foreign researchers was notable (Grant 1947; Furman 1955; Fain 1973; Loomis 1969; Genoways 1973; Werneck 1948, among others), while for helminths this has been developed mainly by national researchers in a punctual manner, and recently in a more systematic aproach: Pulido-Flores *et al.* (2005); Preisser and Falcón-Ordaz (2019); Panti-May *et al.* (2023); Falcón-Ordaz *et al.* (2024).

The nomenclatural revision of both parasites and hosts aimed to achieve the greatest possible accuracy in the records we present. However, some were problematic, such as *Peromyscus maniculatus*, since according to the database we followed (The Mammal Diversity Database 2025) this species is not distributed in Mexico. Notwithstanding, a recent study (Boria and Blois 2023) based on populations of this species in the USA found that *P. maniculatus* split into two regionally distinct subspecies: *P. m. gambelii* and *P. m. sonorensis,* both distributed in Northwestern Mexico. The inclusion of records of "*P. maniculatus*" in our study needs to be confirmed with a similar analysis to that referred to previously. Likewise, in accordance with Rose (2025), *S. hispidus* is distributed exclusively in northern Mexico; however, we found several records of parasites in the central and southern part of Mexico, which do not correspond to the current reported distribution of this rodent species. Unfortunately, the preservation of symbiotypes (*sensu* Frey *et al.* 1992) was not a common practice among parasitologists, so the identity of the specimens cannot be clarified. Some studies refer to this same problem (Light *et al.* 2020). To address this limitation, some efforts have included the collection of host tissue for subsequent DNA-based identification or the deposition of specimens in mammal collections.

Regarding the distribution of these groups of parasites, we can point out that they are distributed throughout all 32 states of Mexico; however, we also observed a significant asymmetry in sampling effort, with more than 220 records in states such as Estado de México, Querétaro, and Oaxaca, while only four have been recorded in other states such as Aguascalientes and Tabasco. Furthermore, it highlights that although sampling effort has been similar in Querétaro (where 30 rodent species have been analyzed), in Estado de México and Oaxaca, the richness of metazoans is practically half of what is reported in these last two states (80 species each). This can be explained by a probable lower regional richness of parasites in Querétaro than in the two states mentioned above, particularly in Oaxaca, which is in the Neotropical portion of the country, and occupies the first place in number of mammal species in Mexico (Briones-Salas *et al.* 2015). To establish the true current distribution of metazoans associated with wild Mexican rodents, a detailed study mapping the collection sites would be necessary; however, many of the older records are difficult to locate on maps due to their imprecise descriptions. Fortunately, many recent works include the precise geographic coordinates [e.g., Herrera-Mares *et al.* (2022); Panti-May *et al.* 2023)] of the sites where the material was obtained among their collection data.

On the other hand, as Herrera-Mares *et al.* (2022) highlighted, some regions still remain unexplored or poorly investigated because they face problems related to violence associated with drug cartels which can limit sampling in these particular areas.

According to the results obtained from the list presented, we found that the eight families of wild rodents have records of parasitic metazoans. However, the two families with the greatest parasite richness are Cricetidae (110 species) and Heteromyidae (40), which is likely related to the high diversity of both groups: 150 species of Cricetidae and 40 of Heteromyidae (Light *et al.* 2020), and to the extensive sampling of species belonging to both families.

In accordance with The Mammal Diversity Database (2025) V.2.0 (MDD2) the number of wild rodent species distributed in Mexico is 270; as result of our study, 204 have been reported as hosts of metazoans, representing 75.5% of the total. This could indicate that the knowledge of parasitic metazoans in this group of hosts is quite advanced in Mexico; notwithstanding, analyzing the individual host records, we can see that the number of metazoan species associated with these mammals varies widely, ranging from one species in *Dipodomys ornatus* (Falcón-Ordaz *et al.* 2024) to 73 in *P. difficilis*.

Parasites and rodents are crucial components of biodiversity and the ecosystems they inhabit. Furthermore, several of these parasitic species are of medical and veterinary importance, either as disease-causing agents by feeding on hosts infected with worms (e.g., *Rodentolepis nana*) or as potential vectors of disease-causing pathogens, since some rodent species are reservoirs of microorganisms (Keesing and Ostfeld 2024). Therefore, we consider it essential to continue monitoring the population dynamics of these parasites in their hosts, not only in relatively well-studied areas, but especially in less explored ones. This task is urgent considering the accelerating impact of human activities and global climate change, which in certain circumstances favor the survival of some species of public health importance.

Acknowledgments

This work is dedicated to Dr. Livia León-Paniagua for her career over 38 years studying Mexican mammalogy,

in which she has made important contributions to its knowledge, and for the great support she has given us in the field collections that we have carried out together. We thank Georgina Ortega-Leite for providing important bibliographic references and to Lázaro Gervara López for their comments abouth the species of Peromyscus. RP-L thanks to program UNAM-PAPIIT IA204525.

Declaration of Artificial Intelligence use

Google translator was used to correct the grammar of the writing.

Author contributions

Carmen Guzmán-Cornejo conceptualization, investigation, data curation, methodology, writing-original draft; Angel Herrera-Mares conceptualization, investigation, data curation, methodology, draft revision; Roxana Acosta-Gutiérrez conceptualization, investigation, data curation, methodology, draft revision; Ricardo Paredes-León conceptualization, investigation, data curation, methodology, draft revision; Rosario Mata-López conceptualization, investigation, data curation, methodology, draft revision; Luis García-Prieto conceptualization, investigation, data curation, methodology, writing-original draft.

Supplementary data

SD1. Records of parasitic metazoans associated with wild rodents in Mexico.

SD2. Literature of parasitic metazoans associated with wild rodents of Mexico.

Literature cited

Boria RA, and Blois J. 2023. Phylogeography within the *Peromyscus maniculatus* species group. *Molecular Phylogenetics and Evolution* 180:107701. https://doi.org/10.1016/j.ympev.2023.107701

Briones-Salas M, Lavariega NMC, Cortes-Marcial M, Monroy-Gamboa AG, and Mases-García CA. 2015. In: Briones-Salas M, Hortelano MY, Magaña CG, Sánchez RG, and Sosa EJE, editors. *Riqueza y conservación de los mamíferos en México a nivel estatal*: Vol. I. Ciudad de México (MEX): Asociación Mexicana de Mastozoología A.C., p. 329–366.

Brumpt EL, Mazzotti L, and Brumpt LC. 1939. Étude épidemiologique de la fiévre récurrente endémique des hauts plateau Mexicains. *Annales de Parasitologie Humaine et Comparée* 17:275–286.

Brusca RC, Giribet G, and Moore W. 2022. *Invertebrates (4th ed. Edition)*. Oxford (UK): Oxford University Press.

Fain A. 1973. Diagnoses d'acariens nouveaux (Listrophoroidea et Myobiidae). *Revue de Zoologie et de Botanique Africaine* 87:330–332.

Falcón-Ordáz J, Aquino-Camacho M, Guevara-Barcenas K, and Fernández J. 2024. Helminths parasites of heteromyid rodents from semiarid regions of Mexico. *Therya notes* 5:157–161. https://doi.org/10.12933/therya_notes-24-164

Frey JK, Yates TL, Duszynski DW, Gannon WL, and Gardner SL. 1992. Designation and curatorial management of type host specimens (symbiotypes) for new parasite species. *Journal of Parasitology* 78:930-932. https://doi.org/10.2307/3283335

Furman DP. 1955. *Steptolaelaps* (Acarina: Laelaptidae) a new genus of mites parasitic on neotropical rodents. *Journal of Parasitology* 41:519–525. https://doi.org/10.2307/3273813

García-Prieto L, Falcón-Ordaz J, and Guzmán-Cornejo C. 2012. Helminth parasites of wild Mexican mammals: list of species, hosts and geographical distribution. *Zootaxa* 3290:1–92. https://doi.org/10.11646/zootaxa.3290.1.1

Genoways HH. 1973. Systematics and evolutionary relationships of spiny pocket mice, genus *Liomys*. *Special Publication Museum Texas Tech University* 5:1–368.

Goater TM, Goater CP, and Esch GW. 2014. *Parasitism: the diversity and ecology of animal parasites*. Nueva York (EEUU): Cambridge University Press.

Grant CD. 1947. North American species of the genus *Laelaps* (Arachnida: Acarina: Parasitidae). *Microentomology* 12:2–21.

Guzmán-Cornejo C, García-Prieto L, Rivas G, Mendoza-Garfías B, Osorio-Sarabia D, and Montiel-Parra G. 2012. *Manual de prácticas de metazoarios parásitos de vertebrados*. Ciudad de México (MEX): Las Presas de Ciencias, Facultad de Ciencias, Universidad Nacional Autónoma de México.

Guzmán-Torres M, and Cano-Santana Z. 2021. Actualización del listado de piojos (Insecta: Phthiraptera) de México: distribución, riqueza, grado de especificidad y pediculosis humana. *Revista Mexicana de Biodiversidad* 92:e923800 https://doi.org/10.22201/ib.20078706e.2021.92.3800

Herrera-Mares A, Guzmán-Cornejo C, García-Prieto L, Rebollo-Hernández A, León-Paniagua L, Del Castillo-Martínez L, Montiel-Parra G, and Ríos-Sais G. 2022. Acari (Parasitiformes and Acariformes) From Mexico: Analysis of Their Geographical and Host Distribution in Rodentia (Cricetidae). *Journal of Medical Entomology* 59:1880–1890. https://doi.org/10.1093/jme/tjac135

Islas F. 1943. Observaciones sobre el tlazahuate de Izúcar de Matamoros y Acatlán, Puebla (Acarina: Trombiididae). Anales del Instituto de Biología, Universidad Nacional Autónoma de México 14: 439–450.

Keesing F, and Ostfeld RS. 2024. Emerging patterns in rodent-borne zoonotic diseases. *Science* 385:1305–1310. https://doi.org/10.1126/science.adq7993

Light JE, Durden LA, Oconnor BM, Preisser WC, Acosta R, and Eckerlin RP. 2020. Checklist of ectoparasites of cricetid and heteromyid rodents in Mexico. *Therya* 11:79–136. https://doi.org/10.12933/therya-20-785

Lynggaard C, García-Prieto L, Guzmán-Cornejo C, and García-Varela M. 2021. Description of a new species of *Moniliformis* (Acanthocephala: Moniliformidae) from *Peromyscus hylocetes* (Rodentia: Cricetidae) in Mexico. *Parasitology International* 83:102315. https://doi.org/10.1016/j.parint.2021.102315

Loomis RB. 1969. Chiggers (Acarina, Trombiculidae) from vertebrates of the Yucatan Peninsula, Mexico. Miscellaneous *Publications, University of Kansas Museum of Natural History* 50:1–22.

Mammal Diversity Database. 2025. *Mammal Diversity Database* (Version 2.3) [Data set]. Zenodo. [Accessed September-October, 2025]. https://doi.org/10.5281/zenodo.17033774

Ochoterena I, and Caballero y Caballero E. 1932. Filaria parásita de las ratas de campo *Micropleura sigmodoni* spec., nov. *Anales del Instituto de Biología, Universidad Nacional Autónoma de México* 3:123–125.

Panti-May JA, Digiani MC, Palomo-Arjona EE, Gurubel-González YM, Navone GT, Williams CM, *et al*. 2018. A checklist of the helminth parasites of sympatric rodents from two Mayan villages in Yucatán, México. *Zootaxa* 4403:495–512. https://doi.org/10.11646/zootaxa.4403.3.4

Panti-May JA, Moguel CWI, Hernández MDI, Cárdenas VMH, Torres CM, García-Prieto L, *et al*. 2023. Helminths of small rodents (Heteromyidae and Cricetidae) in the Yucatan Peninsula, Mexico: an integrative taxonomic approach to their inventory. *Zootaxa* 5357:205–240. https://doi.org/10.11646/zootaxa.5357.2.3

Preisser W, and Falcón-Ordaz J. 2019. A checklist of the parasitic helminths of cricetid and heteromyid rodents in Mexico. *Therya* 10:329–341. https://10.12933/therya-19-787.

Pulido-Flores G, Moreno-Flores S, and Monks S. 2005. Helminths of rodents (Rodentia: Muridae) from Metztitlán, San Cristóbal, and Rancho Santa Elena, Hidalgo, Mexico. *Comparative Parasitology* 72:186–92.

Ritzi CM. 2014. A review of mammalian ectoparasites from the Northern Chihuahuan Desert. In: Hoyt CA, and Karges J, editors. *Proceedings of the Sixth Symposium on the Natural Resources of the Chihuahuan Desert Region*. October 14–17. Fort Davis, Texas (EEUU): Chihuahuan Desert Research Institute; p. 151–184.

Rose RK. 2025. *Sigmodon hispidus* Rodentia: Cricetidae). *Mammalian Species* 57:1–26 https://doi.org/10.1093/mspecies/seae007

Rudow F. 1866. Sechs neue Haarlinge. *Zeitschrift für die gesammten Naturwissenschaften* 27:109–112.

Sánchez-Montes S, Guzmán-Cornejo C, León-Paniagua L, and Rivas G. 2013. A checklist of sucking lice (Insecta: Phthiraptera: Anoplura) associated with Mexican wild mammals, including geographical records and a host-parasite list. *Zootaxa* 3722:183–203. https://doi.org/10.11646/zootaxa.3722.2.4

Sánchez-Montes S, Colunga-Salas P, Álvarez-Castillo L, Guzmán-Cornejo C, and Montiel-Parra G. 2018. Chewing lice (Insecta: Phthiraptera) associated with vertebrates in Mexico. *Zootaxa* 4372:1–109. https://doi.org/10.11646/zootaxa.4372.1.1

Werneck FL. 1948 Notas sôbre o gênero *Enderleinellus* (Anoplura). *Memórias do Instituto Oswaldo Cruz* 45:281–306. http://dx.doi.org/10.1590/s0074-02761947000200001

Whitaker JO Jr, and Morales-Malacara JB. 2005. Ectoparasites and other associates (Ectodytes) of mammals of Mexico. In: Sánchez-Cordero V, and Medellín RA, editors. *Contribuciones mastozoológicas en homenaje a Bernardo Villa*. Distrito Federal (MEX): Instituto de Biología e Instituto de Ecología, Universidad Nacional Autónoma de México and CONABIO; p. 535–666.

Associated editors: Giovani Hernández Canchola and Pablo Colunga Salas
Submitted: October 31, 2025 ; Reviewed: December 12, 2025
Accepted: March 19, 2026; Published online: May 29, 2026