

A checklist of the predators and parasitoids of the fall webworm *Hyphantria cunea* (Drury) (Lepidoptera, Erebidæ) from around the world

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Abstract

A checklist of 488 fall webworm *Hyphantria cunea* (Drury) natural enemies was compiled based on documentation in previous research across its world distribution, including 289 predators and 199 parasitoids. Predators in the checklist include 67 species from 17 families of Insecta, 1 species of Chilopoda, 183 species from 22 families of Arachnida, 1 species of Reptilia, 4 species from 2 families of Amphibia, 33 species from 18 families of Aves. In addition, the checklist includes fall webworm parasitoids from 18 families of Insecta. Among continents, 128 predators and 76 parasitoids were distributed in North America, 78 predators and 62 parasitoids in Asia, and 88 predators and 68 parasitoids in Europe.

Key words: China, distribution, Europe, floral differences, Natural enemy, North America



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Introduction

The fall webworm, *Hyphantria cunea* (Drury, 1773) (Lepidoptera: Erebiidae), is native to North America, where it is considered to be a secondary pest (Tothill 1922). However, *H. cunea* has become a primary pest in some regions that it has invaded over the past 80 years (Edosa et al. 2019). During the 1940s, *H. cunea* invaded Hungary and Japan, and later spread to most European countries, all of East Asia, and parts of central Asia (Trajković and Žikić 2023). In 1979, *H. cunea* first invaded China where it has become a serious pest and its distribution has expanded annually (Ning et al. 2021).

Although *H. cunea* does not kill host trees in China, it causes aesthetic damage and is a nuisance pest, invading buildings, vehicles, and other structures during outbreaks (Ning et al. 2021). Also, cultural preferences in China do not tolerate the appearance of massive caterpillar nests in trees, which are much larger than those typically found in North America. It is unclear why *H. cunea* population levels are much higher in China compared to its native range; however, an important contributing factor may be a lack of natural enemies that have co-evolved with the pest in China. Therefore, it is necessary to compare the composition of *H. cunea* natural enemies in its native North American range to its invaded ranges in Europe and East Asia.

The research history on natural enemies of *H. cunea* can be divided into three stages: (1) prior to 1940 when *H. cunea* was only found in North America (Riley 1887a, b); (2) from 1940 to 1980, when *H. cunea* invaded Eastern Europe, Japan, and Korea, and natural enemy surveys were conducted in Europe, East Asia, and North America (Hasegawa and Itô 1967; Kayashima 1967; Warren and Tadić 1967; Tamura 1969; Kunimi 1983); and (3) from 1980 to present, after *H. cunea* invaded China and extensive surveys of natural enemies were conducted. During this most recent stage, numerous

Chinese parasitoids and predators that attack *H. cunea* were documented (Yang et al. 2008, 2015a, b; Li 2011). More recently, surveys of natural enemies have also been conducted in some central Asian countries, such as Turkey and Iran (Sullivan et al. 2010, 2011, 2012; Karami et al. 2023). Our objective was to compile a global checklist of known natural enemies of *H. cunea*, assemble as much information as possible about these natural enemies, and ultimately build a database for selecting candidates for use in biological control of *H. cunea*. We reviewed the available *H. cunea* natural enemy literature across all time periods and assembled a summary of this information in a species checklist.

Materials and methods

Natural enemy literature review

Our summary of *H. cunea* natural enemies is based on extensive literature searches through December 2023. A systematic literature search of CNKI (<https://www.cnki.net/index/>), Google Scholar (<https://scholar.google.com/>), Google (<https://www.google.com>), and Biodiversity Heritage Library (<https://www.biodiversitylibrary.org/>) was performed with key words, including “fall webworm”, “*Hyphantria cunea*”, “natural enemy”, “parasitoid”, “predator”. We included all literature related to predators and parasitoids of the fall webworm but did not include publications about pathogenic microorganisms of *H. cunea*. Overall, we reviewed 99 publications that reported information about natural enemies of *H. cunea*, from North America, Asia, and Europe.

Natural enemy species information collected

For each publication, we gathered relevant information about the natural enemy species reported. We compiled information into a checklist of predator and parasitoid groups, organized by Latin family name. We also included the Chinese family name. Family names were validated by checking ITIS (Integrated Taxonomic Information System; ITIS 2023). Some species names reported in the earlier literature differed from current valid names. When this occurred, we transcribed the synonym after the citation (e.g., “Oliver 1963 as *Matis carolina*”). For each species in this checklist, we summarized the following information: 1) distribution, 2) recorded interactions of predator or prey with *H. cunea*, 3) prey or host stage attacked, 4) parasitoid type, and 5) notes.

Distribution. The known geographic distribution of a given species, based on the most recent published literature or catalogue website. The level of detail about species distributions varied among publications, with some papers reporting country names (e.g., China, USA), geographical divisions or continents (e.g., North America, Asia), or zoogeographic divisions (e.g., Palearctic, Nearctic).

Recorded interactions of predator or parasitoid with *H. cunea*. The geographic distribution where each predator and parasitoid species was reported preying upon or parasitizing *H. cunea*. This information is very important for analyzing the geographical fauna of predators and parasitoids of the fall webworm

and demonstrates the species biodiversity of natural enemies among the three major regions (North America, Europe, and East Asia).

Prey stage. The *H. cunea* developmental stage preyed upon (i.e., egg, larva, pupa, or adult).

Host stage. The developmental stage of *H. cunea* that is parasitized (i.e., egg, larva, or pupa).

Parasitoid type. Parasitoids were categorized based on location of host-feeding (ectoparasitoids or endoparasitoids); brood production (solitary or gregarious); whether they parasitize hosts directly or indirectly (primary or hyperparasitoids); host specificity (monophagous, oligophagous, or polyphagous); and their impact on their host (idiobiont parasitoids that paralyze their host and koinobiont parasitoids that do not).

Notes. Biological characters of each predator or parasitoid species including any additional information or clarification about the natural enemy species.

Checklist

Part I Predators

Insecta

Mantodea

Mantidae 螳螂科

Stagmomantis carolina (Johanson, 1763)

Distribution. Trinidad, Venezuela, Guatemala, Belize, Costa Rica, Mexico, Panama, USA (Soodnarinesingh 2015).

Recorded interactions with *H. cunea*. USA [Louisiana (Oliver 1963 as *Matis carolina*)].

Prey stage. Larva (Oliver 1963).

Notes. Nymphs feed on small larva and adults feed on large larva (Oliver 1963).

Tenodera sinensis (Saussure, 1871)

Distribution. China, Japan, Micronesia, Thailand, North America, Canada (Patel and Singh 2016).

Recorded interactions with *H. cunea*. China [Beijing (Tao et al. 2008 as *Paratenodera aridifolia*)].

Orthoptera

Tettigoniidae 螽斯科

Tettigonia viridissima (Linnaeus, 1758)

Distribution. Europe and North Africa.

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Dermaptera

Forficulidae 球蝮科

***Forficula auricularia* Linnaeus, 1758**

Distribution. Europe, western Asia, North Africa, North America (Crumb et al. 1941).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg (Warren and Tadić 1967).

Hemiptera

Pentatomidae 蝽科

***Apoecilus bracteatus* (Fitch, 1865)**

Distribution. Canada, USA (Rider and Swanson 2021).

Recorded interactions with *H. cunea*. Canada [New Brunswick, Nova Scotia (Morris 1972)].

Prey stage. Larva (Morris 1972).

***Arma custos* (Fabricius, 1794)**

Distribution. Europe, Asia (Zhao et al. 2018).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967), Italy (Borioni 1991). China [Shanghe County, Jinan City, Shandong Province (Wang et al. 2012 as *A. chinensis*)].

Prey stage. Egg (Borioni 1991), larva (Warren and Tadić 1967).

Notes. Found in 2.33–17.86% of *H. cunea* webs at surveyed sites in Liaoning Province (Wang et al. 2012).

***Euschistus servus* (Say, 1832)**

Distribution. Canada, USA, Mexico (EPPO 2015).

Recorded interactions with *H. cunea*. USA (Riley 1887b).

Prey stage. Larva (Warren and Tadić 1967).

***Picromerus bidens* (Linnaeus, 1758)**

Distribution. Europe, Asia (Rider 2006), North America: Canada, USA (Chordas 2015).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Pinthaeus sanguinipes* (Fabricius, 1781)**

Distribution. Europe, Asia (Zhao et al. 2013).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Podisus maculiventris* (Say, 1832)**

Distribution. Mexico, Bahamas, USA, Canada (De Clercq 2008).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963)], Warren and Tadić (1967) also listed as *P. modestus*, a synonym of *P. maculiventris* (Phillips 1983)].

Prey stage. Larva (Warren and Tadić 1967).

***Podisus placidus* Uhler, 1870**

Distribution. USA, Canada (Phillips 1983).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963)].

Prey stage. Larva (Warren and Tadić 1967).

***Podisus serieiventris* Uhler, 1871**

Distribution. USA, Canada (Phillips 1983).

Recorded interactions with *H. cunea*. USA (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Anthocoridae 花蝽科

***Orius majusculus* (Reuter, 1879)**

Distribution. Europe, Canada (Henry 2008).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg (Warren and Tadić 1967).

Nabidae 姬蝽科

***Himacerus apterus* (Fabricius, 1798)**

Distribution. China, Europe, Canada [Nova Scotia (Lartvière 1992)].

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Nabis apterus*), China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Egg (Shu and Yu 1985), larva (Warren and Tadić 1967; Shu and Yu 1985).

Notes. Both nymph and adult consume *H. cunea* larvae (Shu and Yu 1985).

Reduviidae 猎蝽科

***Agriosphodrus dohrni* (Signoret, 1862)**

Distribution. China, Japan, India, Vietnam.

Recorded interactions with *H. cunea*. China [Beijing, laboratory feeding and testing in 2019].

Prey stage. Larva.

Notes. Both nymph and adult consume *H. cunea* larvae in the laboratory; mature nymphs can consume 4–7 larvae per day, adults can consume 4–11 larvae per day (unpublished data, LMC).

***Arilus cristatus* (Linnaeus, 1763)**

Distribution. Canada, USA, Mexico, Guatemala (Blatchley 1926).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963), Louisiana (Oliver 1963, 1964)].

Prey stage. Larva (Tadić 1963).

Notes. Both nymph and adult consume larvae of *H. cunea* (Tadić 1963; Oliver 1963), attacks second through seventh larval instars (Oliver 1964).

***Pselliopus cinctus* (Fabricius, 1776)**

Distribution. Canada, USA.

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963), Louisiana (Oliver 1964)].

Prey stage. Larva (Oliver 1964).

Notes. Attacks second through fifth larval instars (Oliver 1964).

***Rhynocoris iracundus* (Poda, 1761)**

Distribution. Europe, West and Middle Asia (Putshkov and Putshkov 1996).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Harpactor iracundus*)

Prey stage. Larva (Warren and Tadić 1967).

***Sinea spinipes* (Herrich-Schäffer, 1846)**

Distribution. USA (from New York south to Florida and west to South Dakota, Colorado, and Texas), Mexico (Froeschner 1988).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963), Louisiana (Oliver 1964)].

Prey stage. Larva (Oliver 1964).

Notes. Attacks first through fourth larval instars (Oliver 1964).

***Stenopoda cinerea* Laporte, 1833**

Distribution. Canada, USA, Mexico (Froeschner 1988), Argentina (Diez and Co-scarón 2014).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963)].

Prey stage. Larva (Tadić 1963).

***Yolinus albopustulatus* China, 1940**

Distribution. China, Japan, Vietnam (Lam et al. 2015).

Recorded interactions with *H. cunea*. China [Beijing, laboratory feeding and testing in 2019].

Prey stage. Larva.

Notes. Attacks *H. cunea* in the laboratory, one adult can consume 8–13 larvae per day (unpublished data, LMC).

***Zelus longipes* (Linnaeus, 1767)**

Distribution. Southern parts of USA, Mexico, Central America, the Caribbean, northern South America, Paraguay, and southern Brazil (Zhang et al. 2016).

Recorded interactions with *H. cunea*. USA [Melville (Oliver 1963 as *Z. bilobus*)].

Prey stage. Larva (Oliver 1963).

Notes. Attacks fourth through sixth larval instars (Oliver 1964).

***Zelus cervicalis* Stål, 1872**

Distribution. Belize, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, USA (Zhang et al. 2016).

Recorded interactions with *H. cunea*. USA [Lacombe (Oliver 1963)].

Prey stage. Larva (Oliver 1963).

Notes. Attacks fourth through sixth larval instars (Oliver 1964).

***Zelus luridus* Stål, 1862**

Distribution. Canada, Mexico, and USA (Zhang et al. 2016).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963 as *Z. exsanguis*)].

Prey stage. Larva (Tadić 1963 as *Z. exsanguis*).

Notes. Almost all specimens collected from the US were misidentified as *Z. exsanguis* (Zhang et al. 2016).

***Zelus tetracanthus* Stål, 1862**

Distribution. Brazil, Costa Rica, Curaçao, Honduras, Mexico, Panama, Paraguay, USA and Venezuela (Zhang et al. 2016).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963 as *Z. socius*)].

Prey stage. Larva (Tadić 1963 as *Z. exsanguis*).

Miridae 盲蝽科

***Deraeocoris ruber* (Linnaeus, 1758)**

Distribution. Britain, Corsica, Denmark, France, Germany, Italy, Macedonia, Moravia, Spain, Sweden, USA, Canada (Schuh 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg (Warren and Tadić 1967).

Neuroptera

Chrysopidae 草蛉科

***Chrysopa carnea* Stephens, 1836**

Distribution. Palaearctic, Afrotropical, Oriental (Oswald 2007).

Recorded interactions with *H. cunea*. Italy (Borioni 1991), Turkey [Düzce (Avci et al. 2022)].

Prey stage. Egg (Borioni 1991).

***Chrysopa formosa* Brauer, 1851**

Distribution. Palaearctic, widespread (Oswald 2007).

Recorded interactions with *H. cunea*. China [Dandong city, Liaoning province (Shu and Yu 1985)].

Prey stage. Egg and larva (Shu and Yu 1985).

***Chrysopa oculata* Say, 1839**

Distribution. Canada, USA, Mexico (Oswald 2007).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Egg and larva (Warren and Tadić 1967).

***Chrysopa perla* (Linnaeus, 1758)**

Distribution. Palaearctic, widespread (Oswald 2007).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg and larva (Warren and Tadić 1967).

***Chrysopa quadripunctata* Burmeister, 1839**

Distribution. Southern Canada, eastern USA, Mexico (Oswald 2007).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963)].

Prey stage. Egg and larva (Warren and Tadić 1967).

***Chrysopa pallens* Rambur, 1838)**

Distribution. Palaearctic, widespread (Oswald 2007).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *C. septempunctata*), Liaocheng City, Shandong Province (Yue et al. 2016 as *C. septempunctata*)].

Prey stage. Egg (Shu and Yu 1985), larva (Yue et al. 2016).

***Chrysopa nipponensis* (Okamoto, 1914)**

Distribution. China, Japan, Korea, Mongolia, Philippines, eastern Russia (Oswald 2007).

Recorded interactions with *H. cunea*. China [Liaocheng City, Shandong Province (Yue et al. 2016 as *C. sinica*)].

Prey stage. Larva (Yue et al. 2016).

***Chrysopa carnea* (Stephens, 1836)**

Distribution. Palaearctic (widespread), Afrotropical (Cape Verde, Oman, United Arab Emirates, Yemen), Oriental (China, India, Nepal) (Oswald 2007).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *C. vulgaris*).

Prey stage. Egg and larva (Warren and Tadić 1967).

Panorpidae 蝎蛉科

***Panorpa communis* Linnaeus, 1758**

Distribution. Asia, Europe (Penny and Byers 1979).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg (Warren and Tadić 1967).

Coleoptera

Cantharidae 花萤科

***Cantharis fusca* Linnaeus, 1758**

Distribution. Western and central Europe (Kazantsev 2011).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Cantharis rufa* (Linnaeus, 1758)**

Distribution. Europe, Canada (Pelletier and Hébert 2014).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Carabidae 步甲科

***Calosoma inquisitor* (Linnaeus, 1758)**

Distribution. Europe and part of the Mediterranean (Bruschi 2010).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg (Warren and Tadić 1967).

***Calosoma scrutator* (Fabricius, 1775)**

Distribution. Canada, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Puerto Rico, USA, Venezuela (Bruschi 2010).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva and adult (Warren and Tadić 1967).

***Calosoma sycophanta* (Linnaeus, 1758)**

Distribution. Northern Africa and throughout Europe (Bruschi 2010).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg and larva (Warren and Tadić 1967).

***Carabus hortensis* Linnaeus, 1758**

Distribution. Europe (Turin et al. 2003).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Chlaenius pallipes* (Gebler, 1823)**

Distribution. China, North Korea, South Korea, Japan, Russia, Mongolia (Lorenz 2021).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Pupa (Shu and Yu 1985).

***Nebria livida* (Linnaeus, 1758)**

Distribution. China, Japan, Russia, Europe (Liang and Yu 2000).

Recorded interactions with *H. cunea*. China [Liaocheng City, Shandong Province (Yue et al. 2016)].

Prey stage. Larva (Yue et al. 2016).

***Parena cavipennis* (Bates, 1873)**

Distribution. China, Japan, North Korea, South Korea, Vietnam, Nepal(?) (Shi and Liang 2023).

Recorded interactions with *H. cunea*. China [Rongcheng City, Shandong Province (Wang et al. 1999)].

Prey stage. Larva (Wang et al. 1999).

Notes. Both adults and larvae prey on *H. cunea* larvae. Adults prey at night on all instars; *P. cavipennis* larvae prey on caterpillars in webs (Wang et al. 1999).

***Parena laesipennis* (Bates, 1873)**

Distribution. China, Japan, South Korea, Vietnam, Laos, Thailand, Myanmar, Malaysia, India, Nepal (Shi and Liang 2023).

Recorded interactions with *H. cunea*. China [Dalian City, Liaoning Province (Yang et al. 2008)].

Prey stage. Larva (Yang et al. 2008).

Notes. Both adults and larvae prey on *H. cunea* and live inside the host web; consume 110–265 larvae per web; consume all larvae in 3.2% of webs in the Dalian area (Yang et al. 2008).

***Parena latecincta* (Bates, 1873)**

Distribution. Japan, South Korea, Russia, China, Vietnam, Laos, Thailand, India, Nepal, the Philippines (Shi and Liang 2023).

Recorded interactions with *H. cunea*. China [Dalian City, Liaoning Province (Yang et al. 2008)].

Prey stage. Larva (Yang et al. 2008).

Notes. Similar biology to *P. laesipennis* (Yang et al. 2008).

***Plochionus timidus* Haldeman, 1843**

Distribution. Canada, Mexico, USA (Bousquet 2012).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963)].

Prey stage. Larva (Tadić 1963).

Notes. Both adult and larva prey on *H. Cunea* larvae. Adult tears larva into pieces and then consumes each piece except for the head capsule (Tadić 1963).

Coccinellidae 瓢虫科

***Coccinella septempunctata* Linnaeus, 1758**

Distribution. Native to temperate Europe, North Africa, and Asia, established in North America and South America [Brazil, Chile] (Beverly 2022).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985), Liaocheng City, Shandong Province (Yue et al. 2016)].

Prey stage. Egg (Yue et al. 2016).

Notes. Larva of *C. septempunctata* prey on eggs (Yue et al. 2016).

***Harmonia axyridis* (Pallas, 1773)**

Distribution. Native to central and eastern Asia, introduced to Europe, North America, South America, the Middle East, South Africa, and Australia (Roy 2022).

Recorded interactions with *H. cunea*. China [Beijing (unpublished data, LMC), Liaocheng City, Shandong Province (Yue et al. 2016)].

Prey stage. Egg (Yue et al. 2016).

Notes. Larva of *H. axyridis* prey on eggs (Yue et al. 2016).

***Propylea quatuordecimpunctata* (Linnaeus, 1758)**

Distribution. Europe, North Africa, the Russian Far East, Asia, North America (Nikitsky and Ukrainsky 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Silphidae 葬甲科

***Dendroxena quadrimaculata* (Scopoli, 1771)**

Distribution. Central and Southern Europe, Turkey, Iran and Kazakhstan, Northern Africa, Northern America (Stolbov and Sergeeva 2020).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Xylodrepa punctata*).

Prey stage. Egg and larva (Warren and Tadić 1967).

***Silpha carinata* Herbst, 1783**

Distribution. From Europe to Transbaikalia and Central Asia, including Mongolia and westernmost China (Nishikawa et al. 2010).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg and larva (Warren and Tadić 1967).

Staphylinidae 隐翅虫科

***Quedius ochripennis* (Ménétriés, 1832)**

Distribution. West Palaearctic, Mediterranean, North Africa, Oriental (Salnitska and Solodovnikov 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Egg and larva (Warren and Tadić 1967).

Hymenoptera

Formicidae 蚁科

***Formica rufa* Linnaeus, 1761**

Distribution. Nearctic, Palaearctic (AntWeb, 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Linepithema humile* (Mayr, 1868)**

Distribution. Afrotropical, Australasia, Indomalaya, Nearctic, Neotropical, Oceania, Palaearctic (AntWeb 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Iridomyrmex humilis*).

Prey stage. Larva (Warren and Tadić 1967).

***Solenopsis saevissima* (Smith, 1855)**

Distribution. Afrotropical, Neotropical (AntWeb 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Vespidae 胡蜂科

***Dolichovespula arenaria* (Fabricius, 1775)**

Distribution. Abundant throughout boreal North America (Kimsey and Carpenter 2012).

Recorded interactions with *H. cunea*. Canada [New Brunswick (Morris 1972 as *Vespula arenaria*)].

Prey stage. Larva (Morris 1972).

***Dolichovespula maculate* (Linnaeus, 1763)**

Distribution. North America (Kimsey and Carpenter 2012).

Recorded interactions with *H. cunea*. Canada [New Brunswick (Morris 1972 as *Vespula maculata*)].

Prey stage. Larva (Morris 1972).

***Dolichovespula norvegicoides* (Sladen, 1918)**

Distribution. Widely throughout northern North America and further south along mountain ranges (Kimsey and Carpenter 2012).

Recorded interactions with *H. cunea*. Canada [New Brunswick (Morris 1972 as *Vespula norvegicoides*)].

Prey stage. Larva (Morris 1972).

***Polistes annularis* (Linnaeus, 1763)**

Distribution. USA (Carpenter 1996).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva and adult (Warren and Tadić 1967).

***Polistes dominulus* (Christ, 1791)**

Distribution. Central and southern Europe, Turkey, northern Africa, Israel, Syria, Afghanistan, Russia, Iran, Uzbekistan, Turkmenistan, Pakistan, India, Mongolia, China; introduced to Australia, Chile, USA (Carpenter 1996).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *P. dominula*).

Prey stage. Larva (Warren and Tadić 1967).

***Polistes arizonensis* Snelling, 1954**

Distribution. USA (Carpenter 1996).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967 as *P. exclamans*).

Prey stage. Larva and adult (Warren and Tadić 1967).

***Polistes aurifer* Saussure, 1853**

Distribution. Canada, Mexico, USA (Carpenter 1996).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967 as *P. fuscatus*).

Prey stage. Larva and adult (Warren and Tadić 1967).

***Polistes metricus* Say, 1831**

Distribution. USA (Carpenter 1996).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva and adult (Warren and Tadić 1967).

***Polistes fuscatus* (Fabricius, 1793)**

Distribution. Canada, USA (Carpenter 1996).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967 as *P. pallipes*).

Prey stage. Larva (Warren and Tadić 1967).

***Vespula alascensis* (Packard, 1870)**

Distribution. North America (Kimsey and Carpenter 2012).

Recorded interactions with *H. cunea*. Canada [New Brunswick (Morris 1972 as *V. vulgaris*)], USA [Roycefield (Smulyan 1924 as *Vespa communis*)].

Prey stage. Larva (Smulyan 1924; Morris 1972).

Notes. Preys on larvae by piercing the integument with their mandibles and consuming the liquid and softer parts (Smulyan 1924).

***Vespula maculifrons* (du Buysson, 1905)**

Distribution. Canada, USA (Kimsey and Carpenter 2012).

Recorded interactions with *H. cunea*. Canada [New Brunswick (Morris 1972 as *V. maculata*)].

Prey stage. Larva (Morris 1972).

Chilopoda

Scutigermorpha

Scutigeridae 蚰蜒科

***Thereuopoda clunifera* Wood, 1862**

Distribution. China, Japan (Würmli 1979).

Recorded interactions with *H. cunea*. Japan (Hasegawa and Itô 1967).

Prey stage. Adult (Hasegawa and Itô 1967).

Notes. Occasionally preys on *H. cunea* (Hasegawa and Itô 1967).

Arachnida

Araneae

Agelenidae 漏斗蛛科

***Agelena limbata* Thorell, 1897**

Distribution. China, Myanmar, Laos (World Spider Catalog 2023), Japan (Kunimi 1983).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Agelenopsis* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Allagelena difficilis* (Fox, 1936)**

Distribution. China, Korea (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Agelena difficilis*)].

Prey stage. Larva (Shu and Yu 1985).

***Allagelena opulenta* (L. Koch, 1878)**

Distribution. Russia (Far East), Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983 as *Agelena opulenta*)].

Prey stage. Larva (Kayashima 1967; Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Anyphaenidae 近管蛛科

***Anyphaena celer* (Hentz, 1847)**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Anyphaena maculata* (Banks, 1896)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Anyphaena* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Aysha* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Hibana gracilis* (Hentz, 1847)**

Distribution. Canada, USA, Jamaica (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Aysha gracilis*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Lupettiana mordax* (O. Pickard-Cambridge, 1896)**

Distribution. USA to Peru, Brazil (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Anyphaena fragilis*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Wulfila saltabundus* (Hentz, 1847)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Anyphaenella saltabunda*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Araneidae 圓蛛科

***Araneus diadematus* Clerck, 1757**

Distribution. Europe, Middle East, Turkey, Caucasus, Russia (Europe to Far East), Iran, Central Asia, China, Japan. Introduced to North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984), Italy [Po Valley (Groppali et al. 1993), Pavia (Camerini and Groppali 1999)].

Prey stage. Larva (Groppali et al. 1993; Camerini and Groppali 1999).

***Araniella displicata* (Hentz, 1847)**

Distribution. North America, Europe, Russia (Europe to Far East), Kazakhstan, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Araneus cingulatus* (Walckenaer, 1841)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Conepeira ozarkensis*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Araneus circe* (Audouin, 1826)**

Distribution. Southern Europe, Egypt, Turkey, Caucasus, Iran (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Epeira cornuta*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Araneus grossus* (C. L. Koch, 1844)**

Distribution. Europe to Central Asia (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Araneus* sp.**

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Araneus macacus* Uyemura, 1961**

Distribution. Russia (Far East), Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967 as *A. ventricosus macacus*).

Prey stage. Pupa or adult (Kayashima 1967)

***Acacesia hamata* (Hentz, 1847)**

Distribution. USA to Argentina (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Aoaraneus pentagrammicus* (Karsch, 1879)**

Distribution. Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967 as *Araneus pentagrammicus*).

Prey stage. Pupa or adult (Kayashima 1967).

***Argiope amoena* L. Koch, 1878**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Pupa or adult (Kayashima 1967).

***Argiope bruennichii* (Scopoli, 1772)**

Distribution. Europe, Turkey, Israel, Russia (Europe to Far East), Caucasus, Iran, Central Asia to China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Pupa or adult (Kayashima 1967).

***Argiope* sp.**

Recorded interactions with *H. cunea*. China [Liaocheng, Shandong Province (Yue et al. 2016)].

Prey stage. Larva (Yue et al. 2016).

***Bijoaraneus mitificus* (Simon, 1886)**

Distribution. Pakistan, India, Bangladesh, China, Thailand, Cambodia, Singapore, Philippines, New Guinea (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Araneus mitificus*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Cyclosa atrata* Bösenberg & Strand, 1906**

Distribution. China, Korea, Japan, Russia (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Pupa or adult (Kayashima 1967).

***Cyclosa* sp.**

Recorded interactions with *H. cunea*. China [Liaocheng, Shandong Province (Yue et al. 2016)].

Prey stage. Larva (Yue et al. 2016).

***Epeira* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Eustala anastera* (Walckenaer, 1841)**

Distribution. North and Central America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Eustala* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Gibbaranea bituberculata* (Walckenaer, 1802)**

Distribution. North Africa, Europe, Turkey, Israel, Russia (Europe to Far East), Caucasus, Iran, Central Asia to China, Japan, India (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Italy [Po Valley (Groppali et al. 1993 as *Araneus bituberculatus*), Pavia (Camerini and Groppali 1999)].

Prey stage. Larva (Groppali et al. 1993; Camerini and Groppali 1999).

***Larinioides cornutus* (Clerck, 1757)**

Distribution. North America, Europe, Turkey, Israel, Caucasus, Russia (Europe to Far East), Iran, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984 as *Nuctenea cornuta*), Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Sharov et al. 1984; Groppali et al. 1993).

***Larinioides patagiatus* (Clerck, 1757)**

Distribution. North America, Europe, Turkey, Caucasus, Russia (Europe to Far East), Central Asia, China, Mongolia, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984 as *Nuctenea patagiata*).

Prey stage. Larva (Sharov et al. 1984).

***Micrathena gracilis* (Walckenaer, 1805)**

Distribution. North and Central America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Neoscona arabesca* (Walckenaer, 1841)**

Distribution. North, Central America, Caribbean. Introduced to Nepal, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Neoscona crucifera benjamina* (Lucas, 1838)**

Distribution. North America. Introduced to Hawaii, Canary Is., Madeira (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *N. sacra*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Neoscona pratensis* (Hentz, 1847)**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Neoscona scylloides* (Bösenberg & Strand, 1906)**

Distribution. Russia (Far East), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Pupa or adult (Kayashima 1967).

***Ocrepeira ectypa* (Walckenaer, 1841)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Wixia ectypa*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Singa hamata* (Clerck, 1757)**

Distribution. Europe, Turkey, Russia (Europe to Far East), Caucasus to Central Asia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Central Padana Plain (Groppali et al. 1994)].

Prey stage. Larva (Groppali et al. 1994).

***Singa* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Yaginumia sia* (Strand, 1906)**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Y. zea*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Cheiracanthiidae 红螯蛛科

***Cheiracanthium erraticum* (Walckenaer, 1802)**

Distribution. Azores, Europe, Turkey, Caucasus, Russia (Europe to Far East), Iran, Central Asia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Cheiracanthium eutittha* Bösenberg & Strand, 1906**

Distribution. China (Taiwan), Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983 as *Chiracanthium eutittha*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Cheiracanthium inclusum* (Hentz, 1847)**

Distribution. North America, Central America, Caribbean, South America. Introduced to Réunion (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Chiracanthium inclusum*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Cheiracanthium lascivum* Karsch, 1879**

Distribution. Russia (Sakhalin), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Chiracanthium lascivum*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Cheiracanthium mildei* L. Koch, 1864**

Distribution. Azores, Europe, North Africa, Turkey, Middle East, Caucasus, Russia (Europe) to Central Asia. Introduced to North America, Argentina (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Groppali et al. 1993).

***Cheiracanthium japonicum* Bösenberg & Strand, 1906**

Distribution. Russia (Far East), Mongolia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983 as *Chiracanthium japonicum*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Chieracanthium* sp.**

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Groppali et al. 1993).

***Cheiracanthium unicum* Bösenberg & Strand, 1906**

Distribution. Korea, Japan, China, Laos (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Chiracanthium unicum*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Clubionidae 管巢蛛科

***Bucliona jucunda* (Karsch, 1879)**

Distribution. Russia (Far East), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983 as *Clubiona jucunda*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Clubiona abboti* L. Koch, 1866**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Clubiona corrugata* Bösenberg & Strand, 1906**

Distribution. Russia (Far East), China, Korea, Japan, Thailand (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Clubiona diversa* O. Pickard-Cambridge, 1862**

Distribution. Europe, Caucasus, Russia (Europe to Far East), Kazakhstan, Pakistan, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Clubiona pallens*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Clubiona lutescens* Westring, 1851**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Iran, Kazakhstan, Korea, Japan. Introduced to North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Clubiona marmorata* L. Koch, 1866**

Distribution. France to Ukraine and Turkey (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Clubiona moesta* Banks, 1896**

Distribution. USA, Canada, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Clubiona obesa* Hentz, 1847**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Clubiona pallidula* (Clerck, 1757)**

Distribution. Europe, Caucasus, Russia (Europe to Far East), Central Asia. Introduced to North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Clubiona* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Clubiona vigil* Karsch, 1879**

Distribution. Russia (Kurile Is.), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Elaver excepta* (L. Koch, 1866)**

Distribution. Canada, USA, Caribbean (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Clubionides excepta*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Dictynidae 叶蛛科

***Dictyna arundinacea* (Linnaeus, 1758)**

Distribution. North America, Europe, Turkey, Caucasus, Russia (Europe to Far East), Iran, Central Asia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Moldova (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Dictyna foliicola* Bösenberg & Strand, 1906**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Larva (Kayashima 1967).

***Dictyna pusilla* Thorell, 1856**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Central Asia (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993), Central Padana Plain (Groppali et al. 1994)].

Prey stage. Larva (Groppali et al. 1994).

Dictyna sp.

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Phantyna segregata (Gertsch & Mulaik, 1936)

Distribution. USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Dictyna* aff *segregata*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Gnaphosidae 平腹蛛科

Cesonia bilineata (Hentz, 1847)

Distribution. Canada, USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Drassyllus sp.

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Zelotes sp.

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Linyphiidae 皿蛛科

Frontinellina frutetorum (C. L. Koch, 1835)

Distribution. Europe, North Africa, Turkey, Caucasus, Russia (Europe to south Siberia), Iran, Kazakhstan, Central Asia (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Groppali et al. 1993).

***Grammonota maculata* Banks, 1896**

Distribution. USA, Costa Rica (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Linyphia* sp.**

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Oedothorax retusus* (Westring, 1851)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to north-eastern Siberia), Kazakhstan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Larva (Shu and Yu 1985).

***Strandella quadrimaculata* (Uyemura, 1937)**

Distribution. Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Lycosidae 狼蛛科

***Arctosa cinerea* (Fabricius, 1777)**

Distribution. Europe, North Africa, Congo, Caucasus, Russia (Europe to Far East), Middle East, Kazakhstan, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Pardosa astrigera* L. Koch, 1878**

Distribution. Russia (Far East), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967 as *Lycosa t-insignita*).

Prey stage. Larva and adult (Kayashima 1967).

Mimetidae 拟态蛛科

***Mimetus puritanus* Chamberlin, 1923**

Distribution. USA, Jamaica (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Mimetus syllepsicus* Hentz, 1832**

Distribution. USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *M. interfactor*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Nephilidae 芥蛛科

***Trichonephila clavata* (L. Koch, 1878)**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967 as *Nephila clavata*), Japan [Akikawa (Kunimi 1983 as *Nephila clavata*)].

Prey stage. Larva (Kunimi 1983) pupa or adult (Kayashima 1967).

Notes. Collected from fall webworm nest (Kunimi 1983).

Oecobiidae 壁钱科

***Oecobius cellariorum* (Dugès, 1836)**

Distribution. Mediterranean, Russia (Europe), Azerbaijan, Jordan, Iran; introduced to USA, China, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Oecobius texanus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Uroctea lesserti* Schenkel, 1936**

Distribution. China, Korea (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Larva (Shu and Yu 1985).

Philodromidae 逍遥蛛科

***Philodromus abbotii* Walckenaer, 1837, nomen dubium**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus aureolus* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Central Asia and Middle Siberia), Kazakhstan, Iran, Central Asia, Mongolia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984), Italy [Po Valley (Groppali et al. 1993), Central Padana Plain (Groppali et al. 1994)].

Prey stage. Larva (Sharov et al. 1984; Groppali et al. 1994).

***Philodromus cespitum* (Walckenaer, 1802)**

Distribution. North America, Europe, North Africa, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Mongolia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993 as *P. caespitum*)].

Prey stage. Larva (Groppali et al. 1993).

***Philodromus keyserlingi* Marx, 1890**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus marxii* Keyserling, 1884**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus pernix* Blackwall, 1846**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus rufus* Walckenaer, 1826**

Distribution. North America, Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Central Asia, Mongolia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Philodromus* sp.**

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Groppali et al. 1993).

***Philodromus spinitarsis* Simon, 1895**

Distribution. Russia (south Siberia, Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Larva (Shu and Yu 1985).

***Philodromus vulgaris* (Hentz, 1847)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Thanatus formicinus* (Clerck, 1757)**

Distribution. North America, Europe, North Africa, Turkey, Caucasus, Russia (Europe to Far East), Iraq, Iran, Kazakhstan, Central Asia, China, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Tadić 1963 as *Philodromus formicinus*)].

Prey stage. Larva (Tadić 1963).

Pisauridae 盜蛛科

***Pisaura mirabilis* (Clerck, 1757)**

Distribution. Europe, Turkey, Middle East, Caucasus, Russia (Europe to Middle Siberia), Central Asia, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Pisaura lama* Bösenberg & Strand, 1906**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Pupa or adult (Kayashima 1967).

***Pisaurina mira* (Walckenaer, 1837)**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Dapanus mirus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Salticidae 跳蛛科

***Aelurillus v-insignitus* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Central Asia, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Central Padana Plain (Groppali et al. 1994)].

Prey stage. Larva (Groppali et al. 1994).

***Carrhotus xanthogramma* (Latreille, 1819)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Colonus sylvanus* (Hentz, 1846)**

Distribution. USA to Panama (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Thiodina sylvana*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Eris militaris* (Hentz, 1845)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *E. marginatus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Eris rufa* (C. L. Koch, 1846)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *E. pineus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Eris* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Evarcha arcuata* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Central Asia, China, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Evarcha falcata* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to south Siberia), Kazakhstan, Afghanistan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Heliophanus auratus* C. L. Koch, 1835**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to south Siberia), Kazakhstan, Central Asia, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Hentzia mitrata* (Hentz, 1846)**

Distribution. USA, Canada, Bahama Is. (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Hentzia palmarum* (Hentz, 1832)**

Distribution. North America, Bermuda, Bahama Is., Cuba (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Hentzia* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Icius* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Jotus* sp.**

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].
Prey stage. Larva (Kunimi 1983).
Notes. Collected from fall webworm nest (Kunimi 1983).

***Macaroeris nidicolens* (Walckenaer, 1802)**

Distribution. Macaronesia, Europe, North Africa to Turkey, Caucasus, Turkmenistan, Iran; introduced to Sri Lanka (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993 as *Eris nidicolens*), Central Padana Plain (Groppali et al. 1994 as *Eris nidicolens*)].
Prey stage. Larva (Groppali et al. 1994).

***Maevia inclemens* (Walckenaer, 1837)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *M. vittata*)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Metacyrba taeniola* (Hentz, 1846)**

Distribution. USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Metaphidippus* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Myrmarachne japonica* (Karsch, 1879)**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).
Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].
Prey stage. Larva (Kunimi 1983).
Notes. Collected from fall webworm nest (Kunimi 1983).

***Orienticius vulpes* (Grube, 1861)**

Distribution. Russia (south Siberia to Far East), China, Korea, Japan (World Spider Catalog 2023).
Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Dendryphantès atratus*)].
Prey stage. Larva (Kunimi 1983).
Notes. Collected from fall webworm nest (Kunimi 1983).

***Paraphidippus aurantius* (Lucas, 1833)**

Distribution. USA to Panama, Greater Antilles (World Spider Catalog 2023).
Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Eris aurantia*)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Peckhamia picata* (Hentz, 1846)**

Distribution. North America (World Spider Catalog 2023).
Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Pelegrina galathea* (Walckenaer, 1837)**

Distribution. Canada to Costa Rica, Bermuda (World Spider Catalog 2023).
Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Metaphidippus galathea*)].
Prey stage. Larva (Warren et al. 1967).
Notes. Collected from fall webworm nest (Warren et al. 1967).

***Pelegrina insignis* (Banks, 1892)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Metaphidippus insignis*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Pelegrina proterva* (Walckenaer, 1837)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Metaphidippus protervus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phintella castriesiana* (Grube, 1861)**

Distribution. Canary Is., Southern Europe, North Africa, Middle East, Turkey, Caucasus, Iran, Russia (Far East), Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984 as *Icius castriesianus*).

Prey stage. Larva (Sharov et al. 1984).

***Platycryptus undatus* (De Geer, 1778)**

Distribution. North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Metacyrba undata*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Plexippoides doenitzi* (Karsch, 1879)**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967 as *Hasarius doenitzi*).

Prey stage. Larva (Kayashima 1967).

***Plexippus paykulli* (Audouin, 1826)**

Distribution. Africa. Introduced to both Americas, Europe, Middle East, Nepal, southern Asia, Australia, Pacific Is. (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan (Kayashima 1967).

Prey stage. Larva (Kayashima 1967).

***Plexippus* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus audax* (Hentz, 1845)**

Distribution. North America; introduced to Hawaii, Azores, India (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus carolinensis* G. W. Peckham & E. G. Peckham, 1909**

Distribution. USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus clarus* Keyserling, 1885**

Distribution. North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus insignarius* C. L. Koch, 1846**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus mystaceus* (Hentz, 1846)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *P. incertus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus princeps* (G. W. Peckham & E. G. Peckham, 1883)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus putnami* (G. W. Peckham & E. G. Peckham, 1883)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Phidippus whitmani* G. W. Peckham & E. G. Peckham, 1909**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Rhene atrata* (Karsch, 1881)**

Distribution. Russia (south Siberia, Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983 as *Dendryphantes atratus*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Salticus zebraneus* (C. L. Koch, 1837)**

Distribution. Europe, Turkey, Russia (Europe, Caucasus), Iran (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984), Italy [Central Padana Plain (Groppali et al. 1994)].

Prey stage. Larva (Sharov et al. 1984; Groppali et al. 1994).

***Sassacus cyaneus* (Hentz, 1846)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Agassa cyanea*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Sibianor pullus* (Bösenberg & Strand, 1906)**

Distribution. Russia (Far East), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Bi-anor pullus*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Thiodina* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Zygoballus sexpunctatus* (Hentz, 1845)**

Distribution. USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Tetragnathidae 长脚蛛科

***Tetragnatha laboriosa* Hentz, 1850**

Distribution. Alaska to Chile, Argentina, Falkland Is. (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Tetragnatha* sp.**

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Tetragnatha squamata* Karsch, 1879**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Theridiidae 球腹蛛科

***Enoplognatha ovata* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Middle Siberia), Kazakhstan, Iran, Central Asia, Korea, Japan. Introduced to North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Euryopsis funebris* (Hentz, 1850)**

Distribution. Canada, USA. Introduced to South Africa (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Euryopsis funebris*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Euryopsis* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Heterotheridion nigrovariegatum* (Simon, 1873)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe) to Central Asia, Iran, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984 as *Theridion nigrovariegatum*).

Prey stage. Larva (Sharov et al. 1984).

***Neospintharus trigonum* (Hentz, 1850)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Argyrodes trigonum*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Parasteatoda tepidariorum* (C. L. Koch, 1841)**

Distribution. Asia; introduced to Canada, USA, South America, Europe, Turkey, Caucasus, Russia (Europe to Far East), South Africa, Seychelles, New Zealand, Hawaii (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Achaearanea tepidariorum*)], Japan (Kayashima 1967 as *Theridion tepidariorum*), Japan [Fuchu, Akikawa (Kunimi 1983 as *Achaearanea tepidariorum*)], China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Theridion tepidariorum*)].

Prey stage. Larva (Warren et al. 1967; Kunimi 1983; Shu and Yu 1985), adult (Kayashima 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967; Kunimi 1983).

***Phylloneta sisypchia* (Clerck, 1757)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to south Siberia), Kazakhstan, Central Asia, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993 as *Theridion sisypchium*)].

Prey stage. Larva (Groppali et al. 1993).

***Takayus takayensis* (Saito, 1939)**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983 as *Theridion takayense*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Teutana* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Theridion differens* Emerton, 1882**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Theridion varians* Hahn, 1833**

Distribution. Europe, North Africa, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Central Asia, China. Introduced to Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR [Moldova, Russia (Sharov et al. 1984)].

Prey stage. Larva (Sharov et al. 1984).

***Theridion* sp.**

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Yunohamella yunohamensis* (Bösenberg & Strand, 1906)**

Distribution. Russia (Sakhalin, Kurile Is.), Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983 as *Theridion yunohamense*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Thomisidae 蟹蛛科

***Bassaniana decorata* (Karsch, 1879)**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983 as *Oxyptila decorata*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Diaea subdola* O. Pickard-Cambridge, 1885**

Distribution. Pakistan, India, China, Russia (Far East), Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983 as *Misumenops japonicus*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Ebrechtella tricuspidata* (Fabricius, 1775)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Kazakhstan, Iran, Central Asia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984, name as *Misumenops tricuspidatus*), Japan [Fuchu, Akikawa (Kunimi 1983 as *Misumenops tricuspidatus*)], China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Misumena tricuspidatus*)].

Prey stage. Larva (Kunimi 1983; Sharov et al. 1984; Shu and Yu 1985).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Mecaphesa asperata* (Hentz, 1847)**

Distribution. North, Central America, Caribbean (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Misumenops asperatus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Mecaphesa celer* (Hentz, 1847)**

Distribution. North, Central America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Misumenops celer*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Misumessus oblongus* (Keyserling, 1880)**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *Misumenops oblongus*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Misumenops* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Oxytate striatipes* L. Koch, 1878**

Distribution. Russia (Far East), China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983; Shu and Yu 1985).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Pistius truncatus* (Pallas, 1772)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Iran, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Spiracme striatipes* (L. Koch, 1870)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe) to Central Asia, Iran, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Xysticus striatipes*)].

Prey stage. Larva (Shu and Yu 1985).

***Synema globosum* (Fabricius, 1775)**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Far East), Israel, Iran, Central Asia, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Synema parvulum* (Hentz, 1847)**

Distribution. USA, Mexico (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Tmarus* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Thomisus labefactus* Karsch, 1881**

Distribution. Korea, Japan, China, Thailand (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Thomisus onustus* Walckenaer, 1805**

Distribution. Selvagens Is. (Portugal), Europe, North Africa, Turkey, Caucasus, Russia (Europe to south Siberia), Israel, Central Asia, Iran, China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Xysticus ferox* (Hentz, 1847)**

Distribution. USA, Canada (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Xysticus funestus* Keyserling, 1880**

Distribution. North America (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Xysticus lanio* C. L. Koch, 1835**

Distribution. Europe, Turkey, Caucasus, Russia (Europe to Middle and south Siberia), Turkmenistan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. South of the European part of former USSR (Sharov et al. 1984).

Prey stage. Larva (Sharov et al. 1984).

***Xysticus* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Xysticus* sp.**

Recorded interactions with *H. cunea*. Italy [Po Valley (Groppali et al. 1993)].

Prey stage. Larva (Groppali et al. 1993).

Titanoecidae 隐石蛛科

***Nurscia albofasciata* (Strand, 1907)**

Distribution. Russia (Far East), Korea, Japan, China; introduced to Britain (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Trachelidae 管蛛科

***Trachelas japonicus* Bösenberg & Strand, 1906**

Distribution. Russia (Kurile Is.), Korea, Japan, China (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu, Akikawa (Kunimi 1983)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

***Trachelas similis* F. O. Pickard-Cambridge, 1899**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967 as *T. aff laticeps*)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Trachelas* sp.**

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

***Trachelas tranquillus* (Hentz, 1847)**

Distribution. Canada, USA (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. USA [Arkansas (Warren et al. 1967)].

Prey stage. Larva (Warren et al. 1967).

Notes. Collected from fall webworm nest (Warren et al. 1967).

Uloboridae 妩蛛科

***Octonoba varians* (Bösenberg & Strand, 1906)**

Distribution. China, Korea, Japan (World Spider Catalog 2023).

Recorded interactions with *H. cunea*. Japan [Fuchu (Kunimi 1983 as *Uloborus varians*)].

Prey stage. Larva (Kunimi 1983).

Notes. Collected from fall webworm nest (Kunimi 1983).

Trombidiformes

Trombidiidae 絨蟎科

***Allothrombidium fuliginosum* (Hermann, 1804)**

Distribution. Asia, Europe (CABI Compendium 2022).

Recorded interactions with *H. cunea*. Italy (Borani 1991).

Prey stage. Egg (Borani 1991).

Reptilia

Squamata

Gekkonidae 壁虎科

***Gecko japonicus* (Schlegel, 1836)**

Distribution. China, South Korea, Japan (Uetz et al. 2023).

Recorded interactions with *H. cunea*. Japan (Hasegawa and Itô 1967).

Prey stage. Adult (Hasegawa and Itô 1967).

Notes. Occasionally preys on *H. cunea* (Hasegawa and Itô 1967).

Amphibia

Anura

Bufonidae 蟾蜍科

***Anaxyrus americanus* (Holbrook, 1836)**

Distribution. Canada, USA (Frost 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Bufo americanus*).

Prey stage. Larva (Warren and Tadić 1967).

***Bufo bufo* (Linnaeus, 1758)**

Distribution. Albania, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Jersey, Kazakhstan, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Moldova, Montenegro, Netherlands, North Macedonia, Norway, Poland, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine, United Kingdom (Frost 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Bufo gargarizans* Cantor, 1842**

Distribution. China, India, North Korea, South Korea, Russia, Vietnam (Frost 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985)].

Prey stage. Larva (Shu and Yu 1985).

Ranidae 蛙科

***Pelophylax nigromaculatus* (Hallowell, 1861)**

Distribution. China, Japan, Korea, North Korea, South Korea, Mongolia, Russia (Frost 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Rana nigromaculatus*)].

Prey stage. Larva (Shu and Yu 1985).

Aves

Bucerotiformes

Upupidae 戴胜科

***Upupa epops* Linnaeus, 1758**

Distribution. Breeds in northwestern Africa (east to northwestern Libya), Canary Islands, and central and southern Europe south to Israel, and east to south-eastern Siberia and northern Korea, south to northwestern India and China; mostly migratory, winters to Africa and South Asia (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

Ciconiiformes

Ciconiidae 鸬科

***Ciconia ciconia* (Linnaeus, 1758)**

Distribution. West Palearctic and West Asia: overwinters in tropical and South Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Columbiformes

Columbidae 鸠鸽科

***Streptopelia decaocto* (Frivaldszky, 1838)**

Distribution. Europe to Middle East, India, Sri Lanka, China, and Korea; introduced to North America and Mexico (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

***Streptopelia turtur* (Linnaeus, 1758)**

Distribution. Azores, Canary Is., and Europe to West Siberia and Kazakhstan (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

Notes. Actively prey on the *H. cunea* in September (Camerini 1994).

Cuculiformes

Cuculidae 杜鹃科

***Coccyzus americanus* (Linnaeus, 1758)**

Distribution. Canada to Mexico and West Indies; overwinters in Argentina (Avibase 2023).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Cuculus canorus* Linnaeus, 1758**

Distribution. Europe, Siberia to Kamchatka and Japan; overwinters in Africa (Avibase 2023).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Falconiformes

Falconidae 隼科

***Falco tinnunculus* Linnaeus, 1758**

Distribution. Europe, northwest Africa, and the Middle East to east central Siberia, Afghanistan, and western and northern Pakistan east in the Himalayas to Nepal and Bhutan; overwinters in eastern Africa and southern and southern Asia (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

Galliformes

Phasianidae 雉科

***Gallus gallus* (Linnaeus, 1758)**

Distribution. Palaearctic, Oriental (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Passeriformes

Corvidae 鸦科

***Corvus corone* Linnaeus, 1758**

Distribution. West Europe (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Cyanopica cyanus* (Pallas, 1776)**

Distribution. East central Asia (Avibase 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province] (Shu and Yu 1985).

Prey stage. Larva (Shu and Yu 1985).

Notes. Prey heavily on *H. cunea* from early May to early June (Shu and Yu 1985).

***Pica pica* (Linnaeus, 1758)**

Distribution. Europe, from the British Isles, France, and southern Scandinavia to eastern Europe and Asia Minor (Avibase 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province] (Shu and Yu 1985), Europe (Warren and Tadić 1967).

Prey stage. Larva (Shu and Yu 1985; Warren and Tadić 1967), adult (Camerini 1994).

Notes. Preys heavily on *H. cunea* from early May to early June (Shu and Yu 1985).

Laniidae 伯劳科

***Lanius collurio* Linnaeus, 1758**

Distribution. Widespread in the Palearctic region, South Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Lanius minor* Gmelin, 1788**

Distribution. Iberian Peninsula to Siberia and central Asia, south Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Muscicapidae 鸫科

***Luscinia luscinia* (Linnaeus, 1758)**

Distribution. North Eurasia, overwinters in east and south Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Luscinia megarhynchos* Brehm, 1831**

Distribution. West Europe, North Africa, and Asia Minor; tropical Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Adult (Camerini 1994).

***Muscicapa striata* (Pallas, 1764)**

Distribution. Europe to North Africa, Siberia, and Asia Minor (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Oenanthe oenanthe* (Linnaeus, 1758)**

Distribution. British Isles to Mediterranean, and east to Siberia, Alaska, and northwest Canada (Yukon); winter to central Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

Notes. Preys on *H. cunea* during migration (Camerini 1994).

Oriolidae 黄鹂科

***Oriolus oriolus* (Linnaeus, 1758)**

Distribution. West Palearctic to east Siberia; winter to Africa and northwest India (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Paridae 山雀科

***Cyanistes caeruleus* (Linnaeus, 1758)**

Distribution. Continental Europe to north Spain, Sicily, north Turkey, and north Urals (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Parus major* Linnaeus, 1758**

Distribution. Palaearctic, Mediterranean, Ethiopian, Nearctic, Neotropical, Oriental (Avibase 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province] (Shu and Yu 1985), Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967), Adult (Shu and Yu 1985; Camerini 1994).

Notes. Actively preys on *H. cunea* larvae (Camerini 1994); preys heavily from early May to early June in Liaoning Province, China (Shu and Yu 1985); may be used as a biocontrol agent by augmenting its population using artificial broods (Camerini 1994).

Passeridae 雀科

Passer domesticus (Linnaeus, 1758)

Distribution. Palaearctic, Mediterranean, Ethiopian, Nearctic, Neotropical, Oriental, Australian (Avibase 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province] (Shu and Yu 1985), Europe (Warren and Tadić 1967).

Prey stage. Adult (Warren and Tadić 1967), larva (Shu and Yu 1985).

Notes. Preys heavily from early May to early June (Shu and Yu 1985).

Passer montanus (Linnaeus, 1758)

Distribution. Palaearctic, Mediterranean, Ethiopian, Nearctic, Neotropical, Oriental, Australian (Avibase 2023).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province] (Shu and Yu 1985), Japan [Hiratsuka Shrine] (Hasegawa and Itô 1967). Europe (Warren and Tadić 1967).

Prey stage. Adult (Warren and Tadić 1967; Hasegawa and Itô 1967; Camerini 1994), larva (Shu and Yu 1985).

Notes. Preys heavily from early May to early June (Shu and Yu 1985), played an important role in suppressing the reproduction of *H. cunea* (Hasegawa and Itô 1967).

Sturnidae 椋鸟科

Sturnus vulgaris Linnaeus, 1758

Distribution. Canary Is. and Iceland to Ural Mts., north Ukraine, and southeast Europe (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Warren and Tadić 1967), pupa and adult (Camerini 1994).

Spodiopsar cineraceus (Temminck, 1835)

Distribution. Northeast Asia; winters in south China and Philippines (Avibase 2023).

Recorded interactions with *H. cunea*. Japan [Hiratsuka Shrine] (Hasegawa and Itô 1967).

Prey stage. Adult (Hasegawa and Itô 1967; Camerini 1994).

Notes. Played an important role in suppressing the reproduction of *H. cunea* (Hasegawa and Itô 1967).

Sylviidae 莺科

Curruca curruca (Linnaeus, 1758)

Distribution. East Siberia to north Altai and north Mongolia (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Turdidae 鸫科

***Saxicola rubetra* (Linnaeus, 1758)**

Distribution. West Palearctic; tropical and south Africa (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Camerini 1994).

Notes. Preys on *H. cunea* during migrations (Camerini 1994).

***Turdus merula* Linnaeus, 1758**

Distribution. West Europe; introduced Southeast Australia, Tasmania, Norfolk, Lord Howe Is. (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Turdus philomelos* Brehm, 1831**

Distribution. North and east Europe to central Asia; winters to North Africa and Iran (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Vireonidae 绿鹟科

***Vireo olivaceus* (Linnaeus, 1766)**

Distribution. West-central and Eastern US; overwinters in Cuba and central South America (Avibase 2023).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Piciformes

Picidae 啄木鸟科

***Dendrocopos major* (Linnaeus, 1758)**

Distribution. Palaearctic, Mediterranean, Oriental (Avibase 2023).

Recorded interactions with *H. cunea*. Italy (Camerini 1994).

Prey stage. Larva (Warren and Tadić 1967), pupa (Camerini 1994).

***Dendrocopos medius* (Linnaeus, 1758)**

Distribution. Northwest Spain to France, Estonia, West Russia, Ukraine, Italy, Balkans (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

***Dendrocopos syriacus* (Hemprich & Ehrenberg, 1833)**

Distribution. Southeast Europe, Transcaucasia, Turkey, and Iran to Israel and Jordan (Avibase 2023).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Strigiformes

Strigidae 鸱鸃科

***Asio otus* (Linnaeus, 1758)**

Distribution. Europe, Asia, North Africa, North America (Avibase 2023).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Prey stage. Larva (Warren and Tadić 1967).

Part II Parasitoids

Hymenoptera

Ichneumonidae 姬蜂科

***Apechthis compunctor* (Linnaeus, 1758)**

Distribution. Asia, Europe, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Prepupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, solitary, koinobiont (Yu et al. 2016).

***Casinarina genuina* (Norton, 1863)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [New England or New York or New Jersey (Schaffner and Griswold 1934 as *Neonortonia major*); Colorado (Swain 1937 as *Neonortonia major*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Endoparasitoid (Yu et al. 2016).

***Casinarina limenitidis* (Howard, 1889)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [New England or New York or New Jersey (Schaffner and Griswold 1934 as *C. orgyiae*); Colorado (Swain 1937 as *C. orgyiae*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Endoparasitoid (Yu et al. 2016).

***Casinarina ischnogaster* Thomson, 1887**

Distribution. Europe, Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva (Yu et al. 2016).

Parasitoid type. Endoparasitoid, solitary (Yu et al. 2016).

***Casinarina nigripes* (Gravenhorst, 1829)**

Distribution. Europe, Palaearctic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Apanteles ardimarium*)].

Host stage. Larva (Shu and Yu 1985).

Parasitoid type. Endoparasitoid, solitary (Shu and Yu 1985).

***Cratichneumon culex* (Müller, 1776)**

Distribution. Europe, Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva, pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, solitary, polyphagous (Yu et al. 2016).

***Cratichneumon luteiventris* (Gravenhorst, 1820)**

Distribution. Europe, Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva, emerge from pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Diradops hyphantriae* Kasparyan & Pinson, 2007**

Distribution. Mexico (Yu et al. 2016).

Recorded interactions with *H. cunea*. Mexico (Kasparyan and Pinson 2007).

Host stage. Larva (Kasparyan and Pinson 2007).

Parasitoid type. Koinobiont endoparasitoid (Kasparyan and Pinson 2007).

***Enicospilus lineolatus* (Roman, 1913)**

Distribution. Brunei, China, India, Indonesia, Japan, Korea, Malaysia, Nepal, New Caledonia, Papua New Guinea, Philippines, Sri Lanka (Yu et al. 2016).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. Larva-prepupa (Yang et al. 2008).

Parasitoid type. Solitary (Yang et al. 2008).

Notes. Parasitoid female to male ratio 1.8 (Yang et al. 2008); parasitism rate 1.5% (Yang et al. 2008).

***Enicospilus ramidulus* (Linnaeus, 1758)**

Distribution. Europe, Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. Turkey [Samsun Province (Sullivan et al. 2010)].

Host stage. Pupa (Sullivan et al. 2010).

Parasitoid type. Endoparasitoid, solitary (Sullivan et al. 2010), polyphagous (Yu et al. 2016).

***Enicospilus glabratus* (Say, 1835)**

Distribution. North America, South America (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Eremotylus glabratus*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Gelis* sp.**

Recorded interactions with *H. cunea*. Turkey [Samsun Province (Sullivan et al. 2010)].

Host stage. Pupa (Sullivan et al. 2010).

Parasitoid type. Endoparasitoid, solitary (Sullivan et al. 2010), polyphagous (Yu et al. 2016).

***Gotra octocincta* (Ashmead, 1906)**

Distribution. China, Japan, Korea (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Binzhou City, Shandong Province (Li 2011)].

Host stage. Larva-pupa (Li 2011).

Parasitoid type. Polyphagous (Yu et al. 2016).

Notes. Parasitism rate 0.2% (Li 2011).

***Gregopimpla inquisitor* (Scopoli, 1763)**

Distribution. Palaearctic, Europe, Canada (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR, South Korea (Yu et al. 2016).

Host stage. Larva, emerge from pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Gregopimpla kuwanae* (Viereck, 1912)**

Distribution. Palaearctic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Tai'an City, Shandong Province (Li 2011)].

Host stage. Larva-pupa (Li 2011).

Parasitoid type. Polyphagous (Yu et al. 2016).

Notes. Parasitism rate 1.3% (Li 2011).

***Gregopimpla malacosomae* (Seyrig, 1927)**

Distribution. Palaearctic, Europe (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Sullivan et al. 2010).

Host stage. Larva (Sullivan et al. 2010).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Heterischnus truncator* (Fabricius, 1798)**

Distribution. Palaearctic, Europe (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva, emerged from pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Hyposoter fugitivus* (Say, 1835)**

Distribution. Brazil, Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], Canada (Morris 1976b).

Host stage. Early instar larvae (Morris 1976b).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b), polyphagous (Yu et al. 2016).

Notes. Parasitoid female to male ratio 0.67 (Morris 1976b).

***Hyposoter rivalis* (Cresson, 1872)**

Distribution. China, Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *H. pilosulus*)], Canada (Morris 1976b as *H. pilosulus*).

Host stage. Early instar larvae (Morris 1976b).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b), polyphagous (Yu et al. 2016).

Notes. Parasitoid female to male ratio 1.27 (Morris 1976b).

***Ichneumon deliratorius* Linnaeus, 1758**

Distribution. Europe, Palaearctic, Nearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. North America (Townes 1944 as *Pterocormus cinctitarsis*).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Iseropus stercorator* (Fabricius, 1793)**

Distribution. Europe, Palaearctic, Nearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva, emerged from pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Itoplectis alternans* (Gravenhorst, 1829)**

Distribution. Europe, Palaearctic, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva (Yu et al. 2016).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Itopectis conquisitor* (Say, 1835)**

Distribution. Nearctic, Neotropical, Oceanic (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], North America (Townes 1944).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Itopectis maculator* (Fabricius, 1775)**

Distribution. Europe, Palaearctic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Sullivan et al. 2010).

Host stage. Larva, emerged from pupa (Sullivan et al. 2010).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Itopectis viduata* (Gravenhorst, 1829)**

Distribution. Europe, Palaearctic, Nearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Sullivan et al. 2010).

Host stage. Larva, emerged from pupa (Sullivan et al. 2010).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Netelia* (*Netelia*) *testacea* (Gravenhorst, 1829)**

Distribution. Afrotropical, Australasian, Europe, Neotropical, Palaearctic, Oceanic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Phobocampe pallipes* (Provancher, 1875)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Hypo-soter pallipes*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Phygadeuon variabilis* Gravenhorst, 1829**

Distribution. Europe, Palaearctic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. Former USSR (Yu et al. 2016).

Host stage. Larva, emerged from pupa (Yu et al. 2016).

Parasitoid type. Endoparasitoid, polyphagous (Yu et al. 2016).

***Pimpla aethiops* Curtis, 1828**

Distribution. Europe, East Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. China (Yang et al. 2008 as *Coccygomimus parnarae*).

Host stage. Pupa (Yang et al. 2008).

Parasitoid type. Solitary (Yang et al. 2008).

Notes. Parasitoid female to male ratio 2 (Yang et al. 2008); parasitism rate 0.34% (Yang et al. 2008).

***Pimpla aterrima* Gravenhorst, 1829**

Distribution. Europe, Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Asia (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Pimpla disparis* Viereck, 1911**

Distribution. East Asia, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. Japan [Tokyo (Tamura 1969 as *Coccygomimus disparis*)], China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Coccygomimus disparis*)], Wugong Conty, Shaanxi Province (Ran and Zhao 1989 as *Coccygomimus disparis*)], China (Yang et al. 2008 as *Coccygomimus disparis*).

Host stage. Pupa (Ran and Zhao 1989; Yang et al. 2008).

Parasitoid type. Solitary (Yang et al. 2008), koinobiont (Ran and Zhao 1989).

Notes. Parasitoid female to male ratio 2.78 (Yang et al. 2008); parasitism rate 10% (Yang et al. 2008).

***Pimpla luctuosa* Smith, 1874**

Distribution. East Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Wugong Conty, Shaanxi Province (Ran and Zhao 1989 as *Coccygomimus luctuosus*)], Dandong City, Liaoning Province (Shu and Yu 1985 as *Coccygomimus luctuosus*)].

Host stage. Pupa (Ran and Zhao 1989), mature larva and pupa (Shu and Yu 1985).

Parasitoid type. Solitary, koinobiont (Ran and Zhao 1989).

Notes. Parasitism rate 4–6% (Shu and Yu 1985).

***Pimpla pedalis* Cresson, 1865**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Pimpla rufipes* (Miller, 1759)**

Distribution. Europe, Asia, Oceanic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *P. instigator*), Turkey [Samsun Province (Sullivan et al. 2010)], Iran [Guilan province (Karami et al. 2023)].

Host stage. Pupa (Sullivan et al. 2010).

Parasitoid type. Endoparasitoid, solitary (Sullivan et al. 2010), polyphagous (Yu et al. 2016).

***Pimpla spuria* Gravenhorst, 1829**

Distribution. Europe, Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Pimpla turionellae* (Linnaeus, 1758)**

Distribution. Europe, Nearctic, Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. China (Yang et al. 2008 as *Coccygomimus turionellae*).

Host stage. Pupa (Yang et al. 2008).

Parasitoid type. Solitary parasitism (Yang et al. 2008).

Notes. Parasitoid female to male ratio 1.6 (Yang et al. 2008); parasitism rate 0.12% (Yang et al. 2008).

***Rhimphoctona (Xylophylax) megacephalus* (Gravenhorst, 1829)**

Distribution. Europe, Palaearctic, Oriental (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Pyracmon austriacus*).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Sinophorus validus* (Cresson, 1864)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Eulimneria valida*)], Canada (Morris 1976b).

Host stage. First instar larvae (Morris 1976b).

Parasitoid type. Solitary parasitism, endoparasitoid, koinobiont (Morris 1976b), polyphagous (Yu et al. 2016).

Notes. Adults of *S. validus* emerge a week or two later than those of *H. cunea* and attack first-instar larvae (Morris 1976b). Parasitoid female to male ratio 0.92 (Morris 1976b).

***Therion morio* (Fabricius, 1781)**

Distribution. Canada, Mexico, Panama, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], North America (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Therion sassacus* Viereck, 1917**

Distribution. Canada, Mexico, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], Canada (Morris 1976b).

Host stage. Larva of late instar (Morris 1976b).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b), polyphagous (Yu et al. 2016).

Notes. Parasitoid female to male ratio 0.89 (Morris 1976b).

***Theronia atalantae* (Poda, 1761)**

Distribution. Europe, Palaearctic, Oriental, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Theroscopus esenbeckii* (Gravenhorst, 1815)**

Distribution. Europe, West Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Hemiteles inaequalis* and *H. subzonatus*).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Trychosis legator* (Thunberg, 1822)**

Distribution. Palaearctic (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *T. ingratus*).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Virgichneumon albineatus* (Gravenhorst, 1820)**

Distribution. Europe, Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. Turkey [Samsun Province (Sullivan et al. 2010)].

Host stage. Pupa (Sullivan et al. 2010).

Parasitoid type. Endoparasitoid, solitary (Sullivan et al. 2010), polyphagous (Yu et al. 2016).

***Virgichneumon dumeticola* (Gravenhorst, 1829)**

Distribution. Europe, Asia (Yu et al. 2016).

Recorded interactions with *H. cunea*. Turkey [Samsun Province (Sullivan et al. 2010)], Iran [Guilan province (Karami et al. 2023)].

Host stage. Pupa (Sullivan et al. 2010).

Parasitoid type. Endoparasitoid, solitary (Sullivan et al. 2010), polyphagous (Yu et al. 2016).

Notes. Parasitoid female to male ratio 2.16 (Sullivan et al. 2010).

***Virgichneumon subcyaneus* (Cresson, 1864)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [New England or New York or New Jersey (Schaffner and Griswold 1934 as *Amblyteles pullatus*), Colorado (Swain 1937 as *Amblyteles subcyaneus*)], North America (Warren and Tadić 1967 as *Vulgichneumon subcyaneus*).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Vulgichneumon brevicinctor* (Say, 1825)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [New England or New York or New Jersey (Schaffner and Griswold 1934 as *Amblyteles brevicinctor*), Colorado (Swain 1937 as *Amblyteles brevicinctor*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Solitary, polyphagous (Yu et al. 2016).

***Vulgichneumon leucaniae* (Uchida, 1924)**

Distribution. China, Japan, Russia (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985); Wugong Conty, Shaanxi Province (Ran and Zhao 1989)].

Host stage. Pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, koinobiont (Ran and Zhao 1989).

Braconidae 茧蜂科

***Aleiodes sanctihyacinthi* (Provancher, 1880)**

Distribution. Canada, USA, Serbia (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Rogas hyphantriae*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Apanteles (Dolichogenidea) lacteicolor* Viereck, 1911**

Distribution. Europe, Asia, North America (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Apanteles lacteicolor*), New England (Marsh 1979)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Apanteles (Pholetesor) glacialis* (Ashmead, 1902)**

Distribution. North America (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Alaska (Marsh 1979)].

***Apanteles singularis* (Yang & You, 2002)**

Distribution. China (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Yangling City, Shaanxi Province; Yantai City, Shandong Province (Yang et al. 2002 as *Dolichogenidea singularis*)].

Host stage. Larva 1–3 instar (Yang et al. 2002).

Parasitoid type. Koinobiont, primary, solitary, endoparasitoid, polyphagous (Yang et al. 2002).

Notes. 5–6% parasitism (Yang et al. 2002).

***Cotesia diacrisiae* (Gahan, 1917)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Apanteles diacrisiae*)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Cotesia gregalis* Yang & Wei, 2002**

Distribution. China (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Tianjin City; Qinhuangdao City, Hebei Province; Dalian City, Liaoning Province; Yantai City, Shandong Province (Yang et al. 2002)].

Host stage. Larva (Yang et al. 2002).

Parasitoid type. Koinobiont, primary, gregarious, endoparasitoid (Yang et al. 2002).

Notes. Parasitism rate 6% (Yang et al. 2002).

***Cotesia hyphantriae* (Riley, 1887)**

Distribution. Bulgaria, Canada, China, Czech, Czechoslovakia, Germany, Greece, Hungary, Iran, Japan, Korea, Mexico, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Turkey, USA, Ukraine, UK, Yugoslavia (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Apanteles hyphantriae*)], Turkey [Düzce (Avci et al. 2022 as *Apanteles hyphantriae*)]. Canada (Morris 1976b as *Apanteles hyphantriae*).

Host stage. Larva (Morris 1976b), egg and larva (Warren and Tadić 1967).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b), polyphagous parasitism (Yu et al. 2016).

Notes. Parasitoid female to male ratio 1.38 (Morris 1976b).

***Cotesia ordinaria* (Ratzeburg, 1844)**

Distribution. Asia, Europe (Yu et al. 2016).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Apanteles ardimarium*)].

Host stage. Larva (Shu and Yu 1985).

Parasitoid type. Endoparasitoid, gregarious parasitism (Shu and Yu 1985).

***Cotesia plutellae* (Kurdjumov, 1912)**

Distribution. Widespread all over the world (Yu et al. 2016).

Recorded interactions with *H. cunea*. Hungary [Hédervár (Papp 1988 as *Apanteles plutellae*)], Europe (Warren and Tadić 1967 as *Apanteles plutellae*).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Cotesia ruficrus* (Haliday, 1834)**

Distribution. Widespread all over the world (Yu et al. 2016).

Recorded interactions with *H. cunea*. Hungary [Újszentmargita (Papp 1988 as *Apanteles ruficrus*)], Europe (Warren and Tadić 1967 as *Apanteles ruficrus*).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Cotesia vanessae* (Reinhard, 1880)**

Distribution. Asia, North Africa, North America, Europe (Yu et al. 2016).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Apanteles vanessae*).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Meteorus acronyctae* Muesebeck, 1923**

Distribution. USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Meteorus bakeri* Cook & Davis, 1891**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Meteorus hyphantriae* Riley, 1887**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Washington DC (Riley 1887b), Colorado (Swain 1937)].

Host stage. Larva (Riley 1887b; Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

Notes. Performed well as natural enemy during outbreak and prevented further increase in *H. cunea* populations (Riley 1887b). The parasitism rate 0.08–3.94% of black fall webworm race, and 0.24–5.71% of orange race (Oliver 1964).

***Meteorus pendulus* (Müller, 1776)**

Distribution. Asia, North America, Europe (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *M. communis*)].

Host stage. Larva (Warren and Tadić 1967 as *M. communis*).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Meteorus versicolor* (Wesmael, 1835)**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], Canada [New Brunswick and Nova Scotia (Morris 1976c)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

***Microplitis hyphantriae* Ashmead, 1898**

Distribution. Canada, USA (Yu et al. 2016).

Recorded interactions with *H. cunea*. USA [Washington DC (Ashmead 1898)].

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Yu et al. 2016).

Trigonalidae 钩腹蜂科

***Lycogaster pullata nevadensis* (Cresson, 1879)**

Distribution. Nearctic (Townes 1956).

Recorded interactions with *H. cunea*. USA [Boulder, Colorado (Townes 1956)], North America (Warren and Tadić 1967).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Probably a hyperparasitoid (Townes 1956).

Chalcididae 小蜂科

***Brachymeria femorata* (Panzer, 1801)**

Distribution. Europe, Asia (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Endoparasitoid, polyphagous (Noyes 2019).

***Brachymeria lasus* (Walker, 1841)**

Distribution. Australian, Europe, Asia, North Africa, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Japan [Tokyo (Tamura 1969 as *B. obscurata*)], China [Wugong Conty, Shaanxi Province (Ran and Zhao 1989)], China (Yang et al. 2008), Iran [Guilan province (Karami et al. 2023)].

Host stage. Larva (Ran and Zhao 1989), Pupa only in summer generations (Yang et al. 2008).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989), gregarious parasitism (Yang et al. 2008).

Notes. Parasitoid female to male ratio 6.4 (Yang et al. 2008); parasitism rate 6.6–16.7% (Yang et al. 2008).

***Brachymeria ovata* (Say, 1824)**

Distribution. Nearctic, Neotropical (Noyes 2019).

Recorded interactions with *H. cunea*. North America (Peck 1963).

Host stage. Pupa (McDermott 1911; Burks 1936).

Parasitoid type. Polyphagous (Noyes 2019).

***Brachymeria tibialis* (Walker, 1834)**

Distribution. Europe, North Africa, East Asia, South Asia, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *B. intermedia*), Italy (Boriani 1991 as *B. intermedia*).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Endoparasitoid, polyphagous (Noyes 2019).

***Brachymeria subconica* Boucek, 1992**

Distribution. Nearctic, Neotropical (Noyes 2019).

Recorded interactions with *H. cunea*. Mexico [Nuevo Leon (Noyes 2019)].

Host stage. Larva (Noyes 2019).

Parasitoid type. Primary, polyphagous (Noyes 2019).

***Conura meteori* Burks, 1940**

Distribution. Canada, USA, Mexico (Noyes 2019).

Recorded interactions with *H. cunea*. North America (Peck 1963 as *Cerastonicra meteori*).

Host stage. Cocoon (Riley 1888).

Parasitoid type. Hyperparasitoid (Riley 1888), polyphagous (Noyes 2019).

***Dirhinus himalayanus* Westwood, 1836**

Distribution. India, Iran, Japan, Malaysia, Pakistan, Philippines, Thailand, Turkmenistan, former USSR (Noyes 2019).

Recorded interactions with *H. cunea*. Japan (Habu 1960 as *D. luzonensis*).

Host stage. Pupa (Habu 1960).

Parasitoid type. Hyperparasitoid of tachinid, polyphagous (Habu 1960).

Encyrtidae 跳小蜂科

***Exoristobia klinoclavata* Xu, 2000**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. Larva or pupa (Yang et al. 2008).

Parasitoid type. Hyperparasitoid, endoparasitoid, gregarious (Yang et al. 2008).

Notes. 47 wasps were reared on average from 1 host puparium, parasitoid female to male ratio 6.2, parasitism rate 1.6% (Yang et al. 2008).

Eulophidae 姬小蜂科

***Aprostocetus esurus* Riley, 1879**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA [Washington DC (Marlatt 1903; Peck 1963 as *Syntomosphyrum esurus*).

Host stage. Pupa (Marlatt 1903), larva (Warren and Tadić 1967).

Parasitoid type. Hyperparasitoid (Marlatt 1903), polyphagous (Peck 1963).

***Aprostocetus magniventer* Yang, 2003**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Yantai City, Shandong Province] (Yang et al. 2003b).

Host stage. Pupa (Yang et al. 2003b).

Parasitoid type. Endoparasitoid, gregarious parasitism (Yang et al. 2003b).

Notes. Parasitoid female to male ratio 2.6, highest parasitism rate 3.5% (Yang et al. 2003b).

***Baryscapus coerulescens* Ashmead, 1898**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA (Swain 1937 as *Tctrasticlms dotcni*), North America (Peck 1963 as *Tetrastinhus coerulescens*).

Host stage. Pupa (Swain 1937).

Parasitoid type. Hyperparasitoid (Swain 1937; Noyes 2019).

***Chouioia cunea* Yang, 1989**

Distribution. China, Iran, Italy, Japan, Korea (Noyes 2019).

Recorded interactions with *H. cunea*. China [Wugong County, Shaanxi Province (types); Beijing City (Yang 1989)], Italy [Cremona, Mantova, Pumenengo Bergamo (Boriani 1991), Pontirolo Nuovo, Bergamo; Eraclea, Venezia (Boriani 1994b)], Iran [Guilan province (Karami et al. 2023)], South Korea (Kim et al. 2011), Turkey [Samsun region (Sullivan et al. 2011); Düzce (Avci et al. 2022)].

Host stage. Pupa (Yang 1989).

Parasitoid type. Endoparasitoid, gregarious parasitism, polyphagous, hyperparasitoid of tachinids (Yang 1989).

Notes. Parasitoid female to male ratio 68, the highest parasitism rate 83.2% (in lab) (Yang 1989). Average parasitism 1.9%, average clutch size 117, average parasitoid female to male ratio 44.5 (Sullivan et al. 2011).

***Elachertus cacoeciae* Howard, 1885**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA [Washington DC (Howard 1885), North America (Peck 1963).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Primary (Howard 1885).

***Elachertus cidariae* Ashmead, 1898**

Distribution. Bermuda, Canada, USA; induced to former Yugoslavia (Noyes 2019).

Recorded interactions with *H. cunea*. USA [New England or New York or New Jersey (Schaffner and Griswold 1934 as *E. hyphantriae* and *E. marylandicus*), North America (Warren and Tadić 1967 as *E. hyphantriae*; Burks 1979 as *E. hyphantriae* and *E. marylandicus*), USA [West Virginia (Butler 1993)].

Host stage. Larva (Warren and Tadić 1967 as *E. hyphantriae*).

Parasitoid type. Polyphagous, ectoparasitoid (Noyes 2019).

Notes. Parasitism rate 0.2% (Nordin et al. 1972 as *E. hyphantriae*).

***Elasmus atratus* Howard, 1897**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Canada [New Brunswick; Nova Scotia] (Morris 1976a).

Host stage. Cocoon (Morris 1976a).

Parasitoid type. Hyperparasitoid (Morris 1976a), polyphagous (Noyes 2019).

Notes. Most prevalent hyperparasitoid (Morris 1976a).

***Elasmus nigrescens* Ashmead, 1895**

Unavailable name, determinations made by Mr. W. H. Ashmead (Webster 1895).

Distribution. USA (Webster 1895).

Recorded interactions with *H. cunea*. USA [Warren County, Southern Ohio (Webster 1895)].

Host stage. Cocoon (Webster 1895).

Parasitoid type. Hyperparasitoid (Webster 1895).

***Elasmus pullatus* Howard, 1885**

Distribution. USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA [Ohio, Missouri, Kans (Peck 1963)].

***Elasmus varius* Howard, 1885**

Distribution. USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA (Peck 1963).

***Neochrysocharis hyphantriae* Yoshimoto, 1978**

Distribution. Mexico, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Mexico (Yoshimoto 1978).

Host stage. Pupa (Yoshimoto 1978).

Parasitoid type. Hyperparasitoid (Yoshimoto 1978).

***Pediobius bruchicida* Rondani, 1872**

Distribution. Afrotropical, Australia, Europe, Palaearctic, West Asia (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Host stage. Pupa (Noyes 2019).

Parasitoid type. Facultative hyperparasitoid, endoparasitoid, gregarious (Noyes 2019).

***Pediobius elasmii* (Ashmead, 1904)**

Distribution. Australia, India, Indonesia, Malaysia, Papua New Guinea, China, Philippines, Sri Lanka (Noyes 2019).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. Pupa (Yang et al. 2008).

Parasitoid type. Gregarious parasitism (Yang et al. 2008).

Notes. Parasitoid female to male ratio 2.8–13.6 (Yang et al. 2008); parasitism rate 2.6% (Yang et al. 2008).

***Pediobius pupariae* Yang, 2015**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China (Yang et al. 2015b).

Host stage. Pupa (Yang et al. 2015b).

Parasitoid type. Gregarious parasitism (Yang et al. 2015b).

***Pediobius pyrgo* Walker, 1839**

Distribution. Europe, Nearctic, Oriental, Palearctic (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Host stage. Pupa (Noyes 2019).

Parasitoid type. Primary, hyperparasitoid (Noyes 2019).

***Rhcnopelte crassicornis* Nees, 1834**

Distribution. Palearctic, Europe, West Asia (Noyes 2019).

Recorded interactions with *H. cunea*. Iran [Gilan, Rezvanshahr (Yefremova et al. 2007)].

Host stage. Larva (Yefremova et al. 2007)

Parasitoid type. Gregarious parasitism, ectoparasitoid (Yefremova et al. 2007)

***Tetrastichomyia clisiocampae* (Ashmead, 1894)**

Distribution. Italy, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Pontirolo Nuovo, Bergamo (Borani 1994b)] (Borani 1991 as *Tetrastichus goidanichi*).

Host stage. Pupa (Borani 1994b).

Parasitoid type. Endoparasitoid, hyperparasitoid (Borani 1994b).

***Tetrastichus litoreus* Yang, Qiao & Han, 2003**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Qinhuangdao City, Hebei Province (Yang et al. 2003a)].

Host stage. Pupa (Yang et al. 2003a).

Parasitoid type. Endoparasitoid, gregarious parasitism (Yang et al. 2003a).

Notes. Parasitoid female to male ratio 5 (Yang et al. 2003a) and 3 (Yang et al. 2008); parasitism rate 0.1% (Yang et al. 2008).

***Tetrastichus nigricoxae* Yang, 2003**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Yangling City, Shaanxi Province; Xuzhou City, Jiangsu Province (Yang and Wei 2003)].

Host stage. Pupa (Yang and Wei 2003).

Parasitoid type. Endoparasitoid, gregarious, oligophagous parasitism (Yang and Wei 2003).

Notes. Parasitoid female to male ratio 1.9, parasitism rate 6.2–13.4% (Yang and Wei 2003).

***Tetrastichus septentrionalis* Yang, 2001**

Distribution. China, South Korea (Noyes 2019).

Recorded interactions with *H. cunea*. China [Tianjin City; Dalian City, Liaoning Province; Qinhuangdao City, Hebei Province; Yantai City, Shandong Province], South Korea [Seoul] (Yang et al. 2001; Kim et al. 2011).

Host stage. Pupa (Yang et al. 2001).

Parasitoid type. Endoparasitoid, gregarious, oligophagous (Yang et al. 2001).

Notes. Parasitoid female to male ratio 10, the highest parasitism rate 24% (Yang et al. 2001), 3.2% (Yang et al. 2008).

***Tetrastichus shandongensis* Yang, 2003**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Yantai City, Shandong Province (Yang and Wei 2003)].

Host stage. Pupa (Yang and Wei 2003).

Parasitoid type. Endoparasitoid, gregarious (Yang and Wei 2003).

Notes. Parasitoid female to male ratio 3.2, the parasitism rate 6.2% (Yang and Wei 2003), 3.6% (Yang et al. 2008).

***Trichospilus albiflagellatus* Yang & Wang, 2015**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Yantai City, Shandong Province (Yang et al. 2015a)].

Host stage. Pupa (Yang et al. 2015a).

Parasitoid type. Endoparasitoid, gregarious (Yang et al. 2015a).

Notes. Average parasitoid female to male ratio 58.56, highest parasitism rate 28.6% (Yang et al. 2001).

Eupelmidae 旋小蜂科

***Eupelmus fulvipes* Förster, 1860**

Distribution. Austria, Azerbaijan, China, France, Georgia, Germany, Hungary, Iran, Italy, Montenegro, Poland, Romania, Russia, Serbia, Spain, Turkey (Gibson and Fusu 2016; Noyes 2019; Yang et al. 2008).

Recorded interactions with *H. cunea*. China [Qinhuangdao City, Hebei Province (Yang et al. 2008)].

Host stage. Pupa (Yang et al. 2008).

Parasitoid type. Gregarious, endoparasitoid (Yang et al. 2008).

Notes. Parasitism rates 0.1%, 3 females were reared from a single pupa (Yang et al. 2008).

Eurytomidae 广肩小蜂科

***Eurytoma appendigaster* Swederus, 1795**

Distribution. Europe, North Africa, North America, China (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Host stage. Pupa (Noyes 2019).

Parasitoid type. Primary, polyphagous (Noyes 2019).

***Eurytoma goidanichi* Boucek, 1970**

Distribution. Europe, Iran (Noyes 2019), China (Yang et al. 2008).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. Pupa (Yang et al. 2008)

Parasitoid type. Gregarious, hyperparasitoid (Yang et al. 2008).

Notes. Parasitoid female to male ratio 2.2, parasitism rate 22% (Yang et al. 2008).

***Eurytoma rosae* Nees, 1834**

Distribution. Europe, Asia, North Africa, Argentina (Noyes 2019).

Recorded interactions with *H. cunea*. Romania [Piatra Craiului National Park (Popescu 2006)].

Host stage. Pupa (Noyes 2019).

Parasitoid type. Primary, polyphagous (Noyes 2019).

***Eurytoma verticillata* (Fabricius, 1798)**

Distribution. Europe, East Asia, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Eraclea, Venezia (Borani 1994b)].

Host stage. Pupa (Borani 1994b).

Parasitoid type. Endoparasitoid, hyperparasitoid, polyphagous (Borani 1994b).

Perilampidae 巨胸小蜂科

***Perilampus hyalinus* Say, 1929**

Distribution. Canada, Cuba, Mexico, Peru, Puerto Rico, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Canada, USA (Peck 1963).

Host stage. Pupa or cocoon (Smith 1912).

Parasitoid type. Hyperparasitoid (Smith 1912; Tripp 1962).

Pteromalidae 金小蜂科

***Catolaccus aeneoviridis* Girault, 1911**

Distribution. Bermuda, Canada, Mexico, USA, Nearctic (Noyes 2019).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)].

Host stage. Cocoon (Swain 1937).

Parasitoid type. Hyperparasitoid (Swain 1937).

***Coelopisthia extenta* (Walker, 1835)**

Distribution. Europe, Kazakhstan, Uzbekistan, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Pontirolo Nuovo, Bergamo; Eraclea, Venezia (Borani 1994b)].

Host stage. Pupa (Borani 1994b).

Parasitoid type. Endoparasitoid, gregarious, hyperparasitoid (Borani 1994b).

***Conomorium amplum* (Walker, 1835)**

Distribution. Belgium, Canary Islands, Czech, France, Germany, Greece, Hungary, Italy, Kazakhstan, Madeira, Netherlands, China, Romania, Spain, Sweden, Switzerland, Tselinograd Obl., UK, Uzbekistan (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Pianengo, Cremona; Bisnate, Milano, Pontirolo Nuovo, Bergamo (Borani 1991 as *C. patulum*; Borani 1994a)], Turkey [Samsun region (Sullivan et al. 2011)].

Host stage. Pupa (Borani 1994a).

Parasitoid type. Endoparasitoid, gregarious (Borani 1994a).

Notes. Average parasitism 0.047%, average clutch size 1.5, average parasitoid female to male ratio 0.5 (Sullivan et al. 2011).

***Conomorium cuneae* Yang & Baur, 2004**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China [Tianjin City; Yantai City, Shandong Province; Wugong City, Shaanxi Province, Dalian City, Liaoning Province; Qinhuangdao City, Hebei Province (Yang and Baur 2004)].

Host stage. Pupa (Yang and Baur 2004).

Parasitoid type. Endoparasitoid, gregarious (Yang and Baur 2004).

Notes. Parasitoid female to male ratio 7.5, highest parasitism rate 3.6–12.2% (Yang and Baur 2004), 1.2% (Yang et al. 2008).

***Dibrachys maculipennis* Szelenyi, 1957**

Distribution. Canada, Hungary, Kirgizia, Slovakia, Sweden (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Host stage. Cocoon (Noyes 2019).

Parasitoid type. Hyperparasitoid (Noyes 2019).

***Dibrachys microgastri* (Bouche, 1834)**

Distribution. Europe, Asia, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Pontirolo Nuovo, Bergamo (Borani 1994b as *D. boarmiae*)], China (Yang et al. 2008 as *D. cavus*), Turkey [Samsun region (Sullivan et al. 2011 as *D. boarmiae*)], North America (Warren and Tadić 1967).

Host stage. Pupa (Borani 1994b), larva-pupa (Yang et al. 2008).

Parasitoid type. Endoparasitoid, gregarious, hyperparasitoid, polyphagous (Borani 1994b), gregarious, hyperparasitoid (Yang et al. 2008).

Notes. Parasitoid female to male ratio 8.0, highest parasitism rate 0.15% (Yang et al. 2008). Average parasitism 1.2%, average clutch size 10, average female to male ratio 24 (Sullivan et al. 2011).

***Dirhinus anthracia* Walker, 1846**

Distribution. Australia, India, Philippines, South Africa, China, Vietnam, Zambia (Noyes 2019).

Recorded interactions with *H. cunea*. South Korea (Kim et al. 2011).

Host stage. Pupa (Kim et al. 2011).

Parasitoid type. polyphagous (Noyes 2019).

***Hypopteromalus inimicus* Muesebeck, 1927**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Canada [New Brunswick, Nova Scotia (Morris 1976a)].

Host stage. Cocoon (Morris 1976a).

Parasitoid type. Hyperparasitoid (Morris 1976a).

***Hypopteromalus percussor* Girault, 1917**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA Colorado (Swain 1937)].

Host stage. Cocoon (Swain 1937).

Parasitoid type. Hyperparasitoid (Swain 1937).

***Hypopteromalus tabacum* Fitch, 1864**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. USA (Peck 1951).

***Psychophagus omnivorus* (Walker, 1835)**

Distribution. Europe, West Asia, North Africa, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Turkey [Samsun region (Sullivan et al. 2011), Italy (Boriani 1991), Iran [Guilan province (Karami et al. 2023)]

Host stage. Pupa (Sullivan et al. 2011).

Parasitoid type. Gregarious, polyphagous (Noyes 2019).

Notes. Average parasitism 6.7%, average clutch size 60, average parasitoid female to male ratio 0.92 (Sullivan et al. 2011).

***Pteromalus apum* Retzius, 1783**

Distribution. Argentina, Canada, Russia, USA, Europe (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967 as *Pteromalus planiscuta*).

Host stage. Pupa (Warren and Tadić 1967).

***Pteromalus bifoveolatus* Foerster, 1861**

Distribution. Europe (Noyes 2019), China (Yang et al. 2008).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. Pupa (Yang et al. 2008).

Parasitoid type. Gregarious parasitism (Yang et al. 2008), polyphagous (Noyes 2019).

Notes. Parasitoid female to male ratio 5.5, highest parasitism rate 0.2% (Yang et al. 2008).

***Pteromalus egregious* Foerster, 1841**

Distribution. Canada, Germany, Hungary, USA (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

***Pteromalus phycidis* Ashmead, 1898**

Distribution. Canada, USA (Noyes 2019).

Recorded interactions with *H. cunea*. North America (Noyes 2019).

Parasitoid type. Hyperparasitoid (Noyes 2019).

***Trichomalopsis cotesiae* Yang, 2015**

Distribution. China (Noyes 2019).

Recorded interactions with *H. cunea*. China (Yang et al. 2015b).

Host stage. Larva (Yang et al. 2015b).

Parasitoid type. Hyperparasitoid (Yang et al. 2015b).

***Trichomalopsis genalis* (Graham, 1969)**

Distribution. Europe (Noyes 2019), China (Yang et al. 2008).

Recorded interactions with *H. cunea*. China (Yang et al. 2008).

Host stage. 4th instar larva (Yang et al. 2008).

Parasitoid type. Gregarious, polyphagous (Yang et al. 2008).

Notes. Parasitoid female to male ratio 1.6, parasitism rate 0.2% (Yang et al. 2008).

***Trichomalopsis germanica* (Graham, 1969)**

Distribution. Germany, Sweden (Noyes 2019), China (Yang et al. 2008).

Recorded interactions with *H. cunea*. China (Yang et al. 2008 as *T. germanicus*).

Host stage. Pupa (Yang et al. 2008)

Parasitoid type. Gregarious, hyperparasitoid (Yang et al. 2008).

Notes. Parasitoid female to male ratio 2, highest parasitism rate 15% (Yang et al. 2008).

***Trichomalopsis hemiptera* Walker, 1835**

Distribution. Europe, North America, East Asia (Noyes 2019).

Recorded interactions with *H. cunea*. USA [New England (Peck 1963 as *Eupterotnalus hernipterus*, laboratory rearing)].

Parasitoid type. Hyperparasitoid (Noyes 2019).

Torymidae 长尾小蜂科

***Monodontomerus aeneus* Fonscolombe, 1832**

Distribution. Europe, Iran, Kazakhstan, China, USA, Chile (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Parasitoid type. Polyphagous (Noyes 2019).

***Monodontomerus aereus* Walker, 1834**

Distribution. Europe, Asia, North Africa, North America (Noyes 2019).

Recorded interactions with *H. cunea*. North America, Europe (Warren and Tadić 1967).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Noyes 2019).

***Monodontomerus dentipes* Dalman, 1820**

Distribution. Europe, Asia, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Noyes 2019).

Parasitoid type. Polyphagous (Noyes 2019).

***Monodontomerus minor* (Ratzeburg, 1848)**

Distribution. Europe, Asia, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Italy [Eraclea, Venezia (Borioni 1994b)], China (Yang et al. 2008).

Host stage. Pupa (Borioni 1994b), larva-pupa (Yang et al. 2008).

Parasitoid type. Endoparasitoid, gregarious, hyperparasitoid, polyphagous (Borioni 1994b), hyperparasitoid (Yang et al. 2008).

Notes. Parasitoid female to male ratio 1.4, highest parasitism rate 0.15% (Yang et al. 2008).

Trichogrammatidae 赤眼蜂科

***Trichogramma brassicae* Bezdenko, 1968**

Distribution. Europe, Asia, Australia, North America (Noyes 2019).

Recorded interactions with *H. cunea*. Turkey [Düzce (Avci et al. 2022)].

Host stage. Egg (Avci et al. 2022).

Parasitoid type. Polyphagous (Noyes 2019).

***Trichogramma cacaeciae* Marchal, 1927**

Distribution. Europe, Asia, North America, South America (Noyes 2019).

Recorded interactions with *H. cunea*. Moldova (Plugaru 1979).

Host stage. Egg (Plugaru 1979).

Parasitoid type. Polyphagous (Noyes 2019).

***Trichogramma dendrolimi* Matsumura, 1926**

Distribution. Europe, Asia, Chile (Noyes 2019).

Recorded interactions with *H. cunea*. Asia (Warren and Tadić 1967), South Korea (Noyes 2019), China [Beijing, tested in lab, unpublished data, CLM].

Host stage. Egg (Warren and Tadić 1967; Noyes 2019).

Parasitoid type. Polyphagous, primary (Noyes 2019).

***Trichogramma evanescens* Westwood, 1833**

Distribution. Europe, Asia, North America, South America (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Egg (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Noyes 2019).

***Trichogramma minutum* Riley, 1871**

Distribution. Europe, Asia, Africa, North America, South America (Noyes 2019).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967), Italy (Viggiani and Laudonia 1989).

Host stage. Egg (Warren and Tadić 1967).

Parasitoid type. Polyphagous (Noyes 2019).

***Trichogramma ostrinae* Pang & Chen, 1974**

Distribution. China, Japan, South Korea, South Africa, USA (Noyes 2019).

Recorded interactions with *H. cunea*. China [Beijing, tested in lab, unpublished data, CLM].

Host stage. Egg (unpublished data).

Parasitoid type. Polyphagous (Noyes 2019).

***Trichogramma piceum* Dyurich, 1987**

Distribution. Italy, Moldova (Noyes 2019).

Recorded interactions with *H. cunea*. Italy (Noyes 2019).

Host stage. Egg (Noyes 2019).

Parasitoid type. Polyphagous (Noyes 2019).

Scelionidae 缘腹细蜂科

***Telenomus chloropus* (Thomson, 1861)**

Distribution. Ukraine, Turkey, UK, Russia, Moldavia, Kazakhstan, Georgia, Kazakhstan, Far East, France, Hungary, Japan, Spain, Sweden, USA, Ireland, Iran (Samin et al. 2010).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1970 as *Telenomus mayri*).

Host stage. Egg (Warren and Tadić 1970).

***Telenomus bifidus* Riley, 1887**

Distribution. USA (Riley 1887a).

Recorded interactions with *H. cunea*. USA [Washington, D.C. (Riley 1887a)].

Host stage. Egg (Riley 1887a).

Parasitoid type. Endoparasitoid, oligophagous (Riley 1887b),

Notes. Parasitize eggs of first and second generations of fall webworm. Useful natural enemy (Riley 1887a).

Diptera

Tachinidae 寄蝇科

***Archytas (Nemochaeta) aterrimus* (Robineau-Desvoidy, 1830)**

Distribution. Canada, USA, Mexico (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Sullivan and Ozman-Sullivan 2012).

***Bactromyia aurulenta* (Meigen, 1824)**

Distribution. China, Europe, Japan, South Korea, Russia, Transcaucasia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Honshu, Ibaraki (Tschorsnig 2017)].

***Bessa parallela* (Meigen, 1824)**

Distribution. China, Europe, Japan, Mongolia, Russia, Armenia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Tsukuba (Watanabe 2005)], Serbia, Hungary, Japan, Montenegro, Moldova [Kishinev], Russia [European part], Japan [Honshu, Tokyo, Fuchu, Nara] (Tschorsnig 2017). Asia, Europe (Sullivan and Ozman-Sullivan 2012 as *Bessa selecta*, *Ptychomyia selecta*).

Host stage. Pupa (Warren and Tadić 1967 as *B. fugax* and *B. selecta*).

***Blepharipa sericariae* (Rondani, 1870)**

Distribution. Palaearctic: China, Japan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Honshu, Tokyo] (Tschorsnig 2017).

***Blepharipa zebina* (Walker, 1849)**

Distribution. China, Japan, North Korea, South Korea, Russia, India, Myanmar, Nepal, Sri Lanka, Thailand (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Wugong Conty, Shaanxi Province (Ran and Zhao 1989)].

Host stage. Pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989).

***Blondelia eufitchiae* (Townsend, 1892)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Masicera eufitchiae*)], North America (Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Blondelia hyphantria* (Tothill, 1922)**

Distribution. Canada, USA, China (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Canada (Tothill 1922 as *Lydella hyphantriae*), USA [Colorado] (Swain 1937 as *Anetia hyphantriae* and *Lydella hyphantriae*), North America (Sullivan and Ozman-Sullivan 2012).

Host stage. Larva-pupa (Tothill 1922), larva (Warren and Tadić 1967).

Parasitoid type. Solitary (Tothill 1922).

Notes. Maggot travels from one feeding area to another (Tothill 1922).

***Blondelia nigripes* (Fallén, 1810)**

Distribution. Central Asia, China, Japan, South Korea, Iran, Mongolia, Russia, Transcaucasia, Europe (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Europe (Sullivan and Ozman-Sullivan 2012), Hungary, Russia (Tschorsnig 2017).

***Blondelia obconica* (Walker, 1853)**

Distribution. USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Sullivan and Ozman-Sullivan 2012 as *Tachina obconica*).

***Cadurcia* sp.**

Distribution. Europe (Sullivan and Ozman-Sullivan 2012).

Recorded interactions with *H. cunea*. Europe (Sullivan and Ozman-Sullivan 2012).

***Carcelia bombylans* Robineau-Desvoidy, 1830**

Distribution. China, Europe, Japan, Russia, Azerbaijan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Italy (Borioni 1991). Serbia, Italy [Lombardia, Mantua] (Tschorsnig 2017).

***Carcelia gnava* (Meigen, 1824)**

Distribution. China, Europe, Japan, South Korea, Russia, Armenia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. South Korea (Tschorsnig 2017).

***Carcelia kockiana* (Townsend, 1927)**

Distribution. China (Ran and Zhao 1989), India, Indonesia, Malaysia, Philippines, Papua New Guinea (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Wugong County, Shaanxi Province (Ran and Zhao 1989)].

Host stage. Pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989).

***Carcelia matsukarehae* (Shima, 1969)**

Distribution. China, Japan, Russia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Shandong (Tschorsnig 2017)].

***Carcelia protuberans* (Aldrich & Webber, 1924)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Zenillia protuberans*)], North America (Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Carcelia sumatrana* Townsend, 1927**

Distribution. China, Japan, Russia, Indonesia, Malaysia, Sri Lanka (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Honshu, Tokyo, Fuchu City (Tschorsnig 2017)].

***Ceromasia auricaudata* Townsend, 1908**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Sullivan and Ozman-Sullivan 2012).

***Ceromasia rubrifrons* (Macquart, 1834)**

Distribution. Uzbekistan, China, Europe, Japan, Israel, Mongolia, Morocco, Russia, Transcaucasia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Moldova (Tschorsnig 2017).

***Chetogena claripennis* (Macquart, 1848)**

Distribution. Canada, USA, Puerto Rico, Mexico, Venezuela (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Phorocera claripennis*)], North America (Warren and Tadić 1967 as *Euphorocera claripenn*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Chetogena scutellaris* (van der Wulp, 1890)**

Distribution. USA, Venezuela (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Phorocera floridensis*)], North America (Warren and Tadić 1967 as *Euphorocera floridensis*, Sullivan and Ozman-Sullivan 2012), Mexico [Tamaulipas (Kasparyan and Pinson 2007)].

***Clemelis pullata* (Meigen, 1824)**

Distribution. China, Europe, Israel, Mongolia, Morocco, Russia, Armenia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Moldova [Cahul (Tschorsnig 2017)].

***Compsilura concinnata* (Meigen, 1824)**

Distribution. Canada, USA, China, Europe, Japan, Kazakhstan, North Korea, South Korea, Iran, Israel, Lebanon, Algeria, Egypt, Morocco, Russia, Armenia, Azerbaijan, Nigeria, South Africa, India, Indonesia, Malaysia, Australia, Papua New Guinea (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Canada (Morris 1976b), Italy (Borini 1991), Turkey [Samsun Province (Sullivan et al. 2012)], Iran [Guilan province (Karami et al. 2023)], Japan [Tsukuba (Watanabe 2005)], China (Yang et al. 2008). Austria [Burgenland, Weiden], Serbia [Vojvodina], Hungary, Romania [Bukarest], Ukraine [Transcarpathia], Slovakia [Gabčíkovo, Nitra env.], Japan [Honshu, Gunma], France [Gironde and/or Landes], Bulgaria [Silistra], Turkey [Samsun], Moldova, Italy [Lombardia, Ponte Merlano, Emilia-Romagna, Mantova], Russia, [Voronezh Region], Azerbaijan [Guba-Khachmaz Region], China [Shangdong, Hebei, Liaoning] (Tschorsnig 2017).

Host stage. Pupa and larva (Warren and Tadić 1967), pupa (Sullivan et al. 2012).

Parasitoid type. Endoparasitoid, solitary or gregarious, polyphagous (Yang et al. 2008).

Notes. Parasitism rate is higher for wandering *H. cunea* larvae than in feeding larvae (Watanabe 2005). Parasitoid female to male ratio 1.5 (Yang et al. 2008); parasitism rate 2% (Yang et al. 2008). Female injects fully incubated eggs directly into the host haemocoel. Parasitism 0.14% in Samsun (Sullivan et al. 2012).

***Drino facialis* (Townsend, 1928)**

Distribution. China, India, Indonesia, Malaysia, Philippines, Sri Lanka, Thailand (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Wugong Conty, Shaanxi Province (Ran and Zhao 1989)].

Host stage. Pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989).

***Drino inconspicua* (Meigen, 1830)**

Distribution. China, Europe, Algeria, Egypt, Russia, Armenia, Azerbaijan, Georgia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Europe (Sullivan and Ozman-Sullivan 2012 as *Drina incospicua*, *Sturmia inconspicua*), Serbia [Vojvodina], Hungary (Tschorsnig 2017).

Host stage. Larva (Warren and Tadić 1967).

***Drino inconspicuoides* (Baranov, 1932)**

Distribution. China, Japan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Tsukuba (Watanabe 2005)].

Notes. Parasitism rate is higher in wandering *H. cunea* larvae than in feeding larvae (Watanabe 2005).

***Eurysthaea scutellaris* (Robineau-Desvoidy, 1849)**

Distribution. China, Europe, Japan, Russia, Armenia, Azerbaijan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Serbia (Tschorsnig 2017).

***Exorista fasciata* (Fallén, 1820)**

Distribution. China, Europe, Mongolia, Egypt, Russia, Transcaucasia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Wugong Conty, Shaanxi Province (Ran and Zhao 1989); Dandong City, Liaoning Province (Shu and Yu 1985)].

Host stage. Pupa and larva (Warren and Tadić 1967), Pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989).

***Exorista japonica* (Townsend, 1909)**

Distribution. China, Japan, North Korea, South Korea, India, Nepal, Vietnam (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shi 1981); Wugong Conty, Shaanxi Province (Ran and Zhao 1989)], China (Yang et al. 2008), Japan [Tsukuba (Watanabe 2005)]. Japan [Honshu, Saitama, Tokyo, Kanazawa], South Korea (Tschorsnig 2017).

Host stage. Larva to pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989; Yang et al. 2008).

Notes. Female oviposits on surface of host. Parasitism rate is higher for wandering *H. cunea* larvae than in feeding larvae (Watanabe 2005); parasitoid female to male ratio 1.5 (Yang et al. 2008); parasitism rate 10% (Shu and Yu 1985), 4–15.7% (Yang et al. 2008).

***Exorista larvarum* (Linnaeus, 1758)**

Distribution. Canada, USA, Tajikistan, Turkmenistan, China, Europe, Japan, North Korea, Iran, Israel, Saudi Arabia, Mongolia, Egypt, Russia, India (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Italy (Boriani 1991), Iran [Guilan province (Karami et al. 2023)], Turkey [Düzce (Avci et al. 2022)]. Austria [Burgenland, Weiden], Serbia [Vojvodina], Hungary, Romania, Turkey, Moldova, Italy [Lombardia, Ponte Merlano], Russia, Azerbaijan (Tschorsnig 2017).

Host stage. Pupa (Warren and Tadić 1967).

***Exorista rustica* (Fallén, 1810)**

Distribution. China, Europe, Kazakhstan, North Korea, South Korea, Israel, Mongolia, Egypt, Russia, Transcaucasia, Thailand (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Hungary (Tschorsnig 2017).

***Exorista segregata* (Rondani, 1859)**

Distribution. Turkmenistan, Uzbekistan, Europe, Iran, Israel, Lebanon, Mongolia, Algeria, Canary Islands, Egypt, Morocco, Tunisia, Russia, Armenia, Azerbaijan, Georgia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Serbia, Hungary (Tschorsnig 2017).

***Exorista sorbillans* (Wiedemann, 1830)**

Distribution. Tajikistan, China, Hungary, Romania, Ukraine, Bulgaria, Greece, Italy, Serbia, Spain, Turkey, Austria, France, Japan, South Korea, Iran, Israel, Mongolia, Canary Islands, Egypt, Russia, Cameroon, D.R. Congo, Kenya, Malawi, Nigeria, Sierra Leone, Uganda, India, Australia, Lord Howe Island, Papua New Guinea (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Shandong (Tschorsnig 2017)].

***Exorista xanthaspis* (Wiedemann, 1830)**

Distribution. Tajikistan, Turkmenistan, Uzbekistan, China, Europe, Kazakhstan, South Korea, Israel, Saudi Arabia, Mongolia, Egypt, Russia, Transcaucasia, Africa, U.A. Emirates, Yemen, India, Indonesia, Japan, Thailand (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Serbia [Vojvodina], Serbia, Hungary, Romania, Bulgaria [Silistra region], Russia (Tschorsnig 2017).

Host stage. Pupa and larva (Warren and Tadić 1967 as *E. fallax*).

***Gonia bimaculata* Wiedemann, 1819**

Distribution. Tajikistan, Turkmenistan, Uzbekistan, China, Europe, Iran, Israel, "Palestine", Saudi Arabia, Algeria, Canary Islands, Egypt, Tunisia, Azerbaijan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Serbia [Vojvodina (Tschorsnig 2017)].

Host stage. Larva (Warren and Tadić 1967).

***Hyphantrophaga blanda* (Osten Sacken, 1887)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Canada [Quebec (Beaulne 1939 as *Zenilla blanda*)], Canada (Morris 1976b as *Eusisyropa blanda*).

Host stage. Larva (Warren and Tadić 1967), larva of later instar (Morris 1976b).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b).

***Hyphantrophaga hyphantriae* (Townsend, 1891)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Hyphantrophaga desmiae*)], North America (Warren and Tadić 1967 as *Hyphantrophaga desmiae*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Hyphantrophaga virilis* (Aldrich & Webber, 1924)**

Distribution. Canada, USA, Costa Rica, Mexico (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Zenillia virilis*)], North America (Warren and Tadić 1967 as *Eusisyropa virilis*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Hystricia abrupta* (Wiedemann, 1830)**

Distribution. Canada, USA, Mexico (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Bombyliopsis abrupta*)], North America (Warren and Tadić 1967 as *Bombyliopsis abrupta*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Isosturmia picta* (Baranov, 1932)**

Distribution. China, Japan, South Korea, India, Malaysia, Nepal, Sri Lanka (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. South Korea (Tschorsnig 2017).

***Kuwanimyia conspersa* Townsend, 1916**

Distribution. China, Japan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Honshu, Tokyo, Asukayama (Tschorsnig 2017)].

***Lespesia aletiae* (Riley, 1879)**

Distribution. Canada, USA, Puerto Rico, Costa Rica, Honduras, Mexico, Argentina, Brazil,

Uruguay (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Achaetoneura aletia*)], North America (Warren and Tadić 1967; Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Swain 1937; Warren and Tadić 1967).

Parasitoid type. Solitary, endoparasitoid.

***Lespesia archippivora* (Riley, 1871)**

Distribution. Canada, USA, Cuba, Puerto Rico, Guadeloupe, Trinidad and Tobago, Guatemala, Honduras, Mexico, Nicaragua, Panama, Argentina, Brazil, Colombia, Peru, Uruguay, Venezuela (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Sullivan and Ozman-Sullivan 2012).

***Lespesia frenchii* (Williston, 1889)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Achaetoneura frenchii*)].

Host stage. Larva (Swain 1937; Warren and Tadić 1967).

Parasitoid type. Solitary, endoparasitoid.

***Myiopharus floridensis* (Townsend, 1892)**

Distribution. USA, Jamaica, Puerto Rico, Mexico (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967 as *Euphorocero floridensis*).

Host stage. Larva (Warren and Tadić 1967).

***Nemoraeea pellucida* (Meigen, 1824)**

Distribution. China, Europe, Japan, Kazakhstan, South Korea, Iran, Algeria, Russia, Georgia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Italy (Borioni 1991), Turkey [Samsun Province (Sullivan et al. 2012)]. France [Gironde and/or Landes], Turkey [Tekirdağ, Samsun, Saricakaya, Adapazari], Italy [Emilia-Romagna, Mantova, Lombardia, Mantua, Veneto, Pavia], Romania [Bukarest] (Tschorsnig 2017).

Host stage. Pupa (Sullivan et al. 2012).

Parasitoid type. Endoparasitoid, solitary, polyphagous.

Notes. Female deposits fully developed eggs near hosts, and eggs develop into planidium-type larvae that mount and enter the hosts. Parasitism rate 2.4–19.4% in Samsun (Sullivan et al. 2012).

***Nilea hortulana* (Meigen, 1824)**

Distribution. China, Europe, Japan, Russia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan (Tschorsnig 2017).

***Pales pavid* (Meigen, 1824)**

Distribution. Turkmenistan, China, Europe, Japan, Kazakhstan, Iran, Israel, Mongolia, Morocco, Russia, Armenia, Azerbaijan, Georgia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. China [Dandong City, Liaoning Province (Shu and Yu 1985 as *Centophorocera pavid*); Wugong Conty, Shaanxi Province (Ran and Zhao 1989)], Japan [Tsukuba (Watanabe 2005)], Turkey [Düzce (Avci et al. 2022)]. Japan [Tokyo, Koto, Tachikawa, Honshu], Serbia [Vojvodina], Hungary, Montenegro, Moldova, China [Liaoning], Russia, Ukraine [Crimea, Yarkoe Pole], Turkey [Samsun], Italy [Pavia, Emilia-Romagna, Bologna, Lombardia] (Tschorsnig 2017).

Host stage. Larva (Warren and Tadić 1967), pupa (Ran and Zhao 1989).

Parasitoid type. Solitary, polyphagous (Ran and Zhao 1989).

***Panzeria aldrichi* (Townsend, 1892)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Varichaeta aldrichi*)], North America (Warren and Tadić 1967 as *Mericia aldrichi*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Panzeria ampel* (Walker, 1849)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Panzeria radicum*, *Ernestia ampel*)], North America (Warren and Tadić 1967 as *Ernestia ampel*, Sullivan and Ozman-Sullivan 2012), Canada (Morris 1976b as *Mericia ampel*).

Host stage. Larva (Warren and Tadić 1967), Later instar larvae (Morris 1976b).

Parasitoid type. Solitary, endoparasitoid, koinobiont (Morris 1976b).

Notes. Univoltine in Canada, female deposits larvae on foliage near *H. cunea* colonies, parasitoid larvae attack host larvae they contact (Morris 1976b).

***Panzeria arcuata* (Tothill, 1921)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Sullivan and Ozman-Sullivan 2012).

***Panzeria johnsoni* (Tothill, 1921)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937 as *Ernestia johnsoni*)], North America (Warren and Tadić 1967 as *Mericia johnsoni*, Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Patelloa leucaniae* (Coquillett, 1897)**

Distribution. Canada, USA (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. North America (Warren and Tadić 1967; Sullivan and Ozman-Sullivan 2012).

Host stage. Larva (Warren and Tadić 1967).

***Pseudogonia parisiaca* (Robineau-Desvoidy, 1851)**

Distribution. China, Europe, Kazakhstan, Russia, Transcaucasia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Italy (Tschorsnig 2017).

***Senometopia prima* (Baranov, 1931)**

Distribution. China, Japan, India, Indonesia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan (Tschorsnig 2017).

***Sturmia bella* (Meigen, 1824)**

Distribution. Central Asia, China, Europe, Japan, South Korea, Middle East, Morocco, Russia, Armenia, Georgia, Nepal, New Caledonia, Solomon Islands (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan (Tschorsnig 2017).

***Tachina praeceps* Meigen, 1824**

Distribution. Kyrgyzstan, Turkmenistan, Uzbekistan, China, Europe, Kazakhstan, Iran, Israel, Mongolia, North Africa, Russia, Armenia, Azerbaijan (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Moldova (Tschorsnig 2017).

***Thelaira nigripes* (Fabricius, 1794)**

Distribution. China, Europe, Japan, North Korea, South Korea, Iran, Russia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Russia, Serbia (Tschorsnig 2017).

Host stage. Larva (Warren and Tadić 1967).

***Winthemia* sp.**

Distribution. North America.

Recorded interactions with *H. cunea*. USA [Colorado (Swain 1937)], North America (Sullivan and Ozman-Sullivan 2012).

***Zenillia dolosa* (Meigen, 1824)**

Distribution. China, Europe, Japan, South Korea, Russia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Japan [Tsukuba (Watanabe 2005)].

***Zenillia libatrix* (Panzer, 1797)**

Distribution. China, Europe, Japan, Iran, Russia, Armenia (O'Hara et al. 2020).

Recorded interactions with *H. cunea*. Italy (Boriani 1991). Italy, Japan (Tschorsnig 2017).

Host stage. Larva (Warren and Tadić 1967).

Odiiniidae 树创蝇科

? *Odinia maculata* (Meigen, 1830)

Distribution. North America.

Recorded interactions with *H. cunea*. Canada [Quebec (Beaulne 1939)].

Notes. Gaimari and Mathis (2011) cataloged *O. maculata* as a synonym of *O. trinotata* Robineau-Desvoidy, 1830, but the latter is only distributed in Europe in their catalogue; Beaulne (1939) noted *O. maculata* was a parasitoid of *H. cunea*, which may be a misidentification.

Sarcophagidae 麻蝇科

***Sarcophaga carnaria* (Linnaeus, 1758)**

Distribution. Palaearctic (Pape 1996).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa (Warren and Tadić 1967).

Parasitoid type. Polyphagous.

Muscidae 蝇科

***Musca domestica* Linnaeus, 1758**

Distribution. Originated from central Asia, but now occurs on all inhabited continents, Europe, Asia, Africa, Australasia, Arctic, Americas (Hewitt 2011).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Pupa and Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous.

***Muscina stabulans* (Fallén, 1817)**

Distribution. Cosmopolitan (de Carvalho et al. 2005).

Recorded interactions with *H. cunea*. Europe (Warren and Tadić 1967).

Host stage. Larva (Warren and Tadić 1967).

Parasitoid type. Polyphagous.

Phoridae 蚤蝇科

***Megaselia scalaris* (Loew, 1866)**

Distribution. Europe, Africa, Asia, Americas (Karami et al. 2023).

Recorded interactions with *H. cunea*. Iran [Guilan province (Karami et al. 2023)].

Host stage. Pupa (Karami et al. 2023).

Parasitoid type. Polyphagous (Karami et al. 2023).

Discussion

The diversity of *H. cunea* predators and parasitoids differs among its native and invaded ranges. In North America, where *H. cunea* is native, 128 predators and 76 parasitoids have been reported. *Hyphantria cunea* is not considered a major pest in North America, which is likely attributed, in part, to its long co-evolutionary history with its natural enemies such as birds, spiders, and insects (Schowalter and Ring 2017). In the Eastern Hemisphere, 78 predators and 62 parasitoids have been reported in Asia, and 88 predators and 68 parasitoids have been reported in Europe. Currently, *H. cunea* is rarely reported as causing significant damage in some countries such as Hungary, Italy, and Japan: *H. cunea* was introduced into these countries in the 1940's, and it is possible that native enemies have had sufficient time to adapt to *H. cunea* and help control its outbreaks. However, in newly invaded countries such as China, Iran, and Turkey, *H. cunea* outbreaks frequently occur, possibly because native natural predators in these countries are still adapting to *H. cunea*.

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Additional information

Conflict of interest

The authors have declared that no competing interests exist.

Ethical statement

No ethical statement was reported.

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Data availability

All of the data that support the findings of this study are available in the main text.

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