

## Description and biological notes of the first species of *Xenos* (Strepsiptera: Stylopidae) parasitic in *Polistes carnifex* F. (Hymenoptera: Vespidae) in Mexico

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### Abstract

A description and biological notes on the first species of *Xenos* (*X. hamiltoni*) (Strepsiptera: Stylopidae) parasitic in *Polistes carnifex* F. from Mexico is given. A list of Strepsiptera and their hosts from Mexico is provided.

**Key words:** Strepsiptera, *Xenos hamiltoni* sp. n., *Polistes carnifex*, Mexico

### Introduction

To date thirteen species of Strepsiptera have been described from Mexico. Kifune & Brailovsky (1988) listed eleven and Kathirithamby & Moya-Raygoza (2000) listed twelve, and since then one subspecies has been added (Kathirithamby & Johnston 2003). Of these, only one species, *Melittostylops vesparapium* Kinzelbach, belongs to the family Stylopidae (Kinzelbach 1971). The eighteen species of *Xenos* described so far from the Neotropics have been found to be parasitic in the eusocial Hymenoptera: Vespidae (*Polistes*, *Mischocyttarus*, *Apoica* and *Polybia*) (Kathirithamby 1992).

### Material and Methods

A total of 8 nests of *Polistes carnifex* were collected between 27<sup>th</sup> April and 13<sup>th</sup> May 2001

at the Estación de Biología “Los Tuxtlas” (18° 35’N 95° 5’ W), which lies on the coastal side of Sierra de Tuxtla along the Gulf coast of Veracruz state, Mexico.

The study site consisted of an approximately 700ha site of humid evergreen tropical rain forest which is boarded by farmland, dirt tracks and a village (Villago Escondida).

The nests were collected from open areas surrounding the station and were constructed on plants and buildings. Some 1<sup>st</sup> instars and endoparasitic stages were found associated with the hosts in the nest, but diagnostic characters are unknown for these stages, and it is therefore difficult to confirm whether they belong to the new species here described. Adult *Xenos hamiltoni* sp. n. were observed to be parasitic in two adult *P. carnifex* which were flying near the field station. One host that was parasitized by nine male puparia, was observed on 8 May 2001 to alight on a leaf at a height of 5m from the ground at 18.40h. The host was captured, placed in a plastic container with sugar, and kept outdoors close to a weak fluorescent light. The approximate timing of the emergence of the adult males was recorded.

### Biological Notes

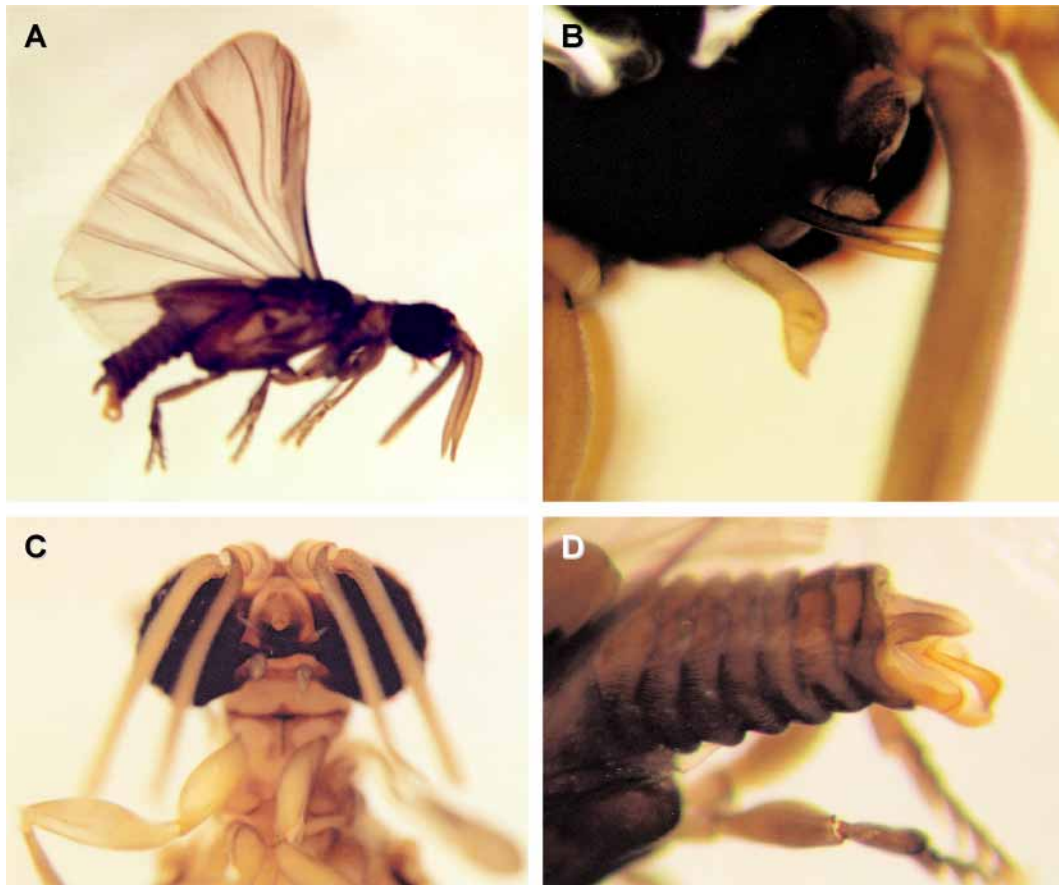
A female *P. carnifex* parasitized by 9 male *X. hamiltoni* sp. n. pupae was observed flying on 8 May 2001 at 18.40h, and it landed five meters above ground on a leaf. It remained motionless for 40 minutes until it was captured. *P. carnifex* builds its nest synchronously in this area, and the occupants of the sampled nests were all of the same stage in development (pre-worker phase). The presence of both a neotenic female adult *Xenos* producing 1<sup>st</sup> instar larvae and free-living adult males emerging within the same week (8–12<sup>th</sup> May) indicates that the generations may be overlapping. Elsewhere (Hughes *et al.* 2003) we report very high levels of parasitism among host brood (larvae and pupae) (probably by *X. hamiltoni* sp. n.). Six of the males emerged between 2000–0800hrs on 11<sup>th</sup>–12<sup>th</sup> May, 2000 (the cage was kept in darkness). A live male *X. hamiltoni* sp. n. was observed to be very active at 22.40hr, but gradually became very weak, and the only movement observed at 23.45 was twitching of the abdominal segments. Another male *X. hamiltoni* sp. n. emerged on 12<sup>th</sup> May at 20.20 (a cage was kept in weak light conditions). Due to host death, the remaining 2 males did not emerge from the puparia.

The host *P. carnifex* was kept in darkness/very low artificial light and the male *X. hamiltoni* sp. n. emerged in the evening, which indicates that this might be a nocturnal species. The presence of the host, which was motionless on a leaf at 18.40 hrs., indicates that the host might have departed the nest, as with *P. dominulus* (Christ) parasitized by *X. vesparum* Rossi (Hughes *et al.* 2004).

Mexico City). ♂: (same data as above) (D. P. Hughes) (Oxford Museum of Natural History, Oxford).

*Description. Male.* Size: total length, 3.44–3.64 mm (Fig. 1A). Head width, 1.10–1.14 mm, wider than prothorax.

Maxilla with long basal segmented (0.16mm) and palpi with a pointed apex fits in a socket (0.08 mm) (Figs 1B, 2).



**FIGURE 1.** A. Lateral view of *Xenos hamiltoni* sp. n. x12. B. Lateral view of head with mandibles and maxilla x80. C. Frontal view of head x40. D. Lateral view of abdomen with IXth abdominal segment and aedeagus x40.

Mandibles as long as maxilla and cross over in the middle (0.21–0.25 mm).

Antennae: four-segmented with flabellum on segment 3<sup>rd</sup> and 4<sup>th</sup> which are almost equal (3<sup>rd</sup> = 1.19–1.23 mm, 4<sup>th</sup> = 1.16–1.22mm) (Figs 1C).

Prothorax: (length, 0.19–0.20 mm; width 0.45–0.46 mm); mesothorax as long as and wider than prothorax (length, 0.18–0.22 mm; width, 0.62–0.65 mm). Scutum + prescutum:

*Schistosiphon* Pierce 1908: 80 [*Xenos peckii* Kirby 1813].  
*Acroschismus* Pierce 1908: 79 [*A. hubbardi* Pierce 1908].  
*Vespaexenos* Pierce 1909: 133 [*V. crabronis* Pierce 1909].  
*Belonogastrechthrus* Pierce: 1911: 498 [*B. zavattarii* 1911].  
*Clypoxenos* Brèthes 1923: 46 [*C. americanus* Brèthes 1923].  
*Brasixenos* Kogan & Oliveira 1966: 346 [*B. fluminensis* Kogan & Oliveira].  
Genotype: *Xenos vesparum* Rossius

### Key to males of the genus *Xenos* from the Neotropics

Out of a total of 18 species of *Xenos* described so far from the Neotropics, only 6 males are known, the rest of the species were described from females. A key to only 5 males is given below since *X. bonairensis* was described without its head or prothorax (Brèthes 1923).

1. Palpus of maxilla absent..... 2
- Palpus of maxilla present ..... 4
2. Maxilla as long as mandibles ..... *occidentalis* (Brazil)
- Maxilla shorter than mandibles ..... 3
3. Maxilla a fourth shorter than mandibles; of equal width throughout ending with a blunt apex ..... *fluminensis* (Brazil)
- Maxilla an eighth shorter than mandibles; basal third wide and narrows to tip.....  
..... *zikani* (Brazil)
4. Basal segment and palpus of maxillae of equal length ..... *indespectus* (Brazil)
- Basal segment longer than palpus ..... 5
5. Basal segment of maxilla two thirds the length of palpus; palpus does not fit into socket in basal segment..... *bohlsi* (Paraguay)
- Basal segment of maxilla twice the length of palpus; palpus fits into a socket in the basal segment ..... *hamiltoni* sp. n. (Mexico)

### *Xenos hamiltoni* Kathirithamby and Hughes, new species (Figs. 1–3)

*Type.* Holotype ♂: MEXICO, Estación de Biología “Los Tuxtlas” UNAM, 8 May 2002, (D. Hughes) (Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City).

Paratypes. ♂: MEXICO, Estación de Biología “Los Tuxtlas” UNAM, 8 May 2002, (D. P. Hughes) (Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City). ♂: (same data as above), (D. P. Hughes) (Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México,

as long as pro- and mesothorax (scutum length, 0.32–0.35mm). Scutellum length: 0.42–0.45 mm. Postlumbium half the length of scutellum (length, 0.25–0.27 mm). Postnotum: twice as long as scutellum (length, 0.80–0.81 mm) (Fig 3A).

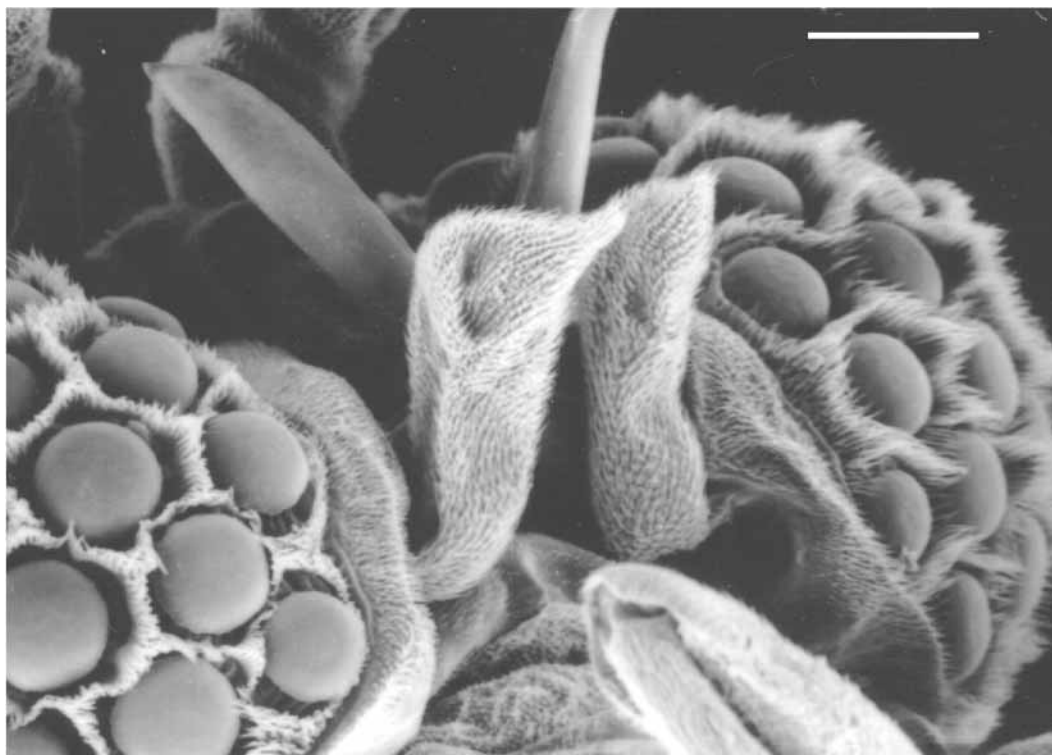


FIGURE 2. *Xenos hamiltoni* sp. n. SEM of lateral view of head. Scale bar=0.1 mm.

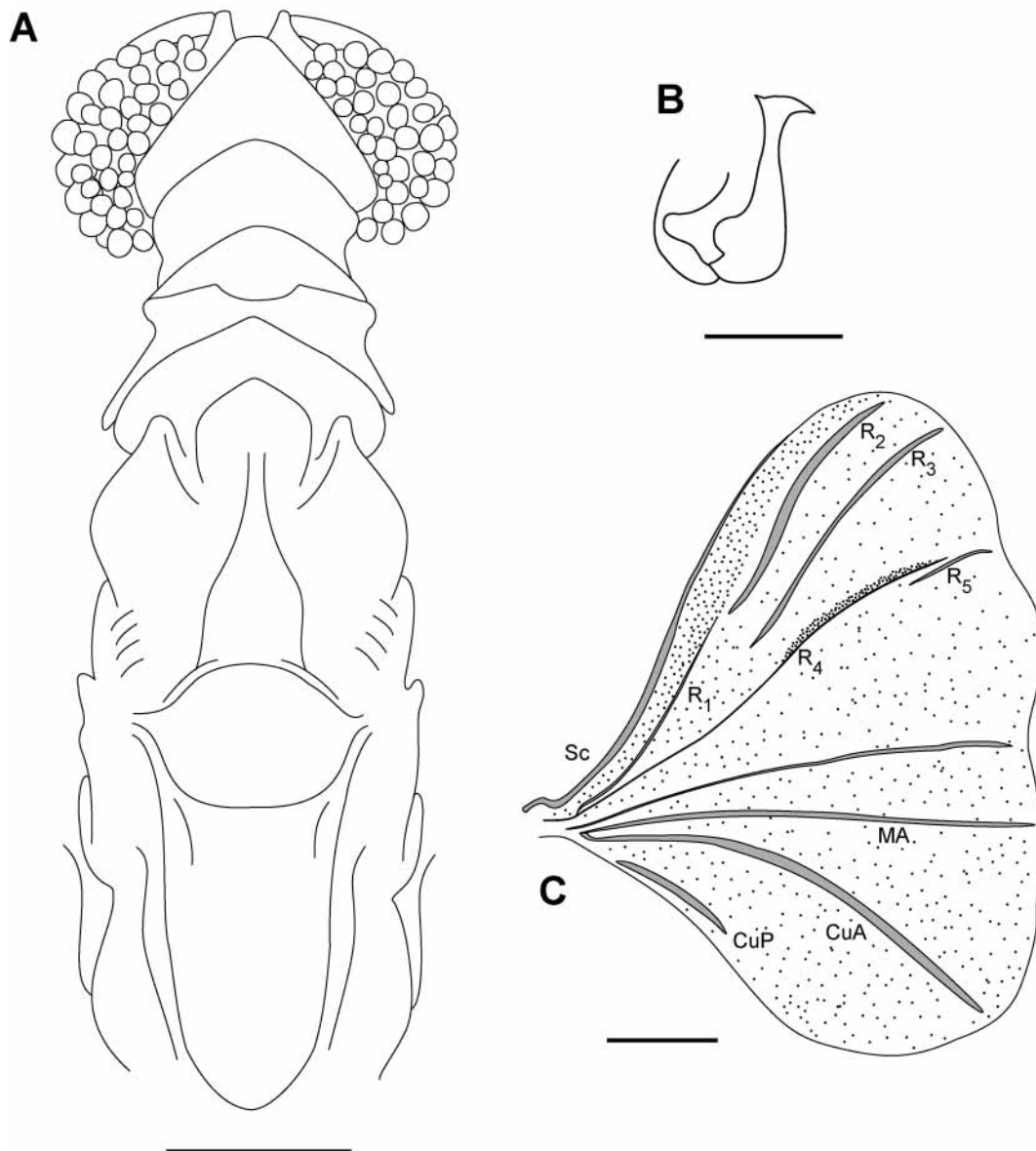
Wing:  $R_1$  is infuscated and interrupted in the middle;  $R_2$  arises a little after this and is as long as  $R_3$ ,  $R_4$  not reaching margin,  $R_5$  is short and arises below  $R_4$ , MA,  $CuA_1$ ,  $CuA_2$  and CuP present and uninterrupted. Length of wing (along its longest length) = 2.77–2.83 mm (Fig 3C).

Length of IX<sup>th</sup> abdominal segment, 0.25–0.26 mm (Fig 1D).

Length of aedeagus, 0.24–0.27 mm (Fig 3B).

Male cephalotheca. Length, 0.86–0.88 mm; width, 1.11–1.3 mm. The male cephalothecae extruded both between abdominal tergites and sternites (II–III, or III–IV or IV–V) (Table 1).

*Diagnosis.* This is the nineteenth species of *Xenos* to be described from Mesoamerica and the first from Mexico. The new species is distinguished by short, pointed maxillary palpi which fits in a socket of the basal segment. The aedeagus, with pointed anterior and posterior heads and a hump on the dorsal posterior region, and the lengths of the pro- and mesothorax, are more than a third of the length of the metathorax.



**FIGURE 3.** *Xenos hamiltoni* sp. n. A. Dorsal view of head and thorax. Scale bar=0.5mm. B. Aedeagus. Scale bar = 0.2 mm. C. Wing (right). Scale bar = 1.2mm.

**TABLE 1:** Position of the extruded male pupae of *Xenos hamiltoni* sp. n. in the abdomen of the wasp *Polistes carnifex* F.

Number of male pupae	Position on abdomen of <i>Polistes</i>
1	IIrd & IIIrd tergites
2	IIIrd & IVth tergites
2	IVth & Vth tergites
1	IVth & Vth sternites
2	IIIrd & IVth sternites

The new species can be distinguished from *X. zikani* which has no basal maxilla segment, a long palpus which is 1/8 shorter than mandibles (*X. hamiltoni* has a long basal segment and very short palpus),  $R_3$  arising close to  $R_4$  and  $R_5$  is absent in the wing ( $R_3$  not arising close to  $R_4$  and  $R_5$  present in *X. hamiltoni*) and hump on dorsal posterior of aedeagus absent.

*Etymology.* The new species is named after the late Bill Hamilton FRS, who inspired us to study the behavioural ecology of the Strepsiptera family Stylopidae.

## List of Strepsiptera from Mexico

**Family Corioxenidae** Kinzelbach 1970: 106

**Subfamily Triozocerinae** Kinzelbach 1970: 105

**Genus** *Triozocera* Pierce 1909: 86

Genotype: *Triozocera mexicana* Pierce

*T. mexicana* Pierce 1909: 86 ♂

*Triozocera texana* Pierce 1911: 491

*Triozocera paulistan* Kogan 1958: 421

*Triozocera mexicana* Shepard 1979: 217

Host: *Pangaesus bilineatus* (Say) (Hemiptera: Cydnidae) Johnson 1973; Smith & Pitts 1974

Distribution: Veracruz, Oaxaca

*T. tecpanensis* Brailovsky & Márquez 1974: 106 ♂

Host: unknown

Distribution: Tecpan de Galeana, Guerrero

*T. vernalis* Kifune & Brailovsky 1987: 132 ♂

Host: unknown

Distribution: Juárez, Puebla

**Subfamily Corioxeninae** Kinzelbach 1970: 106

**Genus** *Corioxenos* Blair 1936: 116

*C. acucyrtophallus* Cook 2001: 397 ♂

Host: unknown

Distribution: Chiapas

**Family Halictophagidae** Perkins 1905: 98

**Subfamily Halictophaginae** Perkins 1905: 98

**Genus** *Halictophagus* Dale (in Curtis 1832: 433)

Genotype: *Halictophagus curtisi* Dale

*H. acutus* Bohart 1943: 352 ♂, ♀,  $L_1$

Host: *Draeculacephala mollipes* (Say), *D. minerva* Ball (Homoptera: Cicadellidae) Johnston & Morrison 1979

Distribution: Atzacapotzalco, D. F.

*H. naulti* Kathirithamby & Moya-Raygoza 2000: ♂  
 Host: *Dalbulus maidis* (Delong & Wolcott) (Homoptera: Cicadellidae)  
 Distribution: Morelos, Tlatizapán

**Family Elenchidae** Perkins 1905: 106

**Genus** *Elenchus* Curtis 1831: 385  
 Genotype: *Stylops walkeri* Curtis (= *Elenchus tenuicornis* (Kirby))

*E. butzei* Brailvosky 1981: 374 ♂  
 Host: unknown  
 Distribution: Tecolutla, Veracruz

*E. koebelei* Pierce 1908: 81 ♂  
*Elenchus tenuicornis* Baumert 1959: 400  
*Elenchus heidemanni* Pierce 1918: 481  
 Host: *Liburnia* sp., *Prokelisia marginata* (Van Duzee), *Prokelisia dolus* Wilson, *Sogatella kolophon* (Kirkaldy) (Hemiptera: Delphacidae)  
 Distribution: Northern District

*E. mexicanus* (Pierce 1961: 467) ♂, ♀, L<sub>1</sub>  
*Sogatelenchus mexicanus* Pierce 1961: 740  
 Host: *Sogatodes* (*Sogata*) *cubana* (Crawford) (Homoptera: Delphacidae)  
 Distribution: Cotaxtla, Veracruz

**Family Myrmecolacidae** Saunders 1872: 20

**Genus** *Caenocholax* Pierce 1909: 88  
 Genotype: *Caenocholax fenyessi* Pierce 1909

*C. fenyessi* Pierce 1909: 88 ♂  
 Host: unknown  
 Distribution: Veracruz, Tabasco

*C. fenyessi waloffi* Kathirithamby & Johnston 2004: ♂, ♀  
 Host: *Dolichoderus bispinosus* Olivier #m; *Macroanaxipha macilenta* (Saussure) #f  
 Distribution: Veracruz, Los Tuxtlas

**Genus** *Stichotrema* Hofenedera 1910: 47  
 Genotype: *Stichotrema dallatorreanum* Hofeneder

*S. mexicanum* Kifune & Brailovsky 1987: 135 ♂  
 Host: unknown  
 Distribution: Los Tuxtlas, Veracruz

*Stichotrema beckeri* (Oliveira & Kogan 1959) Kinzelbach 1983: 33 ♂  
*Caenocholax beckeri* Oliveira & Kogan 1959: 224  
*Stichotrema trilobulata* Brailovsky 1974: 169  
*Stichotrema beckeri* Luna de Carvalho 1978: 356  
*Stichotrema beckeri* Kinzelbach 1983: 33 (fossil amber)  
*Caenocholax wygodzinskyi* Oliveira & Kogan 1959: 225  
*Stichotrema trilobulatum* Kifune & Brailovsky 1987: 137  
*Stichotrema beckeri* Kinzelbach & Pohl 1994: 62 (fossil amber)  
 Host: unknown  
 Distribution: Galeana, Guerrero



**Family Stylopidae** Kirby 1813

**Genus** *Melittostylopus* Kinzelbach 1971: 170 ♂  
 Genotype: *Melittostylopus hesparapium* Kinzelbach

*M. hesparapium* Kinzelbach 1971: 170  
 Host: *Hesperapis rhodocerata* (Cockerell), *H. leucra* (Cockerell) (Hymenoptera: Melittidae)  
 Distribution: Chihuahua, Baja California

**Genus** *Xenos* Rossi 1793: 49  
 Genotype: *Xenos vesparum* Rossius

*X. hamiltoni* Kathirithamby & Hughes n. sp. ♂  
 Host: *Polistes carnifex carnifex* F. (Hymenoptera: Vespidae)  
 Distribution: Los Tuxtlas, Veracruz

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