

Mepraia gajardoi: a new species of Triatominae (Hemiptera: Reduviidae) from Chile and its comparison with *Mepraia spinolai*

Mepraia gajardoi: una nueva especie de Triatominae (Hemiptera: Reduviidae) para Chile y su comparación con *Mepraia spinolai*

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ABSTRACT

Mepraia gajardoi n. sp. is described from specimens collected in the Chilean coastal desert. Egg, color pattern, morphological characteristics of both adult and nymphs are described. Its distinctive features are overall color black, male always winged and hemelytra with apex pointed, conexivum with little reddish spots, fore tibia with short and bent hairs, head, thorax and leg of nymphs shiny black. Karyotype with Y chromosome bigger than the X1 and X2 ones. Geographical distribution restricted from 18° to 26°S. Experimental cross-breeding showed that *M. gajardoi* have a reproductive isolation from *M. spinolai*.

Key words: Hemiptera, Reduviidae, new species, *Mepraia*, karyotype, Chile

RESUMEN

Mepraia gajardoi n. sp. es descrita de ejemplares recolectados en el desierto costero del norte de Chile. Se describen además características morfológicas de sus estados inmaduros. Color general negro, macho siempre alado y con el ápice del hemielitro aguzado, conexivo con pequeñas manchas rojizas, tibia anterior con pelos cortos y curvos, cabeza, tórax y patas de las ninfas negro brillante. El cariotipo se caracteriza por presentar el cromosoma Y más grande que los cromosomas X1 y X2. La distribución geográfica se extiende desde los 18° a los 26°S. Cruzamientos experimentales hechos en laboratorio muestran que *M. gajardoi* n. sp. presenta aislamiento reproductivo con *M. spinolai*.

Palabras clave: Hemiptera, Reduviidae, nueva especie, *Mepraia*, cariotipo, Chile

INTRODUCTION

Mepraia spinolai (Porter) is an endemic species from Chile with an outstanding alary polymorphism. Females are always micropterous, nevertheless, males could be macropterous, brachypterous or micropterous (Mazza et al. 1940, Neiva & Lent 1940a, 1943, Gajardo 1953, Lent & Jurberg 1967, Frías et al. 1987). Porter (1934) described this species as *Triatoma spinolai* from a macropterous male collected near Vicuña (Region IV of Chile). Usinger (1939) described a new species, *Triatoma chilena*,

from specimens collected in Coquimbo, Region IV, Chile. Later, considering only micropterous males and females, Neiva & Lent (1940a) described *Triatomaptera porteri*. Neiva & Lent (1940b) and Mazza et al. (1941) considered this species as a synonym of *Triatoma spinolai*. Recently, *Mepraia* was revalidated considering, in addition to alary polymorphism, the character of the male genitalia (Lent et al. 1994). Mazza et al. (1940) erected the genus *Mepraia* from *Triatoma spinolai* Porter with specimens collected in the Region IV (Paihuano).

M. spinolai is distributed between 18° and 34°S from sea level (Region I) until 3000 m above sea level in the Region IV (Gajardo-Tobar 1953), but we think that the populations from Region I and II (18° to 26° S) correspond to a new species described in this work. *M. spinolai* is a wild species, nevertheless also can be found in peridomestic environments and occasionally is found in the human houses (Schofield et al. 1982). Both adult and nymphs stages are hematophagous, feeding preferably on wild and domestic mammals. Their feeding activity is during daylight, in contrast to other species of Triatominae that feed only at night. This species is associated to stones and rock crevices (Gajardo-Tobar 1953). The purpose of this paper is to describe a new species of *Mepraia* from specimens collected in the coast of the Region I and II, Chile, this zone is denominated by Di Castri (1975) as Coastal desert.

MATERIALS AND METHODS

One hundred and seven specimens (adults and nymphs) were collected in the coast of Region I and II, Chile, from the following localities: Region I: Arica, Caleta Vitor, located on the coast on a nest of a sea bird, 65 km south of Arica city, Punta de Lobos, located 90 km south of Iquique city; Region II: Piedras Negras, located near the coast, 60 km south of Tocopilla city, Bandurrias, 22 km south of Paposo and Cachinales, 23 km south of Paposo. The specimens were transported to the laboratory in plastic boxes. With comparative purposes we utilized one hundred and ten adults and nymphs of *M. spinolai* collected in the Region III (Parque Nacional Pan de Azúcar; Inca de Oro, Mina San Vicente, 16 km north east of Estación Chimbero), Region IV: Pueblo Hundido, 3 km south of Combarbalá city; Mina Monteverde 12 Km west of Illapel city; Region V: El Melón, 12 km northeast of

Nogales city. Metropolitana Region: Til-Til, 55 km northwest of Santiago city; Colina, Canteras de Quilapilún, 41 km north of Santiago city.

The specimens used in this study and the type material are deposited at the Insect Collection of the Instituto de Entomología, Universidad Metropolitana de Ciencias de la Educación, Santiago, Chile (IEUMCE-Chile) and in the Museo Nacional de Historia Natural, Santiago - Chile (MNHN-Chile). All measurements, are in mm, and were made with an ocular micrometer in a stereoscopic microscope. Drawings were made with a camera lucida attached to the stereoscopic microscope. In the female and males were made the followings measurements:

I. HEAD: Head + neck length (HNL), anteocular length (AL), postocular length (PL), 1st rostral segment (1RS), 2nd rostral segment (2RS), 3rd rostral segment (3RS), 1st antennal segment (1AS), 2nd antennal segment (2AS), 3rd antennal segment (3AS), 4th antennal segment (4AS), ocellar diameter (OD), synthlipsis (SY), eyes width (EW), eyes height (EH), ocellar distance (ODI), width head (WHD).

II. THORAX: Pronotum length (PRL), scutellum length (SL), maximum width pronotum (MAWP), minimum width pronotum (MIWP), hemelytra length (HL), hemelytra width (HW).

III. ABDOMEN: Abdomen length (ABL), abdomen width (ABW), body length (BL).

Similar measurements were made on nymphs of I (n = 23), II (n = 16), III (n = 11), IV (n = 6) and V (n = 8) stages. Width and length of eggs were measured and width/length index was calculated. The chorion surface was examined by scanning electron microscopy. Gonads were utilized for chromosome description, then karyotypes were obtained by classic squash lacto-acetic orcein method (Frías et al. 1982). Meiotic plates were obtained by C-banding techniques with barium hydroxide (Sumner 1972). Some of the C-banding preparations were obtained with a laser scanning microscope 633 (Helium-Neon) Carl Zeiss

model 210 from the Michigan State University and others with Optical Leitz Laborlux K microscope from Instituto de Entomología, UMCE. Moreover, reciprocal cross-breeding were carried out between *M. gajardoi* and *M. spinolai* (Table 2) in order to assess the degree of reproductive isolation between these species.

The terminology follows that of Lent & Wygodzinsky (1979) and Frías et al. (1987).

RESULTS

Mepraia gajardoi n. sp

Holotype: Female, Región I, Arica, Caleta Vitor, 65 km south of Arica city, May. 07. 1995, A Henry coll., deposited in IEUMCE (number 991). Paratypes: 1 female and 1 male, same data and locality as holotype, D Frías and C González colls, May 07. 1995, deposited in MNHN-Chile (numbers 4858 and 4859, respectively); 2 females and 2 males, same data and locality as holotype, D. Frías and C González colls, May 07. 1995, deposited in IEUMCE (numbers 992, 993, 994 and 995, respectively); 1 female, Arica city of Morro de Arica, July. 1993, G Navarrete coll; 1 female and 2 males, Punta de Lobos, 90 km south of Iquique, August. 04. 1995, A Henry and C González colls; 3 females and 3 males Piedras Negras, 60 km north of Tocopilla, August. 05. 1995, A Henry and C González colls, 2 males Cachinales beach, 23 km south of Paposo, A Henry and I. Mellado colls.; 1 female and 2 males, Bandurria, 22 km south of Paposo, December. 18. 1995, D Frías and A. Alviña colls. All these other 15 Paratypes (6 females and 9 males) were deposited in IEUMCE-Chile (numbers 996-1010).

Locality-type: Caleta Vitor, 65 km south of Arica city.

Distribution: *M. gajardoi* is distributed between 18° and 26° S in the "Desierto Litoral" in the coast of Region I and II, Chile. Region I: Arica Province: Arica City, Caleta Vitor. Iquique Province: Punta

de Lobos. Region II: Antofagasta Province: Piedras Negras, Cachinales, Bandurria. (Fig. 15).

Diagnosis

This species is characterized by the following features: overall color black, male always winged and hemelytra with apex pointed, connexivum with reddish little spots. Fore tibia pilosity with short and bent hairs. First abdominal segment of the female in dorsal view rounded in posterior margin; VIIth abdominal segment of the male subrectangular. Head, thorax and leg of nymphs shiny black. The karyotype has 20 autosomes and X1X2Y sex determination mechanism. The Y chromosome is bigger than the X1 and X2 ones.

Description

Female: Overall color black. Micropterous. Head: black, strongly granulous, Antennae black with long hairs in all segments. Rostrum black with rostral segments slender. Eyes small never reaching the inferior level of the head. Thorax: pronotum subtrapezoidal uniformly black. Anterior lobe weakly granulous. Posterior lobe rugose. Anterolateral projections blunt annulated and longer than in *M. spinolai*. Scutellum subtriangular, black on semicircular sclerite; posterior process reduce. Mesosternum with a transverse straight ridge. Microelytra reaching until the first segment of the abdomen. Legs uniformly black, with the exception of the tarsi that are darker brown. Tibia with short, erected and curved hairs. Abdomen: ovoid, black with small lateral reddish spots on the dorsal part of connexivum; finely striated transversally. First abdominal segment, in dorsal view, rounded in posterior margin. Venter convex, also finely striated transversally and without spots on the connexivum and with elongate erect setae and not semierect as in *M. spinolai*, less numerous on the

posterior segment than in *M. spinolai*. Spiracles close to but not reaching connexival suture and enclosed in light brown spot (Fig. 11). Genitalia as in Fig. 1.

Male: Overall color black. Brachypterous, hemelytra never attaining or the apex of the abdomen like macropterous male of the *M. spinolai*. Head: rugose, with short and curved black pilosity. Antennae hairy, similar to female. First antennal segment not reaching the apex of the clypeus. Rostrum of same color as head; rostral segments slender. Neck lighter than head, light brown. Clypeus narrow, slightly widened at apex and gradually so on posterior third. Thorax: pronotum subtrapezoidal, uniformly dark. Anterior lobe with limited granulosity, disposed in circles and darker than the rest of the anterior lobe. Posterior lobe dark, rugose striated transversally. Scutellum subtriangular on the semicircular sclerite, heavily rugose with median longitudinal impression. Posterior process of scutellum small, conical and up-turned. Sterna lighter than terga. Hemelytra never attaining the apex of the abdomen, color uniformly dark gray with apex acute (Fig. 2). Legs uniformly black, long and slender specially the hind ones. Tibiae heavily hairy with both short and long hairs. Abdomen: ovoid. Terga black, concave, finely striated transversally.

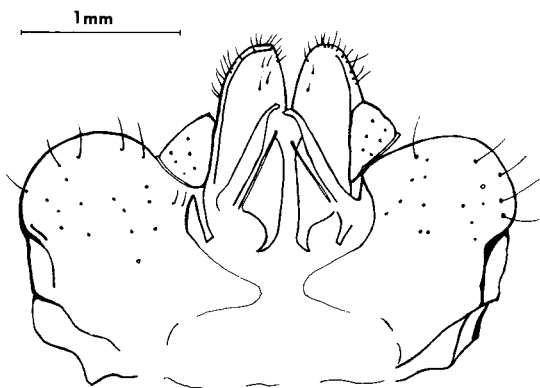


Fig. 1: Female genitalia of *M. gajardoi* in dorsal view.

Genitalia femenina de *M. gajardoi* en vista dorsal.

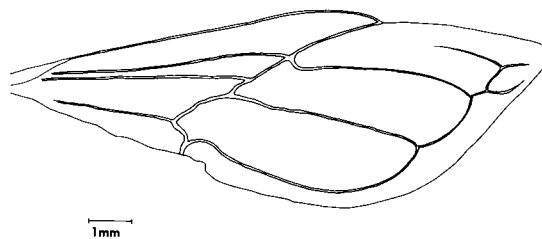


Fig. 2: Fore wing of *M. gajardoi* male.

Ala anterior de macho de *M. gajardoi*.

VIIIth abdominal segment subrectangular. Sterna black convex; finely striated transversally and with elongate erect hairs most numerous on posterior segments. Spiracles close to but not adjoining at the connexival suture and enclosed in light brown spot. Connexivum with reddish small spots (Fig. 12). Genitalia: as in Figs. 3, 4 and 5. Measurements of 25 variables, both females and males are shown in Table 1.

Etymology: This species is dedicated to Dr R Gajardo-Tobar in recognition of his great work on Triatominae, specially in *M. spinolai* in Chile.

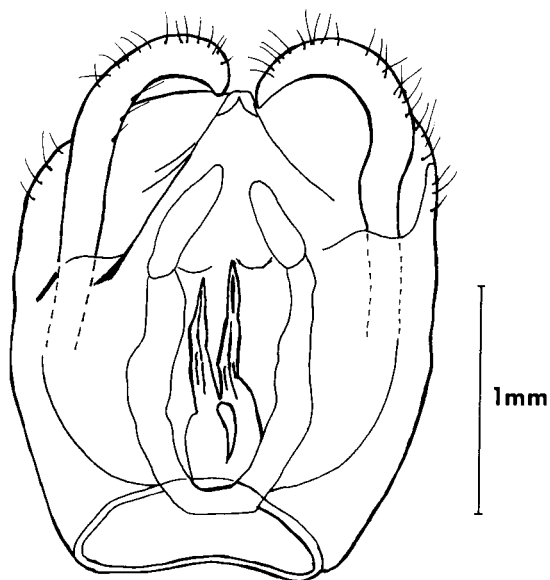


Fig. 3: Genitalia of *M. gajardoi* male in dorsal view.

Genitalia masculina de *M. gajardoi* en vista dorsal.

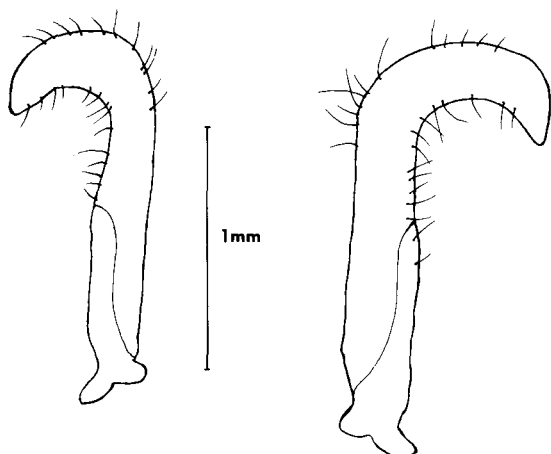


Fig. 4: Parameres of *M. gajardoi* male.
Parámetros del macho de *M. gajardoi*.

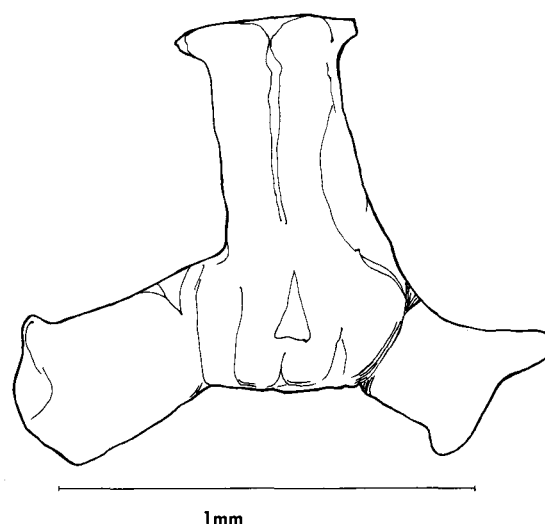


Fig. 5: Articular apparatus of *M. gajardoi* male in dorsal view.
Aparato articulario de *M. gajardoi* en vista dorsal.

TABLE 1

Mean, range and standard deviation of the 25 variables measured (mm) in *M. gajardoi*.
Sample size: 10 males and 6 females.

Promedio, rango y desviación estándar de 25 variables medidas (mm) en *M. gajardoi*.
Tamaño de la muestra: 10 machos y 6 hembras

Variables	Mean		Range		Standard deviation	
	Male	Female	Male	Female	Male	Female
I. HEAD						
HNL	4.10	4.73	3.9-4.3	4.3-5.0	0.15	0.27
AL	2.52	3.06	2.2-2.7	2.9-3.2	0.10	0.12
PL	0.82	0.93	0.7-1.0	0.8-1.0	0.09	0.10
1RS	1.05	1.25	1.0-1.2	1.1-1.4	0.08	0.12
2RS	2.72	3.02	2.5-2.9	2.9-3.2	0.13	0.08
3RS	0.76	0.82	0.6-0.9	0.8-0.9	0.10	0.04
1AS	1.01	1.00	0.9-1.2	0.9-1.1	0.09	0.06
2AS	4.24	3.76	3.7-5.0	3.3-4.5	0.54	0.46
3AS	3.00	2.83	2.7-3.3	2.3-3.7	0.24	0.54
4AS	2.15	2.06	2.0-2.3	2.0-2.2	0.21	0.11
OD	0.24	0.24	0.2-0.3	0.2-0.3	0.04	0.05
SY	0.95	1.35	0.9-1.1	1.3-1.5	0.07	0.08
EW	0.78	0.68	0.7-0.9	0.6-0.7	0.06	0.04
EH	1.20	1.11	1.1-1.3	1.0-1.2	0.05	0.07
ODI	0.83	1.13	0.7-1.0	1.0-1.2	0.10	0.08
WHD	2.08	2.19	2.0-2.2	2.1-2.3	0.06	0.10
II. THORAX						
PRL	2.75	2.53	2.5-2.9	2.3-2.8	0.13	0.18
SL	1.38	1.15	1.1-1.6	0.8-1.6	0.16	0.26
MAWP	4.03	3.48	3.8-4.3	3.1-3.9	0.14	0.33
MIWP	1.72	2.05	1.6-1.9	1.8-2.3	0.08	0.18
HL	12.0	1.69	11.0-13.5	1.5-1.9	0.79	0.18
HW	3.86	0.99	3.6-4.3	0.9-1.0	0.25	0.02
III. ABDOMEN						
ABL	11.0	12.1	11.0-13.5	11.0-12.9	1.01	0.75
ABW	5.50	8.20	5.0-6.0	7.0-9.2	0.50	0.80
BL	20.2	12.2	19.5-21.0	20.0-22.5	0.64	1.06

Description of immature stages

Egg: White, length 2.45 (mean)(range: 2.28-2.64), width 1.55 (mean)(range: 1.49-1.64), width/length index 1.57 (mean), n=30. Morphology of the chorion by scanning electron microscope is observed in Fig. 6. *M. gajardoi* egg is longer and wider than in *M. spinolai*.

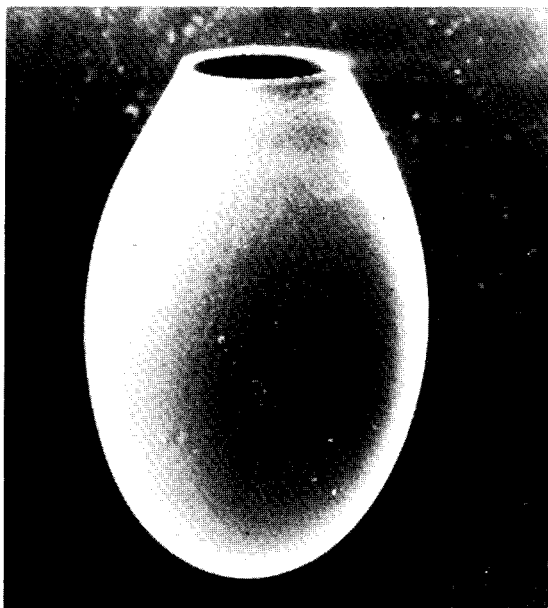
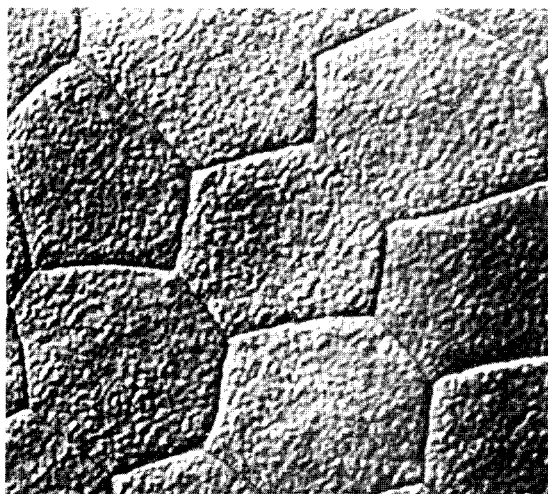


Fig. 6: Egg structure and form of *M. gajardoi* obtained with scanning Microscope A: surface sculpture of chorion, 1000x. B: structure and shape 30x.

Estructura y forma del huevo de *M. gajardoi* obtenida con un microscopio de barrido A: esculpido del corion 1000x. B: estructura y forma 30x.

First instar nymphs: Head, thorax, legs and 1st, 2nd and 3rd antennal segments are blackish. 4th antennal segment brown. Abdomen reddish brown in dorsal view. Both legs and antennae with setae shorter and less numerous than in *M. spinolai*. Anterolateral projection of the pronotum whitish. Measurements: body length 4.3-4.6. Head: length 1.5-1.6; width 0.7. First antennal segment 0.3, second antennal segment 0.7, third antennal segment 0.9-1.0, fourth antennal segment 1.0. Synthlipsis 0.45-0.5. Eye width in dorsal view 0.2, eye height in lateral view 0.25. Thorax: length 0.4-0.5, maximum width 0.9, minimum width 0.7. Scutellum 0.25. Abdomen length in dorsal view 2.2-2.5, width 1.7-1.8.

Second instar nymphs: Head and thorax like first instar nymph. Abdomen reddish brown on the border with half of the dorsal region dark brown and the last abdominal segment with shining blackish brown spots. Legs with short setae. Measurements: body length 10.0. Head: length 2.6-2.7, width 1.2. Rostrum length 2.6. First antennal segment 0.5, second antennal segment 1.1, third antennal segment 1.5, fourth antennal segment 1.4. Synthlipsis 0.8. Eye width in dorsal view 0.30, eye height in lateral view 0.5. Thorax: length of pronotum 0.9. Maximum width 1.5, minimum width 1.1. Abdomen: length in dorsal view 5.0, width 3.8.

Third instar nymphs: Head, thorax and legs shining dark brown. Abdomen light brown. Last urostergites and urosternites shining brown, strongly granulated. Anterolateral projection of the pronotum blunt. Lateral border of pronotum whitish. Measurements: body length 11.3-11.8. Head: length 2.9-3.2, width 1.4-1.6. Rostrum length 3.0-3.3. First antennal segment 0.5-0.6, second antennal segment 1.8-2.0, third antennal segment 1.9, fourth antennal segment 1.5. Synthlipsis 0.9-1.0. Eye width in dorsal view 0.3, eye height in lateral view 0.6. Thorax: length of pronotum 1.0, maximum width 1.7-1.9, minimum width 1.3-1.4. Abdomen length in dorsal view 5.2-5.4, width 3.5-3.8.

Fourth instar nymphs: Head, antenna, legs, thorax uniform brown blackish. Last abdominal segments blackish in dorsal view. Legs hairy with abundant short hairs. Measurements: body length 12. 5. Head: length 3. 3, width 1. 5. Length of rostrum 3. 4. Synthlipsis 1. 0. Eye width in dorsal view 0. 45, eye height in lateral view 0. 65. Thorax: length 1. 1. Pronotum: maximum width 2. 0, minimum width 1. 5. Abdomen length in dorsal view 7. 0, width 5. 0.

Fifth instar nymphs: Similar coloration to fourth instar nymph. Anterior border of pronotum clearer than the rest of the segments. Urosternites light brown. Males with wing sketch, females without wing sketch. (Fig. 13 and 14) Measurements: body length 17. 0. Head: length 3. 9, width 2. 0. First antennal segment 0. 8, second antennal segment 2. 9, third antennal segment 2. 6, fourth antennal segment 1. 8. Synthlipsis 1. 25. Eye width in dorsal view 0. 55, eye height in lateral view 0. 75. Thorax: length 1. 6. Pronotum: maximum width 2. 75, minimum width 1. 8. Abdomen length in dorsal view 10. 0, width 7. 0.

Chromosomic Remarks

The karyotype of the *M. gajardoi* is constituted by $2n=20$ autosomes and a complex system of sex determination $X1X2Y$. Thus, the sexual chromosomes in the males are $X1X2Y$ ($2n=23$) and in the females $X1X1X2X2$ ($2n=24$). The Y chromosome is bigger than X1 and X2 ones. Moreover the Y chromosome is C positive in C banding (Figs. 9a and 9b). In the meiosis, in leptotene of prophase I, the sex chromosome are strongly heteropicnotic, and the autosomes appear independently dispersed with very few telomeric or intercalary heterochromatic regions. (Fig. 10).

Reproductive Isolation

Table 2 show the results of reciprocal cross-breeding between *M. spinolai* and *M. gajardoi*. This result indicated that the fertility between *M. spinolai* male with *M. gajardoi* female is of 10. 4%, while the fertility between *M. gajardoi* male and *M. spinolai* female is scarcely of 5. 9%. On the other hand, the control cross-breeding between male and female of *M. spinolai* show a 48. 9% of fertility.

TABLE 2

Percentage of fertility of the reciprocal cross-breeding between *M. gajardoi* and *M. spinolai*.

Porcentaje de fertilidad en cruzamientos recíprocos entre *M. gajardoi* y *M. spinolai*.

Type of cross	Number of crosses	Number of eggs laid	N° of eggs hatching	Fertility (%hatching)
Male <i>M. gajardoi</i>	18	539	32	5. 9
X				
female <i>M. spinolai</i>				
male <i>M. spinolai</i>	4	48	5	10. 4
X				
female <i>M. gajardoi</i>				
male <i>M. spinolai</i>	38	1952	956	48. 9
X				
female <i>M. spinolai</i>				

DISCUSSION

M. gajardoi is different to *M. spinolai* in its body color, length and distribution of the fore tibia pilosity. Besides, in *M. gajardoi* the anterolateral projection of the pronotum are blunt and small while in *M. spinolai* these are conical and acute. The VII abdominal segment of the male in *M. gajardoi* is subrectangular while in *M. spinolai* is rounded. In *M. gajardoi* females the first abdominal segment in dorsal view is rounded in its posterior margin while in *M. spinolai* is more pointed. Furthermore, reddish spots of connexivum are smaller than in *M. spinolai* (Table 3 and Fig. 7) although Cachinales females, (south of Paposo, Region II, 25° Latitude South), are largest and different shape. Males of *M. gajardoi* are always brachypterous while *M. spinolai* are macropterous, brachypterous

and micropterous according of locality (Frías et al. manuscript). Its geographical distribution is limited to coastal desert of the Region I and II (18° until 26° S) while *M. spinolai* would be distributed only from Region III until Metropolitan Region (26° to 33° Lat. South) (Fig. 11). The karyotype of *M. gajardoi* is different to that of *M. spinolai* in the following characters: the sex determination system in *M. gajardoi* is X1X2Y while in *M. spinolai* is X1X2Y1Y2. The Y chromosome in *M. gajardoi* is longer than X1 and X2 chromosomes (Figs. 9a and 9b), while in *M. spinolai* there are Y1 and Y2 similar in size to X1 and X2 chromosomes. Furthermore, in leptotene of prophase I of *M. gajardoi* the autosomes are independently dispersed, while in *M. spinolai* the sex chromosomes in leptotene of prophase I form a chromocenter (Fig. 10) (Frías & Atria manuscript).

TABLE 3

Morphological differences between *M. gajardoi* and *M. spinolai*.Diferencias morfológicas entre *M. gajardoi* y *M. spinolai*

Character	<i>M. gajardoi</i>	<i>M. spinolai</i>
Pronotum	shiny black	Brown
Anterolateral projection Pronotum	blunt and small	conical and acute
Spots of conexivum	very small or absent	Large
Male hemelytra	always winged. Never attaining of the apex of the abdomen, pointed in the apex	sometime winged. Surpassing the apex of the abdomen, rounded in the apex
Fore tibiae pilosity	with short and bent hairs	with long and straight hairs
First abdominal segment of the female in dorsal view	rounded in posterior margin	more pointed
VII abdominal segment of the male	Subrectangular	rounded
Length and width of the thorax in female	wide and long	narrow and short
Color of nymph: head, thorax and legs	shiny black	dark brown
Sexual chromosome	without chromocenter in the leptotene of Prophase I	With chromocenter in leptotene of Prophase I
Heterochromatin	absent or scarce in telomeric zone	Abundant in telomeric zone
Y chromosome	longer than X chromosome	Similar size to X chromosome
Sex determination system	X1X2Y	X1X2Y1Y2

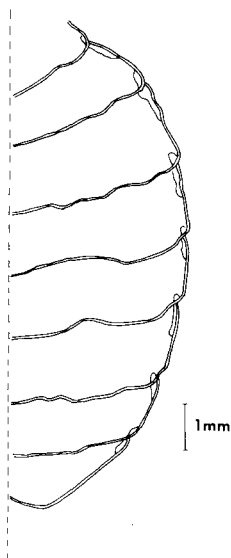


Fig. 7: Abdomen of *M. gajardoi* female in dorsal view.

Abdomen de la hembra de *M. gajardoi* en vista dorsal.

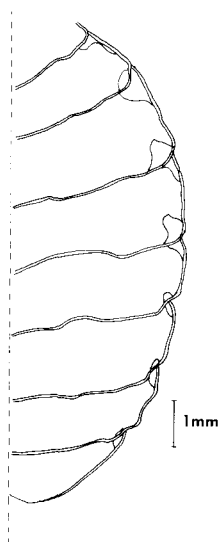


Fig. 8: Abdomen of *M. spinolai* female in dorsal view.

Abdomen de la hembra de *M. spinolai* en vista dorsal.

Reciprocal cross-breeding between *M. gajardoi* and *M. spinolai* shows reproductive isolation between this species. This suggest strong constraints of genic flux among *M. gajardoi* and *M. spinolai* by reasons of geographical isolation and chromosomic differentiation.

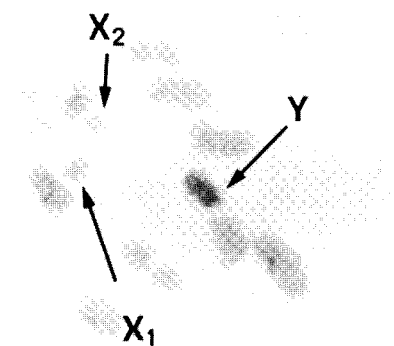
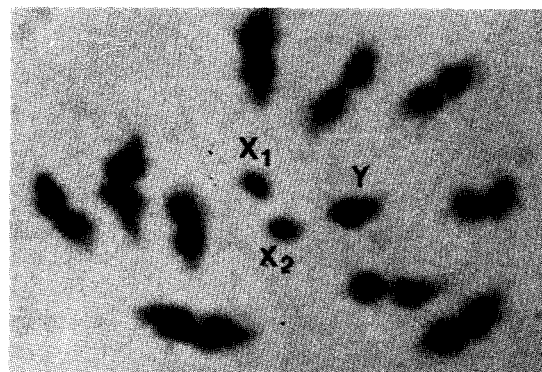


Fig. 9: Meiosis of *M. gajardoi* male. A: C banding Metaphase I obtained with optical Leitz Laborlux K Microscope. B: C banding Metaphase I obtained with Laser Scanning Microscope 633 (Helium Neon), Carl Zeiss.

Meiosis de macho *M. gajardoi* A: Bando C, metafase II obtenida con microscopio Leitz Laborlux K. B: Bando C Metafase I obtenida con un microscopio de barrido láser.

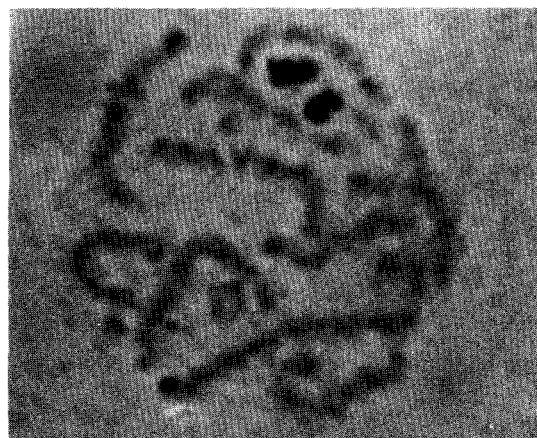


Fig. 10: Meiosis of *M. gajardoi* male. Leptotene of Prophase I.

Meiosis de macho de *M. gajardoi*. Leptoteno, profase I.

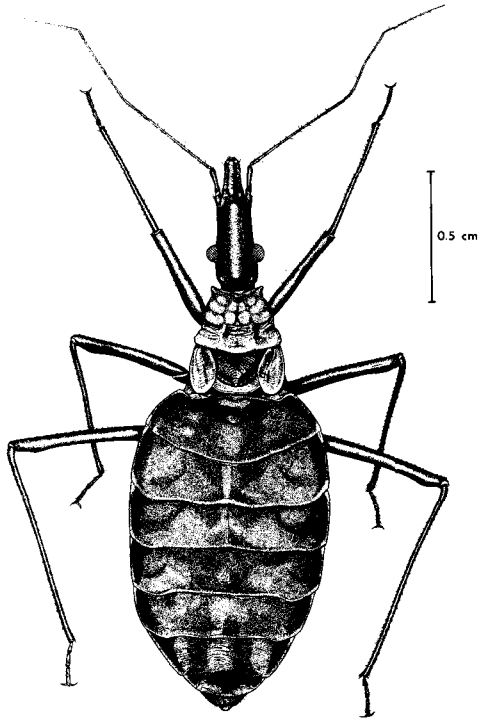


Fig. 11: Female of *M. gajardoi*.
Hembra de *M. gajardoi*.

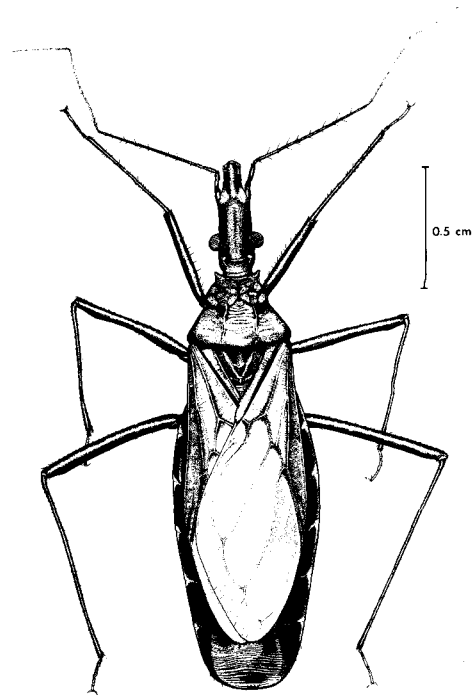


Fig. 12: Male of *M. gajardoi*.
Macho de *M. gajardoi*.

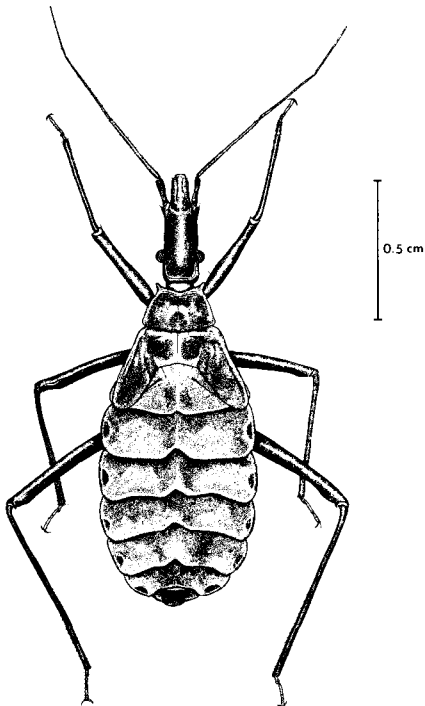


Fig. 13: Fifth instar nymph male of *M. gajardoi*. The wing sketch are observed.
Ninfa macho de V estado de *M. gajardoi* se observan esbozos alares.

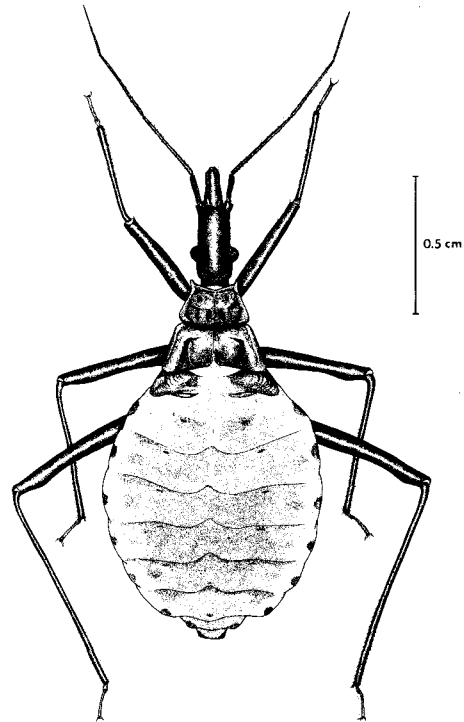


Fig. 14: Fifth instar nymph female of *M. gajardoi*.
Ninfa hembra de V estado de *M. gajardoi*.

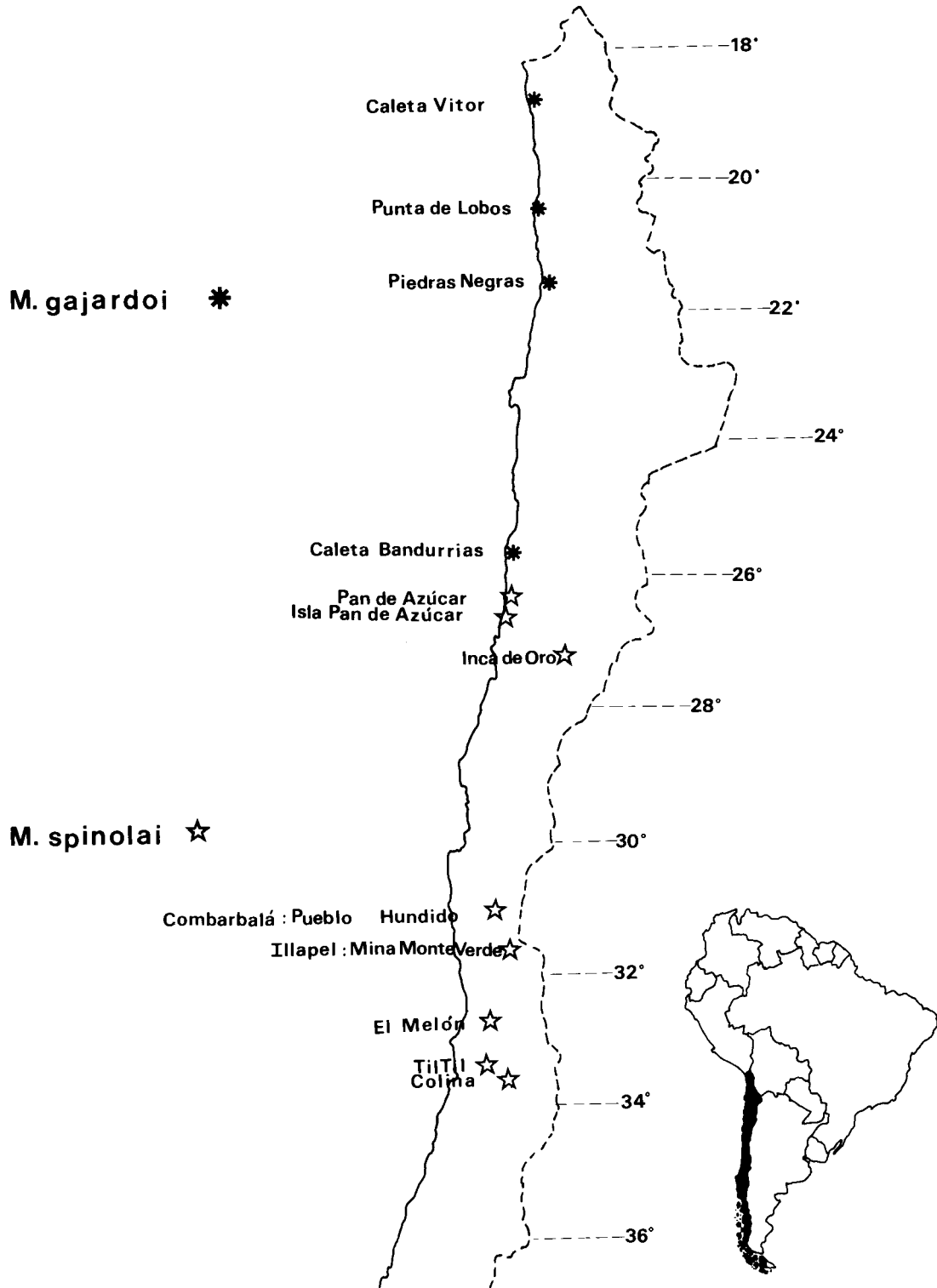


Fig. 15: Geographical distribution of *M. gajardoi* and *M. spinolai*.

Distribución geográfica de *M. gajardoi* y *M. spinolai*.

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