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DISTRIBUTION OF SPECIES AND SPECIES-GROUPS OF *ALEIODES* (HYMENOPTERA: BRACONIDAE) IN MEXICO

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ABSTRACT. A study was made of *Aleiodes* species recorded in Mexico, and specimens deposited in various collections. Using the criteria of Fortier and Shaw (1999), eight species groups were recognized from Mexico, with 21 described and 27 undescribed species recorded. These are first records in Mexico for *A. earinos* Shaw, *A. graphicus* (Cresson), *A. notozophus* Marsh and Shaw and *A. politiceps* (Gahan). The genus is widely distributed in Mexico, being present in 28 of 31 states. Results are discussed in relation to the richness patterns hypotheses of other authors.
KEY WORDS: *Aleiodes*, Mexico, distribution, Rogadinae, parasitoids.

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RESUMEN. El estudio se realizó con las especies de *Aleiodes* registradas en México y material depositado en varias colecciones. Utilizando los criterios de Fortier y Shaw (1999) se reconocieron ocho grupos de especies presentes en México. Se registraron 21 especies descritas y 27 no descritas. Las especies *A. earinos* Shaw, *A. graphicus* (Cresson), *A. notozophus* Marsh y Shaw y *A. politiceps* (Gahan) son primeros registros para México. El géneromuestra amplia distribución en México, estando presente en 28 de los 31 estados. Se discuten los resultados con respecto a las hipótesis de otros autores sobre patrones de riqueza.
PALABRAS CLAVE: *Aleiodes*, México, distribución, Rogadinae, parasitoides.

Aleiodes Wesmael, 1838 is a cosmopolitan genus of parasitic wasps. All the species within this genus are koinobiont endoparasitoids of Lepidoptera, principally nocturnal, from the families Arctiidae, Bombycidae, Choreutidae, Drepanidae, Gelechiidae, Geometridae, Hesperiidae, Incurvariidae, Lasiocampidae, Limacodidae, Lycaenidae, Lymantridae, Lyonetiidae, Noctuidae, Notodontidae, Nymphalidae, Psychidae, Pyralidae, Sphingidae, and Tortricidae (Shenefelt, 1975; Shaw and Huddleston, 1991; Shaw, 1995, 1997; Fortier, 1997).

As with other members of the Subfamily Rogadinae, the majority of these species insert the ovipositor in the host twice during oviposition. First, to paralyze the host larva by injecting venom into it, and second to introduce their eggs (Shaw, 1983). In some *Aleiodes* species the

venom injection does not occur, apparently to reduce the risk of the larva falling to the ground (Shaw and Huddleston, 1991).

Of the few rogadine species studied, most have five larval stages. Of all the braconid species attacking Lepidoptera, these are the only ones that mummify the host larvae in which they pupate (Shaw and Huddleston, 1991). Aphidiinae braconids also mummify their host, but they develop exclusively in aphids. In many of the species of *Aleiodes*, the female wasp oviposits in an early instar, with the wasp larva feeding slowly and not killing the host until later instars. The mummy is usually produced during the final larval stage of the host but sometimes in earlier instars. There are species of *Aleiodes* that attack from the first to the fourth larval stages (Wallner and Grinberg, 1984; Cave, 1995). The mummified host is fixed to the substrate by the parasitoid larva through a hole cut in the host integument. Upon emerging, the adults cut an emergence opening with uniform borders in the extreme posterior, dorsal portion of the mummified host (Shaw, 1983; Shaw and Huddleston, 1991). The majority of these species are solitary parasitoids that can be attracted by light during the night (Shaw and Huddleston, 1991), though some gregarious species are known, such as *A. stigmator* (Frana and O´Neil, 1994) and *A. laphygmae* (Cave, 1995).

Rogadines are likely important in control of Lepidoptera infestations in forest and agricultural environments as they are abundant and known species are relatively stenophagous (Shaw, 1995). However, few of these species have been studied for pest control uses (see Wallner *et al.*, 1983; Wallner and Grinberg, 1984; Cave, 1992 and 1995; Frana and O´Neil, 1994).

Palearctic and Nearctic *Aleiodes* species are well known, whereas there is relatively little information on Afrotropical, eastern Palearctic and Neotropical species. World-wide, 221 species are known, of which 91 are distributed in the Americas, principally in the Nearctic region (Shenefelt, 1975; Marsh, 1979; Fortier, 1997; Shaw, 1997; Shaw *et al.*, 1997; Marsh and Shaw, 1998; Shaw *et al.*, 1998a and 1998b; Marsh and Shaw, 1999 and 2001). Shaw (1997) estimates that in the Neotropics there are approximately 200 undescribed species. A brief nomenclatural history of the 16 *Aleiodes* species reported in México has been published by Delfín and Wharton (2000). This study constitutes the most complete listing to date, and provides previously unpublished locality reports.

Fortier and Shaw (1999) review the results of previous studies (Shaw *et al.*, 1997; Marsh and Shaw, 1998; Shaw *et al.*, 1998a and 1998b; Marsh and Shaw, 1999), presenting the synapomorphies that define 17 *Aleiodes* species groups as monophyletic. The species in the present study were segregated into groups using these criteria and described in material and methods section. Only the represented species groups were described.

MATERIAL AND METHODS

The present study was carried out with material loaned from the following collections: The Natural History Museum, London (BMNH); Colección Entomológica Regional, Universidad Autónoma de Yucatán (CER-UADY); Colegio de Postgraduados, Montecillo, México (CP); Instituto de Biología UNAM, Estación de Biología Tropical Chamela (IBUNAM); Museo de Historia Natural de la Ciudad de México (MHNCM); Natural History Museum of Los Angeles County (NHMLA); Texas A&M University, Insect Collection (TAMU); Colección de Insectos BenéficosEntomófagos, Universidad Autónoma de Nuevo León (CIBE-UANL); Uni-

versidad Autónoma de Tamaulipas (UAT); University of California, Berkeley (UCB); University of California, Davis (UCD); University of California, Riverside (UCR); U.S. National Museum of Natural History, Washington, D.C. Smithsonian (USNM).

Morphology is referenced using criteria proposed by van Achterberg (1993) and Sharkey and Wharton (1997). Material was determined using the studies of Shaw (1997), Shaw *et al.* (1997), Marsh and Shaw (1998), Shaw *et al.* (1998a, 1998b), Marsh and Shaw, (1999), and material determined by Dr. Scott Shaw deposited in TAMU.

Of the established *Aleiodes* species groups (Fortier and Shaw 1999), eight are represented in México. The synapomorphs that define each group are as follows:

1. ***apicalis*** (Brullé) species group. Ocellar diameter shorter than ocello-ocular distance; occipital and hypostomal carinae joined; dense bristle patches on terga 4-7 (males); interantennal carina 0.55X the distance between the clypeus and the antennae base; mesonotum finely granulated or smooth; tarsal claws heavily pectinate (Shaw *et al.*, 1998a).
2. ***gastritor*** (Thunberg) species group. Median length of pronotum up to 0.3X less than head length (Fortier and Shaw, 1999).
3. ***seriatus*** (Herrich-Schaffer) species group. Comb of bristles on posterior margin of metatibia (Marsh and Shaw, 1998).
4. ***dispar*** Curtis species group. Fore wing narrow, less or equal to 0.29X length/width.
5. ***praetor*** (Reinhard) species group. Hind wing vein RS strongly bent, almost reaching the cos-tal margin; lateral ocellus diameter 2.5X greater than the ocello-ocular distance; flagellomere 15 short (Shaw *et al.* 1998b; Fortier and Shaw, 1999).
6. ***pulchripes*** (Wesmael) species group. Tarsal claw strongly pectinate, with more than ten spines commonly forming the pectin; first metasomal terga weakly rugulose to rugulose-costate; third metasomal tergite rugulose to rugulose-costate anteriorly and punctate posteriorly; lateral ocelli enormous, from 1.5 to 9.0X the length of the ocello-ocular distance; malar space shorter than mandible base (Shaw *et al.*, 1997).
7. ***gasterator*** (Jurine) species group. Clypeus has abrupt margin, planar ventrad; oral opening oval, diameter equal to or slightly greater than malar space; malar space at least equal to basal width of mandible, usually longer; hind wing marginal cell narrowest at base, widening to wing apex, vein RS not sinuate (Fortier and Shaw, 1999; Marsh and Shaw, 2001)
8. ***melanopterus*** (Erichson) species group. Antenno-clypeal space less or equal to 0.69X the width of oral space; upper clypeus less than 0.42X its width (Fortier and Shaw, 1999); oral cavity long and oval, equal or larger than face height; large eyes and ocelli; mesonotum and mesopleuron smooth (Marsh and Shaw, 1999).

RESULTS

Our examination of the Mexican fauna has uncovered 21 described and 27 undescribed species of *Aleiodes*. This section includes the mexican species of *Aleiodes* sorted by species group, distribution records for the described species and partial synonymies where appropriate to facilitate retrieval of information published under older names. Complete synonymies can be found in Shaw, 1993, 1997; Shaw *et al.*, 1997; Marsh and Shaw, 1998; Shaw *et al.*, 1998a and 1998b; Marsh and Shaw, 1999 and 2001. Four of the species are first records for Mexico: *A. earinos, A. graphicus, A. notozophus* and *A. politiceps*. All 27 undescribed species are placed

in some species groups only; there is no more information about undescribed species as these will be described in separate articles.

Of the 17 established *Aleiodes* species groups (Fortier and Shaw, 1999), eight are represented in Mexico. Four species (*A. fumialis* (Shenefelt), *A. nigripes* (Enderlein), *A. scriptipennis* (Enderlein) and *A. sonorensis* (Cameron)) where not placed in species groups, and their status remains uncertain. We have not seen specimens of these species, and none of them was treated in the species groups classification presented by Fortier and Shaw (1999). The corresponding Mexican species are as follows.

1. *apicalis* (Brullé) species group. Includes *A. atriceps*, *A. molestus* and an undescribed species.

Aleiodes atriceps Cresson

Aleiodes atriceps Cresson, 1869:380. Shaw *et al.*, 1998a:65. Delfín and Wharton, 2000:59.
Dimorphomastax peculiaris Shenefelt, 1979: 133.

Material examined: NUEVO LEÓN: 1 male, San Roque, Guadalupe (CIBE-UANL); 1 male, Valle Las Puentes, Río La Silla, Monterrey (CIBE-UANL); Río Ramos, Raíces, Allende (CIBE-UANL). TAMAULIPAS: San Carlos, Rincón Murillo (UAT); 1 female, Victoria, La Libertad (UAT). VERACRUZ: 1 male, Río Cazones (CIBE-UANL); 2 females, Jalapa (CP).

Other localities: Mexico (Baja California Sur, Durango, Nuevo León, Sinaloa, Veracruz) and USA (Arizona and Texas) (Fox, 1895; Shenefelt, 1979; Shaw *et al.*, 1998a).

Distribution: Mexico (Baja California Sur, Durango, Nuevo León, Sinaloa, Tamaulipas and Veracruz) (collected between April-May and September-November) and USA.

Aleiodes molestus (Cresson)

Rogas molestus Cresson, 1872, 4:188. *Aleiodes molestus*, Shaw *et al.*, 1998a:70.

Material examined: AGUASCALIENTES: 1 female, Aguascalientes 8 mi NE (UCB). CHIAPAS: 1 female, Rancho Sánchez, Las Rosas, in alfalfa (UCB); 1 male, San Cristobal de las Casas (CP). CHIHUAHUA; 1 male, Chihuahua (CIBE-UANL). JALISCO: Rancho La Quinta, Teocaltiche 5600' (UCD). MÉXICO: 1 male, Tonatico (TAMU); 1 male, Sta. María, Valle de Bravo (CP). MICHOACÁN: 1 female, Junga-peo (CP); 1 male, 6 mi N Cheran (TAMU). NAYARIT: 1 male, Jesús María (UCB). NUE-VO LEÓN: 1 female, 5 mi S Linares (USNM). TAMAULIPAS: 2 females, Hidalgo, Conrado Castillo, bosque de pino (UAT). VERACRUZ: 1 female, Veracruz, with coffee bean (USNM).

Other localities: USA (Arizona, Arkansas, California, Colorado, South Dakota, Louisiana, Texas, Utah, and Wyoming) and Mexico (Shenefelt, 1975; Marsh, 1979; Shaw *et al.*, 1998a).

Distribution: Mexico (collected between February-April and June-September) and USA.

2. *gastritor* (Thunberg) species group. Includes *A. laphygmae*.

Aleiodes laphygmae (Viereck)

Rogas laphygmae Viereck, 1912, 43:581. *Aleiodes laphygmae*, Cave, 1995:38, Delfín and Wharton, 2000:61.

Material examined: 4 males, México (no specific locality), ex: *Spodoptera frugiperda* in sorghum, Collection of SRQF, Stoneville, MS. (USNM).

Other localities: Mexico (Nuevo León), USA, Cuba, Dominican Republic and Nicaragua (Marsh, 1979; Cave, 1995; Delfín and Wharton, 2000).

Distribution. This species has been recorded in southern USA, northern Mexico (April), and Central America.

3. *seriatus* (Herrich-Schaffer) species group. Includes *A. nigristemmaticum* and nine undescribed species.

***Aleiodes nigristemmaticum* (Enderlein)**

Rhogas nigristemmaticum Enderlein, (1918) 1920:156. *Aleiodes nigristemmaticum,* Cave, 1995:39; Marsh and Shaw, 1998:400.

Material examined: OAXACA: 1 male, 2.7 mi NW El Cameron (TAMU). VERACRUZ: 1 male, 14 mi NW Tuxpan (UCB). UNSPECIFIED: 1 female, La Aguilera, Carr. Transístmica km 28 (CP).

Other localities: Mexico (Chiapas), USA (Florida, Mississippi), Costa Rica, Honduras, Puerto Rico, Dominican Republic and Venezuela (Enderlein, (1918) 1920; Cave, 1995; Marsh and Shaw, 1998).

Distribution: Southeastern Mexico (collected in July, September and December), eastern USA (Florida, Mississippi), Central America to northern South America.

4. *dispar* Curtis species group. Includes two undescribed species. This is the first record of the *dispar* group (van Achterberg, 1985) in Mexico.

5. *praetor* (Reinhard) species group. Includes *A. graphicus, A. texanus* and an undescribed species.

***Aleiodes graphicus* (Cresson)**

Rogas graphicus Cresson, 1872:188. *Aleiodes graphicus* (Cresson), Shaw *et al.*, 1998b:561.

Material examined: JALISCO: 1 female, 16 km N Autlán, at black light (TAMU). SINALOA: 1 male, 5 mi N Mazatlán (UCB).

Other localities: USA (Arizona, Colorado, Iowa, Kansas, New Mexico, South Dakota, Texas and Wyoming) (Shaw *et al.*, 1998b).

Distribution. Mexico (collected in July) and USA. First record for Mexico.

***Aleiodes texanus* Cresson**

Aleiodes texanus Cresson, 1869, 2:378.

Material examined: SINALOA: 1 male, 4 mi S Villa Unión (UCB).

Other localities: USA (Texas, Illinois and from Massachusetts to Montana) and northern Mexico (Shaw *et al.*, 1998b).

Distribution: Mexico (June) and USA.

6. *pulchripes* (Wesmael) species group. Includes *A. cameronii, A. earinos, A. notozophus, A. pedalis, A. rossi, A. vaughani,* and seven undescribed species.

***Aleiodes cameronii* (Dalla Torre)**

Rhogas mexicanus Cameron, 1887:389, not *Aleiodes mexicanus* Cresson, 1869. *Rhogas cameronii* Dalla Torre, 1898, 4:216. *Rogas cameronii*, Shenefelt, 1975:1220. *Aleiodes cameronii*, Shaw *et al.*, 1997:17. Delfín and Wharton, 2000:60.

Material examined: Data published in Delfín and Wharton (2000).

Other localities: Mexico (Oaxaca, Sinaloa and Yucatán) and USA (New Mexico and Texas) (Cameron, 1887; Delfín and Wharton, 2000).

Distribution: Shaw *et al.* (1997) recorded this species from southern USA through Mexico and Costa Rica, without providing specific localities. Mexican records currently known to us are from the states of Oaxaca, Sinaloa and Yucatan.

Aleiodes earinos Shaw

Aleiodes earinos Shaw, 1997 (Shaw *et al.*, 1997:23).

Material examined: BAJA CALIFORNIA SUR: 1 male, 9 mi N of Cabo San Lucas (TAMU).

Other localities: USA (Florida, Arkansas, and Texas) (Shaw *et al.*, 1997).

Distribution: Mexico (collected in November) and USA. First record for Mexico.

Aleiodes notozophus Marsh and Shaw

Aleiodes notozophus Marsh and Shaw, 1997, Shaw *et al.*, 1997:29.

Material examined: VERACRUZ: 1 male, Santa Rosa (TAMU).

Other localities: USA (Arizona, California and Florida) and Costa Rica (Shaw *et al.*, 1997).

Distribution: Mexico (July), USA and Costa Rica. First record for Mexico.

Aleiodes pedalis Cresson

Aleiodes pedalis Cresson, 1869:379. Shaw *et al.*, 1997:30. Delfín and Wharton, 2000:63.

Other localities: Mexico (Cresson, 1869).

Distribution: Mexico; no specific localities published to date.

Aleiodes rossi Marsh and Shaw

Aleiodes rossi Marsh and Shaw, 1997. Shaw *et al.*, 1997:32.

Other localities: Mexico, (San Luis Potosí, El Salto) (Shaw *et al.*, 1997).

Distribution: Mexico; no more localities published to date.

Aleiodes vaughani (Muesebeck)

Rogas vaughani Muesebeck, 1960:257.

Rhogas nigriceps Enderlein, (1918) 1920:155 (not *nigriceps* Wesmael, 1838). *Aleiodes vaughani*, Cave 1995:40. Shaw *et al.*, 1997: 33.

Material examined: CHIAPAS: 1 female, Ocozocuautla (UCR). OAXACA: 1 female, Tehuantepec, at black light (USNM); 1 male, Oaxaca (USNM). QUINTANA ROO: 16 females and 1 male, Valle Hermoso Rancho No.3 (UADY). VERACRUZ: 1 male, Córdoba (USNM); 3 females, Cotaxtla, Exp. Sta. Cotaxtla, at light (UCB); 2 females, La Playa Escondida 16 km N Santecomapan, Sierra de los Tuxtlas, Malaise trap, (TAMU); 1 specimen (break), Cimmyt, Poza Rica (CP); 1 female, Los Tuxtlas Biol. Stn. (TAMU). YUCATÁN: 1 female, Colonia Yucatán, Kalah Dzonot, light trap (UADY); 7 females, Reserva de Cuxtal (UADY); 1 female and 1 male, Mérida (USNM).

Other localities: southern Mexico (Veracruz) to Honduras, Nicaragua, Costa Rica, Cuba and Ecuador (Cave, 1995; Shaw *et al.*, 1997; Delfín and Wharton, 2000).

Distribution: Mexico (collected in May and July-October) to northern South America.

7. ***gasterator* (Jurine) species group.** Includes *A. atricornis*, *A. burrus*, *A. smithi* and five undescribed species.

Aleiodes atricornis (Cresson)

Rogas atricornis Cresson, 1872:188. Marsh and

Shaw, 2001:293.

Rhogas ferrugineus Enderlein, (1918) 1920:156.

Aleiodes ferrugineus, Delfín and Wharton, 2000:60.

Material examined: AGUASCALIENTES: 1 female, 8 mi NE Aguascalientes (UCB); 1 female, Calvillo, at light (TAMU). CHIHUAHUA: 1 female, Hwy 45, 5 mi NE Salaices (15 mi SW jct. Hwy 49), 5200 (NHMLA). COAHUILA: 39 Km Sur Agua Nueva, 1770 m snm (IBUNAM); 2 females, 1 mi SE Saltillo, at light (UCB). COLIMA: 1 female, Colima, with leaves of *Citrus* (USNM); 18 females, Santa Clara Canyon, 5 mi W Parrita (UCB). DISTRITO FEDERAL: 2 females and 2 males, 1a. Secc. Bosque de Chapultepec (MHNCM); 3 males, 2a. Secc. Bosque de Chapultepec (MHNCM). GUANAJUATO: 1 male, Inchamacuaro (CP); 1 male, Tarandacuaro, pastizal inducido (CP); 1 female, Tierra Blanca, matorral xerófito (CP); 1 male, Roque (CP); 1 female and 2 males, Purísima de Bustos (CP); 1 male, San Bartolomé(CP); 1 male, Las Trancas (CP); 2 females, Celaya (CP); 1 female, El Copal, matorral xerófito (CP). GUERRERO: 1 female, Iguala, at black light (UCB); 1 female, 18 mi S Chilpancingo (UCD); 1 male, 5 km W Tixtla (CP); 1 male, 6 mi NE Tixtla (TAMU). HIDALGO: 1 female, Tulancingo (CP). JALISCO: 21 females and 1 male, Guadalajara (USNM); 2 females, 3 mi SE Plan de Barrancas (UCD); 1 female, 10 km NE Jalostotitlán (TAMU); 1 female, Sierra de Manantlán Lab. Mat. Las Joyas, Arroyo Las Joyas (IBUNAM); 2 males, Zapopan (CIBE-UANL); 1 male, Rancho La Quinta, Teocaltiche, 5600' (UCD). MÉXICO: 7 females and 13 males, Chapingo, 2260 m snm (CP); 1 male, Tenango del Aire (CP); 6 females and 3 males, Texcoco, 2240 m snm, (CP); 1 female, Tonatico (CP). MICHOACÁN: 2 females, 11 mi W Hidalgo (UCD); 3 male, Morelia (CP); 1 male, La Huerta (CP); 1 male, 3 mi E Carapan (UCD). MORELOS: 1 female, Tepoztlán (CP); 1 female, 2.5 km N Estación CEAMISH, 940 m snm (IBUNAM); 1 male, Huejotengo (CP); 1 female, Yautepec (UCD); 1 female, Cuernavaca (USNM). NAYARIT: 1 male, Jesús María (UCB). NUEVO LEÓN: 1 male, Linares, trampa de luz, (UCB). OAXACA: 1 female, Puerto Escondido, bosque de neblina (CP); 1 male, 8 mi NE El Punto (TAMU); 5 females and 2 males, Oaxaca (USNM); 1 female, 16 mi NW Totolapan (TAMU). QUERÉTARO: 1 female, 7 mi N Querétaro, light trap (TAMU). SAN LUIS POTOSÍ: 1 female, 17 km NE Ciudad del Maíz, 1250 m snm (IBUNAM); 1 male, 37 mi S San Luis Potosí (UCB). SINALOA: 1 female, Concordia (UCD). SONORA: 1 female, 25 km W Sta. Ana Viejo (UCD). TAMAULIPAS: 1 female, Río Soto La Marina, Soto La Marina, pastizal, en luz negra (UAT); 1 male, Hidalgo, Conrado Castillo, bosque de pino (UAT); Gómez Farías, Reserva El Cielo. Est. Los Cedros, 450 m snm (TAMU). VERACRUZ: 1 female, Córdoba (USNM); 1 female, Córdoba, 930 m snm, trampa de luz (UCB); 1 male, Orizaba (UCD); 1 male, 19 km NW Ciudad Mendoza (UCB); 2 males, 8 mi Coatepec S Jalapa, 4100' (UCB). ZACATECAS: 1 female, and 1 male, Concepción del Oro, light trap (TAMU); 1 female, 4 mi NE Concepción del Oro (TAMU).

Other localities: Mexico (Aguascalientes, Chiapas, Chihuahua, Coahuila, Colima, Distrito Federal, Guanajuato, Guerrero, Hidalgo, Jalisco, México, Michoacán, Morelos, Nayarit, Nuevo León, Oaxaca, Querétaro, San Luis Potosí, Sinaloa, Tamaulipas, Veracruz and Zacatecas) (collected between May-October and December) and USA (South Dakota, Nebraska, Kansas, Oklahoma, Texas, New Mexico and Arizona) (Enderlein, (1918), 1920; Delfín and

Wharton, 2000; Marsh and Shaw, 2001).

Distribution: Widely distributed in Mexico and USA.

Aleiodes burrus Cresson

Aleiodes burrus Cresson, 1869, 2:381. Delfín and Wharton, 2000:60. Marsh and Shaw, 2001: 297.

Other localities: Mexico (Cresson, 1869), Canada and USA (Marsh and Shaw, 2001).

Distribution: Mexico; no specific localities published to date.

Aleiodes smithi Marsh and Shaw

Aleiodes smithi Marsh and Shaw, 2001:300.

Other localities: Canada (Ontario), USA (Florida, Georgia, Kansas, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Pennsylvania, Tennesse, Virginia, Wisconsin), Mexico (Colima, Morelos, and Oaxaca) and Costa Rica (Marsh and Shaw, 2001).

Distribution: Widely distributed in North and Central America.

8. *melanopterus* (Erichson) species group. Shaw (1993) used the available genus-group name *Eucystomastax* Brues for this group, treating it as a subgenus. The subgeneric rank was subsequently abandoned (Marsh and Shaw, 1999), and replaced with the informal rank of species group in conformity with the rest of the classification of *Aleiodes* as treated by Shaw *et al.* (1997). Includes *A. mexicanus, A. politiceps*, and two undescribed species.

Aleiodes mexicanus Cresson

Aleiodes mexicanus Cresson, 1869, 2:378, Marsh and Shaw, 1999:105. *Aleiodes (Eucystomastax) mexicanus* Cresson: Shaw, 1993:8.

Material examined: CHIAPAS: 1 male, 4 mi SW Simojovel (USNM). MÉXICO:1 male, Río Blanca (?) (USNM); 1 female, Xilitla, 3500' (USNM). MORELOS: 1 female, Yautepec (UCD). SAN LUIS POTOSÍ: 1 male, San Luis Potosí, 16 km NE entronque Rayón-Cárdenas, 1 10m (IBUNAM). TABASCO: 1 female, Teapa (BMNH). TAMAULIPAS: 2 female, 3.5 km W Gomez Farías, 550 m snm, black light (TAMU). VERACRUZ: 1 female, 25 mi S Acayucan (USNM); 1 female, Orizaba (UCD); 1 male, Córdoba (UCD); 1 male, Puente Nacional 6 mi SE Rinconada, at light (UCB); 7 males, Fortín, Col. Godman and Salvin 1904-1 (BMNH). UNSPECIFIED: 1 male, México, Col. Godman and Salvin, 1904-1 (BMNH); 1 male (BMNH).

Other localities: Mexico (Chiapas, Sinaloa and Veracruz) and USA (Mississippi) (Shaw, 1993; Marsh and Shaw, 1999).

Distribution: Mexico (collected in March, May-July and September-October) and USA.

Aleiodes politiceps (Gahan)

Rogas politiceps Gahan, 1917:206. *Aleiodes politiceps*, Shenefelt, 1975:1243. Marsh and Shaw, 1999:107.

Material examined: NUEVO LEÓN: 1 female, Allende, Raíces Río Ramos (UCR); 1 female, Allende, Raíces Río Ramos (CIBE-UANL). SAN LUIS POTOSÍ: 1 female, Xilitla, black light (UCD). TAMAULIPAS: 1 male, Río Soto la Marina, Soto la Marina, pastizal, black light (UAT); 1 female, Cd. Victoria, 4 km W Victoria, Cañón del Novillo, black light (TAMU).

Other localities: USA (Arkansas, Virginia to Florida, Texas and Tennessee) and Costa Rica

(Gahan, 1917; Muesebeck and Walkley, 1951; Shenefelt, 1975; Marsh and Shaw, 1999).

Distribution: Mexico (collected in May, June and September), USA and Costa Rica. First record for Mexico.

UNPLACED SPECIES

***Aleiodes fumialis* (Shenefelt)**

Rhogas fumipennis Cameron, 1887, 1:389. *Rogas fumialis* Shenefelt, 1975:1230. *Aleiodes fumialis*, Delfín and Wharton, 2000:61.

Other localities: Mexico (Cameron, 1887).

Distribution: Mexico; no specific localities published to date.

***Aleiodes nigripes* (Enderlein)**

Pelecystoma nigripes Enderlein, (1818) 1920: 148. *Aleiodes nigripes*, van Achterberg, 1991: 61.

Other localities: Mexico (Chiapas) (Enderlein, (1918) 1920).

Distribution: Mexico; no specific localities published to date.

***Aleiodes scriptipennis* (Enderlein)**

Heterogamus scriptipennis Enderlein, (1918) 1920:152. *Aleiodes scriptipennis* (Enderlein), Delfín and Wharton, 2000:64.

Other localities: Mexico (Chiapas) (Enderlein, (1918) 1920).

Distribution: Mexico; no more localities published to date.

***Aleiodes sonorensis* (Cameron)**

Rogas sonorensis Cameron, 1887:390. *Aleiodes sonorensis*, Delfín and Wharton, 2000:64.

Other localities: Mexico (Sonora) (Cameron, 1887).

Distribution: Mexico; no more specific localities published to date.

DISCUSSION AND CONCLUSIONS

In the Rogadinae, Shaw (1993) hypothesized that *Aleiodes* species are dominant in temperate zones, while members of the genus *Rogas* are dominant in tropical regions. Available information for Mexico is largely inadequate for testing these hypotheses since known distribution patterns of *Aleiodes* largely reflect sampling artifacts. Thus, known distribution corresponds more to distinct collecting efforts (e.g. Oaxaca-TAMU; Tamaulipas-UAT) than to any biological patterns (Fig. 1). Nonetheless, the majority of species exhibit a Neotropical distribution.

Within Mexico, *Aleiodes* is widely distributed, with records in 28 of the 31 states in the country; the only exceptions being the states of Baja California Norte, Campeche and Tlaxcala (Table 1). Though these records do not permit generalizations, the distribution of the two most diverse species groups, *seriatus* and *pulchripes*, suggest an *Aleiodes* richness pattern corresponding to the general hypothesis, namely, more diverse in the tropics than in higher latitudes (Matthews, 1974; Stevens, 1989; Wharton, 1993).

Fourteen species were previously included within the *seriatus* group. Their distribution indicates that this group is especially rich in the Americas, with one holarctic species, one palearctic, six nearctic, five neotropical and one with wide continental distribution (Marsh and Shaw, 1998). Nine additional species were found during this study and, as a whole, these are predominantly distributed in the tropical regions (Fig. 2).

In the New World, 12 species were previously

included in the *pulchripes* group: five nearctic; four neotropical; and three with wide continental distribution (Shaw *et al.*, 1997). In Mexico, this group has nearctic elements in the northern portion of the country and central plains, as well as neotropical species distributed on the slopes of the Gulf of Mexico and the Pacific coast (Fig. 2). The additions from the Mexican fauna bring the totals to three known species with wide continental distribution, seven with nearctic affinity, seven with neotropical affinity and one component in the Antilles.

The few available biological records indicate that members of the *seriatus* species group parasitize juvenile Noctuidae and Arctiidae (Cave, 1995; Marsh and Shaw, 1998).

The little available information on biology of members of the *pulchripes* species group biology indicates that they attack larvae of Geometridae and Noctuidae (Shaw *et al.*, 1997). Apparently, the same host groups are used by both temperate and tropical members of these *Aleiodes* species-groups, since most host records probably come from the Holarctic. As the neotropical species groups are studied further, and their distribution and biology better understood, a more accurate distribution hypothesis can be developed for them.

Table 1

Distribution of *Aleiodes* species in Mexico by state. Consult text for specific localities. Does not include *A. burrus, A. fumialis* and *A. pedalis* as they have no specific state records.

	AGS	BCS	CHIH	CIS	CHH	COA	CHL	DOF	DGO	GTO	GRO	GOL	JAL	MEX	MIC	MOR	NAY	NLE	OAX	PUE	QRO	QRO	SLP	SNI	STN	TOA	TAM	VER	YUC	ZAC
A. atriceps		X							X									X					X			X	X		
A. atricornis	X		X	X	X	X	X			X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X		X
A. cameronii																			X					X				X	
A. earinus		X																												
A. graphicus													X											X					
A. laphygmae																		X											
A. mexicanus				X										X		X							X	X		X	X	X	
A. molestus	X		X	X									X	X	X		X	X									X	X	
A. nigripes				X																										
A. nigristemmaticum				X															X									X	
A. notozophus																												X	
A. politiceps																		X					X				X		
A. rossi																							X						
A. scriptipennis				X																									
A. smithi						X										X			X										
A. sonorensis																									X				
A. texanus																								X					
A. vaughani				X															X			X						X	X
Undescribed species		3	3			1				1	1		1	2	2	8	1	2	5	4		2	2	4	1		3	3	1	

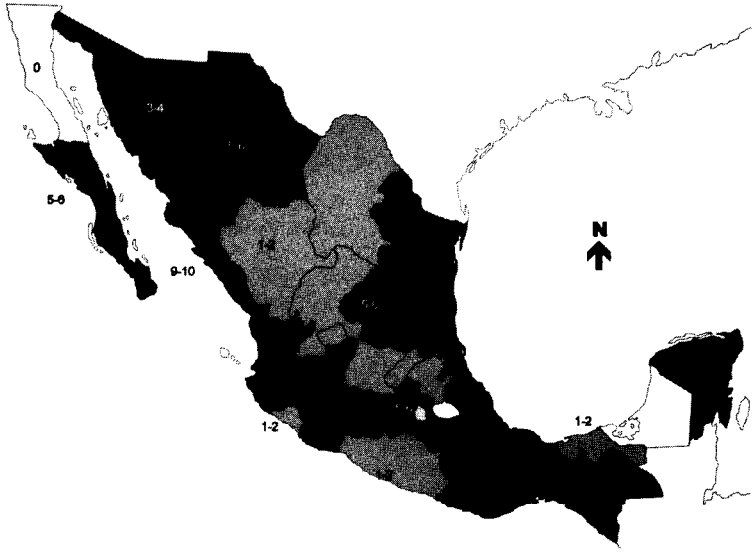

Figure 1. Number of *Aleiodes* species recorded in Mexico by state. States are grouped according to number of recorded species. Species are grouped at six intervals: 0 species, 1-2, 3-4, 5-6, 7-8 and 9-10.

Figure 2. Distribution of *pulchripes* and *seriatus* species-groups in Mexico.

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