

A review of *Polites rhesus* (W. H. Edwards, 1878), with the description of a new subspecies from Mexico (Lepidoptera: Hesperidae: Hesperinae)

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Abstract: The North American skipper butterfly *Polites rhesus* (W. H. Edwards, 1878) is reviewed, and notes on its morphology, distribution, phenology, biogeography and ecology are provided. In addition, a new subspecies, *Polites rhesus otomi* A. Warren & Gott, **ssp. nov.**, is described from high-elevation grasslands in the State of México, Mexico.

Key words: Biogeography, butterfly, distribution, ecology, morphology, skipper

Resumen: Se revisa el hespérido *Polites rhesus* (W. H. Edwards, 1878), con notas sobre su morfología, distribución, fenología, biogeografía y ecología. También, se describe *Polites rhesus otomi* A. Warren & Gott, **ssp. nov.**, de pastizales de gran altura en el Estado de México, Mexico.

Palabras clave: Biogeografía, distribución, ecología, hespérido, mariposa, morfología.

INTRODUCTION

Polites rhesus (W. H. Edwards, 1878) is a small skipper butterfly of short-grass prairie landscapes in North America, ranging from southern Alberta and Saskatchewan, Canada (Layberry *et al.*, 1998), south across the High Plains (*e.g.*, Stanford, 1981), to southern New Mexico (Toliver *et al.*, 1994) and north-central Arizona (Stanford & Opler, 1993; Bailowitz & Brodtkin, 2007). This species is also known from Mexico, as detailed below. Although geographically widespread, this skipper is rarely observed most years. There are, however, reports that *P. rhesus* “fairly swarms” some years following unusually wet winters (Brown *et al.*, 1957; Stanford, 1981). The ventral wing pattern of *P. rhesus* is extremely similar to that of *Hesperia uncas* W. H. Edwards, 1863, a skipper that very frequently occupies the same habitats (though with a later flight-time) and uses the same larval foodplant; as a result, individuals of *P. rhesus* are often misidentified as *H. uncas*, and vice versa.

Originally described from “Southern Colorado” (Edwards, 1878), the type locality of *P. rhesus* was further defined as “west of Pueblo, Colorado, along the road to Hardscrabble Canyon” [Pueblo County] by Brown & Miller (1977). This skipper was originally placed in the genus *Pamphila* Fabricius, 1807 (considered a junior objective synonym of *Hesperia* Fabricius, 1793, type species *Papilio comma* Linnaeus, 1758, since Barnes & Lindsey (1922)), as were many small hesperiines at that time, and was subsequently transferred to *Chaerephron* Godman, 1900 by Godman (1900) in Godman & Salvin (1879-1901). However, Hemming (1935) noted Godman’s genus name was

preoccupied by *Chaerephron* Dobson, 1874 (Molossidae), and proposed *Yvretta* Hemming, 1935 as a replacement name, where the species resided until Burns (1994) synonymized *Yvretta* with *Polites* Scudder, 1872. Recently, Zhang *et al.* (2019) proposed *Yvretta* as a subgenus within *Polites*, and provided notes on the higher-classification of the genus.

Despite its broad distribution, no geographic variation has been described in *P. rhesus*. The single subjective synonym of *P. rhesus*, *Hesperia axius* Plötz, 1883 (synonymized by Godman (1907)), was also described from Colorado. Here, we provide a review of *P. rhesus*, and describe a distinctive new subspecies from grasslands in the State of México, Mexico.

MATERIALS AND METHODS

In an effort to locate Mexican *Polites* specimens relevant to this study, the senior author has reviewed collections of Lepidoptera containing Mexican Hesperidae, as follows: C. P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins (CSU); Coleção Entomológica Padre Jesus Santiago Moure, Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil (DZUP); Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City (IBUNAM); McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville (MGCL); Museo de Historia Natural de la Ciudad de México, Mexico City (MHNCM); Museo de Zoología, Departamento de Biología Evolutiva, Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City (MZFC); Private collection of the De la Maza Family,

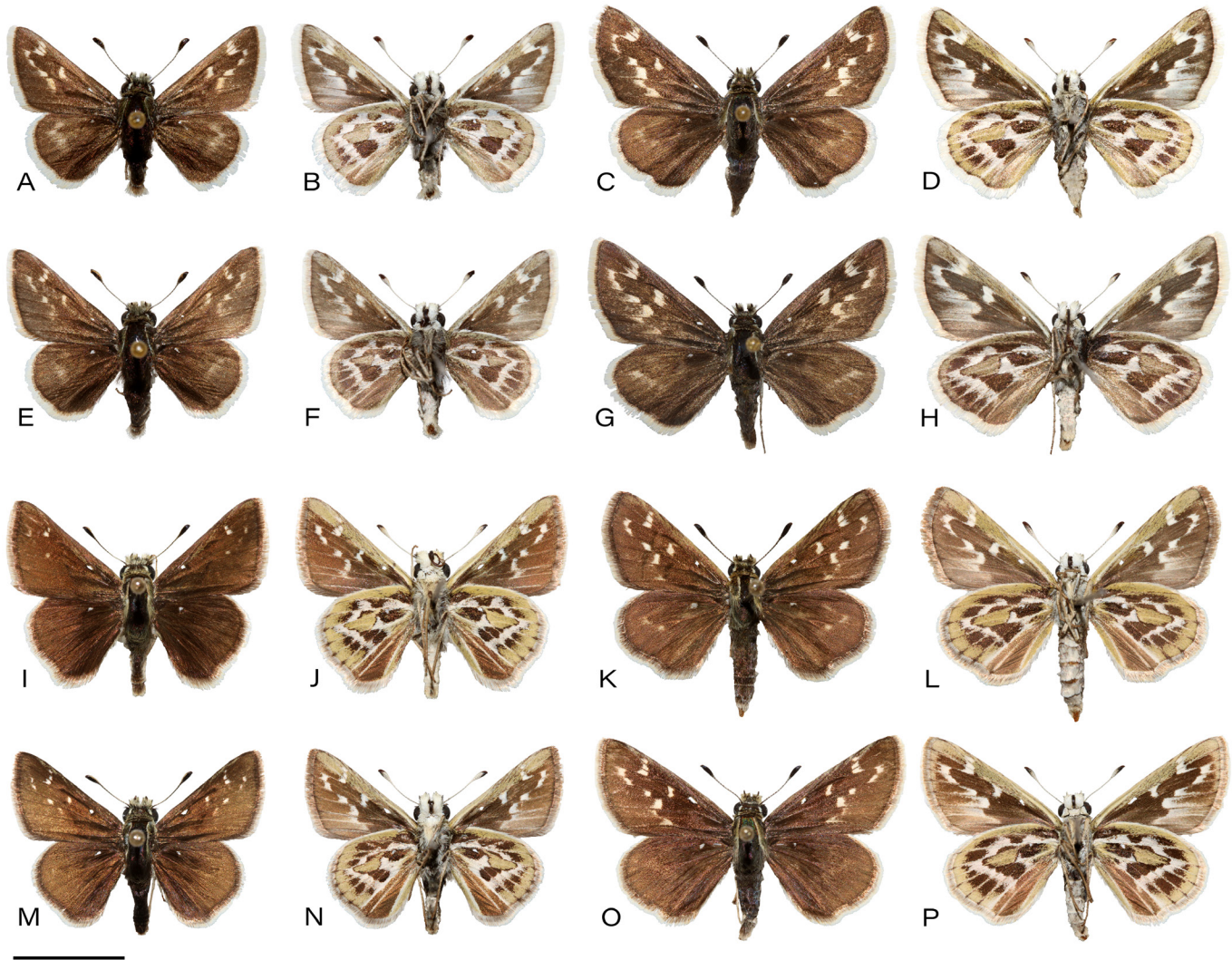


Figure 1. Adults of *Polites r. rhesus* (A-H) and *P. r. otomi* ssp. nov. (I-P). A-H) From 2 mi E of Box Elder Creek, Co. Rd. 30, Arapahoe County, Colorado, USA, 10-13 May 1997, collected by Andrew D. Warren. A + E) Dorsal and B + F) ventral views of males; C + G) dorsal and D + H) ventral views of females. I-P) From east of San Martín Tuchicuitlapilco, Municipality of Jilotepec, State of México, Mexico, 8 May 2007, collected by Andrew D. Warren. I) Dorsal and J) ventral views of male holotype; M) dorsal and N) ventral views of male paratype; K + O) dorsal and L + P) ventral views of female paratypes. Tiny white postbasal spots are pin holes. Scale bar = 1.0 cm.

Mexico City (MAZA); Private collection of the Turrent Family, Mexico City (CFT); Private collection of José de Jesús García Díaz, Tehuacán, Puebla (CJG); Research material of Andrew D. Warren (ADW).

Male and female genitalia were prepared for examination by soaking the abdomens in 10% potassium hydroxide solution for 12 hours before dissection under a Leica MZ 16 stereomicroscope with a camera lucida attached. After dissection, genitalia were soaked in a weak acetic acid solution for 10 minutes to neutralize any remaining potassium hydroxide. After illustration, genitalia were placed in small plastic vials containing glycerin for permanent storage. Photos of adults were taken with a Canon EOS 70D camera with a 100 mm macro lens. Images and plates were modified using Adobe Photoshop 2021 and Adobe Illustrator 2021. Terminology for ventral hindwing pattern elements and wing venation follows MacNeill (1964), and terminology for genitalia follows Klots (1970) and Burns (1994).

RESULTS AND DISCUSSION

Polites rhesus rhesus (W. H. Edwards, 1878) (Figs. 1A-H, 2)

Brown & Miller (1977) designated a lectotype for *P. rhesus*. The nominotypical subspecies of *P. rhesus* (Figs. 1A-H) is characterized by its gray dorsal coloration, white forewing spots, distinctive ventral wing pattern (shared with *Hesperia uncas*), and its uniformly snow-white wing fringes. The mean forewing length of males is 12.6 mm (11.4-13.3 mm, n = 12 from El Paso County, Colorado), and of females is 13.9 mm (11.1-15.1 mm, n = 12 from El Paso County, Colorado).

We have examined specimens of *P. r. rhesus* from across its range in the United States, and have detected no geographic variation in wing morphology. Likewise, we dissected 8 males and 9 females of *P. r. rhesus* from South Dakota, Colorado and Arizona, and detected no geographic variation in genitalia

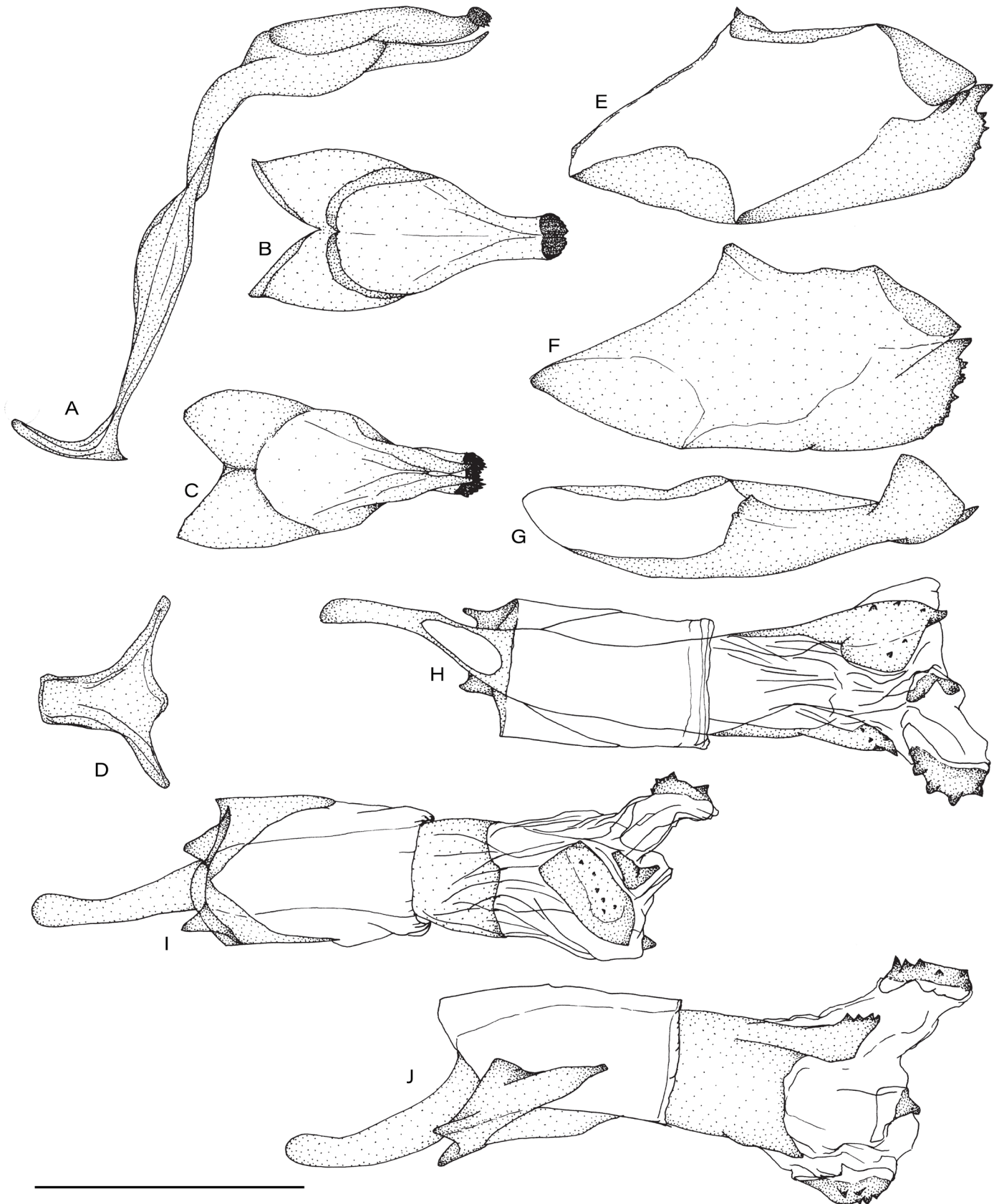


Figure 2. Male genitalia of *Polites r. rhesus* from Jimmy Camp Creek, El Paso County, Colorado, 29-V-1932, collected by F. M. Brown (MGCL); Riley J. Gott dissection no. RG0402. A) Left-lateral view of uncus, gnathos, tegumen, and saccus; B) dorsal view of uncus and tegumen; C) ventral view of uncus, gnathos, and tegumen; D) ventral view of saccus; E) interior lateral view of right valve; F) exterior lateral view of left valve; G) dorsal view of left valve; H) dorsal; I) ventral; J) left-lateral view of aedeagus, juxta, transtilla, and everted vesica. Scale bar = 1.0 mm.

morphology. Burns (1994) provided a photo of the male genitalia of *P. r. rhesus* (from New Mexico) in left-lateral view, yet details of the uncus, gnathos, valvae, juxta and aedeagus are difficult to discern. As a basis for comparison with Mexican *P. rhesus*, we have re-illustrated the male genitalia of *P. r. rhesus* from Colorado (Fig. 2). Burns' (1994) illustration of the female genitalia of *P. r. rhesus* (from Colorado) is extremely detailed and does not require re-illustration.

Specimens examined. Data provided only for specimens in MGCL collection and from ADW research material. USA: ARIZONA: *Apache Co.*: FR 117, 2.4 mi. S Hwy. 60, 4-VI-1988, P. Savage (2 males, 11 females, MGCL); Greens Peak Rd., 7300', 1.9-3.0 mi. S jct. US 60, 28-V-1988, D. D. Mullins (2 females, MGCL); same locality, 29-V-1988, D. D. Mullins (1 male, 1 female, MGCL); same locality, 29-V-1988, J. B. Walsh (1 male, 16 females, MGCL); NF 117, 2 mi E US 60, 13-V-1989, James P. Brock (2 females, MGCL); COLORADO: *Alamosa Co.*: Great Sand Dunes Nat'l Monument, 9-VI-1976, South (1 female, MGCL); 5 mi S of Sand Dunes Nat'l Mon., 8300', 31-V-1975, J. & F. Preston (2 males, MGCL); *Arapahoe Co.*: Co. Rd. 30, 2 mi E Box Elder Ck., 4900', 10-V-1997, Andrew D. Warren (5 males, ADW); same locality, 12-V-1997, Andrew D. Warren (2 males, 2 females, ADW); same locality, 13-V-1997, Andrew D. Warren (2 females, ADW); Piney Creek area on Smoky Hill Rd., 28-V-1993, Andrew D. Warren (1 male, ADW); same locality, 31-V-1995, Andrew D. Warren (1 female, ADW); *Chaffee Co.*: 2 mi E Buena Vista, 30-V-1970, Ray E. Stanford (5 males, 1 female, MGCL); *Custer Co.*: Middle Taylor Rd., 5 mi W Westcliffe, 8300', 5-V-1971, Glenn R. Scott (1 female, MGCL); Rosita, 29-V-1974, A. O. Detmar (1 male, MGCL); *Denver Co.*: Denver, no date (very old) (1 male, MGCL); *El Paso Co.*: Colo. Spgs. State Wildlife Area, 5400', 29-IV-1992, Andrew D. Warren (1 male, 1 female, ADW); same locality, 3-V-1992, Andrew D. Warren (5 males, 3 females, ADW); same locality, 16-V-1994, Ray E. Stanford (2 males, 3 females, MGCL); Foster Ranch, 5700', T15S R65W Sec 14S1/2, 21-V-1970, F. M. Brown (2 males, MGCL); same locality, 24-V-1975, F. M. Brown (3 males, MGCL); same locality, 14-V-1976, F. M. Brown (1 female, MGCL); same locality, 8-V-1977, F. M. Brown (1 male, MGCL); Fountain, 5800', 23-V-1932, F. M. Brown (1 female, MGCL); Fountain Creek, 6 mi S Buttes, 12-V-1968, J. A. Scott (2 males, 2 females, MGCL); Fountain Valley, nr. Colo. Spgs., 5800', 8-V-1956, F. M. Brown (1 female, MGCL); Jimmy Camp Creek, 5900', 14-V-1931, F. M. Brown (1 male, MGCL); same locality, 16-V-1932, F. M. Brown (1 male, 3 females, MGCL); same locality, 17-V-1932, F. M. Brown (1 male, MGCL); same locality, 24-V-1932, F. M. Brown (1 female, MGCL); same locality, 29-V-1932, F. M. Brown (1 male, 2 females, MGCL); nr. Rock Creek, 6200', 21-V-1932, F. M. Brown (1 male, 1 female, MGCL); nr. Touzlan Ranch, 6000', 21-V-1932, F. M. Brown (1 female, MGCL); same locality, 1-VI-1932, F. M. Brown (2 males, MGCL); Rock Creek, 6500', 19-VI-1950, F. M. Brown (1 female, MGCL); *Fremont Co.*: Co. Rd. 123, 3.5 mi W Penrose, vic. 38°26'55.3"N 105°05'23.6"W, 16-V-2017, Andrew D. Warren (1 male, 1 female, ADW); 1 mi. up Bear Creek, 17-VI-1970, J. A. Scott (1 female, MGCL); *Jefferson Co.*: Chimney Gulch, Golden, V, Osler (1 male, MGCL); *Larimer Co.*: Westridge Estates on Horsetooth Res. Rd., 2 mi SW Fort Collins, 19-V-1990, Andrew D. Warren (2 males, ADW); *Park Co.*: Como, 8900', 15-VI-1971, R. J. Jae (1 female, MGCL); *Pueblo Co.*: Burnt Mill Rd., 11 mi SSW Pueblo, 12-V-1970, Ray E. Stanford (1 male, MGCL); same locality, 17-V-1970, Ray E. Stanford (1 male, MGCL); Pinon, 18-V-1969, J. A. Scott (1 female, MGCL); *Saguache Co.*: Noland Gulch Rd. (Rd. 5305), 2.7-2.8 mi W jct. Hwy. 285, ca 3.5 mi S Villa Grove, 8000', 27-V-2002, Thomas W. Ortenburger (1 male, 1 female, ADW); *Weld Co.*: 8 km N Nunn, 1-VI-1976, on *Oxytropis sericea* (1 male, 1 female, ADW); MONTANA: *Cascade Co.*: county road, 2.2 mi. N Ft. Shaw, 3700', 30-IV-2000, J. Harry (1 male, MGCL); NEBRASKA: *Banner Co.*: Bull Cyn., 9-V-1992, [C. Bordelon & E. Knudson colln.] (1 male, MGCL); NEW MEXICO: *Colfax Co.*: Raton, 6000', 21-V-1951, specimen illustrated by W. Howe (1 male, ADW); *Harding Co.*: Mills, 6100', 4-V-1997, Andrew D. Warren (1 male, ADW); *Santa Fe Co.*: Santa Fe, 7200', 22-V-1951, specimen illustrated by W. Howe (1 female, ADW); OKLAHOMA: *Cimarron Co.*: 1.4 mi. N of OK 325 on rd. to Black Mesa, 4200', 8-V-1996, J. & F. Preston (2 females, MGCL); 3.4 mi. N Kenton, 4350', 21-IV-1994, Ray E. Stanford (1 male, 2 females, MGCL); SOUTH DAKOTA: *Custer Co.*: 5 mi. SW Custer, 5100', 27-V-1966, J. Nordin (2 males, MGCL).

Distribution and phenology. *Polites r. rhesus* ranges from the prairies of southern Saskatchewan and Alberta, Canada, where

it has only been encountered a few times (Layberry *et al.* 1998), south through eastern Montana (Stanford & Opler, 1993), western North Dakota (McCabe & Post, 1977), western South Dakota (Marrone, 2002), western Nebraska (Johnson, 1973), western Kansas (Field, 1940), eastern Wyoming (Ferris, 1971); eastern and southern Colorado (Brown *et al.*, 1957; Stanford, 1981); far western Oklahoma, northern Texas (Stanford & Opler, 1993); most of New Mexico (Toliver *et al.*, 1994), and the northern edge of the Mogollon Rim in north-central Arizona (Stanford & Opler, 1993; Bailowitz & Brodtkin, 2007). Throughout this range, most records are from May and early June, with extremes from mid-April to mid-June, indicating a single annual Spring flight time.

Biogeography. The distribution of this skipper is centered in the western Great Plains, or High Plains, a vast region subject to prolonged drought, wildfire, and herbivory (Bock *et al.*, 1991). Populations also exist in suitable habitats in the southern Rocky Mountains mainly east of the Continental Divide, and across the northern edge of the Mogollon Rim in north-central Arizona.

Ecology. *Polites r. rhesus* is a denizen of short-grass prairie throughout its range, mainly occupying habitats dominated by the only confirmed larval foodplant, *Bouteloua gracilis* (Kunth) Lag. Ex Griffiths (Scott, 2020). Adults are most often found in areas where the ground cover consists of very short clumps of *B. gracilis* separated by open, gravelly ground (Fig. 5A), and are most easily observed at nectar sources, especially *Astragalus L.* and *Oxytropis DC.* species. Immature stages were described by Scott (2020).

Discussion. This skipper is very easily overlooked, due to its fast flight and cryptic coloration, as well as its brief single generation in the Spring. It is often the earliest-flying grass-feeding skipper wherever it occurs. Where it co-occurs with *Hesperia uncas*, *P. r. rhesus* is generally done flying by the time the first individuals of the spring brood of *H. uncas* appear (ADW, pers. obs. in Colorado, various years).

Polites rhesus otomi A. Warren & Gott, **ssp. nov.**
(Figs. 11-P, 3, 4)

Description. MALE (Figs. 11-I, M-N): mean forewing length = 11.8 mm (10.6-12.5 mm, n = 12, holotype = 12.0 mm); forewing apex pointed, termen slightly convex; hindwing termen convex, then slightly concave before weakly developed tornal lobe; black forewing stigma poorly-developed to vestigial, in Cu₁-Cu₂ extending from along posterior vein of discal cell below origin of Cu₁, curving slightly caudad to vein Cu₂ at about 1/4 distance to termen from its origin, and below this in anterior half of Cu₂-2A from vein Cu₂ extending slightly proximad, terminating about 2/3 distance across cell; dorsum ground color almost uniformly dark gray-brown; costa with scattered pale beige scales to apex; development of spotting highly variable, some individuals are nearly immaculate; small quadrate white apical spots in R₃-R₄ (usually absent) R₄-R₅, and R₅-M₁; semi-rectangular white subterminal spots in M₁-M₂ and M₂-M₃ (poorly-developed to absent) offset distad from postmedial and apical spots; white postmedial spot in M₃-Cu₁ semi-rectangular, just distad of base of cell; well-maculated specimens with poorly-developed white-gray semi-rectangular macule in Cu₁-Cu₂, and a small spot at the distal end of discal cell; fringe dark gray-grown proximad, pale gray distad. Hindwing coloration dark gray-brown as on forewing, slightly darker at base of wing; fringe dark gray-brown proximad, pale gray distad, slightly paler than on forewing.

Ventral forewing dark gray-brown, darkest at wing base, veins slightly

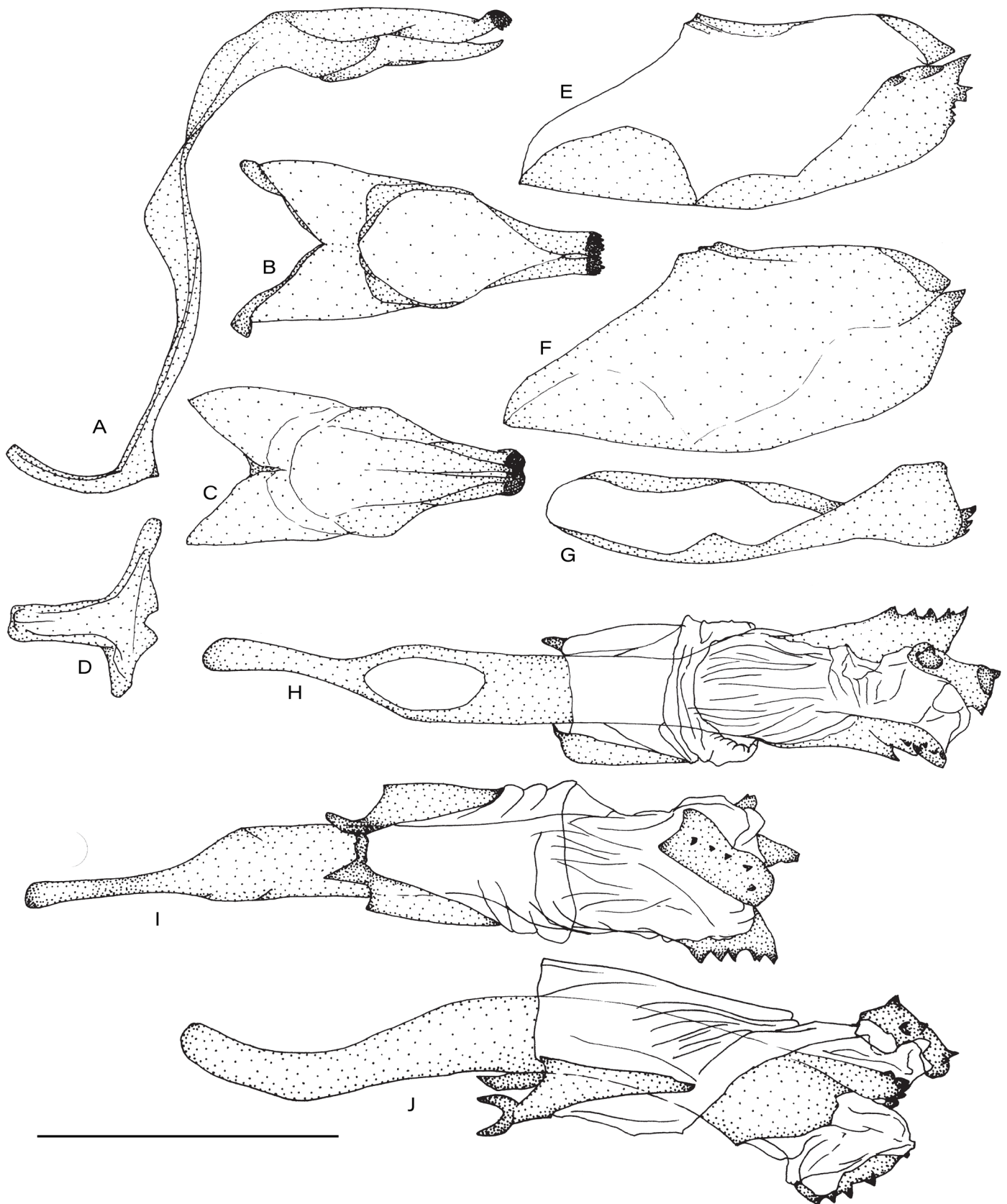


Figure 3. Male genitalia of *Polites r. otomi* **ssp. nov.** from east of San Martín Tuchicuitlapilco, Municipality of Jilotepec, State of México, Mexico, 8 May 2007, collected by Andrew D. Warren; Riley J. Gott dissection no. RG0404. A) Left-lateral view of uncus, gnathos, tegumen, and saccus; B) dorsal view of uncus and tegumen; C) ventral view of uncus, gnathos, and tegumen; D) ventral view of saccus; E) interior lateral view of right valve; F) exterior lateral view of left valve; G) dorsal view of left valve; H) dorsal; I) ventral; J) left-lateral view of aedeagus, juxta, transtilla, and everted vesica. Scale bar = 1.0 mm.

paler; pale beige along costa, expanded at apex to R_5 , with a few pale beige scales at the margin in R_5-M_1 ; white apical and subterminal spots repeated from dorsum but better-developed and with additional spots; spot in CuA_1-CuA_2 usually present though variably developed; poorly-defined semi-rectangular spot in anterior half of CuA_2-2A , terminating at a pale vein-like streak mid-cell; variably-shaped hour-glass shaped spot across distal end of discal cell; fringe dark gray-brown proximad, pale gray distad; subtly darker at vein ends on some specimens. Ventral hindwing predominantly pale beige over a dark gray-brown ground color, with white macular band and basal loop, anal fold beige with variable brown overscaling; dark gray-brown with few scattered pale beige scales in posterior half of CuA_2-2A and all of $2A-3A$; all wing veins subtly highlighted with white, grading to black at the termen of each vein; additional white vein-like streaks in mid- M_1-M_3 , and very prominent in mid- CuA_2-2A ; macular band of conjoined white spots from $Sc+R_1-Rs$ to CuA_1-2A as follows: $Sc+R_1-Rs$, semi-rectangular, centered just distad of mid-cell, partly overlapping proximal portion of macule in $Rs-M_1$; $Rs-M_1$ semi-rectangular, centered just proximad of mid-cell, extending distad along M_1 nearly to macule in M_1-M_3 ; M_1-M_3 irregular, centered in distal 4/5 of cell, extending proximad along M_3 to overlap most of macule in M_3-CuA_1 ; M_3-CuA_1 semi-rectangular, centered proximad of mid-cell, extending distad along CuA_1 and overlapping most of macule in CuA_1-CuA_2 ; CuA_1-CuA_2 rectangular, centered near mid-cell, extending distad along CuA_2 and overlapping most of macule in CuA_2-2A ; CuA_2-2A semi-rectangular in anterior 1/2 of cell, terminating at white vein-like streak, or with a few whitish scales in adjacent posterior 1/2 of cell; basal loop consisting of two macules: triangular in basal 1/5 of $Sc+R_1-Rs$ with a few white scales in adjacent parts of the costa and discal cell; larger, semi-triangular, spanning across posterior 2/3 of distal end of discal cell into base of CuA_1-CuA_2 then into anterior half of CuA_2-2A ; posterior 2/3 of basal 1/4 of costal cell black; black patches bordering macular band as follows: $Sc+R_1-Rs$ extensive, proximad (to basal loop) and distad of macule; $Rs-M_1$ extensive, proximad of macule to base of cell; M_1-M_3 reduced to only a trace of black both distad and proximad of macule, separated mid-cell by a subtle white vein-like streak; M_3-CuA_1 and CuA_1-CuA_2 extensive proximad (extending to macule of basal loop) and reduced distad of macules; CuA_2-2A present only in anterior half of cell cephalad of white vein-like streak, extensive proximad (extending to macule of basal loop), diffused distad with beige scales; large area of black scales proximad of distal macule of basal loop in discal cell; fringe dark gray-brown proximad, pale gray distad, slightly paler than on forewing; conspicuously darker at vein ends, excluding $Sc+R_1$.

Dorsal hirsute vestiture of head mostly pale beige with scattered gray and black; patch of short, white scales dorsad of eye; palpi mixture of pale beige and black scales on dorsum, white-beige on venter, third segment black; antenna pale beige-gray on dorsum, venter white, club abruptly constricted to apiculus from basal nudum segments, club black on dorsum, venter white grading to dark brown distad; nudum dark brown, 9-10 segments; thorax dorsally with black vestiture, pale beige ventrally with scattered whitish scales, tegulae black at center grading to pale beige at edges, legs pale beige; abdomen dark gray-brown dorsally with scattered dark beige scales, paler at segments, white laterally and ventrally.

Male genitalia (Fig. 3), seven dissected, dissection numbers RG0344, RG0403 to RG 0407, SRS-3413: Uncus, gnathos, and tegumen narrow, appearing compressed; uncus narrowing posteriorly, gradually broadening at mid length to nearly twice the width of the narrow, blunt tip; tip slightly upturned, bifurcate, with combs; gnathos bifurcate, narrowing towards posterior tip, slightly arched dorsally; vinculum broad medially, narrowing dorsally and ventrally to tegumen and saccus; saccus narrow, slightly angled dorsally; valvae symmetric, square, narrowing anteriorly; harpe with jagged posterior edge, two large points with smaller points intermixed along posterior edge; costa flattened to square, broad arm reaching towards midline from dorsal view; phallus short, stout; coecum narrow, gradually broadening from ductus ejaculatorius to posterior end; juxta sclerotized; transtilla membranous or absent; two titillators arising dorsally from caudal tip of phallus, left titillator with five points, right titillator with six points; vesica with two cornuti, dorsal cornuti with six points, ventral cornuti with five points.

FEMALE (Figs. 1K-L, O-P): mean forewing length = 12.9 mm (11.6-14.0 mm, $n = 12$); forewing apex pointed, termen slightly convex; hindwing termen convex, then slightly concave before weakly developed tornal lobe; dorsum ground color almost uniformly dark gray-brown, subtly paler than on the male; costa with scattered pale beige scales to apex; small quadrate white apical spots in R_3-R_4 (smallest), R_4-R_5 , and R_5-M_1 (largest); semi-rectangular white subterminal spots in M_1-M_2 and M_2-M_3 offset distad from postmedial and apical

spots; postmedial spot in M_3-CuA_1 rectangular, just distad of base of cell; larger rectangular macule in CuA_1-CuA_2 centered near mid-cell; poorly-developed macule in CuA_2-2A , anterior half centered under distal end of macule in CuA_1-CuA_2 , posterior half positioned basad of proximal edge of macule in CuA_1-CuA_2 ; semi-rectangular macule in discal cell near distal end; fringe dark gray-brown proximad, pale gray distad. Hindwing coloration dark gray-brown as on forewing, slightly darker at base of wing, elements of ventral hindwing macular band barely visible on some specimens, most prominent in M_1-M_3 , M_3-CuA_1 and at the basal loop; fringe dark gray-brown proximad, pale gray distad, slightly paler than on forewing.

Ventral forewing dark gray-brown, darkest at wing base, veins slightly paler; pale beige along costa, expanded at apex to R_5 , with a few pale beige scales variably along the margin at least in R_5-M_1 or to CuA_1 in some specimens; white apical and subterminal spots repeated from dorsum but better-developed; spot in CuA_1-CuA_2 and CuA_2-2A diffused distad towards margin; poorly-defined semi-rectangular spot in anterior half of CuA_2-2A extending nearly to margin, macule in posterior half of CuA_2-2A less defined, extending to margin; semi-rectangular spot across distal end of discal cell; fringe dark gray-brown proximad, pale gray distad; subtly darker at vein ends on most specimens. Ventral hindwing predominantly pale beige over a dark gray-brown ground color, with white macular band and basal loop, anal fold beige with variable brown overscaling; dark gray-brown with few scattered pale beige scales in posterior half of CuA_2-2A and all of $2A-3A$; all wing veins subtly highlighted with white, grading to black at the termen of each vein; additional white vein-like streaks in mid- M_1-M_3 , and very prominent in mid- CuA_2-2A ; macular band of conjoined white spots from $Sc+R_1-Rs$ to CuA_1-2A as follows: $Sc+R_1-Rs$, semi-rectangular, poorly-developed on some specimens, centered just distad of mid-cell, partly overlapping proximal portion of macule in $Rs-M_1$; $Rs-M_1$ semi-rectangular, centered just proximad of mid-cell, extending distad along M_1 nearly to macule in M_1-M_3 ; M_1-M_3 irregular, centered in distal 4/5 of cell, extending proximad along M_3 to overlap most of macule in M_3-CuA_1 ; M_3-CuA_1 semi-rectangular, centered proximad of mid-cell, extending distad along CuA_1 and overlapping most of macule in CuA_1-CuA_2 ; CuA_1-CuA_2 rectangular, centered near mid-cell, extending distad along CuA_2 and overlapping most of macule in CuA_2-2A ; CuA_2-2A semi-rectangular in anterior 1/2 of cell, terminating at white vein-like streak, or with a few whitish scales in adjacent posterior 1/2 of cell; basal loop consisting of two macules: triangular to semi-rectangular in basal 1/5 of $Sc+R_1-Rs$ with a few white scales in adjacent parts of the costa and discal cell; larger, semi-triangular, spanning across posterior 2/3 of distal end of discal cell into base of CuA_1-CuA_2 then into anterior half of CuA_2-2A ; posterior 2/3 of basal 1/4 of costal cell black; black patches bordering macular band as follows: $Sc+R_1-Rs$ extensive, proximad (to basal loop) and distad of macule; $Rs-M_1$ extensive, proximad of macule to base of cell; M_1-M_3 reduced both distad and proximad of macule, separated mid-cell by a subtle white vein-like streak; M_3-CuA_1 and CuA_1-CuA_2 extensive proximad (extending to macule of basal loop) and extensive distad of macules; CuA_2-2A present only in anterior half of cell cephalad of white vein-like streak, extensive proximad (to macule of basal loop), diffused distad with beige scales; large area of black scales proximad of distal macule of basal loop in discal cell; fringe dark gray-brown proximad, pale gray distad, slightly paler than on forewing; conspicuously darker at vein ends, excluding $Sc+R_1$.

Dorsal hirsute vestiture of head mostly pale beige with scattered gray and black; patch of short, white scales dorsad of eye; palpi mixture of pale beige and black scales on dorsum, white-beige on venter, third segment black; antenna pale beige-gray on dorsum, venter white, club abruptly constricted to apiculus from basal nudum segments, club black on dorsum, venter white grading to dark brown distad; nudum dark brown, 9-10 segments; thorax dorsally with black vestiture, pale beige ventrally with scattered whitish scales, tegulae black at center grading to pale beige at edges, legs pale beige; abdomen dark gray-brown dorsally with scattered dark beige scales, paler at segments, white laterally and ventrally.

Female genitalia (Fig. 4), five dissected, dissection numbers RG0345, RG0408 to RG0410, SRS-3414: Ductus bursae well sclerotized laterally, ventrally two to three membranous or lightly sclerotized folds forming longitudinal groove to right of midline, dorsally membranous; ductus seminalis arising at junction of ductus bursae and corpus bursae; corpus bursae with many folds; lamella postvaginalis primarily membranous, two lightly sclerotized curved, longitudinal patches; apophyses anteriores connected to lamella postvaginalis by unsclerotized membrane; apophyses posterior long, reaching caudal end of ductus bursae.

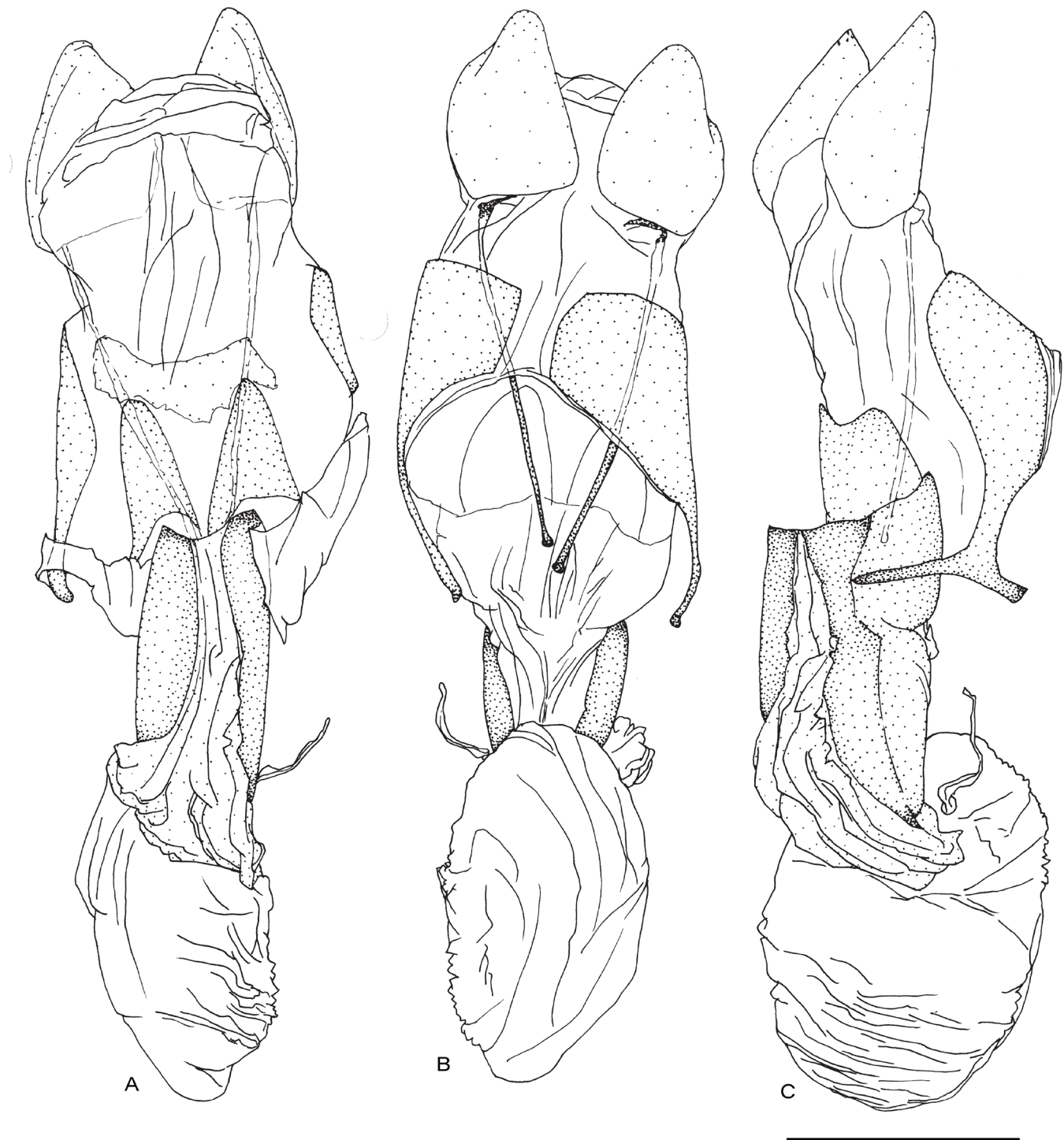


Figure 4. Female genitalia of *Polites r. otomi* **ssp. nov.** from east of San Martín Tuchicuitlapilco, Municipality of Jilotepec, State of México, Mexico, 8 May 2007, collected by Andrew D. Warren; Riley J. Gott dissection no. RG0408. A) Ventral; B) dorsal; C) tilted right-lateral views. Scale bar = 1.0 mm.

Specimens examined. Holotype male with the following labels: white, printed: / MEXICO: MÉXICO: Mpio. / Jilotepec: hill E of San Martín / Tuchicuitlapilco, NW of jct. / Hwys. 57D & 13 (camino / Calpulapan-Acazuchitlán) / 20°05'28.0"N 99°38'18.4"W / 2787m (9145') 8-V-2007 / Andrew D. Warren / ; red, printed: / HOLOTYPE / *Polites rhesus otomi* / A. Warren & Gott /. The holotype and various paratypes will be deposited at the Museo de Zoología, Departamento de Biología Evolutiva, Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City (MZFC); Forty-six

male and eleven female paratypes, same data as holotype. Additional paratypes from same locality, as follows: 24-III-2001, Andrew D. Warren (1 male); 1-IV-2001, Andrew D. Warren (3 males, 2 females); 5-IV-2003, Andrew D. Warren (2 males). Additional specimens (not paratypes) examined from: [El Salto F.], IV-1965 (1f, MGCL), same locality, 7-IV-1965 (2 male, 2 females, MGCL), same locality, 19-IV-1965 (1 male, MGCL); "San Blas, Mexico", 9-V-1965, H. O. Hilton (1 male, MGCL) [see discussion below regarding these localities].



Figure 5. A) Typical habitat of *Polites r. rhesus*, Pueblo Reservoir State Wildlife Area, Pueblo County, Colorado, USA, 13 May 2020, Andrew D. Warren, view to the southwest with the Wet Mountains on the horizon, showing unusually dry Spring conditions; B) type locality of *P. r. otomi* **ssp. nov.** east of San Martín Tuchicuitlapilco, Municipality of Jilotepec, State of México, Mexico, 8 May 2007, Andrew D. Warren, view to the northeast, showing very dry conditions the day most of the type series was collected.

Type locality. The gently sloping hill just east of San Martín Tuchicuitlapilco, Municipality of Jilotepec de Abasolo, State of México, Mexico (Fig. 5B), is comprised of variably grazed, grassy, open areas, with scattered oak (*Quercus* L.) and pine (*Pinus* L.), few other trees or shrubs, and multiple grass species. The hill is subdivided into various parcels by stone-pile walls, with each parcel subjected to different grazing regimes, intersected by small paths used by locals and livestock. Other grassland-inhabiting species of Hesperinae found at the type locality include *Amblyscirtes fimbriata* (Plötz, 1882) in June, *Atalopedes campestris huron* (W. H. Edwards, 1863) in March, April, June and September, *Oarisma era* Dyar, 1927 in June and September, *Polites carus* (W. H. Edwards, 1883) in March, April, and September, and *Polites puxilius* (Mabille, 1891) in September.

Etymology. *Polites r. otomi* **ssp. nov.** is named in recognition of the Otomí, indigenous people of the Central Mexican Valley, whose language is also Otomí, several dialects of which are still spoken (Zillges, 2013). During the Postclassic and early colonial period, Jilotepec, State of México, was considered an important center of the Otomí civilization (Brambila Paz, 2005). The Otomí maintained a strong ethnic identity within Aztec rule, and continued use of their (non-Nahuatl) language until the time of conquest (Smith, 1996). Present-day Otomí villages are mainly located in the State of México, Hidalgo, Querétaro, Guanajuato, Tlaxcala, Puebla, and Veracruz (Granberg, 1970; Salinas-Pedraza, 1978; Lastra, 2006; Zillges, 2013). This subspecific epithet is regarded as a masculine noun in apposition.

Distribution and phenology. The overall distribution of this subspecies is unclear. In the State of México, in addition to the type locality, it is known from Salazar, which is approximately 28 km E of Toluca, from a single female illustrated by Godman (1900) in Godman & Salvin (1879-1901), at The

Natural History Museum, London (this record was missed by Hernández-Mejía *et al.*, 2008). Godman (1900) also noted a pair of specimens from “Milpas in Durango 5900 feet (Forrer).” If the latter specimens are correctly labeled, they would imply a very broad or highly disjunct distribution for *P. rhesus* in the central Mexican Plateau, but the provenance of specimens with this data was questioned by Walsingham (1912) in Walsingham (1909-1914), and Selander & Vaurie (1962) considered the locality “not identified.” Hoffmann (1941, 1976) listed *P. rhesus* (under *Yvretta*) from “Sonora, Sierra Madre Occidental (Durango). Montañas del Centro (hasta unos 3300 metros). Valle de México.” The basis for his record from Sonora (repeated by Stanford & Opler (1993)) is unknown; it was not listed among the known hesperiid fauna of Sonora by Bailowitz *et al.* (2017) and we have not seen material from there. Hoffmann’s (1941, 1976) mention from Durango (repeated by Stanford & Opler (1993)) is apparently based on the report by Godman (1900), and his reference to “Montañas del Centro” likely refers to the specimen from Salazar. As for the report from Valle de México, Beutelspacher (1980) noted that the only known material is from the R. Müller collection, and is in poor condition. In the senior author’s review of Hesperidae in the R. Müller collection at MHNCM in 2007-2008, no specimens of *P. rhesus* were encountered, yet a single worn female of the very similar *Hesperia uncas gilberti* MacNeill, 1964, was encountered from México, D.F.; this specimen is likely the basis for Hoffmann’s (1941, 1976) and Beutelspacher’s (1980) mention of Valle de México for *P. rhesus* (neither author listed *H. uncas gilberti*). De la Maza (1976) reported *P. rhesus* (under *Yvretta*) from Tepoztlán, Morelos, from August. Recent reevaluation of specimens this report was based on has shown they are actually *Polites subreticulata* (Plötz, 1883) (R. de la Maza-Elvira, pers. comm. to ADW, 2020). The basis of the record of *P. rhesus* from Coahuila, by Stanford & Opler (1993) is unknown.

No specimens of *P. rhesus* have been encountered in Mexican Lepidoptera collections. There are 6 specimens of

P. r. otomi **ssp. nov.** in the MGCL collection with vague data. Five of these have handwritten labels, in pencil, that appear to denote “El Salto F.”, collected in April, 1965 (Allyn Museum accession 1981-11 from Eduardo Welling). It is unclear what locality this refers to; there are many “El Salto” waterfalls throughout Mexico, and the best-known to lepidopterists as “El Salto Falls,” in Nuevo León, is not a suitable habitat for this species, consisting of mainly tropical vegetation at only 1340 m elevation. The sixth MGCL specimen (from the Florida State Collection of Arthropods) with vague data is labeled from “San Blas, Mexico”, collected by H. O. Hilton. It is unclear what locality this represents, as the best known “San Blas” from a lepidopterological viewpoint is at sea-level in Nayarit.

Thus, to date, *P. r. otomi* **ssp. nov.** has been confirmed only from the State of México, Mexico, at elevations between 2780 m (type locality) and 2990-3000m (Salazar); it is surely more widespread in appropriate habitats, at least in northern parts of the State of México, and it likely occurs in adjacent parts of Hidalgo at similar altitudes. Current records indicate a rather extended single annual flight in the spring, beginning in late March, with peak abundance in early May. Adults were not encountered during visits to the type locality on 5 September 2007, 14 June 2008 and 10 October 2008, despite favorable conditions for butterfly activity.

Biogeography. Available data suggests that this skipper may be endemic to the high-elevation grasslands at the interface between the southern Mexican Plateau-Valley of Mexico, and the Eje Neovolcánico a region with many endemic plant and animal species (Luna *et al.*, 2007). However, as noted above, questions remain about the overall distribution of *P. rhesus* in Mexico.

Ecology. Males and females of *P. r. otomi* **ssp. nov.** were exclusively encountered flying over very short, heavily grazed grasses on a gravelly, gently sloping hillside (Fig. 5B). Adults were most abundant in areas where the grass had been grazed down to ground-level, where very few other butterfly species were present, and were not encountered in areas where the grass blades extended more than a few centimeters above the ground. Multiple grass species occur at the site, subjected to various degrees of grazing, including *Bouteloua gracilis* (Central Mexican haplotype, *sensu* Avendaño-González *et al.*, 2019), which is likely the larval foodplant for *P. r. otomi* **ssp. nov.** Environmental conditions during the single Spring flight of *P. r. otomi* **ssp. nov.** are extremely dry, with few or no nectar sources available. Males await passing females in low areas among the shortest grasses (Fig. 5B, foreground), and were not encountered on the nearby hilltop. When landed among the dry grasses and bare, gravelly ground, the dorsal and ventral coloration of adults is extremely cryptic, rendering them very difficult to see. Immature stages are unknown.

Diagnosis and discussion. Adults of *P. r. otomi* **ssp. nov.** are immediately separated from *P. r. rhesus* by their dusky wing fringes, which are entirely snow-white on *P. r. rhesus*, and much darker dorsal coloration. In addition, males and females of *P. r. otomi* **ssp. nov.** average smaller than those of *P. r. rhesus*;

dorsal and ventral white spots average smaller on *P. r. otomi* **ssp. nov.** than on *P. r. rhesus*; males of *P. r. otomi* **ssp. nov.** have a concolorous dark gray-brown dorsal hindwing, while that of *P. r. rhesus* males usually shows elements of the ventral hindwing macular band; beige scaling at the edges of the tegulae is better-developed on *P. r. otomi* **ssp. nov.** than on *P. r. rhesus*; the ventral forewing dark areas of *P. r. otomi* **ssp. nov.** are darker than those areas on *P. r. rhesus*; the ventral hindwing pale coloration is much brighter on *P. r. otomi* **ssp. nov.** and consistently grayer on *P. r. rhesus*, while the dark areas on the ventral hindwing are darker on *P. r. otomi* **ssp. nov.** than on *P. r. rhesus*, creating a greater contrast between pale and dark areas on *P. r. otomi* **ssp. nov.**; white scaling along the ventral hindwing veins (and vein-like streaks) is better developed on *P. r. otomi* **ssp. nov.** than on *P. r. rhesus*; finally, the tornal area of the ventral hindwing, in the posterior half of CuA₂-2A and all of 2A-3A is dark gray-brown on *P. r. otomi* **ssp. nov.**, while this region is usually much paler on *P. r. rhesus*.

Genitalia of the subgenus *Yvretta* of *Polites* were characterized by Burns (1994) (as a group of species within *Polites*) by the male genitalia having the posterior tip of the uncus divided with tips having enlarged “uncal combs”, the gnathos divided and separated with a gap from uncus, titillators arising from dorsal part of caudal end of phallus, and the posterior margin of valvae appearing square. Female genitalia of the *rhesus* group were characterized by the apophyses anteriores being connected to the lamella postvaginalis by membranous integument instead of sclerotized integument, the lamella postvaginalis being partially sclerotized, the ductus bursae sclerotized primarily ventrally and laterally, and the ductus bursae with a ventral longitudinal groove positioned to the right of the midline. These characters place *P. r. otomi* **ssp. nov.** in the *rhesus* group of *Polites*, and the nearly identical genitalia of *P. r. rhesus* and *P. r. otomi* **ssp. nov.** supports the naming *P. r. otomi* **ssp. nov.** as a subspecies of *P. rhesus*.

Subtle genitalic differences between the nominate subspecies and *P. r. otomi* **ssp. nov.** are observed in males, while female genitalia is indistinguishable between the two taxa. Although differences are observed in male genitalia, the differences are few, including *P. r. otomi* **ssp. nov.** appearing smaller, the posterior edges of valvae are less jagged with fewer points, and the phallus is thinner with two cornuti, while *P. r. rhesus* is larger, has valvae with more points along the posterior edge of the harpe, and the phallus is thicker with three cornuti present. Variable numbers of cornuti within a species has been noted by previous authors (*e.g.*, Austin *et al.*, 1997), and is not considered to be a character that can be used to distinguish species without further genitalic differences observed. The number and size of points on the caudal edge of the valvae for both subspecies varies randomly and is best characterized by the nominate subspecies generally having more points than *P. r. otomi* **ssp. nov.** Since male genitalic characters observed to differ in these taxa are variable or potentially variable (cornuti) and no genitalic characters were observed to differ among females, *P. r. otomi* **ssp. nov.** is described as a subspecies. Patterns of intraspecific variation in male genitalia were discussed by McNeill (1964), Austin & McGuire (1998) and McGuire (1998) for the related hesperiine genus *Hesperia*.

Despite numerous differences in the wing morphology between *P. r. otomi* **ssp. nov.** and *P. r. rhesus*, differences between the two in the male genitalia are subtle, no differences were observed in female genitalia, and the two taxa seem ecologically nearly identical, sharing a single annual flight in the Spring, and preference for habitats with extremely short stands of the larval foodplant *Bouteloua gracilis*. For these reasons, we have decided to name *P. r. otomi* **ssp. nov.** at the subspecies-level, but acknowledge that future studies may show that it is better considered a species-level taxon.

As discussed above, it remains unknown whether *P. rhesus* occurs in northern Mexico, since previous reports of the species from Sonora and Durango appear to be erroneous. Should specimens from the region become available for examination, they should be compared to both *P. r. otomi* **ssp. nov.** and *P. r. rhesus*, to evaluate the possibility that *P. r. rhesus* might occur in the northernmost areas of Mexico. Efforts to locate additional populations of *P. rhesus* in Mexico should be focused in April and May, in heavily grazed areas dominated by *Bouteloua gracilis*. These habitats are rarely visited by lepidopterists, especially during the Spring, when conditions tend to be very dry and few butterfly species are active. Thus, the possibility exists that *P. rhesus* is indeed broadly distributed across the Mexican Plateau in appropriate habitats, and has simply been overlooked. However, the distinctive appearance of *P. r. otomi* **ssp. nov.** suggests at least some degree of genetic isolation from *P. r. rhesus* to the north. We hope that future studies will clarify the relationship between *P. r. rhesus* and *P. r. otomi* **ssp. nov.**, and reveal further information regarding the distribution of *P. rhesus* in Mexico.

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