A NEW SPECIES OF *DALLA* FROM CHIAPAS, MEXICO (LEPIDOPTERA, HESPERIIDAE, HETEROPTERINAE)

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Abstract - A new species of *Dalla* is described from montane cloud forest habitats in southern Chiapas, Mexico. Based on male genitalia and characters of the wings and body, the new species appears to be closest to *Dalla steinhauseri*, a taxon known from montane cloud forest in eastern Oaxaca, Mexico, although it has been confused with *Dalla freemani* in the literature.

Key words: Endemism, genitalia, Mesoamerica, morphology, skipper butterfly.

Heteropterine skippers (Hesperiidae: Heteropterinae) are the basal group of monocot-feeding hesperiids, being distributed from the Himalayas to Japan and Europe, Africa and Madagascar, and North and South America (Warren *et al.* 2009). Seven genera of Heteropterinae fly in the New World, and by far the most diverse of these is *Dalla* Mabille, 1904, with 96 currently recognized species (Mielke 2005, Viloria *et al.* 2008).

Most *Dalla* species fly in the Andes Mountains of South America, although eighteen described species are known from Central America and Mexico (Warren *et al.* 2011), eight of these being endemic to Mexico (Warren in prep.). Most species of *Dalla* occur in highly limited geographic ranges, generally at elevations above 900m, and often above 2500m (Viloria *et al.* 2008). *Dalla* males are most frequently encountered at damp ground, whereas females of *Dalla* are very rarely seen (Steinhauser 2002, pers. obs.), and remain unknown for a large percentage of species. Larval foodplants have been confirmed only for a few South American *Dalla* species, as noted by Viloria *et al.* (2008), which are *Chusquea* Kunth (Poaceae) bamboos.

Below, we describe a distinctive new species of *Dalla* from montane cloud forests of southern Chiapas, Mexico, based on two male specimens collected by the junior author on two different volcanoes.

***Dalla austini* A. Warren & R. G. De la Maza, sp. nov.**
(Figs. 1a-d, 2a-e).

Description. Male (Fig. 1a-d)- forewing length = 14.6 mm (holotype), 16.4 mm (paratype); forewing apex fairly pointed, termen evenly convex though nearly straight between CuA2 and 1A+2A, no stigma or brand; hindwing slightly produced at apex, termen convex to CuA1, then concave to tornus at 1A+2A, inner margin convex. Dorsal forewing brown, scattered pale golden setiform scales over most of wing, densest on basal half of wing, especially along costa, inner margin and CuA2-1A+2A. Opaque pale ochreous macules as follows: subapical in R3-R4 to R5-M1, quadrate, completely overlapping, forming a nearly straight line perpendicular to the costa; posemedial in mid-M3-CuA1, larger, roughly quadrate with margin along CuA1 produced distad; mid-CuA1-CuA2, larger, roughly quadrate; basal part of CuA1-CuA2, similarly sized, triangular; finally, roughly hourglass-shaped (roughly heart-shaped in paratype) spanning width of discal cell at proximal section of distal fourth of cell, centered between the two macules in CuA1-CuA2, similar in size to them. Wing fringe brown.

Dorsal hindwing same ground color as forewing; prominent overscaling of semi-irridescent olive setiform scales over basal 2/3 of wing, somewhat paler yellow-olive in discal cell and M3 to CuA2, most concentrated in basal half of discal cell and along inner margin to tornus. Pale ochreous, semi-opaque macules as follows: M1-M3, large, semi-rectangular, continuous across M2 with longest part in M1-M2, occupying distal end of discal cell and basal half of cells M1 and M2; basal end M3-CuA1, very small, roughly triangular, mostly overlapping macule in M1-M3 though distal end produced somewhat distad; CuA1-CuA2, centered just past mid-cell, larger, roughly half the size of macule in M1-M3, roughly rectangular, overlapping basal part of macules in M3-CuA1 and M1-M3; paratype with additional tiny macule at base of Rs-M1, over M1 and macule in M1-M3; finally, small but prominent, rounded macule in discal cell just proximad of midpoint. Wing fringe brown proximad, pale ochreous distad, fringes somewhat darkened at vein ends.

Ventral forewing with macules repeated from the dorsal surface, each outlined with a narrow band of golden scales, which also extend as a broad dash from M1, across Sc-R1 and R1-R2 to just before the costa, and, as somewhat paler golden scales, below the macules in CuA2-1A+2A, forming a smudge spanning the central 2/3 of the cell, with pale golden scales densest (and richest in color) immediately below the macules; ground color dark brown, with dense, cinnamon-brown overscaling concentrated along the costa (caudad to M1) and apex (to about M3), and sparsely distributed in adjacent cells; few pale creamy cells at ends of cells M1-M2 and M2-M3; base of discal cell and cells CuA2 and 1A+2A shiny grayish; wing fringes dark at vein ends, areas between vein ends pale creamy proximad, especially from R5 to CuA1 (most pronounced on paratype), darker distad, brown on holotype, cinnamon brown on paratype.

Ventral hindwing with semi-opaque macules repeated from dorsal surface; additional pale ochreous (not semi-opaque) macules in mid-Rs-M1, roughly triangular, and CuA2-1A+2A, roughly circular, both arranged in a straight line with respect

Fig. 1. Adults of *Dalla austini*, *D. freemani* and *D. steinhauseri*; a) dorsal and b) ventral views of holotype male of *D. austini* from Chiapas, Mexico, complete data in text; c) dorsal and d) ventral views of paratype male of *D. austini* from Chiapas, Mexico, complete data in text; e) dorsal and f) ventral views of holotype male of *D. freemani* from GUATEMALA: Dept. Sololá: Olas de Moka, 3000, September 1808 [probably September 1908], Geo. P. Englehardt, Genitalia Vial #96-2, Andrew D. Warren [AMNH]; g) dorsal and h) ventral views of holotype male of *D. steinhauseri* from MEXICO, OAXACA, Sierra Juárez, km. 95, La Esperanza-Cerro Pelón, 7000', 28 May 1990, John Kemner, Genitalia Vial SRS-3737 [MGCL].

to macules in M1-M3 and CuA1-CuA2; Sc+R1-Rs, roughly quadrate, borders somewhat indistinct; middle 1/5 of costal cell, roughly quadrate (distal border ill-defined on paratype); paratype with streak of pale scales basad of macule in M1-M3, along M1, overlapping pale macule in Sc+R1-Rs; scattered pale creamy scales at base of costal cell, Sc+R1-Rs, discal cell, and CuA2-1A+2A, as well as in margin, especially between M1 and CuA1, and on paratype at tornus in CuA2 to 3A; wing fringes dark at vein ends, much paler between vein ends, creamy proximad (paler on paratype), pale cinnamon distad.

Dorsal head black with scattered dark brown, tan, and olive setiform scales, paler below eyes; dorsal labial palpus with mix of brown and pale golden setiform scales, paler laterally and ventrally, inner surface dark brown; third segment dark brown, porrect, barely extending beyond distal scales of second segment. Antennal shaft and club black on dorsum, mostly pale golden on venter with some black between segments; nudum brown, 14 (holotype) or 13 (paratype) segments. Dorsal thorax black with semi-iridescent, olive, setiform scales, ventral thorax with beige setiform scales, continuing onto ventral edge

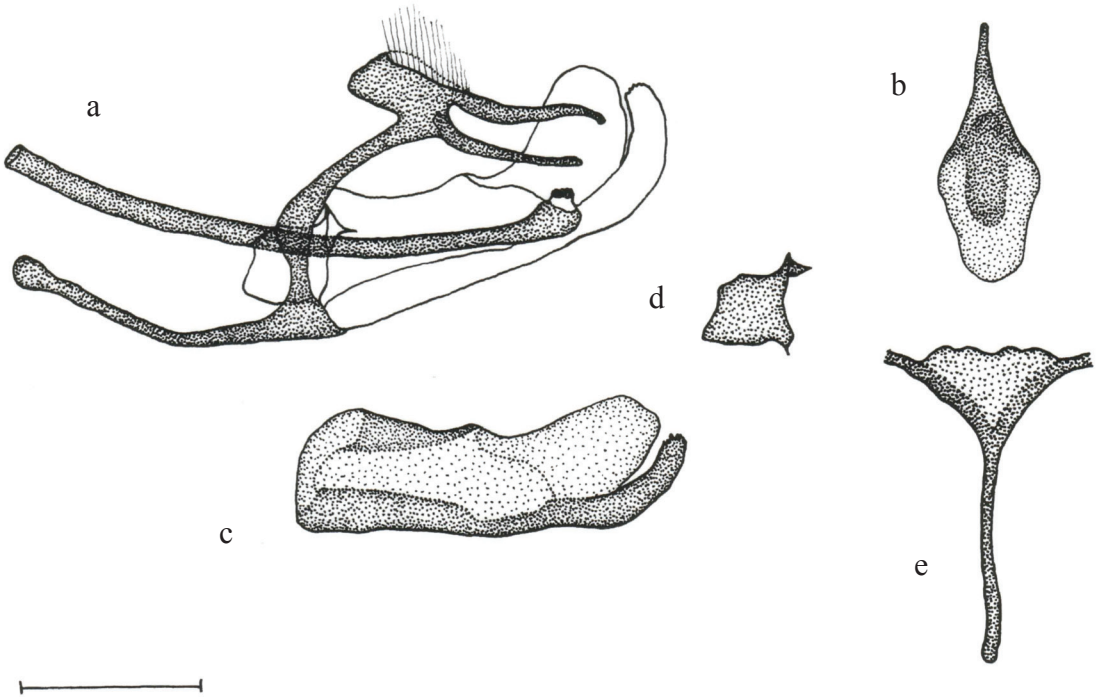

Fig. 2. Male genitalia of *Dalla austini* holotype, genitalic vial GTA-14147, complete data in text; a) left lateral view of uncus, gnathos, tegumen, saccus, right valva, aedeagus and juxta; b) dorsal view of tegumen and uncus (hair tuft not shown); c) left lateral (exterior) view of left valva; d) left lateral view of juxta; e) ventral view of saccus. Scale = 1.0 mm.

of femur; fore-tibia not spined, brownish epiphysis relatively short, extending to distal end of tibia; mid-tibia with longitudinal row of 6 spines on inner surface, pair of spurs distad, outer spur about 2/3 length of inner; hind-tibia with longitudinal row of about 6 spines, two pairs of spurs, in each pair, outer spurs about 4/5 length of inner; tarsus with three longitudinal rows of short spines. Dorsal abdomen dark brown, with long, semi-iridescent olive and pale golden setiform scales, somewhat paler caudad; ventral abdomen paler, with beige and yellowish setiform scales.

Male genitalia (Fig. 2a-e). Uncus in lateral view (Fig. 2a) narrow, concave and slightly uplifted caudad of middle, caudal end tapering to rounded point, slightly downturned; in dorsal view (Fig. 2b) caudal end narrow, rounded point, then broadening gradually cephalad towards junction with tegumen, then narrowing slightly cephalad to overlap large portion of tegumen as oval plate possessing dense pale brown hair tuft (removed in Fig. 2b); gnathos (Fig. 2a) slightly shorter than uncus, narrow in lateral view, tapering slightly caudad to narrow somewhat rounded caudal end; in ventral view relatively broad proximad, narrowing gradually to narrow rounded end; tegumen in dorsal view (Fig. 2b) broadly curved cephalad, broadening slightly to junction with uncus; combined ventral arm of tegumen and dorsal arm of saccus fairly evenly curved (Fig. 2a), somewhat swollen cephalad near midpoint; cephalic arm of saccus (Fig. 2a, e) very long, nearly the length of valva, thin, roughly cylindrical, angled about 20 degrees above horizontal in lateral view, cephalic end slightly swollen and rounded in lateral and dorsal views; valvae (Figs. 2a, c) symmetrical, long (1.4x length of tegumen and uncus), length about 3x width, costa shallowly concave on dorsal edge toward caudal end, ampulla elongate, roughly length of costa, relatively broad (length about 2x length), angled slightly dorsad, caudal end generally rounded but caudal end appearing somewhat squared off in lateral view, setose on both surfaces, especially caudad, harpe curved dorsad to blunt caudal end, exceeding and not overlapping caudal extent of ampulla, dorsal edge weakly grooved; juxta-transtilla (Fig. 2a, d) prominent with pointed dorso-caudal edge and spine pointed caudad in lateral view, subquadrate in ventral view; aedeagus (Fig. 2a) unadorned, shallowly sinuate in lateral view, straight in dorsal view, caudal end slightly expanded, vesica with single, sclerotized, roughly rounded cornutus.

Specimens examined. Holotype male with the following labels: white, printed: / CHIAPAS / VN. HUITEPEC / NE. B. MESOFILO / 2700M. 2 AGO 87 / R. DE LA MAZA E. /; white, printed and handprinted: / Genitalic Vial / GTA-14147 /; red, printed: / HOLOTYPE / *Dalla austini* / A. Warren & R. G. De la Maza /. One male paratype from MEXICO: CHIAPAS: Volcán Tacaná, 2800m, 18 April 2000, R. De la Maza E., Genitalic Vial GTA-14148. The holotype is deposited at the McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville (MGCL); the paratype is deposited in the De la Maza Family Collection, Mexico City, Mexico.

Type locality. MEXICO: CHIAPAS: Volcán Huitepec, NE Bosque Mesófilo, 2700m. This site is comprised of dense montane cloud forest, dominated by *Quercus acatenanguensis*

Trel., *Bomarea acutifolia* (Link & Otto) Herb., *Crataegus pubescens* C. Presl., *Salvia chiapensis* Fernald, *Ternstroemia tepezapote* Schltdl. & Cham., *Viburnum jucundum* Morton, *Xylosoma flexciosum* (Kunth) Hemsl., *Litsea glaucescens* Kunth, *Oreopanax xalapensis* (Kunth) Decne. & Planch., *Ostrya virginiana* (P. Mill) K. Koch., *Sambucus mexicana* Presl., and some *Alsophila* R. Br. and *Cyathea* J. E. Smith arborescent ferns. Along the rocky creeks in the area, scattered colonies of the bamboo *Chusquea foliosa* L. G. Clark are found (Cortés 2005). This locality is strongly influenced by polar air masses (nortes) during the winter, and is exceptional for its general scarcity of butterfly species throughout the year, even during periods of favorable weather. Other butterfly taxa found in the habitat include *Colias philodice guatemalena* Röber, 1909, *Iophanus phirrias* (Godman & Salvin, 1887) and possibly new subspecies of *Oxeoschistus hilaria* (H. Bates, 1865) and *Pedaliodes napaea* (H. Bates, 1865); remarkably, no species of *Cyllopsis* R. Felder, 1869 has yet been found here to date.

Volcán Tacaná, where the paratype was collected, is ecologically distinct from Volcán Huitepec in facing the Pacific Ocean, and is therefore protected from cold polar air masses during the winter. While overall similar, the vegetation on Volcán Tacaná includes additional tree species, such as *Chiranthodendron pentadactylon* Larreat., and a greater diversity of bamboos in the genera *Chusquea* and *Rhipidocladum* McClure. A more impressive diversity of butterflies occur on Volcán Tacaná than on Volcán Huitepec, including *Eretris maria* (Schaus, 1920), *Drucina championi* Godman & Salvin, 1881, three species of *Pedaliodes* Butler, 1867, four species of *Cyllopsis*, and many others, including *Iophanus phirrias*.

Etymology. *Dalla austini* is named in honor of the late George T. Austin, Lepidoptera systematist, in recognition of his myriad contributions to our science.

Distribution and phenology. To date, *Dalla austini* is known only from cloud forest habitats on Volcán Huitepec and Volcán Tacaná, in the southern part of the Mexican state of Chiapas. It seems likely that *D. austini* occurs in similar habitats in Guatemala, and it is hoped that future fieldwork can confirm this hypothesis. Given that *D. austini* is apparently replaced in similar habitats in Oaxaca by *D. steinhauseri*, the former is not likely to range north of Chiapas. Confirmation of the larval foodplant, likely a bamboo as noted above, will enable targeted searches for *D. austini* in additional sites.

Diagnosis and discussion. The two known specimens of *Dalla austini* show considerable individual variation, which might in part be seasonal, with the holotype from August and the paratype from April. Forewing and hindwing macules on the holotype are slightly paler than those on the paratype, above and below, and the ventral forewing of the holotype has increased cinnamon overscaling compared to the paratype. On the hindwing, the paratype has an extra, very small, semi-hyaline macule in Rs-M1, and in ventral view has an extra dash of pale scales basad of macule in M1-M3, along M1, and overlapping pale macule in Sc+R1-Rs. The forewings of the paratype are about 1.8 mm longer than those of the holotype.

The genitalia of the two specimens of *D. austini*, however, are remarkably similar, differing slightly only in size, with overall proportions of the genitalia of the paratype slightly larger than those of the holotype, apparently corresponding with the slightly longer wing length of the paratype. Given the nearly identical genitalia, similar habitats and altitudes of origin, and considering the range of variation seen in many other species of *Dalla* (pers. obs.), these two specimens most likely represent the same species. Hopefully, future field studies will be able to clarify the range of phenotypic variation in *D. austini*.

At first glance, wing markings on *D. austini* appear closest to those on *D. freemani* A. Warren, 1997, a species which to date is known only from the unique holotype male from Guatemala (Figs. 1e-f). However, several differences between *D. austini* and *D. freemani* exist. *Dalla austini* is larger (forewing length 14.6, 16.4mm) than *D. freemani* (forewing length 12.7mm), with considerably paler dorsal hindwing spots. The small, rounded, deep ochreous dorsal forewing spot in CuA2-1A+2A on *D. freemani* (also shared with *D. bubobon* as shown by Warren and González 1996 and Warren *et al.* 2011) is absent on *D. austini*, while the small, roughly triangular, semi-hyaline macule in M3-CuA1 on the hindwing of *D. austini* is absent on *D. freemani*. In addition, forewing macules, especially the three apical spots and the macule in M3-CuA1, are considerably larger on *D. austini* than on *D. freemani*.

The male genitalia of *D. austini* differ from those of *D. freemani* in several ways, as illustrated by Warren (1997). The uncus tapers to a much finer point at its caudal end in *D. austini* than in *D. freemani*, while the proximal end of the tegumen (in dorsal view) in *D. austini* is noticeably broader than that of *D. freemani*. The valva of *D. austini* is longer and proportionally narrower than that of *D. freemani*; the harpe and ampulla narrowly overlap in lateral view in *D. freemani*, but do not overlap, and are separated by a small gap in *D. austini*. The ventral arm of the saccus is proportionally longer in *D. austini* than in *D. freemani*. Finally (since the caudal end of the aedeagus is missing from the holotype of *D. freemani*), while overall rather similar, the shape of the juxta-transtilla is more irregular in *D. austini* than in *D. freemani*.

In essentially all genitalic characters, *D. austini* is most similar to *D. steinhauseri* H. Freeman, 1991, a taxon known from cloud forest habitat in eastern Oaxaca, Mexico (Figs. 1g-h). As illustrated by Steinhauser in Freeman (1991), the genitalia of the holotype male of *D. steinhauseri* are remarkably similar to those of *D. austini*, including the shape of the long, relatively narrow valva, long saccus, similar tegumen and very similar juxta and transtilla; the aedeagus of the two taxa is virtually identical, and no obvious differences were noted in the cornutus. The upturned gnathos illustrated for *D. steinhauseri* (Freeman 1991) represents an artifact of the dissection technique- the gnathos on that taxon is actually very similar in shape, length, and orientation to that of *D. austini* (Fig. 2a). There are, however, a couple subtle differences between the genitalia of the two taxa. The most prominent difference is in the valva, where the harpe and ampulla overlap slightly in lateral view in *D. steinhauseri*, whereas there is no overlap in *D. austini*, which shows a small gap between the harpe and ampulla in lateral view. In addition, in dorsal view,

the caudal end of the tegumen is produced laterally to a greater extent in *D. austini* than in *D. steinhauseri*. Despite the overall darker ventral ground color of *D. steinhauseri*, and its paler forewing and hindwing macules, compared to *D. austini*, the size and position of macules on the two taxa is very similar, especially on the forewing, where the spot patterns are virtually identical. Hindwing spots on the two species differ mainly in the absence of the macules in the discal cell and in M3-CuA1 on *D. steinhauseri*, above and below, and in minor details of ventral pattern and coloration. Thus considering all characters of the three taxa, including size (holotype of *D. steinhauseri* has a forewing length of 14.0 mm), *D. austini* appears perhaps slightly closer to *D. steinhauseri* than to *D. freemani*, although the three taxa are clearly closely related.

While *Dalla austini* has remained undescribed until now, it has been reported in the literature as *D. freemani*. Glassberg (2007, 2008) figured dorsal and ventral views of a live male of *D. austini* from Chiapas (as *D. freemani*), but did not provide detailed locality information for the images. The live individual is virtually identical to the holotype of *D. austini* in dorsal and ventral views. Thus, reports by Glassberg (2007, 2008) of *D. freemani* from Mexico are in error, and represent *D. austini*.

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