

PYRGUS XANTHUS (HESPERIIDAE): SYSTEMATICS,
FOODPLANTS AND BEHAVIOR

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Pyrgus xanthus Edwards has been greatly confused with *P. scriptura* (Boisduval) and *P. ruralis* (Boisduval) (Brown et al., 1957; Callaghan & Tidwell, 1972). This paper clarifies the systematic position of *xanthus*, details its distribution especially in Colorado, and presents brief observations on foodplants, habitat, and adult behavior. I thank F. M. Brown for providing photographs of the types of *xanthus*, and Scott L. Ellis, C. Don MacNeill, Kilian Roever, Maurice Howard, Glenn R. Scott, Ray E. Stanford, and Samuel Johnson for providing specimens and helpful information.

Systematic relationship. Table 1 and Figs. 1-30 show 35 characters by which one or more of the above three species differs from the others. Genitalic characters are based on 10 individuals of each sex of each species. *P. xanthus* is clearly very closely related to *P. ruralis* and much different from *P. scriptura*. *P. xanthus* and *P. ruralis* are apparently completely allopatric, so that *xanthus* is the allopatric representative of *ruralis* characterized by the lack of a costal fold and several genitalic and wing pattern characteristics. It seems best at this time to regard *xanthus* and *ruralis* as distinct species because of these differences in morphology, and because the costal fold of *ruralis* possibly emits a pheromone enabling reproductive isolation from *xanthus*. Further sampling at possible areas of sympatry (they come within about 10 miles of each other in the Douglas-Jefferson Counties area, Colorado) may resolve this question.

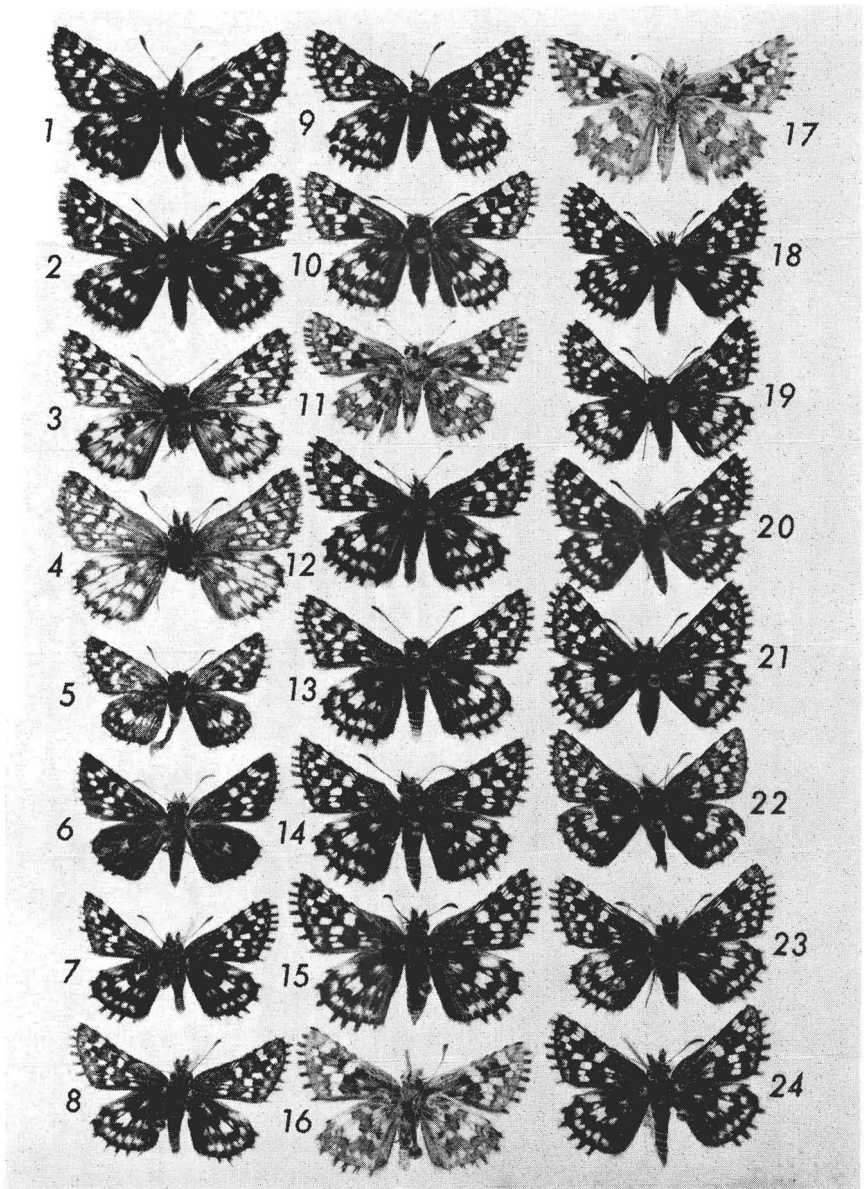
The spring brood of *P. scriptura* has larger white wing spots than later broods (Fig. 5), and was misidentified and figured as *xanthus* by Brown et al. (1957). Spring brood *scriptura* are similar to later broods (cf. Table 1) except for several wing pattern characters by which they can be distinguished. I have seen one *scriptura* from southern Nevada in August with large white wing spots (coll. Ralph Wells), and rarely *xanthus* lacks the basal dorsal hindwing spot, but usually the two species can be easily separated by wing pattern. A whitish subspecies of *P. ruralis* from San Diego County, California (Figs. 3-4) has sometimes been called *xanthus*, but it is identical to *ruralis* in all the characters listed in Table 1. The only geographic variation in *xanthus* appears to

TABLE 1. Differences between *Pyrgus scriptura*, *P. ruralis*, and *P. xanthus*.

Character	<i>scriptura</i>	<i>ruralis</i>	<i>xanthus</i>
altitude	4500–8400' in Colo.	6200–10500' in Colo.	8500–10500' in Colo.
habitat	prairie	openings in coniferous forest	openings in aspen-coniferous forest
foodplant	Malvaceae: <i>Sida hederacea</i>	Rosaceae: <i>Potentilla</i> spp.	Rosaceae: <i>Potentilla</i> spp.
number of broods	three (April–May, June–July, August–Sept)	one (March–June)	one (May–June)
male costal fold	absent	present, small	absent
white spot, base of DHW	absent	almost always present	present
fringe HW	black spots extend only half of fringe	black spots extend to edge	black spots extend to edge
ground color of VHW	greyish tan	reddish tan when fresh	reddish tan when fresh
medial spots VHW	less strongly outlined, less contrasting with ground color	strongly outlined & contrasting with ground color	strongly outlined, highly contrasting with ground color
marginal crescentic spots VHW	crescents in cells Cu ₁ & Cu ₂ little longer than those anterior, crescents distinct to margin	crescents in cells Cu ₁ & Cu ₂ slightly longer than those anterior; spot in cell Rs longer than in other species, cell M ₁ -M ₃ spot suffused with white, which divides marginal ground color band; this band obscures crescents less than in <i>xanthus</i>	crescents in cells Cu ₁ and Cu ₂ longer than those anterior, crescents obliterated by ground color distally except in cell Cu ₂
tegumen	triangular in dorsal and ventral view	oval in dorsal view, bent downward anteriorly in lateral view	oval in dorsal and usually in lateral view
uncus	narrow, sinuous, hooked	narrow, evenly curved	wider, evenly curved
sclerite at base of uncus	long	short	short

TABLE 1. (Continued)

Character	<i>scriptura</i>	<i>ruralis</i>	<i>xanthus</i>
gnathos	absent beyond gnathal bridge	strongly curving to a point beyond gnathal bridge	weakly curving to a point beyond gnathal bridge
saccus	longer	short, broadly connected to vinculum	short
juxta	roughly quadrate, with a dorsal flange extending posteriorly	U-shaped with a shallow notch, no flange	heart-shaped, no flange
aedeagus	bent near middle, slightly bent near base	bent near distal end, spoon-shaped basally	bent near distal end, otherwise nearly straight
valva	long; prong attached dorsally & directed ventroposteriorly with many recurved spines on bulbous tip; A & B narrow, B curved dorsally	shorter; prong attached ventrally, with oval base and a row of long spines at end, directed anteroventrally; A & B wide, B not curved dorsally	shortest especially dorsally; prong as in <i>ruralis</i> but with shorter spines; A wide, B very wide, B not curved dorsally
pre-ostial membrane	no pouch	with a ventral pouch	no pouch
ostium bursa	at anterior edge of lamella postvaginalis	anterior to lamella	anterior to lamella
ductus bursa	with oval sclerite near ostium	no sclerite	no sclerite
lamella post-vaginalis (shape somewhat variable)	two separate sclerites (rarely connected by weakly sclerotized area), each narrowing laterally terminating in a "foot"	one sclerite, V-shaped (narrowed near ostium) and usually with two small anterior arms	one sclerite of two rectangular parts narrowly connected anteriorly
lateral pre-papillar sclerites (tergum 8?)			
a. shape (somewhat variable)	with a falcate ventral neck	roughly quadrate-hexagonal, larger than other two spp.	roughly quadrate-hexagonal
b. anterior tooth	very small to almost absent, no neck	small, at end of neck	long, no neck



Figs. 1-24. Adults of *Pyrgus* spp. *P. ruralis*: 1, ♂, Coal Creek, Jefferson Co., Colorado; 2, ♀, Gregory Canyon, Boulder Co., Colorado; 3, ♂ and 4, ♀, Laguna Mts., San Diego Co., California. *P. scriptura*: 5, ♂ (spring form), Scottsbluff, Nebraska; 6, ♀, nr. Westcliffe, Custer Co., Colorado. *P. xanthus*: 7, ♂, Raton Mesa, Colfax Co., New Mexico; 8, ♂, nr. Game Ridge, Custer Co., Colorado; 9, ♀, Saguache Park, Saguache Co., Colorado; 10, ♀, and 11, ♂, Devil's Hole, Huerfano

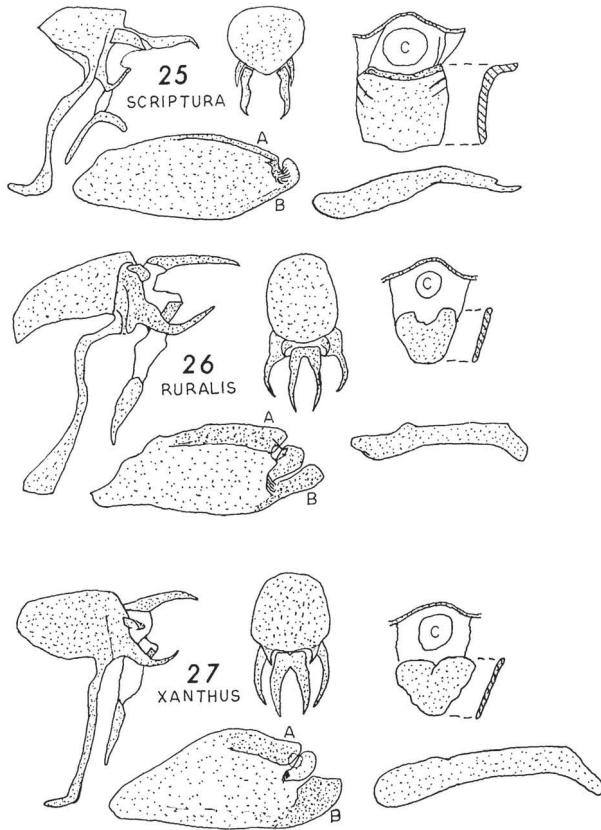
be a slight increase in size in the southern part of its range. The name *macdunnoughi* (Oberthür) is a synonym of *xanthus*.

Lectotype and type-locality. W. H. Edwards (1878) described *P. xanthus* based on several specimens labeled "southern Colorado" collected by Morrison. The Carnegie Museum of Natural History has three male and two female syntypes, and the American Museum has one syntype. F. M. Brown will designate a lectotype male *xanthus* in the Carnegie Museum. I examined photographs of the lectotype and a female paralectotype taken by Brown; both specimens possess all the wing characters described for *P. xanthus* in Table 1. I designate the vicinity of Rosita, Custer County, Colorado, as type-locality of *xanthus*, because Morrison may have collected there (F. M. Brown, pers. comm.) and the species occurs there.

Foodplants. The foodplants of *Pyrgus* (and relatives *Spialia* and *Muschampia*) are primarily Rosaceae (*Potentilla*, *Rubus*, etc.) and Malvaceae, and several species even feed on both families (Higgins & Riley, 1970). *Pyrgus scriptura* feeds on *Sida hederacea* (Malvaceae; many larvae were reared to adults by Jerry A. Powell and C. Don MacNeill at Pittsburgh, California) and *Sphaeralcea coccinea* (Malvaceae; ovipositions at Green Mountain, Jefferson County, Colorado). *P. ruralis* larvae were found feeding on leaves of several *Potentilla* spp. in California by C. Don MacNeill (pers. comm.). *P. ruralis* "feed on the tender centers of *Potentilla tenuiloba*" (Comstock, 1927), and may use *Potentilla* (*Horkelia*) *bolanderi* in southern California (Emmel & Emmel, 1973). Lembert (1894) observed oviposition of *ruralis* in the center of *Potentilla* (*Horkelia*) *fusca* plants. Tietz (1972) lists *Potentilla douglasii* as a foodplant for *ruralis*, which is a synonym of *P. (H.) fusca*. Both Tietz (1972) and Garth (1935) list *Sidalcea* (Malvaceae) for *ruralis* but give no documentation. *Sidalcea* must be considered erroneous for *ruralis*, or based on misidentified animals, until proven otherwise. *P. xanthus*, like *P. ruralis*, seems to feed on *Potentilla* exclusively, and Malvaceae do not occur in most *xanthus* habitats. Female *xanthus* oviposited in the center of *Potentilla* sp. flowers near Flagstaff, Arizona (Kilian Roever, pers. comm.), are associated with *P. ambigens* (determined by William Weber, who doubts the status of *ambigens* as the

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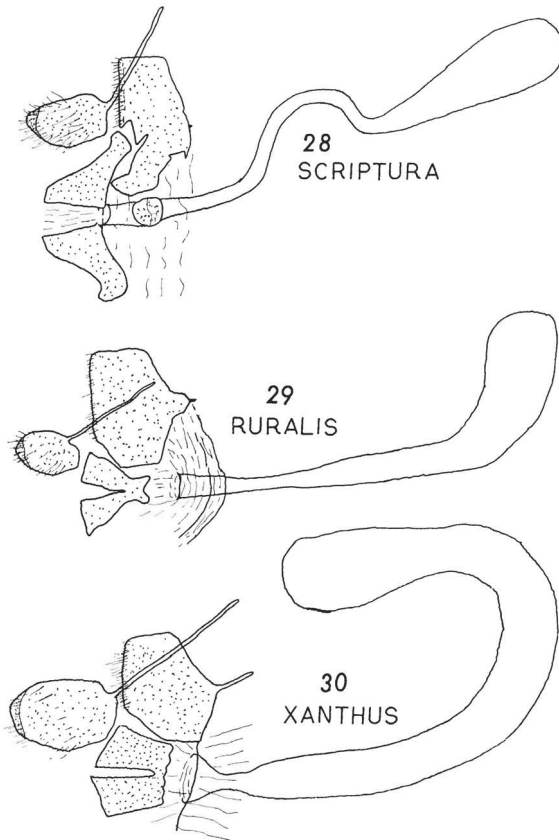
Co., Colorado; 12-13, ♂♂, 14-15, ♀♀, 16, ♂, and 17, ♀, nr. Cloudcroft, Otero Co., New Mexico; 18, ♂, Grandview Lookout, Coconino Co., Arizona; 19, ♂, and 20-21, ♀♀, 5 mi. NW Flagstaff, Coconino Co., Arizona; 22, ♂, Lake Mary Road SE Flagstaff, Arizona; 23, ♂, Ditch Camp, 8000', Apache Co., Arizona; 24, ♀, 16 mi. E. McNary, Apache Co., Arizona.



Figs. 25–27. Male genitalia of *Pyrgus* spp. Lateral view (valvae and aedeagus removed), uncus and tegumen, posterior view and cross section of juxta (C is hole for aedeagus), medial view of right valva, and aedeagus. A and B are valval margins (A — harpe, B — cuiller) (cf. Table 1). Parts differ slightly in scale. 25, Bear Creek, Chaffee Co., Colorado; 26, Clear Creek, 10500', Clear Creek Co., Colorado; 27, nr. Game Ridge, Custer Co., Colorado.

type may have been an interspecific hybrid) near Cloudcroft, New Mexico, and are always associated with *P. anserina* in southern Colorado.

Adult behavior. At high density, males search for females by flying just above the ground near the larval host, and few males occur in gully bottoms. At the usual low density, males mainly wait for females by perching in narrow dry gully bottoms. Courtship, in which male and female flutter about each other, occurs all day. Unreceptive females may fly upward about a meter repeatedly until the male departs. Adults occasionally feed on *Taraxacum officinale* and other flowers, and on manure and mud.



Figs. 28-30. Female genitalia of *Pyrgus* spp. Ventral view, drawn opened on slides; left pre-papillar sclerite (tergum 8?) and left papilla analis omitted. Three drawings differ slightly in scale. 28, Marshall, Boulder Co., Colorado; 29, Copper, Siskiyou Co., California; 30, Howardsville, San Juan Co., Colorado.

Distribution. *P. xanthus* occurs in mountains from southern Colorado to southern New Mexico, northwest along the Mogollon Rim to near Flagstaff, Arizona. It probably occurs in southern Utah but has not yet been found northwest of the Colorado River (* = probable, specimens not examined).

COLORADO. 64 specimens examined. *Douglas Co.*: Russel Ridge, 1-v-73, J. Scott; *Park Co.*: Beaver Creek near Fairplay, 10000', 20-vi-53, Hans Epstein*; near Fairplay, 10500', 30-v, F. M. Brown; Sacramento Creek near Alma, 10500', 31-v-53, F. M. Brown*; Antero Junction, vi-73, R. E. Stanford, M. Fisher; *El Paso Co.*: Beaver Creek, Rampart Range, 9000', 22-v-66, 4-vii-65, Samuel Johnson*; *Chaffee Co.*: near Trout Creek Pass, 19-vi-73, J. Scott; 5 miles W. of Buena Vista, 9000', 16-v-65, 8-vi-65, Samuel Johnson*; Poncha Pass, 9010', 27-v-72, J. Scott; *Custer Co.*:

east of Game Ridge, 9400', 5-vi-71, Juanita Scott, 26-v-72, 18-vi-73, J. Scott; near Rosita, 8800', 26-v-72, J. Scott; *Huerfano Co.*: Devil's Hole, 9100', 15-16-vi-73, J. Scott; *Saguache Co.*: west of junction highway 114 and Luders Creek Road, 9200', 28-v-72, Glenn R. Scott; Luders Creek Camp, 10000', 11-vi-68, 8-vi-69, 30-v-71, Maurice Howard, 6-vi-71, Glenn and Juanita Scott, 23-vi-71, J. Scott; Saguache Park, 10500', 28-v-72, J. Scott; *Costilla Co.*: Culebra Mtn., v-44, Bernard Rotger*; *Conejos Co.*: Torsido Creek west of Capulin, 9700', 2-v-51, B. Rotger*; *Mineral Co.*: Wolf Creek Pass, vi, H. A. Freeman*; *Gunnison Co.*: Gothic, 9500', 20-vi-72, J. Scott; Tincup, 10200', 3-vii-65, M. Howard; Curecanti Creek, 8500', 21-vi-62, S. L. Ellis*; *Montrose Co.*: top of Black Mesa, 9700', -73, S. L. Ellis*; Cottonwood Creek, Uncompahgre Plateau, 8200', 4-vi-61, S. L. Ellis*; *Dolores Co.*: Dolores River near Lizard Head, 8500-9500', 29-v-39, F. M. Brown, J. W. Tilden*; *Archuleta Co.*: 7.7 mi. NE Pagosa Springs, 8-vi-69, S. L. Ellis; Hwy. 29 between Chromo and Chama, 2 mi. NW continental divide, 9-vi-69, S. L. Ellis; *San Juan Co.*: Howardsville, 3-vii-65, J. Scott.

NEW MEXICO. 127 specimens examined. *Colfax Co.*: Raton Mesa, 8800', 3-v-72, J. Scott; *San Miguel Co.*: near Rociada, 8000', 3-v-70, R. E. Stanford*; *Bernalillo Co.*: Sandia Mts., R. Holland*; *Valencia Co.*: Mt. Taylor, K. Roever*; *Otero Co.*: near Cloudcroft, Sacramento Mts., 8700', 21-iv-72, J. Scott; Pine Forest Camp, 8500', 6-v-61, 18-v-63, Kilian Roever; *Catron Co.*: Mogollon Range, 8-v-40, William Burdick.

ARIZONA. 20 specimens examined. *Apache Co.*: Highway 73, 16 mi. E. McNary, 30-v-70, K. Roever; Ditch Camp, North Fork White River, 8000', 30-v-71, K. Roever; *Coconino Co.*: Lake Mary Road, 7 mi. SE Flagstaff, 19-v-68, K. Roever; A-1 Burn, Highway 180, 5 mi. NW Flagstaff, 31-v-64, 31-v-65, 1-vi-63, K. Roever; Grandview Lookout, South Rim Grand Canyon, 20-iv-69, K. Roever; San Francisco Peaks, K. Roever*; Walnut Canyon, 23-iv-67, R. Funk*.

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