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DISTRIBUTION OF SELECTED *ANTHOCHARIS*, *EUCHLOE* AND *PONTIA* (PIERIDAE) IN NEW MEXICO, TEXAS, CHIHUAHUA AND SONORA

RICHARD HOLLAND
1625 Roma NE, Albuquerque, New Mexico 87106, USA

ABSTRACT. This article presents the collecting history leading to the discovery of *Euchloe guaymasensis* Opler and documents extensions in the known range of four other pierids: *Anthocharis sara, Anthocharis pima, Euchloe hyantis,* and *Pontia sisymbrii. Pontia sisymbrii transversa,* originally described as a form of *P. s. sisymbrii* (Boisduval), is elevated to subspecific status.

Additional key words: *Anthocharis sara, Anthocharis pima, Euchloe hyantis, Pontia sisymbrii transversa, Euchloe guaymasensis.*

Prior to 1965, butterfly distribution records from New Mexico and northwestern Mexico (excluding Baja California) reflected the distribution of collectors not butterflies. Extensive collecting in New Mexico had been done only around Albuquerque, Santa Fe, Jemez Springs, Las Vegas, Fort Wingate, and Alamogordo; each of these sites had had resident collectors (see next paragraph). Some field work also had been conducted near Silver City by Bruce Harris and near Los Alamos by Carl Cushing, although the records accumulated by these two lepidopterists were not widely communicated. [The Cushing were reported by Toliver, Holland, and Cary (1994). Some of the Harris records were lost, although many may have been passed on to Cliff Ferris or Dale Zimmerman, who eventually contributed to the Grant County, New Mexico list of Ferris (1976, 1977)]. With the exception of the Townsend collection from Colonia Juarez, Chihuahua (Clench 1965), most pre-1965 collecting in Chihuahua and Sonora was restricted to the vicinity of main highways.

As a result of residents collecting near home, by 1965, discoveries such as *Sandia mcfarlandi* P. Ehrlich and Clench (1960) near Albuquerque and Alamogordo, *Colias scudderi ruckesi* Klots (1937) near Santa Fe and Las Vegas, and *Speyeria nokomis nigrocaerules* W. Cockerell and T. Cockerell (1900) near Las Vegas had been made. Also, *Hesperia woodgatei* Williams was known from both Jemez Springs (Williams 1914) and Colonia Juarez (Clench 1965), and *Speyeria nokomis coerulescens* Holland (1900) had been described from Colonia Juarez. [Nomenclature in this article is based on Miller and Brown (1981), as modified by Ferris (1989).]

RECENT DISCOVERIES AND RANGE EXTENSIONS

The habits of certain species of *Euchloe, Pontia,* and *Anthocharis* have led to the underestimation of their ranges in New Mexico. *Euchloe*

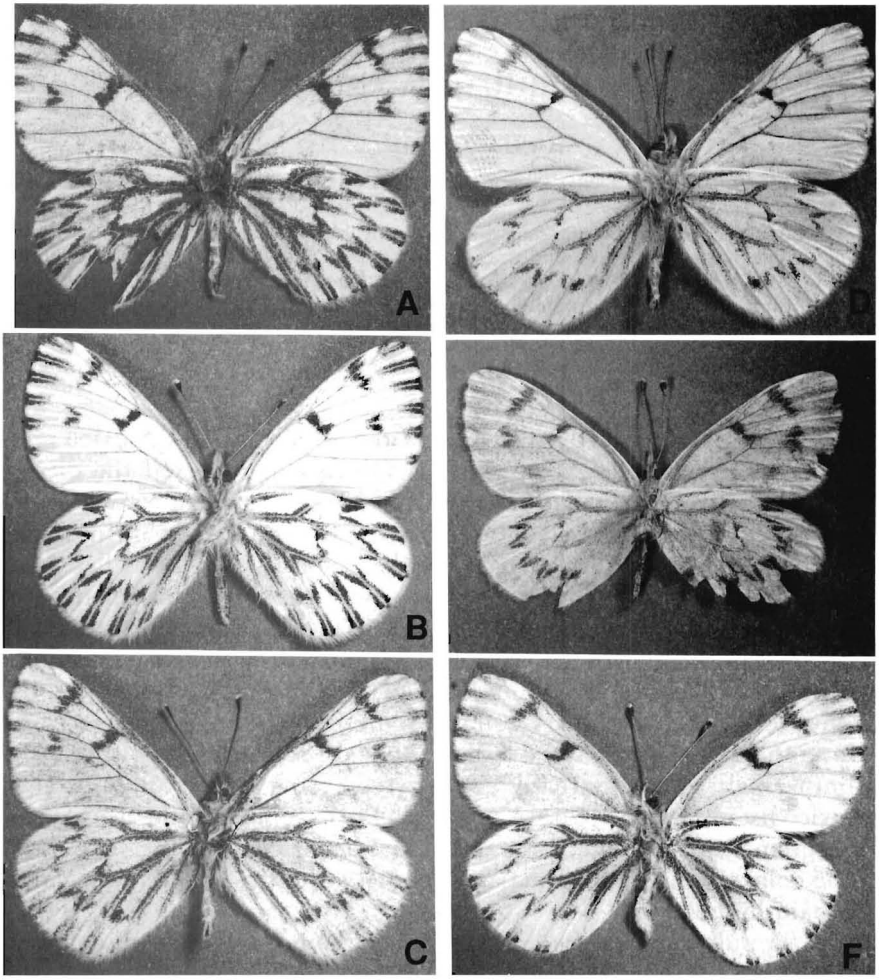

FIG. 1. Ventral surface of *Pontia sisymbrii* phenotypes: **A**, typical male morph, SW slope, Black Range, USFS Road 152, Grant Co., NM, ca. 7500′, 9-iv-89; **B**, intermediate male, Baylor Canyon, NW slope, Organ Mts., Dona Ana Co., NM, 6000′, 16-iii-79; **C**, *transversa* male paratype, North Franklin Peak, Franklin Mts., El Paso Co, TX, ca. 6000′, 1-iv-87; **D**, male paratype with extreme expression of *transversa* features, Gray Ranch, Deer Creek, SW slope, Animas Mts., Hidalgo Co., NM, ca. 5400′, 31-iii-93; **E**, *transversa* male paratype with an unusually dominating VHW transverse postmedial band, 26 mi. E of Ascencion on Mex. Hwy 2, Mun. Ascencion, Chih., 3800′, 1-iv-85; **F**, *transversa* female paratype, Gray Ranch, Deer Creek, SE slope, Animas Mts., Hidalgo Co., NM, ca. 5400′, 31-iii-93.

hyantis lotta (Beutenmuller) occurs 80 miles north and south of Albuquerque, but had not been recorded in the intervening area. Because no one in New Mexico had surveyed hilltops in March or April, *Anthocharis pima* W. H. Edwards also remained unknown from very far east of Tucson, Arizona, until W. A. Baltosser captured one at the Las Cruces, New Mexico city dump in 1977. This capture and the subsequent taking of *A. pima* in El Paso, Texas, generated considerable interest and enthusiasm among New Mexican lepidopterists. Eventually, we discovered *A. pima* in all New Mexican counties and adjacent Mexican municipios on both sides of the Mexico-New Mexico border. *Euchloe hyantis lotta* occurred everywhere *A. pima* did, and was recorded in virtually every other New Mexican county on or west of the Rio Grande, excluding the counties of Valencia, Bernalillo, Santa Fe and Los Alamos. The by-products of this collecting activity were Texas, Chihuahua, and Sonora state records for *Anthocharis sara* Lucas and *Pontia sisymbrii* Boisduval.

The Chihuahua-Sonora specimens of *P. sisymbrii* are of the phenotype *P. s. transversa* (Barnes & Benjamin), with much or all of the distal VHW scaling along the veins absent (Figure 1). This character appears to be sufficiently consistent to justify raising the name *transversa* from synonymy with nominate *sisymbrii*. New Mexican *P. sisymbrii* sometimes have been referred to the subspecies *P. s. elivata* (Barnes and Benjamin), but this subspecies has the ventral hind wing veins even more heavily and uniformly scaled than the nominate subspecies.

During the 1970's and 1980's, I made regular collecting trips in the early spring to Baja California, taking the ferry from the mainland port of Guaymas, Sonora. In March 1974, I drove off Mexico Highway 15 to the Las Avispas (The Wasps) mountain top microwave relay, about half way from Hermosillo to Guaymas. At that time, Sonoran hilltops during March were as much unexplored as those of New Mexico. In the morning, I was startled by the sight of a hilltopping *ausonides*-group *Euchloe*. This group generally is associated with Canadian and Hudsonian life zones, not the Lower Sonoran life zone at one of the hottest, driest places in the New World. A slide of this specimen shown at the 1979 Pacific Slope Meeting of the Lepidopterists' Society in Davis, California, was largely greeted with disbelief. Four more specimens of this *Euchloe* were taken at Las Avispas in 1983 and 1984. Unlike the original worn 1974 specimen, the 1983 and 1984 specimens were in fresh condition. In this condition, they were quite yellow, resembling *Euchloe charlonea* Donzel, illustrated by Sakai (1981) from Afghanistan, and unlike any other Western Hemisphere *Euchloe*.

Opler (1986) described the new species as *Euchloe guaymasensis* (1986), which resulted in a flurry of activity among Tucson collectors

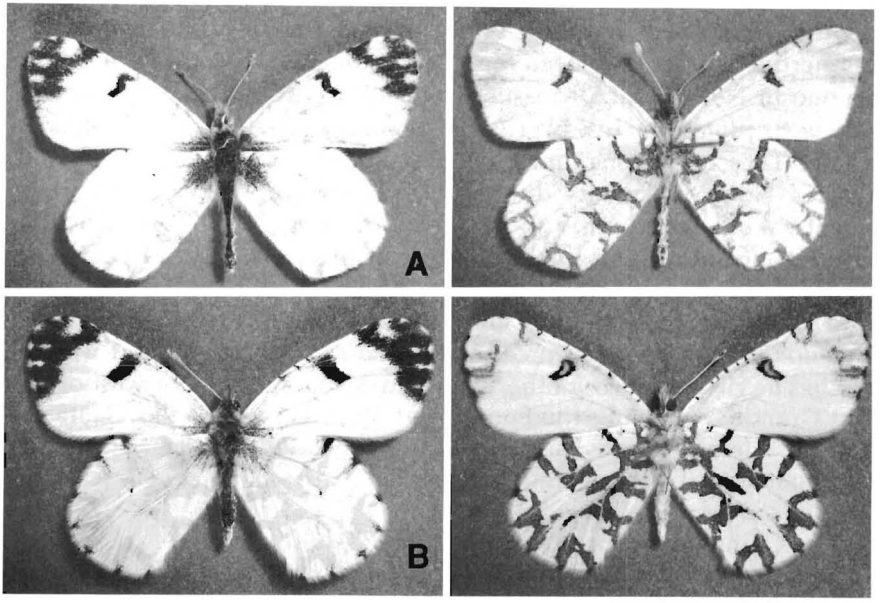

FIG. 2. *Euchloe guaymasensis*: **A** (top row), topotypical male; **B** (bottom row), topotypical female.

not unlike that stimulated in New Mexico a decade earlier by the discovery of *A. pima*. Eventually, *E. guaymasensis* was found as far south as Guaymas and north almost to the U.S. border. Figure 2 shows the previously unillustrated female of *E. guaymasensis*. The species is not strongly sexually dimorphic, although the dorsal surface of the female is more intensely yellow than the male, and occasionally has a few orange scales on the hindwing. Also, the female has small black marginal spots at the ends of the DHW veins, which are usually absent on the male.

In 1990, the anthocharine odyssey came full cycle with the taking of *A. pima* at the *E. guaymasensis* type locality, the Las Avispas microwave relay. Figures 3 and 4 show the currently known distribution of *A. sara* and *A. pima*, *E. h. lotta* and *E. guaymasensis*, and *P. sisymbrii* (typical and *transversa*) in New Mexico, Texas, Sonora, and Chihuahua. Widely reported, older records of *A. sara* and *P. sisymbrii* from central and northern New Mexico are omitted on this figure and in the Appendix.

Prior to Spring 1995, I believed that the eastern, northern, and southern limits of distribution for *A. pima* and *E. h. lotta* in Texas, New Mexico, and Chihuahua were accurately known. Searching outside the distribution areas of Fig. 4 had consistently produced negative results

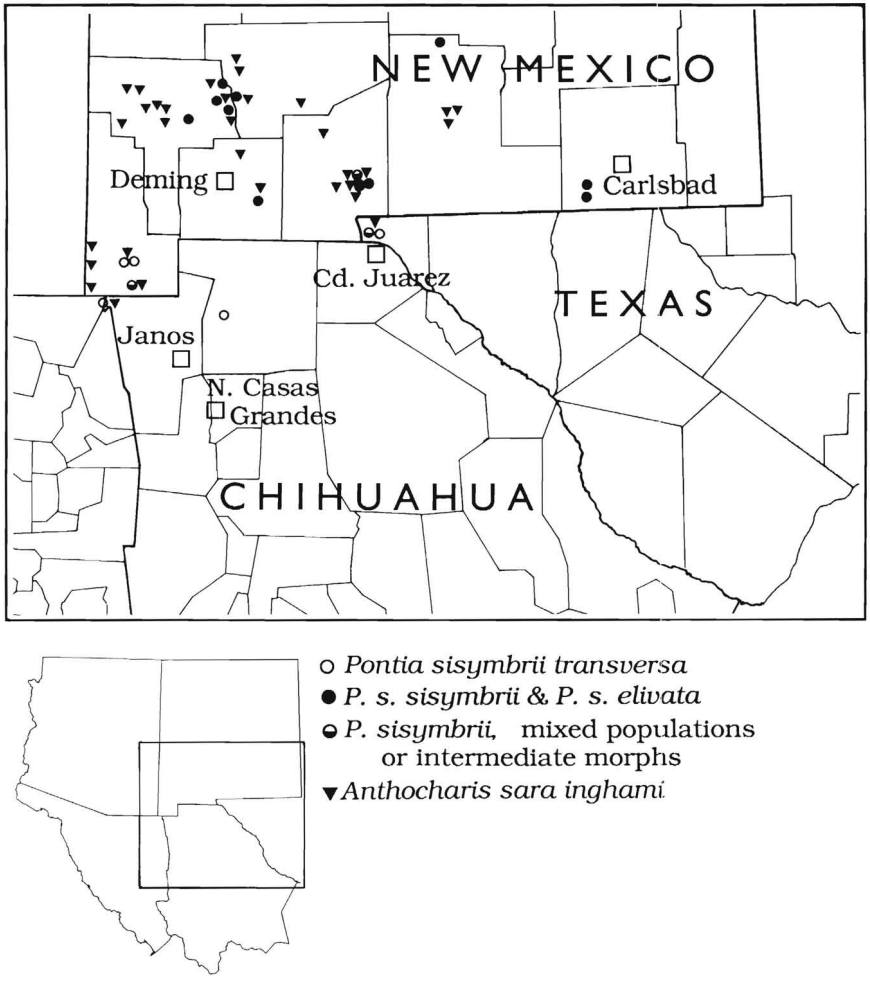

FIG. 3. Distribution of *Anthocharis sara* and *Pontia sisymbrii* (typical and *transversa*) in southern New Mexico, west Texas, Chihuahua, and Sonora.

for 15 years. However, unusually heavy rains in December 1994, followed by an unusually warm mid-winter and early spring changed this outlook. Until 1995, neither of these species was found south into the Sierra Madre winter rain-shadow area across west Texas and Chihuahua beginning about 75 miles south of El Paso. Also, it seemed that *A. pima* did not occur anywhere in New Mexico or West Texas to the north or east of the suburbs of Las Cruces, New Mexico. *Euchloe h. lotta* apparently had a virtually identical eastern limit.

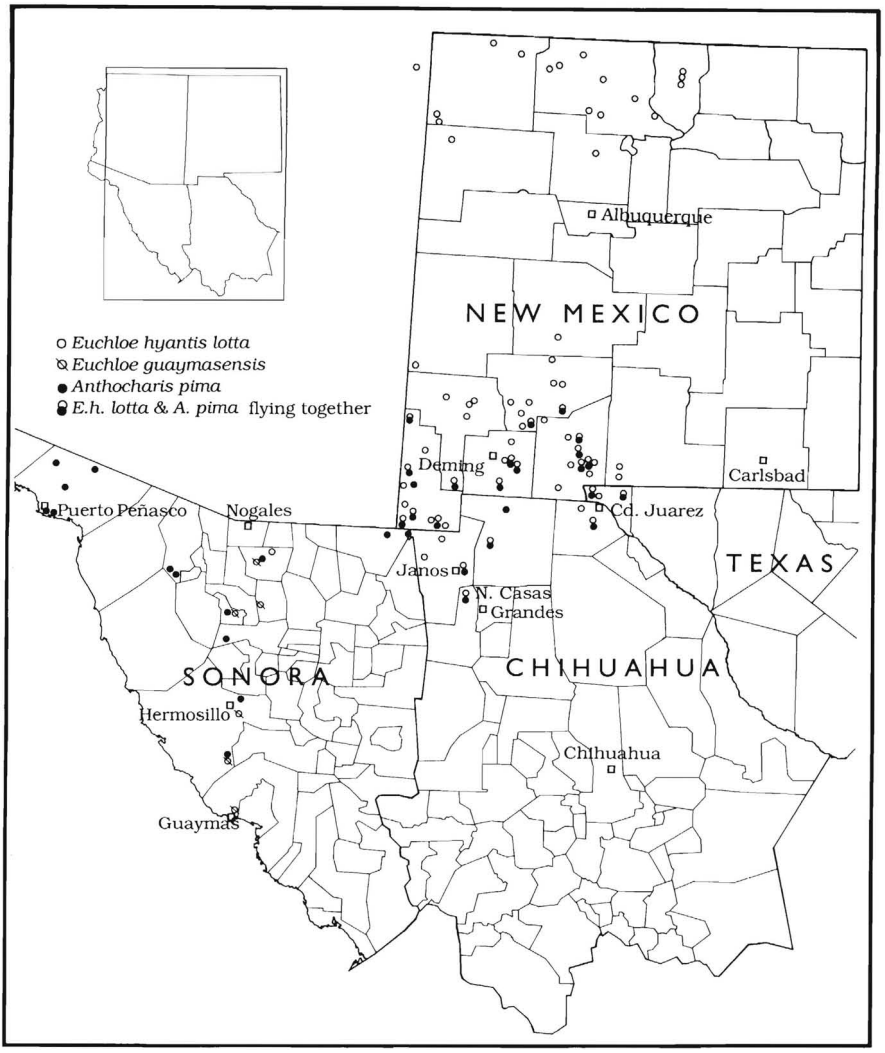

FIG. 4. Distribution of *Anthocharis pima*, *Euchloe hyantis lotta* and *E. guaymasensis* in New Mexico, west Texas, Chihuahua, and Sonora.

Field work in 1995, however, revealed an extraordinary spring plant growth and resulted in the documentation of both species at least 40 miles north and east of all previous observations. These new range extensions coincided with the limits of the abnormal winter precipitation. Consequently, I am now unsure that even the expanded distribution of records reflects the true species distribution; it may merely reflect the distribution of December 1994 precipitation.

There are records of Lepidoptera diapausing over 15 years before emergence from the pupal stage (e.g., Powell 1989). If extraordinary winter precipitation penetrated south into the Madrean rain shadow area (which it did not in December 1994), *A. pima* and *A. hyantis lotta* may have been documented much farther than 75 miles into Chihuahua.

Pontia sisymbrii is widely reported up to the Texas state line in the Guadalupe Mountains of Eddy County in southeastern New Mexico. It likely eventually will be documented from Guadalupe Mountain National Park of Culberson County, Texas. It is possible that the more montane species *P. sisymbrii* and *A. sara* also may extend farther south into the Sierra Madre than is presently confirmed. Sonoran distribution limits are less certain. *Euchloe guaymasensis* could prove to have a much wider range than presently known, especially south of Guaymas, and *A. pima* could be much more widely distributed in Sonora than presently verified. Sonoran collecting of these species seems about a decade behind Chihuahuan work. There are two reasons for this phase lag: the Sonoran terrain is more difficult, and the species in question range much farther south into Sonora than Chihuahua. Connecting the dots on the Sonoran portion of the distribution maps in Figures 3 and 4, even now, leads to a fairly good representation of Mexico Highways 2, 8, and 15.

SYSTEMATICS

Pontia sisymbrii transversa R. Holland, new subspecies

Holotype. Male. Length of right forewing 23.0 mm (Fig. 5). Similar to other subspecies, including nominate *sisymbrii* and *elivata*, except on ventral hindwing (VHW). VHW veins not edged with dark scales posterior of the postmedial chevron band, except at the extreme margin of the wing. VHW vein edging also absent basad of chevron band nearly back to cell along veins arising from cell. General subjective impression is thus to leave postmedial chevron band appearing as isolated transverse maculation—hence the name *transversa*. Holotype bears label "Paradise/Cochise Co./Ariz." reminiscent of labels on specimens known to have been taken by Otto Poling; see Holland and Forbes (1981). Barnes and Benjamin (1926) declare that the holotype was taken in March, although the specimen currently bears no label so indicating. The specimen, however, does bear another hand-written label, "*A. sisymbrii*/f. *transversa*/Holotype ♂ Br. Benj." and a third very small printed label "Mcl." I do not know what this third label indicates.

Female paratype. Length of right forewing 21.5 mm (Fig. 5). Similar to holotype in wing maculation, except the dark scaling along the VHW

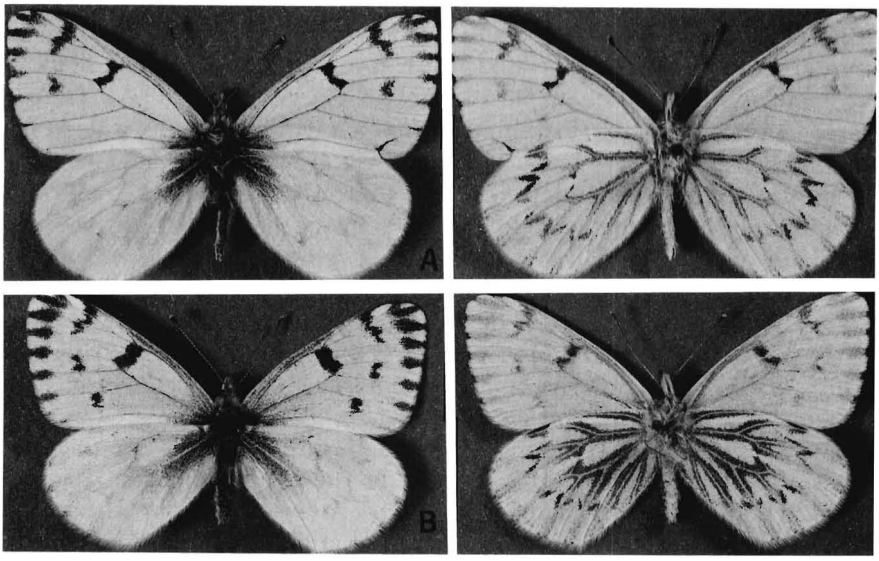

FIG. 5. **A** (top row), holotype of *Pieris sisymbrii* form "transversa" Barnes and Benjamin and *Pontia sisymbrii transversa* R. Holland; **B** (bottom row), allotype of *Pieris sisymbrii* form "transversa" Barnes and Benjamin. This specimen also included as a paratype of *Pontia sisymbrii transversa* R. Holland.

veins is less reduced, especially basad of postmedial band. In this region, only M_2 has an unscaled section. Female paratype also has considerably heavier scaling on veins around VHW cell, and along S_C+R_1, 2A, and 3A. Female paratype bears printed locality label identical to holotype, a hand-written label, "*A. sisymbrii*/f. *transversa*/Allotype ♀ Br.Benj.," a third tiny label "Mch," and a fourth label with only a large "16." Some *P. sisymbrii* females have a slightly cream background dorsally; this paratype is the pure white morph. Barnes and Benjamin (1926) declared that the allotype also was taken in March, although this specimen currently bears no label so indicating, unless the tiny "Mch" label is intended to be an abbreviation for March.

Additional male paratype in the *P. s. transversa* (Barnes and Benjamin) type series bears the label, "Redington/Arizona."

I elevate the name *transversa* from synonymy with *sisymbrii* to subspecific status in the combination *Pontia sisymbrii transversa*. This subspecies is distinguished from other subspecies by the reduction or absence of scaling along the veins of the ventral hindwing, as shown in Figs. 1 and 5. Some populations, especially where the ranges of *P. s. transversa* and *P. s. sisymbrii* or *P. s. elivata* are adjacent, may be phenotypically mixed, and in fact, there may be no populations any-

where which phenotypically are more than 80% *P. s. transversa*. However, New Mexican individuals from north of Las Cruces, New Mexico, are never of the *transversa* phenotype. The percent necessary to be of the *P. s. transversa* phenotype in order to designate the population at a given site as *P. s. transversa* is an issue which will always be open to each worker's personal judgement.

As *P. s. transversa* originally was described as an infrasubspecific form (Barnes & Benjamin 1926), raising it to subspecific status places the elevated name under my authorship (Miller & Brown 1981, note 460). I can, however, see no reason not to retain the Barnes and Benjamin types, which reside at the United States National Museum of Natural History (TL: Paradise, Cochise Co., Arizona), as types for the elevated name. Labels to this effect have been added to three of the four NMNH specimens in question. One of the original *P. s. transversa* (Barnes & Benjamin) paratypes, a female, cannot be found at this time, and thus is not included as a paratype for *P. s. transversa* R. Holland. I also designate the specimens in Figs. 1C, 1D, 1E, and 1F as paratypes. These paratypes will be placed in the AMNH, LACM, AME, and UNAM. Barnes and Benjamin's original description indicates that *transversa* applied to the spring brood. It is now known, however, that *P. sisymbrii* is univoltine (Bailowitz & Brock 1991, Emmel & Emmel 1973). Thus, it is not possible for our material and the original types of *P. s. transversa* to be associated with different broods. What is probable is that the Barnes and Benjamin material, like ours, came from near the southern limit of the range of *P. sisymbrii*, and thus emerged earlier in the spring than most other *P. sisymbrii* populations known to Barnes and Benjamin.

ECOLOGICAL REQUIREMENTS

In much of New Mexico and Chihuahua where *Anthocharis pima* and *Euchloe hyantis lotta* live, both limestone hills and volcanic cinder cones occur. As a general rule, cinder cones are more productive collecting localities, although limestone hilltops are not unrewarding. Both species, as well as *Euchloe guaymasensis*, are thought to use *Descurainia* or *Caulanthus* (both Brassicaceae) as foodplants. Apparently these mustard genera favor volcanic soil, although they do grow and thrive on limestone outcroppings. Recently, Tucson entomologists have reared *Euchloe guaymasensis* on *Descurainia pinnata*. Scarcity of female specimens of *E. guaymasensis*, *E. h. lotta*, and *A. pima* are an artifact of hilltop collecting.

DISCUSSION

This paper describes recent discoveries in the distributions and phenotypes of five pierids in New Mexico, Texas, Chihuahua, and Sonora.

Anthocharis pima is now known to extend as far east as El Paso, Texas and as far south into Sonora as Las Avispas. *Anthocharis sara* is reported for the first time from Chihuahua, Mexico. *Euchloe hyantis lotta* also is now reported from El Paso, Texas, northwestern Chihuahua, northeastern Sonora, and virtually all of New Mexico west of the Rio Grande. The recently described *E. guaymasensis* is reported from much of Sonora north and east of Guaymas, north almost to the U.S. border. In extreme southwestern New Mexico, northwestern Chihuahua, and northeastern Sonora, *Pontia sisymbrii* populations are represented almost purely by the *transversa* phenotype. Hence, I elevate this name, originally proposed as a form by Barnes and Benjamin, to subspecific status.

ACKNOWLEDGMENTS

Tucson collectors generously shared their Sonoran observations, and Steve J. Cary (SJC) his New Mexican records. Steve Cary contributed records he obtained from James A. Scott (JAS), Ray E. Stanford (RES), W. A. Baltosser (WAB), and Kilian Roever (KR). Mike Toliver (MET) records are from Toliver, Holland and Cary (1994). Greg S. Forbes (GSF) collected and retains [at the New Mexico State University (NMSU) collection] the first *Anthocharis pima* taken in Texas. Joanne McCaffrey (JMC) and Bernie Weber donated many of their specimens to the NMSU collection, which was searched by Greg Forbes at my request. Copious data also has been provided by William L. Swisher (WLS). Don Harvey at the NMNH was kind enough to provide me access to the three specimens of the original *Pontia sisymbrii transversa* (Barnes & Benjamin) type series which could be located.

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APPENDIX

Anthocharis sara inghami Gunder

NEW MEXICO (southern counties and low altitude records only): *Dona Ana Co.*: Baylor Canyon, W slope, Organ Mts., 6000′, 16-iii-79 (9♂♂, 3♀♀); same data, 5-iv-80 (3♂♂, 1♀); same data, 21-iv-79 (1♀); La Cueva Ranch, W slope, Organ Mts., 5500′, 18-iii-79 (3♂♂, 1♀); same data, 10–11-iv-82 (SJC); same data, 24-iv-1899 (T.D.A. Cockerell); Finley Canyon, S slope, Organ Mts., 5000′, 25-iii-79 (2♂♂); S rim of Soledad Canyon, near Chimney Rock, Organ Mts., 6000′, 24-iii-79 (1♂, 2♀♀); Long Canyon, S slope, Organ Mts., 6000′, 14-iv-79 (1♂); Fillmore Canyon, W slope, Organ Mts., 7000′, 22-iv-79 (1♂); 1 mi. NE of Aguirre Springs, E slope, Organ Mts., 5500′, 6-iv-79 (3♀♀); 0.8 mi W of San Augustine Pass, Organ Mts., 5500′, 1-iv-83 (1♀, leg. GSF); Aguirre Springs, E slope, Organ Mts., 5500′, 9-iii-82 (7♂♂, leg. GSF); same data, 4-iv-82 (1♂, leg. JMC); same data, 6-iv-82 (1♂, leg. JMC); same data, 1-iv-78 (1♂, 1♀, leg. B. Weber); same data, 11-iv-82 (SJC); same data, 13-iii-77 (WAB); Tortugas Mt., 4900′, 22-iii-77 (WAB). *Grant Co.*: Devil's Backbone, W slope, Black Range, NM Hwy 151 11 mi. E of San Lorenzo, 6800′, 15-iv-66 (2♂♂); Gallinas Canyon, W slope, Black Range, 28-iii-86 (1♂, leg. SJC); Cold Springs Canyon (USFS Road 886), SW slope, Black Range, 7500′, 23-iv-88 (2♂♂, 2♀♀); Royal John Mine Rd. (USFS Road 886), SW slope, Black Range, 7000′, 23-iv-88 (1♂); Silver City, 3-iv-69 (JAS); same data, 30-iii-74 (WAB); Donahue Canyon, W slope, Black Range, 11-iii-89 (SJC); Ash Spring Canyon, 6700′–6900′; Cherry Creek Canyon and McMillen Canyon, 6700′–7300′; Gila River near Gila, 4250′; Lower Gallinas Canyon, 6400′–6800′; Little Walnut Creek, 6600′; Red Rock, 4000′; Cliff, 4500′ (last seven records due to Ferris

(1976)). *Hidalgo Co.*: Clanton Draw, Peloncillo Mts., ca. 5400', 11-iv-81 (SJC); same data, 26-iii-92 (SJC); Gray Ranch, Indian Creek, N slope, Animas Mts., ?-iii-77 (J.P. Hubbard); same data, 14-iv-91 (SJC); Gray Ranch, Deer Creek, SE slope, Animas Mts., 12-iv-91 (SJC); Skeleton Canyon, W slope, Peloncillo Mts., 11-iii-89 (SJC); Guadalupe Canyon, SW slope, Peloncillo Mts., 16-iii-85 (SJC). *Luna Co.*: Ridge E of Spring Canyon, N slope, Florida Mts., 27-iii-86 (1♂, leg. SJC); Spring Canyon, N slope, Florida Mts., 26-iii-86 (1♂, 1♀, leg. SJC); same data, 30-iv-83 (SJC); same data, 24-iii-90 (SJC); Slate Spring, Hadley Draw, NE slope, Cooke Peak, 18-iii-89 (1♂); same data, 19-iii-89 (2♂♂); OK Canyon, Cooke Peak, 12-iii-89 (SJC). *Otero Co.*: Alamo Canyon, SW slope, Sacramento Mts., 6000', 23-iv-73 (1♂, 1♀); same data, 3-iv-75, (5♂♂, 1♀); Dog Canyon, SW slope, Sacramento Mts., 5000', 5-iv-75 (1♀); same data, 11-iv-81 (1♂, leg. JMC); same data, 30-iii-80 (2♂♂, leg. JMC); Mountain Park, 11-iv-82 (JMC). *Sierra Co.* (low altitude records only): Sec. 10, W slope of Brushy Mt., Caballo Mts., 5200', 19-iii-77 (1♂); Granite Spring, W slope of Caballo Mts., 4900', 12-iii-77 (1♂); same data, 9-iv-77 (1♀); Hermosa, E slope, Black Range, 6200', 24-iii-91 (2♂♂); Circle Seven Creek, E slope, Black Range, 6000', 31-iii-91 (2♂♂); vic. of Kingston, E slope, Black Range, ca. 6500', 11-iv-91 (SJC).

TEXAS: *El Paso Co.*: McKelligan Canyon, SE slope, Franklin Mts., El Paso, 5500', 25-iii-81 (1♂, 4♀♀); same data, 27-ii-83 (3♂♂) (early record); Tom Mays Park, W slope, Franklin Mts., 5200', 14-iii-81 (2♂♂).

CHIHUAHUA: *Mun. Janos*: Canyon on Chihuahua side of Puerto San Luis, Mex. Hwy 2, just E of Sonora state line, 5500', 13-iv-85 (2♂♂, donated to UNAM); same data, 7-iv-94 (1♂ taken, 2 more seen).

Anthocharis pima W. H. Edwards

NEW MEXICO (all records for state): *Dona Ana Co.*: Tortugas Mt., N slope, 4000', 22-iii-77 (WAB); 0.5 mi. N of Bishop's Cap, 5300', 17-iii-79 (1♂); S end of Dona Ana Hills at radio tower (Twin Peaks), 4800', 6-iv-80 (1♂); same data, 24-iv-83 (1♂); same data, 10-iii-82 (2♂♂, leg. GSF); same data, 6-iv-80 (1♂, leg. GSF); same data, 5-iv-85 (17♂♂, WLS); same data, 31-iii-87 (5♂♂, 2♀♀, WLS); same data, 1-iv-87 (3♂♂, 2♀♀, WLS); Tortugas Mt., 4900', 5-iv-80 (2♂♂); same data, 6-iv-79 (9♂♂); same data, 12-iii-83 (5♂♂); same data, 8-iv-79 (1♂, leg. GSF); same data, 23-iii-81 (1♂, leg. GSF); hill 1 mi. N of Organ, 4800', 16-iii-95 (4♂♂ taken, 6 more seen, WLS); microwave relay at Rincon, 4800', 2-iv-95 (2♂♂, RH, ESC and SJC). *Grant Co.*: 7 mi. W of Hachita, 5100', 17-iv-83 (2♂♂); same data, 25-iii-93 (16♂♂, WLS). *Hidalgo Co.*: 7 mi. N of Animas and 5 mi. W of NM Hwy 338, Peloncillo Mts., 4600', 17-iv-83 (5♂♂); Guadalupe Canyon, SW slope, Peloncillo Mts., 16-iii-85 (2♂♂, leg. SJC); NM Hwy 9, 6 mi. E of US Hwy 80 (KR); vic. of Playas, 15-iv-80 (Ed Peyton);

Gray Ranch, Smuggler Hills, 3.5 mi. E of Culberson Camp, SE slope, Animas Mts., 5000′, 31-iii-93 (15 seen, SJC); 3 mi. N of Gray Ranch Hdq., 5600′, 2-iv-93 (2 seen, SJC); 7.5 mi. W of Lordsburg, 3900′, 25-iii-93 (4♂♂ taken, 3 more seen, WLS); NM Hwy 92, 1.3 mi. W of Virden, 4500′, 14-iii-95 (1♂, WLS); NM Hwy 92, 1 mi. N of US Hwy 70, 4500′, 14-iii-95 (1♂ taken, 6 more seen, WLS); NM Hwy 92, 0-1.7 mi. N of US 70, 4500′, 17-iii-95 (6♂♂, WLS). *Luna Co.*: ca. 2 mi. SW of Tres Hermanas and 6 mi. NW of Columbus, 4500′, 10-iv-83 (13♂♂); Victorio Canyon, E slope, Florida Mts., 24-iii-90 (SJC); Rockhound State Park, 27-iii-86 (RES); 7 mi. NE of Columbus, 4000′, 13-iii-85 (2♂♂, WLS); same data, 1-iv-87 (3♂♂, 2♀♀, WLS). *Sierra Co.*: Round Mt., 6 mi. N of Nutt, 4800′, 17-iii-95 (6♂♂, WLS); Point of Rocks, Sect. 19-30, T.17S., R.1W., 4800′, 2-iv-95 (4♂♂ taken, 4 more seen, RH, ESC and SJC).

ARIZONA: (near *Hidalgo Co.*) *Greenlee Co.*: 5.3 mi. NW of Duncan, AZ, 4300′, 25-iii-93 (12♂♂ taken, 12 more seen, WLS).

TEXAS: *El Paso Co.*: Tom Mays Park, W slope, Franklin Mts., 5200′, 12-iii-83 (sight); same data, 30-iii-80 (1♂, leg. GSF); E slope, Trans Mountain Rd., c. 4500′, 5-iii-95 (11♂♂, RH and SJC); red hill, 2 mi. W of road to Hueco Tanks St. Park, US Hwy 62-180, 4000′ (1♂, RH and SJC).

CHIHUAHUA: *Mun. Ascencion*: ca. 12 mi. S of Palomas, Rancho Constitucion 1856, 16-iv-83 (2♂♂); 26 mi. E of Ascencion, Mex. Hwy 2, 3800′, 1-iv-85 (2♂♂). *Mun. Ciudad Juarez*: Sierra del Presidio, ca. 25 mi. S of Cd. Juarez, 5000′, 21-iii-84 (sight). *Mun. Janos*: Janos microwave relay, 5 mi. E of Janos, 5400′, 1-iv-85 (1♂); 25 mi. NW of Janos, Mex. Hwy 2, 4300′, 13-iv-85 (1♂); microwave relay at Puerto San Luis, Mex. Hwy 2, Chih.-Son. state line, 6500′, 5-iv-91 (1♂) (probable altitude record). *Mun. Casas Grandes*: 25 mi. N of Nuevo Casas Grandes, Puerto Janos, 4500′, 2-iv-85 (1♂).

SONORA: *Mun. Altar*: 5 mi. SE of Altar on Mex. Hwy 2, 1500′, 1-iii-92 (2♂♂); 7 mi. SE of Altar on Mex. Hwy 2, 1-iii-92 (1♂). *Mun. Agua Prieta*: Microwave relay at Puerto San Luis, Mex. Hwy 2, Chih.-Son. state line, 6500′, 5-iv-91 (1♂); mountains S of Guadalupe Canyon, 4200′, 6-iv-80 (1♂). *Mun. Benjamin Hill*: Santa Eva Microwave Relay, 10 mi. NE of Benjamin Hill, 3000′, 27-ii-92 (4♂♂). *Mun. Hermosillo*: Las Avispas microwave relay, 40 mi. N of Guaymas, 2000′, 24-ii-90 (2♂♂); 19.5 mi. N of Hermosillo on Mex. Hwy 15, 14-iii-80 (2♂♂). *Mun. Imuris*: Road to microwave relay E of Imuris, 22-ii-92. *Mun. Puerto Penasco*: Puerto Penasco, 23-ii-93 (1♂); microwave relay ca. midway from Sonoita to Puerto Penasco, Mex. Hwy 8, 24-ii-93 (4♂♂, 1♀, more seen but not taken); Parque del Volcan del Pinacate, Sykes Crater, 12 to 14-ii-83 (1♂ taken, others seen); 6 mi. E of Los Vidrios, Mex. Hwy 2, 9-iii-93 (1♂ taken, others seen); 8 mi. W of Sonoita, Mex. Hwy 2,

9-iii-93 (14♂♂); 6.5 mi. E of Puerto Penasco, Son. Hwy 37, 24-ii-91 (4♂♂, 1♀). *Mun. Opodepe*: 19 mi. S of Benjamin Hill on Mex. Hwy 15, 14-iii-80 (14♂♂).

Euchloe hyantis lotta (W. H. Edwards)

NEW MEXICO (all records for state): *Catron Co.*: N rim of Big Pine Cyn. in section at SW corner of Catron Co., end of USFS Road 106, 5200′, 1-iv-95 (6♂♂ taken, 6 more seen, RH, ESC and SJC). *Dona Ana Co.*: 1 mi. NE of Bishop's Cap, 5300′, 25-iii-79 (3♂♂); .5 mi N of Bishop's Cap, 5300′, 17-iii-79 (6♂♂, 1♀); Baylor Canyon, W slope, Organ Mts., 6000′, 16-iii-79 (1♂); Bishop's Cap, 6 mi. E of Mesquite Exit, I-10, 30-iii-78 (1♂, leg. GSF); S rim, Soledad Canyon, near Chimney Rock, Organ Mts., 6000′, 24-iii-79 (2♂♂); S end of Dona Ana Hills at radio tower (Twin Peaks), 4800′, 6-iv-80 (12♂♂); same data, 24-iv-83 (1♂); same data, 10-iii-82 (1♂, leg. GSF); same data, 6-iv-80 (1♂, leg. GSF); Tortugas Mt., 4900′, 5-iv-80 (1♂); same data, 7-iv-79 (2♂♂); same data, 6-iv-79 (6♂♂); same data, 12-iii-83 (5♂♂); same data, 10-iv-80 (2♂♂, leg. GSF); same data, 23-iii-81 (1♂, leg. GSF); same data, 8-iv-79 (1♀, leg. GSF); same data, 21-iii-77 (WAB); N base, Tortugas Mt., 4000′, 15-iii-79 (1♂, leg. GSF); same data, 13-iii-79 (1♂, leg. GSF); same data, 28-iii-78 (1♂, leg. GSF); Long Canyon, S slope, Organ Mts., 6000′, 15-iv-79 (2♂♂); same data, 14-iv-79 (1♂); radio tower at Rincon, 4600′, 24-iv-83 (3♂♂, 1♀); Picacho Peak, W side of Las Cruces, 5000′, 25-iv-83 (2♂♂); New Mexico State University Animal Science Ranch, Jornada Experimental Range, 21-iv-73 (1♂, leg. A. Mangini); Jornada Experimental Range, 2.4 mi. W of USDA pillars, 17-iii-79 (1♂, leg. GSF); Potrillo Mts., 1 mi. S of Mt. Riley, 26-iv-77 (WAB); hill on E side, Garfield Exit, I-25, 4600′, 24-iv-83 (2♂♂); .5 mi. N of Organ, 4800′, 26-iii-93 (1♂, WLS). *Grant Co.*: 7 mi. W of Hachita, 5100′, 17-iv-83 (sight); same data, 25-iii-93 (1♂ taken, >100 observed, WLS); Silver City, 3-iv-69 (sight, JAS); Cherry Creek Canyon and McMillen Canyon, 6700′–7300′; Gila River near Gila, 4250′; Signal Peak, 8000′–9000′ (last three records due to Ferris (1976)). *Hidalgo Co.*: Rodeo, 9-iii-38 (leg. J.W. Tilden); 7 mi. N of Animas and 5 mi. W of NM Hwy 338, E slope, Peloncillo Mts., 4600′, 17-iv-83 (3♂♂); Shakespeare, near Lordsburg, 4800′, 17-iv-83 (6♂♂, 1♀); Clanton Draw, E slope, Peloncillo Mts., 5400′, 14-iv-73 (MET); Guadalupe Canyon, SW slope, Peloncillo Mts., 16-iii-85 (SJC); Gray Ranch, Deer Creek, 8 mi. NW of Culberson Camp, SE slope, Animas Mts., 5300′, 31-iii-93 (3 seen, SJC); Smuggler Hills, 3.5 mi. E of Culberson Camp, Gray Ranch, SE slope, Animas Mts., 31-iii-93 (30 seen, SJC); Gray Ranch, Deer Creek at Granite Pass, SE slope, Animas Mts., 4800′, 31-iii-93 (10 seen, SJC); 3 mi. N of Gray Ranch Hdq., 5600′, 2-iv-93 (12 seen, SJC);

NM Hwy 92, 1 mi. N of US Hwy 70, 4500′, 14-iii-95 (1♂ taken, 10 more seen, WLS). *Luna Co.*: ca. 2 mi. SW of Tres Hermanas and 6 mi. NW of Columbus, 4500′, 10-iv-83 (7♂♂); Ridge E of Spring Canyon, N slope, Florida Mts., 27-iii-86 (1♀, leg. SJC); Slate Spring, Hadley Draw, NE slope, Cooke Peak, 19-iii-87 (1♀); same data, 12-iii-89 (SJC); Rockhound State Park, 9-iv-85 (SJC); Little Florida Mts., 23-iii-90 (SJC); vic. Victorio Canyon, E slope, Florida Mts., 24-iii-90 (SJC). *McKinley Co.*: Tohatchi Lookout, SE slope, Chuska Mts., 8300′, 4-vi-78 (2♂♂); same data, 22-v-78 (2♂♂). *Otero Co.*: Davis Dome, McGregor Range Camp, 4200′, 5-iii-95 (3♂♂, 1♀, RH and SJC); Three Buttes (middle butte), McGregor Range, 4300′, 5-iii-95 (2♂♂, RH and SJC). *Rio Arriba Co.*: Below El Vado Dam, 7000′, 12-v-85 (1♀); SW of Embudo, 21-iv-62 (JAS); 1 mi E of Capulin, 11-iv-63 (JAS); 3 mi. W of Gallina, 12-iv-63 (JAS); 6 mi. E of Gallina, 25-iv-78 (JAS); 4 mi. N of El Rito, Arroyo Seco, 7600′, 14-v-78 (JAS); Gobernador Canyon, 6200′, 10-v-83 (JAS); hill 2 mi. SE of Gobernador, 7300′, 10-v-83 (JAS); S. Dulce Lake, 7400′, 10-v-83 (JAS). *Sandoval Co.*: Pajarito Peak, SW slope, Jemez Mts., 9200′, 4-vi-83 (1♂) (late record, probable altitude record); same data, 19-v-84 (3♂♂). *San Juan Co.*: 7 mi. SW of Toadlena, Chuska Mts., 7200′, 24-iv-71 (7♂♂, 3♀♀); same data, 23-iv-78 (1♂); NM Hwy 140, 1.3 mi. S of Colorado state line, 9-v-83 (JAS); hilltop E of Aztec, 9-v-83 (JAS); FAA Tower S of Washington Pass, 9000′, Chuska Mts., 15-v-71 (1♂). *Sierra Co.*: 3 mi. E of Emory Pass, 5-iv-66 (JAS); Ash Canyon, near Elephant Butte Dam, 4500′, 10-iv-77 (1♀); 1 mi. N of NM Hwy 52 and 6 mi. W of Engle, 4600′, 23-iv-83 (1♂); 5 mi. NE of Red Rock, SE slope, San Mateo Mts., 4600′, 1-v-83 (1♂); NM Hwy 151, 28 mi. E of Emory Pass, 28-iii-86 (2♂♂, leg. SJC); hilltop ca. 20 mi. S of Hillsboro on NM Hwy 27, 18-iii-89 (6♂♂, 1♀); 10 mi. S of Hillsboro on NM Hwy 27, Silby Mt., 5300′, 23-iv-88 (SJC); Point of Rocks, Sect. 19-30, T.17S., R.1W, 4800′, 2-iv-95 (2♂♂ taken, 10 more seen, RH, ESC and SJC). *Socorro Co.*: 6 mi. NW of San Marcial, 4600′, 1-v-83 (3♂♂). *Taos Co.*: 3 mi. NE of Big Arsenic Spring, near Rio Grande Gorge, 8000′, 9-v-85 (2♂♂, 1♀); Big Arsenic Spring, Rio Grande Gorge, 7000′, 9-v-85 (6♂♂, 1♀); Rio Grande Gorge, SW of Cerro, 7000′, 10-v-86 (1♂, leg. SJC); Rio Grande Gorge, 24-iv-85 (SJC).

ARIZONA: *Apache Co.* (near *San Juan Co.*, NM): Ridge 2 mi. SW of Cove, Chuska Mts., 7000′, 29-v-78 (4♂♂).

TEXAS: *El Paso Co.*: McKelligan Canyon, SE slope, Franklin Mts., El Paso, 5000′, 7-iv-80 (6♂♂); same data, 26-ii-83 (1♂) (early record); same data, 25-iii-81 (2); Tom Mays Park, W slope, Franklin Mts., 5200′, 6-iv-80 (3♂♂, 1♀); same data, 24-iii-81 (8♂♂, 1♀); same data, 14-iii-81 (2♂♂); same data, 12-iii-83 (3♂♂); same data, 6-iii-83 (3♂♂); same data, 8-iv-83

(4♂♂); same data, 28-iii-85 (2♀♀); same data, 1-iv-87 (1♀); Scenic View Subdivision, W slope, Franklin Mts., 4000′, 8-iv-83 (2♂♂); E slope, Franklin Mts., 3 mi. N of Trans Mountain Rd., El Paso, 5000′, 2-iv-87 (7♂♂); red hill, 2 mi. W of road to Hueco Tanks St. Park, US Hwy 62-180, 4000′ (1♂, RH and SJC). Note: El Paso Co., TX, and Mun. Ciudad Juarez, Chih., were more intensively searched than other areas in an effort to record *A. pima*.

CHIHUAHUA: *Mun. Ascencion*: 26 mi. E of Ascencion, Mex. Hwy 2, 3800′, 1-iv-85 (1♂). *Mun. Casas Grandes*: 25 mi. N of Nuevo Casas Grandes, Puerto Janos, 4500′, 2-iv-85 (1♂). *Mun. Ciudad Juarez*: S slope, Cerro Bolas, ca. 20 mi. SW of Cd. Juarez, 5000′, 21-iii-82 (1♂); Sierra del Presidio, ca. 25 mi. S of Cd. Juarez, 5000′, 23-iii-85 (2♂♂); same data, 13-iii-87 (1♂); same data, 21-iii-84 (several, sight). Note: Approximately the same effort was expended collecting in the Franklin Mts. and the Cerro Bolas, which face each other across the Rio Grande. The only environmental difference I can cite for taking just one specimen in the Cerro Bolas, versus 46 in the Franklin Mts. is that the Cerro Bolas are totally limestone, whereas parts of the Franklin Mts. are volcanic. *Mun. Janos*: Janos microwave relay, 5 mi. E of Janos, 5400′, 1-vi-85 (11♂♂); 35 mi. NW of Janos on Mex. Hwy 2, 4500′, 12-iv-85 (3♂♂); ca. 10 mi. SW of Ejido Pancho Villa on road to Bavispe, ca. 5000′, 6-iv-94 (1♂, RH and ESC).

SONORA: *Mun. Imuris*: 10–12 mi. SW of Cananea, 18-iii-84 (1♂).

Euchloe guaymasensis Opler

SONORA: *Mun. Benjamin Hill*: Santa Eva Microwave Relay, 10 mi. NE of Benjamin Hill, 3000′, 27-ii-92 (1♂). *Mun. Cucurpe*: Santo Domingo Canyon, 12 mi. E of Cucurpe, 1-iii-92. *Mun. Guaymas*: El Vigia microwave relay (on ridge between Guaymas International Airport and city), 12-ii-89 (many ♂♂); same data, 19-ii-89 (worn ♂♂); same data, 24-ii-90 (many ♂♂, 6♀♀, ova, larvae, one pupa on *Descurainia pinnata*); same data, 5-ii-90 (few ♂♂, ova larva, and one pupa on *D. pinnata*); same data, 20-ii-92, (several ♂♂ and fourth instar larva); same data, 6-ii-93 (several ♂♂, ova and first or second instar larva); same data, 29-ii-93 (1♀). *Mun. Hermosillo*: Microwave relay on hill NE of Hermosillo, 21-ii-92 (several ♂♂); Las Avispas microwave relay, 40 mi. N of Guaymas, 2000′, 24-iii-83 (1♂, holotype); same data, 12-iii-74 (1♂, paratype); same data, 23-iii-83 (2♂♂, paratypes); same data, 5-iii-84 (1♂, paratype); same data, 7 & 8-iii-87 (3♂♂); same data, 11-ii-89 (many ♂♂); same data, 18-ii-89 (many ♂♂); same data, 8-ii-92; same data, 21-ii-92; same data, 28-ii-92 (8♂♂ taken, 20–30 more observed). *Mun. Imuris*: Road to microwave relay E of Imuris, 22-ii-92 (several ♂♂).

Pontia sisymbrii sisymbrii (Boisduval)

NEW MEXICO (southern counties and low altitude records only): *Dona Ana Co.*: S rim, Soledad Canyon near Chimney Rock, Organ Mts., 6000′, 24-iii-79 (1♂); Baylor Canyon, W slope, Organ Mts., 6000′, 16-iii-79 (1♂) (intermediate to *transversa*); Fillmore Canyon, W slope, Organ Mts., ca. 7000′, 28-iv-79 (1♂). *Eddy Co.*: Thayer Hill, E slope, Guadalupe Mts., 5500′, 24-iii-86 (1♂); same data, 27-iii-86 (2♂♂); Stone Canyon in Sec. 1, E slope, Guadalupe Mts., 4500′, 23-iii-86 (1♂). Note: Eddy County specimens appear to be subspecies *P. s. elivata*. *Grant Co.*: Cameron Creek, 4 mi. N Ft. Bayard, 6700′, 16-iv-66 (3♂♂); 9 mi. up McKnight Rd. (USFS Road 152) from NM Hwy 61, W slope, Black Range, ca. 7500′, 9-iv-89 (1♂); 3 mi. inside Natl. Forest on Royal John Mine Rd. (USFS Road 886), W slope, Black Range, 7000′, 23-iv-88 (1♀); 1 mi. inside Natl. Forest on Royal John Mine Rd. (USFS Road 886), W slope, Black Range, 6500′, 23-iv-88 (1♂); Gallinas Canyon, W slope, Black Range, 6000′, 28-iii-86 (1♀, leg. SJC). *Luna Co.*: Ridge E of Spring Canyon, N slope, Florida Mts., 27-iii-86 (1♀, leg. SJC). *Otero Co.*: Three Rivers Canyon, Mescalero Reservation, E slope, Sacramento Mts., 6000′, 21-iv-73 (3♀♀). *Sierra Co.*: 1 mi. E Emory Pass, E slope, Black Range, ca. 8000′, 6-v-89 (1♀).

TEXAS: *El Paso Co.*: Tom Mays Park, W slope, Franklin Mts., 5200′, 6-iii-83 (1♂), North Franklin Peak, Franklin Mts., 6000′, 1-iv-87 (6♂♂) (intermediate morphs and mixed series, 2 *transversa* and 4 intermediates, as might be expected on a major mountain top drawing males from different drainages).

Pontia sisymbrii transversa R. Holland

NEW MEXICO (all records for state): *Hidalgo Co.*: Gray Ranch, Peaks S of Animas Peak, Animas Mts., 8200′, 29-iv-91 (1♂, leg. SJC); Gray Ranch, Deer Creek, 8 mi. NW of Culberson Camp, SE slope, Animas Mts., 5400′, 31-iii-93, (3♂♂, 3♀♀, 1 of the males intermediate, leg. SJC); Gray Ranch, Cowboy Rim, 6500′, NE slope, Animas Mts., i-iv-93 (3♂♂, leg. SJC).

TEXAS: *El Paso Co.*: McKelligan Canyon, SE slope, Franklin Mts., El Paso, 5000′, 27-ii-83 (5♂♂) (early record); same data, 25-iii-81 (1♂).

CHIHUAHUA: *Mun. Ascencion*: 26 mi. E of Ascencion, Mex. Hwy 2, 3800′, 1-iv-85 (1♂). *Mun. Janos*: San Luis Microwave Relay, Mex. Hwy 2, Chih.-Son. state line, 6500′, 2-iv-85 (2♂♂); same data, 13-iv-85 (1♂); same data, 4-iv-94 (1♂, 2♀♀); canyon on Chihuahua side of Puerto San Luis, Mex. Hwy 2, just E of Sonora state line, 5500′, 7-iv-94 (1♂, 1♀, the male intermediate).

SONORA: *Mun. Agua Prieta*: San Luis Microwave Relay, Mex. Hwy 2, Chih.-Son. state line, 6500′, 2-iv-85 (2♂♂); same data, 13-iv-85 (1♂).