

A NEW SUBSPECIES OF *PIERIS SISYMBRII* (PIERIDAE) FROM WESTERN GREAT PLAINS RELICT FORESTS

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Pieris sisymbrii Boisduval that occur in scarp woodlands on the western Great Plains have formerly been recognized as distinct from their Rocky Mountain counterparts (Johnson & Nixon, 1967; F. M. Brown, pers. comm.), but their extremely low density required several years for sufficient sampling. They represent a new, allopatric subspecies (described below)—part of a larger array of montane insects that occur northward from western Nebraska and originated in the vast conifer forests which once covered the area after the Wisconsin glaciation. They have been isolated in disjunct relict populations by drier climate and range fire. The present description is part of a larger study of speciation in this former montane area (Johnson, 1976, 1977; Johnson & Balogh, 1976).

Pieris sisymbrii nordini Johnson, new subspecies

Figs. 1, 2

Diagnosis. This subspecies can be distinguished from *P. s. elivata* Barnes & Benjamin by the following traits: Males, upper surface of the forewings: marking between veins Cu_1 and M_3 reduced or nearly absent; extreme proximity of veins R_1 and R_2 allowing only narrow costal margin, black coloration from dark bar at apex of discal cell extending costad and to base of wing [*P. s. elivata*: R_1 and R_2 broadly parallel, allowing wide costal margin, white ground color invading between it and the marking in the cell]. Both sexes, undersurface of the hindwings: vein RS bending broadly along costal margin locating distal RS marking, mounted specimens, quite distad and below the tornus [*P. s. elivata*: RS highly arched, very limited in extension along costal margin (making distal RS marking, mounted specimens, appear well beneath inner margin of forewings)]. Male genitalia (Fig. 2): valvae longer and more broad, area between articulations broadly concave, caudal end exceeding tip of uncus, uncus more toothed than tapered [*P. s. elivata*: shorter, caudally tapered valvae, barely exceeding uncus; area between the articulation not smoothly concave, uncus gradually tapered; *P. s. sisymbrii*, *P. s. flavitincta* Comstock (Fig. 2)].

Male. Upper surface of wings: white; forewings with moderately dark subapical markings deeply incised between stem of veins $R_3 + 4/R_5$ and M_1 ; also less distinct marginal markings. Marking between veins Cu_1 and M_3 reduced or nearly absent. Dark coloration from marking, apex of discal cell, extending costad to base of wing. Hindwings above, vaguely dark along veins.

Undersurface of wings: forewing markings as on upper surface but more greenish with yellow-gold veins. Hindwings, veins outlined uniformly and thickly with brownish green, veins yellow gold; postmedian "arrowhead"-shape markings not concise, more bulbous than tapered; no extremely lightened patch basad along the veins.

Length of forewing: 19.0 mm (holotype), 17.0–19.0 mm (paratypes).

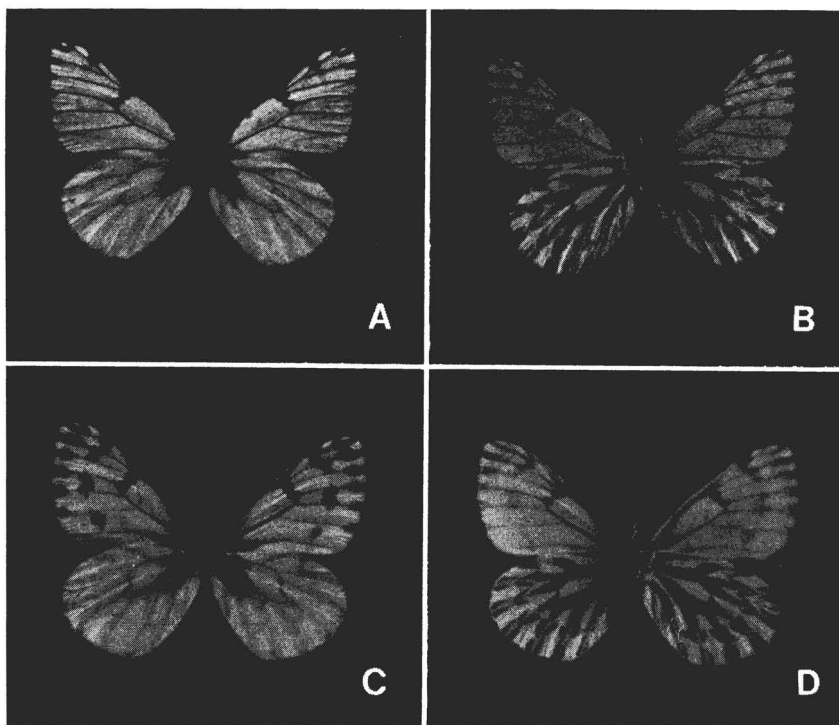


Fig. 1. *Pieris sisymbrii nordini*, new subspecies: (A) holotype, male, upper surface; (B) same, undersurface; (C) allotype, female (yellow), upper surface; (D) same, undersurface.

Female. Two morphs, white and yellow, the latter in high frequency [0.67 ($N = 6$)] compared with *P. s. elivata*, [0.22 ($N = 27$)].

Upper surface of wings: as in male, with marginal and apical-subapical markings darker and more extensive; postmedian marking between veins CU_1 and M_3 dark and extensive; also a dark marking between veins CU_2 and $2aA$. Hindwings heavily powdered along veins, especially above ventral postmedian "arrowhead" markings and at apex of cell.

Undersurface of wings: as in males, with dark postmedian markings between veins CU_1 and M_3 , and CU_2 and $2aA$.

Length of forewing: 19.0 mm (allotype), 17.0–19.5 mm (paratypes).

Male genitalia. Typical of the species, differing mainly as follows: valvae longer and more broad, caudal end exceeding length of uncus, area between articulations broadly concave; uncus caudally more toothed than gradually tapered.

Female genitalia. Typical of the species: sclerotized abdominal segments with apophyses; a large, toothed and bulbous-ended cylindrical signum in the wall of the oval-shape corpus bursae.

Early stages. Unknown.

Foodplant. Probably various Cruciferae (Brown et al., 1957; Ferris, 1971).

Types. Holotype, male, Monroe Canyon, Sioux Co., Nebraska, 24 May 1964 (K. Johnson), in the American Museum of Natural History (AMNH), genitalia in

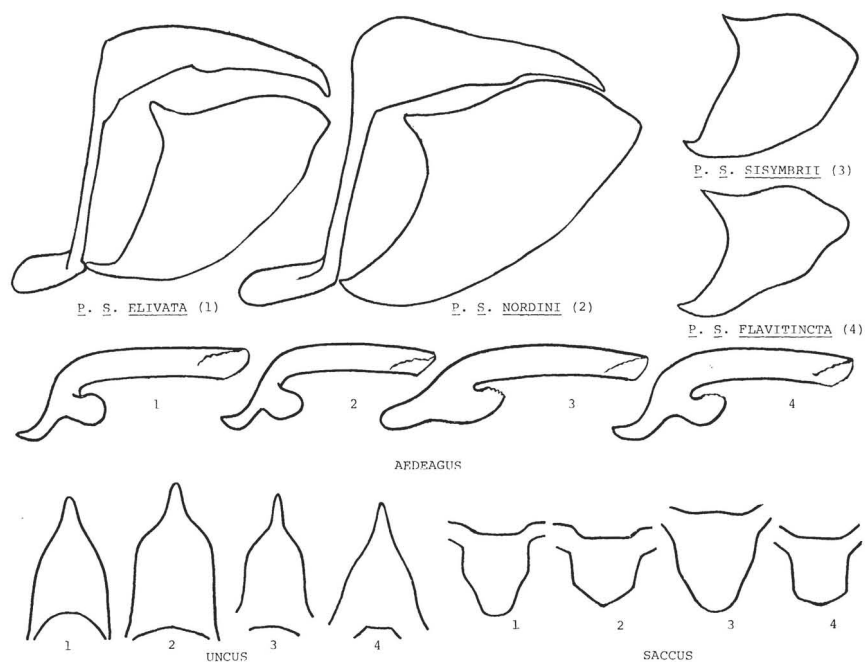


Fig. 2. Genitalia of Nearctic *Pieris sisymbrii* subspecies: (1) *P. s. elivata*, (2) *P. s. nordini*, (3) *P. s. sisymbrii*, (4) *P. s. flavitincta*. Upper: lateral view, uncus, vinculum, saccus, valva (valvae only, *sisymbrii*, *flavitincta*). Middle: lateral view, aedeagus. Lower: left, dorsal view, uncus; right, dorsal view, saccus.

vial KJ #2, same institution. Allotype, female, (representing morph of highest frequency, yellow), same locality, 24 May 1968 (K. Johnson), genitalia in vial KJ #19, same institution. Paratypes, males (battered): same locality, 20 May 1966 (K. Johnson), genitalia in vial KJ #17, same institution; same locality, 26 May 1937 (R. A. Leussler), genitalia in vial KJ #25, in collection of Ohio State University, Columbus, Ohio; Hell Canyon, S of Hwy. 16, Custer Co., South Dakota, 31 May 1968 (J. S. Nordin), in his collection: females (Y = yellow; W = white): (W), 5 mi. W of Pringle, Custer Co., South Dakota, 28 May 1966 (J. S. Nordin), in AMNH; (Y), Chadron, Dawes Co., Nebraska, 6 May 1962 (K. Johnson), genitalia in vial KJ #20, in the Los Angeles County Museum; (W), Monroe Canyon, Sioux Co., Nebraska, 24 May 1968 (K. Johnson), genitalia in vial KJ #18, in the Allyn Museum of Entomology; (Y), Cañon Region, N of Harrison, Sioux Co., Nebraska, 5 June 1914 (R. A. Leussler), genitalia in vial KJ #5, in collection of Ohio State University; (Y), Guffis Canyon Fire Road, Custer Co., South Dakota, 1 June 1968 (J. S. Nordin), in his collection.

Distribution. Black Hills of South Dakota and relict pine woodlands of Nebraska and perhaps North Dakota (Fig. 3).

Flight period. Mid-April (sight records, this author) to early June.

Remarks. These specimens were compared with 53 specimens of *P. s. elivata* from Wyoming and Colorado, of which 10 genitalia were studied. Specimens were

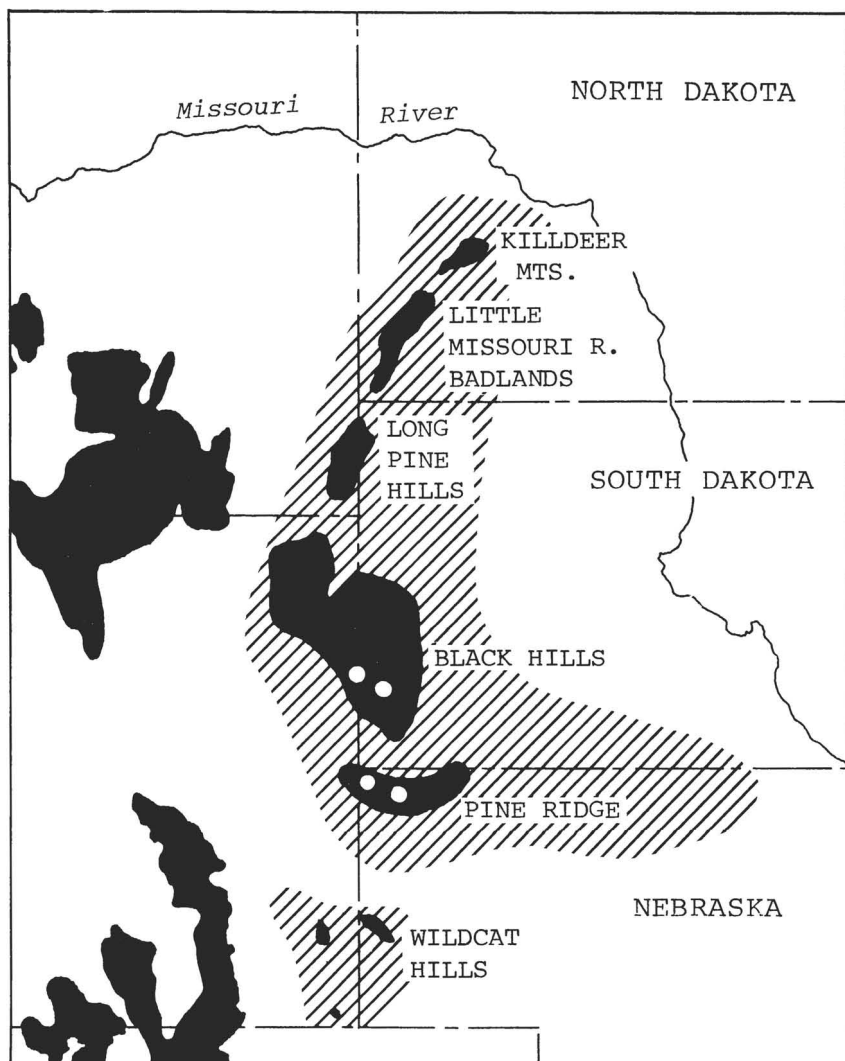


Fig. 3. Known distribution of *P. s. nordini*, new subspecies, superimposed on map of present-day montane area of eastern Rocky Mountains and western Great Plains (black areas). Hatching indicates approximate distribution of post-Pleistocene climax conifer forest. Open pine-juniper woodland extended around it, especially into central Nebraska and westward to the Rocky Mountain forests. Open woodlands, and then the forests, disappeared as conifer environments retreated upland leaving the present-day montane relicts.

also examined of *P. s. sisymbrii* from California and Utah, of which 6 genitalia were examined (3 ♂, 3 ♀).

Etymology. I am very pleased to name this subspecies after Dr. John S. Nordin (Warrington, Pennsylvania), whose collections and research concerning South Dakota butterflies comprise the largest single contribution to the knowledge of South Dakota's butterfly fauna in recent years.

DISCUSSION

Butterfly subspecies endemic to the relict woodlands of the western Great Plains usually are distributed disjunctly from the Wildcat Hills (Scotts Bluff and Banner Cos., Nebraska) and the canyons of Goshen Co., Wyoming [these being relicts of the former "Cheyenne Ridge" (Clements, 1949)] northward to the Pine Ridge of northwestern Nebraska, the Black Hills of South Dakota, and the scarps along the Little Missouri River in western North Dakota. Puckering & Post (1960) mention a "possible" *P. sisymbrii* from just below the North Dakota border in Harding Co., South Dakota. It is not specifically stated whether the specimen figured is the specimen from Harding Co.; the figured specimen does not match the description of *P. s. nordini* in major traits. This and the indistinctness of a marking between veins CU_2 and 2_{dA} (under-surface only), which if the specimen is a female should be much more distinct, suggest that their specimen may represent early spring *P. protodice occidentalis* Reakirt, as is also stated by Dr. A. B. Klots in Puckering & Post (1960).

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OVIPOSITIONAL MISTAKE BY A HACKBERRY BUTTERFLY (NYMPHALIDAE)

Ovipositional mistakes by female butterflies have been previously reported (Remington, 1952, Psyche 59: 61-70; Dethier, 1959, Can. Ent. 91: 554-561; Neck, 1973, J. Lepid. Soc. 27: 22-33). Such mistakes may occur on toxic, exotic species which have palatable native congeners (Straatman, 1962, J. Lepid. Soc. 16: 99-103; Kendall, 1964, J. Lepid. Soc. 18: 129-157).

Herein is described the behavior of a single female *Asterocampa clyton texana* (Skinner) (Nymphalidae) which was observed at 1810 hrs. CST on 7 August 1970 in a residential area of Austin, Travis County, Texas. The adult was observed flying around the yard mostly at ground level. The individual landed momentarily on several ornamental plants: Chinese privet, *Ligustrum sinense* Lour. (Oleaceae); heavenly bamboo, *Nandina domestica* Thumb. (Berberidaceae) and corona vine, *Antigonon leptopus* Hook. & Arn. (Polygonaceae). Subsequently, it landed on a blade of St. Augustine grass, *Stenotaphrum secundatum* Kuntze (Gramineae), upon which it quickly laid three eggs. It then landed on several dead branches of an adjacent Texas sugarberry, *Celtis laevigata* Willd. (Ulmaceae), its major larval food-plant in central Texas. Extrusion of the ovipositor was observed several times but no oviposition occurred. After flying out of the immediate area, the same individual returned at 1825 CST. It landed on the trunk of the privet plant and extruded its ovipositor but laid no eggs. It then flew out of sight and was not seen again.

Asterocampa normally oviposits small to large egg masses on the underside of hackberry leaves (Comstock, 1953, Bull. So. Cal. Acad. Sci. 52: 127-136; Langlois & Langlois, 1964, Ohio J. Sci. 64: 1-11). These observations involved a female *A. clyton texana* which had mated and was apparently intensely stimulated to oviposit although unable to locate new-growth leaves of *C. laevigata*. Such leaves were non-existent at the time of observation; the last significant rainfall had occurred on 28 May (0.97 in.).

These observations may provide insight into future research possibilities on strategies of oviposition in *Asterocampa* in semi-arid habitats. Several days previous to time of observation, weather conditions were overcast with high humidity as a result of fringe weather associated with Hurricane Celia; barometric pressure was slightly below normal levels. No substantial precipitation was recorded (0.22 in. on 4 August). Prolonged periods of slightly depressed barometric pressure and elevated relative humidity would normally be a reliable predictor of sufficient rainfall to produce new growth on *Celtis* which provides requisite oviposition sites.

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