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LARVAL HOSTPLANT RECORDS FOR BUTTERFLIES AND SKIPPERS (MAINLY FROM WESTERN U. S.), WITH NOTES ON THEIR NATURAL HISTORY

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Abstract. Larval hostplants, based on observations of adult oviposition or larval feeding, are presented for butterflies (including skippers) from western United States (mostly Colorado), and many notes on egg placement, overwintering stage, behavior, and ecology of these species are given. A case of larval hostplant switching is reported in which Phyciodes picta (Nymphalidae) originally fed on Aster (Compositae) but now feeds on the recently introduced Convolvulus arvensis (Convolvulaceae), a completely unrelated weedy vine. Ovipositing females have distinctive slow hovering flights, but in Satyrinae these are not as distinct from normal flight. Females of Satyrinae, Speyeria, and Boloria oviposit rather haphazardly near the hostplants, and many Hesperiinae are somewhat haphazard about their choice of grasses/sedges or nearby plants for oviposition.

Introduction

Larval hostplants for western U.S. species are not known as completely as for eastern U.S. butterflies; this paper adds to their knowledge. Some of the springs and summers from 1977 to 1985 were spent observing females to obtain oviposition records, and raising the immatures of some species. Before this time I had found other hostplants during the course of other work. All my data on hostplants through 1985 are given, together with associated information such as the hibernal diapause stage, the location of oviposition or larval feeding (leaves or fruits), etc. The plant family of each hostplant, and the justification for the scientific names of the butterflies used, can be found in Scott (1986). Scott (1986) also summarizes the general ecology, distribution, behavior, and identification of each species. The hostplant records in Scott 1986 are either from the present paper, or from the literature; the literature sources for each hostplant record therein are listed in my card file, and are available to readers on request. For flight periods and other ecological observations on the Colorado fauna, see Scott & Scott (1980) and Scott and Epstein (1986).

Methods

I thank the following persons, especially Dr. Weber, for identifying the hosts (abbreviation in parentheses): James A. Scott (S), William A. Weber (W--University of Colorado Herbarium, Boulder Colo.), June McGaskill (M--University of California Herbarium, Davis, Calif.), James Harding (Ha--same address), Beecher Crampton (C--same address) James L. Reveal (R--Univ. of Maryland, College Park, Md.), John R. Keith, Hansford T. Shacklette, James A. Erdman (all three G--U.S. Geological Survey, Lakewood, Colorado), Farrel Branson (B--same address), L. R. Heckard (H--Univ. Calif., Berkeley, Calif.), John Strother (same address, no abbreviation), Charles Feddema (F--U.S. Dept. Agriculture, Fort Collins, Colo.). Pressed plant specimens identified by the above persons are in the collection of J. Scott. (Because many of the plants are not in perfect condition, they would no doubt be thrown away by herbaria, which generally retain only perfect specimens. Retaining plant specimens also makes it easier to resubmit plants to other botanists with new knowledge of the plant group.) All times are given as 24-hour standard time.

To obtain oviposition records, the observer must train himself to recognize the fluttering oviposition flights. One should walk about the habitat and watch for any female which flutters or hovers

slowly from plant to plant; ovipositing females flutter slowly while searching for an oviposition site, and frequently land, whereas males and non-ovipositing females fly more erratically or swiftly. This distinction is very noticable in most butterflies, especially in fast-flying skippers, though in Satyrinae (Lethe, Cercyonis, Neominois, and others) the flight of ovipositing females is only slightly more fluttering than usual. Papilio females continue to flutter while they oviposit, while other butterflies are generally motionless.

Papilionidae

Parnassius phoebus Fab. About 60 larvae found near or eating Sedum rosea integrifolia Raf. (S) Mt. Evans, 13,600', Clear Creek Co. Colo., 14 July 1980. 3 eggs found on Carex sp. (B) 1 mi. N Cheesman Res., Jefferson Co. Colo. 7 Sept. 1971. Oviposition 13:37 on base of shrub trunk 1 foot from Sedum lanceolatum Torr. (S) Golden Gate Can., Jefferson Co. Colo. 4 July 1980. Ovipositions at 10:08, 10:40, 10:48, 11:51, 12:03, 12:04, 12:06, 12:08, 12:48, and 13:45 on soil, dead twigs, Koeleria sp. (a grass)(W), on two other species of grasses (grasses were the commonest oviposition site because of their abundance in the grassland), on one species of sedge, on Antennaria parvifolia Nutt., and on two other species of dicotyledons, all eggs laid near but not on S. lanceolatum (S) which is the presumed hostplant at this locality NE of Rosita, Custer Co. Colo. June 1969, June 1970, June 1971. Females oviposit haphazardly: to oviposit, the female lands on the ground, and crawls to the nearest clump of grass or other plant to lay, often crawling to 3 or 4 clumps before laying. Eggs hibernate. Adults fly in late spring, but because the hostplants are green in early spring the newly-hatched larvae have time to feed and grow to adults in spring. Alpine populations may be biennial, hibernating as eggs and also as pupae, but pupal diapause is not yet proven. Larvae often pupate in a slight silk nest beneath grass clumps (B. Drummond, pers. comm.), and other persons observed slight silk nests spun by pupating larvae, but my 40 lab larvae spun no silk. I observed a larva at Mt. Evans worming itself into pebbly soil like a charmed cobra. Edwards (1868-1897) saw larvae squeezing through tiny holes, and adults ovipositing haphazardly. Thus larvae may also pupate in loose soil; pupal nests would be useful IF pupae hibernate. Two forewing base hooks (fig. by Scott 1986) probably hook onto grass, silk, pebbles, etc. to pull the unexpanded adult out of the nest. Scott (1973b) reports ecology, behavior, and movements.

Battus philenor(L.). Larvae on Aristolochia sp. (small 5 cm tall grasslike shoots, S) 2 mi. W. Austin, Texas 29 Apr. 1972.

Papilio machaon bairdii Edw. Larvae on Artemisia dracunculus L. (S) 2 mi. SW Canon City and 1 mi. W Wolf Park, Fremont Co. Colo., 27 June 1971. Larvae on A. dracunculus (S) S of Salida, Chaffee Co. Colo. Aug. 1965. Larvae on A. dracunculus (S) Beaver Creek, 6100', E of Phantom Can., Fremont Co. Colo. 30 June 1971 Glenn R. Scott. Larvae eat the leaves.

P. zelicaon Lucas. Larva on inflorescence of Foeniculum vulgare L. (S) Berkeley Hills, Contra Costa Co. Calif. July 1968. Larva on F. vulgare (S) leaves Point Richmond, Contra Costa Co. Calif. 2 and 17 May 1971, 15 June 1972. Oviposition 9:13 on leaf of Harbouria trachypleura (Gray) C. & R. (S) Green Mtn., Jefferson Co. Colo. 3 June 1980 (adults assoc. with H. trachypleura (G) at Pass Creek, Huerfano Co. Colo. 26 June 1971, and at many other central Colo. sites.). Oviposition on leaf of Conium maculatum (S) Red Rocks, Jefferson Co. Colo. 16 June 1981. Older larvae may prefer umbels. Native up to 12,500' in the alpine zone of Park Co. Colo. One flight in Colo.; adults as late as late July in the foothills of the Front Range are perhaps just stragglers from the one flight.

P. polyxenes Fabricius. Larva on Cicuta douglasii (DC.) C. & R. (W) inflorescence Sapello Can., 7800', San Miguel Co. New Mex. 23 Aug. 1978. Larva on C. douglasii (W) Hot Springs, 7000', San Miguel Co. New Mex. 23 Aug. 1978. Oviposition 13:00 under leaf of Conium

maculatum L. (W) Castlewood Res., Douglas Co. Colo. 13 Aug. 1977. 6 eggs found on C. maculatum (W) leaves Lakewood, Jefferson Co. Colo. 17 Aug. 1977. Oviposition on Berula erecta (Huds.) Coville (W) wet meadow 7.2 mi. N New Mexico state line, Hwy. 550, La Plata Co. Colo. 27 Aug. 1977. Adults assoc. with B. erecta (S) 1 mi. S Cochiti Dam, Sandoval Co. New Mex. 9 Sept. 1977. Larva on Daucus carota L. (W) Lakewood, Colo. 5 Sept. 1972. 4th stage larva on Petroselinum crispum (S) umbel Lakewood, Jefferson Co. Colo. 22 July 1985. Oviposition 10:07 on Anethum graveolens (S) umbel Lakewood 22 July 1985. Three flights occur in the Colo. foothills. Older larvae seem to prefer umbels.

P. indra Reakirt. Oviposition 9:05 on leaflet of Harbouria trachypleura (S) (Gray) C. & R., Green Mtn., Jefferson Co. Colo. 3 June 1980. Oviposition 11:35 on leaflet of H. trachypleura (S) S of Golden Gate Can., Jefferson Co. Colo. 5 June 1980. Preoviposition on H. trachypleura (S) 1 mi. NW Idledale, Jefferson Co. Colo. 13 June 1980. This host is not especially bushy, and grows on sandy/pebbly slopes rather than among rocks; most P. indra hosts are bushy and grow among rocks (John F. Emmel pers. comm.). Adults assoc. with Lomatium grayi Coult. & Rose (W) Jones Hole, Dinosaur Nat. Mon., Utah 11 June 1973.

P. glaucus rutulus Lucas. Larva raised from Salix babylonica L. (S) Pueblo, Pueblo Co. Colo. Aug. 1962. Oviposition 12:10 Salix exigua Nutt. (S) N fork Clear Creek, Gilpin Co. Colo. 1 July 1981. Ovipositions 15:45-15:55 on leaves about 10 m up in two trees of Populus angustifolia James (S) (about 15 eggs seemed to be laid though the height was too great to be sure; the female grasps a leaf and flutters while she bends her abdomen beneath her to lay), Mt. Vernon Historic Site, Jefferson Co. Colo. 11 July 1984. Ssp. rutulus is common and has several flights in the suburbs of Denver, Colo., where the imported deciduous trees would seem to be ideal for ssp. glaucus; probably glaucus is not present because the glaucus that do fly in (I caught 1 male that in wing pattern and valva prong shape is typical glaucus at Jarre Can., Douglas Co. Colo. 30 April 1981) hybridize and are swamped by the rutulus population.

P. eurymedon Lucas. Oviposition on small shrub of Prunus emarginata (Dougl.) D. Dietr. (M) Loon Lake, El Dorado Co. Calif. 30 June 1974.

P. multicaudata Kirby. Larvae found on leaves of Prunus virginiana var. melanocarpa (Nels.) Sarg. (S) and Fraxinus pennsylvanica var. lanceolata Sarg. (S) Flintwood Hills, Douglas Co. Colo. 13 Aug. 1977 J. Scott and Carl Decker. Oviposition 11:00 on upperside of leaf of P. v. var. melanocarpa (S) Apex County Park, Jefferson Co. Colo. 24 June 1980. Also a common suburban Denver resident.

P. cresphontes Cramer. Larvae common on Citrus sinensis (L.) Osbeck (S) Phoenix, Ariz. 3 Oct. 1971.

Pieridae

Anthocharis sara Lucas. Oviposition Capsella bursapastoris (L.) (S) Monticello Dam, Yolo Co. Calif. 18 March 1972.

Euchloe olympia (Edw.). Oviposition 9:15 on Arabis glabra (L.) Bernh. (S) on leaf near top of plant, Green Mtn., Jefferson Co. Colo. 12 June 1980. Oviposition 12:25 on A. glabra (S) Hogback at I-70, Jefferson Co. Colo. 22 May 1980. Egg found on A. glabra (S) Wildcat Mound, Douglas Co. Colo. 25 May 1980. Oviposition 11:40 on small plant of Descurainia pinnata (Walt.) Britt. (S) SW end North Table Mtn., Jefferson Co. Colo. 24 May 1980.

E. ausonides Lucas. 8 larvae on Arabis glabra (S) Green Mtn., Jefferson Co. Colo. 12 June 1980. 15 larvae on A. glabra (S) Red Rocks, Jefferson Co. Colo., most larvae on siliques (=pods) but a few larvae eating upper leaves when the siliques were dry, 27 June 1980. 4th stage larva A. glabra (S) inflorescence Apex Gulch, Jefferson Co. Colo. 3 July 1984. 2 mature larvae on A. glabra (S) siliques Tinytown, Jefferson Co. Colo. 21 July 1984. 4 larvae (2nd-5th stages) on A. glabra (S) inflorescences Red Rocks, Jefferson Co. Colo. 20 June 1984. Larva on A. glabra (S) silique Green Mtn., Jefferson Co. Colo. 7 June 1985. 5 larvae on siliques and one on upper leaf of A. glabra (S) Green Mtn. 8, 15, 19 June 1985.

Oviposition Arabis hirsuta (L.) Scop. (W) Red Rocks, Jefferson Co. Colo. 6 June 1978. Mature larva on Arabis drummondii Gray (S) silique Tinytown, Jefferson Co. Colo. 2 July 1980. About 20 eggs and larvae found on A. drummondii (S) inflorescences Red Rocks, Jefferson Co. Colo. 22-23 May 1977. Oviposition 9:38 on Sisymbrium officinale (L.) Scop. (S) E end South Table Mtn., Jefferson Co. Colo. 27 May 1980. Oviposition Sisymbrium altissimum L. (S) 11:39 Green Mtn., Jefferson Co. Colo. 12 June 1980. Two eggs on inflorescence and on lower leaf of small plant of S. altissimum (S) Apex Gulch, Jefferson Co. Colo. 21 June 1984. Oviposition 14:00 and 3 other eggs found, all on terminal flower buds of Barbarea orthoceras Ledeb. (S) Tinytown, Jefferson Co. Colo. 26 May 1984. Eggs on inflorescence of Brassica nigra (S) Briones Park, Contra Costa Co. Calif. 19 March 1970. Oviposition on inflorescence of B. nigra (S) Berkeley Marina, Contra Costa Co. Calif. June 1970. Several hundred ovipositions (at about 9:17, 9:29, 10:05, 10:10, 10:12, 10:24, 10:29, 10:34, 10:41, 10:59, 11:11, 11:38, 12:21, 13:22, 14:13, 14:15, 14:36, 15:09), eggs and larvae found on B. nigra (L.) Koch (S), and larvae raised to adults on B. nigra, Point Richmond, Contra Costa Co. Calif. April-June 1970; eggs are laid singly in the middle of the unopened flower buds, and if the plant has more than one such inflorescence, more eggs are laid on the terminal than on lower inflorescences; females almost always lay only a single egg per plant, then fly at least 3 meters or so (usually much farther) before laying another; plants usually had one to several eggs, but one plant had 10; larvae eat the flowers and growing fruits; eggs pale blue when first laid, turning orange within a day or two. Three ovipositions and eggs found on Raphanus sativus (L.)(S), same locality and date. Scott (1975a) reports ecology and movements.

E. hyantis (Edw.). 3 eggs laid on Arabis sp. (S) Glen Alpine Falls, El Dorado Co. Calif. 3 June 1972. Oviposition on Streptanthus tortuosus Kell. (M) Loon Lake, El Dorado Co. Calif. 9 June 1974.

Pieris rapae (L.). Oviposition Arabis glabra (S) Plaskett Meadows, Glenn Co. Calif. 29 June 1974. Oviposition Brassica oleracea var. acephala DC. (S) Lakewood, Jefferson Co. Colo. 10 June 1977. Oviposition 8:50 on Lunaria annua (S) silicle Lakewood, Jefferson Co. Colo. 21 June 1981. Three ovipositions 11:30 on side of L. annua (S) silicles Lakewood, Jefferson Co. Colo. 1 July 1985. Oviposition 11:30 under Barbarea orthoceras (S) leaf Apex Gulch, Jefferson Co. Colo. 3 July 1984. Oviposition 9:34 under leaf of juvenile Barbarea vulgaris R. Br. (W) El Dorado Springs, Boulder Co. Colo. 5 July 1985. Oviposition 11:10 under leaf of Cardaria pubescens (Mey.) Rollins (S) jct. hwy. 76 and 120th St., Adams Co. Colo. 6 Sept. 1984. Two ovipositions 13:00 on leaves of juvenile plants (growing as sprouts from the base of dead stalks) of C. pubescens (S) Canon City, Fremont Co. Colo. 30 July 1985. Oviposition 11:35 on leaf of juvenile Rorippa teres (Michx.) Stuckey (S) plant Barr Lake, Adams Co. Colo. 17 Aug. 1985.

P. napi (L.). Oviposition 11:00 and other eggs found, on leaves of Nasturtium officinale R. Br. (W) Unaweep Can., Mesa Co. Colo. 30 Aug. 1978 (this population is one of the few multi-flight populations in Colorado, all of which are at low altitude along creeks in western Colo.). Oviposition 11:30 under leaf of Cardamine cordifolia A. Gray (S) Fraser River, Grand Co. Colo. 5 July 1984.

P. protodice Bdv. & LeC. Oviposition 10:45 on Arabis drummondii (W) inflorescence .6 mi. N of Moffat Tunnel, Grand Co. Colo. 16 July 1978. Oviposition A. drummondii (W) 1 mi. E Hopewell Lake Cgd., 9800', Rio Arriba Co. New Mex. 21 June 1978. Oviposition 10:30 on Sisymbrium altissimum L. (W) Chimney Gulch, Jefferson Co. Colo. 10 July 1978. Oviposition 8:20 on S. altissimum (W) inflorescence Red Rocks, Jefferson Co. Colo. 7 July 1978. Oviposition 11:45 on S. altissimum (W) inflorescence Chimney Gulch, Jefferson Co. Colo. 1 July 1978. Oviposition 12:35 S. altissimum (W) inflorescence Green Mtn., Jefferson Co. Colo. 30 June 1978. Oviposition S. altissimum (S) Howard, Fremont Co. Colo. 13 Aug. 1973. Oviposition 15:50 on S. altissimum (S) Filius Park, Jefferson Co. Colo. 3 Aug. 1984. Two eggs on S. altissimum (S) flower buds Apex Gulch, Jefferson Co. Colo. 18 June 1985. Oviposition 8:30 Descurainia sophia (L.) Webb (W) Mt. Zion, Jefferson Co. Colo. 2 July 1978. Oviposition D. sophia (G)

Bear Creek, Fremont Co. Colo. 29 June 1970. Oviposition 10:30 on inflorescence of small plant of D. sophia (S) Mt. Zion, Jefferson Co. Colo. 11 June 1981. Oviposition D. sophia (S) 12:16 Green Mtn., Jefferson Co. Colo. 8 June 1985. Oviposition Descurainia pinnata (S) Crow, Pueblo Co. Colo. 22 July 1972. Oviposition Thlaspi arvense L. (S,G) Coaldale, Fremont Co. Colo. 10 July 1971. Oviposition 8:23 Thelypodium elegans (Jones) (W) Box Canyon, Fremont Co. Colo. 27 May 1972. Egg on Schoenocrambe linearifolia (Gray) Rollins (W) flower bud Caprock S of San Jon, Quay Co. New Mex. 14 May 1985. Oviposition 8:52 Wislizenia refracta Engelm. (W) dunes 5 mi. N San Felipe Pueblo, Sandoval Co. New Mex. 9 Sept. 1977. Oviposition Cardaria draba (L.) Desv. (W) near Ridgway, Ouray Co. Colo. 16 June 1978. 5 eggs laid 10:35-10:41 on top of Cardaria pubescens (S) leaves 1 mi. NW Brighton, Weld Co. Colo. 2 Sept. 1984. Ovipositions 10:55, 11:02, and 12:35, and 4 other eggs found, all on top of leaves of C. pubescens (S), jct. hwy. 76 and 120th St., Adams Co. Colo. 2-8 Sept. 1984. Oviposition 12:06 on Lepidium densiflorum (W) Ute Lake, Quay Co. New Mex. 14 May 1985. Oviposition 13:15 on Berteroa incana (L.) DC. (W) flower bud NE Valmont, Boulder Co. Colo. 5 July 1985. Oviposition 11:30 on Rorippa sinuata (Nutt.) Hitchc. (S) flower bud Barr Lake, Adams Co. Colo. 17 Aug. 1985. Oviposition 10:12 Cleome serrulata Pursh (S) leaf, Box Elder Creek, Arapahoe Co. Colo. 8 Aug. 1973. Oviposition 11:00 on C. serrulata (S) flower pedicel Barr Lake, Adams Co. Colo. 17 Aug. 1985.

P. cloridice beckerii Edw. Oviposition Stanleya pinnata (Pursh) Britt. (G) E of Penrose, Pueblo Co. Colo. 17 Aug. 1970. Eggs on S. pinnata (S) inflorescence 2 mi. W Frenchman, Churchill Co. Nev. 2 June 1972. Eggs on Cleome serrulata (S) 2 mi. SW Penrose, Fremont Co. Colo. 26 Aug. 1973. Oviposition 13:40 Arabis lignifera Nels. (S) Avon, Eagle Co. Colo. 29 May 1983.

P. sisymbrii Bdv. Oviposition Arabis glabra (S) Lookout Mtn., Jefferson Co. Colo. 22 May 1980. Preoviposition, and egg, first stage larva, and 3rd stage larvae found on Descurainia richardsonii (Sw.) O. E. Schulz (W) Irish Can., Moffat Co. Colo. 28 May 1978. Oviposition Erysimum sp. (S) Del Puerto Can., Stanislaus Co. Calif. 21 March 1970 (this plant is probably refused by larvae). The favorite Calif. host (Streptanthus) does not grow in Colo.

Neophasia menapia (F. & F.). Oviposition Pseudotsuga menziesii (Mirb.) Franco (S) 12 mi. W Willits, Mendocino Co. Calif. 13 July 1964. Adults assoc. only with Pinus edulis Engelm. (S) Bear Creek, Fremont Co. Colo. 26 July 1965, 6 Aug. 1965, 8 Aug. 1969.

Nathalis iole Bdv. 5 eggs laid 9:45-10:30 on 4 cm seedlings of Thelesperma megapotamicum (Spreng) Kuntze (W), 4 eggs laid 9:45-10:30 on 4 cm seedlings of Dyssodia papposa (Vent.) Hitch. (W), but no eggs laid on Machaeranthera pinnatifida (Hook.) Shinners (W) or Ratibida columnifera (Nutt.) Woot. & Standl. (W) (all four are Compositae), all at Storrie Lake 6600', San Miguel Co. New Mex. 23 Aug. 1978. About 7 eggs found on top of leaves of D. papposa seedlings 3 mi. E Vineland, Pueblo Co. Colo. 28 Aug. 1983.

Colias meadii Edw. Oviposition 10:13 Trifolium parryi Gray (S) Loveland Pass, Summit Co. Colo. 28 July 1978. Oviposition 10:12 Trifolium nanum Torr. (W) Loveland Pass, Summit Co. Colo. 25 July 1978. Oviposition 9:55 Trifolium dasyphyllum T. & G. (G) Hermit Pass, Custer Co. Colo. 31 July 1970. Oviposition T. dasyphyllum (G) Baldy Peak, Fremont Co. Colo. 29 July 1970. Oviposition T. dasyphyllum (G) Greenhorn Peak 12000', Pueblo Co. Colo. Aug. 1970.

C. eurytheme Bdv. Oviposition 13:30 on Trifolium repens L. (S) leaf Lakewood, Jefferson Co. Colo. 31 Aug. 1980. Oviposition 12:00 on upperside of T. repens (W) leaf E of Tinytown, Jefferson Co. Colo. 30 July 1978. Oviposition T. repens (S) Boulder, Boulder Co. Colo. 10 June 1977. Ovipositions 12:21 and 12:22 on top of T. repens (S) leaves (Trifolium pratense was nearby but ignored by the female) Critchell, Jefferson Co. Colo. 3 Aug. 1985. Oviposition 11:05 on top of T. repens (S) leaf 1 mi. NW Brighton, Adams Co. Colo. 2 Sept. 1984. Oviposition Trifolium nanum Torr. (G) Hermit Pass, Custer Co. Colo. July 1970. Oviposition 13:15 on top of Glycyrrhiza lepidota Pursh (S) leaf Chimney Gulch, Jefferson Co. Colo. 10 July 1978. 2 eggs laid on Medicago sativa (S) Lakewood, Jefferson Co. Colo. 10 June 1977. Oviposition M. sativa (S) Lakewood, Jefferson Co. Colo.

18 June 1977. 3 larvae swept from M. sativa (S) (1 reared to adult C. eurytheme, 1 parasitized, 1 reared to adult hybrid C. eurytheme X C. philodice) Cherry Creek Res., Arapahoe Co. Colo. 13 Aug. 1985. Oviposition 10:25 Medicago lupulina L. (S) Five Points Recreation Area, Fremont Co. Colo. 2 Aug. 1973. Two ovipositions 9:45 on top of leaves of mature M. lupulina (S) Valdez, Taos Co. New Mex. 24 May 1985. Oviposition 14:04 on top of leaf of M. lupulina seedling (S) Taos Ski Area, Taos Co. New Mex. 24 May 1985. Oviposition Melilotus officinalis (L.) Lam. (G) Beulah, Pueblo Co. Colo. 26 July 1970. Oviposition 12:37 on top of Lupinus argenteus (S) leaf, ovipositions 12:42 and 12:45 on top of Astragalus dasyglottis Fisch. ex DC. (W) leaves, all Shingle Creek, Jefferson Co. Colo. 24 July 1984. Oviposition Astragalus bisulcatus (Hook.) Gray (S) Central Plains Experimental Range, Weld Co. Colo. June 1976, J. Scott and David L. Wagner. Oviposition 11:30 Astragalus whitneyi Gray (M) Sonora Pass, Mono Co. Calif. 25 Aug. 1974. Oviposition Astragalus drummondii Hook (W) 2 mi. N Garden of the Gods Road, El Paso Co. Colo. 7 June 1981. Oviposition 13:30 on upperside of leaf of Astragalus flexuosus (Dougl. ex Hook.) G. Don (W) E of Tinytown, Jefferson Co. Colo. 30 July 1978. Ovipositions 10:12, 11:15, 12:55, 12:56 on A. flexuosus (W) Chimney Gulch, Jefferson Co. Colo., 10 July 1978. Oviposition 15:20 on top of A. flexuosus (S) leaf Filius Park, Jefferson Co. Colo. 3 Aug. 1984. 4 eggs laid 11:50-11:55 on top of A. flexuosus (S) leaves Genesee Park, Jefferson Co. Colo. 5 Aug. 1984. 9 eggs laid 10:33-11:19 on top of leaves of 9 small (5-10 cm tall) plants of A. flexuosus (S) Genesee Mtn., Jefferson Co. Colo. 8 Aug. 1984. Ovipositions 10:24 and 10:26 on top of A. flexuosus (S) leaves O'Fallon Park, Jefferson Co. Colo. 13 Aug. 1984. Oviposition 9:41 on Vicia exigua (W) W Tijeras, Bernalillo Co. New Mex. 26 May 1985. Oviposition 11:00 on top of leaf of juvenile Thermopsis divaricarpa (S) NW Lyons, Boulder Co. Colo. 10 July 1985. Females generally place eggs on upperside of leaves, as in other Colias. Larvae and pupae (reared to adults) have a lateral yellow (rose-centered) band and a subdorsal yellow (rose-centered) band; the hybrid eurytheme X philodice larva had the subdorsal band narrow, intermediate between the two species. It has been said that eurytheme migrates into Colo., whereas philodice is a native, but I believe that both are native, and there are no differences in habitat preference or flight periods between them. One would expect the native philodice to be better adapted to possible freezes, but both species fly in late October on the plains when freezes are frequent, as well as in April.

C. philodice God. Oviposition 10:37 under Medicago sativa (alfalfa; S) leaf Montezuma Can. 14 mi. N Camp Cottonwood, San Juan Co. Utah 25 Aug. 1977. Larva swept from M. sativa (S) reared to adult Canon City, Fremont Co. Colo. 30 July 1985. 2 larvae swept from M. sativa (S)(1 reared to adult, 1 died) Cherry Creek Reservoir, Arapahoe Co. Colo. 13 Aug. 1985. C. philodice is common in alfalfa fields in Colo., Utah, and Nev. Oviposition Melilotus alba Desr. (G) 21 mi. S Alpine, Texas, 20 Sept. 1970. Oviposition Thermopsis divaricarpa Nels. (S) Green Mtn., Jefferson Co. Colo. 30 June 1972. Oviposition 10:45 on top of Trifolium repens (S) leaf jct. hwy. 76 and 120th St., Adams Co. Colo. 8 Sept. 1984. Oviposition Trifolium sp. (S) Ophir Creek, Custer Co. Colo. 6 July 1973. Oviposition Astragalus miser Dougl. ex Hook. (W) Saguache Park 11000', Saguache Co. Colo. 24 June 1971. Oviposition Astragalus adsurgens Pallas (W) 2 mi. NE Rosita, Custer Co. Colo. July 1970. Oviposition 15:25 on top of A. adsurgens var. robustior (S) leaf Filius Park, Jefferson Co. Colo. 3 Aug. 1984. Oviposition 11:30 on side of leaflet of Astragalus flexuosus (S) Green Mtn., Jefferson Co. Colo. 16 July 1984. Oviposition 12:09 on top of A. flexuosus (S) leaf Tinytown, Jefferson Co. Colo. 21 July 1984. Oviposition 11:30 on top of leaf of A. flexuosus (S) Falcon County Park, Jefferson Co. Colo. 28 July 1984. Oviposition 10:56 on top of leaflet of A. flexuosus (S) Corwina Park, Jefferson Co. Colo. 27 Aug. 1984. Oviposition 13:00 on top of A. flexuosus (S) leaf (and 7 eggs of C. philodice or C. eurytheme found on other flexuosus plants) Green Mtn., Jefferson Co. Colo. 14 Sept. 1985. Oviposition 11:40 on very young A. flexuosus (S) leaf, and oviposition 11:44 on top of young A. flexuosus (S) leaf, Green Mtn. 19 Sept. 1985. Oviposition 12:30 on Hedysarum

boreale Nutt. (W) leaf bluff E Hayden, Routt Co. Colo. 27 May 1978. Evidently there is no difference in host specificity between C. philodice and C. eurytheme in Colo. Two larvae reared to the pupal and adult stage had a wide lateral yellow band (containing rose dashes) on larva and pupa, but the subdorsal yellow band found on C. eurytheme larvae & pupae was absent, or thin and faint.

C. alexandra Edw. Two eggs laid 9:52 in middle of leaves of Thermopsis divaricarpa (S) Green Mtn., Jefferson Co. Colo. 16-17 Aug. 1972. Oviposition 14:30 under leaf of T. divaricarpa (S) Red Rocks, Jefferson Co. Colo. 12 July 1980. Preoviposition seen and 3 eggs found on leaves (2 on upperside, 1 underside) of T. divaricarpa (S) Tinytown, Jefferson Co. Colo. 20 July 1984. Oviposition 10:32 on underside of leaf of T. divaricarpa (S) O'Fallon Park, Jefferson Co. Colo. 13 Aug. 1984. Oviposition 10:41 under leaf of T. divaricarpa (S) Corwina Park, Jefferson Co. Colo. 17 Aug. 1984. Preoviposition T. divaricarpa (S) Green Mtn., Jefferson Co. Colo. 8 June 1985. Preoviposition 10:10 T. divaricarpa NE Mt. Judge, Clear Creek Co. Colo. 8 Aug. 1985. Oviposition 10:33 on leaf upperside of Astragalus adsurgens var. robustior (W) Shingle Creek, Jefferson Co. Colo. 23 July 1984. Oviposition Astragalus alpinus L. (W) Keystone Gulch, Summit Co. Colo. 6 Aug. 1977. Thermopsis is evidently the preferred host in the Colo. Front Range.

C. occidentalis Scud. Adults assoc. with Lotus crassifolius (Benth.) Greene (M) 1 mi. E Cedar Cgd., Colusa Co. Calif. 8 July 1974.

C. scudderii Reak. Oviposition 9:30 on small 4 cm juvenile Salix (S) sp. plant (evidently immatures of the very common .5 m tall shrub Salix in valley bottoms there) Loveland Pass, Summit Co. Colo. 17 July 1977. Preovipositions 14:00 around juvenile plants of the common .5 m tall bog Salix (S), Loveland Pass, Summit Co. Colo. 27 July 1978. C. s. scudderii in Colo. and C. s. harroweri Klots in the Wind River Mts. Wyo. are both associated with .5 m tall shrub willows in open valley bottoms, and there is little if any difference between them ecologically; both can fly fast at times, though harroweri probably averages slower in speed.

C. pelidne Bdv. & LeC. Oviposition Vaccinium sp. with 5 mm wide leaves (probably cespitosum Michx.) (S) Round Lake, Wind River Mts., Wyo. 9 Aug. 1980. Adults often fly through fairly open forest (unusual in Colias) where this host grows.

Nymphalidae

Danaus plexippus (L.). 4 larvae under Asclepias speciosa To. leaves (S) Morrison, Jefferson Co. Colo. 13 July 1985. Oviposition on Asclepias incarnata L. (S) Wheatridge, Jefferson Co. Colo. 27 July 1973. Larva on leaf of A. incarnata (S) Vineland, Pueblo Co. Colo. 4 Aug. 1983. Larvae on Asclepias subverticillata (Gray) Vail (S) Crystal Creek near Black Canyon, Montrose Co. Colo. 30 July 1972. Adults assoc. with A. subverticillata (W) 6 mi. S Pagosa Springs, Archuleta Co. Colo. 28 Aug. 1977.

Lethe eurydice fumosa Leussler. Females were watched, and all monocotyledons near the eggs laid were identified and their abundance noted. Oviposition 10:45 three eggs in a row under leaf of Agrostis gigantea Roth. (W) (this was the commonest plant near egg, but Poa palustris L. (W) was also fairly common, one Festuca pratensis Huds. (W) plant was within 1-2 m, and a few plants of Carex lanuginosa Michx (W) and Scirpus pallidus (Britt.) Fern. (W) were within 1/3 m); oviposition 10:55 3 eggs in cluster under Polygonum sp. leaf (A. gigantea (W) was commonest near eggs, Carex praegracilis Boott. (W) was uncommon nearby, and C. lanuginosa (W) was rare nearby; oviposition 11:03 1 egg under A. gigantea (W) leaf (A. gigantea was the commonest plant near eggs, and C. praegracilis (W) and the grass Elytrigia repens (W) were uncommon near eggs); oviposition 11:20 3 eggs in row under A. gigantea (W) leaf (A. gigantea was the commonest plant near eggs, and Bromopsis inermis (Leyss) Holub (W) was uncommon 30 cm from eggs); oviposition 12:02 2 eggs under A. gigantea (W) leaf (A. gigantea was common near eggs, but Poa palustris (W) was about equally common, and C. lanuginosa (W) was uncommon near eggs); oviposition 12:10 one egg under A. gigantea (W) leaf (A. gigantea was

common near egg, Poa agassizensis Boivin & D. Love (W) was less common in the understory near egg; oviposition 12:33 3 eggs within 4 mm of each other under Lycopus americanus Muehl. (Labiatae; S) leaf (A. gigantea (W) was the commonest monocotyledon near eggs, but Eleocharis palustris (W) was common in understory near eggs, a Carex nebraskensis Dewey (W) plant grew every 15-20 cm, and one clump of Juncus dudleyi Wieg. (W) was 30 cm away from eggs), all Fort Collins park, 8 July 1985. Paul Opler (pers. comm.) observed oviposition beneath a Thalictrum leaf. At two other sites, grasses were also common, and sedges found were Carex sp. probably aquatilis or emoryi Dewey (W) at Fort Collins school, Larimer Co. Colo. 2 July 1985, and Carex sp. (no perigynia but resembles aquatilis, S) at Fort Collins meadow 2 July 1985. Assoc. with Carex sp. possibly aquatilis Wahlenb. (W) NE Alden, Freeborn Co. Minn. 23-28 June 1985. When ovipositing, the female flutters slowly (with few wingbeats/sec., but hovering somewhat) before landing (other butterfly species hover more obviously before landing quickly) and bending the abdomen down and forward under a leaf; an average of 2.3 eggs are laid on each plant chosen. The eggs are fragile, and if the plant is picked the leaf dries and the eggs are distorted and die (eggs of other butterflies usually survive this). It is tempting to assume that the grass Agrostis gigantea is the main host in Colo., because it is the most common oviposition site and the most common monocotyledon near the eggs; however L. eurydice larvae elsewhere are known to eat only sedges (except for one colony near Ithaca N.Y. that also eats grass), and Steven Spomer (pers. comm.) has reared Neb. and Iowa L. e. fumosa larvae in the lab on "nutsedge" (interestingly, his Iowa larvae appeared intermediate in head color pattern between Lethe eurydice and Lethe appalachia). Minn. and Neb. fumosa are assoc. with sedges, typically the sedge zone surrounding the cattails and below the grassy edge of nearly-filled-in old lakes. Fort Collins meadow adults occurred next to sedges along sloughs through the grassy meadow, but Fort Collins school and park adults occurred in semi-shaded grassy/sedgy areas among cottonwood/willow and other trees at filled-in meanders next to creeks. Adults seem to fly slightly more readily in Colo. than in Minn. and Neb., although in all areas fumosa is a very local butterfly and adults seldom fly more than 3-6 m before landing, and spend at least 80% of their time resting (behavior characteristic of very local butterflies such as Boloria improba acrocnema and Erebia theano). Adults often fly through brush and through tree branches, and frequently land 20 cm or so into the plant canopy, often in the shade. Six adults were found resting on the low leaves of an elm tree at midday. To locate females, males seem to occasionally patrol weakly all day, about 20 cm above ground (or just above the plant canopy), and soon rest again; P. Opler has observed resting males dart out at passing butterflies (perching behavior) but I observed only intermittent patrolling. In courtship of mated rejecting females, the female lands and closes her wings (and often swings down to hang from a leaf if the male persists), and the male often flaps his wings with wide amplitude beside and below her perch, and when he lands he flutters his wings with lesser amplitude (perhaps 10-60 degrees above horizontal, 3-7 times/sec.) while butting her with his head, and then curving his abdomen to attempt to join. Adults bask dorsally, and in warm temperatures turn parallel to the sun to avoid overheating. Adults were observed feeding on mud and on dung, but not on flowers. Ssp. fumosa adults in SW Minn., Neb., and Colo. show the same continuous individual variation in color, the palest adults forming 5-10% of the population in all three states: males are usually dark brown, the extremes light brown, whereas females are usually brown, the extremes tan (in L. e. eurydice, adults are less variable and average paler). Fw length averages longer in Colo.: it is 24.6 mm male & 26.4 mm female in Minn., 24.9 mm male & 26.7 mm female in SW Neb., 25.8 mm male & 27.9 mm female in Colo.

Cyllopsis pertepida dorothea (Nab.). Larvae (obtained from eggs laid in the lab by females from Tinytown, Jefferson Co. Colo. 30 July 1978) eat Poa pratensis in lab; larvae hibernate half grown.

Cercyonis pegala (Fab.). Oviposition 10:30 on edge of dead blade of Festuca arundinacea Screb. (W) Wheatridge, Jefferson Co. Colo. 7

Aug. 1984. Oviposition 13:02, female landed on rose leaf beneath shrub, and dropped an egg from abdomen, which fell and stuck to pine needle in litter, most grass plants within .3 m were Andropogon scoparius (W) but a few Poa agassizensis B. & D.L. (W) plants were within .3 m of egg, Genesee Mtn., Jefferson Co. Colo. 8 Aug. 1984. Oviposition 12:36 on leaf of Carex praegracilis Boott (W) (egg was extruded and dropped from above and stuck to leaf) Lakewood, Jefferson Co. Colo. 7 Aug. 1984. Females no doubt oviposit haphazardly on or near numerous grasses, though they may prefer fairly broad-blade green grasses to narrow-blade and dry ones. Diapause of adult female pegala has been reported, but is doubtful, and does not occur in Colo., where my latest records are Sept. 7 for males and Sept. 13 for females, though the sex ratio after Aug. 15 is about 20% males; there may be a preoviposition period of a few days during which females do not oviposit.

C. oetus (Bdv.). Oviposition 11:39 on dead grass blade below canopy of Ceanothus fendleri Gray (S) prostrate shrub, the only grass there was Poa agassizensis (W), Genesee Mtn., Jefferson Co. Colo. 8 Aug. 1984. Oviposition 11:33 under dead grass blade in litter among Eriogonum umbellatum (S), the only grass present (common) was P. agassizensis (W), oviposition 12:57 under pine needle in litter near Solidago, Astragalus, and the grass Koeleria macrantha (Ledeb.) Schult. (W)(3 or more other grass species were within 1 m, and the oviposition was quick so the female doubtfully knew which grasses were near), both Corwina Park, Jefferson Co. Colo. 27 Aug. 1984. Females no doubt oviposit haphazardly on numerous grasses, and oetus occurs in drier habitats than C. pegala so some narrow-leaf grasses may be eaten. Female Cercyonis hop-flutter when they search for a place to oviposit, and the flight is only slightly more fluttering than the normal hopping flight, in contrast to non-Satyrinae (and skippers) in which the oviposition flight is much more fluttering.

C. meadii (Edw.). Adults associated with Bouteloua gracilis (H.B.K.) Lag. (S) in San Luis Valley, Colo., which is surely its larval hostplant there.

Neominois ridingsii (Edw.). Six ovipositions on Bouteloua gracilis (S), one oviposition on Koeleria cristata (L.) Pers. (B), one oviposition on Artemisia frigida, one oviposition on a dead twig while sitting on A. frigida, all 1 mi. up Bear Creek, Chaffee Co. Colo. June 1969, June 1970. The main larval host at Bear Creek is undoubtedly B. gracilis which forms the main ground cover there. One oviposition on Sitanion hystrix (Nutt.) J. G. Smith (B) Round Mtn., Custer Co. Colo. June 1970. One oviposition on Stipa comata Trin. & Rupr. (B), and one oviposition on top of a Helianthus pumilus Nutt. (G) shrub, both Bull Domingo Mine, Custer Co. Colo. June 1970. One oviposition on top of Gutierrezia sarothrae (Pursh) Britt. & Rusby (G) shrub Ben West Hill, Custer Co. Colo. June 1970. Females oviposit on either green or dead vegetation, either a shrub or herb or grass, wherever the female happens to be during warm parts of the day (ovipositions 9:16, 9:16, 9:33, 10:05, 10:08, 10:13, 10:21, 12:21, 12:31, 12:32). Females most often oviposit on grasses, but in hot weather females move to the top of shrubs to escape the heat, where they oviposit. The hesitant oviposition flight is not as noticeable as in other butterflies such as skippers. Scott (1973a) reports ecology, behavior, and movements. Adults are biennial in the Hudsonian Zone of Calif., but seem to be annual in Colo.

Erebia callias Edw. Oviposition 9:58 on dead grass blade next to Agropyron scribneri Vasey (W), oviposition 9:05 on dead grass blade next to Poa glauca Vahl. (W), oviposition 8:59 on dead grass blade next to Poa sp. (W) and Carex rupestris All. ssp. drummondiana (Dewey) Holub (W), all Loveland Pass, Clear Creek Co. Colo. 27 July 1978. Females oviposit rather haphazardly among grasslike clumps, placing each egg beneath a dead blade. Adult association is therefore important for determining probable larval foods: the sedge Kobresia myosuroides (Vill.) Fiori & Paol (W) is the main and often the only plant where adults are common, at Loveland Pass, Summit Co. Colo. 19 July 1977 and 27 July 1978, at NE Gray's Peak, Clear Creek Co. Colo. 4 Aug. 1984, at Houghton Mtn., San Juan Co. Colo. 22 July 1980, and at Uncompahgre Peak, Hinsdale Co. Colo. 3 Aug. 1979. K. myosuroides is the dominant plant of climax tundra, and forms dense

swards on top of thick-soiled gentle knolls and flats where E. callias is common. Probably biennial, but flying every year.

E. theano (Taus.). Oviposition 8:55 on dead grass leaf within 10 cm of Carex foenea Willd. (W) and Poa nemoralis L. ssp. interior (Rydb.) B. & A. (W), oviposition 11:29 on dead leaf within 10 cm of C. foenea (W) and Festuca brachyphylla Schult. (W), oviposition 13:15 on dead twig within 10 cm of C. foenea (W), P. nemoralis (W), and Agropyron trachycaulum (Link) Malte (W), oviposition 12:27 on dead leaf within 10 cm of Luzula parviflora (Ehrh.) Desv. (W) and C. foenea (W), all on a N-facing slope logged about 30 years previously on Rollins Pass Road, 11000', Gilpin Co. Colo. 5 Aug. 1978 (C. foenea, P. nemoralis, & A. trachycaulum were the commonest monocotyledons at this site, where logging had created its grassy habitat). Adults associated with Calamagrostis canadensis (Michx.) P. Beauv. (W) and another coarser grass at Weminuche Pass vicinity, Hinsdale Co. Colo. 31 July 1972. The preferred habitat is long grass/sedge, which logging can provide; certainly the habitats should not be allowed to be destroyed by the overgrowth of trees, so logging (even clear-cutting) or fire should be practiced. E. theano is biennial in Colo., occurring mainly on even years as adults (except for one odd-year colony in the San Juan Mts.) and hibernating as a larva (larvae eat Poa pratensis L. (S) in the lab).

E. magdalena Strk. Oviposition 12:28 on side of rock near Luzula spicata (L.) DC. (W) on a slope above a rockslide at Loveland Pass, Summit Co. Colo. 27 July 1978 (three Carex species and Kobresia myosuroides (W) were also found at this site). Females fly for short periods and usually land on rocks, and several possible ovipositions on rocks were seen before I learned to search the rocks for eggs after females departed. The newly hatched larvae evidently drop off of or crawl away from the rocks to find food, and are doubtfully restricted to a single host. Michael Young found that larvae eat Poa pratensis in the lab, and larvae hibernate.

Anaea andria Scud. 17 larvae in rolled/tied leaves of large (30 cm) plants of Croton texensis (Klotsch) Muell.-Arg. (S) reared to adults SE Canon City, Fremont Co. Colo. 1 Aug. 1973. Oviposition C. texensis (S) Cottonwood Creek, Baca Co. Colo. 3 July 1973. Freshly emerged adult assoc. many C. texensis plants Barr Lake, Adams Co. Colo. 17 Aug. 1985.

Asterocampa celtis (Bdv. & LeC.). Ovipositions 12:45 on leaf, 13:20 on twig, 13:20 on berry, of Celtis reticulata Torr. (S) Rockvale, Fremont Co. Colo. 23 July 1972; the resulting larvae would not eat Ulmus pumila (S) in the lab. 3 larvae (stages 3-5) and pupal shell (shell attached by the cremaster to one end of a long silk mat that the shell is appressed to for its entire length beneath leaf) found beneath leaves of C. reticulata (S) Falcon County Park, Jefferson Co. Colo. 14 July 1984. 2nd stage larva found beneath leaf of C. reticulata (S) Falcon County Park 28 July 1984. Larva under leaf near tip of branch of Celtis occidentalis (S) Columbia, Missouri 13 July 1977.

Limenitis archippus (Cramer). Oviposition 11:27 on top of leaf tip of Salix exigua (or possibly S. interior Rowl., as these two plants cannot be distinguished)(W) Box Elder Creek, Arapahoe Co. Colo. 11 Aug. 1984. Salix exigua (SG) must be the hostplant in Weld, Pueblo, Fremont, and Saguache Cos. Colo. as it is the only willow or poplar growing in most localities. Unaccountably very rare in the Denver suburbs (never found in the western suburbs), though common along streams SE, E, and NE of Denver.

L. weidemeyerii Edw. Oviposition 12:10 on leaf tip Amelanchier alnifolia Nutt. (S) NW Hayden, Routt Co. Colo. 10 July 1972. Oviposition 10:37 on top of leaf tip of A. alnifolia (S), ovipositions 9:42 and 10:59 on top of leaf tip of Populus angustifolia (S), oviposition 10:45 on top of leaf tip of Salix lutea Nutt. (S), all Cherry Gulch, Jefferson Co. Colo. 17 July 1984. Oviposition 11:03 on leaf tip of juvenile Salix sp. (S) plant with reniform stipules, Red Rocks, Jefferson Co. Colo. 16 July 1973. Oviposition 9:50 on leaf tip of Salix exigua (W) Golden Gate Can., Jefferson Co. Colo. 8 July 1978. Oviposition 9:45 on leaf tip of Prunus virginiana var. melanocarpa (S) Red Rocks, Jefferson Co. Colo. 25 June 1978. Oviposition 11:35 on top of leaf tip of P. v. var.

melanocarpa (S) Red Rocks, Jefferson Co. Colo. 7 July 1978. Oviposition 10:37 on top of leaf tip of P. v. var. melanocarpa (S) Falcon County Park, Jefferson Co. Colo. 28 July 1984. Larva on leaf of P. v. var. melanocarpa (S) S of Franktown, Douglas Co. Colo. 18 May 1985 Glenn R. Scott. Oviposition 10:05 on leaf tip of Holodiscus dumosus (S) Mt. Zion, Jefferson Co. Colo. 17 June 1981. Evidently polyphagous on various deciduous shrubs and trees. The female always lands on top of a leaf, and while the leaf sags under her weight her body becomes nearly vertical as she lays an egg on top of the leaf tip.

Precis coenia (Hubn.). 47 ovipositions at 9:54, 10:18, 10:21, 10:50, 10:55, 10:58, 11:03, 11:09, 11:17, 11:33, 11:48, 12:30, 12:31, 12:48, 12:52, 13:08, 13:34, 13:52, 14:31, and 14:52, usually laid under leaf petioles of small plants without inflorescences (but eggs were laid on plants with 4 and 7 inflorescences), often laid on the fuzzy new leaf buds at the plant center or on twigs or other debris near the plant center, and about 50 larvae found near or eating Plantago lanceolata L. (S) Point Richmond, Contra Costa Co. Calif. 1969, 1970, 1971, many raised in lab on P. lanceolata and on Plantago major L. (S). Oviposition is rapid; one female in nature laid 25 eggs in less than an hour, and the maximum in the lab was 166 in a day; oviposition starts at about age 3 days and continues til day 22 at least in the lab, peaking at age 5-18. Individual females laid from 497-962 eggs in the lab (average 647, N=7). The hibernating stage is controversial (evidently no stage survives hard freezes), but at this mild-winter coastal site larvae were found in winter near the hostplants. Scott (1975d) reports ecology and movements.

Vanessa atalanta (L.). Larvae on Urtica dioica gracilis (Ait.) Sel. (S) SE Wetterhorn Peak, Hinsdale Co. Colo. 19 Aug. 1979. Four larvae in rolled leaves of U. d. gracilis (S) Tinytown, Jefferson Co. Colo. 31 July 1978. Larvae on U. d. gracilis (W) Sapello Can., San Miguel Co. New Mex. 23 Aug. 1978. Larva on U. d. gracilis (S) Mother Cabrini Shrine, Jefferson Co. Colo. 8 Aug. 1978. Oviposition 10:00 on leaf petiole of Rubus idaeus melanolasius (Dieck) Focke (S) next to U. d. gracilis (S), and two larvae on gracilis, Tinytown, Jefferson Co. Colo. 30 July 1978. Oviposition U. d. gracilis (S) Horse Creek, Elbert Co. Colo. 3 July 1978. Larva U. d. gracilis (S) Mother Cabrini Shrine, Jefferson Co. Colo. 9 July 1977. Mature larva in leaf nest of U. d. gracilis (S) Cherry Gulch, Jefferson Co. Colo. 7 July 1984. 1 mature larva eating top of plant, 1 larva in leaf nest (folded together above larva) with parasitoid pupa beside it, both on U. d. gracilis (S) NW Big Turkey Cgd., Douglas Co. Colo. 26 Aug. 1985. 2nd stage larva in leaf nest (leaf folded up around larva) on U. dioica (S) Walnut L. Wildlife Area, Faribault Co. Minn. 23 June 1985. 2nd stage larva in leaf nest (leaf folded up around larva) on U. dioica (S) NE Alden, Freeborn Co. Minn. 23 June 1985. Larvae live in a silk nest on top of leaf, the leaf drawn together above the larva, and older larvae chew partway through the petiole so the leaf droops.

V. cardui (L.). Larva on Cirsium centaureae (Rydb.) K. Schum. (W) Tinytown, Jefferson Co. Colo. 30 July 1978. Larvae on Cirsium hesperium (Eastw.) Rydb. (S) and Cirsium scopulorum (Greene) Cockerell (S) SE Wetterhorn Peak, Hinsdale Co. Colo. 19 Aug. 1979. Larva reared Cirsium sp. (S) Echo Park, Dinosaur Nat. Mon., Moffat Co. Colo. 11 June 1973. Larva on Cirsium sp. (W) Rociada, San Miguel Co. New Mex. 23 Aug. 1978. Oviposition 11:15 Cirsium arvense (S) Timnath, Larimer Co. Colo. 28 Aug. 1973. Larva reared C. arvense (S) Echo Park, Moffat Co. Colo. 11 June 1973. Larvae on C. arvense (S) Tinytown, Jefferson Co. Colo. 29 July 1978 & 30 July 1978. Larvae on C. arvense (S) and Cirsium vulgare (S) Rocky Flats, Jefferson Co. Colo. 24 July 1978. Oviposition C. vulgare (S) leaf and old eggshells found, Golden Gate Can., Jefferson Co. Colo. 22 Aug. 1983. Larvae on C. vulgare (S) Tinytown, Jefferson Co. Colo. 31 July 1978. Oviposition 11:47 and larva on C. vulgare (S) Chimney Gulch, Jefferson Co. Colo. 28 June 1978. Many larvae reared from C. vulgare (G) Bear Creek, Chaffee Co. Colo. 9 June 1970. Larva in silk web nest on top of Cirsium ochrocentrum Gray (S) leaf Green Mtn., Jefferson Co. Colo. 19 June 1985. Larvae feeding on Cirsium undulatum (Nutt.) Spreng (S) Red Rocks, Jefferson Co. Colo. 30 June

1973. Larvae on C. undulatum (F) Central Plains Experimental Range, Weld Co. Colo. June 1976. Oviposition 9:30 on C. undulatum (S) Horsetooth Res., Larimer Co. Colo. 8 May 1977. Oviposition 11:37 on C. undulatum (W) Chimney Gulch, Jefferson Co. Colo. 28 June 1978. Larva on C. undulatum (W) Tinytown, Jefferson Co. Colo. 30 July 1978. Larva on C. undulatum (S) leaf Tinytown, Jefferson Co. Colo. 2 July 1980. Oviposition 12:10 C. undulatum (S), oviposition 1:15 on Anaphalis margaritacea (S), and 3 eggs laid 12:05 on Artemisia frigida Willd. (S), all Russel Ridge, Douglas Co. Colo. 3 June 1973. Oviposition on Cirsium sp. (S) and oviposition on A. margaritacea (L.) B. & H. (S) Lookout Mtn.,Jefferson Co. Colo. 16 May 1973. Oviposition 4 eggs 12:10 on A. margaritacea (S) Jarre Can., Douglas Co. Colo. 6 June 1973. Larvae live inside a silk web on top of leaves, generally where the thistle leaf curls upward naturally. Adults survive only fairly mild winters in Colo. (perhaps one out of two winters).

V. carye annabella (Field). Larva inside silk web on top of Malva sp. (S) leaf Berkeley, Contra Costa Co. Calif. 23 Feb. 1970. 4th instar inside silk web covering top of Malva neglecta (S) leaf (larva died because of an ant which was dragging larva partly out of the silk web) Cherry Creek Reservoir, Arapahoe Co. Colo. 13 Aug. 1985. Rare in Colo., but evidently a native.

V. virginiensis (Drury). Larvae on Artemisia ludoviciana Nutt. (W) Tinytown, Jefferson Co. Colo. 29 July 1978. Larvae live inside a nest of leaves webbed together with silk.

Polygonia interrogationis (Fab.). Larva on Ulmus americana L. (S) Columbia, Missouri 13 July 1977.

P. satyrus (Edw.). Larva under leaf of Urtica dioica gracilis (S) Tinytown, Jefferson Co. Colo. 31 July 1978. Many eggs (in clusters of 3-5) and larvae found beneath U. d. gracilis (S) leaves, tiny larvae rest on the leaf underside without a nest and eat holes in it, older (stage 4-5) larvae rest in a leaf nest made by eating the leaf on both sides of the base then silking the leaf edges together below the leaf, and they eat the leaf from the edge, Mt. Vernon Historic Site, Jefferson Co. Colo. 5 June 1984. Two flights occur in Colo. at least in the lower mountains and plains (perhaps just one in the higher mountains).

P. progne oreas (Edw.). Larvae found under leaves of Ribes sp. not divaricatum (S) (plants with spiny fruits and stems) reared to adult Duncan's Mills, Sonoma Co. Calif. 1 June 1974.

P. progne nigrozephyrus Scott. Adults associated with Ribes inerme Rydb. (S) NE of Cedaredge, Delta Co. Colo. 13-14, 21-22 May 1984, females laid eggs on inerme in sleeves on wild plants and in the lab, and many larvae reared to adults on inerme. Adults associated with R. inerme (S) Pine Creek, Douglas Co. Colo. 24 May 1984. Adults associated with Ribes leptanthum A. Gray (S) Williams Can., El Paso Co. Colo. 16 May 1984. Adults visit and feed on artificial rotten fruit-sugar-alcohol bait. Apparently one flight in Colo., L July overwintering to May, though some E July adults occur in the foothills. Scott (1984) lists the known facts on this ssp., and Scott (mss.) will report the complete life history and compare it with other Polygonia.

P. gracilis zephyrus (Edw.). Oviposition on Ribes cereum Dougl. (S) petiole 11:12 Genesee Mtn., Jefferson Co. Colo. 22 May 1980. Larva under leaf of R. cereum (W) Tinytown, Jefferson Co. Colo. 31 July 1978. Larva found under Ribes inerme (S) leaf reared to adult 3 mi. W Idledale, Jefferson Co. Colo. 12 June 1984. Egg found on R. inerme (S) leaf reared to mature larva and pickled Tinytown, Jefferson Co. Colo. 2 June 1984. Two flights L June-E Aug. and Sep. overwintering to May in the Colo. foothills; in the higher mountains there seems to be one flight L July overwintering to M June, and the adults often fly a thousand feet higher in the mountains after emergence to feed on flowers as in Nymphalis milberti (adults were common in the alpine zone of Mt. Evans, Clear Creek Co. Colo. 3 Aug. 1984, where they fed on flowers and the hostplants were absent, although Ribes was not far away below timberline). P. g. zephyrus makes less of an altitudinal migration than N. milberti, and the other Polygonia, Nymphalis, and Vanessa evidently make no altitudinal migrations.

P. faunus hylas (Edw.). Ovipositions 12:40 & 13:04, and 15 other eggs found, all on healthy twigs of Salix sp. (S) shrubs (2 m tall) with leaves just emerging, the plants growing along a small creek, Russel Ridge, Douglas Co. Colo. 3 June 1973. About 5 eggs found on Ribes inerme (S) leaves (one reared to adult) Tinytown, Jefferson Co. Colo. 26 May 1984. One flight L July overwintering to May.

Nymphalis antiopa (L.). Larvae on Salix exigua Nutt. (S) at Mirage, Saguache Co. Colo. 9 Aug. 1970, at Lake Creek Cgd., Custer Co. Colo. 24 Aug. 1970, at Pruess Lake, Millard Co. Utah 17 June 1972, and at WNW Crestone, Saguache Co. Colo. 22 July 1971. Larvae reared Salix amygdaloides Anderss. (S) Central Plains Experimental Range, Weld Co. Colo. June 1976. 50 larvae on Salix bebbiana Sarg. (W) N fork of Clear Creek, Gilpin Co. Colo. 2 July 1978. Larvae on Ulmus pumila L. (S) at Lakewood, Jefferson Co. Colo. 1961, and at Fort Collins, Larimer Co. Colo. 27 June 1976. Larvae on Celtis reticulata (S) leaves found by Steven Cary, Ute Lake State Park, Quay Co. New Mex. 14 May 1985. Diseased dead (probably sprayed) half-grown (thus having fed for some time) larvae found on planted Celtis occidentalis L. (S) Northern Nursery Co., Denver, Colorado, 29 June 1973. The number of flights is controversial. Undoubtedly only one flight occurs in the higher mountains, as in Europe (Roer 1970), but in the foothills and plains two flights seem to occur, because fresh adults appear L June-M July, and in 1984 these fresh adults were observed chasing each other in mate-locating behavior (hibernating flights generally show mate-locating behavior only in spring). The larvae found 24 Aug. and 22 July represent offspring perhaps of the midsummer flight, or perhaps of very late hibernators because the localities are higher than the foothills. If only one flight occurs in the foothills, then the adults must diapause in Aug.-E Sept., then reappear in L Sept.-Oct. and feed on flowers before hibernating.

N. californica (Bdv.). 70 half grown to mature larvae on Ceanothus fendleri (S), 17 & 23 June 1980, and egg cluster of 80 eggs under leaf 11 July 1980, all Apex County Park, Jefferson Co. Colo. Two larvae on C. fendleri (S) Ralston Butte, Jefferson Co. Colo. 20 June 1980. Larvae of N. antiopa & N. californica do not make silk nests. There is evidently only one yearly flight in Colo., July overwintering to May, because the summer adults feed on mud etc. but do not show mate-locating behavior (hilltopping in this species) which the spring adults do display.

N. milberti (God.). Larvae on Urtica dioica gracilis (S) at Lakewood, Jefferson Co. Colo. 8 July 1971, at Texas Creek, Fremont Co. Colo. 21 July 1971, at Hillside, Custer Co. Colo. 16 July 1971, at Foxton, Jefferson Co. Colo. 27 May 1977, at Summit 7910, Iron Co. Utah 6 June 1970, at Tinytown, Jefferson Co. Colo. 31 July 1978, at N fork Clear Creek, Gilpin Co. Colo. 30 June 1980, and at Crawford Hill, Jefferson Co. Colo. 18 June 1980. Egg masses (each about 100 eggs in a loose pile) and gregarious larvae on leaves of U. d. gracilis (S), the older larvae rest on top of a leaf whose edges curl upward and together, Mt. Vernon Historic Site, Jefferson Co. Colo. 5 June-7 July 1984. Cluster of 1st stage larvae on leaf of U. d. gracilis (S) SE Golden Gate Can. State Park, Gilpin Co. Colo. 17 June 1984. Many larvae on U. d. gracilis (S) Apex Gulch, Jefferson Co. Colo. 21 June 1984. Many larvae on U. d. gracilis (S) Cherry Gulch, Jefferson Co. Colo. 7 July 1984. Many larvae (10 on top of leaf with leaf curled above larva, 1 beneath leaf with the leaf curled below larva) on U. d. gracilis (S) Tinytown, Jefferson Co. Colo. 15 July 1984. Many larvae on U. d. gracilis (S) Tinytown, Jefferson Co. Colo. 20 July 1984. Three clusters of 4th-5th stage larvae on tops of U. d. gracilis (S) (4 larvae were inside a drooping, base-clipped leaf nest, which probably had been made and abandoned by a Vanessa atalanta larva) Green Mtn., Jefferson Co. Colo. 7-8 June 1985. Larva on U. d. gracilis (S) Mother Cabrini Shrine, Jefferson Co. Colo. 18 June 1985. 20 2nd stage larvae on U. d. gracilis (S) NE Mt. Judge 9100', Clear Creek Co. Colo. 8 Aug. 1985. There is evidently only one yearly flight in Colo. The overwintering adults mate and lay eggs in spring, then the larvae are common on the hosts in June-M July, and adults emerge in L June-July, when they seem to migrate high in the mountains to feed on flowers in L July-Aug. (adults are common on flowers in the alpine zone throughout the state, where the host does not grow), then in Sep. they evidently return to the lower

mountains to hibernate. The absence of Aug. larvae, and the abundance of adults in the alpine zone where the host is absent, seem to prove this altitudinal migration. Further proof: the closely related Nymphalis urticae L. (Yamamoto 1976) and Inachis io L. (Hasegawa 1975) also make altitudinal migrations in Japan.

Euphydryas chalcedona (Dbldy.). Larvae on Castilleja sp. (S) Grizzly Flat, El Dorado Co. Calif. 24 March 1974. Many larvae on Castilleja foliolosa H. & A. (H), some larvae on Castilleja martinii Abrams (H), Monticello Dam, Yolo Co. Calif. 16-17 March 1974. Larvae on Scrophularia californica Cham. & Schl. (S) and Castilleja sp. bracts (S) Alum Rock Park, Santa Clara Co. Calif. 6 March 1970. Larvae on top of leaves of S. californica (S) Tilden Park, Contra Costa Co. Calif. 21 March 1970 J. Scott and P. Opler. Larvae feeding on S. californica (M), Foote Crossing, Nevada Co. Calif. 12 May 1974. Two mature larvae feeding on Orobanche fasciculata var. franciscana Achey (S), and some other larvae feeding on S. californica, Castilleja (green-leaved sp.), and Mimulus sp. (all S) 5.4 mi. SW Allegheny, Blue Ravine, Sierra Co. Calif. 12 May 1974 J. Scott & Ralph Wells. Larva feeding on Penstemon antirrhinoides Benth. (S) Chili Bar, Placer Co. Calif. 14 April 1974, and at Jerseydale, Mariposa Co. Calif. 20 April 1974. Larvae hibernate.

E. chalcedona anicia (Dbldy.). A larva on bracts of Castilleja integra Gray (G) raised to adult NE Rosita, Custer Co. Colo. June 1970. Larva on bracts of Castilleja chromosa (S) SW Pulpit Rock, Montezuma Co. Colo. 9 May 1983. 40 larvae in silk web on Penstemon virgatus asagrayi Crosswhite (S) Apex Gulch, Jefferson Co. Colo. 13 Aug. 1978. Larvae inside silk web covering nearly-defoliated plants like a nylon stocking on P. v. asagrayi (W) Idledale, Jefferson Co. Colo. 8 Aug. 1978. Three clusters of eggs and larvae on P. v. asagrayi (W) Tinytown, 10 Aug. 1978. Two egg clusters on P. v. asagrayi (S) Golden Gate Can., Jefferson Co. Colo. 3 July 1980. 20 eggs found under leaf of P. v. asagrayi (S) Tinytown, Jefferson Co. Colo. 21 July 1984. Two silk nests containing 2nd stage larvae on Penstemon alpinus Torr. (W) Tinytown, Jefferson Co. Colo. 29 July 1978. Seven egg clusters under leaves of P. alpinus (S) Tinytown, Jefferson Co. Colo. 2 July 1980. One larva on Potentilla sp. (S)(no feeding damage on plant) Mt. Sherman, Park Co. Colo. 17 July 1980 (evidently just a wandering larva). About 20 larvae under rocks apparently in diapause, Uncompahgre Peak, Hinsdale Co. Colo. 18 July 1980 (the presence of adults and half-grown apparently-diapausing larvae in abundance at the same midsummer time seems to indicate that in the alpine zone many individual life cycles are biennial or longer in length).

Chlosyne gorgone (Hubn.). Many larvae on Helianthus pumilus (S) Chimney Gulch, Jefferson Co. Colo. 17 July 1978, and 10 July 1978. Larvae common on H. pumilus (S) Iron Dollar Gulch, Fremont Co. Colo. 13 July 1971, and at Fleming Mtn., Fremont Co. Colo., and at Red Rocks, Jefferson Co. Colo. 10 July 1972. Several hundred larvae beneath leaves of H. pumilus (S) Golden Gate Can., Jefferson Co. Colo. 18 July 1984. Hundreds of larvae on H. pumilus Nutt. and Helianthus petiolaris Nutt. (both S)(larvae of forms nigra and bicolor on both plants, one form rufa larva on pumilus) Green Mtn., Jefferson Co. Colo. 9 July 1980. Larvae on H. petiolaris (S) Smith Creek Cgd., Custer Co. Colo. July 1971. Many larvae on Helianthus annuus (S), few larvae on Iva xanthifolia (S), few larvae on Ambrosia trifida (S), Vineland, Pueblo Co. Colo. 4 Aug. 1983. About 50 larvae on A. trifida L. (W) Green Mtn., Jefferson Co. Colo. 10 Aug. 1978. Half grown larvae hibernate, and breaking diapause in the lab very difficult.

C. nycteis Dbldy. Many larvae under leaves of Rudbeckia laciniata L. var. ampla (Nels.) Cronq. (W) Sapello Can., San Miguel Co. New Mex. 23 Aug. 1978. Larvae and feeding damage on R. laciniata (S) Tecolote Creek, San Miguel Co. New Mex. 10 Sept. 1978. Larvae on R. laciniata (S) Raton Mesa, Colfax Co. New Mex. 24-viii-79. Larvae on R. laciniata (S) Rio Grande del Rancho, Taos Co. New Mex. 27 Aug. 1978. Larvae on R. laciniata (S) near Mora, Mora Co. New Mex. 25 Aug. 1978. Several larvae under leaves and feeding damage noted on R. laciniata (S) Spring Creek Picnic Ground, Huerfano Co. Colo. 21 Aug. 1980. 15 egg clusters under leaves of R. laciniata (S) Devils Gulch near Idledale, Jefferson Co. Colo. 11 July 1980. Oviposition

9:31 about 100 eggs under leaf of R. laciniata (S) Devils Gulch 7 July 1981. 17 clusters of larvae under leaves of R. laciniata (S) Tinytown, Jefferson Co. Colo. 26, 29, 30 July 1978. Oviposition 153 eggs in cluster under leaf, and 2 egg clusters of 134 and 95 eggs found on other leaves, all on R. laciniata (S) Tinytown, Jefferson Co. Colo. 20 July 1984. 20 egg clusters found on R. laciniata (SG) Golden Gate Can. State Park, Gilpin Co. Colo. 4 July 1977. Larvae on R. laciniata (S) Golden Gate Can.,Jefferson Co. Colo. 22 Aug. 1983. Many eggs on R. laciniata (S) N fork Clear Creek, Gilpin Co. Colo. 7 July 1977. 28 egg clusters on R. laciniata (S) NW Nederland, Boulder Co. Colo. 16 July 1977, 24 July 1977. 1st stage larvae under leaf of R. laciniata (S) Shingle Creek, Jefferson Co. Colo. 23 July 1984. Stage 1-2 larvae under leaf of R. laciniata (S) on six plants O'Fallon Park, Jefferson Co. Colo. 12, 13, 16 Aug. 1984. 5 clusters of 2nd stage larvae under R. laciniata leaves O'Fallon Park 12 Aug. 1985. 21 clusters of larvae found under leaves of R. laciniata (S) Corwina Park, Jefferson Co. Colo. 17-27 Aug. 1984. Cluster of 2nd stage larvae under R. laciniata (S) leaf Kerr Gulch, Jefferson Co. Colo. 12 Aug. 1985. Many 3rd stage larvae diapausing in dead curled leaf tip of R. laciniata (S) NW Big Turkey Cgd., Douglas Co. Colo. 26 Aug. 1985. R. laciniata var. ampla (all the above records refer to ampla) is obviously the only Colo.-N.M. host, whereas several hosts are eaten in E U.S. Half-grown larvae hibernate, and breaking diapause in the lab is very difficult.

C. whitneyi damoetas Skin. Oviposition egg cluster under leaf of Erigeron leiomeris Gray (G) Hermit Pass, Custer Co. Colo. 1 Aug. 1971. Two egg clusters found under rock beside E. leiomeris (S) and 40 diapausing larvae and 1 pupa reared to adult found near leiomeris, Loveland Pass, Summit Co. Colo. 9 Aug. 1978. Four larvae under E. leiomeris (W) Loveland Pass 25 July 1978. 11 larvae & 1 pupa under rocks near E. leiomeris (S) Loveland Pass 15 July 1980. Larva found near E. leiomeris Loveland Pass 23 July 1981. A female from Loveland Pass 20 July 1977 laid eggs in the lab, and the larvae ate E. leiomeris in lab. Adults associated with E. leiomeris (S) Schafer Gulch Road, Hinsdale Co Colo. 21 July 1980, and at Uncompahgre Peak, Hinsdale Co. Colo. 18 July 1980, and at Mt. Massive, Lake Co. Colo 1 Aug. 1982. Half-grown larvae diapause, and there are many diapausing larvae under rocks near the host even in midsummer when adults and eggs are common, indicating that many larvae take several years to mature. Some larvae probably take 1, 2, even 3 or more years to mature, and thus the life cycle should be described as multiannual. Most of the population at any given time seems to be made up of diapausing larvae, and thus the population is virtually immune to extinction, because an entire years' crop of adults can be wiped out and the population will come back the next year because some of the diapausing larvae will find hostplants and mature. Breaking diapause in the lab is very difficult even with constant light.

C. palla Bdv. A cluster of young larvae under leaf of Erigeron speciosus (Lindl.) DC. var. macranthus (Nutt.) Cronquist (W) NW Nederland, Boulder Co. Colo. 24 July 1977. Three egg clusters under leaves of E. s. var. macranthus (S) Ralston Butte, Jefferson Co. Colo. 20 June 1980, a hillside that had burned several years earlier where both hosts and adults were common. Half-grown larvae hibernate.

C. leanira leanira F. & F. Larva on Castilleja sp. (S) Jerseydale, Mariposa Co. Calif. 20 April 1974. Many larvae reared to adults on Castilleja foliolosa (H) and Castilleja martinii (H) Monticello Dam, Yolo Co. Calif. 16-17 March 1974. Larvae on Castilleja sp. (S) Del Puerto Can., 22 mi. W Patterson, Stanislaus Co. Calif. 22 May 1971. Larvae on Castilleja sp. (S) Alum Rock Park, Santa Clara Co. Calif. 6 March 1970. Larvae of all C. leanira ssp. eat the flower bracts. One yearly flight.

C. leanira alma Strk. Larvae on Castilleja chromosa A. Nels. (H) Brunswick Can., Ormsby Co. Nev. 21 April 1974. Larvae on C. chromosa (H) Red Rock Can., Kern Co. Calif. 5 May 1974. Larvae on C. chromosa (W) reared to adults W of Uravan, Dolores River, Montrose Co. Colo. 29-30 April 1978. Larva on C. chromosa reared to adult 1-2 mi. N Mesa Co. line, Dolores River, Mesa Co. Colo. 1 May 1978. One yearly flight.

C. leanira fulvia Edw. Many larvae on Castilleja integra Gray (SW) reared to adults at Pueblo, near Beulah, and E of Wetmore, all Pueblo Co. Colo. 1965-1970. A female resting on the soil at 13:30 laid one egg cluster on underside of lowermost leaf of plant base of C. integra (S), E of Wetmore, Pueblo Co. Colo. 5 July 1970. Larva on C. integra (S) Smith Creek Cgd., Custer Co. Colo. 27 July 1970. Larva on C. integra (S) reared to adult Green Mtn., Jefferson Co. Colo. 12 Aug. 1977. Larvae on C. integra (S) W of Pagosa Jct., Archuleta Co. Colo. 28 Aug. 1977. Larvae on C. integra (S) 9 mi. E of Hwy. 151 on road to Pagosa Springs, Archuleta Co. Colo. 28 Aug. 1977. 30 eggs on base of stem of C. integra (S) reared, 1 mi. S Cochiti Dam, Sandoval Co. New Mex. 9 Sept. 1977. 5 larvae on C. integra (S) bracts 18 mi. WNW Tucumcari, San Miguel Co. New Mex. 13 May 1985. Larvae on C. integra (S) bracts Caprock S of San Jon, Quay Co. New Mex. 14 May 1985. Steven Cary found larvae on C. integra Cooke's Peak, Luna Co. New Mex. 11-12 May 1985 (W). Adults assoc. Castilleja sessiliflora Pursh (W)(this must be the host here as it is apparently the only species present) S Gothenburg, Dawson Co. Neb. 30 June 1985). Adults assoc. with yellowish-flowered Castilleja in W Kans. (Steven Spomer pers. comm.), probably C. sessiliflora. Females oviposit beneath lower leaves, and stage 1-2 larvae seem to eat the lower leaves, whereas older larvae eat the red bracts where they are very conspicuous. Three yearly flights.

Poladryas minuta minuta Edw. Ten eggs in cluster on Penstemon jamesii Benth. (S; flowering plants found here 26 May 1985 det. by W) E of Abbot, 6200', Colfax Co. New Mex. 11 Sept. 1978. 25 eggs on P. jamesii (S) Taylor Springs, 6000', Colfax Co. New Mex. 11 Sept. 1978. Many eggs and larvae on Penstemon jamesii (S) Eagletail Mtn., Colfax Co. New Mex. 13-14 Sept. 1980. Cluster of 32 yellow eggs under leaf of P. jamesii (W) Eagletail Mtn. 27 May 1985. Egg cluster under leaf, and two plants with first-stage larval feeding damage, all on P. jamesii (W), 18 mi WNW Tucumcari, San Miguel Co. New Mex. 13 May 1985. Adults assoc. with P. jamesii (W) Canadian R. W of Roy, Mora Co. New Mex. 12 May 1985. Five egg clusters under leaves of Penstemon albidus Nutt. (W) Caprock S of San Jon, Quay Co. New Mex. 13-14 May 1985 (plants of P. secundiflorus--not a host--at this site had no evidence of P. minuta). Three egg clusters (24, 29, and 33 eggs) and other small larvae on Penstemon cobaea (S, and Roy O. Kendall) Seymour, Baylor Co. Texas May 1 1972. Half-grown larvae hibernate. Larvae reared from Colfax and Baylor Cos. have the ground color of the body orange-red, whereas it is white in ssp. arachne (both ssp. have orange bases of the subdorsal branching spines). In the lab, larvae eat leaves of P. cobaea, P. confertus Dougl. (W), P. confertus ssp. procerus (Dougl.) Cov. (W), young P. secundiflorus Benth. (W), P. whippleanus Gray (W), P. strictus Benth. in DC. (W). F1 hybrid (ssp. minuta female X ssp. arachne male) and backcross (F1 female X arachne male) larvae also ate young P. secundiflorus and other Penstemon.

P. minuta arachne Edw. Four larvae on Penstemon virgatus asagrayi (W) Green Mtn., Jefferson Co. Colo. 14 Aug. 1978. Oviposition P. virgatus (W) Cripple Creek, Teller Co. Colo. Aug. 1969. Half grown larvae hibernate. Lab larvae eat P. whippleanus (W), young P. secundiflorus (W), P. griffinii A. Nels (W), P. barbatus (Cav.) Roth (S), and P. pinifolius Greene (S). Scott (1974b) details ecology, behavior, and movements and studies hybrids between minuta and arachne. Neither ssp. has larval nests.

Phyciodes mylitta (Edw.). 115 eggs in cluster found under leaf of Cirsium vulgare (Savi) Tenore (M), reared to adults in lab on Silybum marianum (L)(S), Copper, Siskiyou Co. Calif. 19 May 1974.

P. orseis Edw. A female ssp. herlani from Glenbrook, El Dorado Co. Calif. 16 June 1972, laid an egg cluster in lab on Cirsium vulgare; the larvae were reared on C. vulgare (S) and C. arvense (L.) Scop. (S)(Scott 1974e). Ssp. orseis larvae from Siskiyou Co. Calif. ate the tender flesh on top of the base of the bracts (the part eaten by humans) of artichoke Cynara scolymus L. in lab, though in nature the hostplant is probably Cirsium growing on slopes. Half-grown (stage 3) ssp. orseis larvae hibernate; diapause is difficult to break in the lab even with constant light.

P. pallida (Edw.). Larvae reared in lab on Cirsium arvense (S) and C. vulgare (S) from eggs laid by a female from Red Rocks, Jefferson Co. Colo. 29 June 1973.

P. tharos/morpheus tharos (Drury). 2 egg clusters and 2 other larvae found under leaves of 3 Aster ericoides (L.)(S) plants (a cluster of 78 eggs produced 27 male 19 female adults, a cluster of 73 eggs produced 14 male 17 female adults, a cluster of 2 1st stage larvae later died) Barr Lake, Adams Co. Colo. 17 Aug. 1985. Adults associated with A. ericoides (S) throughout the plains in Weld, Adams, Jefferson, Arapahoe, Elbert, Pueblo and Crowley Cos. Colo.

P. tharos/morpheus morpheus (Fabr.). Six egg clusters and ten clusters of young larvae under leaves of Aster laevis (W) Golden Gate Can., Jefferson Co. Colo. 8 July to 7 Aug. 1978, 5 Aug. 1983, and 18 July 1984. Larvae on A. laevis (W) Tinytown, Jefferson Co. Colo. 30 July 1978. Cluster of 39 eggs under A. laevis (S) leaf Coal Creek Can., Jefferson Co. Colo. 7 July 1985. Ssp. morpheus (=selenis=pascoensis) has recently been treated as a distinct species, and is reproductively isolated from ssp. tharos in the Appalachians, but in Colorado I reared it from Golden Gate Can. and released females in front of P. tharos tharos males on the plains, and courtship occurred readily and hundreds of hybrids were reared (Scott 1985). The two ssp. are allopatric in Colo. except the foothills W of Fort Collins, Larimer Co. (Paul Opler), tharos occupying the plains and morpheus the mountains; they best fit the concept of subspecies, but are a bit more distinct than the usual subspecies, so the species name could be cited as P. tharos/morpheus. Their antennae are the same in Colo., whereas they differ in W.Va.-Va.-Penn. where they behave as separate species.

P. campestris (Behr). Oviposition 11:30 of 99 eggs, and 15 large larvae found, on Machaeranthera pattersoni (Gray) Greene (W) Golden Gate Can., Jefferson Co. Colo. 7 Aug. 1978. Oviposition of 100 eggs 13:45-13:50 under leaf of Aster chilensis Nees. (W) 7 mi. W Hayden, Routt Co. Colo. 2 Sept. 1978. Oviposition 88 eggs 11:30 on A. chilensis adscendens (Lindl.) Cronq. (W) E Portal Moffat Tunnel, Gilpin Co. Colo. 30 July 1977. Oviposition 13:45 of 27 eggs (more would have been laid had I not disturbed her) under leaf of Aster porteri Gray (S) Green Mtn., Jefferson Co. Colo. 19 June 1985. Oviposition 45 eggs 11:45-11:55 under 4 mm wide leaf of young plant of Aster ericoides (S) where young plants were thick, 3 mi. E Vineland, Pueblo Co. Colo. 28 Aug. 1983. Oviposition 11:40 31 eggs under leaf of juvenile A. ericoides (S) plant Green Mtn., Jefferson Co. Colo. 4 Sept. 1984. 31 eggs in cluster under leaf of young A. ericoides (S) plant Green Mtn. 12 Sept. 1985. 2 preovipositions on Eucephalus glaucus (W) and adults common near it, Green Mtn. Res., Summit Co. Colo. 15 July 1985. In Colo. occupies both the plains (where the host is evidently A. ericoides only) and the mountains (where several Aster and the related Machaeranthera are hosts), occurring in usually drier areas than P. tharos/morpheus; the latter occupies both the plains and mountains, but as different ssp., and generally in moist meadows and creeksides.

P. picta Edw. Ovipositions 10:00-10:15, 10:37, 11:02, 11:16, 12:30, and ten egg clusters found under leaves of Convolvulus arvensis L. (S), plus 7 larvae and 2 pupae found under boards and dried cowpies near C. arvensis, plus 10 eggs under leaf of Cardaria draba (L.) Desv. (Cruciferae; W), all Toll Creek, Highline Canal, Arapahoe Co. Colo. 16 Aug. 1978. In lab the larvae ate C. arvensis well and Aster laevis L. (S) well, but refused Erigeron divergens T. & G. (W) and Aster falcatus Lindl. (W) and Tragopogon dubius Scop. (W) and Podospermum laciniatum L. (W), all four of which were in the same field (these were the only Compositae found in the field). P. picta probably originally fed on Aster and it still eats Aster in the lab, but the natural host is now Convolvulus, a remarkable case of host switching. Adults are associated only with C. arvensis (S) along railroad tracks near Howard, Fremont Co Colo. 3 Aug. 1973 (eggs laid on this plant in lab from this site). Adults associated only with C. arvensis (S) E Canon City, Fremont Co. Colo. 7 July 1970, 17 Aug. 1970, 1 July 1971, 19 July 1972. Adults associated with C. arvensis (S) McElmo Creek, 10 mi. E Utah line, Montezuma Co. Colo. 25 Aug. 1977. Because C. arvensis is a weed, P. picta would be a good

biological control agent, but it unfortunately seems too limited in its choice of habitat, and refuses to populate gardens and cultivated fields.

Euptoieta claudia (Cram.). Ovipositions at 8:08, 8:12, 8:20, 8:25, and one larva found on Linum australe Heller (W)(the larva raised to adult in lab on Viola nephrophylla Greene), 1 mi. E Arroyo del Agua, Rio Arriba Co. New Mex. 19 June 1978. Oviposition 8:56 on L. australe (S) 2.7 mi. up Coyote Can. road, Rio Arriba Co. New Mex. 19 June 1978. Ovipositions 13:58, 14:02, 14:07 on side of stems near tip of seedlings (8-10 cm tall)(females did not even land on flowering Linum) of Linum lewisii Pursh (S) Bandimere Speedway, Jefferson Co. Colo. 10 Aug. 1984. Larva found on and raised on Viola tricolor L. var. hortensis DC. (S) Lakewood, Jefferson Co. Colo. 1964. Six eggs laid 10:50-11:25 on leaves and stems of Hybanthus verticillatus (Ort.) Baill. (S) and one laid on a Thlaspi arvense (S) plant nearby (T. arvense is undoubtedly not a larval food), E end South Table Mtn., Jefferson Co. Colo. 27 May 1980. Oviposition 11:40 under leaf of H. verticillatus (S), another egg found on sepal of same plant, and 4th stage larva found on Gaura sp. (not a hostplant) beside verticillatus, Cherry Gulch, Jefferson Co. Colo. 7 July 1984. Evidently semipolyphagous on certain fresh green low herbs, which may share some yet-undiscovered chemical peculiarity.

Speyeria. The Colo. Speyeria can be divided into "wetland" species (including nokomis, mormonia, and atlantis) which usually oviposit near green violets, and "dryland" species (including aphrodite, callippe, edwardsii, and presumably coronis) which oviposit near green violets if present, but at drier sites lacking late summer green violets they oviposit under shrubs etc. where the violets have dried up for the year and will not sprout from dormant roots until the following spring; the dryland species in general may have a longer delay in egg laying. (Four unstudied species in W Colo. are presumably wetland species: S. hydaspe (Bdv.) and egleis (Behr) occupy conifer-aspen forest, S. cybele (Fab.) occupies the same habitat and shady oak/Amelanchier thickets, and S. zerene (Bdv.) occupies the same habitats as cybele and mesic sagebrush.)

Speyeria aphrodite (Fab.). Oviposition 10:40 under Cercocarpus montanus Raf. (S) shrub E end South Table Mtn., Jefferson Co. Colo. 28 Aug. 1980. Oviposition 11:40 under C. montanus (S) shrub on dead twig, and oviposition or preoviposition under three other montanus shrubs, Green Mtn., Jefferson Co. Colo. 17 Aug. 1978. Ovipositions 11:30 and 11:32 among grass in low spots 1.6 m from C. montanus shrubs Green Mtn., Jefferson Co. Colo. 6 Sept. 1983. Oviposition 11:36 under tiny twig in litter among various plants (no Viola seen), oviposition 11:58 under dead leaf in litter under C. montanus shrub (no violets seen), ovipositions 12:09 and 12:10 under dead twigs in litter under Rhus trilobata bush (no violets seen), all Green Mtn., Jefferson Co. Colo. 19 Aug. 1984. Oviposition 11:50 in litter (near grasses, Artemisia, Liatris, and Linaria, but no Viola seen), and oviposition 11:29 under hillside C. montanus bush (grasses and cactus nearby but no Viola), Green Mtn. 5 Sept. 1985. Two ovipositions 10:42 on dead stems & twigs in litter in 3 cm wide hollow of flat Carex heliophila sward (some grasses and dead plants were nearby, but no Viola) Green Mtn. 7 Sept. 1985. At Green Mtn. no violets occurred near the eggs then, but in the spring Viola nuttallii Pursh (S) is very common under the shrubs (but not on the open grassland where some eggs are laid) so is the presumed larval host. Oviposition 10:25 under dead grass blade 5 cm from Viola adunca (S), oviposition 10:26 under tiny twig 5 cm from V. adunca (S), oviposition 11:44 under pine needle 10 cm from V. adunca (S), all Corwina Park, Jefferson Co. Colo. 17 Aug. 1984. Oviposition 12:52 under dead grass blade in litter 20 cm from small V. adunca (S) plant, oviposition 11:47 in litter with no violets near, Corwina Park 27 Aug. 1984. Oviposition 11:05 on pine needle below V. adunca (S) O'Fallon Park, Jefferson Co. Colo. 12 Aug. 1985. Females oviposit near green violets if present, but if dried up for the year (as on Green Mtn.) they usually oviposit under shrubs etc. where violets are likely to sprout the next spring. Females were seen mating as late as L Aug., but most mate in July-M Aug. and then delay laying eggs (reproductive

diapause) until L Aug.-E Sep. in the foothills and adjacent plains of the Colo. Front Range, when they travel widely and oviposit.

S. nokomis (Edw.). Ovipositions 12:23, 13:30, 14:25, 14:30, 14:31 on dead grass and twigs near Viola nephrophylla Sangre de Cristo Mts., New Mex. Aug-Sept. 1978. Ovipositions 11:40, 11:45, 13:00 on grass etc. next to V. nephrophylla (reared to adults in lab on V. nephrophylla) Chuska Mts., San Juan Co. New Mex., 7 Sept. 1977, 19 Aug. 1980. Because of the late-season flight, females do not seem to delay egg-laying. They oviposit near green violets. Scott & Mattoon (1982) give the life history.

S. mormonia (Bdv.). Oviposition 14:20 on a twig near the ground between Rumex densiflorus Osterh. (S) and Potentilla sp. (S) plants, no violets observed nearby, Keystone Gulch, Summit Co. Colo. 6-7-8 Aug. 1977. Oviposition 11:15 on Achillea lanulosa Nutt. (S) leaf 30 cm away from Potentilla sp. (S), Salix sp. (S), and ?Viola (S) Vail Pass, Summit Co. Colo. 22 Aug. 1977. Preoviposition 5 times in low spot near Vaccinium (perhaps searching for violets?) Loveland Pass, Summit Co. Colo. 5 Aug. 1985. Females seem to have little or no delay in egg-laying (reproductive diapause), though they tend to disperse when frosts come to the high mountains in late summer (I found three females on the plains in L Aug.-E Sep.).

S. callippe (Boisd.). Oviposition 13:00 under Cercocarpus montanus (S) shrub on hill at Lookout Mtn., Jefferson Co. Colo. 11 July 1978. Viola nuttallii (S) was common under these same shrubs in spring 1979. Oviposition 12:50 on twig in shade beneath clump of Prunus virginiana var. melanocarpa (S) bushes, no violets seen, hilltop at Shingle Creek, Jefferson Co. Colo. 23 July 1984. V. nuttallii occurs at the latter site and is probably the main host in the foothills. Females have little or no reproductive diapause, and die before late summer.

S. atlantis (Edw.). Oviposition on Viola nephrophylla (S) stem Chuska Mts., San Juan Co. New Mex. 19 Aug. 1980. Six eggs laid 10:30-11:02, 11:10, and 12:20 on debris near Viola canadensis L. (W), and three eggs laid 11:00, 11:10, 11:30 near Viola adunca Smith (W), both at Tinytown, Jefferson Co. Colo. 30 July 1978. Ovipositions 10:04 & 10:06 under pine needles near V. adunca (S), oviposition 10:58 under grass blade near adunca (S), oviposition 12:01 near adunca (S), oviposition 12:55 on debris near V. canadensis (S), all O'Fallon Park, Jefferson Co. Colo. 13 Aug. 1984. Oviposition 10:55 under pine needle 10 cm from V. adunca (S)(she landed on adunca then crawled away to lay), oviposition 12:25 under dead grass blade near V. adunca (S) O'Fallon Park 16 Aug. 1984. Oviposition 10:50 under twig in litter near V. adunca (S) Corwina Park, Jefferson Co. Colo. 17 Aug. 1984. Adults assoc. with V. canadensis (S) Raton Mesa, Las Animas Co. Colo. 28-29 July 1985. V. adunca and V. canadensis seem to be the main hostplants in the foothills of the Colo. Front Range; adults are associated with both species at Critchell, Jefferson Co. Colo. 1978-1985, and with canadensis at Red Rocks, Jefferson Co. Colo. 1 Aug. 1978 and at Devil's Head Cgd., Douglas Co. Colo. 31 July 1978. Eggs laid by females from Cherry Gulch, Tinytown, Critchell, and Corwina Park, all Jefferson Co. Colo., and from Mt. Judge, Clear Creek Co. Colo., 1984-1985, reared to adults in lab on V. nephrophylla. Females seem to have little delay in egg laying (reproductive diapause), and some females emerge and were seen mating as late as L Aug. Dispersal is weaker than in some aphrodite and mormonia females. Females always oviposit near green violets.

Speyeria edwardsii (Reak.). Oviposition of 2 eggs 9:40 under narrow dead stems in litter in shady 4 cm wide nook of grassland (various grasses nearby but no Viola), and oviposition 9:59 under dead stem in litter in 5 cm wide hollow of grassland (various grasses, Verbena, and Grindelia were nearby, but no Viola), both flat grassland at Green Mtn., Jefferson Co. Colo. 5 Sept. 1985. Viola nuttallii must be the hostplant here, but it appears only in the spring and dies in early summer (normally it does not occur on flat grassland where these eggs were laid).

Boloria. Determining the hosts of Boloria is difficult because females oviposit rather haphazardly and the larvae of many or most species are somewhat polyphagous in the lab, suggesting that native larvae may be able to eat up to half the herbs and young shrubs

present at a locality. Field associations are therefore valuable. The arctic/alpine species seem to hibernate as unfed stage 1 and unfed stage 4 larvae during successive winters, and in artificial lab conditions stage 1 larvae often bypass diapause but stage 4 larvae always diapause; apparently lowland species only have the unfed stage 4 diapause.

Boloria napaea (Hoff.). Adults associated strictly with Polygonum bistortoides (Pursh)(S) in moist meadows and gentle slopes along valley bottoms, always with dense short vegetation, at two sites on the western slope (Sublette Co.) and two sites on the eastern slope (Fremont Co.) of the Wind River Mts., Wyoming, 12 Aug. 1979, 9 Aug. 1980, 11-12 Aug. 1983. This plant is closely related to Polygonum viviparum, the known host in Europe and arctic America.

B. selene D. & S. Oviposition Viola sp. (S) SW of Westcliffe, Custer Co. Colo. Aug. 1970. Habitat generally wet grass/sedge meadow with scattered willows.

B. eunomia (Esper). 2 eggs in cluster laid 9:19, 3 eggs in cluster laid 9:50, both under leaves of Thalictrum alpinum L. (S), 2 eggs in cluster laid 9:00 under leaf of 5 cm tall plant of Pentaphylloides floribunda (Pursh) A. Love (S) Caribou, Boulder Co. Colo. 16 July 1977. 4 eggs in cluster laid 9:13 under a leaf of Caltha leptosepala DC. (W), Loveland Pass, Summit Co. Colo. 17 July 1977. 1 egg laid 9:05 on small plant of Viola adunca bellidifolia (Greene) Harr. (W) Loveland Pass, Summit Co. Colo. 28 July 1978. Eggs hatch after 6 days in the lab. Females oviposit usually in clusters(!) of 1-4, rather haphazardly, and larvae are somewhat polyphagous, eating both Salix and Viola well in the lab, P. floribunda a little, T. alpinum not at all. Adults normally occur in shrub-willow bogs, so Salix is a probable host. Half grown larvae hibernate (probably biennial, hibernating as unfed stage 1 then unfed stage 4 as in other Boloria).

B. improba acrocnema G. & S. and B. i. harryi F. Ovipositions 10:35, 10:45, 11:30, 12:50 on stems of Salix reticulata L. ssp. nivalis Hook. (S) Uncompahgre Peak, Hinsdale Co. Colo. 18 July 1980. Oviposition 11:01 on S. reticulata nivalis (S), and oviposition 11:15 under leaf of Polygonum viviparum (S), both Uncompahgre Peak, Hinsdale Co. Colo. 3 Aug. 1979. Oviposition 10:00 under small leaf of Salix arctica Pallas NW Mt. Chauvenet, Wind River Mts., Wyo. 10 Aug. 1983. Eggs are laid singly. In the lab, small larvae eat holes in leaves of S. arctica, S. babylonica, and several other species of Colo. shrub willows, while older larvae eat entire leaves (see Scott 1982 for the complete life history). Ssp. acrocnema and harryi are obviously subspecies of improba because the hostplants are very similar, the habitats (tundra swales with dwarf willow mats), low weak flight (perhaps slightly stronger in harryi), and most wing pattern and abdominal traits are the same (in overall appearance harryi resembles acrocnema rather than arctic improba). Larvae of the two ssp. are very similar, and pupae are similar also though the shape of some abdomen spots differs slightly (Scott 1986). Larvae hibernate as unfed stage 1 and unfed stage 4 during the two winters of its biennial life cycle (some stage 1 but no stage 4 larvae develop without diapause in the lab).

B. titania (Esp.). Oviposition 13:50 on young plant of Viola adunca bellidifolia (W) Loveland Pass, Summit Co. Colo. 27 July 1978. Oviposition 10:40 on stem of Vaccinium scoparium Leiberg (W) near Jenny Creek, Rollins Pass, Gilpin Co. Colo. 5 Aug. 1978. Oviposition 10:51 at base of stem of Trollius laxus Salisb. (W) Rollins Pass, Gilpin Co. Colo. 4 Aug. 1977. Oviposition 13:34 on grass blade within 3 cm of Polygonum bistortoides, Potentilla sp., and grass, W Hoosier Pass 11800', Park Co. Colo. 30 July 1982. Preoviposition fluttering on Salix reticulata nivalis (S) at Uncompahgre Peak, Hinsdale Co. Colo., 3 Aug. 1979, and at Hermit Pass, Custer Co. Colo. July 1970. Eggs laid singly. Salix is probably a larval host at high altitude, and my lab larvae ate Viola. Larvae also seem somewhat polyphagous, and females oviposit haphazardly.

B. freija (Thunb.). Ovipositions on various plants near Vaccinium cespitosum (S), and larvae raised on this plant in the lab, Caribou, Boulder Co. Colo. 22 June 1973. Eggs laid singly. Larvae hibernate at about the 4th stage. Adults are associated with cespitosum at other places such as Loveland Pass, Summit Co. Colo. 27 July 1978.

Melanis pronostriga (identification based on plates in A. Seitz' Macrolepidoptera of the World, vol. 5). The hairy larvae were reared from leaves of Samanea saman (Jacq.) Merr. (adults and larvae common on this tree) Puerto Asis, Colombia, Aug. 1976, and males patrol around the canopy of this host (and about nearby tops of buildings) from about 17:00 to dusk to seek females.

Apodemia mormo (Felder & Felder). Oviposition Eriogonum jamesi var. jamesi Benth. (S) SW Trout Creek Pass, Chaffee Co. Colo. 15 Aug. 1973. Oviposition 11:22 E. j. var. jamesi (S) just NE Security, El Paso Co. Colo. 8 Aug. 1972. Adult association records are useful in this species because adults are always highly restricted to the larval hostplant Eriogonum. Adults associated with Eriogonum leptocladon var. ramosissimum (Eastw.) Reveal (S) dunes N Rock Point Trading Post, Apache Co. Ariz. 19 Aug. 1980. Adults assoc. Eriogonum microthecum Nutt. (W) jct. Hwys. 12 and 410, Yakima Co. Wash. 9 Sept. 1973. Adults assoc. E. microthecum var. foliosum (R) Hwy 550 Animas River valley 7 mi. N New Mex. line, La Plata Co. Colo. 27 Aug. 1977. Adults assoc. E. microthecum var. foliosum (Torr.) Reveal (R) Horsehead Spring, San Juan Co. Utah 4 Sept. 1977. Adults assoc. E. lonchophyllum var. lonchophyllum T. & G. (R) W of Allison, La Plata Co. Colo. 28 Aug. 1977. Adults assoc. E. corymbosum var. velutinum Reveal (R) E Aztec, San Juan Co. New Mex. 27 Aug. 1977. Adults assoc. E. corymbosum var. orbiculatum (S. Stokes) Reveal & Brotherson (R) Unaweep Can., NE Gateway, Mesa Co. Colo. 23 Aug. 1977.

A. nais (Edw.). Oviposition 12:10 on a lower branch of Ceanothus fendleri (S) near Smith Creek Cgd., Custer Co. Colo. 5 July 1973. Oviposition 14:23 on leaf just below inflorescence of C. fendleri (S) in nature, and in lab 18 eggs laid on leaves, 3 on twigs near leaves, near Smith Creek Cgd. 28 June 1971. Oviposition 9:00 on top of leaf next to inflorescence of C. fendleri (S) Mt. Zion, Jefferson Co. Colo. 3 July 1980. Three females from Mt. Zion, Jefferson Co. Colo. 6 & 11 July 1977 were placed in a plastic box with C. fendleri (S) and Prunus virginiana var. melanocarpa (S), and 64 eggs were laid on fendleri flowers, 21 on fendleri leaves, none on P. virginiana; larvae were raised on C. fendleri until they hibernated half grown. Edwards (1868-1897) raised Arizona nais on Prunus, and Kendall (1976) reported Prunus as the host of A. nais chisosensis F. However, based on the above data and adult associations, only Ceanothus is used in Colo. Larvae live in a nest of leaves silked together.

Hypaurotis crysalus (Edw.). Ovipositions 16:10 and 16:45 in crevices of terminal buds and ends of twigs of Quercus gambelii Nutt. (S) Lake Creek Cgd., Custer Co. Colo. Aug. 1970. Eggs are pale greenish but turn brown after about a week and hibernate. Scott (1974d) reports ecology, behavior, and movements.

Atlides halesus (Cram.). Pupae under bark on trunks of Juglans hindsii Jeps. (S) and Populus trichocarpa T. & G. (S) that have Phoradendron sp. (S) parasitizing them, Sacramento River N of Clarksburg, Yolo Co. Calif. 23 Feb. 1974. Pupae under bark of J. hindsii (S) and Quercus sp. (S) trees W of Davis, Yolo Co. Calif. 1 March 1970.

Harkenclenus titus (Fab.). Female landed on leaf of Prunus americana Marsh. (S) shrub and crawled down stem to ground and oviposited in litter 8 cm from stem, Chimney Gulch, Jefferson Co. Colo. 10 July 1978. The usual larval host is probably Prunus virginiana var. melanocarpa (S) however, based on adult association. Adults were extremely abundant (about 100 seen in a 10 m X 10 m area) on a pure stand of P. virginiana just E of Sand Dunes, Medano Creek, Alamosa Co. Colo. 1 Aug. 1970. The habit of crawling down the host stem to oviposit on trash at the base occurs also in Satyrium fuliginosum, most Lycaena, and Plebejus melissa.

Fixsenia favonius autolycus (Edw.). Adults are associated with Quercus gambelii (S) (normal leaf and shallowly-lobed leaf varieties) at Cottonwood Creek, Baca Co. Colo. 3 July 1973.

Satyrium californica (Edw.). Oviposition 10:30, 3 eggs laid in glued cluster at base of leaf petiole of Prunus virginiana var. melanocarpa (S) Lookout Mtn., Jefferson Co. Colo. 8 July 1977. Oviposition 10:15 two eggs glued in depressed scar on twig, 10:00

four eggs glued in crevice at joint of stem, 10:45 three eggs glued in hole in twig, all on Cercocarpus montanus (S) Lookout Mtn., Jefferson Co. Colo. 8 July 1977. Two females crawled over twigs of C. montanus (S) for 90 minutes searching for oviposition sites, Genesee Mtn., Jefferson Co. Colo. 1 Aug. 1984. 3 egg clusters of 5, 4, and 1 eggs per cluster (each cluster cemented in crevice with clear copious glue) found in healed crevices on twigs of C. montanus (S) Genesee Mtn., Jefferson Co. Colo. 8 Aug. 1984. Females (oddly) glue eggs in clusters with a very copious clear glue, such that some eggs appear completely immersed in the glue, but the glue actually forms a film covering them. The film would provide protection against ants and desiccation. Eggs hibernate. Evidently somewhat polyphagous on a variety of shrubs and small trees.

S. acadica (Edw.). Oviposition Salix exigua (S) twig Canon City, Fremont Co. Colo. 10 July 1970. Eggs perhaps normally laid in clusters, because S. californica (a very close relative, perhaps a ssp.) has this unusual habit. Associated with exigua in the rest of Colo. (Yuma, Jefferson Cos.) also, so evidently monophagous.

S. sylvinus (Bdv.). Oviposition on twig of Salix exigua (S) Mirage, Saguache Co. Colo. 9 Aug. 1970. Adults also associated with exigua (S & G) throughout Saguache, Custer, Fremont, Pueblo, Conejos, and Gunnison Co. Colo., Uintah and Kane Cos. Utah, and in northern New Mexico, evidently monophagous.

S. liparops (LeC.). One egg (compared with eggs dissected from female) found on Prunus virginiana var. melanocarpa (S) twig and preoviposition on melanocarpa twigs, Lakewood, Jefferson Co. Colo. 9 July 1977. (Note: Acer negundo L. (S), a hostplant I reported in J. Lepid. Soc. 22:159 and 1966 Lepidopterists' News #3, is erroneous.)

S. calanus (Hubn.). Adults associated with Quercus gambelii (S) in Jefferson, El Paso, Fremont, Custer, Saguache, Routt, Delta, and Garfield Cos. Colo, and Colfax Co. New Mex. However, two adults were found not near Q. gambelii: an adult in Lakewood, Jefferson Co. Colo., and several adults in Golden Gate Can., Jefferson Co. Colo., where perhaps Prunus was eaten or immigration occurred.

S. saepium (Bdv.). Oviposition 11:23 on twig of Ceanothus fendleri (S) Lookout Mtn., Jefferson Co. Colo. 11 July 1977. Adults assoc. with C. fendleri (S) Russel Ridge, Douglas Co. Colo. Ovipositions 11:03 and 11:10 on side of 2 mm thick green stems of C. fendleri (S) Apex County Park, Jefferson Co. Colo. 29 July 1984. Adults assoc. with Ceanothus cuneatus (Hook.) Nutt. (determined by park ranger) Valley of the Rogue Roadside Picnic Area, Josephine Co. Ore. 15 July 1964. Eggs laid singly on smooth sides of thin stems, in contrast to S. californica. Assoc. with fendleri in Colo., evidently the only host there.

S. auretorum (Bdv.). Oviposition on Quercus sp. (live oak, leaves similar to those of Q. chrysolepis Liebm. and others)(S) Cascade Fall, Yosemite, Calif. 8 July 1964.

S. behrii (Edw.). Oviposition 9:10 on twig of Cercocarpus montanus Raf. (S) N fork Clear Creek, Gilpin Co. Colo. 7 July 1977. Egg found on stem of C. montanus (S) and compared to dissected eggs, Lookout Mtn., Jefferson Co. Colo. 8 July 1977. Adults assoc. with C. montanus throughout Jefferson, Custer, Fremont, and Saguache Cos. Colo., where it must be the only host. Eggs hibernate.

S. fuliginosum (Edw.). Oviposition on lower stems of Lupinus andersonii Wats. (Ha) Sonora Pass, Mono Co. Calif. 13 July 1974. Oviposition near base of Lupinus meionanthus Gray (Ha) Carson Pass, Alpine Co. Calif. 20 July 1974. Females walk down the host stem and lay on stems or trash near the base. Assoc. with Lupinus argenteus in Summit and Routt Cos. Colo.

Strymon melinus Hubn. Larva raised from flowers of Astragalus bisulcatus (Hook.) Gray (S) Central Plains Experimental Range, Weld Co. Colo. June 1976. Oviposition 13:21 on young spiny fruit of Glycyrrhiza lepidota Pursh. (S) Green Mtn., Jefferson Co. Colo. 4 Aug. 1978. Oviposition 10:55 G. lepidota (S) flower buds Marshall, Boulder Co. Colo. 8 July 1980. Oviposition 11:21 on young flower bud of Lupinus argenteus (S) Shingle Creek, Jefferson Co. Colo. 23 July 1984. Oviposition 9:28 on flower bud of L. argenteus Pursh. (S), Golden Gate Can., Jefferson Co. Colo. 6 July 1980. Oviposition 9:12 on tiny leaf near flower of Malva neglecta Wallr. (S) Red Rocks,

Jefferson Co. Colo. 12 Aug. 1977. Oviposition 10:30 on flower pedicel of Eriogonum effusum Nutt. (S) Green Mtn., Jefferson Co. Colo. 12 Aug. 1977. Oviposition 12:35 on pedicel of E. effusum (S) Green Mtn. 18 Aug. 1977. Oviposition 12:43 between flower buds of Eriogonum lonchophyllum T. & G. (S) Bandimere Speedway, Jefferson Co. Colo. 10 Aug. 1984. Oviposition 9:24-9:35 7 eggs on flowers of Eriogonum alatum Torr. (S) Chimney Gulch, Jefferson Co. Colo. 24 July 1978. Oviposition 10:27 on immature fruit of Rumex salicifolius var. triangulivalvis Dans. (S) Green Mtn., Jefferson Co. Colo. 18 Aug. 1977. Oviposition 11:09 between flower buds of Verbascum thapsus L. (S) Lone Rock Cgd., Jefferson Co. Colo. 2 Sept. 1979. 2 eggs laid 10:04, 10:10 on top and side of bracts of flower buds of Mentzelia multiflora (Nutt.) Gray (S) Green Mtn., Jefferson Co. Colo. 10 Aug. 1984. Oviposition 12:00 among unopened flower buds of Croton texensis (S) Barr Lake, Adams Co. Colo. 17 Aug. 1985. Oviposition 10:06 in crack of branch tip where 4 petioles join, on Physalis longifolia Nutt. (W) (one of the fruits had been eaten, possibly by S. melinus) Green Mtn. 7 Sept. 1985. The most polyphagous North American butterfly, but strongly prefers flower buds-flowers-fruits.

Callophrys eryphon (Bdv.). Adults assoc. with Pinus ponderosa Laws. var. scopulorum Engelm. (S) in most of Colorado, including Boulder, Jefferson, and Custer Counties, where it is undoubtedly the larval host; but in Fremont and Saguache Counties Pinus edulis Engelm. (S) is the only conifer at many localities where it must be the host.

C. augustus iroides (Bdv.). Adults assoc. with Arctostaphylos uva-ursi (L.) Spreng. ssp. adenotricha (Fern. & Macbr.) Cald. & Tayl. (S) throughout the Colorado mountains east of the continental divide. In the lab, females from Indian Creek Cgd., Douglas Co. Colo. 3-6 June 1973 oviposited on uva-ursi flowers near the pedicel (only one egg was laid on a leaf, next to a flower). In SW Colo.-N.M. adults assoc. with other plants (adults common on Amelanchier at Gobernador Can., Rio Arriba Co. N. M. 10 May 1983, though several were nectaring on its flowers thus it might not be a host), and at Creel, Chihuahua Mex., adults are associated with shrub Arctostaphylos. SW Colo.-Mex. populations are possibly somewhat polyphagous as in Calif.

C. mossii (H. Edw.). Larvae raised on Sedum sp. (S) South Yuba River NW Nevada City, Nevada Co. Calif. 12 May 1974. Larvae reared Dudleya cymosa (S; photo resembles cymosa) Loon Lake, El Dorado Co. Calif. 9 June 1974. Larvae reared Sedum sp. (S) Lang Crossing, Nevada Co. Calif. 15 June 1974. Larvae raised Sedum spathulifolium Hook. (S) Lake Berryessa, Yolo Co. Calif. 11 May 1974. Adults are very local; a colony can occupy an area of only about 50 x 50 m.

C. polios Cook & Wats. Adults strictly associated with Arctostaphylos uva-ursi adenotricha (S) in Colo.

C. gryneus (Hubn.) ssp. The normal host of ssp. nelsoni (Bdv.). is Calocedrus decurrens Torr., so it is interesting that at Loon Lake, El Dorado Co. Calif. 9 June 1974, adults were common resting and flying about Juniperus occidentalis Hook. (S), the only species of Gymnosperm present there and undoubtedly the hostplant (adults of this population have the white unh median line usually weak, and thus are assigned to nelsoni). Juniperus is the larval host of C. gryneus chalcosiva & siva (Edw.), which occur eastward. In Jefferson Co. Colo., Juniperus scopulorum Sarg. (S) is the only juniper present at siva colonies so must be the hostplant.

C. sheridanii (Carp.) ssp. Ssp. lemberti Tilden oviposited on Eriogonum incanum (T. & G.) Jones (R) W Glen Alpine Falls, El Dorado Co. Calif. 6 June 1970. Ssp. sheridanii (large variety) assoc. with Eriogonum jamesi var. wootenii (W) at Cloudcroft, Otero Co. New Mex. 21 April 1972.

C. affinis homoperplexa B. & B. Oviposition on flower of Ceanothus fendleri (S) Chautauqua Mesa, Boulder Co. Colo. 30 May 1966. In Howe (1975) I assumed that this oviposition was a mistake by the female, but recent data given below prove it was not. Ovipositions 13:42 and 14:05 on base of terminal flower buds of C. fendleri (S) and another egg found on bud, Golden Gate Can., Jefferson Co. Colo. 5 June 1980. Ovipositions 14:15-14:20 of 3 eggs between flower bud and sepal of C. fendleri (S) Apex County Park, Jeff. Co. Colo. 6 June 1980. Oviposition 14:42 on flower bud of C. fendleri (S) Apex County Park

11 June 1980. Preoviposition 13:35 on C. fendleri (S) flower buds Apex County Park 13 June 1980. Oviposition 11:20 C. fendleri (S) flower bud Apex County Park 24 June 1980. Ovipositions 9:30 and 12:00 on C. fendleri (S) flower buds Ralston Butte, Jefferson Co. Colo. 20 June 1980. Oviposition 9:30 and preoviposition 9:32 on Eriogonum umbellatum var. umbellatum Torr. (S) flower buds Crawford Hill, Jefferson Co. Colo. 18 June 1980. Preoviposition 12:00 on E. u. var. umbellatum (S) flowers Apex County Park 23 June 1980. Oviposition 11:28 on flower bud of E. u. var. umbellatum (W) Chimney Gulch, Jefferson Co. Colo. 28 June 1978. Many larvae were raised to pupae and adults in the lab; larvae vary from red to green. Lab larvae eat E. u. var. umbellatum flower buds and occasionally leaves if buds are unavailable, eat E. umbellatum var. majus Hook leaves when buds are unavailable, and eat C. fendleri flower buds (but not the old hard fruits). It is clear that both C. fendleri and E. umbellatum are natural hosts, and females seem to prefer to oviposit on whichever plant happens to be in the proper young flower bud stage. Thus populations occur at some sites where fendleri is absent. Pupae hibernate.

Lycaena phlaeas (L.). Adults associated with Oxyria digyna (L.) Hill (S) at several sites in alpine zone Wind River Mts., Fremont Co. Wyo. 11-14 Aug. 1983, where they occupy nooks in vegetated rockslides.

L. cupreus (Edw.). Oviposition 11:00 on rock next to Oxyria digyna (S) inflorescence, Hermit Pass, Custer Co. Colo. 1 Aug. 1971. Larvae from females from Loveland Pass, Summit Co. Colo. 1984 ate Rumex in lab. Adults of ssp. snowi (Edw.) are associated with O. digyna in nooks of vegetated rockslides or cirques throughout the alpine areas of Colorado (and evidently also in the alpine Uinta Mts. of Utah), whereas in the alpine zone of Wyo.-Mont. this habitat is occupied by L. phlaeas, and in N Utah (Wasatch Mts.)-Wyo.-Mont. L. cupreus artemisia Scott occurs at lower altitude in Canadian-Hudsonian Zone sagebrush and woods openings, where Rumex or Polygonum must be the host. Half grown snowi larvae quit feeding in the lab, perhaps(?) indicating diapause (probably biennial, the two diapause stages uncertain).

L. hyllus (Cram.). Oviposition 13:03 on dead leaf, oviposition 13:10 on dead leaf, oviposition 12:30 on dead tip of live leaf, all on middle or lower leaves of Polygonum coccineum (W) plants growing in shallow water, Wheat Ridge, Jefferson Co. Colo. 14 Aug. 1977. Adults common in pure stand of P. coccineum (S) Barr Lake, Adams Co. Colo. 29 Aug. 1974. Assoc. P. coccineum (S) Upper Twin Lake, Freeborn Co. Minn. 26 June 1985. Oviposition 12:55 on dead leaf at base of Rumex crispus (S) Wheatridge, Jefferson Co. Colo. 14 Aug. 1977. Females oviposit in litter at the host base except when the hosts grow in water, when eggs are placed higher up. Eggs hibernate.

L. helloides helloides (Bdv.). Egg found on dead leaf below plant (identical to eggs dissected from females) of Rumex salicifolius triangulivalvis (S) E of Moffat, Saguache Co. Colo. 29 Aug. 1977. Oviposition on lower branch of Rumex maritimus var. fueginus (Phil.) Dusen (W) lake at Kipling X W. Jewell Sts., Lakewood, Jefferson Co. Colo. 17 Aug. 1978. Oviposition 13:00 on dead lower leaf of Polygonum coccineum Muehl. (S) Barr Lake, Adams Co. Colo. 29 Aug. 1984. 2 ovipositions 9:52 on top of green leaf near top of plant, another egg found on top of green leaf, and 20 2nd-4th stage larvae and 1 prepupa found on green leaves (usually near leaf base, sometimes on stems) near top of plant (females oviposit near top of plants at this site evidently because there was no litter where the plants grew in a slough, and the hosts stand in water after rains; larvae eat holes in leaves or eat leaf tip; pupae are attached by both cremaster and silk girdle), all on P. coccineum (W) Salida, Chaffee Co. Colo. 30 July 1985. Eggs hibernate. Three yearly flights occur on the plains.

L. helloides florus (Edw.). Egg (identical to eggs dissected from female) found on trash at base of Rumex densiflorus Osterh. (W) Keystone Gulch, Summit Co. Colo. 6-7-8 Aug. 1977. Egg (identical to eggs dissected from female) found at base of stem of Rumex salicifolius triangulivalvis Fall River Reservoir, Clear Creek Co. Colo. 10 Aug. 1977. Oviposition 13:12 on dirt at base of Rumex

acetosella (S), oviposition 13:08 on tiny plant next to both R. acetosella (S) and Polygonum aviculare L. (S), oviposition 13:35 on base of stem of P. aviculare (S), all Toll Ranch, Gilpin Co. Colo. 28 July 1977. Oviposition 10:11 on grass blade next to Polygonum douglasii Greene (S) Jim Creek Cgd., Grand Co. Colo. 9 Aug. 1977. The latter three hosts are small plants usually growing on gopher diggings on deep soil of valley bottom forest clearings. Eggs hibernate. One flight. This ecotype/subspecies occurs as low as the Canadian Zone at Critchell 7760' in Jefferson Co. Colo. (to compare with the data of Scott 1979, the number of orange uph lunules on Critchell males is 0-1, 1-3, 2-13, 3-15, 4-8, 5-0; and the amount of upf orange on females is A (none or a trace)-3, B (only postmedian spots)-7, C (postmedian band and some median spots orange)-6, D (postmedian band solid orange and median part of wing mostly orange)-6, E (mostly orange)-2, F (completely orange)-0; these frequencies have remained stable from 1978 to 1985). Wherever in Colo. that temperature limits the species to one yearly flight, the florus ecotype occurs, in which adults vary in appearance from very dark to resembling helloides (Scott 1979); where two or three flights can occur, the helloides ecotype flies.

L. xanthoides editha (Mead). Oviposition 9:50 three eggs on trash next to Rumex acetosella L. (S) Toll Ranch, Gilpin Co. Colo. 27 July 1977. Oviposition 12:07 on dead leaf next to R. acetosella (S) Jim Creek, Grand Co. Colo. 9 Aug. 1977. The small ssp. editha is adapted to small hostplants, whereas the large ssp. dione and xanthoides are adapted to the larger Rumex. Eggs hibernate.

L. xanthoides dione Scud. Oviposition two eggs 12:30 on debris at base of Rumex salicifolius triangulivalvis (S) Red Rocks, Jefferson Co. Colo. 12 July 1973. Two eggs (compared to eggs dissected from female) found at base of Rumex occidentalis Wats. (W) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977. Three eggs (compared to eggs dissected from female) found at base of Rumex crispus (L.)(S) N of Idledale, 21 Aug. 1977.

L. rubidus (Behr). Ovipositions 12:30 (1 egg on chip of wood, 1 egg on 3 cm tall plant similar to Thalictrum) within 10 cm of Rumex salicifolius triangulivalvis (W) Toll Ranch, Gilpin Co. Colo. 28 July 1977. Oviposition 11:30 on trash at base, oviposition 11:50 on twig at base, both on R. s. triangulivalvis (W) Toll Ranch 30 July 1977. Oviposition 12:20 on twig at base, oviposition 12:30 on dead leaf at base, both on R. s. triangulivalvis (W) West Chicago Creek, Clear Creek Co. Colo. 31 July 1977. Two eggs laid 12:30 on dirt at base, and 45 eggs found on trash at base (eggs identical to eggs dissected from females), all at base of Rumex densiflorus (W) Keystone Gulch, Summit Co. Colo. 6-7-8 Aug. 1977. Egg found on twig at base of Rumex occidentalis (W) E Idaho Springs, Clear Creek Co. Colo. 10 Aug. 1977. Five eggs found at base of R. occidentalis (W) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977. Egg found at base of Rumex crispus (S) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977 (eggs from last three sites identical to eggs dissected from females--L. xanthoides and L. helloides eggs can be easily separated from those of rubidus). Elsewhere in Colo. adults are associated with Rumex venosus Pursh. on the northeastern plains in Weld Co., with Polygonum coccineum at Elbert, Elbert Co. 3 July 1978, and with Rumex occidentalis, densiflorus, and utahensis Rech. at various mountain sites. The typical habitat is near a creek, and the small-sized Polygonaceae may be refused, in contrast to L. x. editha. Eggs hibernate.

L. heteronea Bdv. Oviposition 7:35 and 30 eggs found at the base of (generally beneath) umbel-subtending bracts of Eriogonum umbellatum (S) Red Rocks, Jefferson Co. Colo. 14 July 1972. Five eggs on bracts below E. umbellatum (S) umbels SE Blackhawk, Gilpin Co. Colo. 24 July 1973. Six eggs on bracts below E. umbellatum (S) umbels Mt. Zion, Jefferson Co. Colo. 11 July 1977. One egg on umbel-subtending bract of E. umbellatum var. majus Hook (=E. subalpinum Greene) Toll Ranch, Gilpin Co. Colo. 30 July 1977. Oviposition Eriogonum jamesi var. jamesi (S) SW Trout Creek Pass, Chaffee Co. Colo. Aug. 1973. Adults are associated with E. j. var. jamesi throughout southern Colorado (Fremont, Custer, Saguache Cos. Colo.). Six eggs on bracts at base of umbels of E. jamesi var. flavescens Wats. Mt. Zion, Jefferson Co. Colo. 11 July 1977. In contrast to

other Lycaena which crawl down the host stem and lay eggs on stems or litter at the hostplant base, heteronea lays on the bracts subtending the umbel (though in the Calif. ssp. clara eggs are supposedly laid on leaves). Eggs hibernate. Adults are widely distributed on hillsides etc., in contrast to the previous Lycaena which concentrate in valley bottoms.

L. arota (Bdv.). Oviposition on Ribes leptanthum Gray (S) (previously misidentified as R. montigenum McCl. by G; there are no valid records of montigenum for L. arota, thus this host in Scott 1974c, which reports ecology and behavior, is misidentified) twig Williams Can., El Paso Co. Colo. 11 Aug. 1971. Oviposition Ribes leptanthum (G) Little Fountain Creek, El Paso Co. Colo. 4 Aug. 1971. 19 ovipositions (9 on rough bark of the thicker branches, 12 on sides of smooth twigs of the thinner branches, 2 on dead leaves of two different dicotyledons beneath R. leptanthum) all day between 9:12 and 14:24 on R. leptanthum (G) Spring Creek, Fremont Co. Colo. 30 July to 8 Aug. 1969. Females often crawl and flutter down among the hostplant stems well within the plant, where they oviposit; they fly into the center of the bush to oviposit just as often as they fly onto the outer branches, and may spend an hour or more in one plant, alternating oviposition about every five minutes, basking, "hindwing rubbing", and resting. Eggs hibernate.

Hemiargus isola (Reak.). Oviposition 13:36 on flowers of Trifolium repens (S) Wetmore, Custer Co. Colo. 13 Sept. 1971. Ovipositions 9:40, 9:50 on calyx of T. repens (S) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977. Oviposition 10:02 on flowers of Trifolium longipes Nutt. (W) 9800' E Hopewell Lake Cgd., Rio Arriba Co. New Mex. 21 June 1978. Oviposition 10:28 on flower in head of Trifolium fragiferum L. (S) Lakewood, Jefferson Co. Colo. 14 July 1984. Oviposition 10:34 between flower buds of Medicago sativa (S) 14 mi. N Camp Cottonwood, Montezuma Can., San Juan Co. Utah 25 Aug. 1977. Oviposition 12:50 on flower buds of Dalea purpurea Vent. (W) Chimney Gulch, Jefferson Co. Colo. 10 July 1978. Adults associated with Dalea scoparia Gray (W) on sand dunes 5 mi. N San Felipe Pueblo, Sandoval Co. New Mex. 9 Sept. 1977. Two eggs on flower buds (identical to eggs dissected from female) of Glycyrrhiza lepidota (S) Briggsdale, Weld Co. Colo. 14 June 1977. Ovipositions 12:07, 12:09, 12:10, 12:12, 12:15 on young flower heads of G. lepidota (S) Green Mtn., Jefferson Co. Colo. 30 June 1978. Oviposition 9:40 on young flower buds of G. lepidota (S) Chimney Gulch, Jefferson Co. Colo. 1 July 1978. Oviposition 10:04 on flower buds of Melilotus alba (S) Golden Gate Can., Jefferson Co. Colo. 8 July 1978. Typically found in moist habitats and choosing hosts normally found there rather than dryland legumes such as Astragalus. Larvae must greatly prefer flower buds/flowers/fruits.

Leptotes marina (Reak.). Oviposition 10:58 between unopened flower buds of Medicago sativa (S) 14 mi. N Camp Cottonwood, Montezuma Can., San Juan Co. Utah 25 Aug. 1977. Oviposition 13:00 on inflorescence of Dalea purpurea (S) Chimney Gulch, Jefferson Co. Colo. 10 July 1978.

Brephidium exilis (Bdv.). Adults closely associated with Halogeton glomeratus (Bieb.) May. in Ledeb. (det. Hansford Shacklette) Warm Springs, Nye Co. Nevada 20 Sept. 1973. Adults assoc. with Salsola kali (S) L. 4 mi. S Crowley, Crowley Co. Colo. 9 Oct. 1983.

Celastrina argiolus form violacea (Edw.). 40 eggs (identical to eggs dissected from females) found on inflorescences of Jamesia americana T. & G. (S) (this is the main host for form violacea), two eggs on Prunus virginiana var. melanocarpa (S) inflorescence, three eggs on Physocarpus monogynus (Torr.) Coult. (S) inflorescence, one egg on Humulus lupulus L. var. neomexicana Nels. & Cock. (S) inflorescence, while no eggs were found on inflorescences of Rubus deliciosus James (S), Aquilegia sp. (S), Crataegus sp. (S), Acer glabrum Torr. (S), a white-flowered Umbelliferae (S), and Smilacina racemosa (L.) Desf. var. amplexicaulis (S), all at Red Rocks, Jefferson Co. Colo. 22-23 May 1977. Oviposition 11:16 on unopened flower buds of Holodiscus dumosus (Nutt.) Heller (S), and an egg found on J. americana (S) flower buds, both Mt. Zion, Jefferson Co. Colo. 11 June 1978. The forms of argiolus are distributed in an interesting manner in Colo.-N.M.: form violacea is everywhere, but

forms lucia, lucimargina, and marginata occur only south to Boulder Co. on the eastern slope of the continental divide (where they are uncommon; only one or two lucia have been found in Jefferson Co.), whereas these three forms are common on the wetter western slope of the continental divide (common south to the San Juan Mts., and in NW New Mex. near Dulce Lake, Rio Arriba Co.). Evidently the wetter conditions on the western slope cause this difference. Form neglecta is very rare in Colo. (several adults known in El Paso and Jefferson Cos., one in the Wet Mts. of Pueblo Co.); form neglectamajor (considered next) occurs in Colo. only west of Denver as far as I know.

C. argiolus form neglectamajor Tutt. Though this white adult form is the same size almost as form violacea in Colorado, I call it neglectamajor because it closely follows form violacea by several weeks (violacea typically peaks in late May, neglectamajor in mid June) as does neglectamajor in the eastern U.S. (William H. Edwards, 1868-1897 etc., used the name pseudargiolus for this form, which varies in size from large to the size of violacea). In Colorado it is limited to the Front Range near Denver, and resembles the extremely rare summer form neglecta. Probably neglectamajor develops from eggs laid by early-emerging violacea, and probably most of the pupae of both forms (except for the early violacea) hibernate. In E U.S. it has been considered a separate species, which seems doubtful; any such treatment of the eastern neglectamajor will have to cope with the similar insect in Colo. Many ovipositions and 200 eggs and young larvae found on inflorescences of Humulus lupulus var. neomexicana (S), most on male but some on female inflorescences, on 24 June 1973, ovipositions 9:21 and 13:25 on H. lupulus (S) inflorescences 28 June 1973, several eggs on H. lupulus (S) inflorescence 30 June 1973, ovipositions 9:20, 10:15, 10:25 on male flower buds of H. lupulus (S) 27 June 1980, all Red Rocks, Jefferson Co. Colo.; many larvae, which eat mostly male flowers and flower buds, were raised to pupae, which all hibernated in the lab except for 4 which emerged in July as form neglecta (Edw.). Oviposition 12:54 on male unopened flower buds of H. lupulus (S) Chimney Gulch, Jefferson Co. Colo. 1 July 1978. Two eggs on side of inflorescence of H. lupulus (S) Mother Cabrini Shrine, Jefferson Co. Colo. 24 June 1980. Three eggs found on inflorescence bracts of H. lupulus (S) Apex Gulch, Jefferson Co. Colo. 3 July 1984. Adults associated with H. lupulus (S) Bear Crk. W of Idledale, Jefferson Co. Colo. 15-19 June 1984, and Cherry Gulch, Jefferson Co. Colo. 7 July 1984. C. argiolus larvae eat many plant species of numerous families, and females oviposit only on plants in the proper flower bud stage, so the plants chosen change throughout the season in other states where many flights occur, though in Colo. form neglectamajor does seem restricted in hostplant to Humulus, and only occurs where this plant grows. Perhaps the Humulus is native to the Colo. Front Range, but the large Coors Brewery in Golden, Jefferson Co. Colo. was started in 1873, and the first Colo. brewery (Rocky Mountain Brewery, later Zang's Brewery) started in Denver Nov. 1859, and these and other breweries may have planted hops (=H. lupulus) to flavor their beer. The pinecone-like female "catkins" are used for beer; argiolus may have discovered the abundant male inflorescences.

Everes amyntula (Bdv.). Oviposition Astragalus flexuosus (W) Chautauqua Mesa, Boulder Co. Colo. May 1965 (reported wrongly as E. comyntas valeriae Cl. by me in J. Lepid. Soc. 22:165). Oviposition 10:37 on fork of stem of A. flexuosus (W) Tinytown, Jefferson Co. Colo. 26 July 1978. Oviposition 9:09 on junction of stems 5 cm below flowers of A. flexuosus (S) Green Mtn., Jefferson Co. Colo. 12 May 1980. Oviposition 9:24 in crack of stem just above a leaf, on A. flexuosus (S) Green Mtn., Jefferson Co. Colo. 15 June 1985. Adults are associated with Astragalus miser var. oblongifolius (G) at Lake Creek Cgd., Custer Co. Colo. 13 July 1971, and with Lathyrus polyphyllus Nutt. ex. T. & G. (C) SE Copper, Siskiyou Co. Calif. 19 May 1974. Oviposition 9:01 on leaf near flower of Lathyrus leucanthus Rydb. (W) Jarre Can., Douglas Co. Colo. 26 May 1978. Oviposition 13:00 on flower pedicel, and several other eggs found on calyx, of Vicia americana Muehl. (S) North Table Mtn., Jefferson Co. Colo. 23 May 1980. Larvae probably eat leaves and flowers/fruits.

E. comyntas (God.). Ovipositions 14:00, 14:09, 14:11 on flowers of Trifolium repens (S) 10 mi. E of Colorado Springs, El Paso Co. Colo. 9 Sept. 1971. Oviposition 11:30, 12:09 on calyx of T. repens (S) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977. Oviposition 13:38 on leaf of T. repens (S) Comanche Creek E of Kiowa, Elbert Co. Colo. 11 Aug. 1978. Found only along creeks or wet swales on the plains and lower foothills in Colo. (sympatric with amyntula at Tucker Gulch and the gulch N Idledale, both Jefferson Co.), whereas amyntula occurs on drier slopes etc. in the mountains. Probably eats leaves and flowers/fruits.

Glaucopsyche lygdamus (Dbldy.). Ovipositions 9:20 and 9:34, and 12 eggs found on flower buds, 11 eggs found on immature leaves, 8 eggs found on mature leaves, all on Astragalus miser (W) Saguache Park, 11000', Saguache Co. Colo. 24 June 1971. Oviposition on unopened flower buds of Astragalus adsurgens var. robustior (W) Mt. Zion, Jefferson Co. Colo. 11 June 1978. Oviposition on Lupinus argenteus (S) Chautauqua Mesa, Boulder Co. Colo. May 1965. Oviposition 9:30 on flower buds of L. argenteus (S) and 2 other eggs found on buds, Red Rocks, Jefferson Co. Colo. 22 May 1977. Oviposition 11:32 very young flower buds of L. argenteus (S) Chimney Gulch, Jefferson Co. Colo. 28 June 1978. Oviposition 8:38 on flower bud of L. argenteus (S) Green Mtn., Jefferson Co. Colo. 12 June 1980. Oviposition under leaf of Thermopsis divaricarpa (S) Blackman Trail, Gilpin Co. Colo. 19 June 1977. Oviposition 11:55 T. divaricarpa (S) Chimney Gulch, Jefferson Co. Colo. 17 May 1979. Oviposition 11:55 on T. divaricarpa (S) flower buds on hilltop, Lookout Mtn., Jefferson Co. Colo. 17 May 1979.

G. piasus (Bdv.). Oviposition 8:51 of 2 eggs together on side of flower bud of Lupinus argenteus (S) Green Mtn., Jefferson Co. Colo. 12 June 1980. Ovipositions 11:30, 11:34 on flower buds of L. argenteus (S) Chimney Gulch, Jefferson Co. Colo. 1 July 1978. Oviposition L. argenteus (S) Chautauqua Mesa, Boulder Co. Colo. May 1965.

Plebejus idas ("argyrognomon") (Berg.). Oviposition 14:00 Lotus oblongifolius var. nevadensis (C) Scott Camp Creek, SW of Shasta City, Siskiyou Co. Calif. 3 Aug. 1974. Adults common about Astragalus alpinus L. (W) N Weminuche Pass, 10500', Hinsdale Co. Colo. 31 July 1972, and also at Slumgullion Pass, Hinsdale Co. Colo. 30 July 1972.

P. melissa (Edw.). Oviposition 9:55 under leaf of Astragalus flexuosus (W) Chimney Gulch, Jefferson Co. Colo. 17 July 1978. Oviposition 12:28 on dead grass touching stem of A. flexuosus (W) Chimney Gulch 28 June 1978. Oviposition 12:44 on top of leaflet next to stem (after walking from a flower down the stem) of A. flexuosus (S) Green Mtn., Jefferson Co. Colo. 19 June 1985. Six eggs found on Astragalus mollissimus Torr. (S) Central Plains Experiment Station, Weld Co. Colo. 7 Sept. 1976. Ovipositions 13:12, 13:32, 13:39 and three other eggs found (under leaves except 1 on top, 1 on litter below plant) on Astragalus adsurgens var. robustior (S) Green Mtn., Jefferson Co. Colo. 4 Sept. 1984. Fifteen eggs laid on Astragalus miser (W) E Alamosa, Alamosa Co. Colo. 16 Aug. 1974. Oviposition 11:30 Astragalus whitneyi Gray (M) peak top SE of Sonora Pass, alpine zone, Mono Co. Calif. 25 Aug. 1974 (this population can be called P. melissa form annetta Nab., because the orange spots are slightly smaller than in lowland colonies). Oviposition 10:47 on stem of Astragalus drummondii Dougl. in Hook (S) after landing on leaf and walking down stem 3 cm., Green Mtn., Jefferson Co. Colo. 7 June 1985. Two eggs laid 10:40 on dead twig and grass stem beneath A. drummondii (G), plus 32 eggs found on debris beneath plants, 8 eggs on stems several cm above ground, all on A. drummondii, Austin Bluffs near Pulpit Rock, NE Colorado Springs, El Paso Co. Colo. 6 Sept. 1971; one egg on ground beneath, 1 egg on lower stem, of Lupinus argenteus (S), Austin Bluffs, 6 Sept. 1971 (L. argenteus plants were commoner than A. drummondii here but few eggs were found on argenteus, indicating that females prefer drummondii for oviposition); all eggs were placed near the ground, and ovipositing females land on leaves then crawl down the stem to the base to oviposit. Oviposition on hairy stem of Oxytropis sericea Nutt. (S) near the ground, and 3 other eggs found there, NW Gardner, Huerfano Co. Colo. 16 June 1973. Larva on flowers

of O. sericea (S) raised to adult Central Plains Experiment Station July 1976. Oviposition 11:15 on twig on ground after walking down stem of Medicago sativa (S) 14 mi. N Camp Cottonwood, Montezuma Can., San Juan Co. Utah 25 Aug. 1977. Adults common on Psoralea tenuiflora Pursh (S) Green Mtn., Jefferson Co. Colo. (on flowers), which is not a host. Oviposition 13:00 under leaf of Eriogonum umbellatum var. majus (=E. subalpinum) (R) Keystone Gulch, Summit Co. Colo. 6-7-8 Aug. 1977 Glenn R. Scott (this is apparently an error in oviposition by the female, but is interesting nonetheless, because several other Lycaenidae [Callophrys affinis, Plebejus acmon] eat both Leguminosae and Eriogonum as larvae).

P. icarioides (Bdv.). 30 eggs found on leaves of Lupinus plattensis Wats. (F) Central Plains Experimental Range, Weld Co. Colo. June 1976. Two eggs on top of leaves, 1 egg on side of flower bud (eggs identical to eggs dissected from female), of Lupinus argenteus (S) Chimney Gulch, Jefferson Co. Colo. 1 July 1978. Oviposition 12:22 on top of leaf of L. argenteus (S) Golden Gate Can., Jefferson Co. Colo. 8 July 1978. Oviposition 10:08 on leaf underside of L. argenteus (S), oviposition 10:09 on grass blade beside L. argenteus (S), another egg found under same grass blade, Red Rocks, Jefferson Co. Colo. 20 June 1984. Oviposition 9:53 on side of young terminal flower bud of L. argenteus (S) Shingle Creek, Jefferson Co. Colo. 23 July 1984. Oviposition 10:48 on side of dry folded leaf of L. argenteus (S) Genesee Park, Jefferson Co. Colo. 5 Aug. 1984. Oviposition 10:34 on flower bud, another egg found nearby, oviposition 11:38 on top of leaf bud, all on L. argenteus (S), Green Mtn., Jefferson Co. Colo. 8 June 1985. Oviposition 11:35 under L. argenteus (S) leaf Corwina Park, Jefferson Co. Colo. 13 July 1985. Oviposition 9:30 on L. argenteus (S) leaf N Dillon, Summit Co. Colo. 15 July 1985. L. argenteus is the main host in Colo., as adults are associated with it in Jefferson, Boulder, Custer, Saguache, Arapahoe, Elbert, Eagle, Summit, and Hinsdale Cos., and in Rio Arriba Co. New Mex., though adults were associated with Lupinus ammophilus Greene (S) at Texas Creek, Mineral Co. Colo. 21 Aug. 1979.

P. saepiolus (Bdv.). Oviposition 8:25 on flower of Trifolium parryi (W) Loveland Pass, Summit Co. Colo. 19 July 1977. Three ovipositions on T. parryi (W) Loveland Pass 28 July 1978. Oviposition 8:07 on base of Trifolium repens (S) flower, Toll Ranch, Gilpin Co. Colo. 27 July 1977. Oviposition two eggs 10:45 on flowers of T. repens (S) N fork Clear Creek, Gilpin Co. Colo. 2 July 1978. Always along creeks or in moist meadows, though more widespread on moist alpine tundra; several populations occur on the plains adjacent to the foothills (E Marshall, Boulder Co., and gulch on NE side Green Mtn., Jefferson Co.).

P. acmon acmon (Westw. & Hew.). Oviposition Lotus oblongifolius (Benth.) Greene var. nevadensis (Gray) Munz (C) Cottonwood Glade, 6000', Glenn Co. Calif. 16 June 1974 John Lane and J. Scott. Assoc. with E. lobbii var. robustius (R) SE Virginia City, Storey Co. Nev. 15 June 1972.

P. acmon lutzi (dos P.). Assoc. with E. heracleoides var. heracleoides Nutt. (R) Talamantes Creek, Moffat Co. Colo. 8 July 1972.

P. acmon lutzi f. spangelatus Burd. This little-known form occurs above timberline in Washington, Alberta, and Colorado, and is characterized by much smaller uph orange lunules and a darker-gray unh. In Colo. adults are associated with Eriogonum flavum Nutt. var. xanthum (Small) Stokes (S) at all of these alpine zone locations in the Front Range, Sawatch Range, and Sangre de Cristo Mts.: McClellan Mtn. 12800', Clear Creek Co. Colo. 15 July 1980; Mt. Bross 13200', Park Co. Colo. 31 July 1982; Mt. Massive 12500', Lake Co. Colo. 1 Aug. 1982; Baldy Peak 12000', Custer Co. Colo. 29 July 1970; Dry Lakes 11500', Custer Co. Colo. 16 July 1968. Adults fly about 10 cm above these plants and are rather local.

P. acmon texanus Gdp. Oviposition 12:52 on side of calyx of flower bud of Eriogonum lonchophyllum (S) Bandimere Speedway, Jefferson Co. Colo. 10 Aug. 1984. Oviposition on pedicels of Eriogonum effusum (S) Westcliffe, Custer Co. Colo. July 1965. Oviposition 10:05 E. effusum (S) calyx Green Mtn., Jefferson Co. Colo. 18 Aug. 1977. P. acmon must feed on a wide variety of Eriogonum, because adults are

associated with E. corymbosum var. velutinum Reveal (R) ridge 3 mi. S Cortez, Montezuma Co. Colo. 6 Sept. 1978; assoc. with E. annuum Nutt. (R) Hwy. 285 11 rd. mi. N Espanola, Rio Arriba Co. New Mex. 9 Sept. 1977; assoc. with E. cernuum Nutt. (S) Kerr Gulch, Fremont Co. Colo. 15 Aug. 1973; and assoc. with E. cernuum var. cernuum (R) Trout Creek 5.6 mi. SW jct. of hwys. 285 & 24, 8500', Chaffee Co. Colo. 29 Aug. 1977. Adults seem rather local and always occur near the Eriogonum hosts. It has been conjectured that acmon migrates northward each year on the plains, but this is doubtful: on the plains of S Colo. (Scott & Scott 1980) there are 7 records from May 4-June 8, 10 from June 26-July 31, 6 from Aug. 19-Sept. 14; on the plains near Denver acmon does seem most common L Aug.-E Sept.

P. lupini monticola (Clem.). Adults associated with Eriogonum umbellatum new yellow var. (R) Big Pine Meadow, Tulare Co. Calif. 7 July 1974.

Plebejus shasta shasta (Edw.) Oviposition Astragalus whitneyi (M) Sonora Pass, Mono Co. Calif. 25 Aug. 1974.

P. shasta pitkinensis (F.). Oviposition Trifolium dasyphyllum (G) Baldy Peak, Custer Co. Colo. 29 July 1970. Oviposition 11:05 on leaf petiole of a small Oreoxis alpina (Gray) C. & R. (Umbelliferae; S) plant growing amid a 10-cm wide T. dasyphyllum (S) plant Loveland Pass, Summit Co. Colo. 5 Aug. 1985; egg failed to hatch, evidently diapausing. Ovipositions 11:13-11:25 four eggs on leaves of Trifolium nanum Torr. (W) Loveland Pass, Summit Co. Colo. 25 July 1978. One solid green larva attached with silk girdle beneath rock raised to adult, Loveland Pass 15 July 1980. Three prepupae and 9 pupae under rocks, Uncompahgre Peak, Hinsdale Co. Colo. 18 July 1980; pupae are green with tan head and end of abdomen, and sometimes the posterior part of wings is tan also. Eggs evidently hibernate, and Emmel & Shields (1980) reported that nearly mature larvae of ssp. shasta hibernate; thus high altitude shasta populations are apparently biennial, hibernating as eggs the first winter, then as nearly mature larvae the second winter.

Plebejus shasta minnehaha (Scud.). Oviposition 10:20 under leaf petiole of Astragalus spatulatus Sheld. (S) Terry Road Exit of I-25, Laramie Co. Wyo. 2 July 1985; the egg refused to hatch and is evidently diapausing. Adults assoc. with A. spatulatus (F) Central Plains Experiment Station, Weld Co. Colo. June 1976. Eggs apparently hibernate, but perhaps larvae do not, giving this lowland ssp. an annual life cycle, although perhaps it is also biennial.

P. glandon (Prun.). Oviposition 12:08 and 25 eggs (21 under leaves, 1 on top of leaf, 4 on calyx) found on Androsace septentrionalis L. (S) NE of Salida 8500', Chaffee Co. Colo. 12 July 1971. Oviposition 14:25 on inflorescence of A. septentrionalis (S) Central City, Gilpin Co. Colo. 23 June 1973. Oviposition 9:30 on bract at base of umbel of A. septentrionalis (S) Loveland Pass, Summit Co. Colo. 19 July 1977. Oviposition 11:30 on lower leaf and two eggs found on bases of lower leaves of A. septentrionalis (S) West Chicago Creek 9200', Clear Creek Co. Colo. 31 July 1977. Oviposition 10:37 and 5 other eggs found (4 eggs on calyx and 2 under leaves) all on A. septentrionalis (S) Loveland Pass, Summit Co. Colo. 25 July 1978. Two ovipositions under leaves of Androsace chamaejasme Host. ssp. carinata (Torr.) Hult. (S) Hermit Pass, Custer Co. Colo. 1 Aug. 1971. Amazingly, the butterfly is able to mature eating the very tiny Androsace plant.

Euphilotes battoides (Behr). Although the following are only association records, the intense restriction of adults of Euphilotes to their larval hostplants makes association records very useful. Adults associated with Eriogonum jamesi var. jamesi (G. & S.) throughout Pueblo, Custer, Fremont, Chaffee, and Saguache Cos. Colo., which is surely the only hostplant there. Adults assoc. with E. umbellatum new yellow var. (R) Big Pine Meadow, Tulare Co. Calif. 7 July 1974. Adults assoc. with E. umbellatum var. subaridum (S. Stokes) Munz (R) Westgard Pass, Inyo Co. Calif. 7 July 1974. Adults assoc. with E. fasciculatum var. polifolium (Benth.) S. Stokes (R) Red Rock Can., El Paso Mts., Kern Co. Calif. 5 May 1974. Adults assoc. with E. corymbosum var. orbiculatum (R) NE Gateway, Mesa Co. Colo. 23 Aug. 1977. Adults assoc. with E. corymbosum var. velutinum (R) E Aztec, San Juan Co. New Mex. 27 Aug. 1977.

E. enoptes (Bdv.). Oviposition 10:32 in flower of Eriogonum umbellatum (W) Red Rocks, Jefferson Co. Colo. 7 July 1978. Oviposition 9:45 on inner surface of E. umbellatum (S) petal Green Mtn., Jefferson Co. Colo. 15 June 1985. Preoviposition 13:40 E. umbellatum (S) flowers Chimney Gulch, Jefferson Co. Colo. 28 June 1978. Adults associated with E. umbellatum (S) throughout Larimer, Boulder, Jefferson, and Gilpin Cos. Colo. Adults associated with Eriogonum nudum var. nudum Dougl. ex. Benth. (R) Big Hill Lookout, El Dorado Co. Calif. 30 June 1974. Adults associated with E. nudum var. nudum (R) Anthony Peak Lookout, Mendocino Co. Calif. 29 June 1974. Adults associated with E. heracleoides var. heracleoides (R) Talamantes Creek, Moffat Co. Colo. 8 July 1972.

E. rita (B. & McD.). Oviposition inside flower of Eriogonum effusum (S) 1 mi. S Silver Cliffe, Custer Co. Colo. 7 Aug. 1965. Larva (mostly red in color, matching the old flowers and fruits) on flowers of E. effusum (S) raised to adult, Central Plains Experiment Station, Weld Co. Colo. Sept. 1976 (the pupa hibernated). Adults associated with Eriogonum leptocladon var. leptocladon Torr. & Gray (R) NW of Moab, Grand Co. Utah 24 Aug. 1977. Adults associated with E. leptocladon var. ramosissimum (R) sand dunes E of Shiprock, San Juan Co. New Mex. 5 Sept. 1977. Adults associated with E. l. var. ramosissimum (S) dunes N of Rock Point Trading Post, Apache Co. Ariz. 19 Aug. 1980. Adults associated with E. l. var. ramosissimum (W) stateline SE Aneth, Montezuma Co. Colo. 6 Sept. 1978. Adults associated with E. rotundifolium Benth (R) sand dunes 5 mi. NE San Felipe Pueblo, Sandoval Co. New Mex. 9 Sept. 1977.

E. spaldingi B. & McD. Adults associated with Eriogonum racemosum Nutt. (R) Animas River 7.2 mi. N New Mex. line, La Plata Co. Colo. 27 Aug. 1977.

Philotes sonorensis (F. & F.). Ten eggs on Dudleya cymosa (Lem.) Britt. & Rose (S) Lang Crossing, South Yuba River, Nevada Co. Calif. 27-28 April 1978, Ralph Wells, J. Scott and Oakley Shields. Two eggs on D. cymosa (S) Blue Ravine, SW Allegheny, Sierra Co. Calif. 12 May 1974, Ralph Wells, J. Scott.

Hesperiidae

Epargyreus clarus (Cram.). Oviposition 11:12 under leaf of Glycyrrhiza lepidota (S) Marshall, Boulder Co. Colo. 3 July 1971. Oviposition 8:20 on dead leaf of Monarda fistulosa var. menthaefolia (Graham) Fern. (S) (not a larval host) several cm from many plants of G. lepidota (S) Chimney Gulch, Jefferson Co. Colo. 10 July 1978. Two eggs found under leaves of Robinia neomexicana Gray (S) Lakewood, Jefferson Co. Colo. 9 July 1977. 4 larvae on R. neomexicana (S) Lakewood, Jefferson Co. Colo. 4 Aug. 1978. Adults associated with Lotus crassifolius (Benth.) Greene (M) 5 mi. SE Goat Mtn., Colusa Co. Calif. 8 June 1974. Pupae hibernate.

Erynnis icelus (Scud. & Burg.). Oviposition 12:43 on leaf of 10 cm Populus tremuloides Michx. (S) seedling, Hopewell Lake Cgd., Rio Arriba Co. New Mex. 21 June 1978.

E. brizo (Bdv. & Lec.). Preoviposition on Quercus havardii Rydb. (S; 1 m shrubs in thickets with 3 cm live-oak-type leaves) 8 mi. W. Roy, Harding Co. New Mex. 12 May 1985.

E. martialis (Scud.). Oviposition 9:20 on leaf below flower buds of Ceanothus fendleri (S) Ralston Butte, Jefferson Co. Colo. 20 June 1980.

E. persius (Scud.). Oviposition on leaf of Astragalus sp. (probably bisulcatus but no pods present) (G,W) Rosita, Custer Co. Colo. 27 June 1969. Oviposition 10:02 Astragalus flexuosus (S) leaflet, grassland S of Idledale 7600', Jefferson Co. Colo. 10 June 1980. Oviposition 11:28 on leaflet of Lupinus argenteus (S) North Table Mtn., Jefferson Co. Colo. 4 June 1980. Oviposition young plant of Thermopsis sp. (W) Hopewell Lake 9800', Rio Arriba Co. New Mex. 21 June 1978. Preoviposition 12:54 Thermopsis divaricarpa (S) Mt. Falcon, Jefferson Co. Colo. 30 May 1980. Oviposition 12:28 under young leaf of Thermopsis sp. undoubtedly divaricarpa (S) SE Golden Gate Can. State Park, Gilpin Co. Colo. 17 June 1984.

E. afranius (Lintn.). Oviposition Lupinus argenteus (S) Gregory Can., Boulder Co. Colo. May 1966. Oviposition on leaf of small plant of L. argenteus (S) Box Elder Creek, Arapahoe Co. Colo. 8 Aug. 1973.

Pholisora catullus (Fabr.). Larva raised from Amaranthus retroflexus (S) Woodmen Valley, El Paso Co. Colo. 26 Aug. 1973. 5 larvae on A. retroflexus (S) Green Mtn., Jefferson Co. Colo. 12 & 18 Aug. 1977. Larva on A. retroflexus (S) N of Idledale, Jefferson Co. Colo. 21 Aug. 1977. 1 egg on A. retroflexus (S) 10 mi. SW Elbert, El Paso Co. Colo. 3 July 1978. Oviposition 10:00 on upperside of leaf of A. retroflexus (S) Lowry Bombing Range, Arapahoe Co. Colo. 11 Aug. 1978. Many eggs and larvae on A. retroflexus (S) Green Mtn., Jefferson Co. Colo. 14 Aug. 1978. Larvae on A. retroflexus L. (S) raised to adults Kansas City Airport, Missouri 14 July 1977. 30 eggs and 8 larvae on Amaranthus graecizans L. (S) N of Boulder, Boulder Co. Colo. 24 Aug. 1973. 6 larvae on A. retroflexus (S), 3 larvae on Chenopodium album L. (S), both Timnath, Larimer Co. Colo. 28 Aug. 1973. 1 egg and 1 large larva on Amaranthus albus L. (S), 30 eggs and 23 larvae on A. retroflexus (S), 5 eggs and 10 larvae on A. graecizans (S), 1 egg on C. album (S), all Green Mtn., Jefferson Co. Colo. 30 Aug. 1973. Eggs are laid singly on top of leaves. Young larvae roll the edge of a leaf and feed on the epidermis; older larvae live in a rolled leaf or tie small leaves together into a nest. Most of these hosts are weeds (A. retroflexus is the commonest weed in agricultural fields in Colo., and A. graecizans is thick on sidewalks and roadsides). The butterflies fly along gulch bottoms, roadsides, and the edges of fields where these weeds occur. Three host genera reported in the literature (Ambrosia trifida (S), Monarda fistulosa var. menthaefolia (Graham) Fern (S), and Marrubium vulgare L. (S)) are all errors, because 30 larvae put in a container with these three plants did not eat any of them.

P. mejicanus (Reak.). Larvae raised from Amaranthus retroflexus (S) Woodmen Valley, El Paso Co. Colo. 26 Aug. 1973. Larvae from A. retroflexus (S) raised to adults Woodmen Valley, El Paso Co. Colo. 10 July 1977. Oviposition on top of leaf of Amaranthus graecizans (S) Kerr Gulch, Fremont Co. Colo. 15 Aug. 1973. A young larva ate Chenopodium sp. in the lab. Larvae roll leaves and have the same habits as catullus; adults fly along gulch bottoms, railroad tracks, and roadsides.

Pyrgus centaureae (Ramb.). Oviposition 12:15 on Vaccinium cespitosum (S)(not a hostplant) next to Potentilla diversifolia Lehm. (W), and preoviposition on another P. diversifolia plant, Loveland Pass, Summit Co. Colo. 17 July 1977.

P. xanthus Edw. Ovipositions 13:17 & 13:20 at base of leaf of small plants of Potentilla gracilis var. pulcherrima (Lehm.) Fern. (W) W Hopewell Lake Cgd., Rio Arriba Co. New Mex. 20 June 1978. Adults associated with P. g. var. pulcherrima (W & G) at Rosita, Custer Co. Colo. May 1972, at Luders Creek Cgd., Saguache Co. Colo. 28 May 1972, & at Trout Creek Pass, Chaffee Co. Colo. Oviposition 11:00 on stalk of stamen of flower of Potentilla subviscosa Greene (W) after 5 preovipositions among flowers of this species (adults very often feed on subviscosa nectar also) Ledoux, Mora Co. New Mex. 15 May 1985. The abundant males patrolled about subviscosa here, and perched among them about 50% of the time; a few males perched in an adjacent gulch bottom (the preferred mate-location site at low density). Adults associated with Potentilla hippiana Lehm. (W) at Rosita May 1972, at Poncha Pass, Saguache Co. Colo. 27 May 1972, at Luders Creek Cgd. 28 May 1972, at Bartlett Mesa N of Raton, Colfax Co. New Mex. 3 May 1972, at Trout Creek Pass, and at Devil's Hole, Huerfano Co. Colo. (Note: these hippiana plants were previously misidentified as Potentilla anserina L., see Scott 1975b and Scott & Scott 1980, but the plant specimens are now reidentified as P. hippiana (all W); P. anserina is erroneous.). Adults associated with Potentilla pennsylvanica L. at Bartlett Mesa 3 May 1972. Adults associated with and preovip. on non-flowering Potentilla ambigens (W) at Cloudcroft, Otero Co. New Mex. 21 April 1972, where high-density males patrolled about this plant. Females evidently prefer to lay eggs inside host flowers if present, but lay on young leaves if flowers are not common. Adults fly only 2-5 cm above ground.

P. scriptura (Bdv.). Oviposition Sphaeralcea coccinea (S) Green Mtn., Jefferson Co. Colo. 17 July 1973. Adults also fly near ground.

P. communis (Gr.). Larva raised from Malva neglecta Wallr. (S) Coaldale, Fremont Co. Colo. 10 Sept. 1971. Oviposition 12:00 M. neglecta (S) Lockeford, San Joaquin Co. Calif. 15 Sept. 1973. Oviposition Sphaeralcea coccinea (Pursh) Rydb. (G) Bull Domingo Hills, Custer Co. Colo. 8 July 1969. Oviposition S. coccinea (S) Green Mtn., Jefferson Co. Colo. 23 July 1973. Oviposition S. coccinea (S) 1 mi. S Silver Cliffe, Custer Co. Colo. 7 Aug. 1965. Oviposition 11:55 on leaf of S. coccinea (S) Lowry Bombing Range, Arapahoe Co. Colo. 11 Aug. 1978. Oviposition 10:24 on top of leaf of S. coccinea (S) Green Mtn., Jefferson Co. Colo. 7 June 1985. Oviposition 11:30 Sphaeralcea parvifolia A. Nels. (W) 2 mi. N Mesa Co. line S of Gateway, Mesa Co. Colo. 1 May 1978. 3rd stage larva found in silked leaf nest (the leaf folded over with the larva inside) on Sidalcea neomexicana (S) Bijou Creek, Elbert Co. Colo. 22 Aug. 1984. Adults associated with S. neomexicana Gray (W) at Questa, Taos Co. New Mex. 10 Sept. 1977, and at La Madera, Rio Arriba Co. New Mex. 10 Sept. 1977, and at Peter's Spring, 5 mi. N Monticello, San Juan Co. Utah 24 Aug. 1977. In central Colo., larvae eat Malva in towns, Sidalcea in moist meadows, Sphaeralcea on grassland.

Thorybes pylades (Scud.). Oviposition 14:00 under leaf of Lathyrus eucosmus B.& St. J. (S) Red Rocks, Jefferson Co. Colo. 23 May 1977. Adults associated with Lotus crassifolius (M) 5 mi. NE Goat Mtn., Colusa Co. Calif. 8 June 1974.

T. mexicana (H.-S.). Oviposition 13:12 Trifolium longipes (S) Hopewell Lake Cgd., Rio Arriba Co. New Mex. 21 June 1978. Oviposition 9:49 on T. longipes (W) 1 mi. E Hopewell Lake Cgd., Rio Arriba Co. New Mex. 21 June 1978. Ovipositions 12:25 & 12:30 under leaves of Vicia americana (W) Hopewell Lake, Rio Arriba Co. New Mex. 21 June 1978.

Oarisma garita (Reak.). Oviposition 10:09 on Poa agassizensis (W) Red Rocks, Jefferson Co. Colo. 25 June 1978. Oviposition Poa pratensis (F) Central Plains Experiment Station, Weld Co. Colo. 20 June 1976. Oviposition 10:00 Sitanion hystrix (Nutt.) J. G. Smith (B) Round Mtn., Custer Co. Colo. 14 July 1970. Oviposition 10:15 Blepharoneuron tricholepis (Torr.) Nash (B) 2 mi. NE Rosita, Custer Co. Colo. 14 July 1970. Oviposition Stipa columbiana Macoun. (B) Bull Domingo Mine, Custer Co. Colo. 14 July 1970.

Yvretta rhesus (Edw.). Preoviposition Bouteloua gracilis (S) Central Plains Experiment Station, Weld Co. Colo. 11 June 1976 J. Scott & David L. Wagner. This is undoubtedly the native host, based on association at many sites.

Hesperia uncas Edw. Oviposition on Bouteloua gracilis (S) Bull Domingo Hills, Custer Co. Colo. 3 July 1969. Oviposition B. gracilis (S) Round Mtn., Custer Co. Colo. 2 July 1969. Oviposition B. gracilis (S) Bear Creek, Chaffee Co. Colo. 26 June 1969. Oviposition B. gracilis (S) Green Mtn., Jefferson Co. Colo. 23 June 1972. Preovipositions 4 times at 13:40 on B. gracilis (S) and twice on Thlaspi arvense (S) dried inflorescence Green Mtn. 10 Aug. 1978.

H. comma (L.). One egg found on Andropogon saccharoides Swartz (B) 1 mi. N Cheesman Res., 3 Sept. 1971. 8 eggs on Carex sp. (B), 3 eggs on A. saccharoides (B), 3 eggs on leaves of Arenaria fendleri Gray (G), all eggs with the characteristic basal flange of comma, and one oviposition on Bouteloua gracilis (B), all 1 mi. N Cheesman Res., Jefferson Co. Colo. 7 Sept. 1971. Oviposition 11:46 B. gracilis (B) Nighthawk, Douglas Co. Colo. 1 Sept. 1970. Some eggs laid in lab by females from Tennessee Pass, Lake Co. Colo. 17 Nov. 1978 hibernated, while others hatched in the lab and the larvae ate Poa pratensis. Eggs hibernate. Females evidently lay eggs haphazardly, and larvae will eat many grasses in the lab (Scott 1975c reared seven Hesperia on Poa pratensis and Digitaria).

H. juba (Scud.). Oviposition Poa pratensis (S) Fort Collins, Larimer Co. Colo. 5 June 1976. Oviposition 12:50 Poa agassizensis (W) 5 mi. SE Bailey, Park Co. Colo. 31 May 1977.

H. nevada (Scud.). Oviposition Koeleria sp. (W) 2 mi. NE Rosita, Custer Co. Colo. 30 June 1969.

H. pahaska Leuss. Ovipositions 9:35, 10:46, 12:05, 13:38, 14:20, 14:27 under leaves (usually near the outer edge of the clump) of

Bouteloua gracilis (S) 1 mi. up Bear Creek, Chaffee Co. Colo. June 1969 and June 1970 (Scott 1974a reports movements and behavior).

H. viridis (Edw.). Oviposition Bouteloua gracilis (S) 1 mi. up Bear Creek, Chaffee Co. Colo. June 1969 and June 1970. Oviposition Bouteloua curtipendula (Michx.) Torr. (W) 10:40 Chimney Gulch, Jefferson Co. Colo. 17 July 1978.

H. ottoe Edw. Oviposition 10:12 on side of leaf, oviposition 12:00 on side (top) of leaf, both on Andropogon gerardii Vitm. (S) Red Rocks, Jefferson Co. Colo. 11 July 1984. 2 eggs (cream like eggs laid by identified females) found on leaves of A. gerardii (S) Red Rocks 12 July 1984. Oviposition 8:25 under A. gerardii (S) leaf, preoviposition 9:35 under gerardii (S) leaf, (another ovip. on gerardii (S) seen by William McGuire), Red Rocks 4 July 1985.

H. leonardus montana (Skin.). Ovipositions 9:30, 10:30 under leaves of Bouteloua gracilis (S) Lone Rock Cgd., Jefferson Co. Colo. 2 Sept. 1979.

H. leonardus pawnee Dodge. Oviposition 12:11 on dead leaf tip of Carex heliophila (S) in 2 m-wide patch of this sedge, while female was resting on Thlaspi arvense plant (one shoot of Stipa viridula Trin. (W) was 5 cm from egg) Green Mtn., Jefferson Co. Colo. 5 Sept. 1985. Oviposition 12:01 under Aster ericoides (S) leaf (only Carex heliophila Mack. (S) was all around egg, Stipa viridula Trin. (W) was 10 cm and 15 cm from egg, a Bouteloua gracilis (S) plant was 25 cm from egg) Green Mtn. 14 Sept. 1985. Oviposition 12:01 under Sporobolus cryptandrus (Torr.) Gray (W) Green Mtn. 12 Sept. 1985. Oviposition 13:25 under B. gracilis (S) leaf (the nearest other monocot was Stipa sp. (S) 25 cm away) Green Mtn. 14 Sept. 1985. Oviposition 13:37 under B. gracilis (S) leaf (the nearest other monocot was a small Stipa comata (W) 30 cm away) Green Mtn. 14 Sept. 1985. Oviposition 15:41 on bract of dead Bromus tectorum (S) (nearby live monocots were B. gracilis (S) beneath and common all around egg, a small Agropyron smithii Rydb. (W) 10 cm from egg, a big Sporobolus cryptandrus (W) clump 20 cm from egg) Green Mtn. 14 Sept. 1985. Oviposition 10:51 under fruit of dead Thlaspi arvense (S) plant among many B. gracilis (S)(the only other nearby monocots were two small Stipa viridula (W) clumps both 20 cm away) Green Mtn. 19 Sept. 1985. Larvae probably eat many grasses and sedges, though the short green turflike species Bouteloua gracilis and Carex heliophila are possible favorites (lab larvae eat Poa pratensis etc., Scott 1975c).

Hylephila phyleus (Drury). Oviposition 10:00 on "lawn grass" (S) Wellman Hall, University of California, Berkeley, Calif. 22 Oct. 1971.

Polites origenes (Fab.). Oviposition 10:45 under leaf of Andropogon gerardii (S) Red Rocks, Jefferson Co. Colo. 11 July 1984. 5 eggs (pale green like eggs laid by identified females) found on leaves of A. gerardii (S) Red Rocks, Jefferson Co. Colo. 12 July 1984. Oviposition 8:54 under A. gerardii (S) leaf Red Rocks 4 July 1985.

P. sabuleti sabuleti (Bdv.). Adults associated with Distichlis spicata (L.) Greene var. stricta (Torr.)(C) 1 mi. W Kingston, Piute Co. Utah 11 Aug. 1974, and at Green River, Emery Co. Utah 23 Aug. 1974, and at Barr Lake, Adams Co. Colo. 29 Aug.-8 Sept. 1984, and at 1 mi. NW Brighton, Weld Co. Colo. 2 Sept. 1984. This is the usual host in the Great Basin, on alkali flats on valley bottoms. Adults assoc. with Poa sp. and other grasses in wet meadows at many sites in La Plata and Montezuma Cos. Colo. and San Juan and Santa Fe Cos. New Mex. Adults associated with Eragrostis trichodes (Nutt.) Wood (S) at 4 mi. NE Pilar, Rio Grande, Taos Co. New Mex. 10 Sept. 1977, and at .6 mi. E La Madera, Rio Arriba Co. New Mex. 10 Sept. 1977; despite having the same probable host as P. s. ministigma, adults along the Rio Grande of N New Mex. are ssp. sabuleti. There are two flights in Adams Co. Colo. (E June and L Aug.-E Sep.) and apparently in W Colo.-N New Mex.-Utah-C Nev.

P. sabuleti ministigma Scott. 11 eggs found on Eragrostis trichodes (B), 1 egg found on Equisetum sp. (S), 1 egg found on unknown dicotyledon (S), all near E. trichodes, NE of Hayden Creek Cgd., Fremont Co. Colo. 10 July 1971. Adults also associated with E. trichodes (S) in the San Luis Valley, Colo. Only one flight in the San Luis Valley and Arkansas River Canyon.

P. sabuleti chusca (Edw.). Adults associated with Distichlis spicata var. stricta Mesquite, Clark Co. Nev. 8 Aug. 1974. Ssp. chusca must have 2-3 flights/year.

Atrytone arogos (Bdv. & LeC.). Oviposition 11:10 under leaf of Andropogon gerardii (S) Red Rocks, Jefferson Co. Colo. 15 July 1984. The egg was pale yellow, developing a slight red ring on top after a day or so; the stage 1 larva was cream with a red-brown head.

A. logan (Edw.). Three eggs cream with red rings (two eggs with a wide lower red ring and a narrow upper red ring, one egg with only one wide red ring, hatching into cream larvae with ochre heads; these eggs resemble an egg laid by a female logan, and the hatching larvae had paler heads than those of A. arogos) found on leaves of Andropogon gerardii (S) Red Rocks, Jefferson Co. Colo. 12 July 1984. The stage 3 larval head (from the egg laid by the known female) is ochre with three dark-brown vertical bands on each side, and a middorsal dark-brown band which splinters ventrally into five lines positioned beside, at the edge of, and centered in the frontoclypeus.

Ochlodes snowi (Edw.). Ovipositions 10:25 and 10:35 under leaves at the edge of a clump of Blepharoneuron tricholepis (B) Rosita, Custer Co. Colo. 26 July 1970. Before ovipositing the females hover over the grass, flying back and forth about 20 cm above the grass before landing and ovipositing (Scott 1974a reports movements and behavior).

O. yuma (Edw.). Oviposition on basal leaves of Phragmites australis (Cav.) Trin. ex Steud. (=communis Trin.)(S) NE jct. Hwy. 160 and Hatch Wash, San Juan Co. Utah 23 Aug. 1974. Adults are associated with this plant at all sites throughout its range--apparently one of very few Hesperiinae skippers that are restricted to one hostplant.

Poanes taxiles (Edw.). Oviposition Puccinellia airoides (Nutt.) Wats. & Coult. (B) Green Mtn., Jefferson Co. Colo. 11 July 1972. Oviposition Agropyron smithii Rydb. var. molle (Scribn. & Smith) Jones (W) Fort Collins, Larimer Co. Colo. 28 June 1977. Oviposition 10:45 under leaf of Agropyron trachycaulum (Link) Malte (S) Falcon County Park, Jefferson Co. Colo. 14 July 1984. Oviposition 14:15 on Dactylis glomerata L. (W) Chimney Gulch, Jefferson Co. Colo. 17 July 1978. Oviposition 10:02 leaf of Elymus canadensis L. (W) Chimney Gulch, Jefferson Co. Colo. 10 July 1978. Oviposition 10:20 beneath leaf of E. canadensis L. (W) Falcon County Park, Jefferson Co. Colo. 28 July 1984. Oviposition 10:44 under leaf of Agrostis gigantea Roth (W) Golden Gate Can., Jefferson Co. Colo. 18 July 1984. Evidently any moist-habitat (streamside, gulch bottom, etc.) grass with leaves about 3 mm or wider, preferably growing in a single stalk (or few stalks) rather than a clump, is suitable for this species.

Euphyes bimacula (G. & R.). Larvae (raised from eggs laid by a lab female from Republican River, Yuma Co. Colo. 1 July 1973) ate various sedges in the lab and hibernated half grown.

E. vestris (Bdv.). Two eggs laid on Carex heliophila (B) Red Rocks, Jefferson Co. Colo. 18 July 1973. Oviposition 11:10 C. heliophila (S) Golden Gate Can., Jefferson Co. Colo. 6 July 1980. Oviposition 12:30 on C. heliophila (S) Red Rocks, Jefferson Co. Colo. 11 July 1984. Oviposition 14:35 on leaf of C. heliophila (S) Mt. Vernon Historic Site, Jefferson Co. Colo. 11 July 1984. Oviposition 11:50 Carex geophila Mack. (W) Chimney Gulch, Jefferson Co. Colo. 17 July 1978. Oviposition 10:00 C. geophila (W) Coal Creek Can., Jefferson Co. Colo. 11 July 1978. Both plant species are sedges, but they grow on dry hillsides or sloping flats, often above a rock that traps moisture.

Amblyscirtes phylace Edw. Oviposition 11:18 under Andropogon gerardii (S) leaf, preovipositions 10:45 on A. gerardii (S), Green Mtn., Jefferson Co. Colo. 19 June 1985. Preoviposition 11:15 beneath A. gerardii (S) leaf Green Mtn., Jefferson Co. Colo. 15 June 1985.

A. aenus Edw. A female of form erna F. (the unh unspotted) from Furnish Can., Baca Co. Colo. laid eggs in the lab, and the larvae were raised on Poa pratensis, producing two male offspring of the normal spotted-unh form of aenus (thus demonstrating the conspecificity of erna and aenus, Scott 1976).

A. simius Edw. 15 ovipositions all day from 9:03 to 14:44 under leaves (usually near the edge of the clump) of Bouteloua gracilis,

and 20 eggs found on B. gracilis, 1 mi. up Bear Creek, Chaffee Co. Colo. June 1969 and June 1970. Ovipositing females slowly dart back and forth about 30 cm above the grass before landing and laying (Scott 1973a reports movements and behavior).

Aegiale hesperiaris (Walk.). Larvae in leaves (trapdoors under leaf) of mature Agave americana (S) plants Sierra de la Gavia N Saltillo, Coahuila, Mex. 19 Sep. 1969.

A. polingi (Skin.). Larvae in leaves of Agave schottii Engelm. (S) (trapdoors under leaf) Molino Basin, Pima Co. Ariz. 30 Sep. 1969.

Agathymus hoffmanni (F.). Larvae in A. americana (S) leaves (trapdoors under leaf) Sierra de la Gavia N Saltillo, Coahuila, Mex. 19-20 Sep. 1969.

A. neumoegeni (Edw.). Larvae raised from Agave parryi Engelm. (S) W of Jerome 5600', Yavapai Co. Ariz. 29 Sep. 1970.

A. neumoegeni chisosensis (F.). Larva raised Agave sp. (the large gray species; S) Green Gulch, Chisos Mts. Tex. 24 Sep. 1969.

A. alliae (S. & T.). 13 larvae in Agave utahensis Engelm. (S) leaves (trapdoors under leaf) Timp Point, Coconino Co. Ariz. 15 Aug. 1980. 13 larvae in A. utahensis (S) Crazy Jug Point, Coconino Co. Ariz. 17-18 Aug. 1980.

A. mariae (B. & B.). Larvae raised from Agave lecheguilla Torr. (S) leaves (trapdoors above leaf) N Van Horn Tex. 26 Sep. 1969, and N of Bracketville Tex. 21 Sep. 1969, and W of Dryden Tex. 22 Sep. 1969 and 18 Sep. 1970, and Langtry Tex. Sep. 1970, and NW of Boquillas Can. Tex. 23 Sep. 1969, and S of Shafter Tex. 24 Sep. 1969, and W of Lajitas Tex. 24 Sep. 1969, and S of Marfa Tex. 25 Sep. 1969.

A. remingtoni "valverdiensis" F.(a weak ssp. or synonym). Larva raised A. lecheguilla (S) leaves (trapdoors above leaf) N of Bracketville, Tex. 21 Sep. 1969.

Megathymus streckeri streckeri (Skin.). 4 eggs on leaves of young Yucca sp. (S) plants SW Villa Grove, Saguache Co. Colo. 17 & 19 June 1966.

M. streckeri texanus B. & McD. 9 eggs on leaves of young Yucca glauca Nutt. (S) plants near Maysville, Chaffee Co. Colo. 14 & 19 June 1966. Oviposition 12:00 on Yucca elata (introgression with glauca)(W) at Ute Lake State Park, Quay Co. New Mex. 14 May 1985. Adults assoc. with Y. elata (introg. glauca)(W) at 5-6 mi SE Logan, Quay Co., 14-26 May 1985. On grass clumps the uns is camouflaged, but adults often bask on old Yucca flower stalks, where the yellow-rimmed black hindwing uppersides resemble old opened seed pods.

M. beulahae gayleae S. T. & S. Larvae from Agave falcata (S) reared to adults 73 mi. N Saltillo, Coahuila, Mex. 19-20 Sep. 1969. Larvae make cigar-shaped tents as do M. yuccae and M. ursus.

M. ursus violae S. & T. Larvae raised Yucca sp. (S) Franklin Mts., Tex. 23 March & 1-2 April 1969.

M. yuccae (Bdv. & LeC.). Larvae in Yucca sp. (S) Rito Alto Creek, Saguache Co. Colo. 19 July 1970, and at Little Rock, Los Angeles Co. Calif. 15 April 1972, and near Benson, Cochise Co. Ariz.

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