A New Larval Food Plant, Collinsia concolor, for the Endangered Quino Checkerspot, Euphydryas editha quino

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A NEW LARVAL FOOD PLANT, *COLLINSIA CONCOLOR*, FOR THE ENDANGERED QUINO CHECKERSPOT, *EUPHYDRYAS EDITHA QUINO*

Additional key words: *Antirrhinum, Plantago, Cordylanthus, Castilleja*, diapause

Before the Quino checkerspot, *Euphydryas editha quino* (Behr), was placed on the federal endangered list, larvae of this checkerspot were only known to feed on erect plantain, *Plantago erecta* E. Morris (Plantaginaceae) (Emmel & Emmel 1973, Mattoni et al. 1997, Osborne & Redak 2000). Recently, *Plantago patagonica* Jacq. (Plantaginaceae), *Antirrhinum coulterianum* Benth. (Scrophulariaceae), *Castilleja exserta* (A. A. Heller) (Scrophulariaceae), and *Cordylanthus rigidus* (Benth.) Jepson (Scrophulariaceae) were added as ovipositional food plants for this checkerspot (Pratt *et al*. 2001). *Plantago.. patagonica* and *A. coulterianum* were identified as major prediapause and postdiapause larval food plants at elevations higher than 1,300m, seven kilometers south-southwest of Anza, Riverside County, California. It appears that *A. coulterianum* is the preferred ovipositional food plant where both *P. patagonica* and *A. coulterianum* co-occur, but during drought years, when *A. coulterianum* does poorly, *P. patagonica* becomes the main food plant (Pratt *et al.* 2001).

Observation numbers of prediapause larval clusters vary with plant species. There have been hundreds of clusters observed on *Plantago erecta* at many locations, over 50 on *Plantago patagonica*, and over 130 on *Antirrhinum coulterianum* (Pratt *et al.* 2001). Yet only two larval clusters have been observed on *Castilleja exserta* and five clusters on *Cordylanthus rigidus* in a region ten to thirteen kilometers west of Tecate, San Diego County, California (Pratt *et al*. 2001). Since *C. exserta* and *C. rigidus* are abundant at Quino checkerspot occupied sites, it is surprising that more checkerspot larval clusters have not been observed on these plants. So far, *C. rigidus* is used as a prediapause food plant only where *P. erecta* is present for postdiapause larvae. The advantage of *Cordylanthus* in these areas is that *P. erecta* is often a poor prediapause food plant since it dries out early in the season, while *C. rigidus* continues to grow well into summer.

Although Quino checkerspot larvae have been found on larval food plants below 900m (the upper elevation range for *Plantago erecta*) and above 1,300m, no larval food plants are known between 900 and 1,300m. While searching for ovipositional and prediapause food plants on 13 April 2008, twenty kilometers southwest of Anza, Riverside County, California, at 1,050m elevation, Pratt observed a female Quino checkerspot crawling over the ground with its abdomen curled under. Even though no known food plants were observed in the area, this observation was believed to be an ovipositional search behavior. Upon closer examination, Pratt observed numerous tiny *Collinsia concolor* E. Greene plants forming a ground cover. These plants were a reddish brown color blending with the soil surface. Pratt searched the nearby *Collinsia* and found a large, partially hatched egg cluster under a *Collinsia* leaf (Figure 1). Freshly eclosed larvae were found on a nearby leaf.

When Pratt and Pierce returned to the area on 19 April 2008 they found approximately 20 prediapause Quino checkerspot larval clusters at elevations that ranged from 1,050 to 1,075m. These larvae were in first to third instar. Despite extensive searching, no larval clusters were observed on nearby *Castilleja exserta* and *Antirrhinum coulterianum*.

After observing prediapause larval clusters on *Collinsia concolor*, Pratt was able to locate additional clusters on this plant species at other locations. At eight kilometers south-southwest of Anza at 1,366m on 5 May 2008 a prediapause Quino checkerspot larval cluster was found on a *C. concolor* plant at the northern open edge of one large *Collinsia* patch on a north facing slope (Figures 2 & 3). Over 40 additional larval clusters were found on *Collinsia* also on north facing slopes at eight kilometers south of Anza at 1,270m on 6 May 2009. Despite extensive searching of neighboring *Antirrhinum coulterianum* plants, no larval clusters were found on this snapdragon, even though larval clusters were common on *Antirrhinum* at 8.5km south-southwest of Anza on south facing slopes on 5 May 2008.

Quino checkerspot females oviposit in nature upon *Plantago erecta, Plantago patagonica, Collinsia concolor, Antirrhinum coulterianum, Cordylanthus rigidus*, and *Castilleja exserta*. Although *C. rigidus* and *C. exserta* are placed in the Scrophulariaceae along with *C. concolor* and *A. coulterianum*, recent DNA studies show that *Plantago s*pecies in the Plantaginaceae are more closely related to *Collinsia* and *Antirrhinum* than they are to *Castilleja* and other parasitic members of the

FIGS.1-3. **1.** Partially hatched Quino checkerspot egg cluster on *Collinsia concolor* twenty kilometers southwest of Anza, Riverside County, California. **2.** *Collnsia concolor* plant eight kilometers south-southwest of Anza, Riverside County, California with first instar Quino checkerspot larvae. **3.** First instar Quino checkerspot larvae at the base of a *Collinsia concolor* plant.

Scrophulariaceae (Olmstead et al. 2001). *Cordylanthus* is a parasitic member of the Scrophulariaceae (Hickman 1993). Olmstead *et al.* (2001) place the parasitic members of the Scrophulariaceae in the Orobanchaceae and *Antirrhinum, Collinsia*, and *Plantago* in the Veronicaceae. Searches for Quino checkerspots should occur in areas that have sufficient quantities of these plants to support larval development to adults. The only exceptions are *C. rigidus* and *C. exserta*, which may require extensive stands of other food plants to support complete larval development.

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LITERATURE CITED

EMMEL, T. C. & J. F. EMMEL. 1973. The butterflies of southern California. Natural History Museum of Los Angeles County, 145 pp.

Hickman, J. C., ed. 1993. The Jepson manual: Higher plants of California. University of California Press, Berkeley, CA. xvii + 1400 pp.

MATTONI, R., G. F. PRATT, T. R. LONGCORE, J. F. EMMEL, & J. N. GEORGE. 1997. The endangered Quino checkerspot butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). Journal of Research on the Lepidoptera 34: 99-118.

OSBORNE, K. H. & R. A. REDAK. 2000. Microhabitat conditions associated with the distribution of post-diapause larvae of *Euphydryas editha quino* (Lepidoptera: Nymphalidae). Annals of the Entomological Society of America 93: 110-114.

OLMSTEAD, R. G., C. W. DEPAMPHLIS, A. D. WOLFE, N. D. YOUNG, W. J. ELISONS, & P. A. REEVES. 2001. Disintegration of the Scrophulariaceae. American Journal of Botany 88: 348-361.

PRATT, G. F., E. W. HEIN, & D. M. KROFTA. 2001. Newly discovered populations and food plants extend the range of the endangered Quino checkerspot butterfly, *Euphydryas editha quino* (Nymphalidae) in southern California. Journal of the Lepidopterists' Society 55: 176-178.

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