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POLLEN SHED AS TETRADS BY PLANTS OF ESCHSCHOLZIA CALIFORNICA (PAPAVERACEAE).—Mature pollen of *Eschscholzia,* and of the rest of the Papaveraceae, is normally shed from anthers as single grains (monads). In greenhouse-grown plants from two populations of *Eschscholzia californica* Cham. (*Clark 492*—California. Alameda Co.: ca. 2 mi SE of Livermore on S Livermore Rd, 24 May 1975; *Clark 503*—Butte Co.: Butte Canyon Rd, 0.9 mi E of junction with Manzanita Ave and Centennial Ave, 25 Jun 1975), I observed that pollen was shed not only as monads, but also as dyads, triads, and intact, generally tetrahedral tetrads. Individual plants of *Clark 492* present all monad pollen, or mixtures of monad, dyad, triad, and tetrad, or nearly all tetrad pollen. Of the two plants of *Clark 503* examined, one produced all monad pollen and the other a mixture of monad, dyad, triad, and tetrad pollen.

Scanning electron micrographs of intact pollen tetrads are presented in Fig. 1. Notice that individual grains are held together by bridges of pollen wall material. Sachar and Mohan Ram (Phytomorphology 8:114–124. 1958) state that "Wall formation [to form microspores] occurs by furrowing." In these populations furrowing evidently does not proceed to completion, leaving bridges of pollen wall and even cytoplasmic connections, which have been seen in light micrographs of pollen stained with cotton blue. Similar exine bridges have been reported in the Onagraceae (Skvarla *et al.*, Amer. J. Bot. 62:6–35. 1975) and in the fossil *Eomimosoidea* (Crepet & Dilcher, Amer. J. Bot. 64:714–725. 1977), but unlike those of *Eschscholzia,* their tetrads are also bound together at the margins of the apertures. Dyads and triads apparently result from furrowing which detaches only one or two grains from the tetrad.

Both populations have high pollen stainability in cotton blue; meiosis observed in *Clark 492* was normal. Tetrad pollen appears to be functional—pollen from an individual of *Clark 492* which sheds almost all tetrads was able to effect full seed set in other *E. californica* plants. The ability to form tetrads is evidently a heritable trait, appearing in F_1 progeny of crosses between *Clark 492* and other populations of *E. californica* and the closely related *E. mexicana* Greene, but appearing in none of

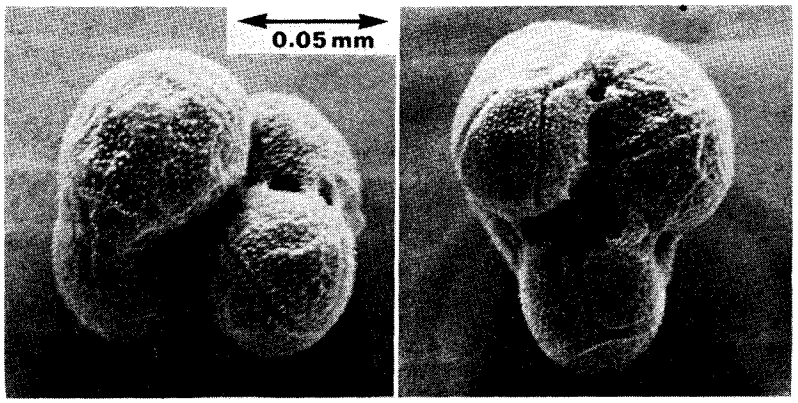

FIG. 1.—Scanning electron micrographs of tetrad pollen of *Eschscholzia californica*

over one hundred plants from 12 other populations of *E. californica* and their hybrids. However, the genetic basis of this inheritance cannot be estimated with the data available.

Examination of pollen of pressed voucher specimens of *Clark 492* (3 plants) and *Clark 503* (2 plants) and of flowers collected in April, 1977, from the approximate location of *Clark 492* revealed only monad pollen. Some greenhouse-grown plants of *Clark 492* present only monads, but it is somewhat surprising that there should be no evidence of tetrad pollen in the natural populations, since the trait is so common in their progeny. Perhaps these plants form tetrads in response to some condition of the greenhouse environment.

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