

## CONCERNING VERNAL POOLS AND THE UNIQUE PLANTS FOUND IN THEM

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The October 1976 issue of *Fremontia*, journal of the California Native Plant Society, has a fascinating series of articles on vernal or spring pools. These are shallow temporary pools formed by the winter rain water collecting in flat-bottomed depressions. These all have an under-layer of claypan or hardpan at a variable depth below the surface, so that the water cannot seep away into the lower soil column. They are found both in the coastal parts of California and in the great valley areas of the Sacramento and San Joaquin rivers. Some are found in soils isotopically dated at over half a million years. But others, with an equally rich flora and fauna, are found in very recent soils. Usually they are round pools, though they may be of other shapes. Concentric displays of flowers succeed one another as the season advances. A photograph in the article by Robert F. Holland and F. Thomas Griggs entitled, "A Unique Habitat-California's Vernal Pools" shows a circular pool with the dainty white and rose meadow foam or *Limnanthes douglasii* var. *niveu* in full bloom. (Figure 1) This species has possibilities as an oil producing crop plant! Other pools have rings of the yellow goldfields, *Lasthenia fremontii*. The pool itself by this time is teeming with many forms of animal life such as the fairy shrimp, the oar-footed little shellfish called Copepods, and numerous aquatic insects. All of these must hatch from eggs, grow to maturity, mate, and lay eggs before the pool dries up again in about two months. Sometimes the rainfall of a season is so little that the pools remain dry, so both the plant seeds and the animal eggs have a built-in ability to survive several years between adequate rainfalls.

As time goes by and the shore line recedes, different sets of plants come into flower, succeeding one another in predictable order. Thus another kind of daisy, the yellow *Chaetopappa aurea* follows the goldfields which occupy slightly higher ground, now too dry for them to continue growth. Brass buttons of *Cotula coronopifolia* will begin to flower at the edge of the water or even in it. Incidentally this flower is not limited to vernal pools but grows in marshy places quite generally throughout California. Then when all the water is gone, the dried-up bed of the former pool will be carpeted with the azure blue of *Downingia pulchella* by the tens of thousands, all the flowers facing the sun! (Figure 2.) These plants are 1 to 4 inches high and seem to be all flower. As they begin to fade away, the blue color is replaced by the rich purple of the sweet aromatic mesa mint, *Popogyne ziziphoides*. Also the spreading coyote thistle, *Eryngium vaseyi*, becomes abundant, their flowers small and inconspicuous, but the sea-green plants contrasting like delicate carvings against the dark purple mint.

Summer comes and for months on through the long dry California fall the pools will be flats, covered with

dried-up leaves and stems, the tough shrubs on the mounds such as deerweed, scrub oak, laurel sumac, and chamise furnishing the only green color.

Some entire genera such as the *Downingia* species are found only in the vernal pools. There are 6 species of this remarkable plant, only one found at any given pool. They are of varying shades of blue and purple and differ strikingly from one another in the form of the flower. They are related to the garden lobelia, being members of the same family, *Lobeliaceae*.

Aside from the wide-spread generally occurring brass buttons which is naturalized from South Africa, most of the vernal pool species are endemic to or found only in California. The ardent evolutionist C. Ledyard Stebbins in his very informative article, "Ecological Islands and Vernal Pools", admits that they "probably evolved during the past ten thousand years."<sup>2</sup> In fact he says: "There followed a post-glacial period of drought and warmth when the Sierran glaciers disappeared completely and the mountains had less snow on them than at present. At this time, about 4000 years ago, lakes were being converted into isolated vernal pools, or were disappearing completely. Still later, during the Christian era, came a "little ice age" which brought on the small glaciers that still persist in a few places in the Sierra. The positions of the vernal pools undoubtedly changed during this period, and new opportunities were presented either for hybridization between varieties or closely related species, or for selective occupancy of new niches on the part of strongly isolated species that were competing with each other."<sup>2</sup> He furthermore states that in very recent years this changed again so that boats could be navigated from the Bay area all the way to Lockford, about 20 miles north-east of Stockton, a distance of about 78 miles. I called attention to the existence of very large lakes in California in my article on "Recency of the Pacific Southwest Desert".<sup>3</sup> It would

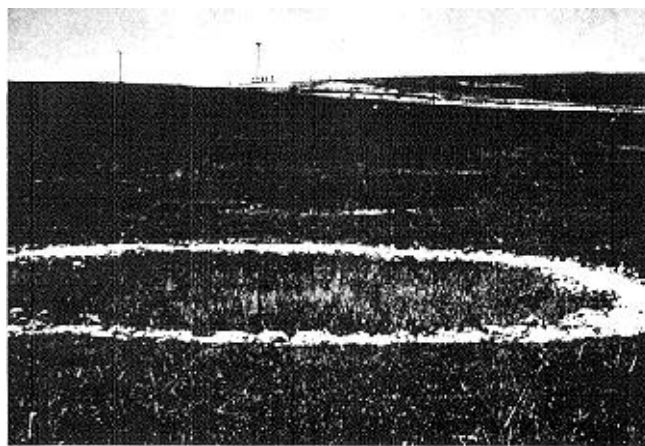


Figure 1. This is a photograph, taken by Alice Howard, of a vernal pool with a ring of meadowfoam (*Limnanthes douglasii* var. *nivea*.) This picture originally appeared in the journal *Fremontia*.

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seem then that the present location of the vernal pools is a very recent phenomenon. The method by which the endemics such as *Downingia* re-established themselves in these new vernal pools is not discussed in any of the articles, and may indeed be as yet unknown.

The unusual vernal pool species must have originated even according to orthodox geological theory within the last 10,000 years. As shown in our article "Plant Succession Studies in Relation to Micro-Evolution"<sup>4</sup> natural selection is hardly the effective agent evolutionists would have us believe it to be. This is largely because plant populations do not remain in any one location long enough for any selection to occur. The frequent shifting of the location of the vernal pools in the last 10,000 years presents much the same problem. Certainly whole genera such as *Downingia* could hardly have originated by selection in the alleged 10,000 years since the last major glacial period.

From the creationist viewpoint these species can hardly be imagined as being part of God's original creation, for in the pre-Flood world the Bible records that there was no rain, but "there went up a mist from the earth, and watered the whole face of the ground" (Genesis 2:6). Accordingly there could not have been any vernal pools! It would seem then that they were created as part of God's providential care after the Flood as part of His plan to create a maximum beauty in the post-flood world.

### References

- <sup>1</sup>Holland, Robert F. and F. Thomas Griggs, 1976. A unique habitat — California's vernal pools. *Fremontia* 4(3):3-6.  
<sup>2</sup>Stebbins, G. Ledyard, 1976. Ecological islands and vernal pools. *Fremontia* 4(3):12-18.  
<sup>3</sup>Lammerts, W. E., 1971. Recency of the Pacific Southwest desert. *Creation Research Society Quarterly* 8(1):50-54.  
<sup>4</sup>Lammerts, W. E., and George F. Howe, 1974. Plant succession studies in relation to micro-evolution. *Creation Research Society Quarterly* 10(4):208-228.



Figure 2. This shows several plants common to vernal pools. Upper left: *Downingia pulchella* Torr. x 2. South coast ranges; Sacramento Valley; Sierra Co. n. to southern Oregon. Center lower lip white, deep bright blue. Upper right: *Downingia ornatissima* Greene, x 3. Low spots of plains, Sacramento and San Joaquin Valley. Squarish white center, otherwise very light blue. Lower left: *Downingia concolor*, Greene, x 3. Corolla blue, lower lip with velvety purple quadrate spot on white central field. Santa Clara Valley to Lake Co. and plains of Sacramento Valley. Lower right: *Downingia bicornuta*, Gray x 2. Corolla blue; lower lip white central field and two yellow spots. Lobes of upper lip violet purple. Low plains of Sacramento Valley; variety *Montana* with longer upper lip grows in mountains from 3,000 to 5,000 feet. These pictures are from the book *Manual of the Flowering Plants of California*, by Willis Linn Jepson, which has been out of print for a long time.