In the regrowth of vegetation after fire by crown sprouting mechanisms and by seedling survival the creationist sees the providence of God as recorded in the book of Job, chapter 38, verses 25-27:

> Who hath cleft a channel for the waterflood,
> Or a way for the lightning of the thunder;
> To cause it to rain on the land where no man is;
> On the wilderness, wherein there is no man;
> To satisfy the waste and desolate ground,
> And to cause the tender grass to spring forth?

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A NOTE ON SPECIATION IN *CEANOTHUS* AND *ADENOSTOMA*

WALTER E. LAMMERTS*

Editor's Note: Since Dr. Lammerts has grown two large populations of ***Ceanothus*** *seedlings from hybrid plants, it is pertinent for Dr. Lammerts to write on speciation in* ***Ceanothus*** *in relation to the previous article by Dr. George F. Howe.*

The genus *Ceanothus*, as Dr. Howe suggests, certainly does form strikingly different variations where seedlings of hybrids are grown, variants which in other genera might easily pass for species. Thus "La Primavera" appeared in 1935 at the Santa Barbara botanical garden[1] among seedlings of some garden gathered seeds of *C. cyaneus*. Though similar to *C. cyaneus*, this variety bloomed one month earlier and had a sturdier root system.

Maunsell Van Rennsselaer, then director of the Santa Barbara botanical gardens, kindly gave me open pollinated seed. I obtained mature shrubs from 807 seedlings. Among these 156 looked like *C. cyaneus*, 130 like *C. spinosus*, 178 like *C. griseus*, 225 like *C. arboreus*, 106 like *C. impressus*, and seven like *C. nomeanus*. Most important was the fact that five looked like *C. tomentosus olivaceus*, even though this species was not growing anywhere near the garden where "La Primavera" was located!

No doubt much of this variation was the result of crossing with the various species all of which, with the exception of *C. tomentosus olivaceus*, were growing in the vicinity. Such statistics do show the great potential for variation carried by *only one plant*, due to prior hybridization and compatability of the gametes produced by it with those of other species.

Similarly in March of 1970 I planted seed of the variety "Theodore Payne", obtained 450 seedlings, and set them out in the spring of 1971. The astonishing variation among seedlings is seen in Figure 1, where the branch held at the right has small leaves in comparison with another seedling plant, at the left, with much larger leaves. In fact, no two plants were identical, as described in my article on the origin of Gentian Plume.[2] This new variety combines the very large flower clusters of "Theodore Payne" with the dark blue flower color of Julia Phelps, which possibly is a hybrid of a species similar to *C. papillosus*.

So then quite evidently if these species did come from a common ancestral type they still have so much similarity that crossing among them occurs naturally.

To me it would seem that Wells exaggerates the monotypic nature of the chamise. Thus Jepson lists two species of the genus *Adenostema*: the chamise, *A. fasciculatum*, and the ribbonwood, *A. sparsifolum*. The chamise (or greasewood) has one listed variety, with bluntish leaves called *obtusifolium*.

Actually botanists for some reason pass over the great amount of variation shown in the chamise. Probably because the flowers are white, it does not have the potential for color variation possessed by genera with colored flowers such as the genus *Ceanothus*. The leaf variation, as may be seen from Figures 2 and 3, is considerable. Not only does the color of the bark vary, but the leaves do also. The variety in which the leaves have three small forks at the ends of most of them would be given varietal status in *Ceanothus* if combined with a different flower color.

The question as to why these variations in *Adenostoma* have not become greater as time went on, whereas they have in *Ceanothus*, is one for evolutionists to answer. No clearly evident survival value has been linked with any given leaf type in *Ceanothus*. Yet radically distinctive leaf forms are found, many very lovely from the horticultural viewpoint. Oddly enough, though having the potential, the chamise never developed widely distinctive or lovely leaf patterns. Such differential behavior over a given period of time poses a real problem for evolutionists.

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Figure 1. *Ceanothus* plants grown from seed of Theodore Payne. Note the variations in the leaf size, upon comparing the plant held in the hand at the right with that at the left.

Figure 2. *Adenostoma fasiculatum (greasewood),* with typical linear needle-shaped leaves on the mature stem.

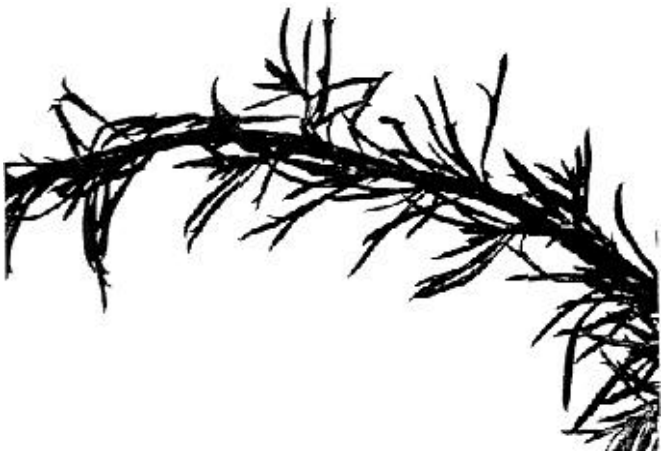

Figure 3. *Adenostoma fasiculatum* (greasewood), with variant three-forked leaves on a mature shrub.

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