EDITORIAL COMMENTS

A variety of scientific disciplines are represented in the articles in this issue of the *Quarterly*. The invited paper by Walter Lammerts concerns botany, i.e. plant succession studies. Dr. Lammerts summarizes his and Dr. Howe's field work on the changes that occurred in populations of certain wildflowers over a period of years.

Recently since evolutionists have attacked the creationist position of a young earth two physical scientists, Dr. Tom Barnes and Dr. Robert Kofahl, defend these scientific positions against such an attack. As the decay of the earth's magnetic field is a strong argument in favor of a young earth, Dr. Barnes and Dr. Russell Humphreys develop the model further in their articles. Dr. Humphreys, in particular, details the predictive value of the creation and decay of the magnetic field as compared to the dynamo theory so popular in naturalistic circles.

Michael Oard continues his examination of the uniformitarian concept of the ice ages, i.e. the use of deep-sea cores as a method of "dating" these ages. Magnus Verbrugge discusses the philosophy of science of De Wit, the Dutch biologist.

Harold Armstrong reviews the new book released by the Society, *Design and Origins in Astronomy*. May I suggest to our members that a good project to help the Society would be to encourage libraries in your local area to subscribe to the *Quarterly* and to obtain the books published by us. Contact the Acquisitions Librarian to determine if there is an interest in CRS publications. Often interest is kindled when the publications are donated. If books and journals are placed in libraries, more people have access to the material.

I have asked Dr. John Moore to prepare a series of educational articles on the evolution-creation controversy. He graciously consented and the first selection appears in this issue. Dr. Hermann Schneider presents compelling arguments that the universe began fully formed rather than without structure as necessary in the "big bang." Several articles in *Design and Origins in Astronomy* make this same point.

There are several interchanges of comments in Letters to the Editor. Please offer your thoughts on items that appear in the *Quarterly*. May each of you have an enjoyable Christmas holiday and a successful New Year.

Emmett L. Williams

INVITED PAPER

PLANT SUCCESSION STUDIES IN RELATION TO MICRO-EVOLUTION AND THE EXTINCTION OF SPECIES

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Abstract

No evidence was found for any type of evolution, including micro-evolution in a plant succession study. Extinction (degeneration process) occurred often. Natural selection at best only maintains the status quo.

Introduction

Both creationists and evolutionists have usually accepted the concept that mutations and variations in plant populations eventually lead to the establishment of varieties, then sub-species, and eventually new species. In fact many dedicated creationists readily accept so-called micro-evolution, but believe that the process stops there, and does not continue on to the formation of generic, and eventually family differences. After considerable discussion of this concept, George Howe and I decided in the Fall of 1968 to study plant succession in populations of five species of endemic California plants. So in the Spring of 1969 definite areas were staked out, and the variations found therein were described then labeled with wire stakes. Herbarium specimens of each variation were taken, and seeds collected wherever possible.

Each year the plots were revisited with the objective of determining (1) if any variation increased in number, and (2) if this increase was progressive, that is leading to a change from what was originally the "typical" or more frequently occurring form.

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Fortunately the Winter and Spring of 1969 were ones of heavy rainfall and a great profusion of wild flowers occurred, mostly as a result of the heavy Spring rainfall and relatively mild Winter. We later found, however, that a heavy rainfall does not necessarily result in a wealth of flowers, at least not in any given area.

Five species were studied: the California poppy, *Eschscholtzia californica;* the lupine, *Lupinus succulentus;* the thistle sage, *Salvia carduacea;* the owl's clover, *Orthocarpus purpurascens;* and a perennial, the lovely yellow pansy, *Viola pedunculata.* The results of five years of study were presented in the article on plant succession in the March 1974 issue of the *Creation Research Society Quarterly.*[1]

Although five years is far too short a time to detect any pronounced micro-evolutionary trends, we did hope to find some shifts in the relative numbers of the particular variants selected. The actual results as summarized in Tables 2-6 of the 1974 article were indeed quite unexpected. They are best discussed by the consideration of each species.

California Poppy – *Eschscholtzia californica*

Following the heavy rainfall and warm Spring of 1969, a great abundance of variation was found. The

33' x 39' plot contained about 1000 plants of which only 33 were the typical solid orange type, or 3.3 percent. Many of the variants reported by A. V. Beatty[2] such as fringed and yellow petal edge with orange center were found. Beatty felt that these were inherited as simple Mendelian recessives. As shown by Cook[3] in the usually arid Southern California the poppy is an annual. In the north the rainfall is much greater and there it is a perennial. Ten of the many variants were staked for plant succession study. During the very dry Spring of 1970 only 93 poppy plants could be found. The Spring of 1971 was equally dry and there was a catastrophic elimination of all poppies. In a nearby area they were monotonously uniform, (a light orange color) and very small. The lack of much variation following the abundant rainfall in 1973 was most unexpected. Only 378 poppies could be found in the plot. Only four variants were located and no types found in 1976 were observed. Most of the plants were below the average size found in 1969 and of a medium orange color. Natural selection, if one wishes to call it that, seems to select the typical form rather to increase any variation. Evidently only under the most ideal conditions of temperature, rainfall, sunlight and lack of competition from grass do poppies exhibit a full range of variation. The lack of continuity as regards the populations would seem to bar any possible natural selection leading to the establishment of new varieties and eventually species.

Lupine — *Lupinus succulentus*

The year of 1969 was very good for this lovely annual lupine and whole hillsides in the Newhall area were completely covered by this species. A 24' x 36' plot on one of these hillsides was selected for study. Nine selections were staked on April 27, 1969, three of them being the pink L. *microcarpus* var. *ruber*. The others varied mostly in leaf size and shape, though some variation in color occurred also. The typical form has a lavender center in the banner and the remainder of the banner, wings and keel are blue. One of the variants had a very small flower with little white in the banner. There were several hundred plants in the plot and most of them were very lush, luxuriant plants three or more feet in height. The very dry year of 1970 reduced this population to only seven small plants with small racemes of typical flowers. Following two more dry years not a single plant of either species could be found in the plot even after the heavy rainfall in the Spring of 1973! There was a catastrophic elimination of lupines in the plot, though there were many nearby hillsides beautifully covered with lupines. Possibly study of other locations would show that this lupine characteristically colonizes a new area, increases in population size and then dies out as the area becomes heavily populated with other plants. George Howe[4] has noted that after a fire in the Newhall area, there is a profusion of lupines and other flowering plants during the first growing season. Yet even though seeds are present in great numbers, lupine populations typically decline during the second and later seasons and do not appear as the dominant flower until after another fire.

Thus with L. *succulentus* there is a "boom or bust" situation which is far from the standard reoccurring populations generally required in natural selection models. Rather than finding stable populations in which the variants or mutations may gradually infiltrate after many generations, L. *succulentus* populations may be separated from each other by decades.

In any event and for whatever reason, the selection plot ended in a complete blank terminating the natural selection of both round and narrow leaf variations as well as other selected types.

Thistle Sage — *Salvia carduacea*

In the case of the thistle sage, there was a catastrophic selection in favor of the very wooly leaf cylindrical type. Now the thistle sage usually has white wooly pinnatifid leaves which are spine tipped and toothed. Three areas selected for study were on adjacent sloping ridges. Because of the heavy rains in 1969 the plants were unusually vigorous some being over three feet high. Ten selections were marked including the wooly leafed cylindrical one. Oddly enough, in the original 1969 plant distribution, this type was a single quite small plant, certainly the *least likely* candidate for any type of selection. Also it did not gradually increase in numbers during the dry 1970, 1971, and 1972 seasons, yet following the high rainfall of the 1973 Spring, it was the only surviving type of plant in the whole plot!

This sort of phenomenon corresponds to the example of catastrophic selection in Clarkia reported by Harlan Lewis.[5] In his examples usually short growing seasons, limited by lack of rainfall, were shown to have catastrophic effects on population size.

Owl's Clover — *Orthocarpus purpurascens*

The succession in this species was in many ways quite similar to that of the California poppy. The plot at Newhall was in the midst of an area near Valencia Boulevard, having a great profusion of very luxuriantly growing owl's clover plants. At least a thousand plants were in the 15' x 30' general area studied April 25, 1969 and these showed a great profusion of variants including five white flowering ones. The typical color is crimson or purplish, the lower lip white tipped, with yellow and purple dots or markings. Variants selected and staked included a range in color from very light lavender to dark purple with a galea either white or yellow. Not one of the 26 variants showed any increase in percentage of population. As with the lupines, absolutely no owl's clover could be found in the Newhall plot following the heavy rains in the Spring of 1973. There was instead a heavy growth of *Erodium cicutarium* or red stemmed filaree, small lupine, *Baeria* or gold fields, and some poppies. Thus any chance for the natural selection of any variation was eliminated. At the Corallitos plot near my home the great majority of the plants in 1973 were the typical lavender purple with leaves showing a considerable amount of purple. Not one of the 21 variations from the type described and staked in 1969 such as white flowered, dark purple, light lavender, "shaving brush" type or trifid leaf could be found. Originally, in 1969, 8336 ± 500 plants were counted. By 23 April 1973 these were reduced in number to about 700 plants. The weather was too cold that year for any growth until April 1. The grass was quite high and evidently the owl's clover had difficulty getting established. Also noticed was the fact that some plants simply withered away during periods of hot weather, probably because of the lack of an ade-

quate root system. Atsatt and Strong[6] have shown that *Orthocarpus* is a hemiparasite. Roots of this species form haustorial connections with host plants of other species. In this way they supplement the water and nutrient supply potential of their own root system by, in a sense, robbing their host plants.

Evidently, in the dry years, the typical form established contacts more rapidly with host plants. The variations then must have been inferior to this type and also relatively similar to one another in their hemiparasitic ability. Atsatt and Strong have demonstrated that variation in this ability does occur. Selection then based on external flower and plant characteristics would only accidentally coincide with this unusual hemiparasitic ability of the typical form. Since it has the maximum hemiparasitic ability it is indeed difficult to see how any natural selection of variant types leading to micro-evolutionary changes could ever occur.

Yellow Pansy – *Viola pedunculata*

Fortunately one perennial species was included in our study. Thus a basis was obtained for an answer to the question as to whether new seedling populations were being established, which in turn would furnish an avenue for micro-evolution. Twenty-three selections were staked and described in the Spring of 1969. Unfortunately only eight of the stakes could still be located in 1973 but the trend was very clear cut as was shown in Table 7 of our 1974 article. It will be noted that in general either no seedlings or very few of them were found near the clones selected. Thus in 1971, selection #10 had several seedlings nearby. But these evidently died during the interval from the Spring of 1971 until that of 1973, for no seedlings (either newly germinated ones or young two year old clones from the 1971 seedlings) could be found near the large well-established 1969 clone #10. Furthermore, the four seedlings found in 1971 near #14 evidently did not mature since only a few very small seedlings that germinated in 1973 could be found near the original plant. Finally, though selection #25 was still remarkably vigorous in the Spring of 1973, no young plants survived from the five seedlings found within one foot of that plant. It was noted that in spite of the very wet Spring of 1973, there were generally very few seedlings near *any* older clones. This is in line with the findings of F. W. Went.[7]

Thus he has described "intra plant" competition which frequently inhibits the establishment of young plants as in forests. He suggests that allelopathic substances may be volatile, or may be produced by living roots, or derived from decaying above ground parts of the plants or trees. Such substances may inhibit other plants or be most effective against plants of the same species. The question of how Viola clones limit seedlings nearby would be a most interesting subject for further research.

In any event, it is quite clear that no avenue for micro-evolution exists where established clones can successfully prevent the *succession of generations.* Only a vegetative asexual succession of "generations" of this *Viola* occurs by the proliferation of runners. Just how the very considerable amount of variation originated remains unanswered.

Discussion of Results

Certainly then natural selection of seedlings leading to distinctive varieties cannot occur when there are practically no seedlings to select. Lest it be claimed that only a few seedlings are necessary for selection to be effective, the bar to this supposition as regards the pansy is that *in every case* the few seedlings observed in 1971 evidently *died* since no young plants were observed near the pansy clones in 1973. As regards the poppy there was as might be expected a great reduction in the numbers of plants during each of the dry years. But the continued *lack* of much variation following the abundant rainfall in the Spring of 1973 was not at all anticipated. The Spring of 1973 did differ from that of 1969 in that the months of February, March, and April were much colder. Perhaps this low temperature factor is what reduced the population size by more than 50 percent. The luxuriance of the 1969 variation suffered about as much reduction in both variety and percentage of the population from cold weather in 1973 as from the dry Spring of 1970. The plant succession as regards the owl's clover was in many respects similar to that of the California poppy, only even more drastic. As mentioned previously, not one of the 21 variations from the typical form staked and described in 1969 could be found. The lupine selections also completely disappeared and the plot in 1973 was a complete blank as far as lupines were concerned. Only as regards the thistle sage there was a catastrophic selection of the wooly leaf cylindrical variant. In the original plant distribution found in the plot in 1969, this type was a single quite small plant compared to the large, spine tipped, pinnatifid typical form. It *did not gradually increase* in number during the dry 1970-72 seasons. In comparison with the luxuriant and typical large revolute leafed forms, it would seem to be at a very distinct disadvantage. Yet the only plants now in the plot are these small, very wooly cylindrical leafed forms. Whether this variant type will maintain itself and eventually develop any chromosomal differences remains to be seen. Certainly no *gradual* shift in the percentages of the many variants found in the 1969 population, as might be expected in accordance with the usual concepts of natural selection, occurred.

In the above five species there is simply no mechanism for the gradual natural selection of any of the many variants staked and described in the 1969 either because of the eventual death of the selections in the plot, or their being overwhelmed, so to speak, by the typical form as in the poppy and owl's clover. The question now is just how did the complex variation patterns ever arise in the first place? As regards the origin of species varying in chromosome number or special arrangement of genes within the chromosome, Harlan Lewis[8] suggested inbreeding in populations which normally are outcrossed. He points out that inbreeding may lead to extensive chromosome breakage. Similarly a shift to intense inbreeding will profoundly affect the expression of variation in populations, setting up small "founder" populations as shown by Mayr.[9] Whether the wooly leafed cylindrical type will become a "founder" population leading to a well-established variety remains to be seen.

But as Lewis asked in relation to two species of

columbine, one the short spurred red *(Aquilegia formosa)* and the other the long spurred cream colored (A. *pubescens*) how did these differences arise in the first place? He admits the first question can never be answered precisely but suggests the usual natural selection of progeny progressively better adapted to either humming birds or hawk moths (for A. *pubescens*). It should be pointed out that although hawk moths are able to effect pollination of the long spurred types, there is little evidence that they cannot also pollinate short spurred flowers.

Suggestions for Further Research

In addition to the investigation of just how clones such as the *Viola* limit the growth of any seedlings near them, the following are other lines of research regarding plant succession which we might well pursue now that we have two research locations. In fact, the Grand Canyon station would be ideal since, like California, Arizona has a climate with usually dry summers.

1. A small 35′ × 40′ area should be cleared of all plants in the late fall and a record should be made as to just which plants colonize the area first, and which ones later. Especially interesting observations could be made as to whether any species displaced ones which were first established.
2. Herbarium specimens have already been made of all plants found at the Grand Canyon station. Plant density studies such as those of Talbot, Biswell, and Horman[10] should be performed in which the product of plant height times density is used to get the plant volume. In this way it could be determined if there were gradual or perhaps catastrophic reduction of any particular species now present as represented by the herbarium specimens. This of course could only be done in a relatively small but representative area.
3. Should any invasions of the area occur, these plants should not immediately be destroyed but carefully studied to determine if they increase or are eliminated by the already established species.
4. Any seedlings variations should be marked and seed taken. They should also be staked and observed from year to year as to whether they increase or are eliminated. Seedlings of these possible variant types should be grown in a cultivated plot near the laboratory so as to get some idea as to their inheritance pattern.
5. Specimens of closely related species might well be planted near a few of the already established ones in order to see if they could compete with those which presumably have a very special adaptation to the area because of a long history of natural selection. I seriously doubt if this natural selection advantage exists but rather believe that the location of plants in any given area is more or less a matter of chance. Their establishment is of course limited by climatic factors such as rainfall. Here exists a chance to experimentally test whether this is true or whether the plants now present actually do have a selection advantage.

Ten Years After

Though I was unable to go down to Newhall to look at the various plots which we studied from 1969 until 1973, George Howe very kindly investigated them for me about the middle of March 1984. The following is his report:[11]

1. Thistle sage plot on McBean Parkway. There were no thistle sage plants present anywhere on this whole hilly area. There was no chance to see if the wooly leaf cylindrical type had established itself since all plants of this species were simply gone from this whole area. Some portions of the plot appear as if they should support the thistle sage plant, but now only dried grasses and black mustard can be found.
2. Poppy plot across from the College of the Canyons on Valencia Boulevard. There were no poppy plants present anywhere on this plot or on the nearby hills.
3. *Orthocarpus*—owl's clover plot. Again there simply were no owl's clover plants to be found. The other plot at the end of Valley Street is totally changed into streets and houses!
4. *Viola* plots on Pico Canyon Road. These were still present. There were hundreds of plants with leaves in the shade of oak trees but only a few were flowering. Accordingly no detailed study could be made as to whether any of the clones studied from 1969 until 1973 still survived.
5. Lupine plot. Though George Howe was not able to visit the lupine plot it is his belief that no lupine plants would be found. This is because lupines require scarification of their seeds in order for them to germinate. So only after a fire are there large hillsides of them. So then natural selection and any resultant micro-evolution could only occur after fires or about every 50 years or so.

As Howe wrote in his letter[12] to me in the Fall of 1983, when he made a study of these areas, if micro-evolution depends on the long tenure of plant populations, there simply could not be any. In fact one of the owl's clover plots has been converted into streets and houses. Large piles of dirt have been dumped at the foot of the hill where the thistle sage plot is located. There is a subdivision home and a swimming pool only about a hundred yards away from this plot. Because of the activities of *Homo realtorensis* we are witnessing the obliteration of whole areas formerly available for study of plant population succession. This then brings us to the last subject of our paper, plant and animal extinction.

Extinction Occurring at an Alarming Rate

Though we could find no evidence for even incipient micro-evolution, there is evidence for plant and animal extinction. Thus Peter H. Raven[13] wrote an article in *Fremontia* (April, 1983) entitled, "The Importance of Preserving Species." He discusses the research which shows that evening primroses have a nutrient called gamma-linolenic acid, found in the oil from their seeds. Whole populations of human beings are characterized by a deficiency of this active essential fatty acid. Thus the oil from the seeds of evening primroses may prove to be important in helping us avoid coronary diseases, eczema and arthritis. There are four species of the primrose on the Endangered List, and one is found in the Antioch dunes. As Raven says, who knows which species of evening primrose will have the richest source of this essential fatty acid? Were it not for two species of endangered butterflies, we might now have only sand mining there. Sand mining began in 1921. By 1951 the dunes were reduced in height from 115 feet

to about 30 feet. Sand mining continued into 1979 and finally was stopped by the State Division of Mines and Geology. Now two small parcels of ground are federally owned. The Antioch Dunes evening primrose (*O. deltoids* subspecies *howellii*) is safe for the time being.

Raven further states that "the extinction of species is probably the most significant event that is occurring in our lifetime." Of the roughly 20,000 species in the United States, about 10 percent are "endangered" or "threatened." The Smithsonian Institution in 1978 listed 1485 species of plants as endangered, 1408 as threatened, and 360 as extinct! The loss of genetic diversity on a world scale caused by plant extinction cannot be stressed too much. It badly limits the growth of biological knowledge. Wild relatives of domesticated plants are of obvious importance, and should receive special attention.

In the July 1981 issue of *Fremontia* there is a review of the book entitled "The Sinking Ark," written by Norman Myers.[14] Myers, an ecological consultant warns us that with the present practice and the likely increase in the human population, as many as 100 species of organisms per day will be lost by the end of the century.

Anthony Huxley[15] in *Fremontia* (July 1976) states that "at present between 50 and 200 plant species become extinct every year, and that the proportions will steadily increase.' Dr. Melville believes that 20,000 species will no longer be with us in the year 2000. It is estimated that there are between 250,000 and 300,000 species of flowering plants in the world.

Finally, a most interesting article in *Fremontia* (July 1983) by Walt Anderson[16] entitled "The Sutter Buttes: An Island" has the following to say about the rape of the Sacramento Valley.

> To be sure, the land (of the Buttes) has experienced change. The Indians themselves are gone, as are the grizzly bear, tule elk, and pronghorn. Native plants must now compete with a long list of aliens brought in by various human activities. Grazing influences can tip the balance towards the invaders. There are pressures growing in the Buttes for condominiums in addition to the roads, towers, quarries and trailer sites already scarring the land. These will increase.

Conclusions

Though we found absolutely no evidence for even incipient micro-evolutionary changes in our plant succession studies, we did find very strange and sudden disappearances of whole populations in our various plots, especially during the dry years. After three dry years we found absolutely no evidence for the re-establishment of the very large populations with all the fascinating variants found in 1969 even after the very wet Spring of 1973. What plants were present tended to be the typical form of each species except the thistle sage. Here there was a catastrophic selection of a wooly cylindrical type of variant. In 1969 this was a single quite small plant in comparison to the luxuriant large three-feet tall revolute leafed plants typical of this species. Most certainly it would have been the last candidate for any type of natural selection. Furthermore it did not gradually increase in number during the dry 1970-72 seasons. We hoped that possibly we had found a variant which might eventually become an incipient new variety of the thistle sage. However, unfortunately in August of 1983 not a single dried specimen of any type could be found. As Howe wrote,[17] "It looks as if our little species populations died out."

But though we found no evidence for the continuity of populations needed for any sort of natural selection, Howe reported that some of the plots have been damaged by subdivision activity.

So then though we found no evidence for the sort of selection of variant types which might lead to the evolution of species, we did find plenty of evidence for the disappearance of whole populations of plants, which brings us to the subject of plant extinction. As shown by a number of studies reported in *Fremontia*, the journal of the California native plant society, there is abundant evidence for the extinction of species at an alarming rate. Thus the ecological consultant, Norman Myers, warns us that with the present practice and likely build-up in human population, as many as 100 species of organisms per day will be lost by the end of the century. Though there are several million species of animals, micro-organisms and plants in the biosphere such a rate of extinction would soon leave us with only the most widespread species, certainly a rather monotonous world! It is time that creationists join our environmental protection enthusiasts in combating the tendency of man to destroy what God has given him. For though man was put in the garden of Eden to dress it and to keep it, far too many in the years since creation have forgotten this basic command. Let us then be more aware of the still great beauty of God's creation and strive to maintain it as we are asked to do.

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