DERMATITIS PRODUCED BY PHACELIA (HYDROPHYLLACEAE)

IN March of this year, on returning from a botanical trip to the Colorado Desert of California, I developed a severe case of dermatitis on the face, hands and arms, with the usual symptoms produced by "poison oak" (*Rhus diversiloba* T. and G.), although no Rhus grew in the region in which I had been working. The disturbance lasted for about ten days. I had had the same sort of experience before and determined to attempt to learn the cause. For several days my hands were stained with a heavy brown material that had come from pressing a series of specimens of a very glandular plant (*Phacelia pedicellata* Gray) and naturally this species became suspect. On my next trip to the desert I rubbed a bit of it on one of my arms and in 24 hours the area so treated turned red and began to swell and itch. I suffered quite a little annoyance for several days. I was pleased to know what had caused my trouble and determined to guard against this plant in the future.

Early in May I was again on the desert, this time in the region of Death Valley. There I collected a peculiar form of *Phacelia crenulata* Torr., carrying the plants in to camp on my left forearm. The next day the skin of this arm and of my right hand became inflamed. Now at the end of two weeks this attack is just disappearing. The fact that this second species could produce the same effect as the first one led to experimentation with several others. *Phacelia grandiflora* (Benth.) Gray, *P. minor* (Harvey) Macbr., *P. Campanularia* Gray, and *P. brachyloba* (Benth.) Gray all produced decided dermatitis when rubbed on the skin, but *P. distans* Benth., *P. tanacetifolia* Benth., and *P. ramosissima* var. *subsinuata* (Greene) Macbr. had little or no effect. The species that produced the irritation fall in at least three different sections of the genus and agree only in being viscid-glandular, while the others are but slightly glandular.

I have discussed the matter with two physicians, neither of whom was aware of any such poisonous properties in Phacelia. Several laymen with whom I have talked have had experiences similar to mine, namely, a severe dermatitis after trips into regions where they knew *Rhus diversiloba* did not exist. One physician, after such a trip, had wondered why "Rhus Tox" antigen had no remedial effect, although he usually had good results with it. I have made no careful examination of the literature, but it would seem that many cases of "poison oak" dermatitis in the West are not caused by Rhus at all, and that a field of investigation as to toxic properties, preparation of extracts, etc., is open with regard to some of our native plants, such as Phacelia spp. and other viscid Hydrophyllaceae as *Nama Parryi* Gray. Furthermore, the desirability of the present use in our "wildflower mixtures" of some of the glandular species of Phacelia, as *P. minor* and *P. Campanularia*, may well be questioned.

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THE UNDERGROUND WATER LEVEL AND ITS RELATION TO THE DROUGHT OF 1930

THE writer had the opportunity of collecting some data on ground water and lake levels during the past few years. The results of these observations have given definite information concerning the fluctuations of the ground water level, as a result of the drought of 1930.

In 1929, the annual rainfall at the Ohio Experiment Station located at Wooster, Ohio, was 44.35 inches, 5.25 inches more than normal, which for the period of 41 years is 39.10 inches. During that year, every month except March, August, September and October were well above the average. In January of 1930, the rainfall was 5.33 inches, 2.19 inches above the average, which is 3.14 inches. From February, 1930, to April, 1931, there was not a single month which had normal rainfall; all were well below the average and some below half of what it should be. From April, 1931, the rainfall for the balance of the year was somewhat above normal. As far as the rainfall deficiency is concerned, the drought began in February, 1930, and ended in April, 1931. The writer had occasion, in connection with another problem, to measure the height of the water in a well at Wooster. In 1929, the water stood at a point 13.5 feet from the top. During the summer of 1930, a time of extreme drought, the water level, as indicated by the depth to the water surface, was 17 feet. During the later part of the summer and early fall of 1931, the water surface was 19 feet from the top. In May, 1932, the water level was still below what it was in 1929.

The writer questioned a number of farmers in the vicinity of Wooster and Orrville, Ohio, concerning the water supply during the years 1929, 1930 and 1931. In every case the opinion, based on observation, was that the water supply from streams, wells and springs was smaller during the summer and early fall of 1931 than at the height of the drought during the summer and fall of 1930. All gave testimony that springs and creeks were still flowing and wells had enough water for all purposes in the summer and fall of 1930. Investigations by the writer made in the course of field trips resulted in the same conclusion. During the winter of 1930–1931, wells began to go dry, and during the summer and early fall of 1931 the creeks dried up and springs disappeared. An interesting case was brought to the attention of the writer of an artesian well, 55 feet deep, which flowed

normally until about the middle of the summer of 1930. Its flow gradually slowed up until it finally stopped in September, 1931. During the fall of 1931, a new well was drilled, 100 feet deep. The initial flow was .44 gallons per minute, which increased to 4 gallons per minute by March, 1932.

Lake levels in Ohio furnish us with another body of facts concerning the fluctuations of the ground water level during 1930 and 1931. Not far from Loudonville, Ohio, are located several lakes. Careful investigation was made of the levels of these lakes from 1929 to 1932. All observations indicate that the lake levels were lowest during October and November of 1931. One of these lakes, Round Lake, overflowed through its outlet in 1929. In January, 1931, a stake was placed to indicate the water level. On November 10, 1931, the level had fallen 20 inches below the stake. On February 27, 1932, the surface was still 8 inches below the stake. The three largest lakes in Ohio, Buckeye, St. Marys and Indian Lakes, all show the lowest water level in the late summer and fall of 1931. The level of St. Marys Lake fell steadily from April, 1930, reaching its lowest points in September, October and November, 1931; the lowest point recorded was in September, 1931. Buckeye Lake fell to its lowest level in November of the same year.

The evidence is conclusive that the ground water level was lower during the summer and fall of 1931 than at the peak of the drought in the summer, fall and winter of 1930–1931. The ground water level sank steadily from April, 1930, until the fall of 1931. The facts indicate that, although the rainfall was normal from April, 1931, on, the ground water level did not stop its downward movement until seven months later, during the later part of November and December, 1931, when it started to rise gradually. It is evident that a series of rains may have no immediate effect on the ground water level, although temporarily the run-off may cause the streams to flow vigorously.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A NEW TECHNIQUE FOR THE PREPARATION OF VITAMIN A-FREE CASEIN[1]

THE basal diet for vitamin A experiments has been investigated extensively. Sherman and Smith[2] have discussed fully the common method used in basal diet preparation in their book "The Vitamins." The vitamin A-free diet used in the Sherman laboratories is as follows:

	Per cent.
Casein vitamin A-free	18
Salt mixture, Osborne and Mendel	4
Dried brewers' yeast	10
Sodium chloride	1
Cornstarch	67

It includes also a satisfactory source of vitamin D.

This diet was used for the vitamin A experiments in the author's laboratory during 1930–31, the casein being rendered free of vitamin A by the alcohol extraction method.[1] This method involves a long tedious process. The long time of preparation, together with the large quantities of alcohol required, makes this vitamin A-free casein very expensive.

Preliminary experiments were started early in 1931 in an attempt to develop a more economical method for preparation of vitamin A-free casein. Ground commercial casein was heated in 500 to 600 gram quantities and spread on shallow trays to a depth of one and one half inches. A temperature of 110° C. was maintained in a thermostatically controlled electric oven for seven days. The casein was stirred daily to secure better air exposure.

Since the depletion records in the preliminary study indicated that the air-heated casein was as free of vitamin A as alcohol extracted casein, all vitamin A experiments for the year of 1931 and 1932 were conducted with this air-heat-treated form in the basal vitamin A-free ration.

A summary of the depletion records of vitamin A reserves in rats shows that the air-heat-treated form of casein does not carry vitamin A. An average 44-day depletion period was required for 57 animals receiving the vitamin A basal diet in which the casein had been treated by the alcohol extraction method. The average initial weight of these rats was 42 grams with a depletion weight of 116 grams, thus showing a weekly gain of 11.8 grams. The average depletion period of 131 rats which were on the vitamin A basal ration containing the air-heat-treated casein was 34 days. The average initial weight for this group of rats was 45 grams, depletion weight 112 grams, and the average weekly gain was 9 grams. Both series of animals appeared to be equally satisfactory for vitamin A tests. The longer period required for depletion of the animals on the alcohol extracted form of casein is to be explained by a modification in the stock diet. The stock diet used in the laboratory during 1931–32 was not as rich a source of

[1] Published as Scientific Paper No. 228, College of Agriculture and Experiment Station, State College of Washington.

[2] H. C. Sherman and S. L. Smith, "The Vitamins," 2d Ed., pp. 256–258, 1931.