

all of them spores or the homologues of spores, seem to draw little support from the fact recorded. It is well said though by Hartog that the whole eight-cell group should be considered as egg-organs and not in any part as prothallium. I made this point in the note that was withdrawn, from a consideration of the staining phenomena mentioned above, and it seems not unlikely that it will be supported. It is very evident that the endosperm of the Metaspermæ is a different structure from that of the Archispermæ. It is probable that the two types are to be referred to different generations, that of the Archispermæ to the gametophytic and that of the Metaspermæ to the sporophytic.—CONWAY MACMILLAN, *University of Minnesota*.

A bit of the flora of Central Arizona.—During July and August of last year I was collecting plants and studying the flora of Central Arizona. While *en route* for Camp Verde by the old Black Cañon stage route between Phoenix and Prescott, I stopped for two days at Big Bug. This is a small mining camp and stage station some eighty miles north of Phoenix. During my sojourn here, I found in a deep cañon several miles northwest of the station as interesting a bit of flora as I have seen since coming to the territory.

As we leave the flat sandy desert, which extends for some distance north of Phoenix, and enter the mountainous region, there is almost an entire change in the floral aspect of the country. At this season of the year the only conspicuous vegetation on the sandy mesa that could be observed from the top of the stage coach were several species of cacti and the creosote bush, *Larea Mexicana* Moric. This shrub grows in nearly all parts of Southern Arizona, and is perfectly at home upon the driest mesa, where, in some years, it is without rain for several continuous months. It has surface roots and frequently grows upon a hard, rocky subsoil. No doubt the gum which covers the leaves like a coat of varnish aids greatly in retarding the evaporation of moisture.

Of the species of cacti found here, *Cereus giganteus* Engelm., *Echinocactus Wislizeni* Engelm., and the great tree cactus, *Opuntia arborescens* Engelm., are the first to catch the traveller's eye.

There is a marked variation in the forms of this latter species as found in the various parts of the territory. This variation is noticeable in length of spines, relative length of joints, color, and in the general aspect of the plant. It is possible that some of these forms may constitute varietal differences, or even specific ones, under more extended study.

As we reached the mountains, our route brought us to the Agua Fria River, which in July was almost dry. The banks of this stream,

together with its tributaries, were in many places covered with large clumps of *Prunus demissa* Wal. and *Rhamnus Californica* Esch., with now and then a large cottonwood or black willow showing above them. *Platanus racemosa* Nutt., *Fraxinus pistaciæfolia* Torr., and *Juglans Californica* Watson, were frequently seen nearly covered with the long and heavy vines of *Vitis Arizonica* Engelm., which grows in great abundance in nearly all the valleys of the territory. In many places the river bed was a complete tangle of *Fallugia paradoxa* Endlicher, *Baccharis glutinosa* Pers. and *Baccharis salicina* T. & G., while in the open places *Petunia parviflora* Juss., *Chamæsaracha coronopus* Gray, *Euphorbia polycarpa* Benth. var. *aristida* Watson, *Euphorbia serpyllifolia* Pers., *Euphorbia albomarginata* T. & G., *Croton Texensis*, Müll., *Polanisia trachysperma* T. & G. and *Gaura parviflora* Dougl., sprang up between the stones or out of the clear white sand. Extending back to the mountains on each side of the river was a dense chapparal of several varieties of *Quercus undulatus* Torr., densely loaded with acorns. In some localities these shrub oaks fruit so profusely that swine ranches are maintained upon the acorns alone. Mixed in with these oaks were found *Arctostaphylos tomentosa*, Dougl., *Arctostaphylos Nevadensis* Gray, *Arctostaphylos pungens* HBK., *Acacia Greggii* Gray, and *Zizyphus lycioides* Gray; while underneath them were growing *Hedeoma Drummondii* Benth., *Verbena ciliata* Benth., *Mentzelia Wrightii* Gray, and several species of *Eriogonum*. An *Opuntia* was occasionally seen, while here and there a *Yucca baccata* Torr. extended its long filamentous leaves in all directions, or an *Agave Parryi* Engelm. projected its scape high in the air. A few straggling spears of grass were found, mostly *Bouteloua racemosa* Lag. and *Muhlenbergia Texana* Thur. with a frequent bunch of *Hilaria rigida* Scrib. At this season the annuals were mostly scorched and destroyed by the prolonged drouth.

Traveling several miles northwestward from Big Bug, I entered the cañon to which I previously referred, and almost instantly found myself under the shade of *Quercus Emoryi* Torr., *Alnus oblongifolia* Torr., and *Platanus racemosa* Nutt. At either side, growing from the steep mountain slopes, were *Juniperus Californica* Carr. var. *Utahensis* Engelm., *Juniperus pachyphlœa* Torr., *Pinus monophylla* Torr. & Frem., and *Canotia holacantha* Torr. At my feet were many cones from *Pinus ponderosa* Dougl. which had been washed down by the stream from a dozen or more miles up the cañon.

Ascending the cañon, the banks of the stream on either side for rods are lined with the beautiful *Aquilegia chrysantha* Gray. Growing from the water were large bunches of *Juncus tenuis* Willd. and *Scirpus pun-*

gens Vahl., out of which were peeping the bright yellow flowers of *Mimulus pilosus* Watson. Here and there along the banks I gathered *Nicotiana attenuata* Torr., *Nicotiana trigonophylla* Dunal., *Mimulus luteus* L., *Polygonum incarnatum* Ell., *Coreopsis cardaminaefolia* Torr. & Gray, *Asclepiodora decumbens* Gray, *Erythræa venusta* Gray, *Ambrosia psilostachya* DC., *Oxalis violacea* L., *Thalictrum Fendleri* Engelm., *Solidago Missouriensis* Nutt., *Solidago Canadensis* L., *Krameria parvifolia* Benth., *Aster ericæfolius* Rothr., *Viola Canadensis* L., var. *scopulorum*, *Oenothera albicaulis* Nutt., *Polygala hemipterocarpa* Gray, *Petalostemon multiflorus* Nutt., *Boerhaavia spicata* Choisy, *Solanum nigrum* L., *Erigeron divergens* Torr. & Gray, *Helianthus petiolaris* Nutt., *Riddellia Cooperi* Gray, *Nama hispidum* Gray, and *Maurandia Wizlizeni* Engelm.

Further up the cañon the stream is shut in by almost perpendicular walls of rock. In many places where the water slowly seeps through small fissures in these rocky walls, *Mimulus cardinalis* Dougl., one of the most beautiful of wild flowers, was growing in abundance. Here also were found *Mirabilis multiflora* Desf., and *Heuchera parvifolia* Nutt. In many places large areas of *Pteris aquilina* L. spread their broad fronds in the shade of the protecting rocks.

On my return to the station, my plant-can contained more than seventy-five species in fit condition for herbarium specimens.—J. W. TOUMEY, *Tuscon, Arizona*.

EDITORIAL.

BOTANICAL AUTHORITY seems to be following the same lines of evolution as political. It began with a system of tyranny or dictatorship that vested all such authority in a single individual. Linnæus seems to have ruled the botanical world with a rod of iron, and his word was law. There next followed the reign of a botanical aristocracy, whose spirit was not merely to snub but even to suppress the work of the less favored. Naturally, the spirit of freedom and independence gradually increased, and numerous became the revolts against self-constituted authority.

OUR OWN country has passed through the period of a botanical aristocracy, and there is a good deal of written and unwritten history concerning rank injustice done to both worthy but unknown botanists and known but underrated botanists. A new generation, however, has come to the front; one in which the spirit of democracy is prevalent,



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