we see clearly how this species may have been introduced into the pueblos. But our problem is not solved with this new evidence. Tobacco was unquestionably cultivated in the Pueblo country, by Indian and Spanish farmers alike, for decades before these recent experiments. The question is, What species of tobacco was this, and what is its history?

Mr. Mewborne tells me of seeing tobacco under cultivation in New Mexican villages in the early 1900's. Dr. H. P. Mera reports that he has seen tobacco grown near Santa Fe 25 or 30 years ago. Mr. Pete Gonzales also informs me that *punche* has been grown in Rio en Medio since "1875, at least." But we do not know what species of *Nicotiana* are involved in these instances of cultivation.

Through the kindness of Professor Clyde Kluckhohn, of Harvard University, a manuscript in the Peabody Museum by Dr. Edw. Palmer, who made extensive botanical collections in the Southwest for many years prior to 1890, was examined for references to *N. rustica* among the pueblos.[4] None was found. Dr. Beinhart, Dr. Rogers McVaugh, also of the U. S. Department of Agriculture, and Mr. Volney H. Jones have made search among Palmer's field notes and elsewhere, but without discovering any evidence of *N. rustica* under cultivation among the pueblos.

Further inquiry among documentary historians supports Bandelier's claim that "tobacco was not known to the Pueblos until Spanish rule became established."[5] Archeologists have no evidence of the use of tobacco among the Pueblos in prehistoric times.

The situation, then, seems to be this: Tobacco was not used among the Pueblos prior to the advent of the white man. All our specimens, collected subsequent to the experiments of Mr. Mewborne and Dr. Beinhart, are of *N. rustica,* and hence may have been introduced by them. But tobacco of some species was grown in the Mexican villages and Indian pueblos of this region for decades before 1925. Was this species also *rustica*? If another species, has its cultivation been discontinued, possibly as a consequence of recent introduction of *rustica*? Or, is it still being grown to-day? These and other questions must be answered before we can write the history of tobacco cultivation in the Southwest.

P.S.—Since the above was written, "Three New Mexico Chronicles," translated and edited by H. Bailey Carroll and J. Villasana Haggard, has been published by The Quivira Society (University of New Mexico Press, Albuquerque, 1942). In this work we find two references to the cultivation of tobacco in New Mexico in the 19th century. The first, from a treatise by Juan Bautista Pino, published in 1812, states that tobacco was cultivated in New Mexico at that time but that its production was limited by a government monopoly (p. 97). The second reference is from notes on New Mexico by José Agustín de Escudero, published in 1849, which states that "a kind of tobacco which the Indians call *punche*" was grown "but which its producers can not sell because of the government monopoly" (p. 120).

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[3] E. G. Beinhart, SCIENCE, 94: 538–39, December 5, 1941.

[4] Geo. Vasey states that Palmer observed *N. rustica* under cultivation among the Indians of New Mexico (Report of the Botanist, p. 76, in Report of the Commissioner of Agriculture for 1886), but all effort to find this statement in Palmer's notes, unpublished as well as published, has failed.

[5] Final Report, etc., Pt. I, p. 37 (Papers of the Archeological Institute of America; Amer. Series III; 1890).

BREEDING DISEASE-RESISTANT CROPS

IN a recent article Stevens[1] pointed out that the production of new varieties of crops, even those bred for resistance to some important disease, often prove to be very susceptible to some other disease which, even with extensive testing, might not be discovered by the breeder prior to its release. This has happened so often that it has come to seem almost axiomatic to many people.

The danger of introducing a gene for susceptibility to some other disease while introducing one or more for resistance to the disease under consideration may be avoided by using the backcross method of breeding.[2] In a self-pollinated crop like wheat the progeny of a hybrid will become homozygous for the genes of the recurrent parent with a sufficient number of backcrosses. Only the gene or genes being introduced must be maintained by selection. Therefore, the new variety will be exactly like the recurrent parent except for the introduced genes and perhaps some other very closely linked ones.

We have used this method in breeding wheats resistant to bunt, *Tilletia tritici,* and to stem rust, *Puccinia graminis,* and find that the derived varieties are exactly like the recurrent parent in all characters except for resistance to the two diseases mentioned. Their reaction to mildew, septoria, leaf rust and other diseases has not been changed.

In cross-pollinated crops, like corn, backcrossing to a heterozygous parent is equivalent to one generation of inbreeding; therefore, this method of breeding may not be so directly applicable, especially if such a crop loses vigor when inbred. In the case of corn it should be very useful in improving inbred lines.

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[1] Neil E. Stevens, SCIENCE, 95: 313–316, 1942.

[2] Fred N Briggs, *Amer. Nat.,* 72: 285–292, 1938.