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IRRIGATION AND AGRICULTURAL PRACTICE IN ARIZONA.

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chance upon them, utilize the run-off from summer storms, soak their soil, and plant quick-growing crops of corn, beans, squashes, and melons. The several tribes along the Colorado River—the Mohaves, Chemehuevis, Yumas, and Cocopahs—grow crops in that fertile valley after a peculiar method necessitated by the behavior of the river. Their main crop season begins immediately after the subsidence of the annual flood in July. Millets are sown in the mud flats exposed by the falling waters, much after the fashion of Egyptian irrigators under the old basin system used along the Nile. Other crops, such as corn, squashes, and melons are planted, as soon as the bottom lands are dry enough, in pits sometimes 2 feet deep, from which the plants issue quickly in profuse growth. Sufficient moisture is brought within the reach of the plant roots by this method of deep planting to insure a crop without further irrigation.

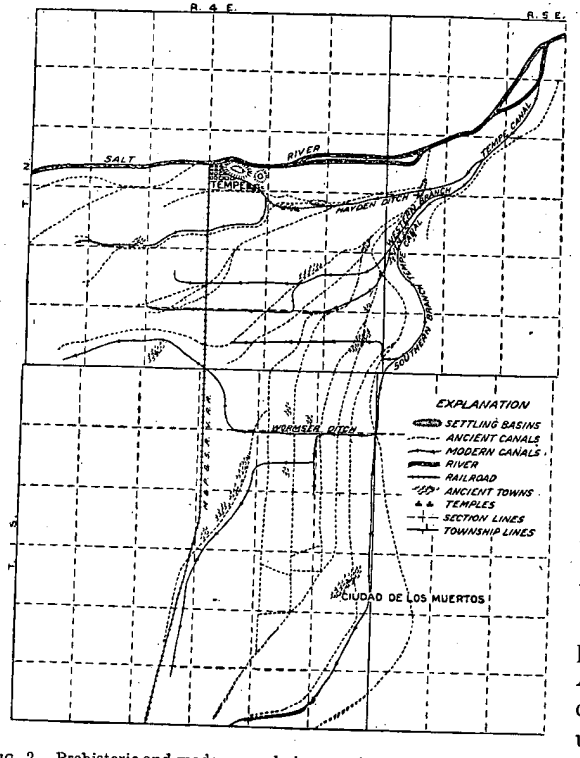

FIG. 2.—Prehistoric and modern canals in a portion of Salt River Valley, located by James C. Goodwin, Tempe, Arizona.

The first European irrigators in Arizona were, without doubt, the Jesuits, who first established themselves at the old missions of Guevavi and San Xavier in 1732. It was not until the more prosperous period from about 1768 to 1822, however, that there was any considerable development of irrigation at favorable points along the Santa Cruz River, near the missions and the Spanish presidios of Tubac and Tucson. During the chaotic period of Mexican rule which followed acequias were maintained, orchards were planted, and annual crops of barley, wheat, corn, tobacco, beans, melons, squashes, and peppers—both native and introduced crops—were cultivated. Although from an engineering standpoint the head works and canals of this period

were of the simplest construction and of small extent, the Mexican people were skillful in the management of water and possessed an agricultural aptitude well expressed by them in their phrase "el mano por sembrar"—the planting hand. They also adopted certain ideas in equity, and customs relating to the distribution and use of water, which are approved in the best irrigation practice of the present time. Among these was the rule that water is appurtenant to the land.

The Americans in Arizona received their first instruction in irrigation from the Mexicans. The third, or modern, stage of agricultural development may be said to date from the Gadsden purchase in 1854, after which increasing numbers of Americans—military followers, stragglers from the immigrant stream to California, and pioneers by instinct—began to make permanent homes in the land.

Irrigation in the Salt River Valley began soon after the close of the Civil War, when military occupation of the region was resumed and the Army posts offered the settlers both safety and remunerative prices for their products. Canal construction was rapid, beginning with the old Swilling Ditch in 1867, and 20 years later about as much land had been reclaimed as could be irrigated from Salt River in seasons of scant flow. Nevertheless, during a series of wet years that followed, additional areas were put under cultivation until more ground was nominally reclaimed than could be irrigated by the "critical minimum" water supply. The inevitable hardships which resulted from this condition during ensuing dry years, especially 1898–1904, led to anxious discussion of remedial measures and prepared the way for the construction under United States Reclamation Service auspices of the Roosevelt Storage Dam, which is now (March, 1911), completed.

The second largest irrigated district in Arizona (1911) is in Graham County on the upper Gila River. It was settled by Mexican colonists in 1874 and later by the Mormons in 1879. As in the Salt River Valley, there has been a tendency to overappropriate lands under the available water supply, with consequent distress in dry years. Thus far, however, conditions in this locality are prosperous, owing to the fact that the flow of the Gila River at this point is comparatively regular and fairly adequate to irrigate the area under cultivation, although the total amount of land under ditch is in excess of the water supply.

The Colorado River Valley, although the most extensive and potentially the richest and best watered of the agricultural regions, is the last to be developed through irrigation, principally because of the unmanageable character of this eccentric stream and the large expense of the permanent irrigation works required for its control. Although a few small enterprises near Yuma have achieved temporary successes during the past 15 years, it was not until the United States

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