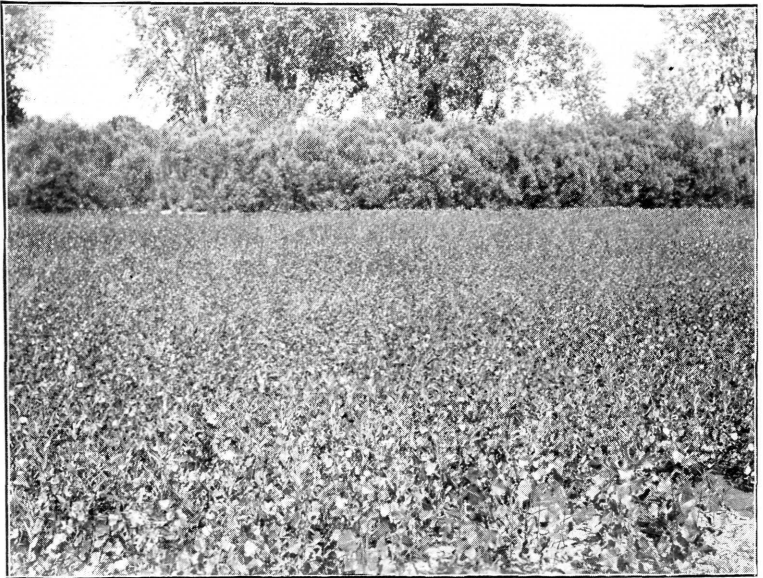


## THE STRUGGLE FOR LIFE ON A CERTAIN SANDBAR.

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In the year 1900, the Republican River which flows through Clay County, Kansas, was very low for a long time. This gave an opportunity for the development of a thick growth of vegetation on the wide sandbars common along this stream.

The writer was much impressed by the remarkable development of young trees on some of these bars and made a careful study of one of them to ascertain what seedlings were growing under the conditions present. The picture given below (Fig. 1)



was taken from near the water's edge and shows the river bank in the background, covered with a solid belt of the Sandbar Willow (*Salix fluviatilis* Nutt.) This bar had been nearly barren the previous year but now it was covered with little trees. The only seedlings present, except here and there some herbaceous plant, were Cottonwoods (*Populus deltoides* Marsh.), Peachleaf Willows (*Salix amygdaloides* And.), and Sandbar Willows (*Salix fluviatilis* Nutt.) In some places the three species were about equally mixed, in others nearly all of the plantlets were of a single species. Near the outer margin where there was a thinner stand, as shown in the foreground of the picture, eighty Cottonwood plants from twelve to eighteen inches high were counted per square foot. But among these eighty survivors were numerous

smaller dead and decaying individuals. Going a little farther toward the centre of the field, two hundred plants (Cottonwoods, Peachleaf Willows, and Sandbar Willows) were counted on an accurately measured square foot! Many, however, were losing in the struggle for space and light and were either sickly in appearance or in a dying condition. A few were already dead. The smaller ones were hopelessly shaded. A great destruction was taking place among these immature or juvenile individuals long before the normal conditions of adult life were possible. All had apparently sprouted at about the same time and the struggle for existence was among more or less similar individuals of a very few species. These possessed the ground so completely that there was practically no opportunity for an intruder to gain a foothold at this stage of the process.

But suppose that this society were to continue its development for a number of years or until the trees had grown to maturity. In three years there would be about one tree for each square foot. Such examples are numerous on old sandbars. Of the two hundred plants one hundred and ninety-nine would have no room and must inevitably perish. But in this way space is again made available for other plants to sprout among the survivors. Thus the original struggle among those of like nature makes an opportunity for plants of other species to invade the territory. Some of these can endure the shade and other imposed conditions already present and the result is more and more of a mixed society. The struggle for life is now between diverse species under all gradations of favorable and unfavorable conditions. The struggle among the original possessors of the soil is, however, not yet at an end. As the trees grow larger more and more must give way to their more powerful or fortunate neighbors. In twenty-five years there would be at most but one large Cottonwood or Willow for each fifty square feet. Nine thousand nine hundred and ninety-nine little Cottonwoods and Willows will have been over-reached and over-shadowed and the one solitary giant will stand as the sole survivor of a conquered multitude.

Not a single plant of this particular society, however, was thus fortunate. For two years later a high flood washed over the entire bar and removed every vestige of the thriving young plant society. Accidental destruction put an end to the process of the elimination of the unfit. At present the struggle for existence is again going on as vigorously among the members of a new society as it did among those which had occupied the soil before; and it is evident that without the destruction of the previous society the later generation would not even have had an opportunity to try the experiment of the juvenile stage.