

Lactarius delicatulus seems to spawn intermittently for, larvæ and post-larvæ of this, greatly varying in length, are simultaneously met with all through the season.

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¹ Russell, F. S., *Journ. Mar. Biol. Assoc.*, N. S., 1935, 20, 150.

² Day's nomenclature is followed.

³ Hardy, A. C., *Min. Agri. Fish. Fish. Invest.*, Ser. II, 1924, 7, 3, 1-53; Lebour, M. V., *Journ. Mar. Biol. Assoc.*, N. S., 1924, 13, 330 and Ogilvie, H. S., *Fisheries Scotland Sci. Invest.*, 1927, 1, 1-10.

⁴ Data kindly supplied by Mr. M. A. S. Menon of this Laboratory to whom I am greatly indebted.

REVERSE MUTATION IN *OPUNTIA DECUMANA*

THE prickly pear to which species of *Opuntia* belong has one species free from spine, called the spineless cactus. In this species when the joints (phylloclades) are young, tender fleshy spines are present, but these soon drop off, as the joint enlarges to form a spineless surface. The exact origin of the spineless cactus is obscure. Luther Burbank supposes that during the phylogeny of the cactus the original spineless type has acquired the spine in order to protect itself from becoming extinct during ages past. This hypothesis is purely conjectural. The large number of cactus species of the present day are all of the spiny type and the spineless species described are very few. For want of authentic records, it is, therefore, difficult to state whether spineless cactus arose as a mutation from the spiny type or *vice versa*.

"Reversion," "throw back" or "atavism" of characters is a phenomenon which is accepted by geneticists to indicate a reversion to the old or ancestral form. This phenomena affords a clue to the history of a character. In the light of this the reverse mutation which forms

the subject of this note shows that the spiny character in cactus is primitive or ancestral compared to the spineless character.

The species to which the spineless cactus, grown in the Economic Botanist's Area in Poona (which has thrown off two spiny mutants), belongs is described by Burns (1940) as *Opuntia decumana* while Mehta (1923) includes it in *Opuntia ficus-indica*. The spineless plants have been under the constant observation of the writer for the past ten years, and until two years back no spiny type was seen to arise from the spineless type. Two years

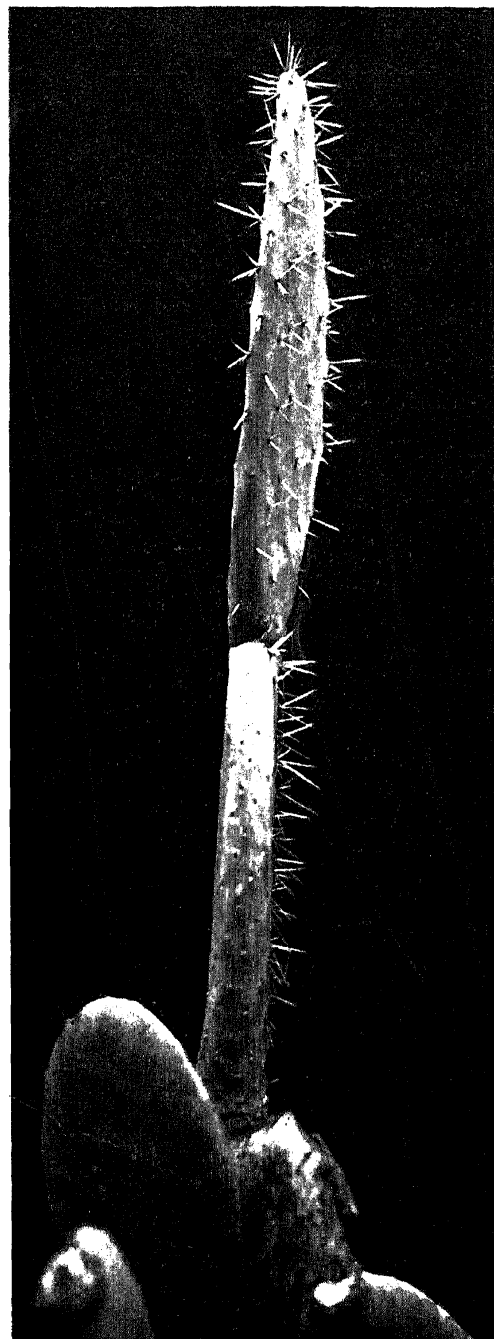


FIG. 1.—The joints at the bottom are spineless. The middle joint on edge view has spines on the surface to the right while the surface to the left is spineless.

back, however, in a trial undertaken to compare the effectiveness of spineless cactus as a live-hedge, one set or joint out of several hundreds of the spineless type that were planted gave rise to spiny and spineless joints subsequently. The photographs illustrate the type of somatic mutation which gave rise to the joints bearing spines.

A single spineless joint (phylloclade) was planted with one-third of its portion buried underground. From this several subsidiary spineless joints were produced and from one such arose a joint which had spines on one of its flat surface while the opposite surface was spineless (Fig. 1). This is evidently a case of sectorial chimera which has arisen due to somatic mutation. Later, from this joint showing spine on one side and none on the other arose another joint which likewise repeated the characteristics. In the second joint, however, some spines are to be seen along the margin of the spineless surface.

The other instance (Fig. 2) arose independent of the above in a plot where joints of spineless cactus were planted for multiplication. From this arose joints without spine and one having spines. The spiny type subsequently gave rise to joints bearing spines.

In the second example it is noticed that the few segments which bore spines profusely are giving rise to subsequent joints with fewer and fewer spines. This is an interesting example of successive reversions taking place in the course of two years.

The above two instances very clearly illustrate the sudden origin of a spiny cactus from the spineless type by somatic mutation of a bud from which the joints arose. On the hypothesis of reversion to ancestral or primitive character, it would appear that the cactus types having spines have had an earlier origin. If this is considered with Willis's age and area hypothesis, the extensive areas over which the cactus (spiny) has spread in its own home in South America and the greater number of species as represented by it would definitely

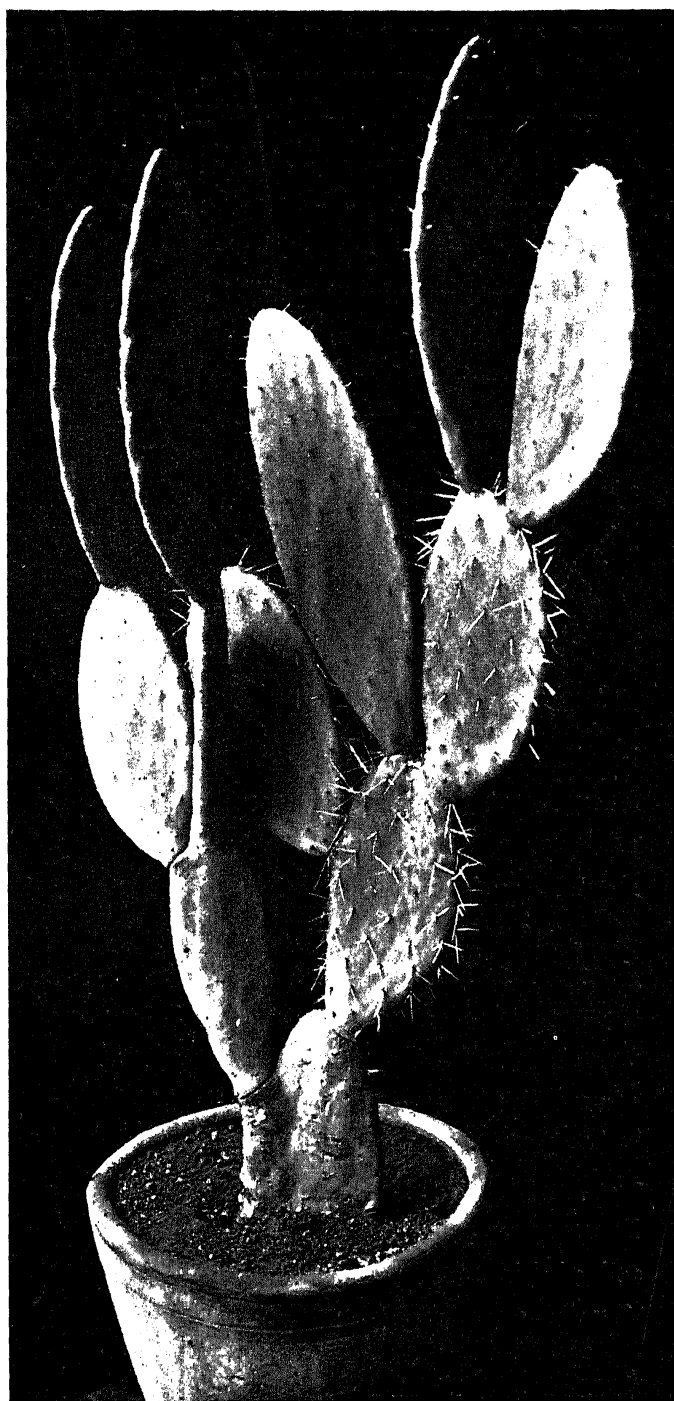


FIG. 2.—From a spineless joint, spiny joints have arisen to the right and spineless to the left. Of the spiny joints on the right, those below are completely covered with spines, while those towards the top show decrease in the number of spines.

indicate that the spineless cactus is of more recent origin.

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July 6, 1942.

¹ Burns, W., *Indian Farming*, 1940, 1, No. 4, 160.

² Burbank, Luther, *A Partner of Nature*, Appleton Century Inc., 1939.

³ Mehta, H. G., *The Agri. Jour. of India*, 1923, 18.

⁴ Willis, J. C., *Age and Area*, Cambridge University Press, 1922.