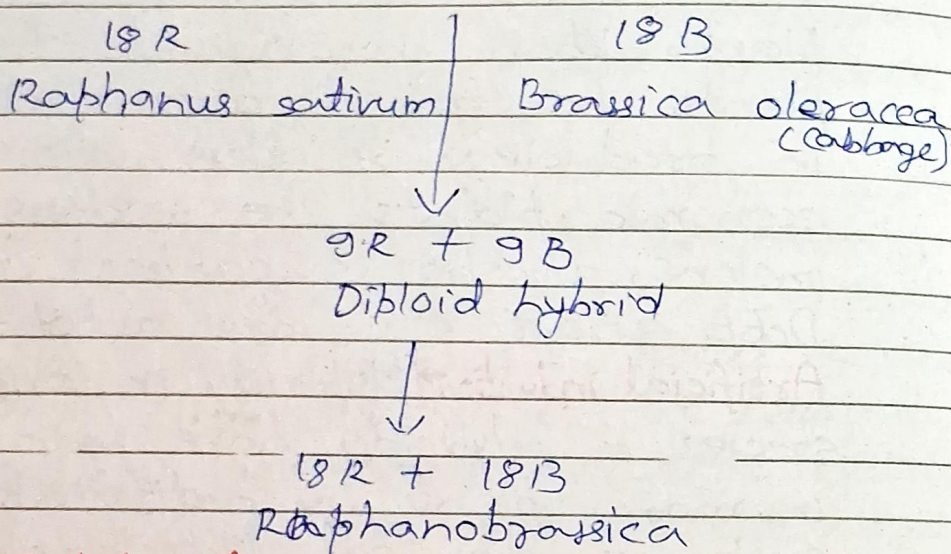


Q. Discuss the role of Polyploidy in origin of new species.

INTRODUCTION → Polyploidy is the condition of organisms in which their cells contain more than two sets of chromosomes. Such organisms have been termed as Polyploid. Polyploidy results in increase in gene content and gene number. It is more common in plants than in animals. Polyploid plants has great commercial value in producing seedless varieties of economic plants. The seedless watermelons, grapes, sugarbeet, bananas, Dobb grass etc. are autotriploids.

Artificial induction → Polyploidy in origin of species of polyploidy have been induced in many plant by artificial means. such as chemical like chlorate hydrate colchicine, sulfanilic amide, mercuric chloride and radioactive substances. These induced usually disturb the mitotic and meiotic spindle and cause non segregation of all ready duplicated chromosomes during cell division. It has been found that allopolyploidy has great value in origin of cultivated plants. This has been pointed by Winge (1917) but the first allopolyploid was produced by Russian

scientist Karyuchenko (1927), this was Raphano brassica. It was produced by crossing Raphanus sativum ($2n=18$) and Brassica oleracea ($2n=18$). This F_1 plant were sterile hybrid but among these some F_1 hybrids a few fertile plants were observed which contain 36 chromosomes. These fertile tetraploids were called Raphano-brassica.

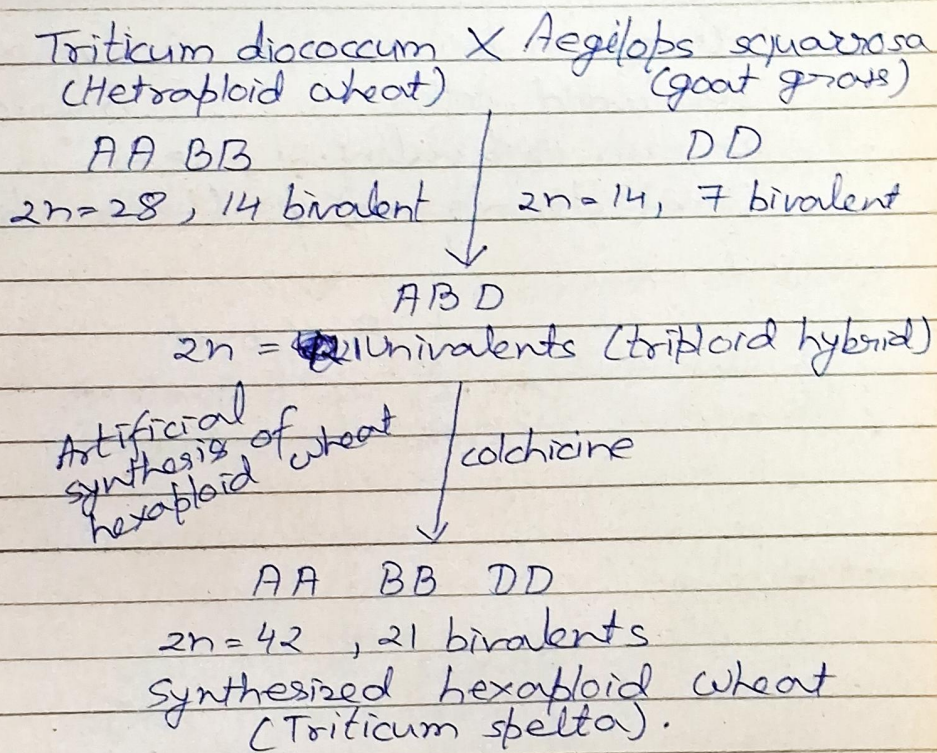


Artificial synthesis of Raphanobrassica

There are similar examples. Some common examples are the followings —

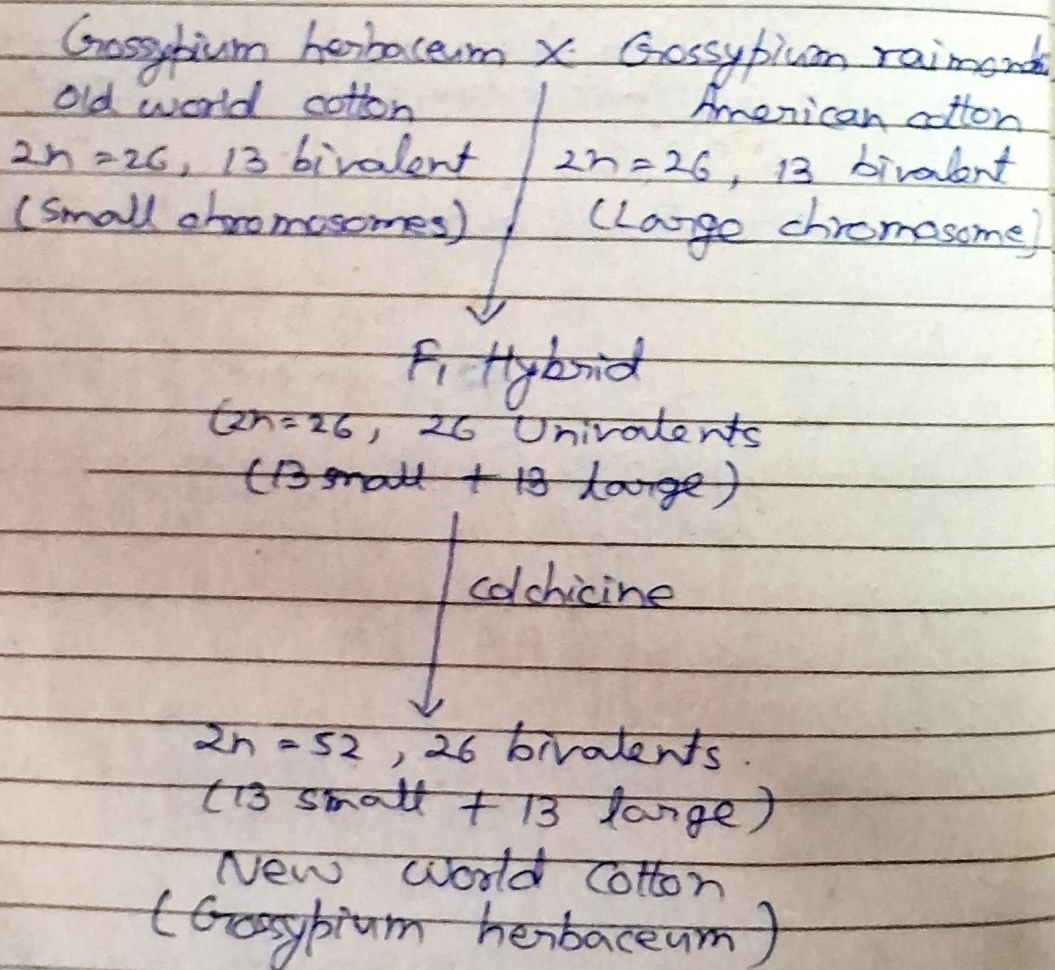
① Origin of Triticum spelta → Triticum spelta is a hexaploid wheat. which was artificially synthesized in 1946 by Matedden and Sears and also by Kihara. They crossed Triticum dicoccoides ($2n=28$) with Aegilops squarrosa ($2n=14$) and doubles the chromosome number in the F_1 hybrids. This artificially synthesized

hexaploid wheat was found to be similar to the primitive wheat *Triticum spelta*. The F_1 hybrid was completely fertile. This suggested that hexaploid wheat must be suggested that hexaploid wheat must be originated in the nature due to natural hybridization followed by duplication of chromosomes of F_1 hybrid.



② Origin of *Gossypium herbaceum* → It is the new ^{species} ~~species~~ ^{world} of cotton plant and is another interesting example of allopolyploidy. The old world cotton *Gossypium herbaceum* has 13 pairs of chromosome while a plant cotton also contain 13 pairs

of chromosomes (Beasley 1948) crossed the old world and American cottons and doubled the chromosome number in the F_1 hybrid to produce the allopolyploid which resembles the cultivated new world cotton. It also suggests that tetraploid G. herbaceum originated from diploid species namely G. herbaceum and G. raimondii.



Artificial synthesis of New world cotton.

~~Origin of Raimutta kewensis →~~