INDUCED TETRAPLOIDY IN *DIOSCOREA DELTOIDEA* WALL.

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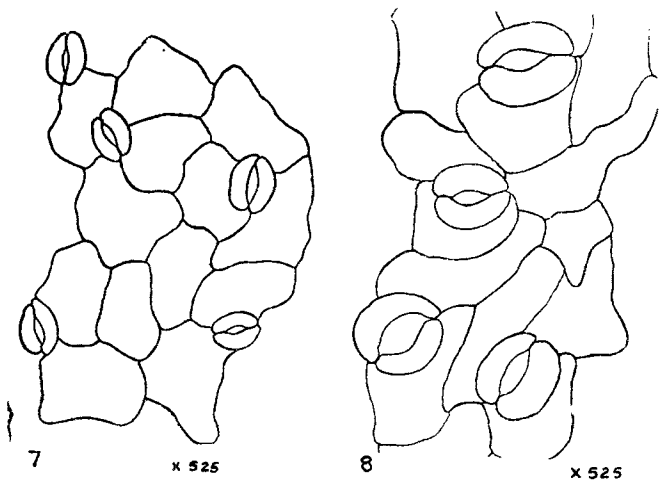
INTRODUCTION

THERE are over 150 species belonging to the genus Dioscorea of which about 28 species are found growing in India (Prain and Burkill, 1936–38). Burkill (1960) classifies the genus into 2 sections those with rhizomatous roots and those with tubers. Of these the former the Stenophora are considered more primitive. *D. deltoidea* of the West Himalayas and the closely related *D. prazeri* of the East Himalayas, the two Indian species belonging to the section Stenophora are important as sources of Diosgenin which is being increasingly used for the preparation of Cortisone and other steroid hormones (Chakravarti *et al.*, 1954). We are at present chiefly interested in *Dioscorea deltoidea* which grows plentifully in Jammu and Kashmir and has higher percentage of Diosgenin than *D. prazeri.*

Of the 17 species belonging to the section Stenophora, 14 are found in Asia, mostly in China and Japan. *D. deltoidea* whose distribution extends from Tonkin to the Western Himalayas links the Stenophora of Asia with *D. caucasica* found growing as an endemic between the Caucasus and the Black Sea, and the only European species *D. balcanica* of the Balkans. The presence of 2 species of Stenophora in North America and one in Brazil shows that it probably had a wider distribution during earlier geologic periods. This is confirmed by the presence of fossils of this affinity in North Italy and America (Burkill, *loc. cit.*). All the Stenophora species of Asia and Europe, examined so far, are diploids $2n = 20$ and these include *D. caucasica*, *D. gracillima*, *D. quinqueloba*, and *D. tokoro* of Japan. (Darlington, C. D. and Janaki Ammal, E. K., 1945). To this group we can now add *D. deltoidea* of the Western Himalayas in which we found $2n = 20$

(Plate XXII, Fig. 1) and not $2n = 40$ as was reported by Sundara Raghavan (1958). It is interesting to note that while all the tuberous Dioscorea into which fall the edible yams are high polyploids, the only polyploid found in the Stenophora section is *D. villosa* $2n = 60$ of Eastern U.S.A. (Smith, 1937) which is cultivated in Botanical Gardens of Europe.

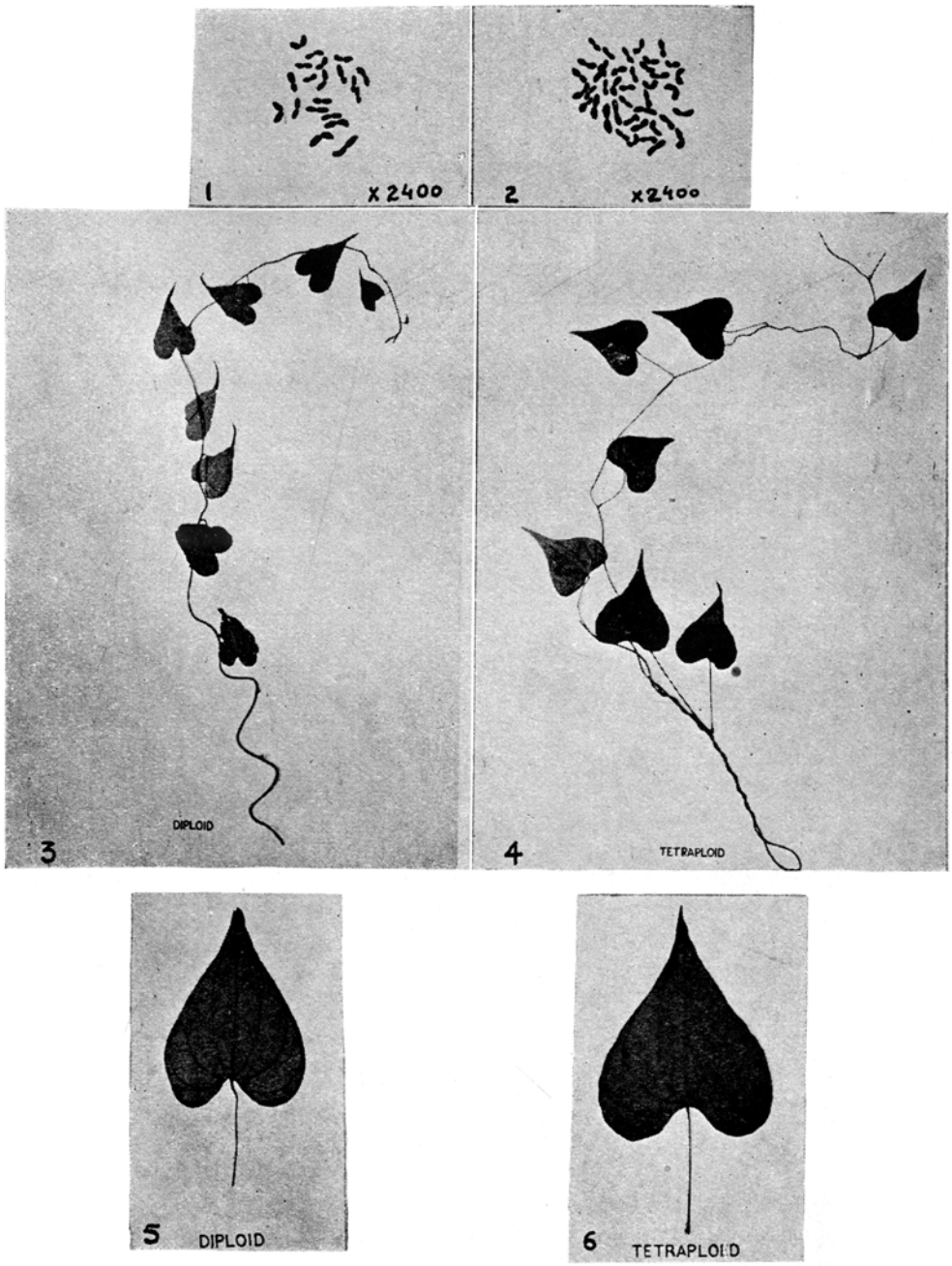
It was considered important to double the chromosomes in *D. deltoidea* with a view to possible increase in the active principle prior to bringing it into cultivation. Rhizomes were injected with 1 to 0·4 per cent. aqueous solution of colchicine by means of a hypodermic needle during the resting condition and planted out in sand. Shoots with $2n = 40$ (Plate XXII, Fig. 2) chromosomes were produced and these had larger and thicker leaves and bigger stomata than the diploid (Plate XXII, Figs. 3,.4, 5, 6, Text-Figs. 7 and 8). Rhizomes of tetraploids were found to be slower growing than diploids. Two-year plants are now being propagated at the Regional Research Laboratory, Jammu, for studies of diosgenin content.



FIGS. 7–8. Fig. 7. Stomata of *D. deltoidea* diploid, ×525. Fig. 8. Stomata of *D. deltoidea* tetraploid, × 525.

SUMMARY

The present paper deals with chromosomes of *Dioscorea deltoidea* $2n = 20$ and its induced tetraploid from $2n = 40$. The position of *D. deltoidea* in relation to other rhizomatous species of Dioscorea of Asia and Europe and to the tuberous yams in cultivation is presented.



FIGS. 1–6. Fig. 1. *Dioscorea deltoidea*, diploid $2n = 20$, ×2,400. Fig. 2. *Dioscorea deltoidea*, tetraploid $2n = 40$, ×2,400. Fig. 3. Shoot of diploid *D. deltoidea*. Fig. 4. Shoot of Tetraploid *D. deltoidea*. Fig. 5. A leaf of Diploid *D. deltoidea*. Fig. 6. Leaf of Tetraploid *D. deltoidea*.

REFERENCES

1. Burkill, I. H. .. *Journ. Linn. Soc.*, 1960, **56**, 319.
2. Chakravarti, R. N. (Mrs.), Chakravarti, D. and Baruah, A. K. *Indian Medical Gazette*, **89**, I.
3. Darlington, C. D. and Janaki Ammal, E. K. *Chromosome Atlas of Cultivated Plants*, Allen & Co., London, 1945.
4. Prain, D. and Burkill, I. H. *Annals of Royal Botanical Garden*, Calcutta, 1936–38, **14**, Parts I & II.
5. Smith, B. W. .. *Bull. Torrey Bot. Cl.*, 1937, 64–189.
6. Sundara Raghavan, R. .. *Proc. Ind. Acad. Sci.*, 1958, **48**, Sec. B, No. 1, 48–69.