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A new petrified tetralocular capsular fruit *Tetraloculaire mohgaonese* gen. et sp. Nov from deccan intertrappean beds of Mohgaonkalan, M.P., India

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Abstract: *The Present Fossil is collected from Deccan Intertrappean beds of Mohgaonkalan. Both part and counterpart of fruit revels that, fruit is cup-shaped, tetralocular, capsule showing septicidal dehiscence along with short stalk & persistent calyx. Single seed is present in each locule. The whole fruit measures approx. 4150µm in length and 3150µm in width.*

Key Words: *Fruit cup-shaped, tetralocular, septicidal capsule.*

1. INTRODUCTION:

The present paper deals with a detailed investigation of a fossil dicotyledonous capsular fruit from the Deccan intertrappean beds of Mohgaonkalan of uppermost cretaceous age. From this locality several capsular fruit have been reported and studied by many workers. Some of them are, ***Enigmocarpon parijae*** **(Sahni, 1943),** ***Indocarpa intertrappea*** **(Jain, 1964),** ***Harrisocarpon sahnii*** **(Chitaley & Nambudiri, 1973),** ***Sahniocarpon harrisii*** **(Chitaley & Patil, 1972),** ***Deccanocarpon arnoldi*** **(Paradkar & Dixit, 1975),** ***Euphorbiocarpon singhpurii*** **(Bhowal, 2006),** ***Chitaleocarpon intertrappea*** **(Kapgate, 2000)** and ***Gynobasiocarpon sheikhii*** **(Saxsena, 2004).**

The present investigation gives additional information to the knowledge of capsular fruits from the Deccan Intertrappean flora of Mohgaonkalan, M.P., India.

2. MATERIAL & METHOD:

Some silicified cherts were collected from mohgaonkalan of chhindwara distt. of M.P., India. After breaking of chert, well preserved longitudinally cut specimen is clearly seen. Serial peel sections were taken from part & counterpart by peel method and studied in detail for its identification.

3. DESCRIPTION:

Fruit morphology

Both part and counterpart of present petrified fruit exposed in oblique longitudinal plane. The present fruit is cup-shaped, tetralocular, with single seed in each locule. Pericarp is differentiated into three zones ie. epicarp, mesocarp & endocarp. The dicot capsule shows presence of persitant calyx and gynobasic style with short stalk. Each seed is vertically placed. All four locule seprated by four septae. Central axis arises from the basal part of fruit extend towards apical region of fruit showing gynobasic nature of fruit. It measures approximately 4150µm in length and 3150µm in width. (Plate I, Figs. 1 to 12, Plate II, Figs. 13 to 24; Text Figs. 1 to 14, & 15 to 27)

Fruit anatomy

On the basis of anatomical study of both part and counterpart of the present petrified capsular fruit shows three distinct structure **1) Cup-shaped fruit. 2) Persitant calyx. 3) Stalked fruit.**

1) Cup-shaped fruit*:* **-** The whole cup-shaped body of fruit consists of Pericarp, Septae, Locule, Seed and central axis.

Pericarp: **-** It is differentiated into three zones outer epicarp, middle mesocarp & inner endocarp. The outer epicarp is single layered made up of small circular to oval, thickwalled parenchymatous cells. The middle mesocarp is multilayered consisting of thin walled parenchymatous cells which are long, elongated in shape and loosely arranged. The inner endocarp is single layered and also comparising small parenchymatous cells The fruit wall or pericarp measures 200µm in thickness (Plate III, Fig. 28; Text Fig. 29) It breaks towards septa showing septicidal dehiscence.(Plate I, Figs. 11,12; Text Figs. 13/23, 14/24) In longitudinal section,vascular supply is clearly observed in fruit wall.(Plate III, Fig 27). At some place in pericarp, few canals are present thus septicidal dehiscence confirms capsular nature to the fruit. (Plate III Fig 28; Text Fig 29)

Septae :- The four locules of the fruit are seprated by four septae The septae are made up of ill preserved parenchymatous cells as seen in pericarp. Each septae measures approx. 89µm in thickness. (Plate III, Fig 25; Text Fig 28)

Locule: - ***L.S***. of fruit shows four locules hence fruit is tetralocular with single seed in each locule. Each locule is long & elongated in shape and pointed towards both the end. Each locule measures approx. 2650µm in length and 500µm in width. (Plate III, Fig 25; Text Fig 28)

Seeds: - ***Each*** locule contains a single seed. The seed is vertically placed. It is elongated in shape and shows extension on both the side may be for dispersal device. Seed is free from the wall of fruit and septae, Placentation is not clear. Each seed measures 2490µm long & 432µm broad. Embryo is not preserved hence on comment could be made on embryonic nature of the seed. (Plate III, Fig 25; Text Fig 28)

Central axis: - ***It*** is well preserved and clearly seen in the L.S. of both part & counterpart of the fruit. It arises from the base of the ovary and extends towards the apex of fruit and bifurcate giving appereance of gynobasic style. It measures 95µm in thickness and consist of thick walled parenchymatous cells with central vascular supply.(Plate III Fig 25,26,27,29 ; Text Fig 28)

2) Persistent calyx: - At the base of the cup-shaped fruit, leafy structure is present which may be persitant calyx. It consists of thick walled parenchymatous tissue having brown depositions. Calyx is free from the fruit wall and measures 135 -156µm in thickness. (Plate III, Fig.25,26; Text Fig. 31)

3) Stalked fruit: - The cup-shaped fruit is well preserved on the stalk. Stalk of fruit is multilayered and measures 1500µm long &400µm broad and consisting of thick walled compactly arranged elongated parenchymatous cells.(Plate III, Fig 25, 26 ; Text Fig 30)

4. DISCUSSION & IDENTIFICATION:

From the description, it is evident that the present fossil fruit is formed from tetracarpellary, syncarpous superior ovary, with persistant calyx and gynobasic nature of style, preserved on short stalk. Consisting of four locules in L.S. hence tetralocular and each locule contain single dicotyledonous seed. Fruit wall is differentiated into epicarp, mesocarp & endocarp and breaks at septae showing capsular nature of fruit with septicidal dehiscence.

On the basis of above characters comparisons are made with the earlier reported fossil fruit. ***Enigmocarpon parijae*** **(Sahni, 1943)** is a 6-12 locular fruit with thick spongy wall, with a row of seeds in each locule. ***Indocarpa intertrappea*** **(Jain, 1964),** shows similarity in having tetralocular fruit but vary in containg 80-100 seeds or multiseeded one.***Harrisocarpon sahnii*** **(Chitaley & Nambudiri, 1973),** differ as it is pentalocular with two seeds in each locule. ***Sahniocarpon harrisii*** **(Chitaley & Patil, 1972),** vary in its pentalocular nature. ***Deccanocarpon arnoldi*** **(paradkar, 1975),** differ as it is eight locular with one seed in each locule. ***Euphorbiocarpon singhpurii*** **(Bhowal, 2006),** differ in having trilocular, unstalked fruit with presence of glandular hairs which is totally absent in present one. ***Chitaleocarpon intertrappea*** **(Kapgate, 2000),** vary in having seven locular capsule with 2-8 seeds in each locules hence incomparable. ***Gynobasiocarpon sheikhii*** **(Saxsena, 2004),** shows close resemblance in having dicot capsule with single seed in each locule, fruit is with stalk, persistant calyx, gynobasic nature of style and septicidal dehiscence. But the difference encountered in having trilocular ablong fruit, presence of two dorsiventral leaves present on both the side of stalk. Whereas the present one is tetralocular cup-shaped fruit hence not compared.

Thus, the present fossil capsular fruit does not resemble with any of the earlier reported fossil fruit. Now, it is compared with the modern families having capsular fruit. Such type of dehiscent, 2-10 chambered capsular fruit is found in the dicotyledonous family like ***Malvaceae, Sapindaceae, Elatinaceae, Geraniaceae, Commelinaceae, Boraginaceae, Solanaceae, Convolvulaceae.*** **(Mathew 1983, Cooke 1958, Hooker 1961)**

Fruit of ***Malvaceae,*** is similar in having persistent calyx, superior ovary but differ in having 3 or more seed in each locule. Fruit of ***Sapindaceae,*** differ in having loculicidal capsule with arillate seeds. Fruit of ***Elatinaceae,*** is similar in having persistent calyx, superior ovary, septicidal capsule but vary in having many ovules in each locule. Fruit of ***Geraniaceae,*** is similar in having persistent calyx, septicidal capsule with single seed in each locule but differ in absence of gynobasic style. Fruit of ***Commelinaceae,*** is similar in having superior ovary but vary in absence of persistent calyx. Fruit of ***Boraginaceae***, is similar having superior 2 to 4 celled ovary, 1 or 2 ovule in each cell and gynobasic style but differ in having drupe fruit. Fruit of ***Solanaceae,*** is similar in having persistent calyx, superior 2-5 locular ovary but vary in having many seeds in each locule. Fruit of ***Convolvulaceae,*** is similar in having 1-4 locular, superior ovary with persistent calyx but differ in having indehiscent capsule.

Hence, it is not comparable with the fruit of the living families and also with earlier reported fossil fruit so for time being, a new name ***Tetraloculaire mohgaonese*** gen. et sp.nov**.** is given to the present capsular fruit. The generic name is after the tetralocular fruit and specific name is after the locality mohgaonkalan from where it was collected.

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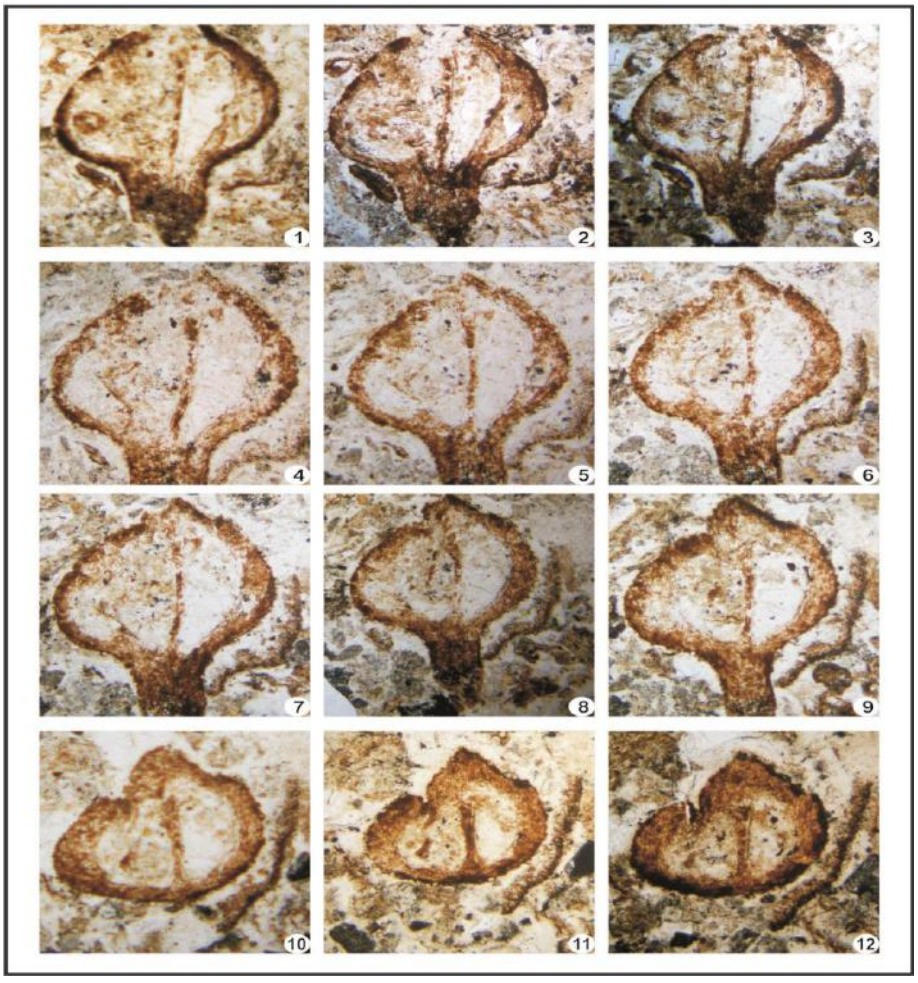
Tetraloculaire mohgaonese gen. et sp. Nov **EXPLANATION OF PLATE-I, FIGS. 1 To 12.**

Figs. 1 to 12 : Serial section of the fruit showing different stages of the fruit cut longitudinally. (Part). 25X

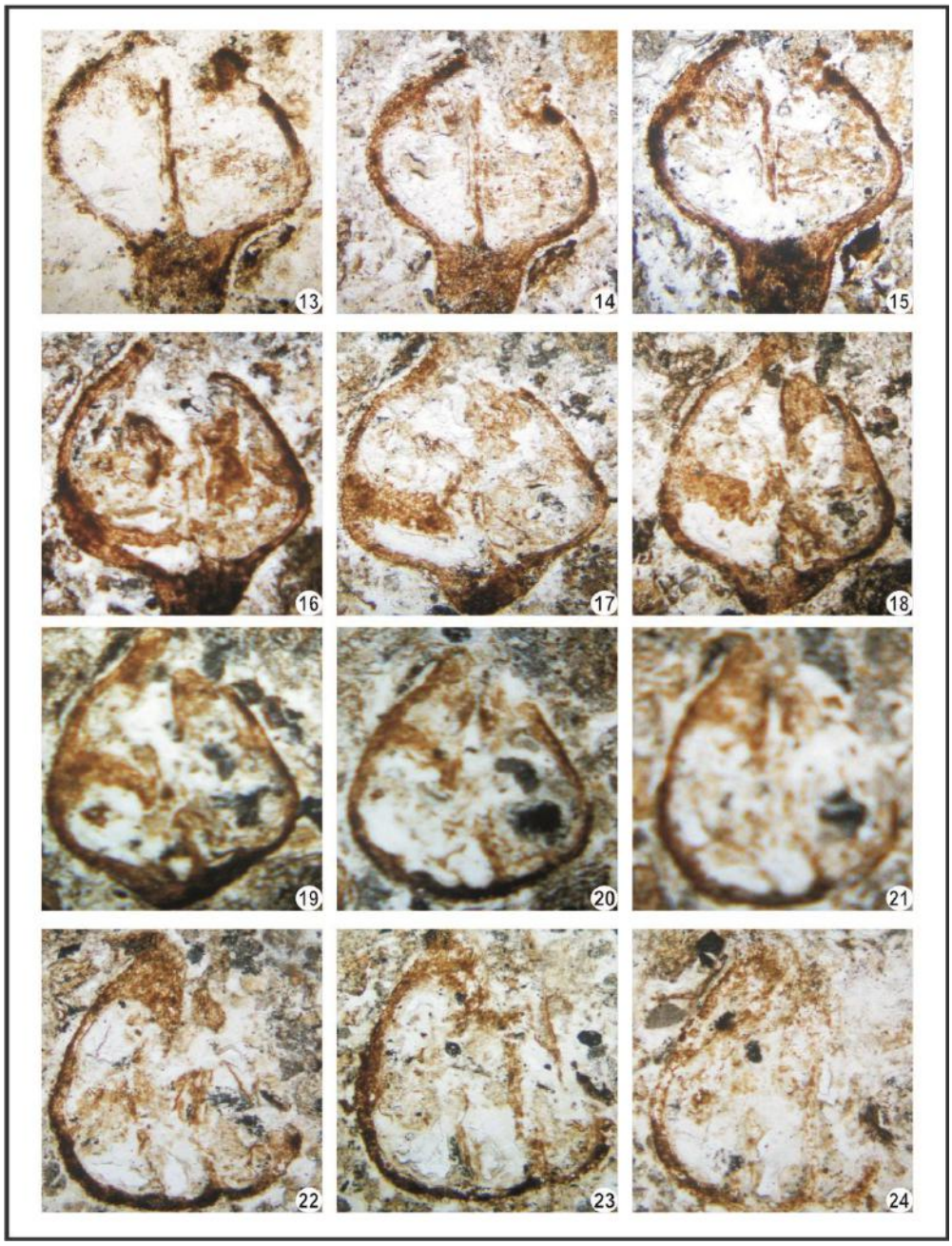
PLATE-I



EXPLANATION OF PLATE-II, FIGS . 13 To 24.

Figs .13 to 24 : Serial section of the fruit showing different stages of the fruit cut longitudinally. (Counterpart). 25X

PLATE-II



EXPLANATION OF PLATE-III, FIGS . 25 To 29

Fig. 25 : Enlarged L.S. fruit shows cup-shaped, tetralocular with single seed per locule and persitent calyx. 25X

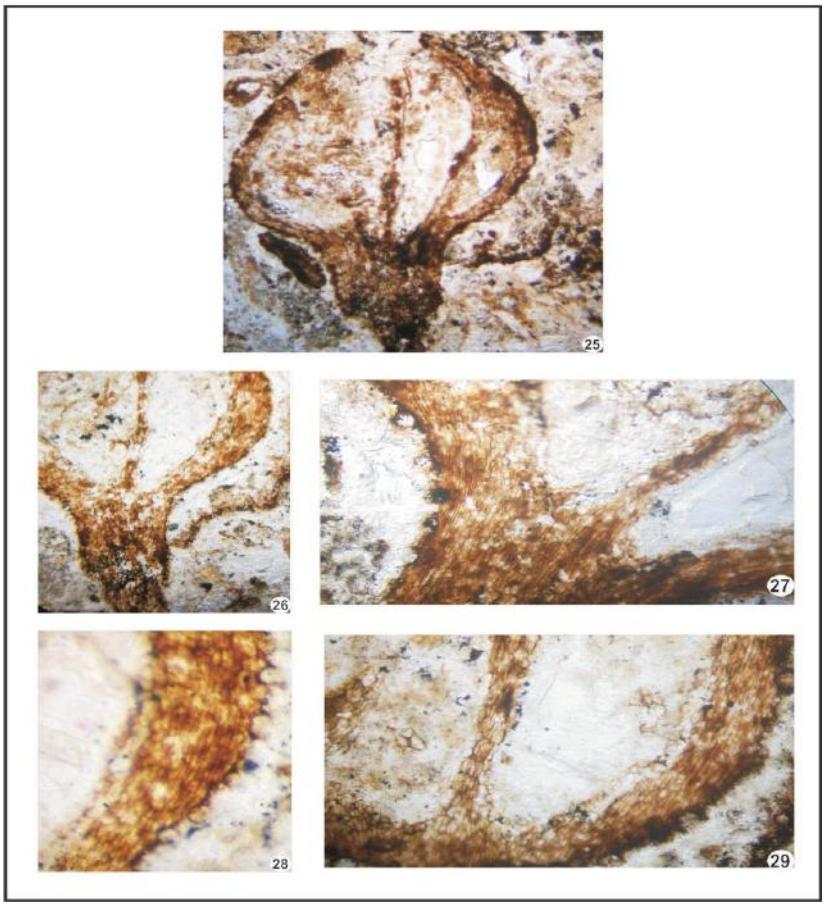
Fig. 26 : Calyx is free from the fruit wall and clearly attached with the stalk of fruit. 200X

Fig. 27 : Enlarged central vascular supply. 200X

Fig. 28 : Enlarged pericarp. 200X

Fig. 29 : Enlarged central axis**.** 200X

PLATE-III

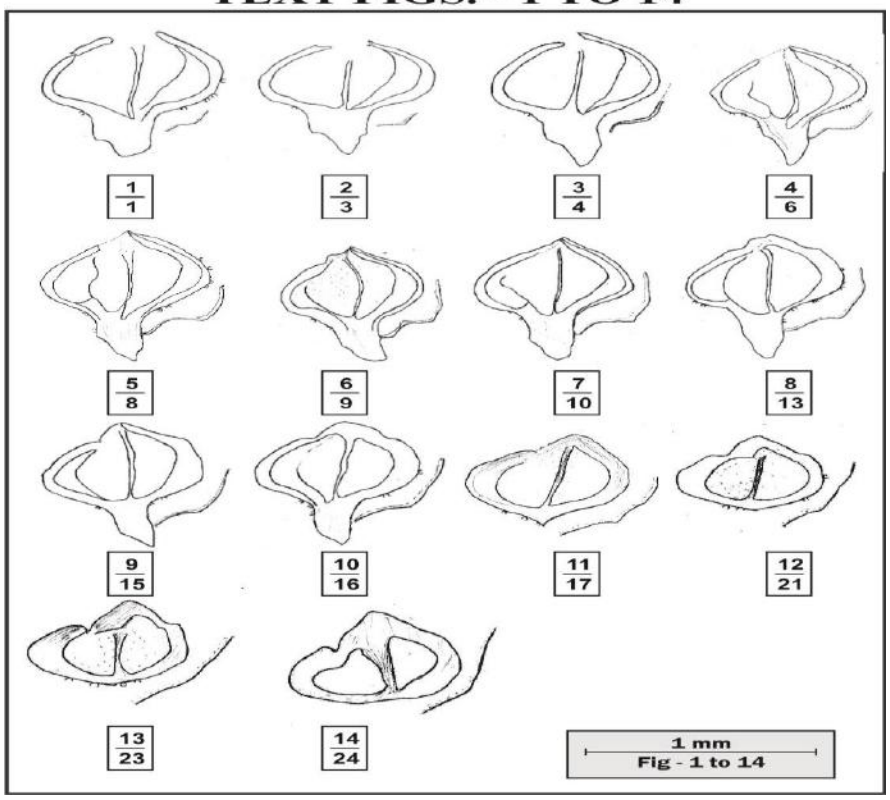


EXPLANATION OF TEXT FIGS. 1 To 14

[The numerator indicates the serial number of text fig and denominator indicates peel number]

Figs. 1/1 t: Serial section of the fruit showing different **14/24 ,** stages of the fruit cut longitudinally. (Part)

TEXT FIGS. - 1 TO 14



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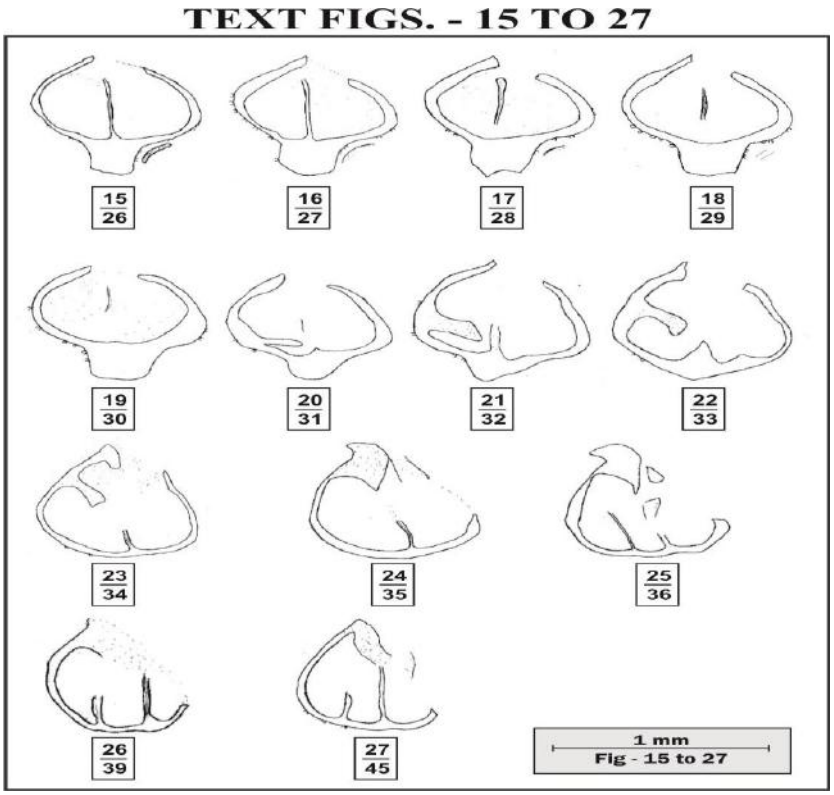
EXPLANATION OF TEXT FIGS. 15 To 27

[The numerator indicates the serial number of text fig and denominator indicates peel number]

Figs. 15/27 : Serial section of the fruit showing different **27/45 ,** stages of the fruit cut longitudinally. (Counterpart)



EXPLANATION OF TEXT FIGS. 28 To 31

Fig. 28 : Enlarged view of L.S. of complete fruit shows cup shaped, tetralocular with single seed per locule and persitent calyx.

Fig. 29 : Enlarged Pericarp.

Fig. 30 : Enlarged stalk of fruit.

Fig. 31 : Enlarged persistent calyx.