# MALVACEOCARPON DECCANII GEN.ET.SP. A NEW PETRIFIED DICOT FRUIT FROM THE DECCAN INTERTRAPPEAN BEDS OF MOHGAONKALAN.( M.P.)INDIA

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**ABSTRACT**

A new petrified fruit was obtained from Deccan Intertrappean beds of MohgaonkalanChhindwara District,Madhya Pradesh.Initially it shows only two locules but later it develops third locules. So it is trilocular fruit and all the three locules are fertile with bitegmic seed.The fruit is capsular with loculicidal dehiscence.Fruit shows resemblance with presentdayfamilieslike*Polygalaceae,Malvaceae,Guttiferae,Tiliaceae,Malphagiaceae,Rutaceae*etc. On comparision it shows more resemblance with the characters of family Malvaceae.Though it could not be traced to a particular genus but it is placed under the family Malvaceae and named as Malvaceocarpon deccanii gen.et.sp.nov.

**Keywords**:Bitegmic, Capsular,Deccan,Fertile,Trilocular.

Hence has been taken for present investigation.

## INTRODUCTION

The present investigation deals, with the trilocular fruit collected from Mohgaonkalan exposures .So far many capsular fruits have been reported some notable ones are Enigmocarpon parijai (Sahni 1943), Indocarpa intertrappea (Jain 1964), Harrisocarpon sahni (Chitaley and Nambudiri 1973), Sahniocarpon harrisii (Chitaley and Patil 1972), Deccanocarpon arnoldii (Paradkar 1975), and Indocarpa mahabalii (Nambudiri1969). Daberocarpon gerhardii (Chitaley and Sheikh 1971), Wingospermocarpon mohganse (Sheikh and kapgate 1984), Triloculocarpon mahabalii (kapgate 1988), Euphorbiocarpon deccanii (Upadhye 1971),Euphorbiocarpon drypeteoides (Mehrotra etal 1983), Phyllanthocrpon singhpurii (Mistri 1989), Euphorbiocarpon singhurii (Bhowal 1979),Loculocidocarpon chitaleii (Kapgate 1999),Chitaleocarpon intertrappeae (Kapgate,2000) Lythraceocarpon mohgaonse (saxena,2004), Portulacaceocarpon jamsavlii (Bhowal,Narkhede and Meshram, 2011).Tiliaceocarpon jamsavlii(Meshram.et.al 2013)Rodeocarpon mohgaonse (Konde L.2015),Pentaloculocarpon intertrappean (Khursel and Narkhede ,2016),Portulacaceocarpon bhuterensis(Borkaret.al 2016), Tamaricaceocarpon mohgaonse (Yadav A.M.2017),Acanthaceocarpon jamsavaii(yadav,2018). A Present fruit is different from the above reported specimens and hence formed the matter of present investigation.

## MATERIAL AND METHOD

The black chert containing this fruit was collected from Mohgaonkalan exposures Chhindawara distt., Madhya Pradesh, India. The anatomical details were studied by etching the chert with Hydrofloric Acid. The peel section were prepared without grinding the material and were studied a number of times to understand the morphology and anatomy of the fruit thoroughly. The

fruit appeared in longitudinal plane in complete series of 52 peels. The camera lucida sketches of the fruit were drawn and the important stages of the fruit were photographed.

## DISCRIPTION

The peels section initially reveal a two chambered fruit circular in shape the two chambers were elongated, placed side by side (Text Fig 1/1; plate Fig.1) both the chambers shows the presence of thick walled cells that is the seed coat (Text Fig.1/1; plate Fig 2).the remenants of the seed coat in seen up to 5$^{th}$ peels section (Text Fig 2/5). The size of the fruit along its middle is 1650 µm in length and 1560µm in width. The seed is clearly visible from 8$^{th}$ peel (Text Fig.4/8).the dehiscence of the fruit wall along its locule which is clearly seen from 8$^{th}$ peel section (Text Fig.8/15). The third locule appeared from the downword side which can be seen in the 15$^{th}$ peel section. (Text Fig.8/15).the third locule is gradually increasing in its size and shows the presence of seed (Text Fig.11/19). Thus the fruit becomes tricolour with three fertile locule (Text Fig.13/31,14/36; plate 1 Fig/6).the third locule occupy the central space and both the lateral locules started desreasing in their size along with their seed (Text Figs.13/31, 14/36, 15/40; plate l fig.7). Gradually both the locules disappearing and only a single locule appeared with hood like appearance on its upper side (Text Fig.27/47, 22/48) seen in the 48$^{th}$ peel. ultimatly in the last peels section remants of the fruit can be seen in the form unilocular fruit.

Anatomicaly the fruit shows following structures:

**PERICARP:** the fruit wall or the pericarp differs in its thickness at various places. It varies between 200 µm to 130 µm in thickness. It is further differentiated into three wells defind zones, the outer epicarp and the inner endocarp (Text fig. 24 plate I fig 11; plate II fig 1, )

**EPICARP:** this is the outer most layers of the fruit. It consist of thin to thick parenchymatos cells in 3 to 4 layers (Text Fig 24; plate II Figs 1,2) . The width of the region varies at different places the average width of epicarp is the broadest being 78 µm. Below the epicarp, lies the mesocarp.

**MESOCARP:** this is the middle layer of the fruit wall and lies just below the epicarp (text fig 24; plate 24 II 1,2 ). the thickness of the mesocarp consist of fibrous tissue (text fig 24 plate II fig 1) which is most crushed and so the cellular composition is not very clear. They appear dark and opaque (platell II fig 1, 2).

**ENDOCARP:** the inner most layer of the pericarp is the endocarp and is single layered (text fig 24; plate II figs 1, 2). A distinct roundish elliptical thck walled cells are present measuring about 13 µm in width.

**LOCULE:** it is a trilocular fruit , with three well differentiated locules ( Text fig 23; I figs . 4,6 ) all the three locules are fertile with a prominent single seed in each locule ( text figs. 15/40, 16/42, plater I figs 6 , 11; plate II fig. 3) . The left locule is 975 µm in length and 620 µm in breadth. The right locule is 1050 µm in length and 525 µm in breadth. In between these two locules the third locule is present upto the last peels section this locule is 900 µm in breadth. In the central region vasculsar elements are seen with pitting (text fig 25; plate I fig. 10 Plate II fig 2).

**SEED:** seed is the orthotropous in nature and oval to oblong in shape (text figs 12/24, 24 plate I figs 6, 10, 11). The seed present in left chamber measures about 900 µm x 525 µm, while in right chamber measures 975 µm x375 µm while the right chamber measures 975 µm x 375 µm and that in the middle chamber measures 825 µm x 810 µm. The seed coat is clearly visible and is differentiated into outer testa and inner tegman, it means seed coat is bitegmic in nature (text figs 26; plate II figs 2, 3) the inner layer is very clear

showing inside it soft papery layer. Inside the seed no tissue mass is observed in any one of the peels which proves that no comment can be made on the embryonic nature of the seed.

**DEHISCENCE:** the fruit is capsule showing loculcidal dehiscencs along its locule (text fig 23 plate I figs 4,5,6 ) .

**DISCUSSION AND IDENTIFICATION**

After having studied the important anatomical characters from serial peels, it becomes evident that the above fossil fruit is trilocular probably formed from tricarpellary syncarpous ovary, with single seed in each locule. The presence of bitegmic nature of seed coat and orthotropous ovule make the study more specific. The fruit has dry pericarp and show loculicidal dehiscence.

This type of fruit is generally found in the dicot families like Polygalaceae, Malvaceae, Guttiferae, Theaceae, Tiliaceae, Malphigiaceae,Polygalaceae, Rutaceae, Olacaceae, Aquifoliaceae (K.M. Mathew 1993). In the families Like Polygalaceae, Theaceae, Tiliceae, Rutaceae the fruits are dry Capsular, 3-5 Celled but differs in having ovules 2 per locule. Tiliaceae shows resemblance in having ovary superior, 3-5 celled, axile placenta and loculicidal dehiscence. But all the four families differ from the fossil in some respect like in Polygalaceae there is two celled ovule, one per cell, capsule overtopped by wing sepals, seed oblong, and pressed. Thus, it shows great deviation from the studied fossile. Theacae shows mostly 3-5 celled ovary ovules 1, 2 or more per cell, loculicidal capsules or indehiscent drupes but differs in having pendulous seed. Tiliaceae shows mostly 3-5 celled ovary ovules 1,2 or more per cell, loculicidal capsules or indehiscent drupes but differs in having pendulous seed. Tiliceacea shows resemblance in having ovary superior, ovules 1, 2 or more per cell, drupes or capsules locuilicidal or indehiscent, differ in having seed pendulous or transversa . Rutaceae shows much resemblance with the present fruit having ovary superior 3-5 celled rarely more, ovule 1 or 2 or more per cell, fruit berry, and drupe, capsule. In Guttiferea, fruits shows ovary superior, 1-3 celled ovule 1 per cell, axile placenta but it differs from the present specimen because the fruits in it are generally berry of drupe. Malphigiaceae differs in having fruit samara with 3 unequal wings. In Olacaceae fruits are drupes enclosed by calyx. Aquifoliacea fruits have ovary superior 3 or more celled, ovule 1 or 2 per cell, pendulous but the fruits are Drupes.

The present trilocular fruit with all three fertile locules is a capsular fruit with loculicidal Dehiscence is very much close to the family Malvaceae, capsule globose, 3 celled, opening loculicidally, 3 seeds are found in the members of family Malvaceae that include genera Rydia. The genus Rydia very close to the describedss fruit as it has capsular, 3 celled fruit, ovules 1 or 2 per cell opening loculicidally.

The earlier described capsular fruits belonging to various dicotyledonous families from the Deccan Intertrappean beds of India differ from the present fruit in a number of characters. Enigmocarpon parijai ( Sahni 1943 ) is a locular fruit with thick spongy wall, with a row of seeds in each locule it differs from present specimen in having 6-12 locules and row of seeds. Indocarpa intertrappea (Jain 1964) is a septifragel capsule with fleshy testa and thus differs from present specimen. Harriso Carpon Sahnii ( Chaitaley and Nambudiri 1973 ) and Sahniocarpon harriso (Chaitaley and Patil 1972 ) are pentalocular capsules with loculicidal dehiscence Harrisocarpon differs with two seeds in one locule Daberocarpon gerhardii ( chaitaley and Sheikh 1971 ) is a ten locular capsule with one seed in each locule. Deccanocarpon arnoldi ( Paradkar 1975 ) is eight locular capsule with one seed in each locule. Thus it differs in having eight locules. Euphorbiocarpon singhpurii ( Bhowal 1998) trilocular, capsular , with only one fertile chamber , Septicidal dehiscence , pericarp with glandular hair. It differs from the present fruit in having pericarp with glandular hair and septicidal dehiscence.Chitaleocarpon intertrappeae (Kapgate V.D.2000) is seven locular capsule with 2-8 seeds in each locule.Schizocarpic aliformii (Bhowal and Sheikh2002) differs in having

irregular eye shaped bilocular fruit with two fertile chambers .Bicarpelaocarpon singhpurii (Bhowal and sheikh 2008)vary in having empty air chamber in the septa. Tiliaceocarpon jamsvlii (Meshram et.al 2013 ) is hexagonal shape and unilocular indehiscent capsule.Rodeocarpon mohgaonse (Konde L.2015) differs in having multilocular multiseeded fruit with axile placentation.Pentaloculocarpon intertrappean (Khursel and Narkhede 2016) is a five locular with single seed in each locule.Portulacauceocarpon bhuterensis (Borkar et al 2016) differs in having uniloculocarpon multiseeded capsule.Tamaricaceocarpon mohgaonse (Yadav A.M.2017) is unilocular indehiscent capsule and Acanthaceocarpon jamsavlii (Yadav A.M.2018)vary in having biloular,bicarpellary syncarpous ovary with single seed in fertile locule.
To sum up from the comparisons made above , it can be concluded that , through there are similarities with the genuss Ridia, but it could not be placed under it due to morphological differences, hence it was placed under the family Malvaceae, with which the fossil specimen shows number of important characters. The Name suggested for the fruit is Malvaceocarpon deccanii. The generic name is given after family Malvaceae and specific name is after the horizon.

## DIAGONOSIS

Malvaceocarpon gen.nov

Fruit circular with three fertile locule, single seed in each locule, single seed in each locule ,seed orthotropus in nature bitegmic, trilocular capsule with loculicidal dehiscence.

Malvaceocarpon deccanii gen.et.sp.nov.

Fruit circular unstalked trilocular all the three locules fertile single seed in each locule. Seed orthotropus, seed coat differentiated into outer testia and inner tegman. Fruit measuring along its middle is 1650µm in length and 1560 µm width. Pericarp 200 µm x 130 µm in thickness. Mesocarp, cellular composition is not very clear. They appear dark and opaque measuring 65 µm. Endocarp single layered, roundish elliptical thick walled cells about 13 µm in width.

**HOLOTYPE** : SPQ/Ang – 4/ Botany Department, Institute of Science, Nagpur.

**HORIZON** : Deccan Intetrappean Series of India.

**LOCALITY** : Mohgaonkalan, M.P. India

**AGE** : Uppermost cretaceousS?

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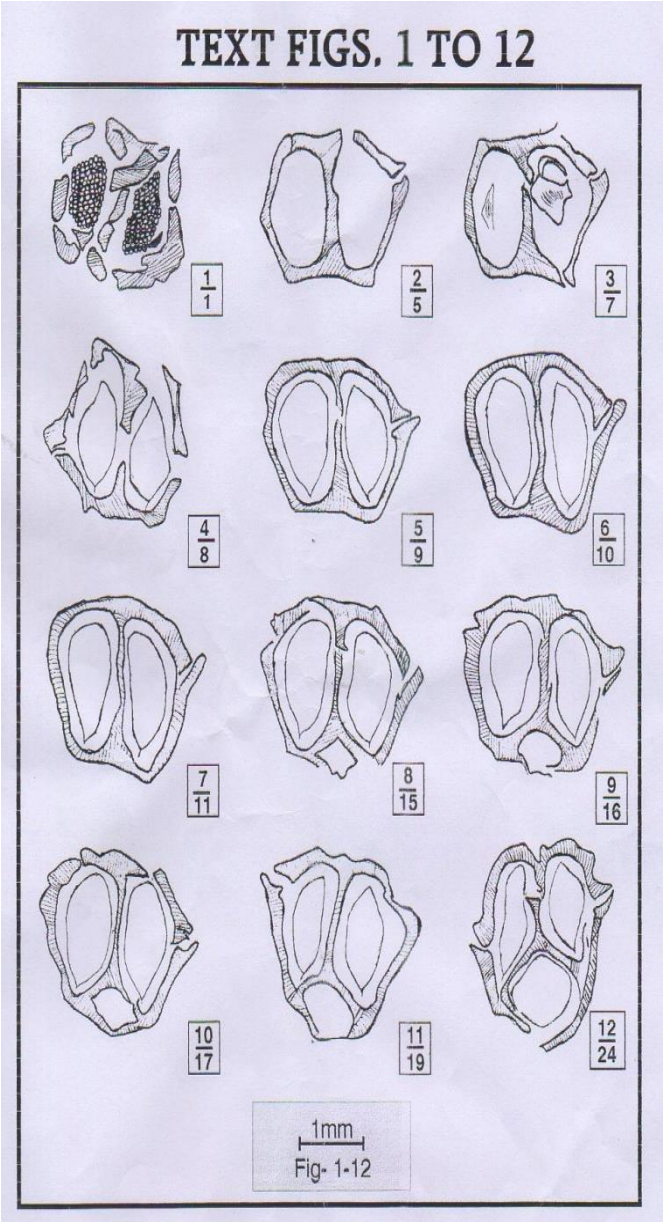



**DICOT FRUIT**

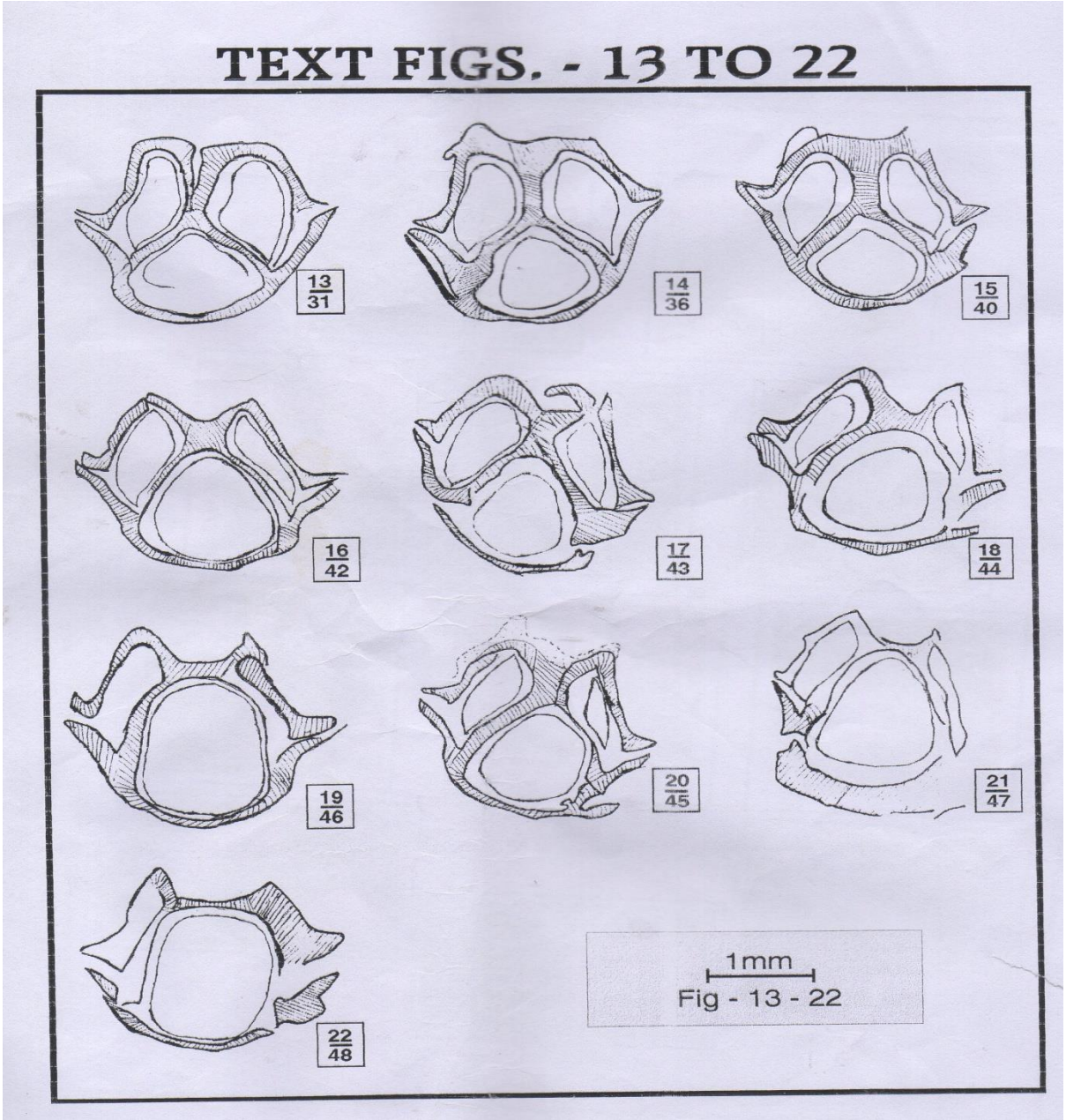
Malvaceaocarpon deccanii gen . et . sp. . . nov

Explaination of text figs. 1/1 to 12/24

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

Fig. 1 : the fruit showing two fertile locules with seed coat.

Fig. 1/1 to 12/24 : serial section of the fruit showing different stages of fruit cut in Longitudinal section.




**DICOT FRUIT**

Malvacceocarpon decanii gen et. Sp. Nov.

Explaination of text figs . 13/31 to 22/48

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

Fig. 13/31 to 22/48: serial sections of the fruit showing different stages fruit cut in

Longitudinal plane.


**DICOT FRUIT**

Malvaceaocarpon decanii . et. Sp. Nov.

Explanation of plate I fig. 1 to 10

Fig. 1 to 8 : serial section of the fruit shoing different stages of the fruit cut longitudinally

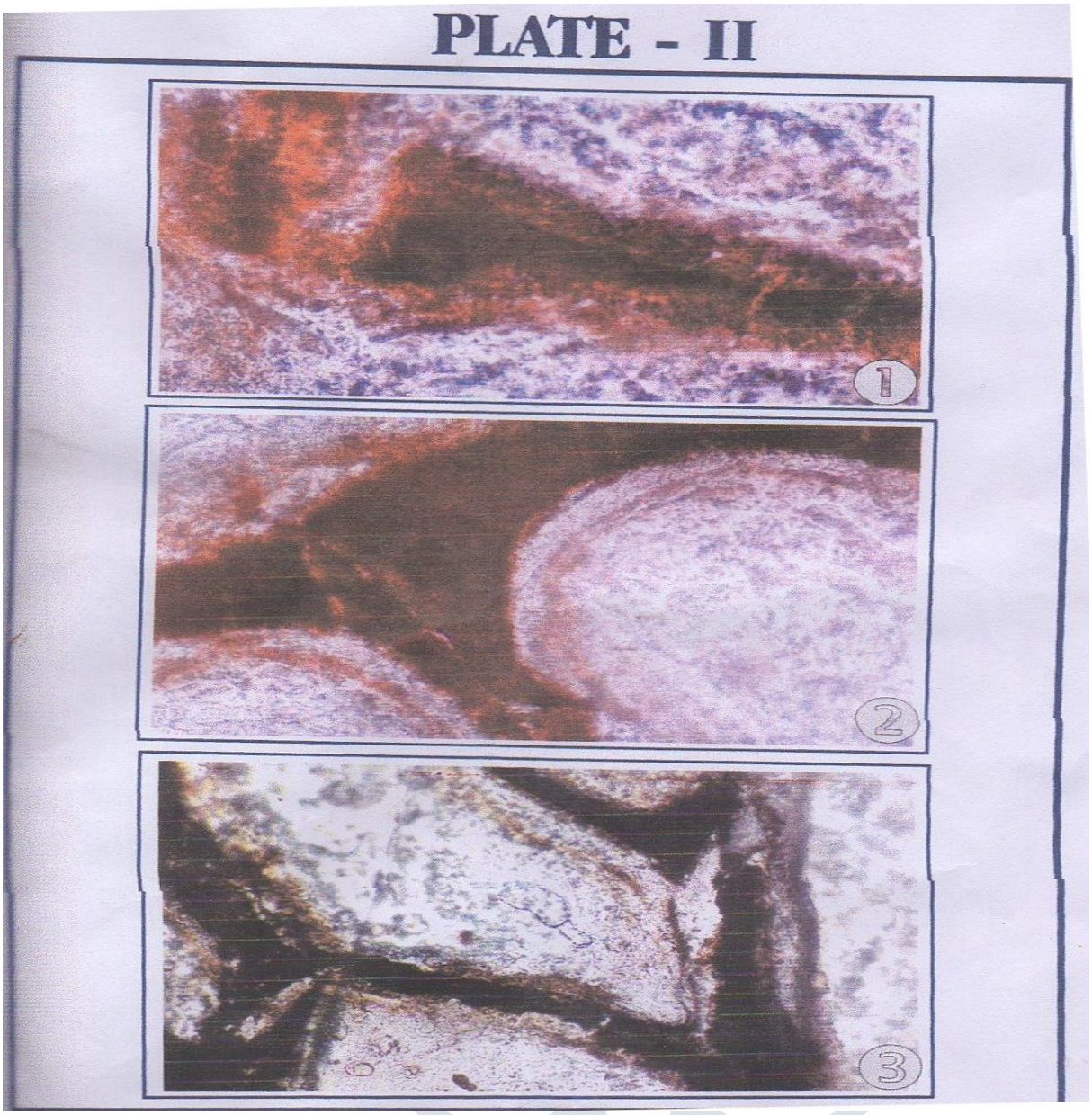
25X

Fig. 9 : section of the fruit showing seed coat on both the fertile chamber. 111 X

Fig . 10 : showing fruit wall, with two fertile chamber showing the presence well

Developed seed in it. 111 X

Fig. 11 : fruit showing all the three fertile chamber with loculation dehiscence. 111 X




Malvaceocarpon decanii gen. Et. Sp. Nov

Explanation of plate II figs. 1 to 3

Fig. 1 : Enlarged part of fruit wall differentiated into epicarp mesocarp and Endocarp. 500 X

Fig. 2 : enlarged part of fruit showing two fertile chamber with well developed seed And showing vascular supply. 500 X

Fig. 3 : enlarged part of fruit showing all the three fertile chambers with longitudinal Dehiscence. 500