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INNER SCULPTURING OF THE FRUIT OF JUGLANDACEAE

D. V. Shuhart
Oklahoma A. and M. College

The degree of irregularity of the carpellary cavity of Juglandaceae reaches a maximum in some of the American species of hickories and walnuts. Just how the kernel of a thick hard shelled nut has been so completely packed into the narrow deep folded and twisted contour of some of these nuts is even less perplexing than the question of how the sculpturing of such irregular cavities was accomplished.

While Adriance, Benson and Wellsford, Braun, DeCandolle, Nicoloff, Van Tieghem, as well as Woodroof and Woodroof have studied the structrue in fruits of various species of Juglandaceae, none of these authors have given a clear explanation of the manner in which the inner sculpturing is brought about. Some have mentioned that the "packing material," i. e., parenchymatons endocarp, has been pressed back against the cell wall by the expanding integument.

A study of the carpellate flowers and developing fruits of these species reveals that the original carpillary cavities are narrow slits with smooth walls. The cavity is at first biloculate in the basal portion and uniloculate in the apical portion. Closer observation reveals that the carpellary tissue has, through differential development, given rise to a continuous endocarp, a more or less incontinuous mesocarp, and parenchymatous endocarp. The exocarp develops into the hard outer shell of the nut. In varieties of J. nigra, and J. cinerea it is difficult to distinguish between

exocarp and the cupule tissue but in some of the hickories this distinction is quite definite.

The mesocarp in some species adds to the hardness of the shell for it is only slightly if at all differentiated from the tissue which becomes exocarp. In H. pecan the mesocarp becomes a more or less brittle tissue containing much tanin. The parenchymatous endocarp assumes that form in its differentiation which will eventually be the sculptured cavity. The enlargement of the slit-like cavity through the digestion and absorption of the parenchymatous endocarp back to and between the masses of mesocarp is accomplished by the expanding integument of the ovule. This integument is lined inside with a layer of endosperm with a large vacuole in the center. The basal portion of the integument is very meristemstic. As the integument grows, the vaculoe increases in size. Its contents exert pressure against the inner layer of endosperm and thus the integument is continually forced against the parenchymatous endocarp which it digests and absorbs. This sculpturing process continues until the cavity eventually becomes that area formerly occupied by the parenchymatous endocarp.

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