THE DISTALLY LOBED INNER INTEGUMENT OF HERNANDIA PELTATA MEISSN. IN DC. (HERNANDIACEAE)

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A peculiar structural detail, occurring during the development of ovules, seems to have passed almost unnoticed till the present day. It concerns the distal rim of either the outer or the inner integument, which appears to be slightly lobed in the ovules of several unrelated plants. In a recent note (1970) I called attention to this feature.

It is known from *Juglans* and *Platycaria* (Warming, 1878; Leroy, 1955; Boesewinkel and Bouman, 1967), where the single integument is two-lobed. Warming mentioned two more cases, namely *Lagarosiphon* and *Symplocarpus;* however, I cannot confirm his observations from dried material. I noticed it myself in *Scyphostegia borneensis*, in *Caloncoba welwitschii*, and in *Sterculia alexandri*. In these three species the lobes occur at the rim of the outer integument. To these can now be added *Hernandia peltata*. However, in that species the lobes occur at the rim of the inner integument.

In *Hernandia peltata* the development of the lobes follows immediately upon the initiation of the inner integument. The figures show the lobed rim surrounding the nucellus; together they are placed in a hood-shaped outer integument. This ovule is about half a millimeter in length, its curvature is only half completed. At a later, yet young, stage of the ovule it is hardly or not possible any more to distinguish the lobes. I think that this is due to the fact that the growth of the lobes does not keep pace with the growth of the tubular part of the inner integument, possibly a sign of reduction of the lobes. The lobes are irregular, more or less separate, and are undivided or slightly subdivided into smaller lobes. There is a tendency towards five unequal lobes.

We could imagine several causes for the lack of attention paid to this feature. 1) The minute objects need external observation by means of a powerful dissecting stereomicroscope prior to microtoming. Since the interpretation of microscopic slides is hazardous, even for advanced workers, it is inadvisible to prepare the ovules right away for microtoming. 2) It is impossible to revive tiny meristems like these lobes from herbarium material in a dependable way. Properly fixated material should be used, the ovules prepared free, stained lightly by some customary stain, and differentiated afterwards. 3) In late primordial stages of the ovules the lobes become outsized by the growth of the rest of the ovule which is very large as compared with the retarded growth of the lobes. Finally the lobes cannot be observed any more. 4) Perhaps the lobedness occurs in cases of exceptionally favourable growth only, maybe under uncommon conditions. 5) The in fact limited occurrence of the lobes on integuments in the Angiosperms. However, I would not be surprised if, after having drawn attention, the lobes would prove to be of wider spread occurrence. As in my opinion the general structure of ovules has been insufficiently covered by careful comparative anatomical and developmental studies, I suppose that the lobed rims of the integuments have often been overlooked.

The morphological significance is evident. The lobes induce to consider the integuments as compound organs, built up from separate units. In the same way the multiple

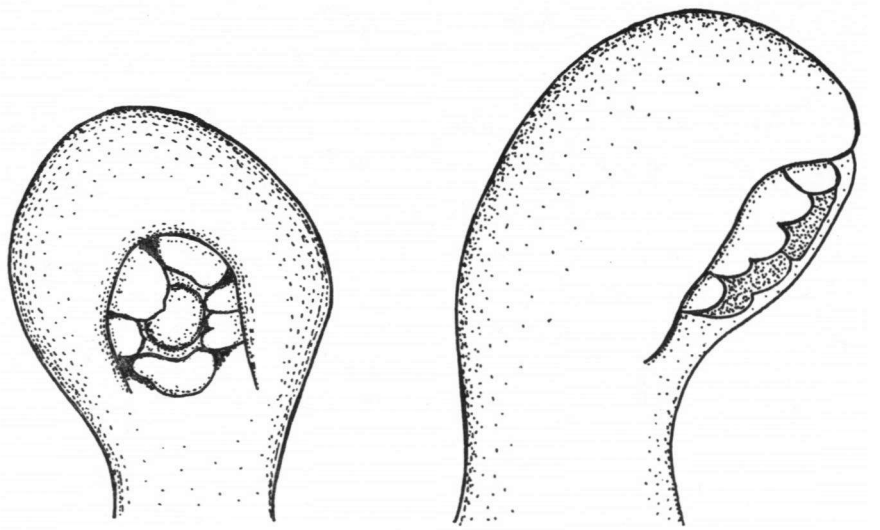

Fig. 1. *Hernandia peltata*, two young ovules with lobed inner integument, one front view, the other near side view. 60 ×.

structure of a lobed calyx is accepted, especially if free calyx parts occur in related plants, or if the lobes correspond to parts of the organ that are recognizable as units by their separate vascular bundle supply. Among calyces in *Bombax*, for instance, some have major lobes, others minor lobes, and still others are cupular. However, in ontogeny the cupular ones are crowned with minute lobes that are later outsized by the advanced growth of the tubular part. Unfortunately, none of the cases of lobed integuments in Angiosperms can as yet be related with the location of vascular bundles.

In Gymnosperms integuments are known to be composed of units and there is a positive relation with vascular bundles (de Haan, 1920). I noticed that the integument in *Podocarpus spp.* in a young stage is very distinctly and regularly five-lobed. Also in Pteridosperms the cupules and integuments are known to occur as separate units, as partly fused units, or finally as entirely tubular. I may refer the reader to Long (1966), in whose paper a review is also given of the phylogenetic interpretations that have been offered for the compound integuments in several groups of plants. See also Meeuse (1966).

My conclusion is that the presence of distally lobed inner or outer integuments in Angiosperms may mean that in Angiosperms too integuments in some groups may have originated through increasing fusion — and tubular intercalation — of originally free parts, that possibly need not necessarily be all homologous.

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