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2. H. U. STAUFFER (Zürich). – **Contributions to the floral diagram of the Santalales.** Fundamental investigations on the floral diagram were supplied for the order Santalales for Santalaceae and Loranthaceae by Eichler (1878) and for Olacaceae by Valeton (1886). Since that time only few supplementary observations have been made. Certain knowledge of the diagram is, however, a necessary condition for discussions about the conditions of the relative relationships within the order and over possible connections in the order as a whole.

Within Santalaceae Eichler refers to two different carpel arrangements: with isomerism the carpels are with most genera between the perianth leaves, with *Choretrum* and *Leptomeria* in contrast invariably before the same. In one with the latter genera we found near related generic group with otherwise completely identical morphological conditions both carpel arrangements under itself, in individual cases even among species. So it is with *Dendrotrophe varians* (Bl.) Miquel the carpel is opposed to the perianth leaves, with *Dt. umbellata* (Bl.) Miquel against them and alternate with them. With *Dt. buxifolia* (Bl.) Miquel most vouchers possess alternating carpels; one collected by Pierre on the island of Puh Quoc in Indochina shows, however, with otherwise complete concordance opposed carpels. With representatives of the genus *Cladomyza*, which in contrast to the discussed species of *Dendrotrophe*, show abortion of the stamens in the female flowers both positions occur again with closely related taxa. (For example: *Cl. uncinata* Danser, carpels alternating; *Cl. pachydisca* Danser, carpels opposed.) Concerning the carpel arrangements an instability is therefore to be stated in this group, whereby intermediate stages are never observed, but either or the other position always appears erratically. How the change - additionally accomplished with a completely inferior ovary, cannot be said at present. Anatomical investigations studying the vascular bundle process are under way. The opposing carpel arrangements are - so far as is known - limited within the whole order to the mentioned generic groups of Santalaceae, while otherwise both with Olacaceae and with the Santalaceae and Loranthaceae with isomerism the carpels are always alternate.

In the androecium, Valeton regarded conditions with the genus *Coula* (Olacaceae) as the original condition. From his representation one finds there three staminal whorls, the outermost in front of the sepals, the innermost in front of the petals, the median, two-merous are on the right and left edge of each of the petals. The inner whorl occasionally can be missing. The comparative investigation of stamen conditions in the tribe Couleae supply us with a substantially different picture: in the three closely-related genera *Minquartia*, *Ochanostachys* and *Coula* the occurrence of an outside, alternipetalous whorl is constant. The number of stamens standing immediately in front of the petals changes within a single flower, still more strongly within and between the genera. Thus occur with *Minquartia* one to two, with *Ochanostachys* one to three and with *Coula* two to four stamens next to each other before the individual petal. These cannot be understood differently than colateral fission products of only one internal whorl. Therefore, as a basic groundplan for the androecium, the diplostemonous Bauplan [constructional plan] has to be considered in the order, which seems unmodified from the primitive genera *Heisteria* and *Ximenia*. Already within Olacaceae the outer, episepalous whorl clearly shows the tendency towards atrophy. Within Santalaceae and Loranthaceae it is invariably missing.

In closing, the diagram of the *Loranthus* flower supplied by Eichler is critically considered: Eichler concluded that the "calyculus" is not as a calyx, but as axial figuration. He further accepted two whorls of perianth leaves, which alternate with one another, then two identical

whorls of stamens and finally three carpels alternating with the internal staminal whorl. Eichlers view, based primarily on relatively specialized New World genera, does not stand, however, in conformity with the following observations: newer anatomical investigations by the Indian school of the primitive genera *Nuytsia* and *Atkinsonia* proved the occurrence of vascular bundles in the "calyculus" - Danser had earlier understood this organ as a genuine calyx. With the Old World genera, neither in the developmental history nor in the morphological construction of the perianth leaves, is there any indication of two whorls. With the isomerism of the carpels proven in several genera these always alternate with the perianth, while after Eichler they would have to stand opposed. Therefore a correction upon of the Loranthaceae diagram is suggested: a calyx ("calyculus") – one whorl that alternates with the petal whorl, one of the petals opposed to the staminal whorl, and one with the petals alternating with the carpellary whorls.

The close affinities between the Olacaceae, Santalaceae and Loranthaceae is in such a manner convincingly confirmed by the anatomical, biochemical, embryological and morphological facts that offhand also in the diagram substantial agreement must be expected. In the case of our view of Loranthaceae diagram congruence with the diagram of some Olacaceae (e.g. *Strombosia*) results, while the typical diagram of Santalaceae differs only by complete atrophy of the calyx.

Literature

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