FLORAL ANATOMY OF SOME GARHWAL HIMALAYAN TREES. I—*AESCULUS INDICA* COLEBR.

Aesculus indica Colebr., a common deciduous and temperate tree of Himalayan region, belongs to the family Hippocastanaceae of Sapindales (HUTCHINSON, 1973). MUKHERJEE (1949) and SHARMA (1954) have made some anatomical studies of inflorescence axis and the flower of *Mangifera indica* of Anacardiaceae, a taxon closer to Hippocastanaceae. Since there is no information available on the floral anatomy of this family, *Aesculus indica* has been presently investigated.

Flowering in *Aesculus indica* occurs from February to April every year. Flowers are whitish or yellowish pedicellate, ebracteate, zygomorphic, complete, hermaphrodite, hypogynous, pentamerous, tetracyclic and racemose in arrangement. Sepals 5, gamosepalous, 5-fid, tubular, imbricate. Petals 4, unequal, two long and two short. Stamens 7, with free filaments. Ovary tricarpellary, syncarpous, tri-locular; style elongated with simple stigma.

The serial sections of the flower indicate that in pedicel there is a continuous ring of conjoint, collateral vascular bundles (Fig. 1). Slightly above this ten strong sepal laterals emerge from the central stele, followed by 5 sepal medians which appear alternating with the sepal laterals (Figs. 2-4). In the later stages, sepal median and sepal laterals beset many branches to supply the sepal (Figs. 7, 11).

After producing the sepal traces, the central stele appears to be quadrangular to pentangular, giving rise to 5 prominent traces for the petals which are slightly above and almost opposite to the sepal median trace (Figs. 4, 5). One of the petal traces aborts in its further differentiation, leaving only four traces for four petals. The petal traces remain undivided at the basal part of the petal and it is only in the upper region that they divide profusely giving rise to several branchlets (Fig. 11). Alternate and opposite to the petal traces 7 stamen traces get differentiated from the central stele and enter directly into the filament and connective of the stamen. Staminal traces expanded radially and form a horse-shoe-shaped structure at the time of entering in the filament (Figs.5,7).

The central stele becomes more or less cylindrical, a complete ring of six ; three alternate bundles depart towards the periphery and each bifurcates into two—forming carpellary dorsals (Fig. 6). Each of the remaining three bundles forming three common lateral carpellary bundles gives supply to the lower side of the ovule (Figs. 7, 8). The ventrals and common lateral are completely utilised in the carpellary region. Only three of the dorsal bundles enter into the style and they again bifurcate in the stigma (Figs. 12-14).

It is concluded that the pedicels consist of normal ring of conjoint, collateral vascular bundles. Sepals are three-traced, one median and two laterals. Laterals emerge out earlier than the sepal median trace. The petals are primarily only one-traced. There is a sign of reduction in the number of traces and consequently the number of petals also gets reduced from 5 to 4. Stamen traces arise independently from the central stele, and these enter into the filament and connective of stamen. Gynoecium is tricarpellary, trilo-

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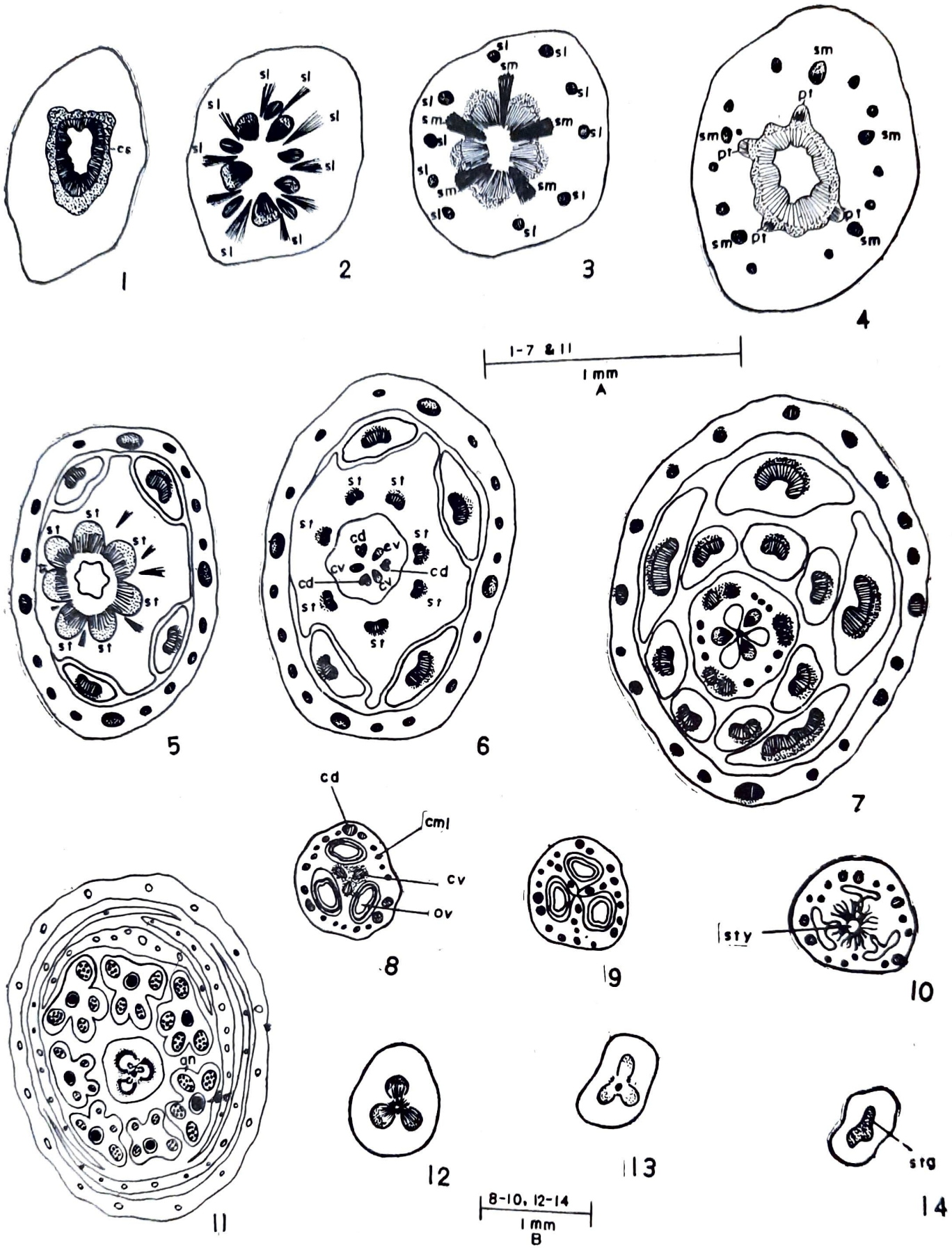

Figs. 1-14. *Aesculus indica* Colebr. Serial transverse sections of a flower from base upwards showing vascular supply to different organs.

Abbreviations—an=anther, cd=carpellary dorsals, cml=carpellary medium laterals, cv=carpellary ventrals, ov=ovule, pt=petal trace, sl=sepal lateral, sm=sepal median, st=stamen trace, stg=stigma, sty=style.

cular bearing single ovule in each locule. Three dorsal and three ventral bundles divide to form six dorsal and later three common ventral carpellary, and three common lateral carpellary bundles.

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