which has a spherical nucleus with those in Sm^{152} and Sm^{154} which have deformed nuclei brings out the above conclusion more clearly.

Thus it may be seen that the anomaly regarding the K-shell conversion coefficients of $2^+ \rightarrow 0^+$ transitions in deformed even-even nuclei is getting resolved and it seems that the E2 internal conversion process is unaffected by nuclear structure. Any unknown effect due to nuclear deformation, if present, has to be less than 6-7%.

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MORPHOLOGY AND ONTOGENY OF THE ETHEREAL OIL CELLS IN *SCHISANDRA* MICHAUX.

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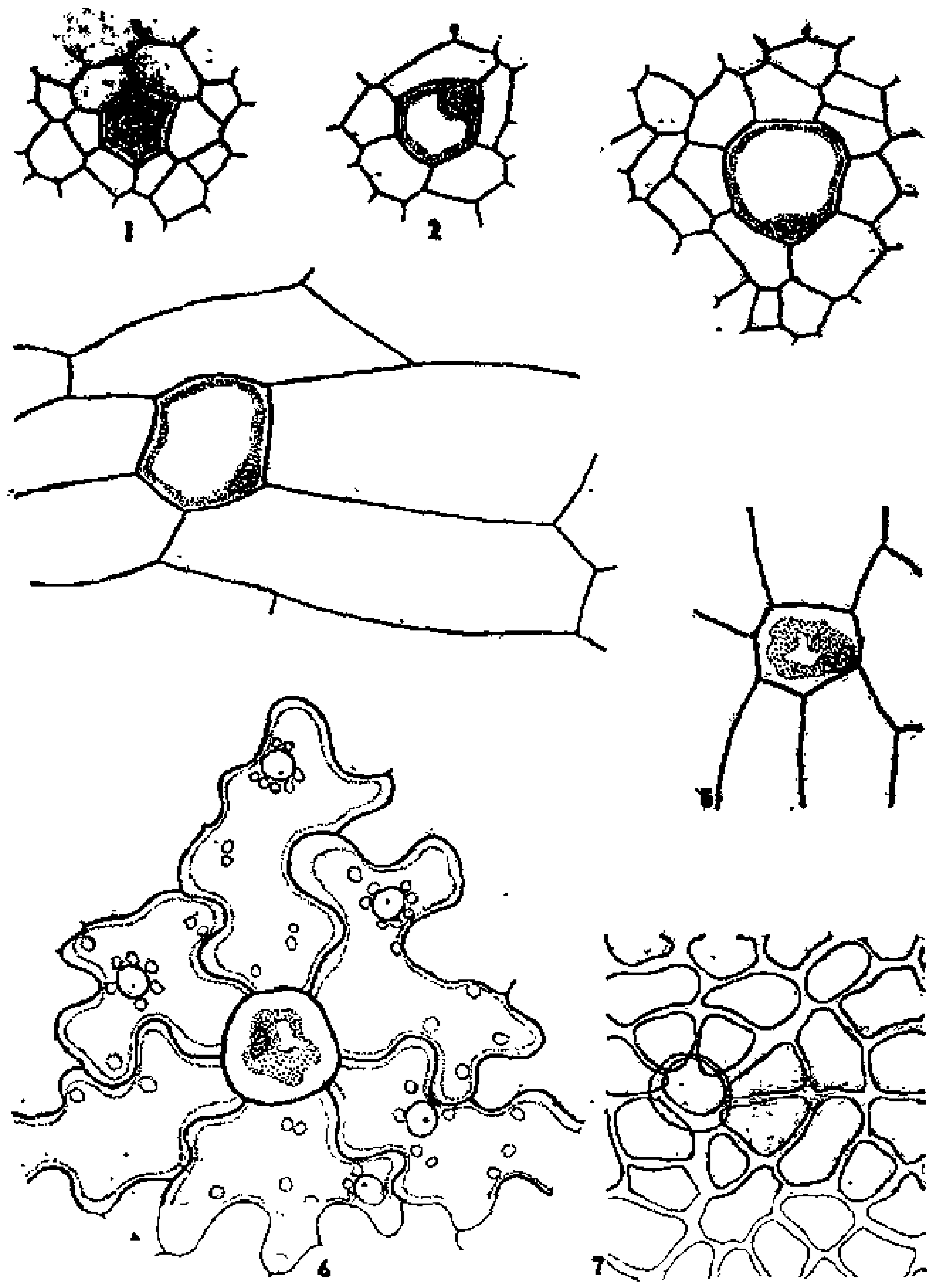
THE genus *Schisandra* comprises 22 species distributed in the south-eastern areas of the Northern Hemisphere. Although much work has appeared on its embryology (*see* Hayashi,[5] Kapil and Jayan[9]), palynology (Erdtman,[3] Jalan and Kapil,[8] Wodehouse[12]), stomata (Jalan[7]), and systematic position (Jalan[6]), anatomical observations are still meagre and insufficient. The present investigation deals with the structure and development of the ethereal oil cells in *Schisandra* Michaux.

Portions of the root, stem, leaf, and various floral parts of *Schisandra grandiflora* and *S. neglecta* were collected from several localities in Eastern and Western Himalayas (*see* Jalan[6]). The ethereal oil cells were examined mostly by peeling off strips of cuticle as outlined by Bailey and Nast.[1] Whole-mount preparations of young leaves were also made.

The ethereal oil cells occur on both vegetative and reproductive organs. They are most abundant on the leaves being confined to the lower surface and distributed in a mosaic fashion. In general, two categories of oil cells may be recognised, namely, epidermal and sub-epidermal. The latter occur in the deeper layers of the cortex, pith, stamens, carpels, and in the mesophyll tissue of the leaves. The epidermal cells adjoining the ethereal oil cells are disposed in a rosette fashion.

Both in *Schisandra grandiflora* and *S. neglecta* the epidermal ethereal oil cells of leaves are more or less spherical (Figs. 3, 6), while those found in the epidermal or sub-epidermal layers of the stem or petiole are polyhedral (Figs. 4, 5). In surface view the oil cells are relatively small as compared with the surrounding epidermal cells (Figs. 4-6). Structurally, each oil cell contains a single nucleus imbedded in the vacuolated cytoplasm. In general, the nuclei of the ethereal oil cells resemble those of the surrounding cells. However, the nucleoli of the former are more prominent and the nuclear membranes stain more deeply as compared with those of the nuclei of the non-secretory cells Also, the nucleoli in the ethereal oil cells vary in number and size. Figures 2, 3 show nuclei with four and six nucleoli respectively; in a few instances as many as eight nucleoli were also observed in each nucleus. This is in

accordance with the findings of Zirkle[13] who also noted variations in the number of nucleoli in the secretory cells of *Pinus strobus*.



FIGS. 1–7. Figs. 1–3. Stages in the development of ethereal oil cells, × 580. Fig. **4.** Surface view of ethereal oil cell in the epidermis of the stem, × 580. Fig. 5. Same, from the petiolar epidermis, × 580. Fig. **6.** A mature ethereal oil cell from the lower epidermis of the leaf; note rosette of surrounding epidermal cells, × 580. Fig. 7. 'Hair scar' on leaf, × 560 (After Rao, 1939).

The ethereal oil initials appear more or less simultaneously with the stomatal mother cells in the young leaf primordia. However, in contrast to the latter, the oil cells arise directly from the protodermal cells. There is no indication that the division preceding the formation of oil cell initials is a differential division, as in the development of the trichosclereid initials of *Monstera* (Bloch[2]) or of other idioblasts (*see* Foster[4]). Although most ethereal oil cells arise early in the very young leaf primordia, some may also develop later when the stomata are already fully mature.

In the beginning, the ethereal oil cells are polygonal, somewhat larger than the neighbouring protodermal cells, and are characterised by dense cytoplasm and prominent nuclei (Fig. 1). They also show a distinct avidity for cytoplasmic and nuclear stains. Soon they become more or less spherical (Figs. 2, 3). Simultaneously, vacuoles appear in the cytoplasm. They eventually fuse and push the cytoplasm against the cell-wall (Figs. 1-3), and the nucleus becomes elongated. The wall of the ethereal oil cells is slightly thicker than that of the adjoining cells (Figs. 1–6). Its cytoplasm takes a lighter stain than that of the neighbouring cells of the epidermis. However, as mentioned earlier, the nuclear membrane and the nucleoli stain more deeply.

Rao[10] mistook the ethereal oil cells as hair scars, and remarked: "....hair scars when present are observed usually on the lower surface and in *Kadsura scandens* on the upper surface also." His Fig. 103' (reproduced here as Fig. 7) really shows the oil cells surrounded by rosettes of epidermal cells. It may also be noted that none of the species of *Schisandra* or *Kadsura* are pubescent (*see* Smith[11]) and, therefore, the presence of hairs or hair scars is out of question. The hair scars reported by Rao in some species of *Magnolia* and *Manglietia* are also probably ethereal oil cells.

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