OIL-BODIES IN INDIAN LIVERWORTS

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IN recent years, the study of oil-bodies in liverworts, particularly in foliose forms, has gained considerable attention in other countries (Müller, 1939 ; Hattori, 1951, 1953 ; Schuster and Hattori, 1954 ; Schuster, 1966 ; Inoue, 1967). In India, however, no attempt has been made so far towards this aspect of study. Since the oil-bodies are considerably significant in the taxonomy of leafy liverworts, an attempt is being made to present their details in the liverworts growing in the country.

The oil-bodies can be successfully studied only from living plants. It has been observed that herbarium specimens examined after 6 months or a year of storage from the date of collection invariably do not show the presence of oil-bodies. However, in some species they seem to be retained even for over a year or so. In Marchantiales and Metzgeriales oil-bodies are almost absent except in few genera. In a majority of Jungermanniales and Calobryales oil-bodies are prominently present. An account of oil-bodies in 10 species of leafy liverworts, collected by the authors from Darjeeling (Eastern Himalayas) during the month of December 1969 and January 1970, has been given. The observations recorded in the present work were taken within one month after the date of collection.

1. *Plagiochila himalayensis* Schffn. (Fig. 1). —The oil-bodies are 3–7 per cell in the middle, 3-5 at the margins and at the base of the leaf. They are spindle-shaped, 5·76–11·52 (15·84)μ long, granules obscure, smooth in outline with a prominent granular projection in the middle.

2. *Scapania parva* St. (Fig. 2).—The oil-bodies are 2–5 per cell in the middle, at the margins and at the base of the leaf. They are globose to sub-globose, 2·47-7·2μ long, more or less smooth in outline, containing minute granules.

3. *Radula complanata* (L.) Dum. (Fig. 3). —The oil-bodies are usually 1(–2) per leaf cell ; when the number is two, one oil-body is much smaller than the other, the latter occupies most of the area of the cell lumen. They are usually elongated or oblong, 5·76–20·16μ long, somewhat irregular in outline, containing prominent granules.

4. *Radula campanigera* Mont. (Fig. 4).— The oil-bodies are usually 2 in each leaf cell with one small (rarely two) and one much larger. Sometimes only one large oil-body may be seen. They are spherical or globose, 3·46-15·36(-19·2)μ in diameter, more or less smooth or irregular in outline, containing prominent granules.

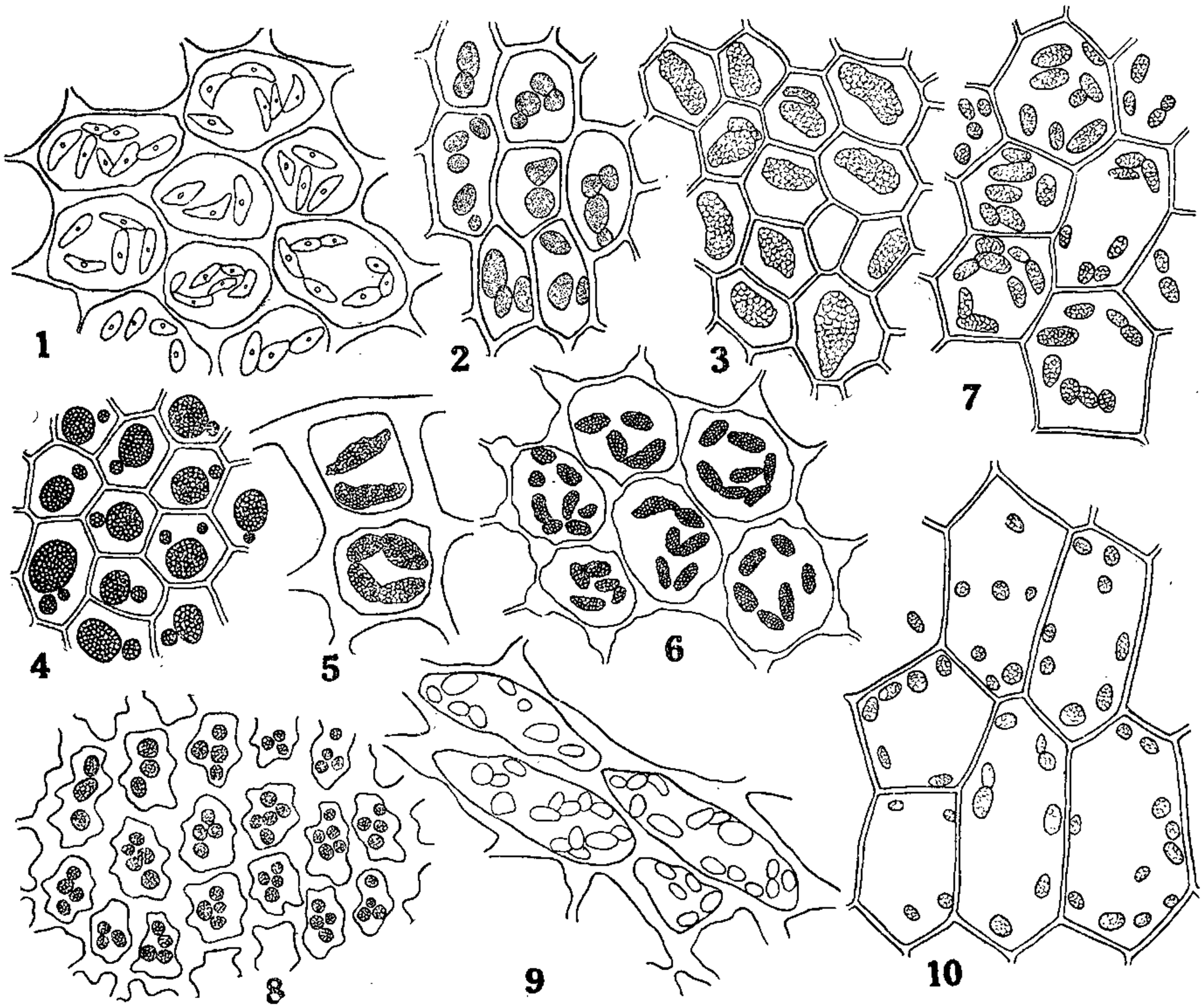
5. *Notoscyphus lutescens* (L. *et* L.) Mitt. (Fig. 5).—The oil-bodies are usually 2(–3) in each cell at the margin and 2–4 in the middle and basal cells of the leaf. They are elliptical or spindle-shaped, elongated, about 9·6–19·2μ long, irregular in outline, containing prominent granules.

6. *Frullania retusa* Mitt. (Fig. 6).—The oil-bodies vary from 4-8 in each cell of the leaf. They are usually elliptical or spindle-shaped, rarely somewhat spherical or sub-globose, 3·36-7·68 (-9·6)μ long, more or less irregular in outline, containing prominent granules.

7. *Cephalozia gollani* St. (Fig. 7).—The oil-bodies vary from 6-8 in each cell of the leaf. They may be globose to sub-globose or even sometimes elongated, 2·4–11·52 (–14·52)μ long somewhat smooth in outline containing conspicuous granules.

8. *Chandonanthus hirtellus* (Web.) Mitt. (Fig. 8).—The oil-bodies vary from 3–5 in each cell of the leaf. They are usually spherical or globose, rarely sub-globose, 2·4-5·28 (-6·24)μ in diameter, more or less smooth in outline, containing granules.

9. *Herberta sikkimensis* St. (Fig. 9).—The oil-bodies vary from 5–14 in each cell of the leaf depending on the size, usually more in the cells of the vitta which are considerably larger in size than the other cells of the leaf. They are sub-globose or slightly elongated,



FIGS. 1–10. Fig 1. *Plagiochila himalayensis* Schffn., × 540. Fig. 2. *Scapania parva* St., × 540. Fig. 3. *Radula complanata* (L.) Dum., × 540. Fig. 4. *Radula campanigera* Mont.. × 540. Fig. 5. *Notoscyphus lutescens* (L. *et* L.) Mitt., × 540. Fig. 6. *Frullania retusa* Mitt., × 540. Fig. 7. *Cephalozia gollani* St., × 540. Fig. 8. *Chandonanthus hirtellus* (Web.) Mitt., ×510. Fig. 9. *Herberta sikkimensis* St., × 540. Fig. 10. *Lophocolea bidentata* (L.) Dum, × 540.

2·4–9·6(–11·52)μ long, smooth in outline, granules obscure or homogeneous.

10. *Lophocolea bidentata* (L.) Dum. (Fig. 10).—The oil-bodies vary from 4–8(–11) in each cell of the leaf. They are globose to subglobose, sometimes elongated, 2·4–7·2 (–9·6)μ long, smooth in outline, containing granules.

The present paper constitutes the first Indian contribution solely on the structure of oil-bodies in leafy liverworts.

1. Hattori, S., "Oil-bodies of Japanese Hepaticæ (1)," *Jour Hattori, Bot. Lab.*, 1951, **5**, 69.
2. —, "Oil-bodies of Japanese Hepaticae (2)," *Ibid.*, 1953, **10**, 63.
3. Inoue, H., "Studies on oil-bodies of some Malayan liverworts," *Ibid.*, 1967, **30**, 54.
4. Müller, K., "Untersuchungen über die Ölkörper der Lebermoose," *Ber. Deutsch. Bot. Gesell.*, 1939, **57**, 325.
5. Schuster, R. M., *The Hepaticæ and Anthocerotæ of North America*, Columbia Univ. Press, New York, 1966, **1**.
6. — and Hattori, S., "The oil-bodies of the Hepaticæ II, The Lejeuneaceae," *Jour. Hattori Bot. Lab.*, 1954, **11**, 11.