Ultrastructure of the Mitotic Apparatus in *Dictyota dichotoma* (Lamour)

by

B. GALATIS, C. KATSAROS and K. MITRAKOS

Institute of General Botany, University of Athens (Greece)

The mitotic apparatus of the brown alga *Dictyota dichotoma* was studied in dividing cells of the outer and inner layers of the thallus apex. Since, as far as we can know, no one up to now has reported on the fine structure of the mitotic apparatus in brown algae, we believe that this report will contribute in understanding the evolution of the mitotic apparatus in the plant kingdom, on an ultrastructural level [1, 2, 3].

Material and methods

The general procedures of fixation, embedding, and staining for light and electron microscopes, were similar to those suggested by COLE *et al.*, [4], and FOWKE & PICKETT-HEAPS [5].

Observations

The interphase nucleus, in both cell layers, shows a typical envelope with a large number of pores, usually filled with a darkly stained material. Inside a chromatin network, a large nucleolus is observed, while outside but in close proximity to the nuclear envelope, centrioles are often detected. The centrioles are surrounded by a small number of microtubules. In a few cases, centrioles are appearing in pairs (diplosomes).

During prophase, while the envelope does not show any change, the nucleolus is starting to disperse and the chromatin shows a higher degree of condensation (fig. 1, 2). Microtubules are not observed within the nucleus, but an increased number of microtubules, ending around the prophase centrioles is observed (fig. 4). Centrioles are taking a polar position during prophase (fig. 1).

In cross, as well as in longitudinal sections of these centrioles, one observes that microtubules are focused at on an amorphous darkly stained material near the centriole (fig. 4, 5).

At prometaphase we observed that the nuclear envelope breaks at two points just opposite to the centrioles. Microtubules coming from the centrioles radiate in the nucleoplasm, through these gaps.

In metaphase the chromosomes become close together, and are wellshaped (fig. 3). The chromosomes of *Dictyota* do not show an organized kinetochore.

During anaphase the chromosomes are mowing to the poles as " chromosomal plates " (fig. 6). Separation, is accompanied by considerable spindle elongation, as well as by a surface increase of a nuclear envelope. Also its gaps seem to show a larger diameter (fig. 6).

During telophase the increased nuclear envelope is breaking off near the two groups of chromosomes, the two daughter envelopes are formed, while remnants of the mother envelope together with some microtubules etc. are collapsed. Soon the nucleoli appear in the daughter nuclei. Until this stage both nuclei being located at the cell poles, start now to move toward the cell center (fig. 8). The formation of the septum begins from the walls towards the center of the cell, by invagination of the plasmalemma (fig. 8). Golgi vesicles probably contribute essentially to the formation of the new cell wall.

Rapp. Comm. int. Mer Médit., **22**, 4, pp. 53-54, 8 fig. (1973).

References

[1] PICKETT-HEAPS (J.D.), 1969. — *Cytobios*, **3**, pp. 257-280.
[2] PICKETT-HEAPS (J.D.), 1970. — *Cytobios*, **6**, pp. 69-78.
[3] PICKETT-HEAPS (J.D.), 1971. — *Cytobios*, **3**, 12, pp. 205-214.
[4] COLE (K.), BOURNE (V.), & LIN (S. CS), 1968. — *Can J., Genet. Cytol.*, **10**, pp. 63-67.
[5] FOWKE (L. C.) & PICKETT-HEAPS (J.D.), 1969. — *J. Phycol.*, **5**, 3, pp. 240-259.

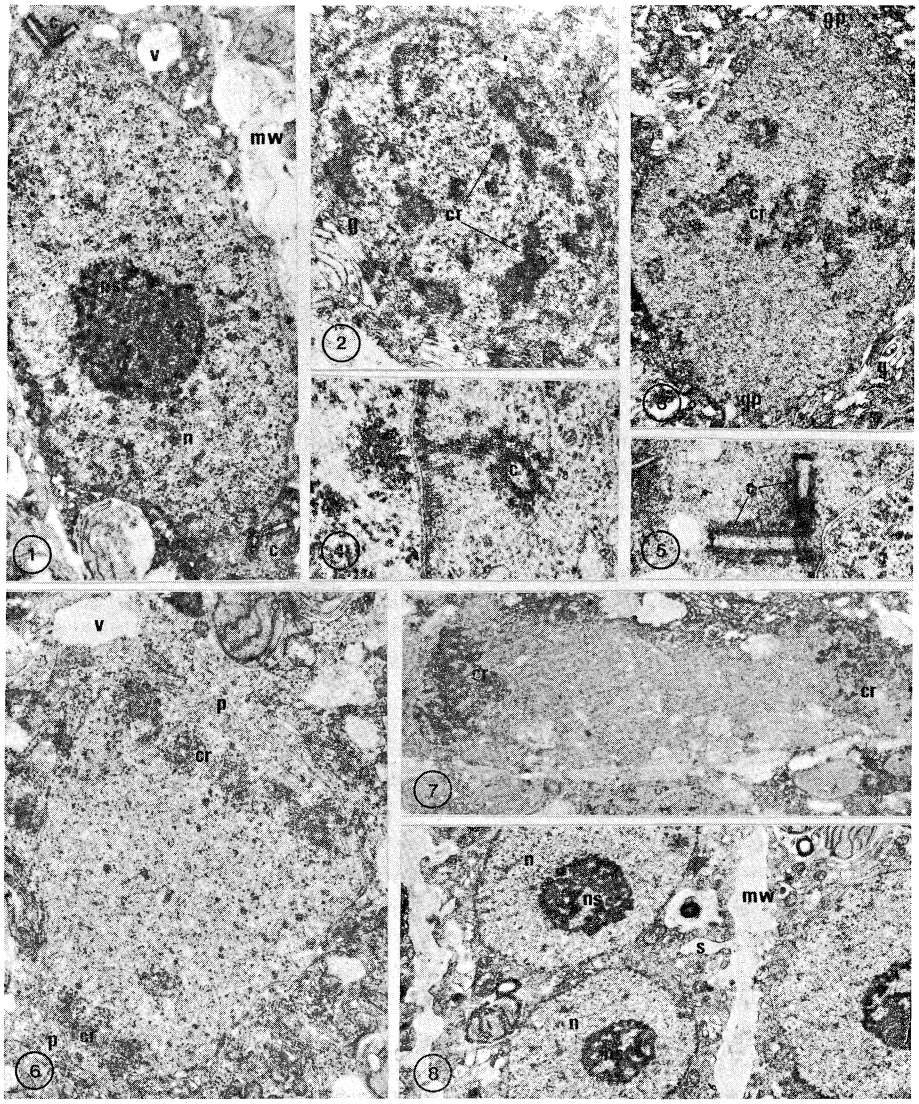

FIG. 1. — Early prophase. X 8,000
FIG. 2. — Prophase. X 10,000
FIG. 3. — Metaphase. X 10,500
FIG. 4. — Centriole. X 30,000
FIG. 5. — Diplosome. X 32,500
FIG. 6. — Anaphase. X 11,000
FIG. 7. — Early telophase. X 6,500
FIG. 8. — Late telophase. X 5,000

Abbreviations used on figures

o = centriole, cr = chromosome, g = Golgi body, gp = gap of the nuclear envelope, m = microtubule, m = mother cell wall, n = nucleus, ne = nuclear envelope, ns = nucleolus, p = pole of spindle, s = septum. v = vacuole.