Chaudhary, B.R., Agrawal, S.B. (ed.): **Cytology, Genetics and Molecular Biology of Algae.** - SPB Academic Publishing, Amsterdam 1996. 439 pp. Hard bound US $ 140.50. ISBN 90-5103-126-2.

Memorial volume dedicated to late Professors Y.S.R.K. Sarma and Y.B.K. Choudhry, the prominent Indian phycologists, as well as to Professor M.B.E. Goodward, the world leading scientist in algal karyology, includes 24 contributions which successfully reflect the contemporary progress in algal research.

The karyology of some algal groups (*Chrysophyceae, Chlorococcales, Volvocales, Cladophorales, Conjugatophyceae, Characeae*) belongs to the important area of Indian cytology (Agrawal, Bhatnagar, Chaudhary, Gautam, Gupta, Patel) and hance dozens of karyotype numbers are listed in the review articles. They were obtained by direct counting, rectangular electrophoresis, and differential staining for observation of the chromosome banding pattern. Some link between chromosome structure and charophycean phylogeny is discusssed. Multinucleate condition in red algal cells is the important starting point for parasexually produced hybrids between male and female cells (Wu). The knowledge of ultrastructure of euglenoid as well as the dinophycean nucleus helps in understanding peculiar groups (Gavrila). Iglesias-Prieto investigated biochemical and spectroscopic properties of the light-harvesting complex of dinoflagellates. These investigations confirm the complex secondary-endosymbiotic origin of the photosynthetic apparatus in *Dinophyta*. Wujek stresses the evolutionary links between chrysophytes and diatoms, which is expressed also in the similar way of stomatocyst development inside the silicon deposition vesicles, and also clearly explaines the differences among newly described classes, *Chrysophyceae* and *Synurophyceae*. The striated connecting band between flagellar basal body and nucleus (rhizoplast) is depicted with perfect clarity. Two contributions deal with the diatoms: Giri discusses the mitosis in diatoms, but the diminution of the cell size is usually considered as the result of cytokinesis, rather than mitosis. Mann reviews the chloroplast morphology in diatoms based on the precise observation of the living cells and their division pattern. The recognised typology of this organelle does not correlate with the contemporary classification of diatoms, but it elucidates the more biological approach to this group. Lewis uses hybridisation of brown algae as important tool for species determination, because the thallus morphology is not reliable and the pheromone production is also less species-dependent. The most sensitive character is the gamete compatibility based on species-specific glycoproteins of the outer surface of gametes, which are responsible for the mating process.

Systematics and taxonomy of green algae are the subject of several contributions. Watanabe and Floyd continued the investigation of the classification of coccoid algae and related organisms based on the ultrastructure of swarmers. Coccoid greens are an intermediate form between the ancestral flagellates and the more advanced branched and thallus forming algae. The authors express the idea that the ultrastructural characteristics reflect phylogenetic relationship, that will stand the test of future molecular research. In the course of evolution, convergence of cell features and thallus morphology occurred across different phylogenic lines. Terrestrial coenocytic alga, *Protosiphon*, is classified in *Chlorococcales* (*Chlorophyceae*), in spite of it, its zoospore morphology resembles that of *Chlorococcum* (*Chlamydophyceae*). The state in green algal systematic on the class level is controversial, because many of the contemporary authors differ in understanding of the classes *Chlamydophyceae, Pleurastrophyceae* and *Trebouxiophyceae*. It seems that the multinucleate cells within *Chlorococcales* are not diagnostic. Takeda recommends cell wall composition (mainly sugars) of *Chlorella* as the taxonomic character.

Special part of the volume is dedicated to molecular phylogenetics, the most modern approach to the evolutionary questions. McCourt *et al.* tested the phylogenetic relationships inside the order *Charales*, using both the morphology and nucleic acid and ribulose-1,5-bisphosphate carboxylase/oxygenase contents. This article closely links with the next contribution, which deals with the evolution of green algae and the land plants (Waters and Chapman). Current analyses of nuclear-encoded and plastidic genes indicate two major lineages among green plants: one comprises the charophycean green algae and monophyletic land plants that arose from them, the another includes the remaining green algae. The bryophytes (*sensu lato*) are most closely related to land plants. The micromonadophycean, pleurastrophycean, and chlorophycean lineages (*sensu* Marox

and Stewart 1984) are not supported as monophyletic classes. In this connection the reintroduction of the division *Streptophyta* (Bremer 1985), as well as the subkingdom *Chlorobionta*, including *Charales*, *Bryophyta* and land plants is proposed. Ho *et al.* evaluate various methods of molecular approaches applied in the taxonomy of the red and brown seaweeds. More detailed analyses of the phylogenetic relationships among genera and higher-level taxa within *Coralinales* are subject of the contribution of Bailey and Chapman.

Last part of the volume is devoted to the genetics and genetic engineering of cyanobacteria. Priya Sethu *et al.* describe isolation of various plasmids, which can be used in direct transformation of *Spirulina platensis*, but also in other cellular systems. The next level of traditional Indian search for effective clones of nitrogen-fixing bacteria consists in genetic improvement of such strains. Vaishampayan *et al.* genetically improves NH_4^+-derepression of N_2 fixation in cyanobacteria, which includes the resistance to the fungicide carbendazine. Genetic engineering of cyanobacteria is an important subject of biotechnological interest in China. Shilin Lou *et al.* consider cyanobacteria as the suitable genetic donors and acceptors in gene engineering not only for bacterial, but also for other cellular models, *e.g.*, eukaryotic heterotrophs or eukaryotic autotrophs, like the *Chlamydomonas* cells.

The reviewed volume contains voluminous information about broad questions of temporary phycology, and for this reason it is recommended to every phycologist, botanist and plant physiologist as an important enrichment of their libraries. From the other point of view, the contribution are arranged without a clear plan, which sometimes makes difficult the orientation in the book.

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