Structural Connections between Flagellar Base and Stigma in Dinobryon

Brief Report

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In the Chrysophyceae the putative photoreceptor system usually consists of a chloroplastidic stigma in juxtaposition to a swelling on the second (i.e., smooth) flagellum (eyespot type B, after Dodge 1969). The flagellar swelling is generally considered to be the site of photoreception, with the stigma acting as a shield or filter for the light. It is possible, however, that the stigma might play a more active role in the photoreceptive process; if so, then the problem of impulse transfer from stigma to flagellum must be considered. Our examinations of the supposed photoreceptive system in Dinobryon have revealed some previously unreported structural details which might permit such impulse transfer.

The material for this investigation, Dinobryon cylindricum Imh. var. alpinum Bachm. was collected from natural populations in ponds in North Zealand, Denmark: Karlssø (27-4-72) (in cooperation with Dr. D. J. Hibberd, Cambridge, England) and Børstingerød village pond (13-5-75). Standard methods were used for fixation and embedding.

Figs. 1 and 2 show the main components of the supposed photoreceptor system in Dinobryon. The stigma is located anteriorly in one of the two chloroplasts and consists of osmiophilic globules arranged in a monolayer overlain by the chloroplast envelope and one-to-several thylakoids (Joyon 1963, Wujek 1969, Franke and Herth 1973). The basal bodies, close to the stigma, lie at an angle to one another. The base of the flimmer-flagellum (I) is provided with an extensive root system, consisting of both a microtubular and a striated root, presumably providing mechanical support. The basal body...
Fig. 1. Transverse section through apical portion of a *Dinobryon* cell. Basal body I with its root system is seen in transverse section, basal body II in longitudinal section. The connection between basal body II and the stigma region (ST) is indicated by an arrow. ×40,000

Fig. 2. Oblique section through apical portion of a *Dinobryon* cell shows stigma (ST), flagellar swelling (FS), and glancing sections of both flagellar bases. The microtubular root (MTR) and the striated root (SR) from basal body I are evident. The connection from basal body II to the stigma-containing part of the chloroplast is indicated (arrow). ×40,000

Fig. 3. Transverse section of basal body II shows connection (arrow) to the stigma region. ×48,000