Synaptonemal complexes in Neurospora

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Abstract
Synaptonemal complexes in Neurospora
There results suggest that the relationship between the rate of RNA synthesis and the rate of growth in N. crassa follows a pattern very similar to the one observed in bacteria. – = Institute of Plant Sciences, C. N. R. Unit for Cell and Molecular Biology in Plants, University of Milan, Milan, Italy.

Gillies, C.B. Synaptonemal complexes in Neurospora.

Synaptonemal complexes have been identified in nuclei of N. crassa at pachytene, using the technique developed with Neottiella by Westergaard and von Wettstein (1970 Compt. Rend. Trav. Lab. Carlsberg 37: 195) for isolating; embedding and sectioning single ascii. Prior to isolation of ascii, the perithecia from a cross between wild type strain 74A and lysine-requiring ascospore strain 374020 (FGSC#405) were fixed for 6 hours in 6.5% glutaraldehyde dissolved in 0.067 M phosphate buffer at pH 7.0. After washing in buffer, post-fixation in 2% OsO4 in buffer was carried out. Crosses were executed according to Barry (1966 Neurospora News. 10: 12), 300 mg/llysine being added to the crossing medium.

Unlike in Neottiella, the chromatin of the pachytene bivalents of N. crassa is poorly contrasted and difficult to distinguish from the nucleolasm in electron micrographs. However, the components of the synaptonemal complex are distinctly contrasted. The synaptonemal complex is absent from nuclei which, according to ascus size, should be at early diploctene (Barry 1969 Chromosoma 26: 119).

The synaptonemal complex in N. crassa consists of two bound lateral components (co. 400 Å in diameter) which are held about 1200 Å apart by a central region containing the ca. 200 Å thick central component. The later components seem to contain alternating thick and thin bands with a center to center spacing of about 170 Å. Thus they are similar to Neottiella and other ascomycetes (Westergaard and von Wettstein 1970 Rev. Cytol. et Biol. veg. 23: 1). Occasional local thickenings of the central component into electron dense nodes ca. IWO Å x 500 Å in section are characteristic for the synaptonemal complex of N. crassa. These nodes partly fill the space of the central component in the central complexes of Pustularia cupularis and Galactinia plebia. – = Institute of Genetics, University of Copenhagen, Øster Farimagsgade 2A, DK-1353, Copenhagen K., Denmark.

Van Winkle, W. B. Evidence for a spindle apparatus in somatic nuclei of Neurospora.

A previous report presented ultrastructural observations of the slime mutant of Neurospora (Van Winkle 1969 Neurospora News. 14: 5). Further studies have shown this mutant to be amenable for observations of the fine structural aspects of somatic nuclear division (Van Winkle et al. 1971 in press). The confusion engendered by conflicting interpretations of somatic nuclear division in Neurospora studied by light microscopy seemed to warrant a study of those features of division not resolvable through light microscopic techniques. The presence in nuclei of Neurospora of a definite spindle apparatus, usually equated with a "conventional" form of mitosis, has been suggested previously by Bakerspiegel (1969 Neurospora News. 14: 5) and Robinow (personal communication, 1970) but had not been reported with certainty.

Electron microscopic observations of glutaraldehyde-OsO4-fixed hyphllet cells of the slime mutant (heterocaryon fzm; sit-arg-1, cr, our, or-l; al-2, nic-1, lys-3, or-1; FGSC#327) have revealed the following aspects of somatic nuclear division:

1. Somatic nuclei in the process of division have present within their nucleolasmic a definite spindle apparatus consisting of 180 Å microtubules.
2. In conjunction with the spindle, specialized regions (spindle plaques) on the external surface of the nucleus act as termini for opposite poles of the spindle and may be involved in the polymerization and orientation of the forming spindle fibers.
3. A dense granule-spindle plaque complex observed in the early stages of division may represent the "centriole" observed in light microscopic studies.
4. Not only spindle fibers (which attach to chromatin regions), but also a tightly compressed longitudinal bundle of filaments (which stretch the late telophase daughter nuclei) is seen. This filament bundle may be similar to the "Zentralstrang" described by Girbardt (1969 Protoplasma 67: 413).

Although the complete sequence of events during somatic division in Neurospora has not been fully observed, the presence of such features as a spindle apparatus and its attachment to chromatin regions and division stages believed to be prophase, anaphase and telophase seems to indicate that somatic division in Neurospora is not unlike the "classical" or "conventional" mitosis found in other organisms. – = Department of Zoology, University of Texas, Austin, Texas 78712. Present address: Baylor College of Medicine, Houston, Texas 77025.