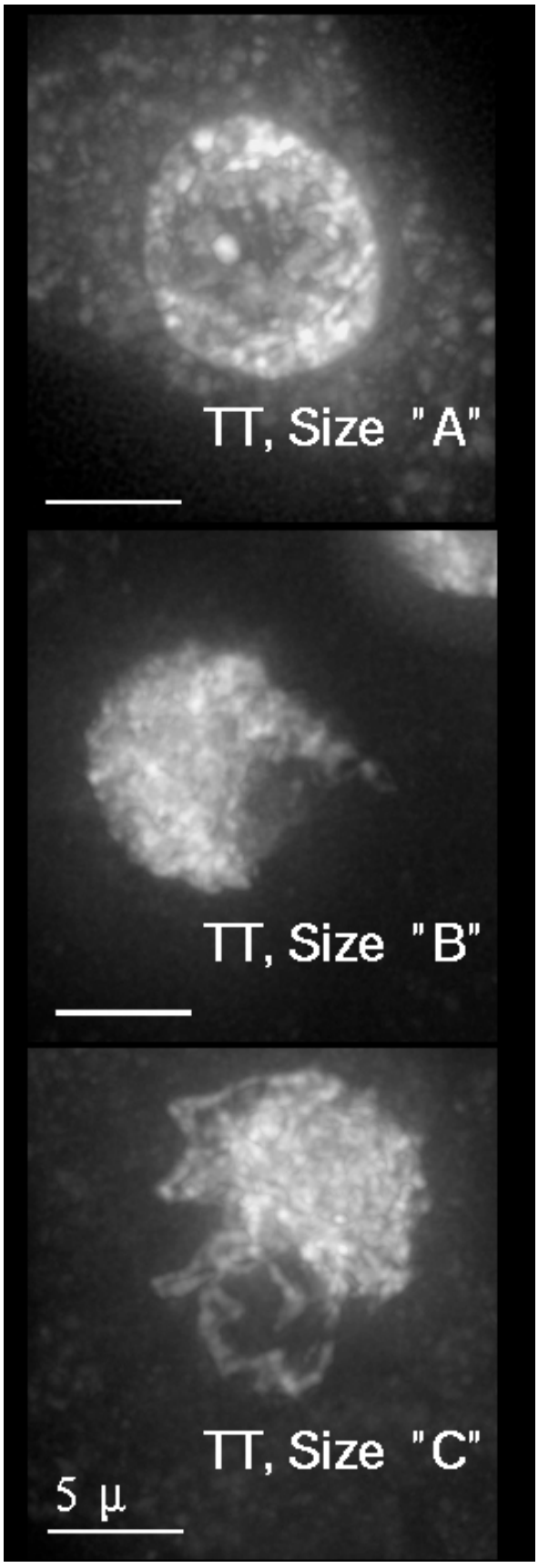

Figure 3.

pachytene, respectively. These anthers will provide mRNA preparations for microarray analysis of meiotic gene expression. Anthers from the larger floret are dissected in the greenhouse, measured on a ruler under a dissecting microscope, and frozen. Anthers are collected for four months at a time, then a new set of collections is started. Those shown in Figure 3 are from the first trimester of 2000 (Jan-April).

Variable distribution of meiotic homologs; on-line spinning projections of 3D data from chromosome painting and telomere FISH analysis of OMAd9.2

--Bass, HW, Bordoli, SJ

We have developed a 3D FISH system to study meiotic telomere behavior and homologous chromosome interactions during meiotic prophase (Bass et al., 1997, J. Cell Biol., 137:5-18). In a recent chromosome painting study, the 3D intranuclear distribution of homologs was characterized in pollen mother cells before and during meiotic prophase (Bass et al., 2000 J. Cell Sci. 113:1033-1042). Examination of deconvolution image data revealed a surprising diversity of homolog arrangements and dispositions, relative to each other, and relative to the position of the telomere cluster-defined bouquet. In particular, many bouquet-stage nuclei (mostly at zygotene) contained spatially separated homologs. This observation, along with the published measurements of interhomolog distances in well-preserved nuclei indicate that premeiotic pairing does not contribute much, if anything, to the zygotene synapsis that is required for proper homolog disjunction. Thus, the homology search appears to function during meiotic prophase, after chromosomes have reorganized into condensed and extended fibers, and largely coincident with the bouquet stage when the telomeres are clustered on the nuclear envelope.

Computer-assisted inspection of the 3D data conveys a great deal of information. In order to make the visual data more accessible, we have prepared an on-line supplemental data page for some of the meiotic nuclei analyzed by Bass et al., (2000). The web page, http://bio.fsu.edu/~bass/mv/bq2/, contains a table with links to Quicktime movies that can be downloaded or viewed with web browsers. For each movie, projections of the FISH signals are shown for the telomeres (purple) and the maize-9 homologs (green). The DAPI image, which marks the entire nucleus (42 oat plus 2 maize chromosomes), was omitted. Each movie is made from a cropped down cube of data in which a single spherical nucleus is centered.

This form of data display may be useful to researchers and educators who are interested in the native structure of meiotic chromosomes and the function of the telomere bouquet. The movies convey some of the spatial and topological aspects of meiotic chromosome pairing and synapsis. The original data are archived as DeltaVision image data (A.P.I. Seattle, WA) and the optical sections can be distributed as grey scale TIFF files upon request from HWB (bass@bio.fsu.edu).