Meiosis and genetic diversity in the model organism

Sociology

4 November 2013 Section 24 TA- Erik Ohlson Meiosis and Genetic Diversity in the Model Organism, Sordaria flmicola Introduction Research groups from the Imperial College ofScience, Technologyand Medicine and the Institute of Evolution at the University of Haifa have been studying the model organism, Sordaria fimicola, in regards to controlling cross over frequency in response to environmental pressures. Sordaria fimicola is a good model organism because it has a fast life cycle and elongated asci that are easily seen under a microscope.

In addition, there are multiple different combinations of ascospore olors due to recombination during meiosis. Evolution Canyon is the research model for this experiment because of its exceedingly differing slopes. The South facing slope (SFS) receives high temperatures and droughts due to the high solar radiation. On the other hand, the North facing slope (NFS) exhibits shadier, cooler, and more humid climates. Asexual filaments were collected from either slope and grown in the lab.

Wild type spores(black spores) were acquired from self-cross between the asexual filaments and spore color mutants (tan spores) were obtained from wild type trains that produced non-black spores that arose spontaneously within each population. They made crosses with wild type vs. tan spores from differing slopes (NFS-SFS) and found that cross over frequencies between the differing slopes was great (Hass and Ward, 2010). Contrary to previous belief, cellular mechanisms were influenced by environmental conditions; this tells us that differing environments can lead to different recombination frequencies.

In our part of the experiment, we created a control where the spores were grown under the same optimal lab conditions. The combinations of ascospores we observed include, 4: 4, 2: 2: 2: 2, and 2: 4: 2. During meiosis, 4 ascospores are produced after crossing over occurs. Then the spores undergo a series of mitosis where 8 spores are then created. In a 4: 4 recombination, there could either be 4 tan then 4 black or 4 black than 4 tan. In the 2: 2: 2: 2, there could be tan, black, tan, black or vice versa. In the 2: 4: 2, there could be tan, black, tan and so on.

Therefore, 6 different combinations asci classes can occur. Our goal for this experiment was to identify the different spores, cross over frequency, and mapping distance. However, there were challenges in preparing the squashes, and then identifying the different spores. Methods We divided the petri dish into four sections, where the wild black type samples were diagonal from each other and the tan type samples were also diagonal from each other hyphae side down onto mating agar to increase the possibility of crossing over to occur.

After two weeks, using an inoculating loop, we scraped some perithecia from the center of the dividing lines where we believed crossing over occurred. We then placed them on slides with a drop of water to observe the crossing over requencies under a microscope. Pressure was applied to the coverslip in order to release the asci from within the perithecia in order to count the frequency of each asci type. To calculate cross over frequency and map distance, we used the formulas: 1. % Cross Over=(# of recombinant asci/ total # asci) x 100% 2.

Map Distance= % cross over/ 2 *Note that map distance accounts for all spores, but in our experiment only half crossed over, we divide by 2. Results Table 1. Individual Data. This illustrates the number each recombination found within our picture we were provided. Non-recombinant Recombinant Total # of Asci Total # Recombant Asci (B+C) # of Type A Asci # of Type B Asci # of Type C Asci 8 5 3 4 Table 1 illustrates the number each recombination found within our picture we