LAB 3:
THE EFFECT OF MICROFILAMENTS ON GROWTH OF POLLEN TUBE

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**Introduction:**

Pollen germination is a method by which flowering plants or angiosperms fertilize to initiate sexual reproduction. The pollen/pollen grain is produced within the anther (‘the male reproductive system of the plant’), by means of meiosis. In order for the pollen to fertilize the egg cell, the pollen must first reach the ovary (‘the female reproductive system of the plant’). To accomplish this, the pollen must reach the stigma, “the base of the structure containing the egg cell. At the stigma the pollen germinates to form the pollen tube which elongates the down the stigma to deliver the haploid nuclei to the ovary for fertilization” (Hasenkampf & Olaveson, 2003). Therefore without pollen germination, it would not be possible for fertilization to occur; for that reason pollen germination has huge importance in plant life. Furthermore, sexual reproduction allows for genetic recombination or variation, therefore without pollen germination this would not be possible.

“In eukaryotes, the cytoplasm consists of an organelle called the cytoskeleton, which is made up of three important components: microfilaments, intermediate filaments, and microtubules” (Purves, 2000). As a result they have three important functions: “maintain cell shape and support, aid various types of cell movement, and help the cell move or move things within the cell by means of motor proteins” (Purves, 2000). The microfilament component of the cytoskeleton, besides “stabilizing cell shape” (Purves, 2000), it is also “involved in various types of movement such amoeboid motion, cytoplasmic streaming, and muscle contraction in animal cells” (Hasenkampf & Olaveson, 2003). So therefore one can hypothesize that the “microfilaments are important for the movement of nucleus down the pollen tube, and as well the growth of
the pollen tube” (Hasenkampf & Olaveson, 2003). This hypothesis can be tested by having two separate Petri dish of pollen, one of which will be the control group and receive no treatment, and other, which will receive the cytochalisin B treatment. Since “cytochalisin B is powerful chemical inhibitor that blocks the formation of microfilaments” (Hasenkampf & Olaveson, 2003), the group containing this treatment should show no sign of pollen growth or very little growth in contrast to the group without the treatment. If this is true, then it can be approved that microfilaments are definitely important for the growth of pollen tube.

**Materials and Methods:**

Two Petri dishes, one dish containing pollen without any treatment and the other containing pollen with Cytochalisin B had been prepared. The pollen was taken from the flower known as Setcretia. A sample was then taken from each dish to “prepare a wet mount slide as shown in Method Box 1.1”(Hasenkampf & Olaveson, 2003). The slides were observed under a compound microscope to pinpoint the amount of pollen present and the length of their pollen tube if any had been grown. This was indicated as the initial time or $t = 0$. This is was done for both slides and the whole process was repeated when 5 minutes had been passed ($t = 5$), and again when 60 minutes had been passed ($t = 60$). At each consecutive time ($t = 0$, $t = 5$, $t = 60$), the length of the pollen tubes was measured by making estimation of the tube length in comparison to length of the field of view of the microscope. The estimation for one pollen tube was done by dividing 1 by the number pollen length it would take to stretch across the field of view and then multiplying that value by the field of view, as shown below in the equation.

$$\frac{1}{\text{Number of pollen length to stretch across the field of view}} \times \text{Field of view}$$
The estimation was done for each pollen located at each time. Along with the estimation, the percentage of the pollen that had been germinated was calculated at each time.

References Cited:
