Boston University School of Medicine
Division of Graduate Medical Sciences

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ANNOUNCEMENT OF FINAL ORAL EXAMINATION
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

CANDIDATE:	**Sarah Kleinsorge**
DEPARTMENT OR PROGRAM:	**Genetics and Genomics**
TITLE OF DISSERTATION:	**"The Role of Cell Polarity During Cell Fate Specification and Programmed Cell Death in the *Drosophila* Ovary"**
DATE, TIME, AND PLACE:	**Friday, May 29, 2015 at 10:00a.m.** **Boston University School of Medicine** **72 E. Concord Street (Room L 112)** **Boston, MA 02118**

EXAMINING COMMITTEE

FIRST READER:	**Dr. Caryn Navarro**
SECOND READER:	**Dr. Kim McCall**
THIRD READER:	
CHAIRMAN OF THE EXAMINING COMMITTEE:	**Dr. David Levin**
ADDITIONAL COMMITTEE MEMBERS:	**Dr. Karen Symes** **Dr. Horacio Frydman**

Members of the committee are asked to confirm attendance by replying directly to the Chairman of the Examining Committee.

ALL MEMBERS OF THE SCHOOL OF MEDICINE FACULTY ARE INVITED TO ATTEND.

THE ROLE OF CELL POLARITY DURING CELL FATE SPECIFICATION AND PROGRAMMED CELL DEATH IN THE *DROSOPHILA* OVARY

SARAH ELIZABETH KLEINSORGE

Boston University School of Medicine, 2015

Major Professors: Dr. Caryn Navarro, Assistant Professor of Biomedical Genetics
Dr. Kimberly McCall Professor of Biology

ABSTRACT

As an organism develops, multiple cellular processes need to occur in order to specify and organize tissue. One essential process is the establishment of cell polarity, which drives cell fate specification and stem cell differentiation. Another key process is programmed cell death, which is important for tissue remodeling and clearing damaged or diseased cells from the body. A loss in cell polarity can lead to defects in tissue organization and carcinogenesis. Defects in programmed cell death can lead to autoimmune diseases and cancer. However, hyperactive programmed cell death can lead to neurodegeneration. The Drosophila ovary, which is composed of germline and somatic cells, is an excellent model to study both cell polarity and cell death. In the germ cells, oocyte fate is specified and maintained through the asymmetric localization of cell cycle and cell polarity RNAs, proteins, and organelles, such as mitochondria, to and within the oocyte. Additionally the somatic follicle cells, which surround the germ cells, require a specific apical-basal polarity to function. During oogenesis, programmed cell death can be induced within the ovary to prevent oogenesis from maturing under low nutrient, high

stress or crowded conditions. When this occurs, the germline is cleared from the ovary by a process known as engulfment. Somatic follicle cells surrounding the germline synchronously enlarge and engulf the corpses of the dying germline cells. It is unknown what triggers the enlargement of the follicle cells. Previous research has shown that the apical side of a follicle cell is heavily marked by cell polarity proteins, to specify the apical side away from the lateral and basal sides. Since many important genes regulating both cell polarity and engulfment are conserved between Drosophila and other eukaryotes, we can study the establishment and maintenance of cell polarity and its role during engulfment to obtain a better understanding of these processes in mammals and their relevance to diseases. This dissertation investigates the role of cell polarity in both the specification of oocyte cell fate, and the organization and enlargement of the follicle cells during engulfment in the ovary.