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PROGRAM IN DEVELOPMENTAL BIOLOGY AND
THE EPITHELIAL CELL BIOLOGY CENTER

TRUDI SCHUPBACH, PH.D.
CONTROL OF EGF RECEPTOR ACTIVITY AND
AXIS ESTABLISHMENT IN DROSOPHILA OOGENESIS

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VANDERBILT  UNIVERSITY
MEDICAL CENTER

CONTROL OF EGF RECEPTOR ACTIVITY AND AXIS ESTABLISHMENT IN DROSOPHILA OOGENESIS

The focus of our research is the mechanisms that establish pattern and polarity in development. In *Drosophila*, the axes of the egg and embryo are laid down during oogenesis. We have found that signaling between oocyte and follicle cells plays an important role in this process, and shown that restricted EGF receptor activation sets up both axes of the egg. We have concentrated on investigating the restricted production of Gurken, a TGF- α -like signaling molecule, which activates the *Drosophila* EGF receptor in the follicle cells. Its regulation involves both RNA localization and translational control. Recently, this investigation has led us into the analysis of checkpoints, since we found that a meiotic checkpoint affects Gurken translation and dorso-ventral patterning. This checkpoint is activated by unrepaired DNA breaks. In addition, we have found that mutations in the piRNA pathway, which guards the germline against retrotransposon activity, can also activate the checkpoint and cause dorso-ventral patterning defects.

We are also analyzing the response of the follicle cells to EGFR activation. We found that the interaction of the Notch signaling pathway with the EGFR pathway is crucial in establishing the anterior-posterior axis of the *Drosophila* egg.



TRUDI SCHUPBACH, PH.D.

**PROFESSOR OF MOLECULAR BIOLOGY
PRINCETON UNIVERSITY**

**HOWARD HUGHES MEDICAL INSTITUTE INVESTIGATOR
MEMBER, NATIONAL ACADEMY OF SCIENCES**

Trudi Schupbach is Professor of Molecular Biology at Princeton University and a Howard Hughes Investigator. She grew up in Switzerland, where she did her undergraduate and graduate work at the University of Zurich. There she worked with Dr. Rolf Nöthiger studying the development of the genital disc and sex determination in the germline of *Drosophila*. She moved to Princeton as a research associate in 1981, where she began her work on the study of axis formation and cell-to-cell signaling during *Drosophila* oogenesis. She became a member of the tenured faculty at Princeton in 1990, and an Associate Investigator of the Howard Hughes Medical Institute in 1994. She has identified and characterized many genes that act during oogenesis to set up the polarity and pattern of the egg and the surrounding follicle cells. Her most recent work has also uncovered a meiotic checkpoint mechanism that affects patterning in oogenesis. In addition, her work has characterized genes required for epithelial cell morphology and function. Dr. Schupbach is a member of the American Academy of Arts and Sciences and of the National Academy of Sciences. She serves as Associate Editor of *Genetics* and of *Advances in Genetics*, and she is a member of the Editorial Board of *PNAS* and *Developmental Cell*. She was awarded the Edwin F. Conklin Medal by the Society for Developmental Biology, and she has served as the president of the Genetics Society of America.
