Dumont J N. Oogenesis in *Xenopus laevis* (Daudin). I. Stages of oocyte development in laboratory maintained animals. *J. Morphology* 136:153-79, 1972.
[Biology Division, Oak Ridge National Laboratory, TN]

This publication describes six stages of oocyte development in the popular and classical laboratory amphibian, *Xenopus laevis*. The stages are easily identified due to their morphological appearance and size. Details of histological and cytological events associated with each stage are included as part of the stage descriptors. [The *SCI®* indicates that this paper has been cited in over 520 publications.]

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During my doctoral work in E. Anderson's laboratory at the University of Massachusetts, I became interested in the concept of comparative oogenesis, particularly the cytological phenomena associated with yolk acquisition, in the various animal phyla. My early studies examined oogenesis in the horseshoe crab, *Limulus polyphemus*, and an annelid, *Enchytraeus albidus*.

After completing my degree and postdoctoral study, I accepted a position in the Biology Division at the Oak Ridge National Laboratory and soon came to share a mutual interest in oogenesis with Robin A. Wallace. We realized after a short time that studies of the process of oogenesis might be more fruitfully approached by using an experimental animal that could be easily maintained in the laboratory and whose reproductive cycle could be controlled. Our search led us to the classical laboratory amphibian, *Xenopus laevis*.

Wallace's early work was directed toward understanding the biochemistry of yolk (vitellogenin) and the relationship between hormones and yolk synthesis by the liver,[1,2] while mine was directed toward understanding the cytological events that occur in the oocytes themselves as they accumulate yolk.[3-5] Each day held new fascinations and discoveries as techniques and approaches frequently failed or, less frequently, succeeded. Simple experiments deepened our insight into events of oogenesis in *Xenopus*: countless experimental animals survived ovarian biopsies under hypothermia and carried scars (sometimes three or four) as proof, others literally turned blue from injections of biological tracers such as trypan blue and became the parent of "blue babies"! Animals that escaped from their tanks were often discovered in sinks or on the floor by late-night workers who were predictably startled—blue frogs, indeed! Still other animals became exhausted from induced ovulations. Early experiments such as these, however, provided information about the dynamics of oocyte production and development and contributed immeasurably to the understanding of oogenesis in *Xenopus*.

Discussions with laboratory colleagues and the cadre of graduate students and postdoctoral fellows soon revealed that a common language that would more precisely describe specific oocytes—their size, cytology, or dynamics (in short, their stage of development)—would improve our ability to understand and communicate our data. Literature searches revealed that while reference nomenclatures for phases of oocyte development had been proposed for other amphibia and fish, no syntax was available or directly applicable that satisfied our need to identify specific developmental stages in *Xenopus*. I set out to develop one; thus, Stages I through VI. These developmental stages can be easily identified on the basis of oocyte size, color (pigmentation), animal and vegetal hemisphere differentiation, and banding—gross morphology. The use of these six stages to designate developmental progression became routine and made our exchange of information more precise and easier to understand: cytological or developmental activities could be associated with a specific stage.

As the convenience and usefulness of the staging method became increasingly apparent, I felt that it might also be useful to colleagues using *Xenopus* oocytes as their experimental models and I presented the stages formally as a publication in the *Journal of Morphology*.

I consider it a great personal compliment that the staging method has been adopted by so many friends and colleagues, and I trust that my small effort has made a contribution to their ability to share their discoveries covering a wide range of subjects including genetics, cytology, chemistry, maturation, and fertilization.

This method is used by most researchers who use *Xenopus* oocytes in many fields of biology. C.D. Lane recently reviewed key aspects of development in *Xenopus* oocytes.[6]

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2. **Jared D W, Dumont J N & Wallace R A.** Distribution of incorporated and synthesized protein among cell fractions of *Xenopus* oocytes. *Develop. Biol.* 35:19-28, 1973.
3. **Brummett A R & Dumont J N.** Intracellular transport of vitellogenin in *Xenopus* oocytes: an autoradiographic study. *Develop. Biol.* 60:482-6, 1977.
4. **Wiley S & Dumont J N.** Stimulation of vitellogenin uptake in Stage IV *Xenopus* oocytes by treatment with chorionic gonadotropin *in vitro*. *Biol. Reprod.* 18:762-71, 1978.
5. **Dumont J N.** Oogenesis in *Xenopus laevis* (Daudin). V. The route of injected tracer transport in the follicle and developing oocyte. *J. Exp. Zool.* 204:193-218, 1978.
6. **Lane C D.** The fate of genes, messengers, and proteins introduced into *Xenopus* oocytes. *Curr. Top. Develop. Biol.* 18:89-116, 1983.

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