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Gurdon J B. Changes in somatic cell nuclei inserted into growing and maturing amphibian oocytes. *J. Embryol. Exp. Morphol.* 20:401-14, 1968.
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Nuclei from various tissues have been injected into growing and maturing oocytes of the frog *Xenopus* and cultured for up to three days. The injected nuclei changed their activity to conform to that of the host cell into which they were injected. Most significantly, the rate of transcription of injected nuclei continued for the whole of the culture period and increased dramatically during this time. [The *SCI*® indicates that this paper has been cited in over 255 publications.]

The Importance of Cytoplasm

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There are probably two reasons this paper has been extensively cited, relating to its scientific and technical interest.

The experiments reported were scientifically significant because they showed particularly clearly that the kind of cytoplasm by which a cell nucleus is surrounded has a rapid and dramatic effect on the morphology and synthetic activity of the chromosome material. Nuclei from adult brain, usually regarded as a terminal cell type, were made within a few hours to initiate DNA synthesis, to increase their rate of RNA synthesis, or to form condensed chromosomes, according to the characteristics of the particular host cell into which these nuclei were transferred. The enhancement of RNA synthesis and its persistence for many days was of special interest because the only equivalent experimental system for analysis, namely, the incubation of isolated nuclei in cell extracts, did not permit continued transcriptional activity for any great length of time. This work therefore opened the way towards the analysis of transcription using much more natural conditions than could be obtained in test tubes.

The origin of the experiments reported in this paper went back to my earliest work on nuclear transplantation. In contrast to the results of others, I found that single nuclei from specialised cells were made to change their genetic activity when injected into enucleated eggs, since normal larvae and even adult frogs could be obtained by transplanting nuclei from somatic cells. These early results led me to ask whether the changes in activity that followed nuclear transplantation were specific to the kind of cytoplasm into which nuclei were transferred. Hence I chose growing and meiotic oocytes as broadly similar host cells but with dramatically different endogenous activity. It was this general approach of transplanting nuclei to different kinds of cells, and of eventually injecting purified macromolecules into oocytes and eggs, that has occupied most of my career and that is proving useful in analysing the mechanisms of gene activation in embryonic development.[1-3]

Although this paper was not primarily technological, it did contain details of the exact procedure by which nuclei were injected into oocytes and by which the injected oocytes were cultured and labelled for several days.

It is interesting, and reassuring, that although this work was published in a journal that would not be regarded as either fashionable or prestigious, the paper has been much quoted by scientists who work outside the field of embryology, thereby testifying to the care and trouble that many scientists take to quote the original work in a field.

1. **Gurdon J B & Wakefield L.** Microinjection of amphibian oocytes and eggs for the analysis of transcription. (Celis J E, Graessmann A & Loyter A, eds.) *Microinjection and organelle transplantation techniques: methods and applications.* London: Academic Press, 1986. p. 269-99. (Cited 10 times.)
2. **Gurdon J B.** Nuclear transplantation in eggs and oocytes. *J. Cell Sci.* (Supp. 4):287-318, 1986. (Cited 10 times.)
3. **Gurdon J B, Lane C D, Woodland H R & Marbaix G.** The use of frog eggs and oocytes for the study of messenger RNA and its translation in living cells. *Nature* 233:177-82, 1971. (Cited 405 times.)

