They could pave the way to experiments in the as yet somewhat esoteric field of quantum measurement and control. For unsatisfied sceptics, Badzey and Mohanty have also developed a system of suspended nanomechanical beams made of silicon, each of which can be forced electrostatically to switch between its two stable states (Fig. 1). With stochastic resonance allowing enhanced control over such switching, these nonlinear states may eventually be useful as nanomechanical memory cells.

Stochastic resonance, although difficult to implement in practice, has always been an intriguing option for harnessing the background noise in certain systems. But the hubris of the 1990s was followed by a dearth of results to confirm that the mechanism underlies natural neurophysiological functions, and a general paucity of devices that were readily 'tunable' to take advantage of noise. These factors, together with the witches' brew of funding vicissitudes and some questionable publications, led to a waning of interest. Yet work such as that of Badzey and Mohanty[3] shows that the effect can be invoked in a noisy, nonlinear dynamic system under appropriate operating conditions, and that it can also be exploited in carefully crafted applications. The effect has also recently been used in biomedicine[7] and in the amplification of electric field signals in carbon nanotube transistors[8]. These achievements, and the demonstration that background electrical noise is involved in the 'hunting frenzy' of the paddlefish *Polyodon spathula* as it preys on swarms of the water-flea *Daphnia*[9,10], indicate that this effect is more than just a laboratory curiosity. ■

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DEVELOPMENTAL BIOLOGY

Cell cycle unleashed

Takeo Kishimoto

How does fertilization cause animal eggs to begin embryonic development? Following entry of the sperm, the ingeniously regulated degradation of a protein seems to kick-start the stalled cell cycle.

In animal eggs, the cell-division cycle is held in check part-way through, awaiting sperm entry. A major event after fertilization is therefore the alleviation of this blockage so that cell division can begin in earnest to form the embryo. Thomas Mayer and colleagues (page 1048 of this issue)[1] and Liu and Maller, writing in *Current Biology*[2], now provide a molecular answer to the long-standing question of how the cell-cycle arrest is released by fertilization.

In sexual reproduction, development of the embryo cannot begin until completion of the specialized cell cycle that forms eggs (meiosis). This temporal coupling is coordinated such that the meiotic cell cycle in eggs is arrested at a particular stage and the arrest is released by fertilization. In vertebrates, including frogs, mice and humans, the stage of the cycle at which the cell typically arrests is called metaphase of meiosis II (or meta-II)[3]. Relieving the cell-cycle blockage requires the activity of a protein complex called APC/C^{Cdc20}. This complex is a highly regulated enzyme that targets several cell-cycle regulatory proteins for destruction by attaching a ubiquitin group to them. Removal of these regulatory proteins then allows the cell to exit from metaphase and move on to the next stage of the cell cycle[4].

Early studies in the 1930s by Lewis Victor Heilbrunn and Daniel Mazia showed that one of the earliest molecular events following fertilization is a rapid escalation in intracellular calcium ion concentration, and they suggested that this increase might be the signal that triggers embryo development. In frog and mouse eggs, this rise in calcium activates a protein called calmodulin-dependent protein kinase II (CaMKII)[5]. But how the activity of APC/C^{Cdc20} is inhibited during meta-II arrest, and how CaMKII abolishes that inhibition, have been largely unknown. Using extracts from frog eggs, Mayer and colleagues[1] and Liu and Maller[2] demonstrate that CaMKII acts on the protein Erp1 (for 'Emi1-related protein 1'), an inhibitor of APC/C^{Cdc20}. This causes Erp1 to be degraded and thereby allows APC/C^{Cdc20} to release the brakes on the cell cycle (Fig. 1).

50 YEARS AGO

In the leading article in *Nature* of August 20 on "Educational Problems of the Colonial Territories", it is stated that "only some 450 scientists are at present engaged in Colonial research"... Most British scientific workers are superannuated at the age of approximately sixty-five. Many of them are capable of another ten years of research, and a moderate amount of teaching. Some, at least, would be happy to work in a Colonial university or research institute. The necessary qualifications are the capacities to work in a tropical or subtropical climate, and to form friendships with non-Europeans... I think that the presence in a Colonial university of even two or three Fellows of the Royal Society carrying out fundamental research with African or Asian colleagues would help the local population to generate its own scientific culture. **J. B. S. Haldane**

From *Nature* 15 October 1955.

100 YEARS AGO

The Citizen, a Study of the Individual and the Government — Prof. Shaler, who is professor of geology at Harvard, has set before himself the practical and unambitious task of instructing the youth of the United States in the first principles of citizenship. In this he has succeeded; his work is interesting, suggestive and extremely sensible... A favourable specimen of his mode of argument may be found in the discussion of woman's suffrage. There is no reference to the various views held by thinkers from Plato downwards; but probably Prof. Shaler's one-page argument is quite sufficient, that women, owing to their usually secluded lives, are not fitted in the same way as men to form judgments on political questions, but that, after all, if a majority of women should desire to vote, it would probably be best to give them the franchise, for the reason that it is most undesirable to have any considerable body of the people in a discontented state.

From *Nature* 12 October 1905.

50 & 100 YEARS AGO