were injected both into the cytoplasm and into the nucleus of the immature starfish egg.

The color changes upon injection indicate the pH of the nucleus to be in the neighborhood of 7.6 to 7.8, whereas that of the living cytoplasm is 6.6 to 6.8,[1] and cytoplasm cytolyzed by mechanical injury is 5.4 to 5.6.

TABLE I.

Starfish Egg.	Cytoplasm.		Nucleus
	Injured 5.4-5.6	Normal 6.6-6.8	7.6-7.8
Methyl Red	Yellow	Yellow	Yellow
Br. Cr. Purple	Yellow	Blue	Blue
Br. Thy. Blue	Yellow	Green	Blue
Phenol Red	Yellow	Yellow	Red
Cresol Red	Yellow	Yellow	Yellow
Neutral Red		Red	Orange

[1] Needham, J., and Needham, D., *Proc. Roy. Soc.*, Series B, 1926, Vol. 99.

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The Effect of Fluorides on the Echinoderm Egg.

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In the course of some experiments by one of us on the action of fluorides on coagulation of the blood it occurred to us to note the effect of fluorides on other cell structures. The arbacia egg, since it is reliable and convenient to work with, was chosen for study.

The eggs were placed in 70 cc. of sea water containing one cc. of an isotonic solution of NaF, KF, K oxalate, and K citrate respectively. An immediate flocculation of the eggs occurred in the sea water to which NaF, or KF were added. No similar phenomenon occurred with K oxalate or K citrate, or when artificial sea water was used in which Ca was absent. The flocculation, therefore, seems to be a direct effect of the fluorine ion and

is not due to the removal of the calcium from the sea water. The flocculation was characterized macroscopically by the instantaneous clumping of the cells into large masses. Microscopically the groups of cells seemed to be enmeshed in a bed of gelatinous material. No such gelatinous material was noted except in the cases where NaF or KF were added. This phenomenon occurred both in the unfertilized and the fertilized eggs.

No change in the size of the cells was noted for a period of over two hours. The H-ion concentration of the solutions was followed potentiometrically and showed practically no deviation from the normal in all solutions.

Further observations were made on the time and rate of division in the fertilized cell. Isotonic solutions of KF, NaF, K oxalate, and K citrate were added within five minutes after fertilization and the time of the first division and the number of cells going through the first division each minute after this, was noted. It was found that the cells to which KF or NaF had been added divided at about the same rate as the controls. With K oxalate or K citrate the rate of division was very much slower. A slightly greater number of eggs divided with KF or NaF than with the control, and the per cent of division was much reduced with K oxalate or with K citrate.

TABLE I.
Results of a typical experiment.

	Per cent of eggs going through 1st division	Time from fertilization to 1st cell division.	Total time for 1st cell division
Control (sea water)	86	42 min.	8 min.
Sea water + NaF (M/100)	92	42 min.	8 min.
Sea water + KF "	89	42 min.	9 min.
Sea water + K oxalate	61	46 min.	12 min.
Sea water + K citrate	54	45 min.	14 min.

A comparison of the rate of oxidation, determined by the Winkler method on the fertilized cells to which KF, NaF, K oxalate or K citrate were added, showed no constant variation of the rate of oxygen consumption from the normal controls.