of water is necessary to get 99 per cent. reduction with a spore former in six hours, while 0.5 part to 1,000,000 is sufficient for this degree of reduction with non-spore formers.

4. Sixteen parts of available chlorin per million of water does not effect complete killing of *B. subtilis;* 1.5 parts brings about complete sterilization with *B. coli* and *B. prodigiosus.*

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Studies on barium feeding.

By **C. L. ALSBERG** and **O. F. BLACK.**

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Half-grown rats fed for some months on a mixed diet to which $BaSO_4$ was added remained in good health and did not store up measurable traces of barium in their tissues. However, when instead of a mixed diet one poor in calcium was fed, other conditions being the same, a few milligrams of barium were stored in the tissue of each animal. It is therefore evident that under special conditions even very insoluble substances may be absorbed to some extent.

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The production of grafted and multiple embryos.

By **A. J. GOLDFARB.**

[*From the College of the City of New York.*]

After removing the fertilization membranes of sea urchin eggs (*Arbacea*) and allowing them to develop to the desired stage, the eggs were placed in an alkaline (NaOH) sea water and centrifuged in narrow bore tubes. In this way large numbers of eggs were agglutinated, and developed into double, triple, etc., blastulæ, gastrulæ and plutei. In ten to forty per cent. the eggs and blastomeres were more or less completely fused, forming giant blastulæ, composed of three, four or more eggs.

In the first group parallel development took place, resulting in double, triple, etc., embryos, many of which were subsequently separated by the antagonistic sweep of the cilia. In the second group, the eggs were more intimately united to form a common

blastocœle, common gut, or common body, within which the independent organs may or may not unite. When the embryos fuse slowly the contained organs appear to be antagonistic, for one is often absorbed completely, or the interaction results in a united but very atypic gut, skeleton, body, etc. The details of these changes are exceedingly interesting, but can be given only in the fuller publication.

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The production of typical monstrosities by various means.

By **A. J. GOLDFARB.**

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Typical abnormalities have been produced by subjecting developing eggs to the action of certain salts, such as lithium chloride, and the implication, if not the conclusion has been made that a certain specificity obtained between these salts and the resulting abnormality. Herbst for example produced definite atypic gastrulæ, by subjecting sea urchin eggs to lithium chloride in sea water. Stockard produced definite atypic conditions of the eye and brain formation in *Fundulus*.

That the same results may be obtained in other ways seems to demonstrate that the extra-gastrulate condition of the sea urchin, for example, is due not so much to any specific action of the lithium chloride, as to a factor common to each of the following. Extra-gastrulate embryos were produced in fairly large numbers by such anesthetics as chlorotone and alcohol, by changing the concentration of the sea water in opposite directions, either by dilution or by concentration of the sea water, by the action of carbon dioxide and lastly various sugar solutions.

Similarly other well-defined atypic blastulæ, gastrulæ or plutei, though not always produced by each of these solutions, were found in many of them, thus giving color to the view that a disturbance once set up results in a typical reaction conditioned not so much by the nature of the disturbance as by the mechanism (the egg) involved.