

6317

# Studies in Ageing Eggs. Changes in Resistance of Egg Membrane to Bursting in Hypotonic Solutions.

A. J. GOLDFORB AND VICTOR SCHECHTER.

*From the Marine Biological Laboratory, Woods Hole, and the Biological Laboratory, College of the City of New York.*

When unfertilized Arbacia eggs of one female were placed in the same hypotonic solution of sea water, at the same temperature and pH, the time required for 50% to cytolize decreased sharply with ageing of eggs, i. e., the rate of cytolysis involving bursting of egg membranes increased rapidly with ageing of eggs.

TABLE I.

Time in min. for 50% of eggs to cytolize in a 30% solution of sea water at 21.5.

| Min. | Age<br>Hr. |
|------|------------|
| 14½  | 1          |
| 13½  | 3½         |
| 7½   | 6½         |
| 5½   | 20         |
| 4½   | 24         |
| 4½   | 28         |
| 4    | 32         |
| 3½   | 44         |
| 2½   | 46½        |
| 3    | 49         |
| 2½   | 52         |
| 2½   | 56         |
| 2½   | 58½        |
| 1½   | 68         |
| 2    | 73         |

Table I is an example of one experiment in which a 30% solution of sea water was used at 21.5° and pH 8.2. One hour after shedding, 50% burst in 14½ minutes. When 73 hours old, 50% burst in 2 minutes.

Similar striking increase in the rate of cytolysis with ageing of eggs occurred in every experiment in every concentration, viz., 0 (distilled water), 10, 20, 30, 45, and 60% solutions of sea water.

The curves representing the rate of cytolysis in different concentrations of sea water were not parallel. In more concentrated solutions the initial rates of cytolysis were very much slower, but the final rates approximate closely the rates in more dilute solutions.

When eggs from one female were subjected at each age to 3 different concentrations, for example, 20, 30, and 45% solutions of sea water, at the same temperature and pH, the 3 curves represent-

ing the rates of cytolysis in each solution converged with ageing of eggs. The terminal rates are closely correlated with the osmotic pressure differences across the egg membrane. The convergence indicates a greater effect of osmotic forces on cytolysis at later ages and, conversely, lesser effect at early ages.

The increase in surface area of eggs placed in a given hypotonic solution at constant temperature and duration, is greater with ageing of eggs. This is due to increased permeability of the egg membrane with age. The resulting per cent increase of stretching of the membrane was measured and compared with the percent increase in the rate of bursting. The 2 curves are not parallel. Bursting is progressively faster than stretching. Hence, increased stretching of membrane with ageing, is not solely responsible for the increased rate of bursting.

These 2 lines of evidence, namely, (1) convergence of bursting rates in different concentrations, (2) non-parallelism between rates of stretching of membrane and rates of bursting, strongly indicate a third factor, namely, a change (i. e., a decrease) in tensile strength of the egg membrane with ageing of eggs.

This increased stretching plus the decreased tensile strength of the egg membrane, we believe are the major factors involved in the more rapid bursting of the egg membrane during ageing.

## 6318

### Further Study on the Incidence of *B. dysenteriae* in the Normal Individual.\*

DONOVAN C. BROWNE. (Introduced by C. W. Duval.)

*From the Department of Pathology, Tulane University, New Orleans.*

Study of the stools of 50 healthy individuals, selected from various sections of New Orleans, was previously reported. *B. dysenteriae* was recovered from the feces in 6 instances, or 12%. Of these 6 isolations, 5 were the lactose fermenting strain described by Duval<sup>1</sup>, and one was the true Shiga type.

The present report completes the survey, which includes 50 additional cases. The first group was selected from the public clinics,

---

\*Aided by a grant from David Trautman Schwartz Research Fund.

<sup>1</sup> Duval, C. W., *J. Am. Med. Assn.*, 1904, **46**, 381.