appears not to have been noticed hitherto. It may persist or not, thus explaining the occurrence of cell-chains or of isolated cells in different races of Yeast. (4) Carbohydrates are stored up in Yeast in the form of glycogen, which accumulates or disappears from the vacuoles very rapidly, according to conditions of nutrition and growth. The colour given by a known quantity of iodine-solution to a known amount of Yeast-culture shows these variations most sharply. The change of tint by heat after iodine-action, and the destruction of the intracellular glycogen by saliva, also give very clear results.

L. ERRERA, Brussels.

OSMOTIC OPTIMUM AND MEASUREMENTS.—Recent researches made by Dr. F. Van Rysselberghe in the Botanical Institute of Brussels have shown that vegetable cells generally answer an *osmotic stimulus* by an appropriate *osmotic reaction*, and that the relation between stimulus and reaction follows, within wide limits, the 'law of Weber.' Hence results the possibility of predicting the existence and value of an *osmotic optimum*.

Let n be the normal osmotic pressure in a given cell ;

x the osmotic pressure of an external solution applied as stimulus ;

R the reaction, i.e. the change in the osmotic pressure of the cell in response to this stimulus. Then one has, according to Weber's law :

$$R = c \log \frac{x}{s} \quad (c \text{ and } s \text{ being constants}).$$

The total value of the osmotic pressure in the cell is of course $R+n$, and its excess over the pressure of the surrounding solution is,

$$y = R + n - x,$$

$$\text{or } y = c \log \frac{x}{s} + n - x.$$

It is easy to find by differentiation that this excess has a maximum value when $x = c \log e$ (e being the basis of the Napierian logarithms = 2,7182818...).

Experiments made with *Tradescantia*, *Symphoricarpos*, *Allium*, *Elodea*, *Spirogyra*, agree most satisfactorily with these theoretical results.

Additional interest arises from the fact that these values of x really

correspond to *optimal* solutions, in which the cells live longer than in any other.

The investigations just alluded to have proved that de Vries' constant *isotonic coefficients*, excellent as they are for a first approximation, are not sufficiently exact for more minute experiments. Here it is advisable to use, instead of them, the coefficients of electric conductivity, which vary slightly with the concentration of the solution.

Thus, osmotic pressures are not strictly proportional to the concentration of the plasmolysing solutions, and these pressures ought no more to be expressed in molecule-grams of NO_3K , as is now generally done. The use of *an atmosphere* as unit, though better, is also objectionable, as it varies from one place to another.

I would therefore suggest to adopt the C.G.S. unit of pressure, viz. 1 dyne per sq. cm., or rather (to avoid useless decimals) 1 *myriadyne per sq. cm.*, i. e. the pressure of 10,000 dynes per sq. cm., the dyne being the force which gives the mass of 1 gram in 1 second an acceleration of 1 cm. per second.

This unit is roughly equal to $\frac{1}{100}$ atmosphere; we found it to be very convenient for all sorts of osmotic calculations.

L. ERRERA, Brussels.

THE FORM OF THE PROTOPLASMIC BODY IN CERTAIN FLORIDEAE.—In *Ceramium rubrum* and other species a strong strand of protoplasm runs along the axial cells from pit to pit. In this strand the nucleus is occasionally suspended; more often it lies over the pit at the base of the strand.

In *Dasya coccinea* the branches of limited growth run out into pointed uncorticated filaments, the cells of which are large. Across the vacuole of these cells, running from pit to pit, occurs a thread of protoplasm much more delicate than the corresponding structure in *Ceramium*.

In *Callithamnion byssoides* threads of protoplasm radiate from a cushion lying over the pit and end blindly on the vacuole. These threads are in incessant movement, swinging over, bending on themselves, and extending or retracting. All these phenomena point to the great physiological importance of the pit-communication between cell and cell.

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