The Molecular Weight of Glycogen.

RECENTLY Mr. W. K. Slater has prepared glycogen in a high degree of purity, and has commented on the difficulty of obtaining the polysaccharide in an anhydrous form (*J. Physiol.* 58, 163, 1923; *Biochem. J.*, 18, 621, 1924). This observation may be of significance in connexion with the molecular weight of the higher polysaccharides for a reason which I have not hitherto seen discussed, although it is probably familiar to some of your readers.

When the general formula for the complete hydrolysis of a lower polysaccharide, such as *raffinose* or *stachyose*, is considered, it will be seen that the saccharide on being converted into n molecules of hexose requires only $(n-1)$ molecules of water:

$$\underset{\text{Raffinose.}}{C_{18}H_{32}O_{16}} + 2H_2O = 3C_6H_{12}O_6,$$

$$\underset{\text{Stachyose.}}{C_{24}H_{42}O_{21}} + 3H_2O = 4C_6H_{12}O_6.$$

Applying this equation to the hydrolysis of a higher polysaccharide, such as *glycogen*, it would appear either that (1) the higher polysaccharide exists in some stage of the hydrolysis as a cyclic compound requiring the addition of two molecules of water in order to produce two derivative molecules; or that (2) the simple equation for the hydrolysis of a polysaccharide is not quantitatively correct, and instead of being:

$$(C_6H_{10}O_5)_n + nH_2O = nC_6H_{12}O_6$$

it should be:

$$(C_6H_{10}O_5)_n + (n-1)H_2O \longrightarrow nC_6H_{12}O_6.$$

Now, if n molecules of hexose be formed from the hydrolysis of one molecule of a polysaccharide by the addition of $(n-1)$ molecules of water, the formula for a polysaccharide must be:

$$(C_6H_{10+2/n}O_{5+1/n})_n$$

and the equation becomes:

$$(C_6H_{10+2/n}O_{5+1/n})_n + (n-1)H_2O = nC_6H_{12}O_6.$$

Consequently, from a percentage analysis of a pure polysaccharide the value of n may be obtained by calculating the difference between the observed value for the hydrogen $(H_{10+2/n})_n$ and the theoretical value $(H_{10})_n$ found from the $(C_6H_{10}O_5)_n$ formula.

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The Uniform Development of Photographic Plates.

IN the issue of NATURE for April 5 we directed attention to the limit of accuracy which is imposed on all methods of photographic photometry, by lack of uniformity in the manufacture, or development of photographic plates. In most cases these errors are much larger than any other errors, and, as the photographic method of photometry is so much used at present, it is very desirable that these errors should be removed.

From various considerations it appears that by no ordinary method of development can fresh developer be supplied to the surface of the plate as fast as the plate can use it, (or, alternatively, the products of development cannot be removed so quickly that they do not remain in appreciable concentration). The result is that any local increase in eddy motion in the developer gives rise to a darker image. If, however, the eddy motion close to the plate could be made so great that fresh developer could be supplied more quickly than it could be used, any small change in turbulence should cause no change in the development.

With this in view, we have tried a developing tank in which the plates are held against the vertical walls, and a piston nearly fitting the tank is moved up and down past the plates. Thus the developer is caused to flow at a high velocity through the narrow opening between the piston and the plates. The violent eddies produced effect very thorough mixing.

Developing ordinary commercial plates in this way, we have obtained much greater uniformity of density than we can get by any other method, and the results are better than any others published which are known to us, including those obtained with specially prepared plates on flat glass.

G. M. B. DOBSON.
D. N. HARRISON.

Clarendon Laboratory,
Oxford, October 27.

Aquarium Technique.

MAY I claim the hospitality of your columns to publish a method of getting rid of blue-green algæ from aquarium cultures for biological teaching? In procuring inoculation material for starting Amœba, Actinosphærium, Rotifer, etc., cultures (see NATURE, vol. 102, p. 166; vol. 105, p. 232), blue-green algal spores are frequently included in the "catch." These latter develop quickly, the resulting filaments becoming troublesome inhabitants of the cultures, binding down the other contents and interfering generally with the well-being of the micro-organisms.

I have been experimenting for some time with various chemicals, and have found that ferrous sulphate is an excellent poison for the blue-green algæ, while at the same time it appears to be a "tonic" for the amœba, actinosphærium, and rotifer. In a bad case of infection it was necessary to add 1 gram to a bulk of 2 litres of liquid (June 5). At the time of writing this note, November 1, the rotifer culture so treated is in a flourishing condition.

While awaiting the publication of a paper on *Amœba proteus* (where the subject of hydrogen ion concentration and amœba cultures is dealt with more fully) it may be of interest to the many people who have applied to me for assistance in starting cultures to know that ferrous sulphate has also been used with success for restoring the optimum P_H of the water of an amœba culture that had departed too far from that value for the well-being of the amœbæ.

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British Actiniaria.

I AM preparing a monograph on British Actiniaria which the Council of the Ray Society has undertaken to publish shortly. Certain little-known species of vague systematic position have never reappeared since their first discovery, this usually dating prior to 1860. In such a case it is very desirable that all described forms should be procured before the appearance of a new monograph, so that an accurate species-list and correct details of distribution may be included. If any one who would care to collect living material during 1925 will communicate with me, I shall be glad to supply a list of desiderata and localities, to defray cost of postage, etc.

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