clear aqueous suspension. It is, however, not yet established that the sedimentation is purely the result of centrifugal force acting on the virus aggregates as such, rather than on aggregates larger than the virus to which it may be absorbed. Further experimental work is in progress.

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Studies on Annelid Muscle. II. Observations on Annelid Phosphagen.

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That some annelids exhibit peculiarities in the behavior of their phosphagen complex has been demonstrated by Arnold and Luck[1] and by Needham, Needham, Baldwin and Yudkin.[2] This note extends previous observations.

Early in our work on annelid muscle extracts clarified with basic lead acetate we noted positive Jaffe reactions in the lead-free filtrates. More important was the steady increase in the amount of color produced as the filtrates were evaporated at pH 6.0 at temperatures below 100°C. Thus in *Nereis brandti* muscle extract the total "apparent creatinine" values increased 59% when the volume of the extract was reduced to one-fourth the original. Extracts of *Audouinia spirabranchus* muscle gave smaller increases in color production. That the substance responsible for the positive Jaffe reaction was not creatinine itself was shown by negative Weyl and Salkowski tests. The substance could, however, be precipitated by phosphotungstic acid and recovered in the fraction insoluble in absolute methanol. Arginine phosphotungstate is fairly soluble in this reagent, while creatinine phosphotungstate is but slightly soluble.[3] The methanol insoluble phosphotungstate on removal of the precipitant yielded a filtrate giving positive Jaffe and Sakaguchi reactions; attempts to isolate the substance or substances responsible were not successful.

Determinations of labile phosphate in *Audouinia spirabranchus,*

[1] Arnold, A., and Luck, J. M., *J. Biol. Chem.*, 1933, **99**, 677.

[2] Needham, D. M., Needham, J., Baldwin, E., and Yudkin, J., *Proc. Roy. Soc. London (B)*, 1932, **110**, 260.

[3] Drummond, J. C., *Biochem. J.*, 1918, **12**, 5.

Nereis brandti, *Glycera rugosa*, and also in *Urechis caupo* indicated a slowly-hydrolyzable phosphate, unstable in acid at room temperature. *Glycera rugosa*, the most active species, gave the highest values for this labile phosphorus.

To study further the nature of annelid phosphagen the method of Meyerhof and Lohmann[4] for the isolation of phosphoarginine was applied to the body-wall muscle of *Nereis brandti*. From 160 gm. of muscle there was obtained 0.2 gm. of an impure barium salt. Qualitative tests indicated the presence of barium, phosphate, and some substance giving the Sakaguchi reaction. The phosphorus content was low, indicating that it was possible for only 21% of the isolated material to have been phosphoarginine. Although the Sakaguchi test was positive no trace of arginine could be detected by the use of arginase and xanthydrol. Concentrations of the hydrolyzed barium salt were used which should have given from 25 to 50 times the amount of urea necessary for detection with xanthydrol after treatment with a liver arginase preparation of demonstrated activity.

From these results we conclude that either (a) the procedure used for the isolation was unsatisfactory, or (b), in the light of the cumulative evidence, that the phosphagen of *Nereis* is not arginine phosphate. We favor the latter alternative.

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A New Apparatus and an Improved Method for Chromatographic Adsorption.

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It is well known that chromatographic adsorption has been a very valuable method for the separation of organic compounds of biological importance. The principle involved in the use of our apparatus is essentially the same as in the older forms. The procedure, however, differs in that we filter our solution through the column of adsorbent by pressure and not by suction and we localize the area of specific adsorption of colorless compounds by means of a color reaction carried out on one side of the column of adsorbent or by the fluorescence observed with ultraviolet light. The method pro-

[4] Meyerhof, O., and Lohmann, K., *Biochem. Z.*, 1928, **196**, 49.