tion of the alcohols at the salicylaldehyde/water interface. We consider that changes in the polar characteristics of the interfacial layer of salicylaldehyde molecules and water dipoles are induced by the alcohol molecules in accordance with their steric disposition. These changes at the $A_2$ interface will lead in turn to electrical asymmetry of the cell, due to different states of ionic distribution at the $A_1$ and $A_2$ interfaces. The salicylaldehyde/water interface may therefore be considered as having the properties of a specific receptor for alcohols with certain arrangements of the carbon chain.

The phenomena described above may conceivably lead to a clarification of certain selective phenomena in biological systems, such as, for example, the changes in the properties of local anesthetics caused by different carbon chain arrangements and the specificity shown by the olfactory chemoceptors.

Further observations are proceeding, and their results, together with a more detailed account of the above, will appear in the *Arkiv för Kemi,* Stockholm.

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## EXPERIMENTAL VITAMIN P DEFICIENCY

RUSZNYÁK and Szent-Györgyi[1] were the first to find that flavones (citrine) behave like vitamins in man. The new vitamin was named P vitamin, because of its effect on the permeability of capillaries. Later Bentsáth, Rusznyák and Szent-Györgyi[2] found that scurvy in guinea-pigs is not only due to vitamin C deficiency, but is a mixture of deficiency in C and P vitamins. Zilva[3] could not confirm these later experiments, and Szent-Györgyi[4] did not succeed in reproducing them. Two years ago Zacho[5] showed that the diminution of capillary resistance in guinea-pig scurvy has no connection with a lack of ascorbic acid, and can only be made to cease with citrine. It seemed that with the help of a method based on this result vitamin P deficiency could be studied and the efficiency of various citrine preparations controlled. Our own experiments are in agreement with those of Zacho, and we succeeded in showing that those citrine preparations which have a therapeutic action in man, cause the diminished capillary resistance to disappear in the guinea-pig. As it appeared that the scurvy diet is not only deficient in ascorbic acid, but in flavones also, we have studied the effect of a scorbutogenic diet on rats. It is well known that the rat does not develop scurvy even on a diet lacking ascorbic acid. It appeared that under the influence of a scorbutogenic diet the rats did not, in fact, develop scurvy even after a long period of time, but their capillary resistance, measured with the Borbély method, diminished considerably in 5 to 6 weeks. When we gave such rats with diminished capillary resistance 3 to 4 mgm. of citrine per day subcutaneously, their capillary resistance became normal in 10 to 14 days. It became clear, therefore, that one can study vitamin P avitaminosis and control the efficiency of citrine preparations on guinea-pigs with scurvy and rats kept on a scorbutogenic diet. These animal experiments are in entire agreement with the results of Scarborough,[6] who has recently published observations which prove the occurrence of isolated P avitaminosis in man.

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SZEGED, HUNGARY,
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# SCIENTIFIC APPARATUS AND LABORATORY METHODS

## PREPARING NITRATE-FREE SEA WATER

IN the photometric or colorimetric determination of nitrate in sea water by the "reduced strychnine" method, nitrate-free sea water of the same chlorinity as the water being analyzed is required for the preparation of the standard solutions used in the estimation of the unknown solutions or calibration of the photometer.

Harvey[1] first mentioned the difficulty of obtaining nitrate-free sea water. However, he made the observation that surface water from the English Channel during the spring months usually contained less than ten microgram atoms of nitrate-nitrogen per liter. (A microgram atom is a millionth of a gram atom.) Riddell[2] also observed that at the time of extensive diatom flowering certain waters from the Georgia Straits were nitrate-free. Unfortunately, naturally occurring nitrate-free sea water is not always available when needed. Because of this sea water is often freed of nitrate by conversion of the nitrate to ammonia by boiling for several hours with amalgamated

[1] *Nature,* 138: 27, 1936.
[2] *Ibid.,* 138: 798, 1936; 139: 326, 1937.
[3] *Biochem. Jour.,* 31: 915, 1488, 1937.
[4] *Hoppe-Seylers Zeits.,* 255: 126, 1938.
[5] *Acta path. scand.,* 16: 1411, 1939.
[6] *Lancet,* 2: 644, 1940.

[1] H. W. Harvey, *Jour. Mar. Biol. Asn. United Kingdom,* 14: 71–88, 1926.
[2] W. A. Riddell, *Jour. Biol. Board Canada,* 2: 1–11, 1936.

zinc and sulfuric acid. This method introduces considerable quantities of $ZnSO_4$ and is somewhat uncertain.

A better method of freeing sea water of nitrate has been used by the authors in which the ability of certain pelagic plants, such as algae and diatoms, to extract nitrate from sea water, even when contained in glass bottles, has been utilized.

Samples of surface water were collected on August 1 from the bay at Friday Harbor, Washington, on an incoming tide. The plankton population at this time consisted largely of diatoms. Two-liter samples, contained in glass bottles, were placed where they would receive a maximum of diffuse light but little direct sunlight. The change in nitrate concentration was followed over a period of seventeen days, Table 1,

TABLE 1

REMOVAL OF NITRATE FROM SEA WATER BY PLANKTON*

| μga $PO_4$–P per liter | μga $NO_3$–N per liter | | | | | |
|---|---|---|---|---|---|---|
| Days | 0 | 4 | 9 | 12 | 14 | 17 |
| 1.65 | 39 | 39 | 37 | 15 | 2.3 | 0.0 |
| 3.00 | 27 | 22 | 22 | 15 | 0.6 | 0.5 |
| 3.50 | 66 | 72 | 68 | 33 | 20 | 1.6 |
| 4.00 | 70 | 68 | 73 | 40 | 29 | 6 |
| 4.50 | 32 | 23 | 13 | 7 | 6 | . . |
| 5.00 | 44 | 44 | 47 | 30 | 6 | 0.0 |

* μga or microgram atom is equivalent to gram atom × $10^6$.

using a modification of Harvey's reduced strychnine method.[3] Two or three ml samples of water that had been filtered through a Jena G-3 fritted-glass filter were mixed with an equal volume of reagent. The color was allowed to develop for three to five hours in the dark and then the white sediment was separated from the red solution by centrifugalization. The color estimations were made with the Zeiss-Pulfrich photometer using a variable cell depth of 1–10 mm and the S-53 color filter. The instrument had been calibrated against standard solutions of potassium nitrate in nitrate-free sea water of the same chlorinity.

No special control was exercised over the presence of animals or bacteria, the type of plants involved or the abnormal conditions of environment. These probably affected the rate of photosynthesis of the diatoms more than any small differences in concentration of nutrient salts. As shown in Table 1, the phosphate concentration was varied but had no effect on the rate of nitrate removal. The addition of plankton, collected from the bay with a hand net, accelerated the nitrate removal in general, although the nitrate concentration occasionally increased at first. Probably this was due to bacterial action on the plankton killed by removal from their natural habitat.

As soon as the samples became nitrate-free, the suspended organisms were removed by filtration and mercuric chloride was added to prevent the formation of nitrate through bacterial action on the dissolved albuminoidal nitrogen. Eight ml of saturated solution per liter of sea water was an effective amount and did not interfere with the subsequent determination of nitrate. The water was stored in paraffined bottles until used.

[3] H. W. Harvey, *Rapp. et Proc-Verb.*, 53: 68–74, 1929.

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## SMOOTHING COLORS APPLIED BY COLORED PENCILS

BRANDON GROVE, of the Vacuum Oil Company, Madrid, Spain, described in the April 4 issue of SCIENCE a seemingly "new" method of smoothing colors applied by colored pencils. This method is so old in the U. S. Forest Service that I tried to determine its origin. As I have been in the Service only twenty-two years I went to our head draftsman, here in Missoula, Joe Halm. He could not tell me because—"When I started out coloring maps, *in 1912,* the old timers showed me how to use gasoline to smooth and fix the colors"! Standard rubbing pencils called "stomps" are obtainable from any draftsman's supply store which are absorbent and permit a much better job of gasoline smoothing than can be done with a cloth, as recommended by Mr. Grove.

Mr. Halm informed me that his CCC trainee-draftsmen, at the Nine Mile Camp, have recently discovered something that was new to him, however. The boys have found that the liquid used in Pyrene fire extinguishers is just as good and much cheaper than drug store or c.p. carbon tetrachloride for *removing* colors which for some reason have to be changed or eliminated. The commercial Pyrene fluid is also better than carbon tetrachloride for cleaning tracings which have been soiled in the process of inking. The Pyrene does not thin the India ink lines as much as c.p. carbon tetrachloride. After it has evaporated colored crayons and gasoline smoothing can be used without any thinning or weakening of the colors.

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BABCOCK, HARRIET. *Time and the Mind; Personal Tempo —The Key to Normal and Pathological Mental Conditions.* Pp. 304. Sci-Art Publishers.

KOLTHOFF, I. M. and J. J. LINGANE. *Polarography.* Pp. xvi + 510. 141 figures. Interscience Publishers. $6.00.

LEHMER, DERRICK H. *Guide to Tables in the Theory of Numbers; National Research Council Bulletin No. 105.* Pp. xiv + 177. The Council, Washington. $2.50.

O'HANLON, M. ELLEN. *Fundamentals of Plant Science.* Pp. xi + 488. 268 figures. Crofts. $4.25.