leaves. After treatment Lots 5 and 6 were placed under shade in diffuse light in the greenhouse (maximum light intensity 200 ft-c) to check the effects of light after starch depletion, and Lots 7 and 8 were retained in the dark following treatment.

Twenty-four hr after application abscission had begun on plants in the dark treated with the defoliant-sugar combinations, but none had occurred on plants in the dark treated with the defoliants alone. Also, at this early date abscission had become initiated in the plants kept in the light, with and without sugar additions to the defoliants.

Ninety-six hr after treatment abscission was mostly complete, and defoliation counts were made. These are recorded in Table 1 as the average percentage abscission per treatment. The results show a general increase in percentage abscission when sugar, regardless of type, was added to the defoliant, over the defoliant alone. This effect was noted under high light intensity and temperature conditions as well as under moderate light intensity and temperature conditions. The importance of translocatable carbohydrates in the abscission process was demonstrated by the difference in response of the starch-depleted plants kept in the dark when they were treated with the sugar-defoliant combination compared to the defoliant alone. This effect appears to be due primarily to the addition of sugar. When plants were placed in diffuse light after starch depletion in the dark (Lots 5, 6), they did not respond much differently to the defoliant than those kept continuously in the dark (Lots 7, 8), unless sugar was supplied. It is apparent that the form of sugar (at least among the three types tested) is not critical.

It should also be pointed out that in other work (*3*) we have obtained, in agreement with others (*4–6*), a retardation of abscission by spraying cotton plants with sucrose prior to chemical defoliation or by using a high sucrose concentration with the defoliant. The disparity between the inhibiting effect of sucrose and the accelerating effect obtained by applying the defoliant with a lower concentration of sucrose is not clear at this time. This point is now being investigated.

Repeated research has clearly assigned to sugar a definite role in metabolic absorption by the root. The function of an ion-binding substance formed from sugar accounting for the transport of inorganic ions across the root cell has been postulated (*13*). Weintraub and Brown (*10*) considered their results with sugar and growth-regulators inconsistent with the idea of a definite combination occurring between the two. However, the possible role of sugar in an ion-binding or complex formation capacity in the leaf should be more carefully investigated before definite conclusions can be formed.

Juhrén and Went (*14*) have also suggested a tonic or protective effect of sugar on plant cells. This effect, in light of the known toxicity of chemical defoliants as well as the role of soluble carbohydrates in polar translocation of metabolites, respiration, and abscission (*2, 15*), needless to say, needs further study.

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Lipid Detection in Paper Electrophoresis

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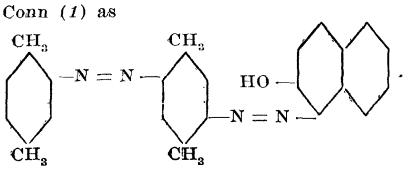
In the course of an investigation of protein-lipid relationships in serum by paper electrophoresis (to be reported elsewhere), several lipophilic dyes have been examined. In our experience the dye oil red 0[1] has proved to be superior to any other examined, including Sudan III, which was used by Bennhold (*2*) in following the migration of lipid serum components with the electrophoresis apparatus of Michaelis and which has recently been used in paper electrophoresis by Fasoli (*3*).

Fig. 1 illustrates results obtained with oil red 0 compared to bromphenol blue staining (*4*) for a normal and a pathological serum. Photoelectric scanning patterns, which were automatically recorded, are included for each strip. The bromphenol blue strips were scanned at 590 mμ and the oil red 0 strips were scanned at 525 mμ in an apparatus to be described elsewhere.[2]

Strip *A* is a bromphenol blue pattern of a normal

[1] Oil red 0 is sometimes confused with Sudan II. The latter has Color Index No. 73, whereas oil red 0 has not been assigned a Color Index number. The formula for oil red 0 is given by Conn (*1*) as



[2] The particular bromphenol blue scanning patterns presented here show albumin areas which are known to be relatively low. This is due to the high optical density of the albumin zone which for these strips exceeded the linear range of the instrument. Grassman and co-workers (*5*) have described another direct scanning apparatus for paper strips.

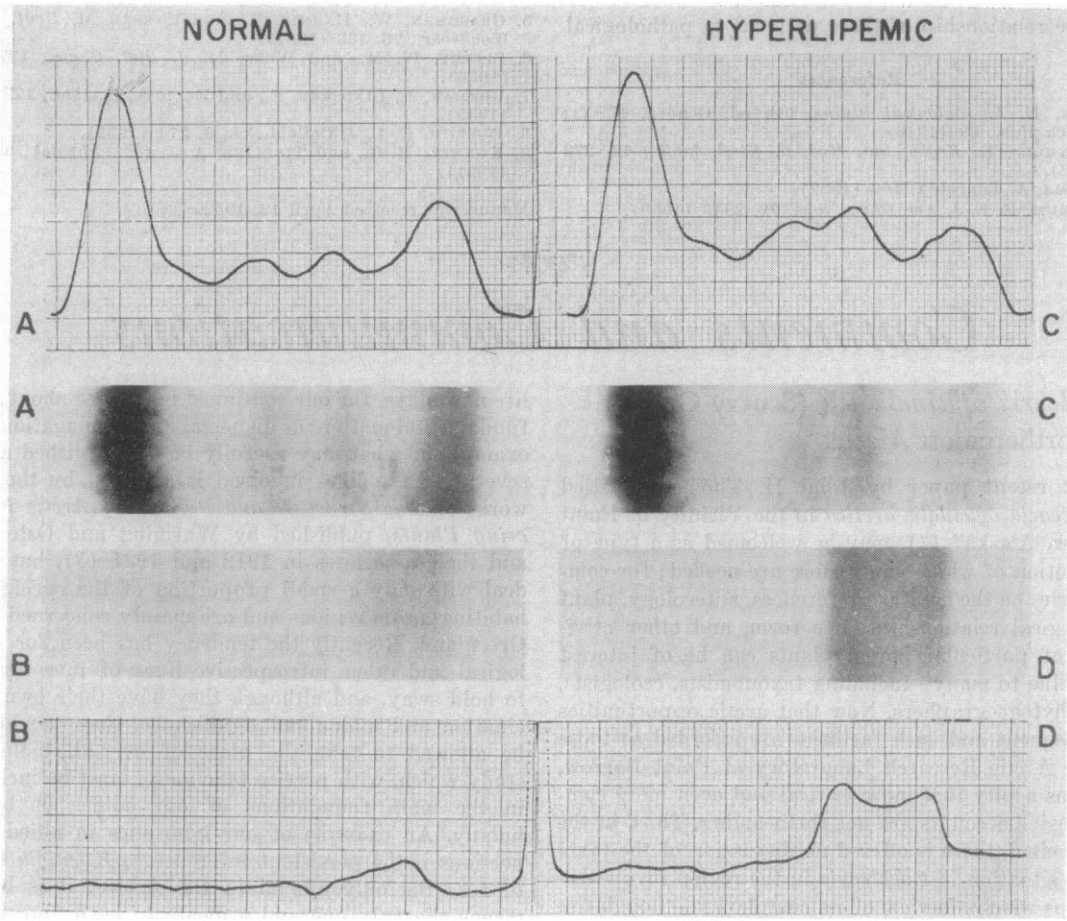


FIG. 1. Paper electrophoretic patterns of normal and hyperlipemic sera.

human serum with a total cholesterol (*6*) value of 200 mg/100 ml, $S_{f\ 11\text{-}21}$ 6 mg/100 ml (*7*), $S_{f\ 20\text{-}100}$ 5 mg/100 ml. Strip *B* is an oil red 0 pattern of the same serum. Strip *C* is a bromphenol blue pattern of a serum from a patient with arteriosclerotic heart disease who had had a recent myocardial infarction and whose total cholesterol was 445 mg/100 ml, $S_{f\ 11\text{-}21}$ 100 mg/ml, $S_{f\ 20\text{-}100}$ 342 mg/100 ml. Strip *D* is an oil red 0 pattern of the same serum. These patterns were prepared by the paper electrophoresis method previously described (*4*). They were all prepared simultaneously in the cell described in (*8*) with 0.01 ml of the sera streaked across the apices of 29 mm wide strips of Whatman 3 MM filter paper. The buffer was veronal, pH 8.6, ionic strength 0.05. A potential of 200 v was applied for 6 hr. After this time the strips were dried in an oven at 110° for 10 min.

The bromphenol blue strips (*A* and *C*) were then placed for 16 hr in a dye bath of the following composition: bromphenol blue 100 mg, glacial acetic acid 50 ml, and mercuric chloride 50 g, with water to make 1 liter. Then the strips were rinsed for 5 min in each of three changes of 2% acetic acid,[3] followed by a final rinse of 10 min in 2% acetic acid containing 0.5% sodium acetate (to provide a pH at which bromphenol blue will be in its blue form), blotted, and dried in the oven.

The oil red 0 strips (*B* and *D*) were stained for 16 hr in a bath comprising a saturated solution of the dye in 60% ethanol, with a tap-water rinse followed by blotting and drying. The resulting strips show a red pattern against a pink background.[4] (Both strips *B* and *D* also show a faint red band corresponding to the albumin position, which is not satisfactorily reproduced in the photograph.)

Using the technique as described above, 14 sera with elevated lipoprotein content (Gofman [*7*] $S_{f\ 11\text{-}21}$ range 63–136, mean 82) were compared with 15 sera of lower lipoprotein content ($S_{f\ 11\text{-}21}$ range 2–19, mean 12). The patterns selected in Fig. 1 are typical of these two groups. A study is in progress of the

[3] Kunkel and Tiselius (*9*) have pointed out the value of acidifying the rinse water.

[4] In common with other investigators we have observed that the serum lipoproteins appear to be strongly adsorbed on filter paper; however, this does not preclude comparative studies.

possible relationship of these patterns to pathological states.

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Comments and Communications

Cochlearia officinalis s.l. (Scurvy Grass) in Northernmost Alaska

THE recent paper by John H. Thomas, entitled "*Cochlearia officinalis arctica* in the Vicinity of Point Barrow, Alaska" (*1*), may be welcomed as a type of publication of which many more are needed; for commentaries on the habitat preferences, autecology, plant sociological relationships, life form, and other attributes of particular boreal plants can be of interest and value to many—including taxonomists, ecologists, and phytogeographers. Now that arctic opportunities are frequent and such facilities are afforded as those of the Arctic Research Laboratory at Point Barrow, it seems a pity that more critical and even more comprehensive accounts are not forthcoming. Thus, in the paper cited, there is offered no discussion of the taxonomic situation in *Cochlearia* in the region involved—perhaps wisely, in view of its complexity—though one would have expected that in the making of the prerequisite field observations, at least, there would have emerged some ideas about how the plants concerned should be treated taxonomically. Instead, it appears that Hultén's treatment (*2*), which recognizes only one subspecies in the vicinity, has been tacitly accepted; and, whereas there can scarcely be a better authority to follow in such matters, it should be noted that there does indeed seem to be more than one variety of *Cochlearia* in northernmost Alaska. Hultén himself says of the (only) two "races" which he recognizes there and to the south that "There is wide variation within the material and no sharp limit can be drawn between these types, but the tendency in very evident. Whether or not these two types can be further divided on account of other characteristics seems unclear." Thus a direct challenge has been ignored; and, whereas Thomas was perhaps being merely cautious in not taking up one of such proportions, it is to be hoped that others who have the opportunity in the future will tackle such problems. Arctic botany is fairly bristling with them.

I would like to put in a plea, also, for more biological and phenological data on arctic plants whenever they can be obtained. There seems little excuse, considering the ease and comfort of arctic travel and life nowadays, for our continued ignorance about such fundamental matters as dispersal and propagation. An example of what may usefully be accomplished along several of the lines involved is afforded by the two works on *The Structure and Biology of Arctic Flowering Plants,* published by Warming and Ostenfeld and their associates in 1912 and 1921 (*3*), but they deal with only a small proportion of the species inhabiting arctic regions and are mainly concerned with Greenland. Recently the tendency has been for cytological and other introspective lines of investigation to hold sway, and although they have their own fascination and undoubted significance, they should not be allowed to take the place of over-all biological study which, with precise taxonomy, must be included in the main foundations of our edifice of boreal botany. An example of our ignorance in allied connections is the persistent reference to *Koenigia islandica* as the only annual in the Arctic; it is by no means the only one and appears to be by no means always annual—at least according to my observations in the Far North, and particularly in Spitsbergen and the Canadian Arctic Archipelago.

Especially in the case of *Cochlearia* in the Arctic is there an unsolved mystery of the most intriguing nature, on which it might have been hoped Thomas would throw light or at least provide comment—the more so in view of the abundant representation, plasticity, and wide habitat tolerance of the complex in the vicinity. Following his wintering with the *Vega* expedition at Pitlekaj on the Arctic Ocean coast of eastern Siberia, Kjellman (*4*) reported, of an individual of *Cochlearia,* that it

> . . . commenced blossoming in the summer of 1878 but had not concluded its flowering period when the winter descended and put an end to its development. Consequently the floral system contained flower-buds in various stages of development, newly-opened flowers, faded flowers, and more or less ripe fruits. Of the rosette leaves there could be found only small and withered remains, but the upper cauline leaves were fresh and vital. In this condition the plant was overtaken by winter and exposed to its full rigour. One would assume now that this would have destroyed the plant, and that especially the tender flowering parts just developed would have been destroyed by frost and so rendered incapable of further development. But this was not the case. As the summer of 1879