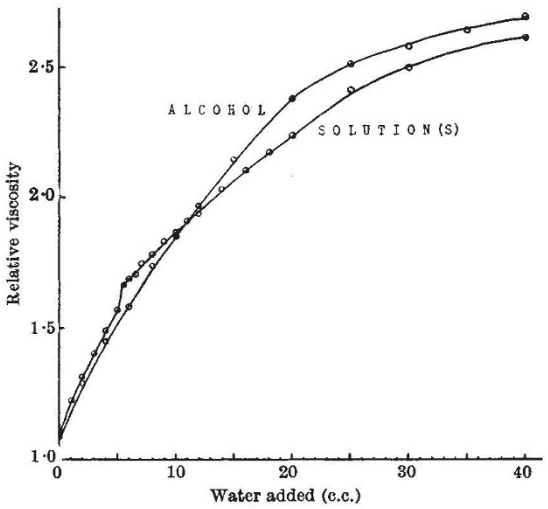
Binding of Water by Stearanilide

I HAVE suggested[1] that in the hydrated anilides of stearic and palmitic acids, the 'bound' water is held by a micellar structure. Some further evidence supporting this view has now been obtained.

Quantities (0–40 c.c.) of distilled water were added to 50 c.c. samples of a 0·1 per cent solution of stearanilide in absolute alcohol (*S*). The mixtures were well shaken and allowed to stand for 20 hours. Mixtures containing 0–5·0 c.c. water were clear; slight opalescence developed in those containing 5·5–7·0 c.c. water; with more than 7 c.c. added water a white precipitate of hydrated stearanilide was formed. The bulk of precipitate increased gradually with the amount of water but became constant when this reached 15 c.c.; no further precipitation occurred on adding more water to the filtrates from solutions originally containing 15 c.c. or more of water.



Solutions containing a precipitate were filtered through sintered glass and the filtrates collected in dry vessels. The relative viscosities of all the solutions were then measured at 20° C., using a Höppler Viskosimeter. Afterwards the relative viscosities of a series of alcohol-water mixtures (prepared by adding 0–40 c.c. distilled water to 50 c.c. samples of absolute alcohol) were measured under the same conditions. In the accompanying graph are shown the viscosity changes brought about by adding water to 50 c.c. solution *S* and to 50 c.c. absolute alcohol.

Interpretation of these results may be attempted along the following lines: addition of water to solution *S* lowers the solubility of the stearanilide, but before precipitation occurs aggregation of the stearanilide molecules into micelles of colloidal dimensions takes place (this is shown by the development of opalescence and an abrupt increase in viscosity as the amount of added water is increased from 5·0 to 5·5 c.c.). Addition of more water has three effects: (1) hydration of the micelles in solution, (2) precipitation of hydrated stearanilide, (3) dilution of the intermicellar fluid. Factor (2), involving abstraction of water from the intermicellar fluid, tends to decrease viscosity and is operative in solutions containing 7–15 c.c. added water. Factor (3) has the opposite effect (the alcohol-water curve) and operates throughout the series. The influence of factor (1) on viscosity is obscure because two actions are opposed, namely, swelling of the micelles and removal of water from the intermicellar fluid. In the region where factors (1) and (3) only are in operation (that is, with 5·5–7·0 c.c. added water) the slow rise in viscosity suggests that the second action predominates.

The precipitation of hydrated stearanilide is complete when 15 c.c. water have been added to 50 c.c. solution *S*. At this stage the precipitated material contains about 95 per cent water of hydration as it floats in the liquid phase. This 'primary' bound water is difficult to remove by ordinary desiccation[1]. With the addition of water in excess of 15 c.c., further hydration of the precipitate takes place, as is shown by the widening of the gap between the two curves. Easily removed by ordinary drying methods, this 'secondary' bound water is probably held loosely on the outer surfaces of the swollen micelles. The amount of 'secondary' bound water taken up reaches a constant value when the quantity of water added to 50 c.c. solution *S* exceeds 30 c.c. (the attainment of complete hydration of the stearanilide is indicated by the two curves becoming parallel).

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July 15.

[1] NATURE, **145**, 1019 (1940).

Does the Hypophysis Secrete a Pancreotropic Hormone?

EXPERIMENTS to determine whether the anterior pituitary lobe secretes a 'pancreotropic' hormone, that is, a hormone necessary for the maintenance and function of the pancreatic islets, have been made on the following lines:

(1) The pituitary gland was removed from a series of Wistar rats. The weight of the pancreas decreased, in proportion to the body weight, from an average of 0·57 gm./100 gm. of body-weight to 0·44 gm./100 gm. one month after hypophysectomy. At the same time the insulin extractable from this diminished pancreas was equal to or even greater than that of control animals, in proportion to the body weight[1,2]. Thus, 150 control rats contained 0·64 units of pancreatic insulin per 100 gm. of body-weight, while 77 animals weighing 118 gm. one month after hypophysectomy contained 0·62 u./100 gm., and 48 rats weighing 78 gm. under similar conditions contained 1·06 u./100 gm.

(2) When crude anterior pituitary extracts containing the pancreotropic factor[4] were administered to the hypophysectomized rat by injection, the relation of pancreatic insulin to the increased body-weight remained at or returned to the limits for control animals (0·69 u./100 gm. for thirty-five rats averaging 128 gm. at operation, and 0·58 u./100 gm. for thirty rats averaging 83 gm. at hypophysectomy).

(3) Implantation of tablets of œstrogen depresses growth by interfering with normal pituitary function. Under such conditions the size of the pancreas is not diminished in proportion to body weight and the insulin contained therein is significantly increased in