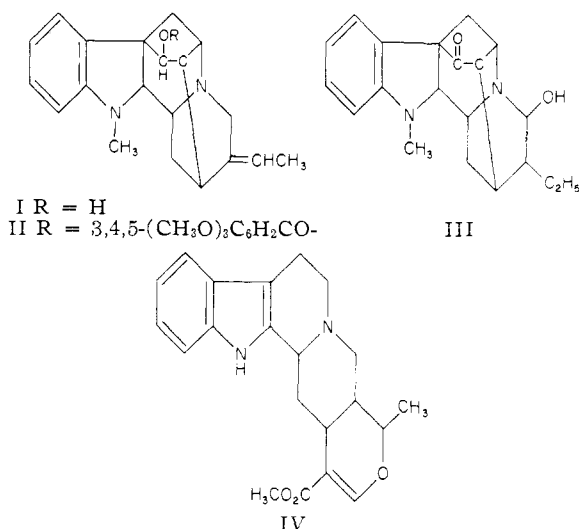


mitine is the trimethoxybenzoate of tetraphyllicine and must possess structure II.



Biogenetically, the presence of the ethylidene function (reminiscent of curare alkaloids such as mavacurine¹⁰) is attractive in the light of current views⁷ on the natural precursors of yohimbé alkaloids; the relationship of I to the heterocyclic, oxygen-ring containing alkaloids of the serpentina-ajmalicine (IV) series is particularly clear. It is appropriate to point out that various representatives of this group have been isolated together with tetraphyllicine from two *Rauwolfia* species.^{2,8,11}

We are indebted to the American Heart Association and to Chas. Pfizer and Co. for financial assistance in the form of fellowships (M.G. and S.C.P.)

(10) H. Bickel, H. Schmid and P. Karrer, *Helv. Chim. Acta*, **38**, 649 (1955).

(11) Serpinine, isolated in minute quantity from *R. serpentina* (S. Bose, *Naturwiss.*, **42**, 71 (1955)), may be identical with tetraphyllicine.

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CRYSTALLIZABLE POLYSTYRENE

Sir:

Natta, *et al.*,^{1,2} reported some physical properties of a crystalline polystyrene, but no preparative method was disclosed.

We have found that Alfin-polymerized polystyrene can be crystallized to various degrees by a suitable crystallization solvent. Morton³ in his work dealing with Alfin-catalyzed polystyrene probably prepared samples of the crystallizable polymer, the crystallizability of which was not recognized at that time. Natta² reported that the polystyrene prepared in his work contained crys-

(1) G. Natta, P. Pino, P. Corradini, F. Danusso, E. Mantica, G. Mazzanti and G. Moraglio, *This Journal*, **77**, 1708 (1955).

(2) G. Natta, *J. Polymer Sci.*, **16**, 143 (1955).

(3) A. A. Morton, *Ind. Eng. Chem.*, **42**, 1488 (1950).

talline and non-crystalline fractions, the non-crystalline fraction being removable by extraction with aliphatic hydrocarbons.

When Alfin-catalyzed polystyrene of moderate molecular weight was extracted with boiling *n*-heptane, no soluble polymer was removed, yet partially crystalline polystyrene resulted. Since the interplanar spacings and relative intensities of the seven strongest X-ray reflections are in close agreement with those reported by Natta,² the crystalline phase is the same. The hot extraction solvent served only as a crystallization medium supplying the necessary energy and swelling effect for the polymer to crystallize. X-Ray investigation before treatment revealed a completely amorphous polymer, while after treatment, the polystyrene showed moderate crystallinity. Suitable crystallization media are: *n*-hexane, *n*-heptane, *n*-octane, *n*-decane, hexene-1, and, to a less efficient extent, butanol-1, heptanol-1, octanol-1, cyclohexanol, 2-methoxyethanol, and ethylene glycol. Methanol and *n*-pentane failed to cause crystallization because of their low boiling points or failure to penetrate the polymer. At higher temperatures under pressure, *n*-pentane functioned well as a crystallizing solvent.

Crude Alfin-polystyrene containing a high proportion of isotactic chains can be crystallized readily by heat alone at 150°.

When the crystallized polystyrene is reprecipitated from benzene into methanol, the polymer is completely amorphous. Crystallinity can be restored by the hot solvent technique. X-Ray examination of the Alfin-crystalline polystyrene shows that it can be heated up to 200° without loss of crystallinity. Between 200 and 220°, there is a gradual reduction in crystallinity, and the polymer becomes completely amorphous after heating above 220°.

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ISOLATION FROM RUTABAGA SEED OF PROGOITRIN, THE PRECURSOR OF THE NATURALLY OCCURRING ANTITHYROID COMPOUND, GOITRIN (L-5-VINYLS-2-THIOOXAZOLIDONE)¹

Sir:

In earlier studies on the goitrogenic effects of various foods in man, it became apparent that the antithyroid effect of rutabaga and turnip seemed to be contained in a compound which was liberated from a precursor in the plant by enzymatic hydrolysis when the cells were crushed but was otherwise not present. Although both raw rutabaga and raw turnip exerted an inhibitory effect on the radioiodine uptake in man, this effect was not present if the vegetables were cooked before being fed.² The liberated antithyroid compound was later isolated and proved to be L-5-vinyl-2-thiooxazolidone,³ henceforth called goitrin.

(1) I am indebted to Eugene V. Clark and Howard L. Erwin for excellent technical assistance and to Drs. Theodore A. Geissman, Harry Wood and M. G. Ettlinger for valuable advice and suggestions.

(2) M. A. Greer and E. B. Astwood, *Endocrinology*, **43**, 105 (1948).