

ADVERSE EFFECT OF MIXING TAPIOCA AND SWEET POTATOES IN WHEAT FLOUR

FOR overcoming the food shortage in the country, the Ministry of Food has recommended the mixing of tapioca and sweet potatoes meal in wheat flour. This scheme while calculated to increase of food supply of the country, is likely to produce an adverse effect on the health of the nation, which is already suffering from an ill-balanced diet.

For religious and economic reasons animal proteins (meat, fish and eggs) are ruled out from the diet of a good percentage of the people. The intake of dairy products is very low in our country, the *per capita* consumption of dairy products in India being about one-tenth of Canada and Newzealand, one-eighth of Great Britain and one-seventh of U.S.A.¹ Due to ill-balanced diet, the people are undernourished and are afflicted by many diseases. Shortage of good quality proteins and the B-vitamins are the two outstanding nutritional deficiencies in the cereal diet of the masses. Addition of some food rich both in good quality proteins and vitamins of the B-complex is necessary for balancing the cereal diet.

TABLE I
Chemical Analysis of Some Foods
Percentages

Foods	Protein	Fat	Carbo- hydrate	Moisture	Ash
Wheat (whole)	13.0	2.0	72.4	11.0	1.6
Sweet potatoes	1.8	0.7	27.9	68.5	1.1
Tapioca	0.6	0.2	86.4	12.6	0.2
Food Yeast (<i>Torula utilis</i>)	48.0	2.0	24.0	8.0	8.0

As evident from Table I both tapioca and sweet potatoes are rich in carbohydrates which is principally starch. The addition of these starchy foods to wheat flour would render it ill-balanced. The resulting mixture will have less protein and fat and much more carbohydrate. These changes in protein, fat and carbohydrate contents will be proportional to the quantity of tapioca or sweet potatoes incorporated. Thus though the caloric intake of food will be increased due to the added carbohydrate there will be a marked fall in the percentage of the protein, and is likely to be a more widespread incidence of the deficiency diseases in the country.

In order to make this scheme practicable, the proposed mixture will have to be fortified with good quality proteins and the vitamins

of the B-complex. As evident from Table I dried food yeast contains about 50% proteins of high nutritive value. Also yeast is a very rich source of B-vitamins. It can be added upto 5% to the flour, without any detectable change in taste and appearance of the product.

Food yeast can be easily produced in India either from molasses—a by-product of the sugar industry or from bassia flowers or from cellulosic waste materials such as wood, straw, stalks, husk, bagasse.

It is hoped that the Ministry of Food will reconsider their proposal and modify their scheme in the light of what has been presented in this note.

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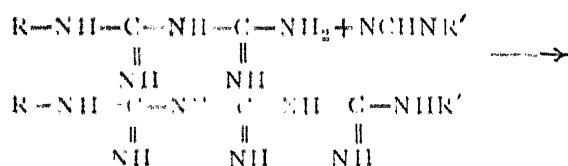
ATTEMPTS TOWARDS THE SYNTHESIS OF SUBSTITUTED POLYGUANIDES

ON the basis of their observations, Curd and Rose¹ put forward the hypothesis that for antimalarial activity, the aromatic ring and the basic side chain should be linked through a system of alternate carbon and nitrogen atoms with appropriate double bonds; they also argued that the "tautomeric possibilities existing within certain known active drug molecules" relate to the antimalarial activity. Paludrine, satisfying all the above conditions, has been claimed to be one of the best antimalarials obtained so far.

With this background, it was thought worthwhile to prepare compounds with a larger number of these conjugated system of carbon and nitrogen atoms, expecting that such compounds might prove to be better and more effective antimalarials. The polyguanides, such as tri-, or tetra-guanides or even the higher members are to provide more of the tautomeric possibilities and such other factors. This postulation was also supported by our observation that the mono-guanide derivative with *p*-chlorophenyl- and isopropyl groupings present at the two ends, (*viz.*, N¹-*p*-chlorophenyl-N³-isopropyl-

guanidine acetate²), as in paludrine, was found to possess no antimalarial activity and was also found to be too toxic.³

Various methods were tried for the preparation of these compounds which are really biguanides lengthened further by the addition of one or more of guanidine residues. By analogy with the formation of biguanides from guanidines and cyanamides,⁴ the condensation of N¹-mono-alkyl (or aryl)-substituted-biguanide with mono-substituted alkyl-(or aryl)-cyanamides was tried for the preparation of triguanides as follows:—

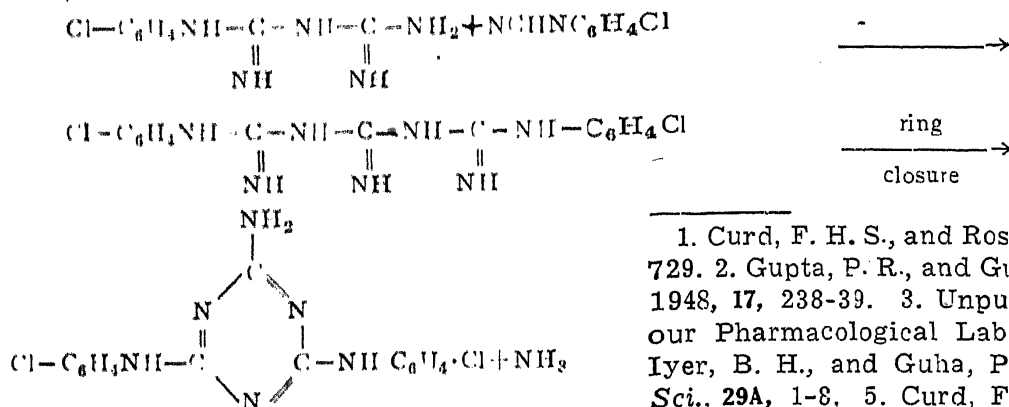


where R and R' = CH₃—, β-OHC₂H₅—, iso-C₃H₇—, p-cl-C₆H₄—, etc.

The condensation was tried under varying conditions of experiments, viz.,

- In acidic, neutral or basic medium in alcoholic solution;
- In presence of pyridine or dioxane;
- Under ordinary pressure or under pressure in closed vessels.

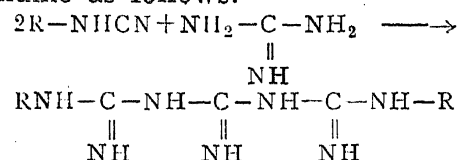
From the reaction products of none of these experiments, the desired triguanides could be isolated; in one particular instance, however, when the reaction was tried with p-chlorophenyl-biguanide and p-chlorophenyl-cyanamide in a closed vessel in alcoholic medium, ammonia came out profusely on opening the soda-water bottle, in which the reaction was conducted; and on working out the reaction product 2-amino-4:6-di-p-chloro-anilino-1:3:5-triazine-hydrochloride,⁵ (m.p. 284-85°; Nitrogen found: 22.36%; C₁₅H₁₇N₆Cl₂, HCl requires 21.92%) was isolated, which was evidently formed, from the triguanide, first formed, by ring closure, as follows:—



In some other cases unsubstituted melamine was obtained, which was crystallised from

water in fine needles, m.p. 213° C. (Nitrogen found: 66.82%; C₃H₆N₆ requires 66.6%.) The substituents were all knocked off during the process.

The synthesis was next tried by the condensation of two molecules of mono-substituted cyanamide with a molecule of guanidine as follows:—



where R=p-chloro-phenyl-.

From the reaction product no triguanide could be isolated but a compound having an m.p. of 253-55° C. and containing 16.85% nitrogen was isolated.

Lastly, with the same object, the condensation of N¹-p-Cl-phenyl-N³-cyanoguanidine with N¹-isopropyl-guanidine (either as a base or its salt) was also tried, but eventually some compound other than the triguanide could only be isolated. The substance was crystallised in shining flakes from 95% alcohol. It had an m.p. of 174° C. and contained 15.8% of nitrogen.

In most of the cases, very viscous semi-solid mass was formed which solidified only after a few days' standing. The exact nature and characterization of the compounds which were isolated during the investigation, as also other methods of synthesis are now being studied and will be published at a later date.

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