

except those containing alcohol. I have not been able to test the platinum chloride (PtCl_2) solution. With alcoholic solutions, the sodium hexametaphosphate apparently forms an emulsion which separates out in a short time. This immiscibility with alcoholic solutions is no great drawback, since all of the usual fixatives containing alcohol also contain acetic acid. The object of the sodium hexametaphosphate is to avoid the 'gasing' caused by acid fixatives when used on calcareous material, and hence, as a rule, these would not be used. Chromic acid fixatives do not cause appreciable gasing, and can be used to advantage.

To those fixatives which in Gray's paper are prepared by the addition of a large volume of water to the basal fixing solutions, I recommend adding instead the same volume of 25 per cent sodium hexametaphosphate solution. In other cases, the solution can be added as an addition to the normal fixative. In all cases where the material is in reasonably small pieces, decalcification takes place in the normal period of fixation.

I find also that the sodium hexametaphosphate solution is miscible with the usual solutions used for washing after fixation.

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¹ NATURE, 142, 958 (1938).

² J. Roy. Micro Soc., 53 (1933).

Carcinogenic Colouring Matters

PROF. J. W. COOK's article on "Cancer-Producing Chemical Compounds" published in NATURE of March 2 raises questions of extreme importance for all those who employ artificial colouring matters in the manufacture of articles intended either for internal consumption or for application to the skin, or whose business it is—as in my own case—frequently to have to give advice about suitable colouring matters to use for either of these purposes.

May I suggest that it is highly desirable that a full report of the experiments mentioned by Prof. Cook should be published, and that the work should be continued?

Prof. Cook's reference to a "limited range" of "permitted" food colouring matters in Great Britain is both puzzling, and, I venture to suggest, misleading. In Great Britain, unlike the United States of America, certain of the Dominions, and various other countries, there is no list of "permitted" food colouring matters. The use of certain metallic colouring matters, one colouring matter of vegetable origin (gamboge), and five specified coal-tar colours, is forbidden. These apart, food and beverage manufacturers are free to use any colouring matters they like so far as they are not injurious to public health.

A fairly considerable range of colouring matters is manufactured by firms specializing in the production of colours for the food industries. These include several azo-compounds, all of which are not sulphonated. Among the latter, special mention may be made of Yellow AB (benzene-azo-beta-naphthylamine), and Yellow OB (orthotoluene-azo-beta-naphthylamine). According to work reported by Prof. Cook, these two colouring matters should be

regarded with suspicion; but they are "permitted" colours in the United States, where legislation is far more stringent in the matter than in Great Britain.

There is a fairly general impression that toxicity of dye-stuffs is, at least in many cases, reduced or destroyed by sulphonation, which, at the same time, converts the substance from an oil-soluble dye into a water-soluble one. It is highly desirable to know, I suggest, whether this process also destroys any carcinogenic properties.

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A FULL report of the experiments on the carcinogenic properties of 2:2'-azonaphthalene and its transformation products, and of the tests carried out on certain food colouring matters, to which reference was made in my recent article, is at present being prepared for publication. These experiments form part of an extensive series carried out by Prof. E. L. Kennaway and myself, with our collaborators, in the research laboratories of the Royal Cancer Hospital (Free), London.

I agree with Mr. Redgrove that my reference to "permitted" food colouring matters in Great Britain is a misrepresentation. Changes in my circumstances had deprived me of access to a correspondence which I had with the Government Chemist in 1936, when the tests with food colouring matters were begun. I have now been able to consult this correspondence and it is clear that the reference in my article to tests carried out with "a selection of these permitted dyes" should have read "a selection of the relatively few dyes in common use as food colouring matters".

The unsulphonated dyes mentioned by Mr. Redgrove undoubtedly require, and will receive, further attention. I was not aware that Yellow AB and Yellow OB are used in the food industries, and from inquiries which I have now made it would appear that these dye-stuffs are very little used in Great Britain.

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High Proportions of Homostyle Plants in Populations of *Primula vulgaris*

As part of a study of heterostyly in *Primula*, with particular reference to the fertility relations existing between the two normally occurring types, pin and thrum, counts of their proportions in natural populations have been made. My own data have been supplemented by some counts made by friends and colleagues in various parts of Britain.

By far the most striking of the populations of *P. vulgaris* so far discovered are some from Somerset. I received from Miss M. Ll. Jones a collection of flowers, one taken from each plant selected at random in Sparkford Wood. Out of a total of 323, 102 were pins, 11 were thrums, and 210 were long homostyles, that is they had the anthers in the thrum position, while the style was long with the stigma in the pin position. A few stigmas were examined microscopically, and they all had long papillae.