precise identity of the latter. In view of the fact that various roots are known to contain carbohydrates, like inulin, which are by no means identical in physiological value with starch although they have various reactions in common with it, I have separated the most abundant carbohydrate of the cat-tail root for identification.

It gives a blue color with iodine, forms a characteristic paste with hot water, is readily digested (in contrast with inulin) by saliva, and yields on hydrolysis a dextro-rotatory solution from which an osazone, identical with glucosazone, was prepared. The carbohydrate thus corresponds with starch. Our "flour" indicated a carbohydrate content of 56.8 per cent., estimated in the conventional way from the reducing sugar formed by hydrolysis with acid.

To test the innocuousness of the cat-tail root as a food mice were fed for a week on otherwise adequate diets containing 30 per cent. of the "flour" without evident untoward results. The animals gained in weight upon the ration.

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Do fruits contain water-soluble vitamine?

By THOMAS B. OSBORNE and LAFAYETTE B. MENDEL.

[*From the Laboratory of the Connecticut Agricultural Experiment Station, and the Sheffield Laboratory of Physiological Chemistry in Yale University, New Haven, Conn.*]

Although fresh fruits have long been classed as valuable anti-scorbutic foods there are comparatively few recorded scientifically planned tests of their potency aside from the familiar studies of the juice of oranges and lemons. With respect to the possible presence, in fruit, of water-soluble vitamine (water-soluble B) comparable to this essential factor in yeast, scarcely anything has been published. We have begun experiments on rats in the otherwise adequate diet of which fruits and fruit juices furnish the the sole source of the water-soluble vitamine. When larger portions (more than 5 grams per day) of fresh apples and pears are fed the characteristic decline in weight observed where vita-

mine-free diets devoid of water-soluble vitamine are used, is averted. The bulky character of such fruits has made it impracticable to feed more than 10 grams per day without decreasing too greatly the intake of other essential nutrients. Ten c.c. of orange juice per day suffice to promote considerable growth. The inner peel of the orange (which Hess has found to be antiscorbutic) seems also to contain some of the other water-soluble vitamine. It is already evident that the proportions of the latter in the fruits tested is not large in relation to the quantities edible.

27 (1487)

Some observations on the biological characteristics of bacillus botulinus.

By PAUL F. ORR (by invitation).

[*From the Department of Preventive Medicine and Hygiene, Harvard University Medical School, Boston, Mass.*]

In a study of sixteen strains of *Bacillus botulinus*, which have been isolated in connection with outbreaks of food and forage poisoning occurring in different parts of the United States during the past five years, a number of interesting facts have been observed. While a complete report of the findings will be published elsewhere, it seems justifiable to record at this time some of the salient facts; namely:

1. Contrary to the general view that the optimum temperature for growth of *B. botulinus* is about 22° C., we have found that the body temperature 37° C., is most favorable for the growth and spore production of all of the sixteen strains of *B. botulinus* studied. Toxin is readily formed at this temperature.

2. At autopsy of guinea pigs which have been either fed or injected with cultures of *B. botulinus* it has been possible to recover this organism quite frequently from the liver and spleen and also occasionally from the heart's blood, the kidneys and the pancreas.

3. Contrary to the results obtained by previous investigators, guinea pigs, which have been fed or injected with toxin-free spores of *B. botulinus*, Nevin strain, have died with symptoms resembling those of botulinus poisoning. At autopsy of these animals *B. botulinus* was recovered from the liver and spleen.