It was found that the toxicity of the drugs varied with the age of the tadpoles and with the nature of the drug. Very young tadpoles succumbed much more quickly to all the poisons than the older ones when placed in solutions of the drugs of the same concentration. Tadpoles 1 and 2 days old quickly died in all the solutions unless the drugs were present in a very dilute concentration. Older tadpoles continued to live in solutions of all the drugs longer than was at first expected. The most toxic of the 3 drugs in point of dosage was nicotine. Next in toxicity came caffeine and the weakest of the 3 drugs studied was ethanol. It was surprising to find that while caffeine even in great dilution proved deleterious to the growth and development of the tadpoles, ethanol affected the animals to a much lesser degree. Thus it was found that while tadpoles of the age of 8 days when placed in a solution of nicotine, 1–50,000 succumbed on the 23d day, other tadpoles of the same age placed in caffeine solution, 1–10,000 died on the 12th day, while still other tadpoles of the same age placed in a solution of ethanol, 1–100, by volume, lived as long as 40 days. It was furthermore noted that tadpoles placed in solutions of ethanol, 1–500, lived even longer and appeared to be but slightly affected by the drug. Further experiments on the subject are in progress. This investigation was begun in the spring of 1920.

121 (1703)

The nutritive properties of milk with special reference to growth and reproduction in the white mouse.

By H. A. MATTILL.

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In a recent paper[1] from this laboratory some success was reported in correcting the failure of rats to reproduce by the addition of yeast to a ration of powdered whole milk. The value of yeast had been indicated by some simultaneous experiments on the white mouse. As was suggested by Miss Wheeler some years ago,[2] the mouse, unlike the rat, cannot grow normally on an ex-

[1] Mattill, H. A. and Conklin, R. E., *J. Biol. Chem.*, 1920, xliv, 137.

[2] Wheeler, Ruth, *J. Exp. Zoöl.*, 1913, xv, 209.

clusive diet of dry whole milk. Of the two limiting factors which she indicated, protein and inorganic salts, the latter appears to be the more important; but on a dried milk ration supplying both of these factors in added amounts the rearing of young has not been generally successful. On a food consisting of dried whole milk 93 per cent., salt mixture 2 per cent. and yeast 5 per cent., we have now obtained a fourth generation. Animals on this food without yeast (98 per cent. milk powder, and 2 per cent. salt mixture, with an additional 0.2 per cent. Fe citrate) become pregnant and young are born, but they are small and scrawny in appearance and usually die within 3 or 4 days. Sometimes no trace is found of these litters, the only evidence being the drop in weight of the female. What constituent of yeast is responsible for the successful reproduction secured by its addition remains to be determined by the work at present under way.

122 (1704)

The presence of vitamine A in the peel of common citrous fruits

By ETHEL COOPER (by invitation).

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About a year ago, preparations of orange peel were added to a diet otherwise free from the fat soluble vitamine. The possibility that such preparations might contain fat soluble A was based on the hypothesis of Steenbock[1] that the fat soluble vitamine is a yellow vegetable pigment or a closely related chemical compound.

The peels used for a determination of their fat soluble vitamine content were faultless and of the deepest yellow color. The outer surface of the dried peels was grated enough to break the tiny pockets which contain the yellow oil. Peels and gratings were then extracted on the water bath with ether and alcohol. These extracts were evaporated down to dryness. The gummy mass thus obtained was stirred thoroughly into a diet otherwise free from fat soluble vitamine and then fed to a number of white rats. The results yielded indubitable evidence that the waxes and oil

[1] Steenbock, *Science*, 1919, i, 352.