

Experiments were also conducted using hyoscyamin in place of atropin, and others are now under way covering some of the other drugs with central emetic actions. The results of all of these will be detailed in the complete paper to be published later.

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**The distribution of the fat soluble A, the growth-promoting substance of butter fat, in the naturally occurring foodstuffs.<sup>1</sup>**

By **E. V. McCOLLUM, NINA SIMMONDS, and WALTER PITZ**  
(by invitation).

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That butter fat and egg yolk fats contain a substance whose chemical nature is unknown, which is indispensable for growth or prolonged maintenance of health was first pointed out by McCollum and Davis. Later they showed the presence of this substance in the maize kernel and in wheat embryo, and presented some evidence that if it is found in the oat kernel it is in very small amount.<sup>2</sup> Our further studies have confirmed these observations.

McCollum and Kennedy<sup>3</sup> have discussed the desirability of employing the term "fat-soluble A" for this, to distinguish it from the "water-soluble B," a substance which is widely distributed in the natural foodstuffs of both animal and vegetable origin and is likewise indispensable for growth or prolonged maintenance. The water-soluble B only is concerned with the production and cure of polyneuritis in pigeons.

Our experimental work with the grains has shown that the content of the fat-soluble A is greater in the maize kernel than in wheat, and greater in wheat than in the oat kernel. In all three the content is too low to induce growth at the maximum rate even though all other factors in the diet be near the optimum.

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<sup>1</sup> Published with the permission of the Director of the Wisconsin Experiment Station.

<sup>2</sup> McCollum and Davis, *Jour. Biol. Chem.*, Vol. 15, p. 167 (1913); Vol. 21, p. 179 (1915); Vol. 23, pp. 181 and 231 (1915).

<sup>3</sup> McCollum and Kennedy, *ibid.*, vol. 24, p. 491 (1916).

We have much experimental evidence indicating that the unknown A is principally confined to the germ of the seed. Sunflower seed appears to be fairly rich in this substance.

We have also found that the leaves of certain plants, especially alfalfa and cabbage are very rich in the fat-soluble A as compared with the grains. It is probable therefore that it is universally associated with metabolizing plant cells. We have rats in our colony which have grown to very near the normal adult size at slightly below the normal rate on a simple mixture of polished rice sixty and powdered alfalfa leaves forty per cent. They are in an excellent condition after eight months on this diet and one female has produced young.

We wish to call attention to the importance of having found a good source of the fat-soluble A in foodstuffs containing but little fats and other substances soluble in lipid solvents. We shall report later on methods of isolating this substance from such sources.

### 73 (1137)

#### **The effect of exercise on the blood sugar of depancreatized dogs.**

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Blood sugar curves of dogs made to run on the treadmill one to four days after extirpation of the pancreas showed:

1. That after 20 to 30 minutes of such exercise, in animals which were being fed 200 grams of meat and bread daily, there occurred a fall in the amount of reducing substance in the blood, sometimes amounting to as much as 100 mgm. per 100 c.c.

2. That in starved animals such exercise caused a rise in the amount of reducing substance in the blood, amounting in one case to 85 mgm. per 100 c.c. during 30 minutes of exercise.

The conclusions suggested by these results are that, even after complete extirpation of the pancreas the power of sugar consumption is not entirely lost, and that there may be a difference in the power of such animals to utilize sugar according as it is derived from tissue proteins or by absorption from the intestinal tract.