

Nutrient Pioneers

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Second in Series **Elmer McCollum**

If anyone could be called the Father of Nutrition Science, it would be Elmer McCollum. It's obvious that I didn't know him at the height of his research because he began in 1907, a year before I was born. When I finally met him, he was already the elder statesman of nutrition. But he was a kindly man, easy to talk with, who had that pleasing facility of remembering one's name.

It was he who first used rats in nutrition research. His invention of the method of biological assay turned mere feeding trials into a chemical science. He was the first to discover that there are carbon compounds in the diet in invisible amounts, some fat soluble and some water soluble, that are essential to life. He called this "the Newer Knowledge of Nutrition."

All his life he believed in telling about his discoveries in simple words so everybody could understand them, so he wrote a popular book about it. This helped people to believe that nutrition is based on chemistry. When synthetic vitamins began to pour out of the chemical laboratories and they actually "worked", there was a period of great excitement. Nutrition scientists were looked upon somewhat like the astronauts of a later

period. Their pictures were in the papers. There was as yet no opposition to vitamins from the medical establishment — that came later.

In 1907, the scene was the Wisconsin State Agricultural Experiment Station, connected with the College of Agriculture, Home Economics, and Mechanic Arts. Established by an act of Congress, they defined Mechanic Arts as "Physics, Chemistry, and the like." Each state had one, and each Station had a Director. The director needed somebody to direct, so the next person to be hired was a Chemist. The cast of characters (and characters may be the proper word) were Harry Russell, Director; Stephen Babcock, Assistant; and Edwin (Dad) Hart, Chemist.

They had tried feeding groups of dairy cows on various grains to see which was best. The cows getting wheat went blind. They decided to hire a young Ph.D. chemist to analyze the wheat, and find out what there was in it that made the cows blind. They hired Elmer McCollum, just out of Yale.

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It didn't take long for him to see that using cows as test animals was much too slow. What he needed was a test animal with a short life span, that gave birth often, and would eat anything. He chose rats.

When Harry Russell learned that he was about to feed rats, he was very upset. Rats were farm pests. Who ever heard of *feeding* rats instead of killing them? What if the farmers got word that up there at Madison they were using taxpayers' good money to feed rats? Dad Hart wasn't happy about the rats, either.

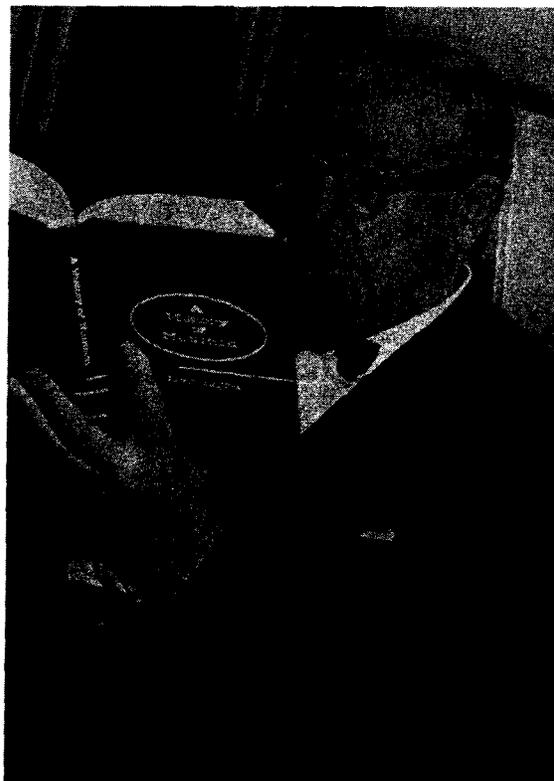
Stephen Babcock, however, was on McCollum's side, and in the end he won out. McCollum got his rats. This was the first experimental rat colony in America. McCollum knew rats grew well on milk. He decided to use a mixture of chemicals duplicating milk, leave out one chemical at a time, and see what happened.

He planned a ration of lactose, butterfat, milk protein, and mineral salts. But Hart wouldn't let him use butterfat. Wisconsin is a dairy state, and in those days practically all the money value of milk was in the butterfat. They were supposed to make money selling farm products and do research at the same time! Hart made McCollum use the cheaper lard instead.

The rats didn't grow well. After a short time they couldn't see in a dim light; they were going blind. Elmer remembered the blind cows. Secretly he replaced the lard with butterfat, which soon cured the rats. Then he did chemical work on the butterfat and got out a chemical that wasn't fat itself, but was soluble in fat. It was so potent that he could put a tiny bit in lard and keep the rats well.

That was in 1913. McCollum had just discovered the first vitamin. Since it would dissolve in fat, he named it "fat soluble A." He said he could just as well have chosen the last letter of the alphabet instead of the first, because he had no idea that there would be any more vitamins.

In these days of million dollar research grants, perhaps there's something to be said for having a boss who pinches pennies. When Hart heard that he was using butter, he said McCollum would have to cut cost somewhere else. Sucrose, ordinary table



Elmer McCollum

sugar, was a lot cheaper than milk sugar, so he could change to sucrose.

On sucrose the rats once again began to fail in health. They lost appetite, failed to grow, became sick and nervous. McCollum put the milk sugar back, and the rats almost immediately perked up and were well again.

McCollum found that the lactose contained an impurity, something soluble in water. He made an extract, which kept the rats healthy even on sucrose instead of lactose. That was in 1915. He had discovered a second vitamin. Using the next letter of the alphabet, he named it water soluble B. Later this turned out to have several fractions, the B complex.

Elmer McCollum had an able co-worker named Marguerite Davis, whom I never met. She never allowed anyone *to take* her picture.

In 1917 Johns Hopkins University asked McCollum to become the first professor of biochemistry in their new School of Hygiene and Public Health, and he moved to Baltimore. McCollum had wanted to study the vita-

NUTRIENT PIONEERS

min that prevents scurvy, but his rats wouldn't let him. Using the next letter, he named it water soluble C. He must have remembered stories his mother had told him about how the doctor said he had scurvy when he was one year old out in Kansas, and how his mother had saved his life with apple scrapings when the doctor said he would die.

Many times, over the long years when he had been working his way through the University of Kansas, and then on to Yale for a doctor's degree, McCollum had remembered the apple cure. From Kansas farm boy to scientist, he lived to name the vitamin that had saved his life.

When he learned that guinea pigs need vitamin C, he used guinea pigs to prove that rats make their own vitamin C. He did this by feeding rat livers to the deficient guinea pigs. Within minutes they recovered from the typical "face ache" position, got up and began eating. He was assisted by Helen Parsons in this work.

Elmer McCollum next tackled the problem of rickets, a bone-deforming disease of children. In ancient Rome people blamed it on babies playing on cold floors. Londoners blamed it on fog, and they were right, because sun makes vitamin D-3 on your skin. Scots protected their babies with bad-smelling oil from the livers of cod fish.

McCollum had tried codliver oil and knew it contained his "fat soluble A." He wondered if vitamin A would prevent rickets too. He changed his rat food so the rats would get rickets, and the cod-liver oil worked. But he was too good a scientist to take that as proof. He blew air through the hot oil, which he knew would destroy the vitamin A.

Then came the big test. Would the hot-air-blown oil cure rickets or not? He tried it, and it did. Then he did chemical work on the oil and got out an unsaponifiable fraction, very powerful in antirachitic effect. The next letter of the alphabet was D. McCollum had discovered vitamin D. He contributed in many other areas as well.

Elmer Verner McCollum was born in 1879. He retired from Johns Hopkins in 1946, and lived twenty-one years more, a legend in his own time. In 1957 his **A History of Nutrition** was published by Houghton Mifflin Company.