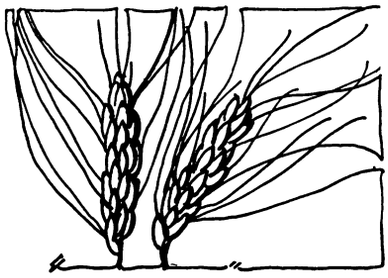
BIOCHEMISTRY

NATURE RAMBLINGS

by Frank Thone



Trace or Tracer?

➤ RADIOACTIVE ISOTOPES, mostly generated in the atomic pile, have become such common items of scientific traffic that the term "tracer elements" has become familiar not only to physiologists but to the newsreading public at large. At the same time another term, "trace elements" has also become rather common property. The natural result has been a certain amount of confusion on the part of persons who keep up with scientific progress but who are themselves not professional scientists.

The distinction is really pretty easy, as a rule. Fortunately, both terms are in everyday English, so that there is no danger that confusion in tongues will increase confusion of concepts.

A tracer element is simply one that can be traced. This is usually (and most easily) done by employing a radioactive variety, or isotope, of one of the commoner, non-radioactive elements. For example, scientists who want to trace the course of common salt through the blood and body tissues of an animal make up a little salt in which either the sodium, or the chlorine, or both, are radioactive. They can do the same kind of thing with calcium and phosphorus in calcium phosphate, one of the principal constituents of bones. Or with radioactive carbon in carbon dioxide which they "feed" to plant leaves. Afterwards, Geiger counters, electroscopes or other instruments for detecting radioactivity tell where the tracer elements have gone, and in what abundance.

Some tracer elements are not radioactive, but are tracked in other ways. In this class are heavy oxygen, double-weight hydrogen or deuterium, etc. But the most popular tracer elements just now are the radioactive ones, because tracing them is so easy.

Trace elements have been known and studied a little longer than tracer elements. They are elements that show up in ordinary chemical analyses of animal or plant tissue in such small quantities that formerly analysts never bothered to express their presence in percentages of a total, as they did for the more abundant elements like calcium or potassium or phosphors or carbon or oxygen. These they would tabulate; then at the bottom of the table would list such things as zinc, boron, copper and manganese, with the word "trace" opposite each.

Later, biochemists and physiologists discovered that though all they could find of elements in this list of chemical Cinderellas were "just traces," these micro-quantities were absolutely necessary to the health of plants and animals, sometimes to their very lives. So now some of these trace elements are also being used as tracer elements, for it has become highly important to know where they go in plants and animals, and what happens to them.

Science News Letter, October 4, 1947

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Cancer May Be Foiled by Chemical Sculduggery

➤ THE possibility that cancer can be fought by hoodwinking certain chemicals which synthesize cancer tissue is proposed by Prof. David M. Greenberg and Martin Shulman of the University of California at Berkeley. (*Science*, Sept. 19)

This theory stems from a principle used in the treatment of infectious diseases, called metabolite antagonism. Sulfa drugs, for example, do their job by interfering with the synthesis in the body of compounds essential to the growth of bacteria.

In cancer it would work like this: About 10 of the amino acids essential to formation of both normal and cancer tissue must be obtained from the diet because the body cannot synthesize them.

Prof. Greenberg suggests withholding those aminos and slipping the body an overdose of chemically similar antagonistic compounds. This would pull the wool over the enzymes' eyes because they cannot distinguish between the two. They would spend all their time trying to synthesize the antagonist, thus interfering with further cancer formation.

Prof. Greenberg believes adoption of this principle should bring some order out of the chaos of thousands of compounds proposed for fighting cancer and give a guiding principle for selection.

Prof. Greenberg reports that his studies on the subject are incomplete but are being continued.

Science News Letter, October 4, 1947