

CHEMISTRY-PHYSICS

# Two Drops of Blood Reveal Elements in New Analysis

## Spectroscope Used in Technique Capable of Finding Elements Present in Only One Part in 100,000

**A** NEW method of analyzing blood and other body fluids, capable of detecting elements present to the extent of only one part in a hundred thousand, was explained to the scientists attending the spectroscopy conference of the Massachusetts Institute of Technology.

The ultra-penetrating eye of science's master key of investigation, the spectroscope, forms the basis for the delicate and precise analysis. Dr. O. S. Duffendack of the University of Michigan, who developed the new technique along with Dr. Kenneth B. Thomson and Dr. William C. Lee, also of Michigan, told the conference that only two drops of the solution being tested are needed for the investigation, a decided advantage over other methods of analysis in that large amounts of complex body fluids are often not available to investigators.

Dr. Duffendack's technique also has the advantage of being considerably speedier than the usually employed chemical analysis while losing none of that method's precision.

The method was developed particularly for the analysis of urine, blood and other body fluids for sodium, potassium, calcium and magnesium. And Dr. Duffendack has found that the method also works well in ferretting out minute traces of aluminum, chromium, copper, nickel, iron, silicon, and similar substances in electroplating solutions, caustic liquors and other industrial chemicals.

### New Research Weapon

The new technique is expected to arm investigators with a powerful new weapon in research and may prove to be the start of a new approach to some of science's most baffling problems.

There are two variations of the method as developed by Dr. Duffendack, each with its own peculiar advantages. In general principle, both employ fundamental spectroscopic technique, spreading the light given off into the colors of the rainbow. Each of these lines, or colors, tells a story, enabling

the scientist to see what elements are present by identifying them from their peculiar tints.

The first variation employs a 25,000 volt inductive spark, maintained between two electrodes which are in reality composed of the solution under analysis. A minimum of nine cubic centimeters, only a few tablespoonsful, of the solution is required for the test but the method regularly yields results with an average error of approximately three per cent.

### Need Only Two Drops

The second method utilizes a high voltage alternating current arc between spectroscopic carbons upon which a drop of the solution under analysis has been evaporated. Thus only two drops of the solution are needed for the experiment, a valuable factor in the study of body fluids and other solutions available only in extremely small amounts. This method also has the added advantage of detecting elements present in exceptionally small amounts in solutions containing large amounts of other substances.

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AGRICULTURE

## "Through Our Fault" Is the Waste of Land

**WE** HAVE wasted our land recklessly in the past. In floods and dust storms, in higher taxes and human suffering, we are all paying the price today."

With these words Dr. Rexford Tugwell, now on the Front of the Drought in an effort to maintain the necessary folk-movement as an orderly retreat with good morale, instead of a starved and desperate rout, opens a new publication of the Resettlement Administration, "America's Land." Although written before the present crowning catastrophe in the Northwest, it is based on all-too-vivid national memory of similar harsh events in the recent past.

Incidentally, the pamphlet is a new landmark in better and more interesting-looking typographical work now being turned out by the Government Printing Office. In type, layout, and illustrations it is worthy of any printing plant in the world. Uncle Sam's linotypists, engravers, and pressmen are to be congratulated.

Administrator Tugwell continues his Confiteor: "The individual men who committed this waste did so ignorantly, not willfully. They followed the example of others, an example on which



**THE HARVEST**

*It is hard to imagine where more potatoes could have found space to grow in this limited area. (See page 83.)*

society as a whole had set its approval. Our riches were without limit, they thought. Let each man take what lies within his reach.

"Harsh experience has dispelled this pleasant indifference. We have learned that our land, as well as our forests and minerals, must be conserved. We have learned that this is a group, not an individual, problem."

To our forefathers, the text goes on, the idea that some day there might not be enough land for everyone seemed absurd. They felt that "there will be land for the hundredth and the thousandth generation."

To the homesteaders the forest was a bitter enemy. It had to be destroyed before they could work the farms which would make them independent and comfortable. They believed the land and the forests to be endless.

Yet even in early days, the land was not endless. Thousands of pioneers were forced to settle on poor land, or on good land periodically worthless from lack of water, because other men had preempted the most desirable acres. It is the problem of their descendants and successors, in the furrowed hills of the Southeast, on the sun-blasted plains of the Northwest, that has become a national burden today. On our ability to meet and solve it as a national problem will hinge, very largely, our ability to survive as a national entity.

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#### ARCHAEOLOGY

### "Pie Crust" Graves Found in Kentucky

"PIE crust" graves, an extraordinary burial fashion of ancient America, have been found in an Indian mound excavated near Lexington, Ky., by Dr. W. D. Funkhouser, professor of anthropology of the University of Kentucky.

The 16 skeletons were found each resting on a baked clay layer and covered by another. The clay was pressed together at the edges in pie crust manner, according to Dr. Funkhouser's report just published.

One skeleton was found accompanied by copper bracelets and rings. Others had buried with them awls, celts, arrow-points, and stone gorgets.

The mound is unique in Kentucky, and is believed to represent Indians influenced by the Hopewell or Adena mound builders, if not actually belonging to one of those Indian cultures.

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#### CHEMISTRY

## First Compound of an Enzyme Discovered in Yale Research

NEW and important knowledge of enzymes, those mysterious chemical agents which play a part in reactions ranging from digestion of food to brewing of beer, has been gained by the discovery of a new compound which contains an enzyme as one of its chemical components. This discovery was made by Dr. Kurt G. Stern of Yale University.

The discovery upsets the still widely held theory that enzymes never enter into chemical reactions, although they exert some force which brings about these reactions, many of which are vital to life. Now Dr. Stern has evidence that at least one of the enzymes does enter into direct chemical reaction.

Catalase, the widely distributed enzyme he studied, breaks down the hydrogen peroxide which the body may form, to harmless water and oxygen. But nobody has been able to study the mechanism of this reaction; for one thing, it

went too fast. Dr. Stern replaced one hydrogen atom in hydrogen peroxide with a heavier radical which is the base of ordinary alcohol, and which is called an ethyl group. The catalase breaks down this material, but at a much slower rate than it breaks down hydrogen peroxide.

Using an instrument called a spectroscope, which detects minute amounts of chemicals by their effects on a beam of light passed through them, Dr. Stern found that the enzyme combined chemically with the material it decomposed. His observations show that the process is: Catalase and ethyl peroxide combine to form a new compound, which breaks down to form catalase, aldehyde, and other products. The production of aldehyde from a peroxide may provide a clue for the function of catalase in animal and plant tissues.

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#### PHYSIOLOGY

## Fresh Green Grass Juice is Newest Growth Promoter

ADD to sauerkraut juice, tomato juice, and other juices that are good for what ails you—grass juice.

Drs. C. A. Elvehjem and E. B. Hart of the University of Wisconsin have discovered that the growth-promoting properties of milk can be markedly enhanced by adding fresh grass juice. Juice squeezed out of lawn clippings was added to the daily milk ration of young rats, causing them to gain weight much more rapidly than "control" rats that got just plain milk.

Liver and brain tissue were also found able to promote growth when added to winter milk.

This finding, if it proves applicable to human nutrition, may point to the desirability of fortifying winter milk with materials containing the growth factor which it lacks. Such additions will not be necessary with milk produced in summer, for cows having access to pasture give a product which is potent in promoting growth.

Just what is the nature of the growth factor with which winter milk is inadequately supplied is not definitely known. The fact that brain and liver apparently contain considerable amounts of it suggests it may be vitamin B<sub>4</sub>, but this is not certain.

The fact that the search for materials to improve the quality of winter milk resulted in failure with many substances narrows the possibilities of what the unknown growth factor may be. Vitamins B and B<sub>2</sub> proved of no value in trials at the University of Wisconsin. Since carotene, cod liver oil, orange juice, and irradiation all failed to improve milk as far as the growth factor is concerned, evidently it is not A, C, or D.

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Wistaria vines have been known to live for more than a century, and a vine may spread over a thousand feet of wall area.