Comments and Communications

You Just Pays Your Money

WALTER ROSE (SCIENCE, **116**, 70 [1952]) says "it does not seem to be a serious matter how soon the social science law of energy conservation is discovered, as long as thinkers can be delighted and excited by thoughts of social science perpetual motion machines." Such a social science law of energy conservation was discovered long ago, however—just how long ago I do not know. It reads: *"Plus ça change, plus c'est la même chose."*

And still thinkers all the way from philosophers to politicians continue to devise Utopias.

Mr. Brown in his rejoinder seems to suggest that he thinks "the natural course of development is toward dissolution and decay." That, I suppose, would be the social law of entropy, which has for the time being become a part of the law of conservation of energy. "Change and decay in all around I see" is not a new idea, but it is not the same as the social science law of the conservation of energy. Nor is it the same as Utopianism.

One of the profound contributions of classical economic theory to modern thinking is its three laws of returns. There is a law of diminishing returns, a law of constant returns, and a law of increasing returns. I suppose the privilege was granted of electing any one of these three jurisdictions, all of which has disadvantages as well as advantages. Evidently some such all-embracing trio is going to be necessary to suit everybody in the social sciences—one for the pessimists, one for the cynics, and one for the optimists. As the operator of the three-shell game used to say, "You pays your money and you takes your choice."

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Digesting Tissue Samples

THE article on "The Preparation of Wet Ashed Tissues for Liquid Counting" (SCIENCE, **115**, 597 [1952]) exemplifies the fact that most biologists and biochemists are not acquainted with a satisfactory method that has been in routine use in the laboratories of the Atomic Energy Project of the University of Rochester during the past eight years for complete digestion of tissues and all other biological matter.

It might be of value to your readers to call their attention to this method. It is given in detail on pp. 15–18 of Vol. VI-3 of the "National Nuclear Energy Series," *Biological Studies with Polonium, Radium and Plutonium* (New York: McGraw-Hill [1950]).

The digestion procedure is simple and rapid, and results in complete aqueous solution of all tissues. Over 10,000 samples have been digested by this method with very satisfactory results. The author wishes to stress that the proportions and details given in the reference must be followed. Departures from the method may cause rapid reaction, with resultant losses from boiling over or burning; attention to several factors pointed out therein will obviate these occurrences.

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WE ARE glad Dr. Minto has called attention to the method that has given such excellent results in the hands of workers at the University of Rochester. We were aware, of course, that there are other methods of digesting tissue samples so as to obtain a homogeneous solution, but it seemed that an extensive review of the literature would be out of place in the brief note that we submitted. We have simply reported one method which we have found particularly useful under certain circumstances where the use of perchloric acid was considered inadvisable.

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Saucers?

IN VIEW of the interest in so-called flying saucers, and the lack of an adequate explanation for them, perhaps it would be well to call attention to earlier references to such phenomena.

The first reference concerns unusual forms of lightning and is as follows: "Lightning: Its Risks and How to Avoid Them," by Elihu Thomson, C. A. Adams, Louis Bell, D. C. Jackson, and A. E. Kennelly (*Gen. Elec. Rev.* [Mar. 1916]). On page 167 are the following paragraphs:

> (5) Ball or Globular Lightning—There are numerous records to the effect that a very rare and perhaps dangerous form exists, described by some observers as a luminous but not very brilliant ball or patch, which may persist for some little time and may move from place to place. It is described as terminating, in many cases, in a loud explosion. No doubt many cases of reported ball lightning are fictitious or illusory. Owing to the great rarity of ball lightning, practically nothing is known of its nature or of the dangers, if any, accompanying it.
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> (6) Bead Lightning is another very rare form of discharge described as resembling a chain of beads gradually fading away. Nothing seems to be known of the danger, if any, connected with it.

The second reference is contained in a letter by the late John Zeleny published in SCIENCE, January 15, 1932, entitled "Rumbling Clouds and Luminous Clouds." In this letter Mr. Zeleny describes two rather unusual clouds, both of which he was fortunate enough to observe. One of these he saw in July 1931 over Cache Lake in Ontario on a chilly cloudy morning. This cloud he described as passing over the lake in the form of "a very long, narrow, tenuous cloud—whose cross-sectional diameter was only 200 feet." This cloud moved at right angles to its length and gave off a very loud rumbling sound. The other cloud

he described as having seen on a clear summer night at Hutchinson, Minn. This he describes as "a solitary, brightly, luminous, cumulus cloud," which "shone with a uniform, steady, vivid, whitish light." He also adds: "I have been at some loss to account for the luminosity of the cloud. It could not have been due to reflected light coming from a city."

Could not the objects in the sky (the saucers) and the objects seen by Mr. Zeleny be one and the same thing? Could not these objects be moved by wind currents and perhaps, too, be magnetic fields? Could they not be tied in with the phenomena of ball lightning, occurring very rarely under conditions favorable to thunderstorm activity?

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The Use of Hydrofluoric Acid in Making Glass Microneedles[1]

THE following procedure provides a simple solution to the problem of making glass microdissection needles, such as those used in isolating yeast ascospores. The technique obviates the need for an expensive microforge (*1, 2*) by utilizing a 50% solution of hydrofluoric acid to produce a smooth, sharply pointed microneedle. Stepwise etching with acid provides control over formation of the point, whereas control is difficult to obtain with manual or mechanical pulling techniques.

Six-inch lengths of 2 or 3 mm soft glass rod provide the stock from which needles are made. One end of the rod is reduced in diameter to about 30 μ over a length of about 1 in. The small end of this filament is grasped firmly but gently with flat forceps. While a steady pull is exerted, this portion of the needle is moved slowly toward the flame of a microburner[2] until it heats rapidly and is pulled out into a hairlike *pointed* filament. The length and character of this portion of the needle are unimportant, provided only that the needle *tapers* to a point rather than ending in a fused bead.

All necessary bends are introduced before the point is etched, so as to avoid accidental heating and destruction of the delicate tip. Bending is best accomplished by bringing the needle near, but not into, the microburner flame *from the side* and guiding it with a metal dissecting needle as the glass softens. The exact bends required will depend on the type and dimensions of the moist-chamber type of micromanipulator clamp, and other apparatus used.

For the etching process, aqueous solutions of HF (50%) and sodium bicarbonate (saturated) are used. These solutions and two rinses of distilled water are placed in beakers large enough to minimize accidental contact with the walls during agitation of the needle in the solutions. The etching is carried out by immersing about 1 in. of the pointed end of the needle in HF for 5–20 sec, rinsing carefully and thoroughly, first in the bicarbonate solution, then twice in distilled water. Progress of the etching is followed under low power of a compound microscope. Etching is repeated until any hairlike tip is dissolved and the fine point of the needle is brought into the desired relationship to the heavier shank.

It should be emphasized that the HF must be neutralized completely by thorough rinsing in bicarbonate, otherwise pits and roughened areas will develop along the shank. These tend to retain HF from subsequent etchings and may in time result in weakening and breakage of the microneedle.

To a great extent this etching technique removes the uncertainty inherent in manual and mechanical needle-making procedures. Uniformly reproducible tools may be made with a minimum of previous experience. Stepwise etching with HF has been used successfully to produce flexible spatulate needles (*3*), and other applications are doubtless possible.

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[1] Abstracted from a dissertation submitted to the Graduate School of Yale University in partial fulfillment of the requirements for the Ph.D. degree.

[2] A serviceable microburner may be made from a 22-gauge hypodermic needle with the bevel removed.

References

1. THAYSEN, A. C., and MORRIS, A. R. *J. Gen. Microbiol.*, **1**, 221 (1947).
2. DEFONBRUNE, P. *Technique de Micromanipulation.* Paris: Masson et Cie (1949).
3. PERKINS, D. D. Personal communication.

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Book Reviews

The Theory of Relativity. C. Møller. New York: Oxford Univ. Press, 1952. 386 pp. Illus. $7.00.

This new addition to the "International Series of Monographs on Physics" is in many respects a remarkable one, which no teacher of relativity theory can afford to overlook. It contains many novel ideas, even for people familiar with relativity theory, and it will help answer students' questions that are not answered in other texts. Many references to original literature have been given in footnotes, but much of the material has never been published before.

About half the book deals with special relativity