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

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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