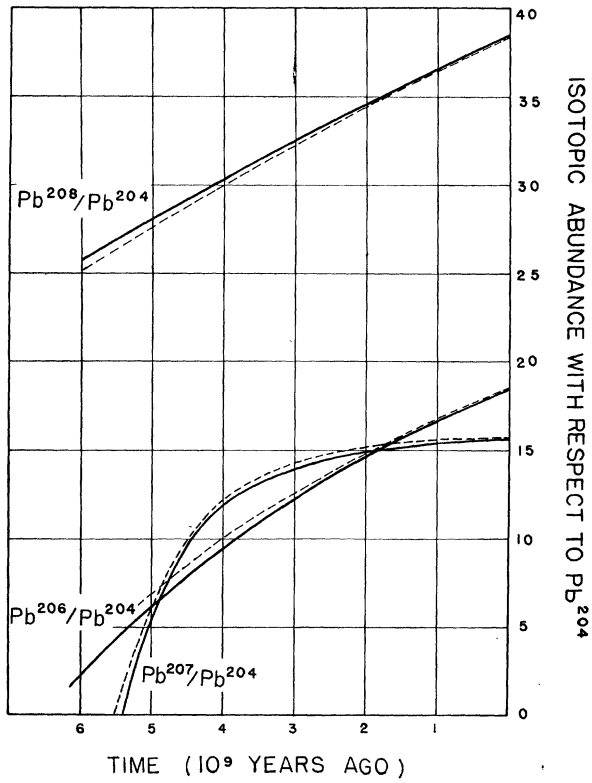

FIG. 1. Average lead isotope abundance-time curves. Broken curves after Collins *et al.* (*2*). Solid curves are those derived in this paper.

with each other and with ages obtained by other methods of geological dating. In Fig. 2 abundances of the lead samples are plotted against the mean ages. It is seen that they fit all three curves quite closely. This supports the hypothesis that the old leads should fit the curves fairly well.

In conclusion, the results above would seem to show that the uncertainties in the ages that have been assigned to common lead samples have not caused a very great error in the results obtained by Collins, Russell, and Farquhar.

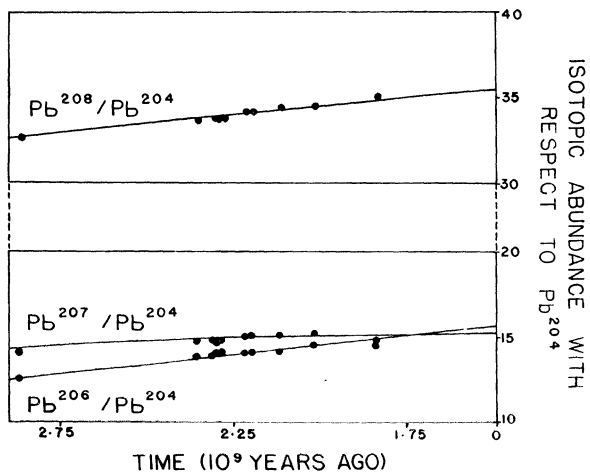

FIG. 2. Isotopic abundances of old leads fitted to the abundance-time curves.

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An Effective Safety Pipette[1]

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The increasing use of radioactive solutions, suspensions of viable microorganisms and other hazardous liquids has created a need for accurate transfer of these materials by pipette without exposure to the operator. Several remotely controlled pipettes (*1, 2*) have been designed to fulfill this need. In addition to these remotely controlled pipettes, many scientific supply houses furnish various devices labeled as "safety pipettes" to accomplish the same purpose. There are two serious difficulties with the available types of apparatus: (*a*) they are generally quite elaborate and expensive, and (*b*) the operator is unable to control the liquid in the pipette with any degree of accuracy. It is the purpose of this note to present a very simple and easily constructed piece of apparatus which eliminates the possibility of oral or cutaneous contamination of the operator when transferring toxic or hazardous liquids, yet it maintains complete and accurate delivery control.

The apparatus, as shown in Fig. 1, is constructed by sealing a piece of 5-mm OD glass tubing to a piece of 6-mm OD tubing in a T seal. The 5-mm tube is then bent to the form of a small h. The ends of the tube are cut to the specified length and fire polished. The side arm is connected to a rubber bulb of convenient size by means of a short piece of rubber tubing containing a glass bead large enough to completely close the rubber tubing. A short piece of rubber tubing is used to attach the apparatus to the pipette. The size of the rubber bulb is, of course, determined by the volume of the pipette to be used. A ¼-oz bulb is convenient for pipettes up to 5 ml and a 1-oz bulb is satisfactory for pipettes up to 25 ml capacity.

The use of the apparatus is very simple. One first opens the glass bead valve by squeezing the rubber tubing around it and expels the air from the rubber bulb by squeezing. Release of the bead valve when the rubber bulb is collapsed produces a "portable vacuum supply." The tip of the pipette is then introduced under the surface of the liquid and the open top of the apparatus is closed with the finger tip. The pipette is filled by gently squeezing the glass bead valve. When

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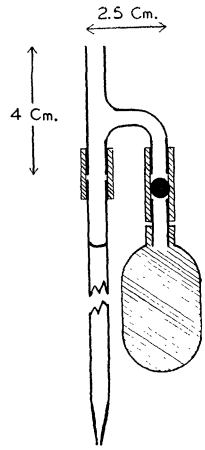

FIG. 1. Diagram of a simple and easily constructed pipette.

the liquid is drawn into the pipette to the desired level, the glass bead is again released. The meniscus is adjusted and the contents of the pipette delivered with finger tip control as with an ordinary pipette.

The apparatus described here does not fulfill the need for a truly remotely controlled pipette. It does, however, provide many advantages over the available types of safety pipettes. (*a*) It is simple in design and inexpensive. (*b*) One can accurately control the delivery of any desired volume of liquid by varying the size of pipettes and rubber bulbs employed. (*c*) Smaller pipettes may be filled several times with a single emptying of the rubber bulb. (*d*) With practice it is possible to accomplish the entire pipetting operation using only one hand.

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Local Refractometry of Cell Particulars with the Cylindrical Lens Microscope

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Cylindrical lens systems, as used preferably in electrophoresis equipments, permit the direct registration of local refractive differences within mobile protein fractions. This ingenious registration method, as described by Philpot (*1*), Svensson (*2*), Wiedemann (*3*), and others, is suitable not only in electrophoretic problems but likewise for studies on resting boundaries and refractive gradients within anatomical microscopic specimens. While by other refractometric methods only the optical properties of one structure point after the other can be measured, the Philpot-Svensson method directly shows the refractive gradients, i.e., the local changes of the product of refractive index × thickness, of the microscopic structures within a rectangular area of the sample and records it. Therefore, the one dimension is available for automatically plotting a diagram of the refractive gradient, and the other dimension is used as abscissa to show position in the object.

Generally, the usual Philpot-Svensson optics within an electrophoresis equipment reproduce an image of an area of 40–50 mm in height; in microelectrophoresis apparatuses the distance may be 10 times less, i.e., a few millimeters. For further biological studies it would be of value to increase the resolving power of the instrument or, accordingly, to minimize the structure particulars which can be analyzed by this method.

For such studies the use of a cylindrical lens microscope (Fig. 1) is recommended. In this instrument the image of the entrance slit (2) is projected onto a revolving slit (5) by means of a schlieren objective (3, 4). The microscopic specimen (7) is placed between the two symmetrical halves of the objective.

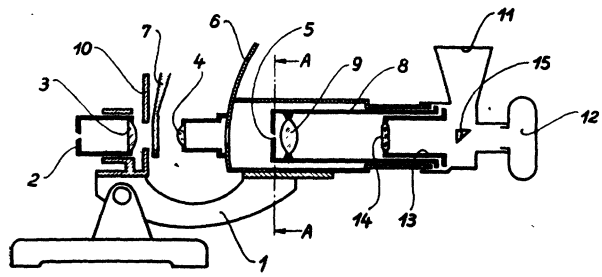

FIG. 1. Scheme of the cylindrical lens microscope.

A small area of the specimen, screened out mechanically, is projected by the lens (9) onto a focusing screen (11) by means of the prism (15) or immediately onto the film of a miniature camera (12). The oblique slit (5) is reproduced by the cylindrical lens (14) as a sharp, vertically arranged line seen as the base line in the final diagram, provided the microscopic specimen is optically empty. In this way each structure detail of the sample, based on differences of refractive gradients, leads to a lateral deviation from the above-mentioned baseline.

If a microscopic specimen is put into such a cylindrical lens system, a result is obtained such as that shown by Fig. 2. These schlieren graphs are taken from different, not fixed, and not stained tissue sections, cut at approximately 30 microns thickness. Each tissue has a relatively characteristic diagram. Homogeneous biological tissue gives relatively uniform diagrams. Complexly composed tissues such as human parenchymatous organs give more complicated graphs difficult to interpret. On the other hand, simple model tests, such as thin glass threads in one or more imbibition fluids, give simple graphs mathematically easy to explain (*4*). Keck (*5*) shows diagrams of skeletal muscle tissue of the isolated singular living muscle

[1] I am indebted to H. Engel of the University's Institute for General Botany for helpful suggestions.