Modification of the Use of the Pipette Filler for Reducing the Hazards of Contamination

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An adaptation is described which makes the common propipette readily acceptable for repetitive use. The application of pressure from an appropriate gas to permit rapid delivery of fluids and a method by which the propipette may be used comfortably in one hand make this tool amenable to routine use in a practical attempt to reduce the risks of contamination to both the operator and his cultures.

Contamination is a constant threat in the laboratory. This has been very aptly discussed by Coriell (1), especially with respect to the cell and tissue culture laboratory. Overt infection results in losses of cell lines and strains. Latent infection delays detection of contaminants and leads to invalidation of experiments and serious losses in time. The loss of valuable cultures through contamination is one problem; however, the threat of infection of the investigator, himself, by the culture has now become of major concern. The increased use of the cultured cell as a substratum for virus growth, especially in the search for and study of oncogenic viruses, now presents a potential health hazard for the operator (3).

Over the years, attempts have been made to minimize the threat to valuable cell strains and to the individual. These have usually centered around the design of laboratories and the use of rigorous technical procedures and restrictive hoods (2). Losses from infection can often be circumvented by duplication of stocks and by low-temperature storage. The former method is laborious and costly; the latter has its own specific problems. A major fault, however, still remains. This is the prevalent use of the mouth for routine pipetting. It is our opinion that this practice needs to be replaced as the acceptable procedure in the cell and tissue culture laboratory. We present a feasible, nonrestrictive way of doing this by modifying the use of the common propipette or pipette filler (Spectronic Corp., Westbury, N.Y.).

In the recommended procedure, the stem of the pipette filler, which contains the exhaust valve, rests between and at the base of the first and second fingers as shown in Fig. 1. This leaves the fingers free to withdraw the pipette from the sterile canister and flame it in the usual manner. The pipette is fixed directly to the propipette with the help of the free hand. It is then held between the thumb and the second finger of one hand; the forefinger is free to align and secure the propipette in a comfortable position. From this point, the pipette is handled exactly as it would usually be. The little finger and palm of the hand are free to manipulate caps and stoppers in the usual way. Transfer of fluids is accomplished by applying pressure on the appropriate valves between the thumb and the index finger while the pipette rests inside the flask (Fig. 2).

Two things were necessary before this device could become acceptable for routine work requiring repetitive pipetting. First, it was essential to position the propipette comfortably in one hand and to learn to accept it as an extension of the hand, not as an addition to it. Secondly, and perhaps more importantly, it was necessary to modify the tool so as to shorten the time needed for ejection of fluids. This latter was most con-
Fig. 2. Position of the pipette filler during the transfer of fluids. Aspiration and transfer of fluids are accomplished by the application of pressure on the respective valves between the thumb and index finger while the pipette rests inside the flask.

veniently accomplished by applying pressure from a tank of gas to the stem of the exhaust valve of the pipette filler through a length of flexible tubing. In our laboratory 5% CO₂-95% air is used since our medium depends on the bicarbonate buffer system; any inert gas would be suitable. A flow rate of 1 liter/min is enough for immediate ejection of fluids while still permitting sensitive control for quantitative delivery.

The simple technique described here requires no highly specialized or costly equipment yet has been most effective in our hands. The procedure is flexible and readily lends itself to variation; each individual will want to make minor adjustments to meet his own skill. With a minimum of effort and an average degree of dexterity, an operator can become adept at this procedure so that it is no more cumbersome, nor does it require any more time than the original practice requiring the use of the mouth. Indeed, in procedures requiring gassing of cultures, their execution is more rapid with this modification since it permits constant and simultaneous gassing during transfer. Some of us have developed facility with this technique within 5 to 10 min of use; others may take longer. This technique allows complete protection of the individual, including the head when necessary, yet leaves his hands free for the complete operation. Because of this, it could effectively eradicate the potential hazard to the culture in use or to the worker heretofore required to pipette by mouth. We have found this such a convenient and time-saving technique that we have substituted it entirely for the use of the mouth in all tissue culture procedures.

This method is recommended not only for use in cell and tissue culture laboratories, but for any potentially hazardous procedure requiring repetitive pipetting. It works extremely well for semi-quantitative procedures where one or several or more milliliters are delivered. It could certainly be adapted as well for quantitative work and for delivery of smaller volumes. This would require a somewhat greater degree of dexterity and practice.

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