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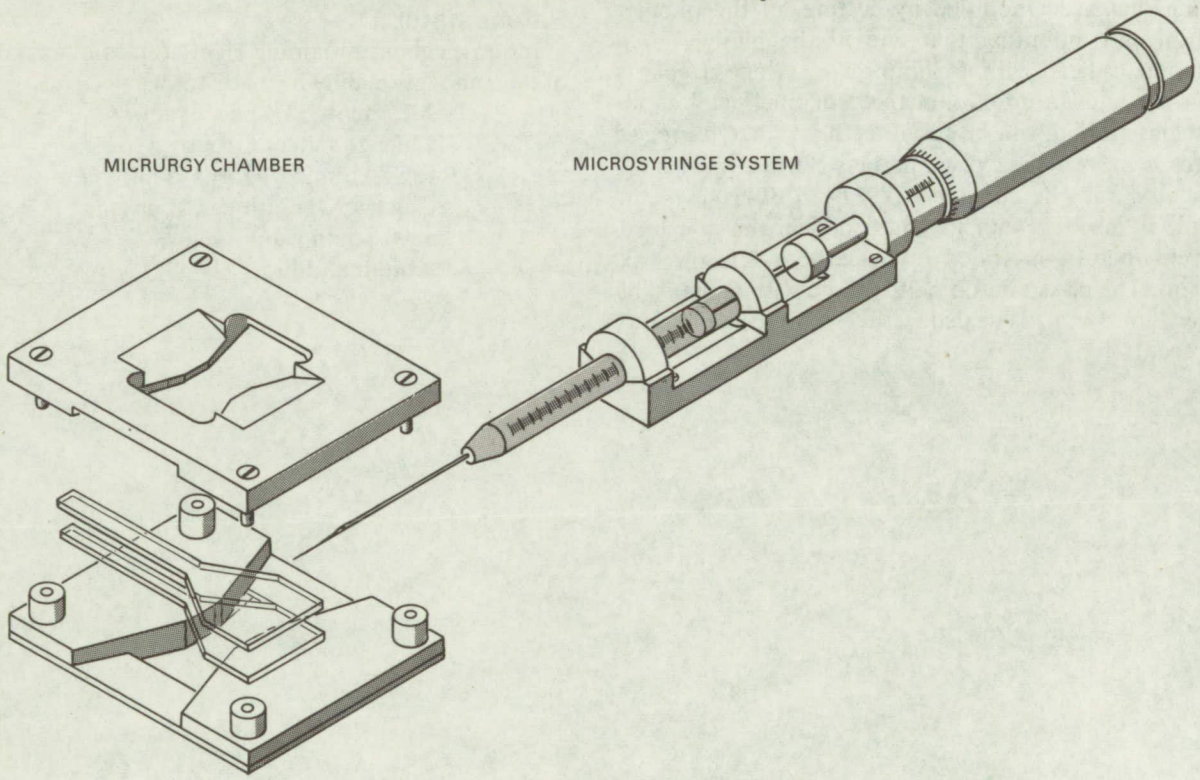
Liquid Micrurgy Chamber and Microsyringe Designs Allow More Efficient Micromanipulations



The problem:

To allow the performance of more dependable and efficient micromanipulations on large amoebae.

The solution:

A liquid micrurgy chamber was designed to allow amoeba specimens to be flattened sufficiently in a plane microscopic field to enable a clear view of all the nuclei; the design also eliminates spherical abberation and evaporation without adding the problems of anoxia or oil toxicity.

A microsyringe was designed, which moves the entire system closer to the specimen for improved operator control.

How it's done:

The Micrurgy Chamber. The chamber is made from two glass slides, supported by metal plates which are separated by rubber spacers at their corners. Screws passing through these spacers hold the plates together. The lower plate is brass, and the upper is stainless

(continued overleaf)

steel, beveled to premit changes of microscope objectives without refocusing. Adjacent surfaces of the plates are recessed to make room for microtools.

Two standard 3- × 1- × 1/25-inch glass slides are cut away as shown and are attached with a thin film of petrolatum to the opposing surfaces of the chamber. The chamber is designed so that the specimen lies 6 mm above the microscope stage; this allows room for the microtools. The condenser lens has a focal length of 6 mm, and is flush with the microscope stage.

The Microsyringe System. The syringe is fitted with a micrometer head and is mounted in an aluminum holder bolted to a micromanipulator. The entire system is thus closer to the specimen. The conventional long tubing between the syringe and microtip, with its inherent fluid drag and associated high pressure, is eliminated. In the figure, a 10-μl Hamilton syringe has been modified by cutting off the plunger button and mounting that end of the plunger in a micrometer head with a clamp. The syringe needle is removed and an additional piece of thick-wall capillary glass tubing can be fused to the syringe barrel to increase the working distance between the micromanipulator and the chamber. A 27- to 30-gage metal needle is inserted with its sharp end in the extended barrel, where it is sealed in place with Kronig wax cement. The glass micropipette, made with a shank of some 2 to 3 cm , is sealed with Kronig cement onto the needle.

Notes:

1. The micrurgy chamber is a versatile instrument which can also be used for: (a) measurement of the volume of single cells, (b) a counting chamber using a ruled grid, (c) ultraviolet radiation of parts of single cells, using quartz instead of glass, and (d) laser irradiation of parts of single cells.
2. Inquiries concerning this innovation may be directed to:

   Office of Industrial Cooperation
   Argonne National laboratory
   9700 South Cass Avenue
   Argonne, Illinois 60439
   Reference: B67-10305
   Source: E. W. Daniels—Biological and Medical Research Division (ARG-251)

Patent status:

Inquiries about obtaining rights for commercial use of this innovation may be made to:

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U.S. Atomic Energy Commission
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