carries two or three embryos and sometimes one or four.

Nothing is known about the length of the gestation period of this mammal, as is also stated by Wislocki and van der Westhuysen. All I could find in the literature was that the young are born in November and December. The year I commenced to collect this material I started in the first week of November expecting to find all stages of development in this animal, which is hardly bigger than a rabbit. All fetuses were near birth or the young were already born. The following year I started collecting in August and got embryos about 8 cm. long. The animals caught in May of the succeeding year possessed already small embryos. It was only in April of the fourth year that I succeeded in obtaining uteri without any outward sign of gravidity. From this we may infer that the length of the gestation period of *Procavia capensis* is six to seven months. This is a very long time for an animal of that size, but Dr. Broom of the Transvaal Museum informs me that the probable ancestors of the dassie were much larger animals, and the length of the gestation period supports that view.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN IMPROVED CELL FOR OPTICAL DIFFUSION MEASUREMENTS ON SOLUTIONS[1]

MEASUREMENTS of the absolute diffusion rate in solutions require transparent cells in which the original boundary between solvent and solution and its spreading incidental to diffusion can be recorded photographically by either light absorption or light refraction methods.[2,3]

The stainless steel cell of Lamm,[4] now in general use, offers the great advantage of plane parallel glass windows that eliminate optical distortions seen with cylindrical glass tubes. On the other hand, boundary formation in the Lamm cell, accomplished by gradual withdrawal of a steel or bakelite diaphragm separating solvent from underlying solution, causes displacement of the upper column of liquid which may adversely influence the diffusion measurements when a high degree of precision is required.

To eliminate this difficulty, a simple diffusion cell of small volume has been designed on the principle of the new Tiselius electrophoresis cell.[5] In the cell described here, solvent and solution surfaces are in direct contact as the boundary is formed. However, unlike the conditions with the Tiselius cell, the boundary is formed in the photographic field and thus does not have to be moved by special compensating arrangements. This cell, somewhat similar to that of Loughborough and Stamm,[6] has been designed and built in cooperation with Mr. H. S. Bush, instrument maker of Cornell University.

Two stainless steel blocks A and A_1, with rectangular slots, constructed as shown in Fig. 1, are placed

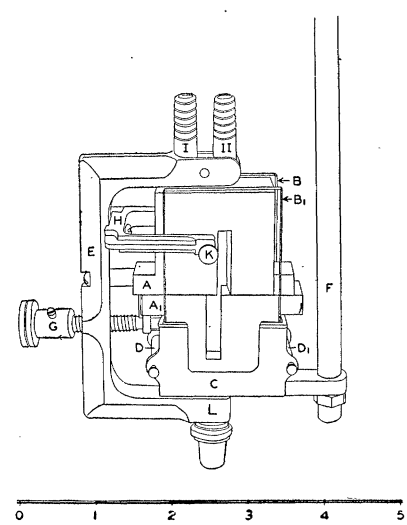

FIG. 1

one above the other. The upper block is fixed at the top and the side to the frame, E. The lower block is pressed against the upper one by the spring at L and can be moved laterally by means of a screw, G. The sliding surfaces of the blocks and their vertical front and back surfaces are ground and polished flat to within 1/10,000 of an inch. Two optically flat glass windows, B and B_1, fit against the cell surfaces and, together with block A_1, are held in place by means of two brackets C and C_1 (the latter not shown), clamped together by the screws D and D_1. H is a C-shaped clamp attached loosely to E and carrying the screw K, which can be tightened to exert pressure on the upper part of the glass windows.[7] The vertical

[1] This work has been made possible by a grant from the Rockefeller Foundation.

[2] A. Tiselius and D. Gross, *Kolloid. Z.*, 66: 12, 1934.

[3] O. Lamm and A. Polson, *Biochem. J.*, 30: 528, 1936.

[4] O. Lamm, *Nova acta regiae soc. scient. Upsaliensis* 10, No. 6, 1937.

[5] A. Tiselius, *Trans. Farad. Soc.*, 33: 524, 1937.

[6] D. L. Loughborough and A. J. Stamm, *J. Phys. Chem.*, 40: 1113, 1936.

[7] In a recent design of the cell, the attachment of the clamp H has been moved from the frame E to the rod F. This permits the screw K to be left tightened during boundary formation.

rod F leads to an attachment by which the cell is mounted in the constant temperature bath. I and II are cylindrical openings through which the cell is filled. By sliding the lower block to the left until its slit is in line with tube I, the lower compartment is completely shut off from the upper one. This part of the cell can be filled with solution through tube I, which connects through a one-eighth inch hole drilled through the upper block. The upper compartment is filled with the solvent through tube II. After the cell has been placed in the constant temperature bath, the screw K is loosened slightly, and the lower block, together with the glass plates, is moved slowly to the right until the upper and lower compartments are in alignment. Then the screw K is tightened again and diffusion proceeds.

A very thin layer of stop-cock grease is applied to the steel surfaces before the glass windows are set in place. In order to prevent grease from soiling the glass forming the windows of the upper half of the cell, a quarter-inch wide area to the left of the upper rectangular slot is left free of grease. For greater refraction power, the thickness of the cell has been increased, in comparison with the Lamm cell, from 1 to 1.7 cm. All parts with the exception of the stainless steel blocks, A and A_1, are made of chromium-plated brass.

From an experimental viewpoint the cell has been found to offer the following advantages: 1. Smooth boundary formation and immediate visibility of the boundary at the position of formation. 2. Small volume capacity, *i.e.,* 2 cc of solution and solvent each being sufficient for a diffusion experiment. 3. Greater refractive power due to the increased thickness of the cell; this allows the diffusion rate of protein solutions to be measured in concentrations of 0.2 per cent. and less. 4. Easy dismantling and reassembling for cleaning purposes.

The cell has proved to be suitable for diffusion measurements with solutions of proteins as well as of low molecular weight substances, the results of which will be published elsewhere.

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A SIMPLE, THIN AQUARIUM

A SATISFACTORY, water-tight, live chamber can be built easily with two sheets of clear window glass, a length of heavy-walled "pressure" rubber tubing, two wooden rectangles of the same size as the glass and four C-clamps. The figure shows the separate parts and the assembly in end view. This unit will hold water, can be made in any size or shape needed, and, for photographic work with artificial backgrounds placed behind the assembly, is excellent, since it does not distort the backgrounds or cause lack of uniformity in illumination.

If a thicker cell is wanted and rubber tubing of the largest size not adequate, a still broader unit can be made by adding a flat wooden rectangle and another U of tubing to the sandwich. Thus the thick cell will consist of rectangle—glass—tubing—rectangle—tubing—glass—rectangle. Smaller tubing can then be used and the flat rectangle made any thickness needed.

With this type of thin aquarium, all sorts of interesting lighting can be employed and many scenic backgrounds provided. Yet the organisms can not get far enough away from the front glass to escape a hand lens or dissecting binocular used horizontally.

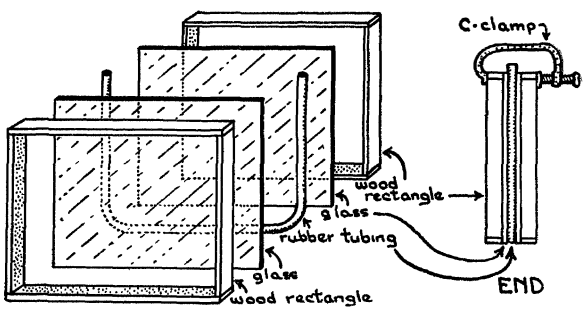

FIG. 1

For study of water insects, salamanders or fish, this type of equipment is much preferable to the commonly used thin museum jars, since it lacks distortion and can be made of any dimensions desired.

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