difficult to understand how energy-expending, internally heated systems could have survived in a cooling environment. This use for insulation must be a fairly recent innovation because even the more primitive, less specialized mammals still show a tendency toward ectothermism (poikilothermism) while many of the most highly specialized thermal animals, the birds, do not acquire complete endothermism (homeothermism) until some time after hatching.

This analysis presents another example in which it can be argued that rising or high temperatures may have played a dominant part in evolution.

In the Laboratory

Semi-continuous Tap-water Aerator[1]

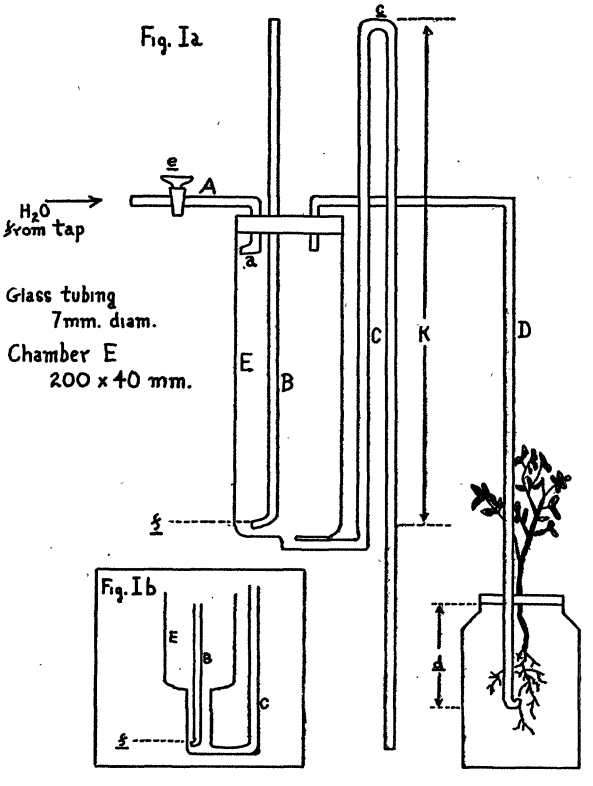
E. C. CANTINO and E. D. HATFIELD
University of California, Berkeley; Hercules, California

For many species, the water culture method for growing plants requires continuous aeration of the nutrient solution. By this means, the root system is maintained at an oxidative level favorable for active growth and metabolism.

In the greenhouse and in most laboratories, the source of oxygen is generally an air compressor, from which a continuous supply for the aeration process is readily obtainable. In the event that a compressor is not available, an alternative source of air is required.

The apparatus described herein has been constructed from common inexpensive glassware and requires a minimum of space. A trap or filter for oil spray and other contaminants commonly found mixed with air derived from a compressor is unnecessary because the source of such foreign material is eliminated. The quantity of water used per day for production of a moderate stream of air (approximately 10 cc. per minute) is usually in the neighborhood of four gallons or less. Results indicate that a relatively high efficiency and low cost of operation are characteristic of this equipment.

The apparatus is illustrated diagrammatically in Fig. 1a. Tap water is forced through A into chamber E, open to the atmosphere only through tubes B and C, and dropwise rate of water flow is regulated by stopcock *e*. Air is initially displaced from the chamber through B until water approaches level *f*. Subsequently, aeration of the solution commences after the pressure due to the head of water *d* has been overcome. When water has risen to level *c* in the siphon tube, it is automatically removed from chamber E by a siphon mechanism through C. During this short interval, aeration ceases. When the chamber has been emptied, the cycle is repeated and aeration continues. Water inlet tube A and tube B are bent toward the side of chamber at *a* and *f* in order to avoid spattering at the bottom of tube C during the siphoning interval and, consequently, to minimize introduction of excess air bubbles into tube C which affects the continuity of fluid in C. A highly porous, fritted glass disperson disc may be used for more effective gas distribution at the terminal end of the aeration tube, D. However, it has been determined that a low porosity tube introduces some difficulty. The magnitude of the frictional resistance to gas flow offered by such material results in an undesirable increase in the total pressure which must be exerted by the expanding gases in E to overcome the gross resistance in the system.



The time interval between intermittent aeration can

[1] The authors wish to express their appreciation to T. C. Broyer for helpful suggestions and criticisms with this paper, which was written while the senior author was located in Pasadena, California.

be minimized by designing the apparatus so that the time required for removal of water from E is small as compared to the time necessary for liquid in C to reach level *c*. Although the dimensions of chamber E (Fig. 1a) are satisfactory for aeration of plant root systems, the time interval between cessation of siphoning and production of a closed system in E upon reaching level *f* can be reduced if continuous aeration is desirable for some other purpose. This can be accomplished by constructing the chamber as shown in Fig. 1b. The advantage of a slight increase in efficiency is consequently attained at the expense of a more elaborate design, which decreases to some degree the simplicity of the original apparatus.

It has been found that, in order to maintain the described continuity in the rate of aeration with the apparatus in Fig. 1a, the relationship between height K of siphon tube C and head of water *d* to be overcome in the culture tank can be formulated by the following approximation: $K = 2.2d$. Obviously, this relationship is only applicable if the dimensions of chamber E and diameter of glass tubing used are equivalent to the specifications outlined in Fig. 1a.

The aeration equipment described in this paper was constructed with siphon tubes of several dimensions and used successfully for aeration of culture solutions of various depths. The apparatus has been used continually for periods of more than thirty days at one time, and with the exception of occasional minor adjustments of the rate of water flow due to slight fluctuations in the pressure of the main water supply, no difficulty was experienced.

Prozones and Blocking Effect in Normal Iso- and Hetero-Agglutination With Cord Sera

HERBERT H. LUBINSKI
Jewish General Hospital, Montreal, Canada

Wiener (*2*) has recently described a blocking test for Rh sensitization as a method to detect specific antibodies in anti Rh sera, which otherwise fail to demonstrate the usual *in vitro* agglutination phenomena. He has also demonstrated that these blocking antibodies are the cause of the prozone phenomenon, which may be observed, not infrequently, in anti Rh agglutination.

Using the blocking technique, Levine and Gilmore (*1*) were able to obtain a blocking effect with the serum derived from a patient suffering from infectious mononucleosis in which the Paul Bunnel reaction was negative. The effect was quite analogous to that observed in Rh negative mothers of erythroblastotic infants.

The opportunity presented itself to the writer to test the relation of blocking antibodies to the prozone phenomenon in normal iso- and hetero-agglutination. During a study on cord sera four sera were found among several hundred which showed a more or less marked inhibition zone. These sera, which had been stored at refrigerator temperature for 2 to 3 weeks, were used to search for the presence of blocking antibodies. The sera were all group O.

Technique: Previously unheated serum (0.2 cc.) was diluted in increasing amounts with 0.2 cc. of saline and 0.1 cc. of a 2.5 per cent suspension of thrice-washed red cells added. The mixture was shaken well and centrifugalized for 2 minutes at a speed of 1,200 rpm. A first reading was then made, to see if an inhibition zone was present. After renewed centrifugalization the supernatant fluid was withdrawn and replaced by a type-specific serum diluted to such a degree that it still gave a 4+ reaction with the red cells used in the experiment. The tubes were then thoroughly shaken, centrifugalized a third time and readings made. Two tests were done with A and B cells, respectively, and two with rabbit cells. The results are given in Table 1. They show

TABLE 1
SERUM—DILUTION

Serum	Red cells	undil.	1/2	1/4	1/8	1/16	1/32	Nature of test
1652	B	−	−	±	3+	2+	±	Direct titration
		1+	2+	4+	4+	4+	4+	Blocking
1818	A	1+	2+	4+	4+	2+	1+	Direct titration
		1+	3+	4+	4+	4+	4+	Blocking
1819	Rabbit	−	2+	4+	4+	3+	1+	Direct titration
		2+	4+	4+	4+	4+	4+	Blocking*
		±	2+	4+	4+	4+	4+	Blocking†
1863	Rabbit	1+	2+	4+	4+	3+	1+	Direct titration
		1+	2+	4+	4+	4+	4+	Blocking

* Testing serum diluted 1/2.
† " " " 1/32.

that in the prozone the added serum could not achieve a complete agglutination, whereas in the highest dilutions 2+ and 1+ reactions as well as the negative were changed to 4+, thus demonstrating a blocking effect of the tested cord sera.

The question as to the nature of the blocking antibodies is still open to speculation. Wiener regards them as "an antibody having the capacity of combining with the sensitive cells without producing a visible reaction. After proper absorption the serum may give a positive agglutination reaction." One may think of an agglutinoid, *i.e.* an agglutinin which has lost the agglutinating part and consists of the hapto-