TABLE I

RELATIVE RESPIRATION VALUES OF LEMONS UNDER THE INFLUENCE OF THE VAPORS OF SEVERAL FUNGI

Treatment	January														
	5	6	7	8	9	10	11	12	13	15	17	19	20	23	27
Control	100	99	99	101	100	97	99	99	88	91	89	90	85	78	82
Penicillium digitatum	100*	113	129	151	233	196	176	176	157	172	169	187	176	143	178
Penicillium italicum	100*	102	102	103			106			107		113		98	101
Sclerotinia sclerotium	100*	93	97	105			104			102		110		89	83
Aspergillus niger	100*	94	94	102			99			95		103		84	83

* Mold placed in series with jars.

much reduced activity or complete lack of response by the fruit to the emanations of the other fungi as evidenced by Table I.

P. italicum (blue mold) appears to produce a slight effect, much less than that of green mold, though these two species are closely related physiologically. The other species, as well as *Oospora* and *Alternaria* which were tested in other experiments, did not seem to bring about any acceleration of the CO_2 evolution.

Rapid yellowing of green lemons was observed in all cases in which emanations of green mold were passed over the fruit. A slight increase in the rate of color development took place under the influence of blue mold, with no effect produced by the vapors of the other fungi. Shedding of stem ends was caused by green mold only. Apparently the responses of the fruit to the gaseous products of *P. digitatum* are similar to the effects of ethylene. Definite proof as to the production of this substance by the fungus is hoped to be obtained by direct chemical analyses. Detailed discussion of these experiments will be forthcoming in the *American Journal of Botany*.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A CONVENIENT APPARATUS FOR THE MANIPULATION OF EGGS IN THE STUDY OF THE CHORIO-ALLANTOIC MEMBRANE

IN the study of the lesions produced by viruses of vaccinia and ectromelia on the chorio-allantoic membranes of chick and duck embryos using annular oblique incident illumination, it was found by Himmelweit[1] that it was necessary to raise the membrane until it was in close contact with a coverslip which was sealed over the opening in the shell. He found that the natural air sac could be inflated by exerting gentle pressure, by means of a rubber tube, to the opening which had previously been made in the wall of the natural air sac for the purpose of lowering the membrane. During our study by high power microscopy of the virus of infectious myxomatosis on the chorio-allantoic membranes of eggs the piece of apparatus here described was developed.

After culturing the virus of infectious myxomatosis on the chorio-allantoic membrane according to the technique of Goodpasture and associates,[2] the shell was broken down to allow an opening of from 2 to 3 cm in diameter, and a layer of vaseline and paraffin mixed in equal parts was built up around this opening to a height of approximately 2 mm above the cut edge of the egg-shell. A few drops of saline were then placed on the membrane and a coverslip was sealed to the paraffin wall according to the method described by Himmelweit. The egg was sealed onto a spoon holder as described by one of us.[3] A piece of 7 mm glass tubing, the end of which had been previously flared to increase its diameter, was sealed over the hole in the wall of the natural air sac by means of paraffin, not by Ash's Model Cement as used by Himmelweit. This glass tube was held firmly in position by means of an ordinary wooden clothespin fastened to a No. 5 cork stopper, as shown in Fig. 1. A rubber tube provided

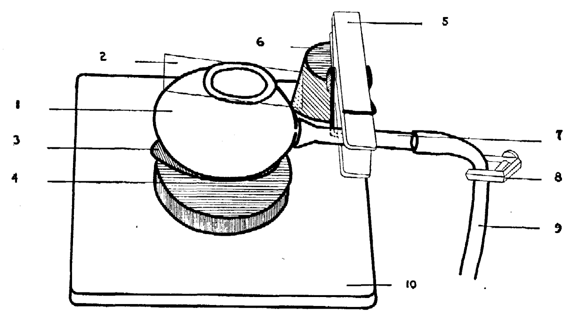

FIG. 1. 1. egg; 2. coverslip; 3. spoon; 4. metal lid; 5. clothespin; 6. cork; 7. glass tube; 8. screw clamp; 9. rubber tubing; 10. wooden base.

with a screw clamp was fitted to the other end of the tube. The entire apparatus was securely fastened to a small wooden base which could be held in the hand.

[1] F. Himmelweit, *Brit. Jour. Path.*, 19: 2, 108–123, 1938.

[2] A. Woodruff and E. Goodpasture, *Amer. Jour. Path.*, 8: 209–222, 1931.

[3] R. E. Hoffstadt, Stephen Pilcher and Elizabeth Osterman, SCIENCE, 86: 356, 1937.

After a small hole had been made in the paraffin wall to allow air to escape from the artificial air sac, the egg was ready for manipulation of the membrane into position in contact with the coverslip by inflation of the natural air sac. Holding the egg tilted away from the opening in the paraffin wall, air pressure was applied by blowing gently through the rubber tube. The air pressure was carefully controlled by means of the screw clamp while the opening in the wall was sealed by the application of a pair of heated forceps to the glass immediately above it. The screw clamp was then closed tightly.

These membranes were found to remain in contact with the coverslip from two to seven days, or could be lowered and raised again at will. If desired, the glass tube can be removed from the egg and the opening in the wall of the natural air sac sealed with the vaseline and paraffin mixture. The apparatus is cheap, convenient and easily constructed.

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A TUBE FOR NITROGEN PURIFICATION

WE have found it necessary to devise a rugged, high capacity tube for the removal of traces of oxygen from nitrogen for our work in an oxygen-free atmosphere. Several designs of tubes have been described[1,2] that appear to have certain unique features. However, our apparatus is rugged, efficient, inexpensive and can be constructed in a very short time from materials available in most laboratories. These characteristics make it seem worthwhile to describe the apparatus briefly here.

The apparatus is described pictorially in Fig. 1.

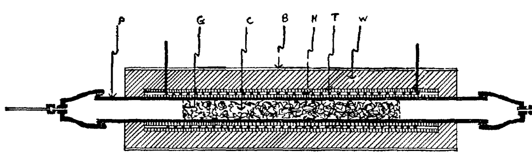

FIG. 1. P—iron pipe; G—copper gauze; C—copper turnings; B—asbestos paper; H—Nichrome wire (heater); T—asbestos tape; W—asbestos wool.

In brief, the apparatus is as follows: a 2 inch × 24 inch iron pipe is fitted with reducers to each end of which is attached a 1 foot length $\frac{3}{8}$ inch copper tubing by means of sleeves and connectors. The copper tubing can be sealed easily to a glass line or rubber tubing by means of de Khotinsky cement or sealing wax. The tube is packed with fine, bright copper turnings to serve as the oxygen remover; the turnings are held in place with loose wads of copper screen. The outside of the iron pipe is wrapped with three layers of asbestos tape then wound with 40 feet of No. 18 Nichrome wire (0.4 ohm per foot) to serve as the heater coil. This is wrapped with two layers of asbestos tape, then with a $1\frac{1}{2}$-inch layer of asbestos wool (commercial asbestos), held in place with two layers of asbestos paper and finally with several more layers of asbestos tape. The temperature may be regulated by means of an outside resistance. In fact it is highly desirable to calibrate the external resistance for several temperatures in the heater pipe.

The copper may be regenerated by slow, careful flushing with hydrogen.

A safety feature that is desirable in the use of any of these oxygen-removal tubes is a bottle of alkaline pyrogallic acid through which the purified gas may be passed after it leaves the heater tube; the pyrogallic acid will become discolored as it is exposed to and reacts with oxygen. This will serve both as an indicator of the efficiency of the tube as well as a safety trap to remove traces of oxygen should they not be removed in the hot tube. After the pyrogallic acid has become appreciably discolored it should then be replaced with a fresh solution and the copper must be regenerated. If the rate of flow of gas through the heated tube is very rapid it may be necessary to cool the gas before passing it through the pyrogallic acid solution. This is done easily by using a longer piece of copper tubing as an exit tube, coiling it several times and placing the coil under a stream of cold water.

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[1] E. C. Kendall, SCIENCE, 73: 394, 1931.
[2] Savage and Ordal, *ibid.*, 91: 222, 1940.

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