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BOX 1 FOLDER 33

Air Supply Examination

1927

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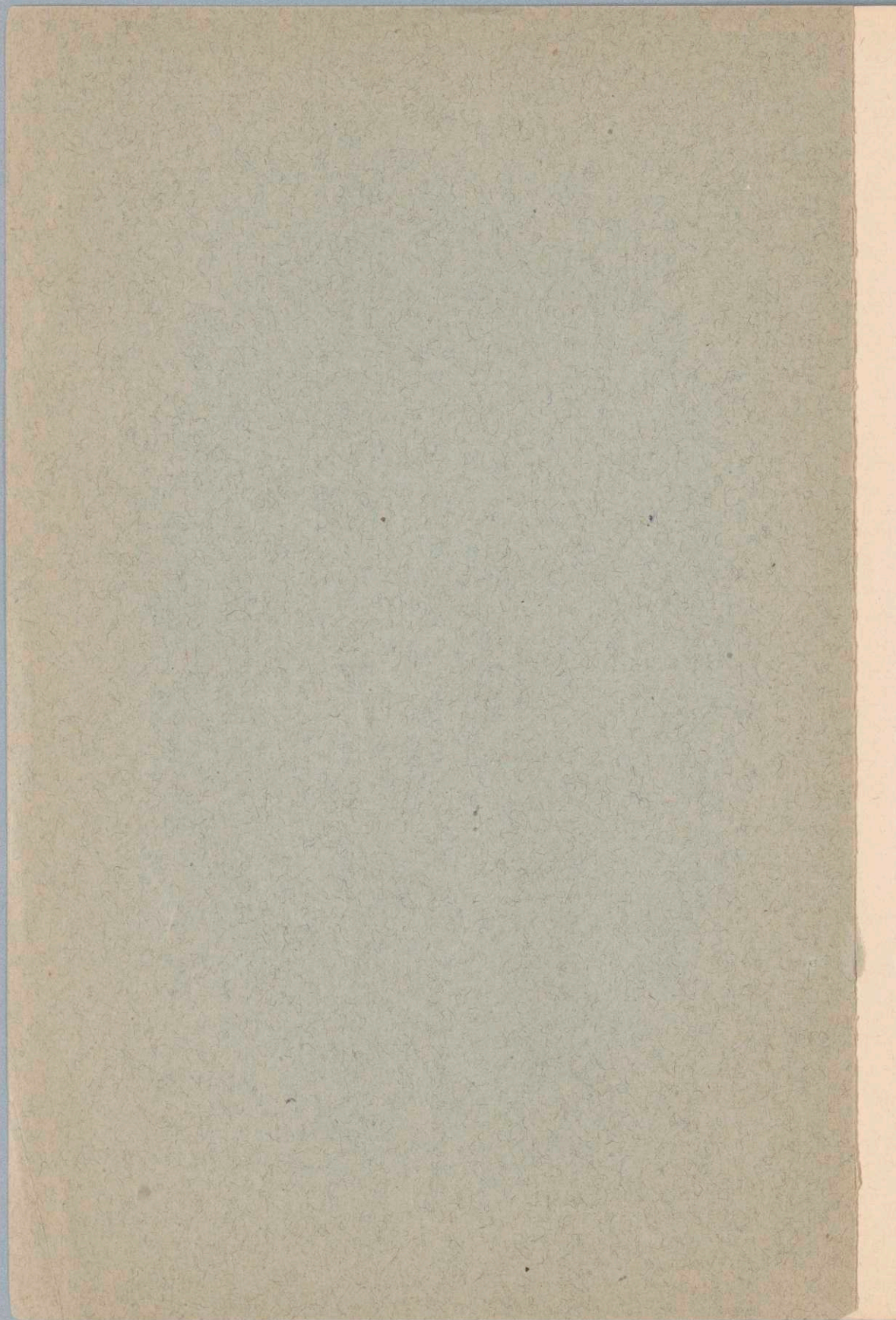
Air Supply Examination

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T-N
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AIR SUPPLY EXAMINATION.

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AIR SUPPLY EXAMINATION.

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In considering the practical problems of ventilation, what is needed is the more frequent asking of the question, "Is this air safe to breathe?" as we ask "Is this water safe to drink?"

The readiest means of answering the question should be worked out by this laboratory section.

Some possible methods of arriving at a just conclusion, involve the asking and the answering of the following questions:

I. Is it dusty?

If so, is the dust inert, that is, sand or soot?

Is it composed of active germs?

II. Is it above normal moisture content (humidity)?

III. Is it above the optimum temperature?

IV. Is it odoriferous in any way?

V. Has it above 6 parts in 10,000 of CO_2 ?

From the results of these inquiries the expert examiner should make his determination, not from any one of them alone. Just as in the case of water supply and food supply there will arise special cases that require special methods. For example, leaky gas pipes fouling the air with carbon monoxide should be detected under IV, odor of gas. Even leaking furnaces give accompanying odors, and sewer gas gives a decided taste on the lips, if not a distinctive odor to the educated nose.

The following are possible methods of answering question I, Is it dusty?

a. Observation by means of a sunbeam crossing the room or by a search light.

b. Placing a glass plate 18 x 24 inches in such a position as to catch the falling dust for two hours.

c. Filtration of from 4 to 10 litres of the air as described below.

d. Examination by means of exposed gelatine plates.

For determining the answer to question II, various instruments are on the market which give humidity readings with no difficulty of manipulation.

To answer III, thermometers cheap and sometimes reliable can be procured.

Feeb. Coll.

The test IV requires a certain education of the olfactory nerves and experience in detecting the one odor sought, among several present.

Fifth, the estimation of the CO_2 present should be by one of the approved methods. Modifications of the Cohen and Appleyard method are suggested.

A comparative test for dust in the air may be made by a method similar to that used for milk. A large funnel to serve as director and directing surface is filled with a small, moistened filter paper as for chemical filtration. A small wad of absorbent cotton, which may be moistened with water or glycerine or a sugar solution, is placed in the apex. The air is then passed through by any available means. Suction may be applied from the operator's lungs if he has no other means at his disposal. A length of rubber tubing will even permit him to be in an adjoining room.

The exposure of the Petri dishes may be for such time as seem to answer the particular questions.

It is conceded by all experts that temperature and humidity play a part far greater than that of carbon dioxide in the comfort if not in the health of persons occupying enclosed spaces. Therefore greater attention should be paid to these factors.

The "stuffy" character of air is largely due to odors added to humidity and temperature. Mr. Dissel's tests of railway cars confirms previous work. A greater supply of fresh air is the remedy for all these ills. A keener sense of the foulness of air as it approaches us will tend to health and long life.

A quick and ready method for estimating the carbon dioxide in the air of enclosed spaces is a great desideratum. The properties of the gas and its relations to other substances, have not, hitherto, admitted of a mechanical measure as a thermometer is a measure of the degree of heat.

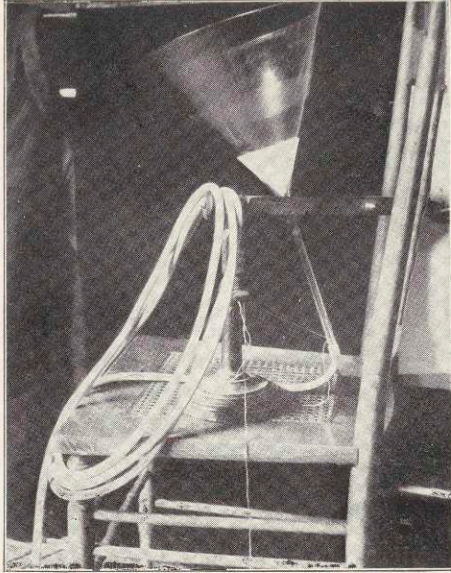
The Wolpert plan of a bead of liquid flowing down a thread serves for a day or two. But the thread soon becomes encrusted and ceases to conduct the liquid, and the reservoir requires renewing frequently.

The various devices for absorbing the gas by lime water present the most practical methods. The difficulty in manipulation is greatly increased by the improvements in ventilation. Thirty years ago, 20, 30, and even 50 parts of CO_2 in 10,000 were commonly to be

PLATE 4

Apparatus for obtaining dust spots as indicators for air cleanliness.

FUNNEL.



PAPERS.

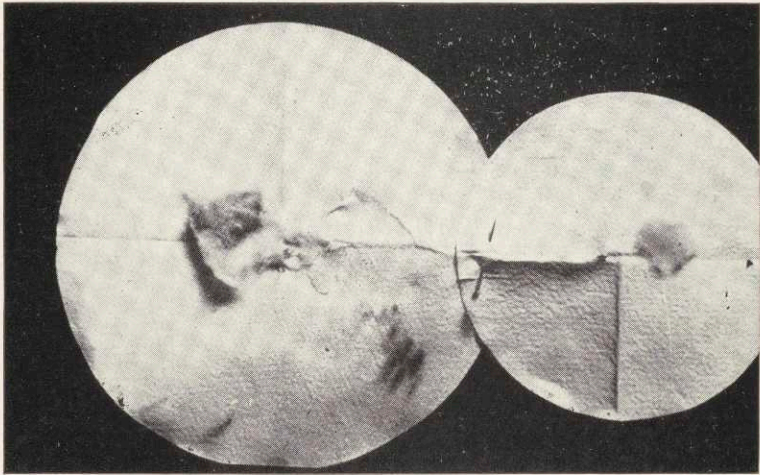
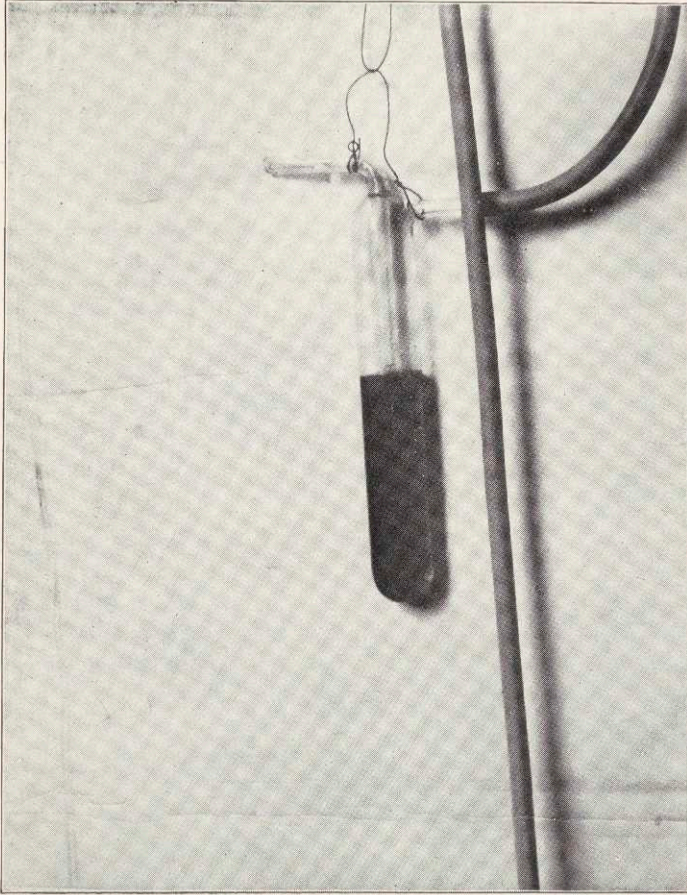


PLATE 5



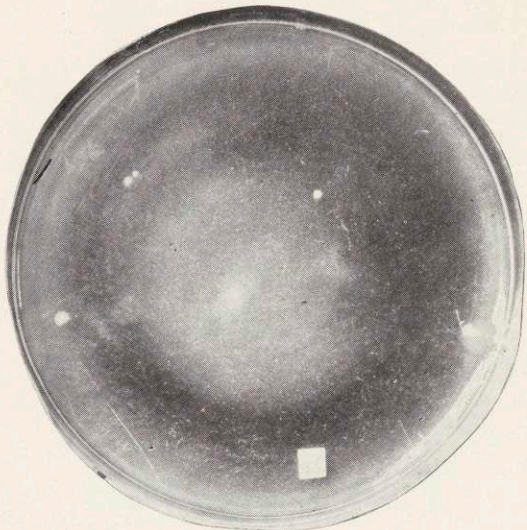
Apparatus for air testing. Cohen and Appleyard principle.



PLATE 6

PETRI DISHES.

No. 2. October 23, 3 p. m., exposed on dining room table for ten minutes, half an hour after carpet sweeper was used on the rugs.



First photograph 48 hours after exposure.



Second photograph 72 hours after.



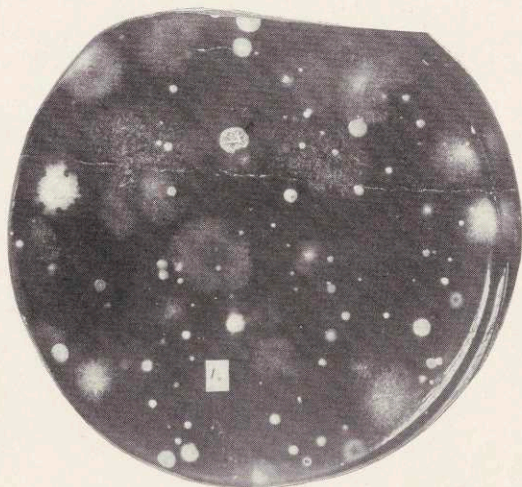
PLATE 7

PETRI DISHES.

No. 1. Reception room. Five minutes exposure during dusting.



Photograph taken 48 hours after exposure.



Photograph taken 72 hours after exposure.

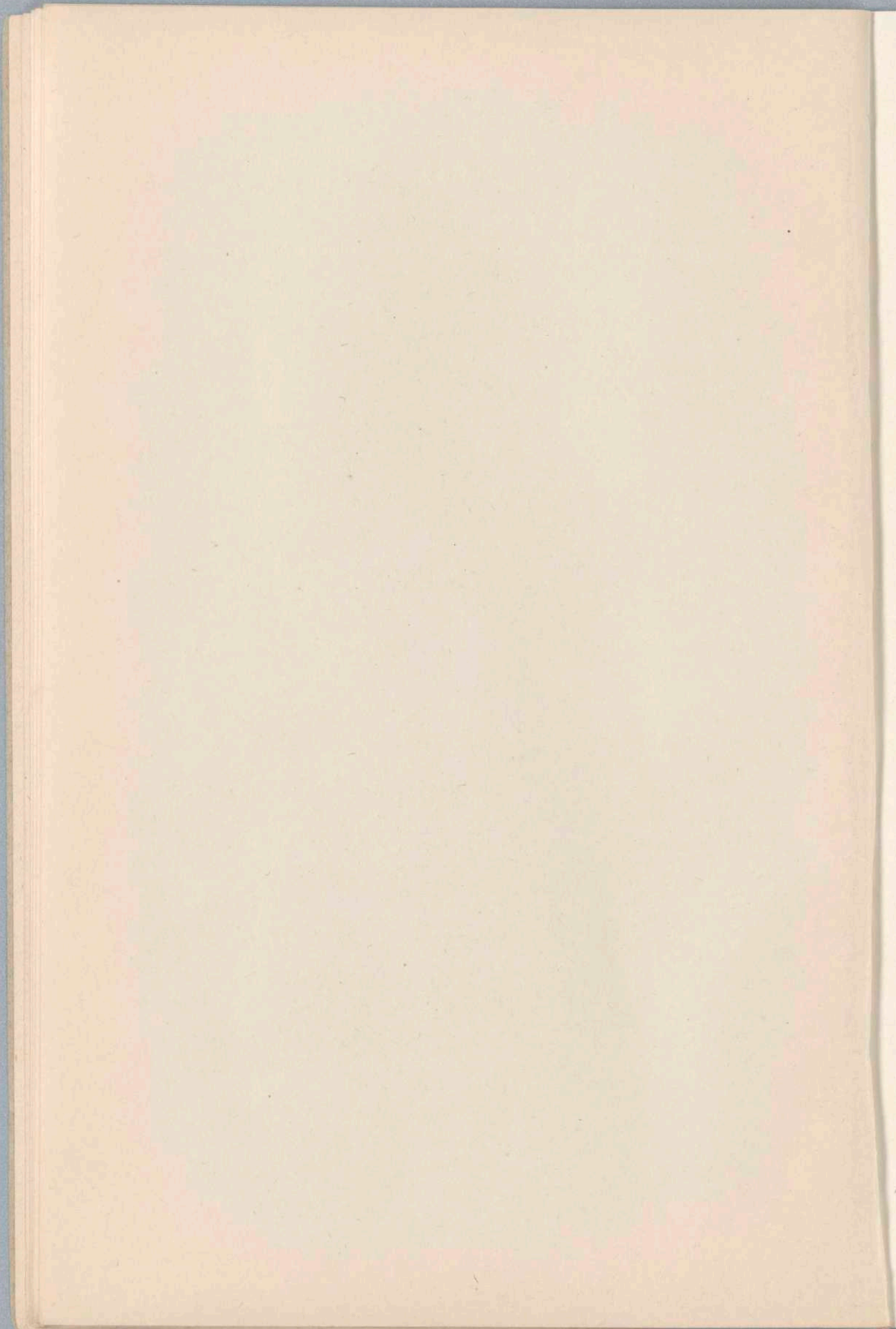
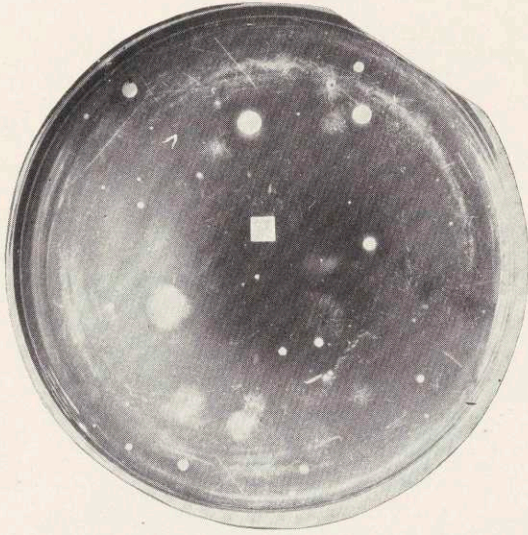


PLATE 8

PETRI DISHES.

No. 3. Library table. Five minutes exposure during dusting and beating up of cushions.



Photograph taken 48 hours after exposure.



Photograph taken 72 hours after exposure.

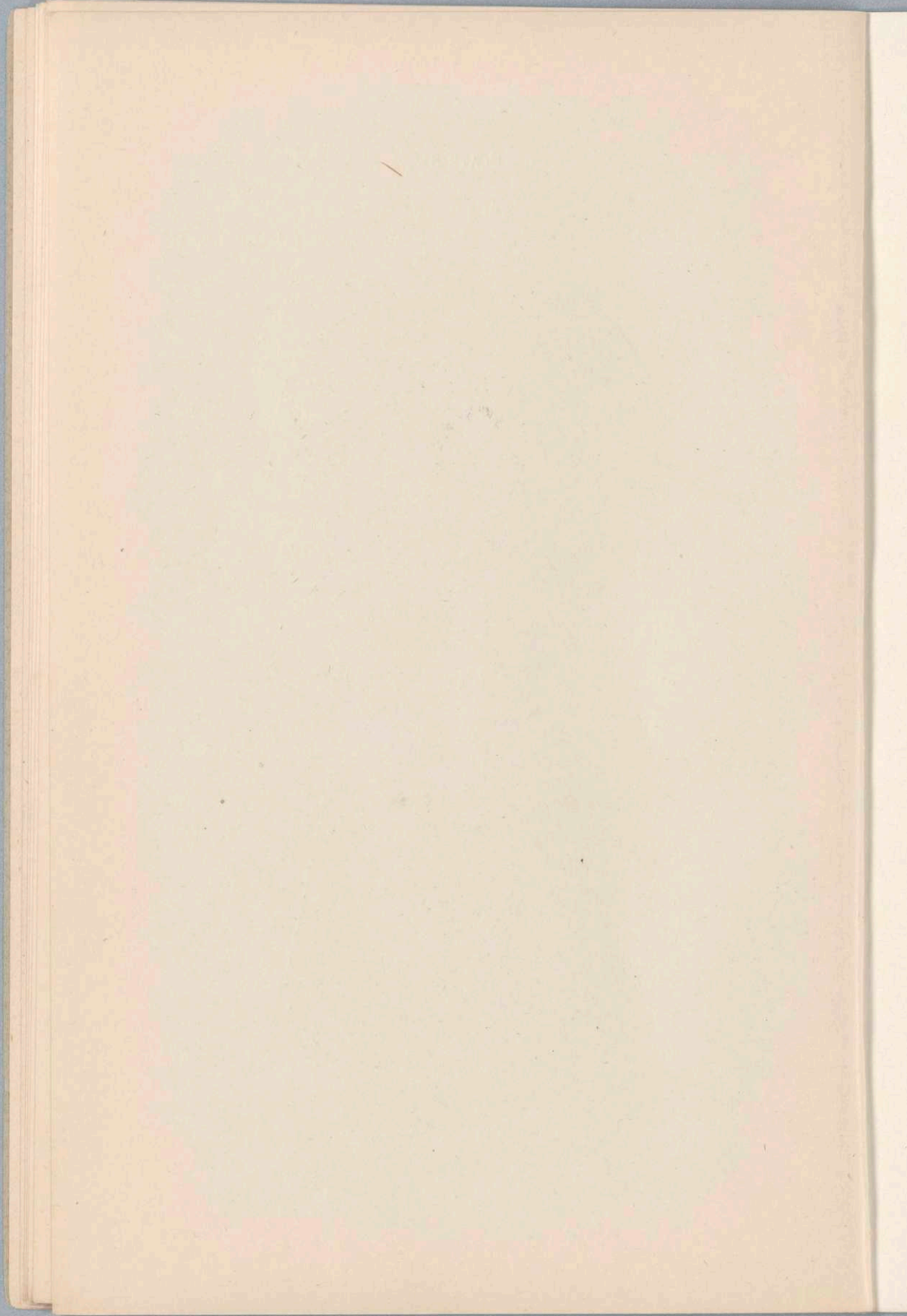
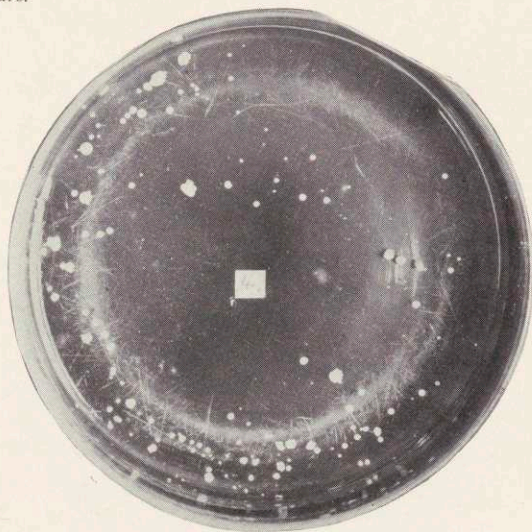


PLATE 9

PETRI DISHES.

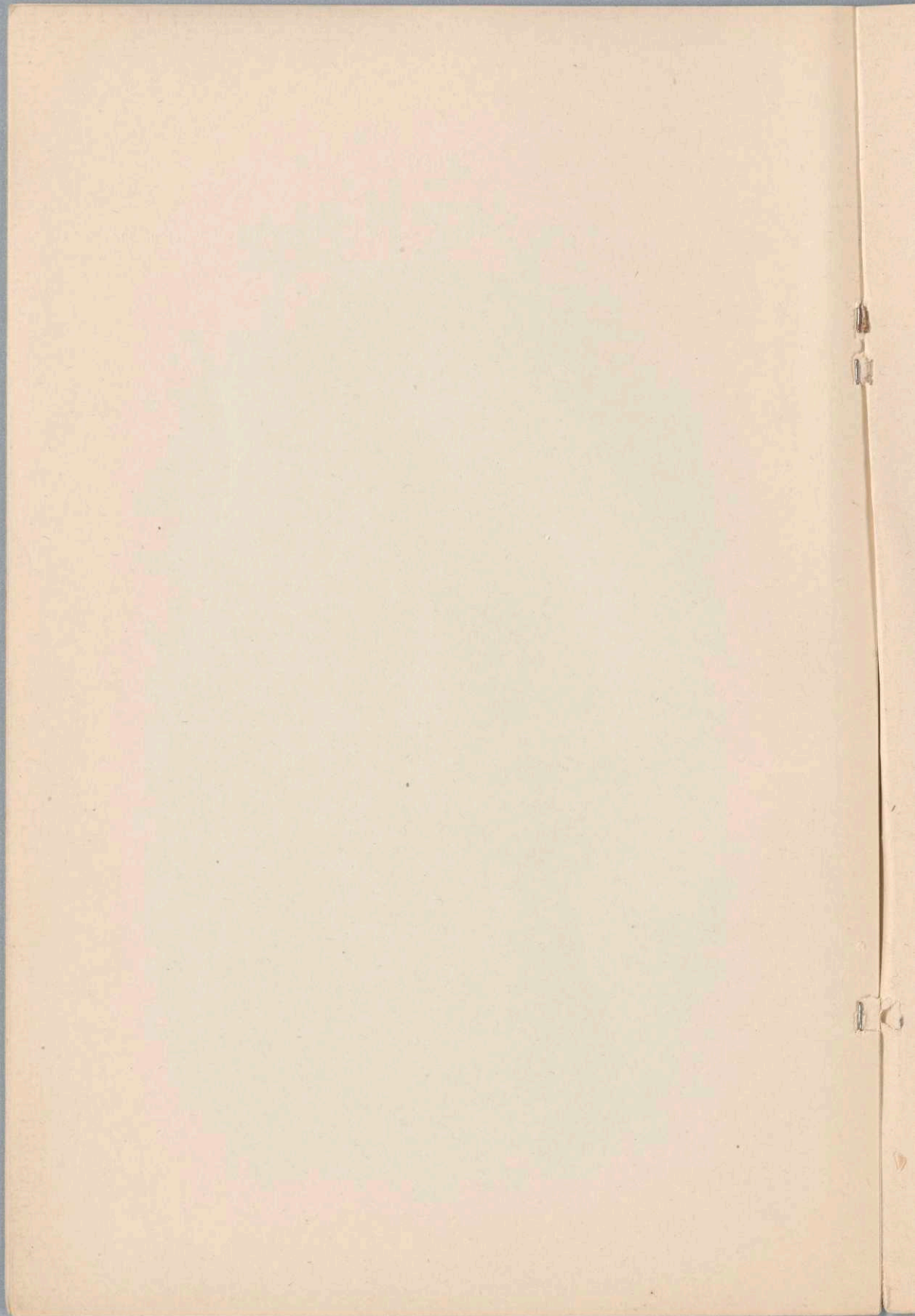
No. 4. Library table, half an hour after dusting, doors and windows open. 10 minutes exposure.



Photograph taken 48 hours after exposure.



Photograph taken 72 hours after exposure.



tested for. To-day 6, 8, and 10 are the numbers, so that popular methods are much more difficult to arrive at.

The most scientific and probably the most available method is same modification of the method of Cohen and Appleyard proposed in a paper before the British Association in 1894. It depends upon a scientific fact, (the law of partial pressures), that the greater the amount of CO_2 in a given volume of air, the quicker it will be absorbed by an alkaline solution. Tables may be made for any variations of apparatus used to carry out this principle. For instance, a test of the ventilation of sleeping cars may be made by collecting the air in 500 c. c. bottles and, in the laboratory, noting the time taken to decolorize a lime water solution of a given strength.*

In the examination of places difficult of access or for lecture room experiments, the use of an absorbing tube is very practicable. The volume and *rate* a minute must be strictly noted, together with the strength of solution. Tables prepared for the given conditions enable the operator to estimate closely enough for comparative purposes. The proportions used by the writer are 1-100 of saturated lime water in 20 c. c. volume, at a rate of 100 c. c. a minute.

Decolorization is carried only to the decided fading of the phenolphthaline, not to the disappearance of the yellowish pink which is so persistent and which vitiates so much work with this indicator.

* For method and cure see thesis by T. A. Dissel, Course II, M. I. T., 1906.

