tra link attached to the chain to accommodate the largest diameter sleeve should be placed one link from the end of the chain so that the rubber tubing extends beyond the extra link, thus providing complete rubber contact with the glass sleeve.

In use, the rubber covered chain is looped around the sleeve and the appropriate projecting link is slipped over the pin. Pressure on the handles clamps the chain around the desiccator sleeve, and the rubber tubing affords a good grip on the glass. The sleeve can then be turned in either direction.

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Germicidal Activity of Electric Heaters

Relatively little information is available concerning the possible secondary effect of various heat sources on the microbial population of room air. It appeared reasonable that a reduction in numbers might be induced by electric heaters, particularly those of a type in which a considerable amount of the heat generated is distributed by convection currents through the heater rather than by radiation. The higher temperature of the air in the immediate vicinity of the heater element, as well as inactivation or incineration of the biological agent on striking a hot surface, could be effective in reducing the numbers of air-borne organisms. Wesix heaters were selected for the tests since they are of a type (*1*) through which air circulates quite rapidly through and around a ceramic chimney (900 to 1200°F) supporting the heating element (1100 to 1500°F).

Table 1. Effect of electric heaters on the microbial population of air in various rooms of a home under normal conditions of use. Temperature range of 69° to 72°F.

Location	Air sample (liters)	Colony counts		
		Hours		
		0	1	2
Bedroom	40	88	44	8
Bedroom-study	35*	188	99	
Dining room	50	25	11	7
Dining room	100	74	43	31
Dining room	†	54	23	8
Dining room	100	16	8	3
Dining room‡	100	66	19	6
Dining room	†	68	21	14

* Millipore filters used for assay.
† Numbers settling on agar in petri dish in 15 minutes.
‡ Wall-type heater instead of floor-model heater.

Tests (*2*), to be reported in detail elsewhere, were conducted to determine (i) the direct germicidal action exerted when suspensions of bacteria, bacterial spores, or bacteriophages were nebulized in such a manner that a continuous stream of the aerosol passed through the heater core; (ii) the effect of the heater in an experimental room in which the population could be controlled; and (iii) the influence of a heater on the air-borne microbial population in rooms of my home.

Results of tests of type one and two indicated that the heaters did exert rather marked bactericidal, sporicidal, and viricidal activity. For example, direct passage of aerosols through the heater indicated a reduction in numbers of viable spores of the order of 50 to 75 percent, of around 90 percent for bacteria, and around 99 percent for a bacteriophage.

Tests of type three are of more general interest because they were designed to determine the reduction in numbers of air-borne microorganisms during normal operation of a heater in the home. Representative samples of air were passed through broth in an impinger flask (*3*), the numbers of viable spores and bacteria collected therein being determined by ordinary dilution and plating techniques. In some tests, the air was also sampled with the aid of Millipore filters. The two methods yielded similar results, but dilution and plating were better adapted to wide variations in numbers of organisms sampled.

The tests were carried out on different days and in different rooms under normal conditions in the home; the numbers of bacteria, therefore, showed considerable variation. Counts made on replicate samples of air, however, agreed quite closely with each other—for example, 73 and 75 colonies developed from 100 liters of air sampled 1 and 2 hours before the heater was used. Results of a number of tests are summarized in Table 1. The percentage reductions (including higher fungi developing during incubation for 72 hours) noted after 1 hour ranged from 46 to 56 percent and in the following hour from 30 to 80 percent. Plate counts of organisms settling out from the air indicated similar reductions. Different patterns of air circulation in the room and through the heater are responsible in part for the marked variations noted over longer test periods. Similar tests carried out with a wall-type heater rather than a floor model gave results of the same general nature (see Table 1).

The results of this study indicate that in addition to their primary heating function, electric heaters of the type described do exert germicidal activity during the time they are in operation in experimental chambers or in rooms in a home. In the latter case, rates of reduction of air-borne microorganisms were in the general range of 50 percent per hour.

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References and Notes

1. J. C. Beckett, *Am. Inst. Elec. Engrs. Applications and Industry* 73, part 2, 161 (1954).
2. Grateful acknowledgment is made to A. P. Krueger and J. C. Beckett for helpful advice.
3. T. Rosebury, *Experimental Air-borne Infection* (Williams and Wilkins, Baltimore, Md., 1947).

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Disposable Petri-Type Dish

It has been possible to have fabricated a petri-type dish from paper and plastic materials. This dish is fully reliable for usual bacteriological uses and is inexpensive enough to be discarded after it has been used once.

Figure 1 shows the appearance of the currently available (A. S. Aloe Co., St. Louis, Mo.) disposable petri dish. The left portion of the illustration shows an opened dish. The top stands on edge above the bottom dish. The right portion shows two streaked plates.

Dimensions are approximately those of the standard 90-millimeter diameter glass petri dish. Walls are constructed of heavy paper and tops and bottoms consist of cellophane or similar transparent plastic material. The plastic bottoms and tops are sealed in their marginal portions to the walls by adhesives applied under pressure.

The assembled dishes, which need not be washed, can be sterilized in the autoclave (115 to 120°C for 15 minutes or longer); the sterilization does not cause any discernible change or distortion in shape or composition of the materials employed in manufacture of the dishes. Dry air sterilization cannot be employed because the plastic is unstable at high, dry temperatures and is destroyed.

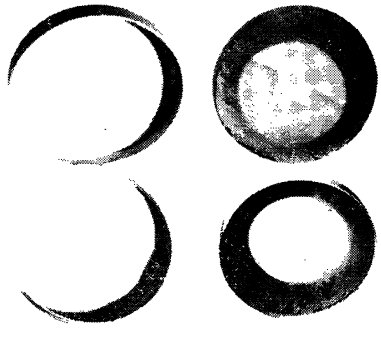

Fig. 1. Disposable petri-type dish.