

ENGINEERING

# Radiant Heating Makes High Room Temperature Unnecessary

## People Found to be Comfortable in Cold Rooms When Radiating Wall Panels Prevented Losses of Body Heat

**A** RADICALLY different approach to controlling human comfort, which has marked advantages over air conditioning, was presented before the recent New York meeting of the American Society of Heating and Ventilating Engineers.

Drs. C. A. Mills and Cordelia Ogle of the laboratories of experimental medicine at the University of Cincinnati presented their preliminary findings on the control of loss of body heat by the use of heated (or cooled) areas in the walls of rooms. The use of these panels, which can radiate heat to the clothing in cold weather or absorb heat from the clothing in hot weather, permits human comfort without the necessity of cooling or heating great masses of air, and the walls of the room, as is now done in air conditioning.

### Earlier Experiments

The general principle underlying the thermal panel system is not new; it was in use even in antiquity, and modern use, based on careful engineering research, has been made of it in Great Britain. The experiments of the Cincinnati doctors extend and verify these results.

Although the findings are only preliminary, the physicians say, "these results appear to be striking and unequivocal in their significance, so much so that their early publication was deemed advisable in order that other investigators might aid in expanding this line of research."

"Air conditioning would seem to be highly inefficient as a method of controlling body heat loss," say the scientists. Present methods, they point out, require that great masses of air and whole walls of rooms be cooled or heated in order that the body may be comfortable.

Moreover, sharp contrasts in temperature must be maintained with present systems. In winter a person leaves a room at 75 degrees to go to low outdoor temperatures. And in summer one leaves the outdoors with temperatures up to 100 degrees and enters a room air conditioned to 80 or 85 degrees. These sharp contrasts, state the physicians, can be

suspected of increasing infections of a respiratory nature.

Four experimental rooms were built for the investigation. Room 1 was kept hot and moist (temperature 90 degrees Fahrenheit and humidity 65 per cent), Room 2 had the same temperature and humidity conditions as room 1 but was lined with thin aluminum foil and contained six areas that could be cooled to a temperature in the 30's.

Room 3 contained air at 32 degrees but had panels in the walls which could supply radiant heat to the clothing on the body. With the cold air and the heating units operating an equilibrium temperature of 70 to 76 was maintained in this room.

Room 4 was identical with room three except that there were no heating or cooling areas, the temperature of 66 to 70 being maintained by air conditioning without radiation control.

The hot, sticky nature of room 1 was what might be expected in its semi-tropical artificial climate. Persons found the room produced free perspiration and a discomforting, smothering sensation.

### Some Felt Too Cool

Room 2, with its cooling areas, provided an interesting case. The air in the room and the humidity were the same as in room 1 but the presence of the cold areas permitted the body heat to be radiated to these "thermal sinks," as scientists call them, and left the subject in the room without the smothering feeling and without free perspiration. In fact, some persons who worked in the room for some hours found it necessary to cover part of the cold plates to prevent chilling. Another person had to wear a sweater in the room despite its temperature of 90 degrees and a humidity of 65 per cent!

In room 3, where the incoming air was cooled to 32 degrees, severe chilling occurred without the radiant heating from the plates.

However, within a few minutes after the heating panels were turned on, people in the room were quite comfortable even though the air temperature was around

40 degrees and the exhaled breath was visible as it is on a cold day. After some weeks of this mixture of chilled air and radiant heating this room became uncomfortably warm for a person after a half hour even though its temperature was only 70 to 76 degrees.

In room 4 subjects were cool but comfortable when dressed in usual indoor winter clothing.

The significant finding of the research, said the scientists, is that the control of the liberation of heat by the body appears to be the deciding factor in human comfort. That explained the equal comfort in the two rooms, one very cold but with radiant heating and the other very warm but with radiant cooling.

### Clothing Slows Chilling

"Clothing materials rapidly radiate their heat to cold surfaces," report the scientists, "and fall to temperature levels well below those of surrounding hot air, thus encasing the body in a cooled capsule to which it can readily lose its internal heat. And in cold air, clothing readily absorbs radiant heat and forms a warm envelope around the body to slow the process of heat loss from the skin."

It is the temperature of the air surrounding the body (inside the clothing) which determines the body's comfort. One can achieve such comfort by heating all the air in rooms and the walls but the new report shows that the same comfort can be obtained without using this rather inefficient process.

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ARCHAEOLOGY

## Unwalled Ancient Cities Evidence of Peaceful Ways

**P**ROFOUND peace must have reigned over the highly civilized cities in the Indus valley in India 5,500 years ago. Thus reasons Prof. Walter von Brunn of the University of Leipzig, from the fact that Mohenjo-daro, Chanhudaro, and other sites have no walls or other fortifications. In this they contrast strongly with most other cities of the ancient Near East, which were constantly at war with each other and belted themselves with thick, high walls.

The peace they presumably enjoyed was reflected in their great prosperity. All the dwellings were built of well-burned brick, and there was a sewer system equal to that of Pompeii and other cities of the Roman Empire 1,500 years later. Today the inhabitants of the same region live in mud huts.

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