circulation of dust and lint. Sources of ultraviolet radiation should be so situated as to protect the eyes of the occupants of the room from direct or reflected rays. A combination of ultraviolet radiation and dust control measures is believed to be more effective than either one of the two used alone, but the proof for this has yet to come.

There is no doubt that these methods will reduce the number of bacteria in the air of an enclosed space, but there is still considerable question as to whether they are practical measures for reducing the total number of respiratory infections among personnel, since exposure by contact is an important factor. Bourdillon and his group concluded that there is justification for attempting to reduce the load of air-borne microorganisms by the methods now at our disposal.[4] They have explored the properties of a number of compounds, and their conclusions are in agreement with those of American investigators.

The present status is admirably reviewed by the Committee on Sanitary Engineering of the *National Research Council*,[27] and by a subcommittee of the *American Public Health Association*.[9] Both committees feel that the problem of air disinfection is still in the experimental stage. Knowledge concerning the effectiveness of glycol vapors has not kept pace with the development of vaporizing devices, and there is real danger that commercial exploitation of the various devices may discredit the method and discourage careful research in this important field.[28] More experimentation is needed for arriving at a definite conclusion concerning its use in industry and public buildings.

VALUE OF AIR COOLING UNDER TROPICAL CONDITIONS

The commissioning of a class of naval hospital ships with all wards, laboratories and living spaces air cooled is a notable achievement to provide better treatment of patients, especially those suffering from extensive burns, by control of environmental factors. Although statistics are not at hand to indicate the deaths or retarded recoveries of patients due to lack of air cooling in ships operating in tropical waters, it is generally agreed among competent observers that high temperature and humidity are major factors in prolonging disability and increasing mortality of the sick and injured. Physiologic data obtained on healthy men, moreover, show the large loss of body fluids and the stress on the cardiovascular system in terms of increased pulse rate when these men are continuously subjected to high temperatures. Even at rest about 50 cc of fluid per hour are lost as sweat through intact skin. In burn patients the difficulty, encountered in temperate climates, of maintaining fluid and electrolyte balance is tremendously augmented by the additional evaporative fluid loss in hot environments.

Patients who have such varied conditions as heart disease, thyrotoxicosis, shock from any cause, severe hemorrhage, or those who have had an anesthetic, will invariably store heat when subjected to a hot, humid environment. The gradient between the body surface temperature and the environmental temperature is such that loss by radiation is slight. The heat loss by evaporation in a warm, humid environment is low whether the patient does or does not perspire. The heat regulatory center may be temporarily deranged following an anesthetic, brain injury, or after an overdose of barbiturate. Loss of fluids and electrolytes is another influencing factor. Cooling the body is the answer to this problem, and this can best be done in a cool room of low relative humidity where conditions for heat loss are ideal. This measure is also valuable in controlling temperature height of patients with various acute febrile diseases.[30]

Frequently from 50 to 75 percent of personnel aboard naval vessels operating in tropical waters are afflicted with heat rash to a degree that interferes with rest and sleep. In carefully controlled experiments[29] it was possible to produce a fulminating type of rash in all men living continuously at an effective temperature of 85 (90 F dry-bulb and 83 F wet-bulb). In the control group, 12 out of 24 hr were spent in a relatively cool atmosphere of 75 ET (80 F dry-bulb, and 70 F wet-bulb). These men either remained free from heat rash, or occasionally developed a mild form. Thus, intermittent cooling to a degree which prevented sweating in men at rest eliminated a serious handicap to good performance of duty.

In both laboratory tests and aboard hospital ships a relatively cool living environment of 76 to 78 ET provided an atmosphere conducive to rest and sleep without excessive sweating. Berthing spaces tended to have extremely low odor levels. Motivation, initiative and alertness, in contrast to the usual irritability and lack of incentive incident to residence in tropical climate, were maintained.[31]

Little has been done, however, to obtain practical methods for application of air conditioning under heavy heat loads and on the enormous scale that would be needed to modify life in the tropics. It is not improbable that cooled houses in a tropical climate, if used consistently for one generation, would modify the whole character of a population. The obvious advantages of part time cooling on personnel to promote rest and sleep in tropical areas would provide a prophylactic measure of great potential importance.

TREATMENT OF DISEASE

In the past few years considerable progress has been made in using air conditioning as an adjunct in the treatment of various diseases. Among the important applications are those in operating rooms, nurseries for premature infants, maternity and delivery rooms, children's wards, clinics for arthritic patients, heat therapy, cold therapy, oxygen therapy, X-ray rooms, the control of allergic disorders, and for the physiological effects in industry.

Normal individuals may be subjected to considerable strain in adjusting to hot, humid conditions. Heat loss by radiation is reduced, as is loss by evaporation of sweat. Individuals with certain disease processes are at a still greater disadvantage since they may also have difficulty in the transport of heat from the interior to the surface of the body via the circulation.

Patients with thyrotoxicosis tolerate hot, humid conditions or *heat waves* very poorly. Their metabolism is high, and therefore their heat production is excessive. They may be unable to eliminate heat from the body surface as rapidly as it is produced and transported to the skin. They develop hyperthermia or fever, and a tachycardia or rapid heart rate. The demand on the circulation for transport of heat from the interior of the body to the skin surface is increased. The increased body temperature leads to increased cell metabolism, and in turn to still greater heat production. This vicious cycle may threaten life if the cardio-vascular or transport mechanism breaks down. A cool, dry environment favors the loss of heat by radiation and evaporation from the skin, and may save the life of the patient with thyrotoxicosis.

Cardiac patients may be unable to maintain the circulation necessary to insure normal heat loss. Individuals with head injuries, those subjected to brain operations, and those with barbiturate poisoning may have hyperthermia, especially in a hot environment, due to a disturbance in the heat regulatory center of the brain. Obviously, one of the most important