even harmful. People entering and remaining in cooled spaces for short periods, 15 min or less, may be satisfied with less cooling. For long occupancy very little deviation from the optimum effective temperature is indicated.

An exit shock upon re-entering a warm atmosphere is equally plausible. Experiments at the A.S.H.V.E. Research Laboratory[26] indicated no demonstrable harm to a healthy individual. Adaptation occurred as soon as normal perspiration was established. Mild exercise shortened the adaptation time.

A great number of persons seem to be fairly content in summer with a higher plane of indoor temperature. Studies by the University of Illinois[27] in cooperation with the A.S.H.V.E. Committee on Research indicate that effective temperatures as high as 74.5 ET are acceptable in the living quarters of a residence, and while this condition is not representative of optimum comfort, it provides sufficient relief in hot weather to be acceptable to the majority of users, in the interest of economy. Individual minority differences can be counteracted by clothing.

Satisfactory comfort conditions for persons at work[28] vary, depending upon the rate of work and the amount of clothing worn. In general, the greater the degree of activity, the lower the effective temperature necessary for comfort. Clothing has been evaluated for its overall insulation effects by a physical unit, the *clo* which equals 0.116 C deg per (kilogram calorie) (square meter) (hour).[29] Yaglou[30] criticizes the concept of overall insulation, and points out that different parts of the body require different amounts of insulation. The literature on effects of clothing is difficult to coordinate at the present time, as much of it is still in military service reports which are yet to be published and amplified.

For prematurely born infants, the optimum temperature varies from 100 to 75 F, depending upon the stage of development. The optimum relative humidity for these infants is placed at 65 percent.[31] No data are yet available on the optimum air conditions for full term infants and young children up to school age. Satisfactory air conditions for these age groups are assumed to vary from 75 to 68 F with natural indoor humidities. For children (having high metabolism) at school, in winter clothes, 70 F has been considered correct, with 55 F recommended for gymnasiums.

REFERENCE

[1] Code of Minimum Requirements for Comfort Air Conditioning (A.S.H.V.E. TRANSACTIONS, Vol. 44, 1938, p. 27).

[2] A.S.H.V.E. RESEARCH REPORT No. 1031—Ventilation Requirements, by C. P. Yaglou, E. C. Riley and D. J. Coggins (A.S.H.V.E. TRANSACTIONS, Vol. 42, 1936, p. 133).

[3] A.S.H.V.E. RESEARCH REPORT No. 959—Indices of Air Change and Air Distribution, by F. C. Houghten and J. L. Blackshaw (A.S.H.V.E. TRANSACTIONS, Vol. 39, 1933, p. 261)

[4] Tobacco Smoke Control—A Preliminary Study, by Charles S. Leopold (A.S.H.V.E. TRANSACTIONS, Vol. 51, 1945, p. 255).

[5] A.S.H.V.E. RESEARCH REPORT No. 921—Changes in Ionic Content in Occupied Rooms Ventilated by Natural and Mechanical Methods, by C. P. Yaglou, L. C. Benjamin and S. P. Choate (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932, p. 191). A.S.H.V.E. RESEARCH REPORT No. 965—Physiologic Changes During Exposure to Ionized Air, by C. P Yaglou, A. D. Brandt and L. C. Benjamin (A.S.H.V.E. TRANSACTIONS, Vol. 39, 1933, p. 357). A.S.H.V.E. RESEARCH REPORT No. 985—Diurnal and Seasonal Variations in the Small Ion Content of Outdoor and Indoor Air, by C. P. Yaglou and L. C. Benjamin (A.S.H.V.E. TRANSACTIONS, Vol. 40, 1934, p. 271). The

Nature of Ions in Air and Their Possible Physiological Effects, by L. B. Loeb (A.S.H.V.E. TRANSACTIONS, Vol. 41, 1935, p. 101). The Influence of Ionized Air Upon Normal Subjects, by L. P. Herrington (*Journal Clinical Investigation*, 14, January, 1935). The Effect of High Concentration of Light Negative Atmospheric Ions on the Growth and Activity of the Albino Rat, by L. P. Herrington and Karl L. Smith (*Journal Industrial Hygiene*, 17, November, 1935). Subjective Reactions of Human Beings to Certain Outdoor Atmospheric Conditions, by C.-E. A. Winslow and L. P. Herrington (A.S.H.V.E. TRANSACTIONS, Vol. 42, 1936, p. 119).

[6] *The British Medical Journal*, Editorial, June 25, 1932, p. 1182.

[7] The Mechanism of Heat Loss and Temperature Regulation, by Eugene F. DuBois (Lane Medical Lectures, Stanford University Publications, *Medical Science*, Vol. 3, 1937, No. 4, p. 348; also *Transactions of the Association of American Physicians*, Vol. 51, 1936, p. 252).

[8] Exchanges of Heat and Tolerance to Cold in Men Exposed to Outdoor Weather, by E. J. Adolph and G. W. Molnar (*American Journal of Physiology*, Vol. 146, 1946, p. 507).

[9] A.S.H.V.E. RESEARCH REPORT No. 1108—Cardiac Output, Peripheral Blood Flow and Blood Volume Changes in Normal Individuals Subjected to Varying Environmental Temperatures, by F. K. Hick, R. W. Keeton, N. Glickman and H. C. Wall (A.S.H.V.E. TRANSACTIONS, Vol. 45, 1939, p. 123).

[10] A.S.H.V.E. RESEARCH REPORT No. 1107—Recent Advances in Physiological Knowledge and Their Bearing on Ventilation Practice, by C.-E. A. Winslow, T. Bedford, E. F. Dubois, R. W. Keeton, A. Missenard, R. R. Sayers and C. Tasker (A.S.H.V.E. TRANSACTIONS, Vol. 45, 1939, p. 111).

[11] A.S.H.V.E. RESEARCH REPORT No. 830—Heat and Moisture Losses from the Human Body and Their Relation to Air Conditioning Problems, by F. C. Houghten, W. W. Teague, W. E. Miller and W. P. Yant (A.S.H.V.E. TRANSACTIONS, Vol. 35 1929, p. 245).

[12] Rate of Insensible Perspiration (Diffusion of Water) Locally Through Living and Through Dead Human Skin, by G. E. Burch and T. Winsor (*Archives of Internal Medicine*, Vol. 74, 1944, p. 437).

[13] The Influence of Clothing, Work and Air Movement on the Thermal Exchanges of Acclimatized Men in Various Hot Environments, by N. A. Nelson, W. B. Shelly, S. M. Horvath, L. W. Eichna, and F. F. Hatch (*Journal of Clinical Investigations*, Vol. 27, 1948, p. 209).

[14] A.S.H.V.E. RESEARCH REPORT No. 654—Some Physiological Reactions to High Temperatures and Humidities, by W. J. McConnell and F. C. Houghten (A.S.H.V.E. TRANSACTIONS, Vol. 29, 1923, p. 129). A.S.H.V.E. RESEARCH REPORT No. 672—Further Study of Physiological Reactions, by W. J. McConnell, F. C. Houghten and F. M. Phillips (A.S.H.V.E. TRANSACTIONS, Vol. 29, 1923, p. 353). A.S.H.V.E. RESEARCH REPORT No. 690—Air Motion, High Temperatures and Various Humidities—Reactions on Human Beings, by W. J. McConnell, F. C. Houghten and C. P. Yaglou (A.S.H.V.E. TRANSACTIONS, Vol. 30, 1924, p. 167). A.S.H.V.E. RESEARCH REPORT No. 718—Work Tests Conducted in Atmospheres of High Temperatures and Various Humidities in Still and Moving Air, by W. J. McConnell and C. P. Yaglou (A.S.H.V.E. TRANSACTIONS, Vol. 31, 1925, p. 101). A.S.H.V.E. RESEARCH REPORT No. 719—Basal Metabolism Before and After Exposure to High Temperatures and Various Humidities, by W. J. McConnell, C. P. Yaglou and W. B. Fulton (A.S.H.V.E. TRANSACTIONS, Vol. 31, 1925, p. 123). A.S.H.V.E. RESEARCH REPORT No. 908—Heat and Moisture Losses from Men at Work and Application to Air Conditioning Problems, by F. C. Houghten, W. W. Teague, W. E. Miller and W. P. Yant (A.S.H.V.E. TRANSACTIONS, Vol. 37, 1931, p. 541). A.S.H.V.E. RESEARCH REPORT No. 1106—Air Conditioning in Industry—Physiological Reactions of Individual Workers to High Effective Temperatures, by W. L. Fleisher, A. E. Stacey, Jr., F. C. Houghten and M. B. Ferderber (A.S.H.V.E. TRANSACTIONS, Vol. 45, 1939, p. 59). A.S.H.V.E. RESEARCH REPORT No. 1153—Seasonal Variation in Reactions to Hot Atmospheres, by F. C. Houghten, A. A. Rosenberg and M. B. Ferderber (A.S.H.V.E. TRANSACTIONS, Vol. 46, 1940, p. 185).

[15] A.S.H.V.E. RESEARCH REPORT No. 1151—The Peripheral Type of Circulatory Failure in Experimental Heat Exhaustion, by R. W. Keeton, F. K. Hick, Nathaniel Glickman and M. M. Montgomery (A.S.H.V.E. TRANSACTIONS, Vol. 46, 1940, p. 157).

[16] Heat Disease: Clinical and Laboratory Studies, by M. W. Heilman and E. S. Montgomery (*Journal of Industrial Disease and Toxicology*, 18:651, 1936).

[17] Performance in Relation to Environmental Temperature, by L. W. Eichna, W. B. Bean, W. F. Ashe and N. Nelson (*Bulletin of Johns Hopkins Hospital*, Vol. 76, 1945, p. 25–58).