hay fever season usually represent the number of grains found on 1.8 sq cm of a 24-hr *gravity slide*.

Hay fever sufferers may notice the first symptoms when the pollen count is 10 to 25, and in some localities the maximum figures for the seasonal peak may approach 1000 for a 24-hr period, depending upon the sampling and reporting methods of the laboratory. Translation of gravity counts by special formulas to a volumetric basis, or the number of grains per cubic yard or per cubic foot of air, is unreliable because of the complexity of the modifying factors. When such information is important, it is best obtained directly by a volumetric instrument. The number of pollen grains per cubic yard of air evidently varies from 2 to 20 times the number found on 1 sq cm of a 24-hr gravity slide, depending on grain diameter, shape, specific gravity, wind velocity, humidity and physical placement of the collecting plate.[29, 30, 31]

AIRBORNE BACTERIA

Study of the occurrence and significance of micro-organisms in the atmospheres of the indoor world is absorbing the energies of a substantial number of physicians, bacteriologists, aerobiologists, physicists, public health workers, engineers and hospital personnel. Some data are available on the types and quantities of bacteria found in a variety of spaces, but it is not possible at present to use this information as a conclusive index of the potential health hazard of a given environment. The reported number of airborne organisms may vary from 1 to 1000 per cubic foot of air, influenced somewhat by the method of testing.[32] Many are attached to the dust particles present in the air.

Where it seems advisable or desirable to control the bacterial content of rooms, public conveyances or buildings, highly effective methods are available (see Chapter 7), and their extended use may do much to assist the workers in this field in accumulating the necessary mass of evidence that will decide the practical value of air sterilization for the control of communicable disease. It is now well established that ultraviolet radiation is feasible for the protection or preservation of pharmaceuticals, cosmetics, and food products.

RADIOACTIVE AIR CONTAMINANTS[33]

Radioactive air contaminants are physically similar to ordinary industrial and chemical plant contaminants. They differ from ordinary contaminants, however, in that they may be highly toxic when ingested and may present a direct radiation hazard when accumulated in appreciable quantities. Another factor which must be considered in the filtration of these materials is the possibility of their being concentrated in plant and animal life in the area of contamination. Concentrations resulting from absorptions by plants and subsequent feeding of animals in the magnitude of several thousand times, is not unusual. Tolerances for radioactive contaminants have been established and are under continuing study and review. Guidance in regard to tolerance levels for discharge of contaminated air in different types of localities can best be had from the classified literature which is available through proper clearance procedures.

REFERENCES

[1] Atmospheric Pollution of American Cities for the Years 1931 to 1933, J. E. Ives, et al (*U. S. Public Health Service Bulletin No.* 224, March 1936).

[2] *Micrometrics, The Technology of Fine Particles,* by J. M. DallaValle (Pitman Publishing Corporation, 1943).

[3] Atmospheric Pollution Due to Smoke, by A. C. Stern (*Heating and Ventilating,* May, 1945).

Atmospheric Pollution Due to Dust and Cinders, by A. C. Stern (*Heating and Ventilating,* July, 1945).

[4] Sootfall Studies for New York City, by J. Siegel and B. Feiner (A.S.H.V.E. Journal Section, *Heating, Piping and Air Conditioning,* September, 1945, p. 495)

[5] The Use of Fuel Consumption and Equipment Data in the Abatement of Atmospheric Pollution, by A. C. Stern (A.S.H.V.E. Journal Section, *Heating, Piping and Air Conditioning,* August, 1945, p. 447–454).

[6] Effects of Atmospheric Pollution Upon Incidence of Solar Ultra-Violet Light, by J. H. Shrader, M. H. Coblentz and F. A. Korff (*American Journal of Public Health,* Vol. 19, 1929, p. 7).

[7] Studies in Illumination—III: A Study of the Loss of Light Due to Smoke on Manhattan Island, by J. E. Ives (*U. S. Public Health Service Bulletin No.* 197, June, 1930).

[8] Study and Control of Industrial Atmospheric Pollution Nuisances, by F. M. Stead (*American Journal of Public Health,* Vol. 35, May, 1945, p. 491–498).

[9] Evaluation of Odor Nuisance in the Manufacture of Kraft Paper, by J. M. DallaValle and H. C. Dudley (*U. S. Public Health Service Reprint* No. 2022, Public Health Reports, Vol. 54, January 13, 1939, p. 35–43).

[10] Disposal of Refinery Wastes, Section II: Waste Gases, Vapors, Sludges and Dusts (*American Petroleum Institute,* New York City, 1938).

[11] *Offensive Trades,* by David Ronald (William Hodge and Co., London, 1935).

[12] Limits of Inflammability of Gases and Vapors, by H. F. Coward and G. W. Jones (*U. S. Bureau of Mines Bulletin* No. 279, 1939).

[13] Inflammation Limits and Their Practical Application in Hazardous Industrial Operations, by G. W. Jones (*Chemical Reviews,* Vol. 22, February, 1938).

[14] Private Communication, by Hylton R. Brown (*Bureau of Mines,* College Park, Maryland).

[15] Explosibility of Agricultural and other Dusts as Indicated by Maximum Pressure and Rates of Pressure Rise, by P. W. Edwards and L. R. Leinbach (*U. S. Department of Agriculture Technical Bulletin* No. 490, October, 1935).

[16] Dust Explosion Hazards in Plants Producing or Handling Aluminum, Magnesium, or Zinc Powder, by H. R. Brown (*U. S. Bureau of Mines Information Circular* No. 7148, March, 1941).

[17] Inflammability and Explosibility of Metal Powders, by I. Hartman, J. Nagy, and H. R. Brown (*U. S. Bureau of Mines Report of Investigation No.* 3722, October, 1943).

[18] Inflammability and Explosibility of Powders Used in the Plastics Industry, by I. Hartman and J. Nagy (*U. S. Bureau of Mines Report of Investigation* No. 3751, May, 1944).

[19] Industrial Dust Explosions, by H. R. Brown (*U. S. Bureau of Mines, Information Circular* No. 7309, January, 1945).

[20] Proposed Code for the Prevention of Dust Explosions in the Plastics Industry (*National Fire Protection Association,* Boston, May, 1945).

[21] National Fire Codes for the Prevention of Dust Explosions (*National Fire Protection Association,* Boston, 1944). Contains codes for aluminum, magnesium, coal, pulverized fuel, flour, spice, starch, sugar, cocoa, sulfur and wood.

[22] *An Introduction to Pollen Analysis,* by G. Erdtman (Chronica Botanica Co., Waltham, Mass., 1943).

[23] *Pollen Grains,* by R. P. Wodehouse (McGraw-Hill Book Co., New York, 1935).

[24] Atmospheric Pollen, by R. P. Wodehouse (*Aerobiology,* p. 8–31, Publication No. 17, *American Association for the Advancement of Science,* Washington, D. C., 1942).

[25] *Hayfever Plants,* by R. P. Wodehouse (Chronica Botanica Co., Waltham, Mass., 1945).

[26] *Hay Fever: A Geographical and Batanical Survey,* by E. R. Squibb and Sons, New York, 1937.

[27] Techniques for Appraising Air-Borne Populations of Microorganisms, Pollen and Insects (*Phytopathology,* Vol. 31, March, 1941, p. 201–225).

[28] *Apparatus for Determining the Pollen Concentration of the Atmosphere,* by B. J. Cody, W. F. Kinney and N. A. Kerstein (Research Department, the Detroit Edison Company, Detroit).