CERAMIC ABSTRACTS

Compiled by

THE AMERICAN CERAMIC SOCIETY

Journal Reference: The journal name appears in italics, followed by the volume (bold-faced), issue number (in brackets), page numbers, and year (in parentheses).

Vol. 21 June 15, 1942 No. 6

Abrasives

Mechanical polishing with a film of abrasive. F. L. Stillwell. *Econ. Geol.*, 37 [1] 76–78 (1942).—In polishing specimens on revolving lead laps, any excess abrasive or lubricant must be squeezed out, leaving only an abrasive film of uniform thickness between the specimen and lap. A polishing machine providing sufficient pressure (about 10 lb. per in.^{2}) to secure the desired results is described and illustrated. Pressure is applied through a ball joint to insure a uniform distribution. Abrasives used are graded 303$^1/_2$ optical emery and calcined magnesium oxide (the regular reagent grade is unsatisfactory as a polishing powder). B.C.R.

Surface finish. K. W. Connor and D. A. Wallace. *Aircraft Prod.*, 3 [28] 41–44; [30] 144–48; [32] 209–12; [33] 227–30 (1941); 4 [38] 93–100 (1941); abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 152, p. 51 (Feb., 1942).—Work in connection with automobiles and aircraft is described. The following subjects are dealt with: relation of friction and lubrication to surface finish; effect of various abrading operations on the microstructure of surfaces; measurement of surface finish; honing and its application to aero-engine cylinders, master connecting rods, and other aircraft components; and the superfinishing process.

Surface finishing and structure. J. Wulff. *Amer. Inst. Mining & Met. Engrs. Tech. Pub.*, No. 1318; *Metals Tech.*, 8 [4] 6 pp. (1941); abstracted in *Bull. Brit. Non-Ferrous Metals Research Assn.*, No. 146, p. 225 (Aug., 1941); see *Ceram. Abs.*, 20 [9] 211 (1941).

Use of noble corundum for grinding materials having low tensile strength. Fritz Kulpmann. *Schleif- & Polier-tech.*, 16 [8] 150–51 (1939).—Practice has shown that it is possible to grind aluminum, red brass, copper, chill castings, gray-iron castings, cast iron, tempered and untempered steel, coal, refractory block, and other materials having low tensile strength with abrasive bodies containing noble corundum or bodies in Dilumit-X bonding. Noble corundum abrasives are 40% more efficient than silicon carbide abrasives, and their manufacture in the form of disks and bodies is comparatively simple and rapid. See "Grinding. . . ," *Ceram. Abs.*, 19 [6] 132 (1940). M.V.C.

PATENTS

Abrasive-projecting apparatus. N. J. Quinn (Quinnex Corp.) U. S. 2,279,342, April 14, 1942 (May 25, 1935).—In abrasive-projecting apparatus, the combination of two spaced rotatably mounted disks having yieldable coatings on their adjacent surfaces, the coatings being provided with radial recesses and being arranged with such surfaces in at least partly opposed and cooperative relationship, means for feeding abrasive angularly to the recesses in each of the disks, and means for synchronously rotating the disks.

Abrasive wheel. Albert Strasmann (Albert Strasmann Präzisions-Werkzeug- und Maschinenfabrik). Ger. 706,004, April 10, 1941; 67c. 1; *Chem. Abs.*, 36, 2106 (1942). Addition to Ger. 702,317 (see "Restoration. . . ," p. 116).—An abrasive wheel is made of Al. The working surface is roughened and hardened by electrically oxidizing it.

Abrasive wheel for making decorations and effects on metallic surfaces. Franz Musil. Austrian 157,572, Dec. 11, 1939; 49a; *Chem. Abs.*, 36, 2106 (1942).

Buffing wheel. R. A. Garling (Bruce Products Corp.). U. S. 2,280,399, April 21, 1942 (Nov. 20, 1940).

Built-up abrasive. J. C. Drader (Michigan Tool Co.). U. S. 2,281,420, April 28, 1942 (April 15, 1936).

Coated abrasive. W. C. Ware (M. R. Ware). U. S. 2,278,158, March 31, 1942 (June 24, 1940).—A flexible abrasive sheet for use under conditions developing high abrading-surface temperatures.

Coated abrasive article. N. P. Robie (Carborundum Co.). U. S. 2,280,852, April 28, 1942 (Feb. 24, 1938).

Diamond abrasive tool. E. W. Engle (Carboloy Co., Inc.). U. S. 2,277,428, March 24, 1942 (May 31, 1939).

Diamond-polishing wheel. Julius Dinhofer. U. S. 2,279,940, April 14, 1942 (Dec. 4, 1940).

Grinder. Hans Petersen (Storm Mfg. Co., Inc.). U. S. 2,277,144, March 24, 1942 (Jan. 29, 1940). H. H. Roake. U. S. 2,279,494, April 14, 1942 (July 22, 1940).

Grinding or abrading machine. Arthur Scrivener. U. S. 2,277,417, March 24, 1942 (June 9, 1941).

Grinding disk. A. H. Graenser (D. E. Meyer). U. S. 2,279,673, April 14, 1942 (May 25, 1940). I. R. Shue

...of the finished product is an especially important mat-... It may be of greater importance economically than ... technical question concerning the manufacture of ... Ordinary building brick are in a class with iron, ... and cement as key products of national economy.
W.H.H.

How Scio makes pottery. ANON. *Ceram. Ind.*, 38 [2] ...44, 48–55 (1942).—A description of Scio-Ohio Pottery ... plant and its unique history is given. Diagrammatic ...outs show the flow of ware through the plant and the ...ient mechanical handling of goods. An automatic jig-... machine produces 14,000 dozen pieces of ware per day. ...strated.
H.T.

Indiscriminate administration of vitamins to workers in ...dustry. AMERICAN MEDICAL ASSN. COUNCIL ON FOODS ...D NUTRITION AND COUNCIL ON INDUSTRIAL HEALTH. ...r. *Amer. Med. Assn.*, 118, 618–21 (Feb. 21, 1942).—...tisfactory evidence of the wisdom of the general practice ... providing all employees of industrial concerns with ...amins indiscriminately is lacking. When a satisfactory ...udy of any given industrial situation indicates the wis-...m of providing vitamins to employees, the Councils ...int out the necessity of observing the proper scientific ...mitations of such action; after the employee has been re-...red to a healthful state, the use of a good diet of natural ...otective foods thereafter should suffice. Nothing in this ...port is intended to belittle the significance of vitamins in ...trition or the value of the proper use of added vitamins ... improving foods such as bread and flour. The need for ...e avoidance of indiscriminate mass use of vitamins, a ...actice which supports the commercial exploitation rather ...an scientific rational use of these important dietary fac-...rs, is emphasized.
F.S.M.

Industrial "lifeguards" meet in Cincinnati. ANON. *Bull. Amer. Ceram. Soc.*, 21 [4] 57 (1942).

Judge trademark infringement on deception, not simi-...arity. LEO T. PARKER. *Ceram. Ind.*, 38 [3] 59–60 (1942). —Recent decisions by the higher courts show that identical ...ademarks may be used on noncompeting ware without ...fringement. Courts uphold unregistered trademarks in ...e territory in which goods have been sold. Various court ...ses are reviewed.
H.T.

Lung function in silicosis. E. ROELSEN. *Proc. Medical ...ngr. Northern Countries, 19th Congr., Oslo, June, 1939; ...ta Med. Scand., Supp.*, No. 123, pp. 236–43 (1941).—R. ...ports the principal results of lung-function tests on 40 or ... silicotic patients, including porcelain workers, stone-...asons, sandblasters, and foundry workers. He found a ...crease in vital capacity and an increase of residual air, ...pecially in the second and third stages of the disease. The explanation lies in the decreased motility of the thorax ...all and diaphragm, causing a diminution of lung elas-...city. The difference in alveolar ventilation of different ...rtions of the lung is generally increased, considerably so ... the second and third stages. Lung functions are not as ...verely affected in silicotics as in emphysema patients. See *Ceram. Abs.*, 20 [3] 78 (1941).
F.S.M.

Methods of avoiding corrosion. ANON. *Product ...ng.*, 13 [4] 192–235 (1942).—In a discussion on means ... conserving metals by preventing their corrosion, the ...llowing principal methods are mentioned: (1) organic ...atings on carbon steels, (2) porcelain enamels on stamp-...gs and castings, (3) glass for floats, springs, and mechani-...al parts, (4) molded porcelain where both dielectric ...rength and corrosion resistance are required, (5) plastics ...ch as Saran to replace brass and copper tubes, (6) ...igh-silicon case on steel produced by heat-treatment as ... the Ihrigizing process, (7) thin lead coatings produced ...y dipping as by the Hurbenium process, (8) chemical sur-...ce treatments such as bonderizing, parkerizing, black ...agic, jetal, and others, and (9) silver plating or cladding ... base metals for corrosion resistance. Many practical ...amples are described, including glass tubing to replace ...ckel-chromium tubing for protecting sheaths for thermo-...uples; this Vycor glass is 96% SiO_2, the remainder being ...ostly B_2O_3. It has a softening point of 1510°C. ± 30°, ... annealing point of 890°C. ± 20°, a strain point of ...°C. ± 20°, a density of 2.18, and a coefficient of linear expansion of 7.8 to 8 $\times 10^{-7}$; the maximum temperature at which it can be used for limited periods is 900° to 1000°C.
M.H.

New treatment for burns (preliminary report). K. L. PICKRELL. *Bull. Johns Hopkins Hosp.*, 69, 217–24 (Aug., 1941).—The method of treatment involves the application of 3% sulfadiazine in 8% triethanolamine by spraying. Full details of the immediate and later treatment are given. In the opinion of the surgical staff, the burned areas of the 115 patients healed more rapidly than they would have with any other form of treatment used at the hospital.
F.S.M.

Pathogenesis of heat disease in man. B. SCHLEGEL AND H. BOETTNER. *Deut. Arch. klin. Med.*, 187, 193–205 (1941).—The effects of heat are divided into three classes: exhaustion, stroke, and cramps. The authors conducted 50 experiments on 35 persons to study the behavior of the human body at the stage just prior to heat stroke and heat exhaustion. The subjects were kept in a chamber at a temperature of 40°C. (104°F.), for 2 hr. when possible. Losses through the skin amounted to 11 gm. sodium chloride, 430 mgm. nitrogen, and up to 2700 gm. water. Most of the persons complained of symptoms referable to the nervous system, including palpitation, oppression, dizziness, and fatigue. The body temperature in some cases rose to 38.5°C. (101.3°F.), but the rise was not related to heat tolerance. The pulse rate, however, rose sharply to 176 at the point where the heat could not be tolerated; in resistant persons 140 was the upper limit. In a few persons on whom the experiment could be conducted to a stage of imminent collapse, a strong decline of the systolic and diastolic pressure was seen. All the observed phenomena indicated that the blood goes to the diluted peripheral vessels, while those in the internal organs, including the brain, are contracted. The characteristic of heat exhaustion is a breakdown of the circulatory regulation with an intact temperature-regulation system. The syndrome of heat stroke consists of failure of the temperature-regulating system combined with long resistance of the circulatory regulation. Exhaustion of sodium chloride reserves is the important feature in heat cramps. The authors believe that the organ primarily damaged by heat is the adrenal cortex.
F.S.M.

Pneumoconiosis—a study of 379 cases. H. B. WILLIAMS. *Med. Bull. Veterans' Admin.*, 18, 250–53 (Jan., 1942).—A survey was made to determine the relative incidence of pneumoconiosis in beneficiaries of the Veterans' Administration. A review of 379 cases of individuals who had been exposed to numerous occupational dust hazards is presented. Of this number, 179 cases were classified as pneumoconiosis, either uncomplicated or complicated by infectious disease. A detailed system of classification is included. No definite conclusions are drawn, but the data support the belief that pneumoconiosis increases susceptibility to tuberculosis in a direct ratio. W. stresses the need for more careful and detailed histories and physical examinations.
F.S.M.

Preparation of slides for particle-size determination. L. SILVERMAN AND W. FRANKLIN. *Jour. Ind. Hyg. & Toxicol.*, 24, 51 (March, 1942).—It is suggested that, in following Green's technique of preparing slides for particle-size determination, it is possible to crush particles of the range 1 to 10 microns. This seemed to be borne out by a comparison of the results of counts made on slides prepared by evaporation of suspensions and by mechanical dispersion.
F.S.M.

Significance of porphyrinuria in lead poisoning. R. KARK AND A. P. MEIKLEJOHN. *Jour. Clin. Investigation*, 21, 91–99 (Jan., 1942).—Solutions of hemoglobin were injected into two subjects with lead poisoning, anemia, and porphyrinuria. The injection was followed by a rise in plasma bilirubin resembling closely both in degree and time of onset the bilirubinemia which has been observed in normal subjects under comparable conditions. It was also accompanied by transient increase in urinary urobilinogen excretion. The injection resulted in no detectable increase in the excretion of coproporphyrin either in the urine or feces. These results failed to demonstrate any

PNEUMOCONIOSIS: A STUDY OF 370 CASES

Harry B. Williams, M. D., *Veterans' Administration, Oteen, N. C.*

A survey was recently conducted (while the author was on duty at Veterans' Administration Facility, Sunmount, N. Y.) to determine the relative incidence of pneumoconiosis in beneficiaries of the Veterans' Administration. The data for the study consisted of questionnaires, formulated by the chief, division of postgraduate instruction and medical research, which had been sent to and executed at field stations, in relation to beneficiaries who had been exposed to occupational dust hazards; radiograms of chests of affected beneficiaries; and, in a few instances, tissues from affected beneficiaries who had died.

A total of cases so collected from the field stations of the Veterans' Administration was 370. The beneficiaries in this series had been variously occupied: As miners of metal ores (lead, copper, gold, silver, iron, quartz), coal (anthracite and bituminous) miners, brick-yard laborers, tunnel laborers, rock drillers, street cleaners, laborers on various types of construction work, automobile factory employees, blacksmiths, grinders, stonecutters, cement workers, railroad switchmen, machinists, sandblasters, pottery workers, quarrymen (limestone, sandstone, granite, marble, slate, etc.), laborers on stone crusher, tobacco-factory employees, bricklayers, silk-mill employees, steam-engine firemen, asbestos workers, molders, grain-elevator employees, textile workers, steel-mill employees, stone masons, grocery dealers, farmers, aluminum melter, clerk, tile presser, iron workers, foundrymen, carpenters, metal polishers, glass workers, smelter workers, and powder-factory employees. In a few cases no occupational history was given.

Modern study of dusty occupations has led to the rather definite conclusion that there are only two forms of dust which really cause pulmonary disease, namely free silica (SiO_2) or silicon dioxide and asbestos (magnesium silicate). Talc, also a silicate of magnesium, is closely allied chemically to asbestos and is under suspicion. As yet, however, it has not been definitely proven to be a factor in the production of lung disease. Coal-dust causes pigmentation (anthracosis) and occasionally slight fibrosis, but this has been proven to be relatively harmless from a pathological standpoint. Dust from the various minerals commonly mined is not considered a factor in the production of the disease. The silica-bearing rock encountered in mining is the source from which the disease is contracted. Workers in the cement industry, although exposed to dust, are not affected, because the materials which they handle contain little or no silica. Most of the various clays used in the pottery industry are innocuous, and there is some reason to believe that some of them modify or even inhibit the development of silicosis. Coal dust is also believed by some observers to modify or inhibit the progress of the disease. It should not be understood from this that there is no dust hazard in the pottery industry, because certain employees in this industry are subjected to high concentrations of silica-bearing dust, especially the grinders, polishers, and furnace men. Dusts from hay, grain, flour, etc., encountered on farms, in grain elevators, mills, and bakeries constitute no real hazard so far as the production of chronic lung disease is concerned, although they may set up an acute bronchitis. They would also probably aggravate an existing tuberculosis. The same may be said of the dusts encountered in jute and textile mills. Road and street dust cannot be regarded as hazardous, as the amount of silica in such dust is very small and in low concentration.

After study of the data submitted, 171 cases of this group were classified (either definitely or probably) as having lung disease due to dust inhalation, either uncomplicated or complicated by infectious disease. The histories in many of these cases were rather inadequate, and, without a detailed history, it is difficult to form a definite opinion in the individual case. For instance, a man may have worked in a mine for many years and still have had little or no exposure to disease-producing dust. A history of this type of case should show not only where he worked, but what he did in detail, how long he did it, and to what form of dust he was exposed. In other words, the production of disease by dust depends upon the form of dust, plus its concentration, plus the time of exposure to it. Some of the films submitted were of poor quality and the lesions were not as sharply outlined as they should have been. However, the general average of the films was quite good.

The characteristic lesions in the lungs in silicosis are fibroid nodules varying in size from 2 to 5 mm. in diameter. These are discrete in the early cases, tending to become confluent in the far-advanced cases. In the extremely far-advanced cases these nodules tend to lose their individual identity in dense masses of fibrous deposit. These cases are almost invariably associated with infectious disease, usually tuberculosis.

The cases studied were classified as:

1. Silicosis, first stage (S1): Showing accentuation of the lung markings with fine discrete generalized nodulation.
2. Silicosis, second stage (S2): Showing marked extensive nodulation, still discrete, the individual nodules being generally larger than in the first stage.
3. Silicosis, third stage (S3): Showing very extensive nodulation with large nodules tending to become confluent.

4, 5, and 6. Silicosis, first, second, and third stages, plus infection: These cases were of the same types as 1, 2, and 3, with definite evidence of accompanying infectious disease.

7. Silico-tuberculosis (S TB): Far-advanced cases in which the individual nodules had lost their identity in dense fibrous masses of infiltration. These are considered the resultant of silicosis combined with tuberculous infection, but it is impossible to determine a separate background for either process.
8. Cases without definite evidence of silicotic involvement, but with definite evidence of lung disease, the appearance of which indicates a background of infection only.

9, 10. Fibrosis: Cases showing no nodular deposits, with slight or well-marked accentuation of the lung markings. This condition cannot be regarded as characteristic of silicosis; it is often present in cases of respiratory infection, acute or chronic, in passive congestion due to cardio-renal disease, or in other conditions. These linear shadows are also subject to normal variations in the adult chest.

11. Asbestosis: This condition has been termed "silicatosis" in contradistinction to silicosis. Early cases of asbestosis are difficult to recognize as such. The radiographs usually show only minor changes indicating an interstitial fibrosis, similar in appearance to those cases in classifications 9 and 10. The more advanced cases show what has been described as a "ground glass" appearance; that is, a diffuse haze over the lower lung fields, together with a marked accentuation of the lung markings, but with little or no nodular deposit. This haze may be so dense as to obscure the cardiac borders and the domes of the diaphragm.

12. Negative: Cases in which there was no evidence of lung disease.

The following table shows the incidence of industrial lung disease according to the occupations represented:

	S1	S2	S3	S1-Inf.	S2-Inf.	S3-Inf.	S TB	Asb.	Total
Miners, metal ore[1]	11	7	1	11	20	7	14		71
Miners, coal[1]	23	5	1	13	7	4	7		61
Granite workers	1	1		3	1	1	3		8
Rock drillers				3	1	6			8
Sandblasters					3	1	1		5
Stonecutters		1			1		1		3
Pottery workers					2	1			3
Stone crushers	1			1					2
Molders	2								2
Bricklayer, furnace							1		1
Smelter	1								1
Stone mason				1					1
Asbestos carder								1	1
No industrial history[2]				1	2				3
Carpenter[3]						1			1
Aluminum melter[4]								1	1
Sheet-metal worker[3]					1				1
Total	38	12	2	33	36	20	37	3	171

[1] It will be noted that there is a preponderance of miners shown in this table. Hard-rock miners constitute the largest group of workers in dusty occupations. These could be subdivided into smaller occupational groups if more information were available.

[2] Although there was no industrial history given in three cases, the radiographic appearance was quite typical of silicosis and they were so classified.

[3] The industrial history of these cases is open to question. It is believed that more detailed histories would have furnished more appropriate information.

[4] Aluminum melters wear large asbestos aprons and gloves while working over the crucibles. The molten metal spatters on these, thus releasing considerable quantities of asbestos dust. In the rooms where a number of these men are at work there is probably a considerable concentration of this dust. It also seems likely that the friction of these garments incidental to the work would be an added factor in the release of asbestos particles.

Diagnosis.—The importance of a detailed occupational history cannot be emphasized too strongly. The symptoms exhibited by cases of uncomplicated silicosis are few and often absent. Cough and expectoration are not troublesome. In the far-advanced cases there may be dyspnea, anorexia, loss of weight, and cyanosis as a terminal manifestation. The same may be said of physical signs. Decreased resonance of various degrees may be elicited in the more-advanced cases, together with signs of emphysema. The dearth of evidence of disease shown by symptoms and physical signs is striking when compared with the extent of disease shown by the radiograph. X-ray study is the most definite and satisfactory method of diagnosis. This, together with a carefully taken history, is absolutely necessary in making the diagnosis and in following up the individual cases. The great hazard in these cases is an intercurrent acute respiratory infection, such as pneumonia or influenza. In the cases complicated by tuberculosis it is often difficult to differentiate the shadows of the two diseases. Often, cases of tuberculosis will show nodular deposits very similar to those of silicosis; the appearance of the shadows of each disease may also be modified by the other. In these cases detailed histories are even more important, and the cooperation of the clinician and the roentgenologist is indispensable. Of course in these cases the symptoms, physical signs and laboratory findings of tuberculosis are present.

Of the 171 cases shown in the table, 52 or about 30 percent were classified as uncomplicated silicosis or asbestosis; 38 of these were in the first stage, 12 in the second stage, and only 2 were classified in the third stage. A post-mortem examination of one of the last cases showed a far-advanced silicosis without evidence of infection. Nevertheless, the pathologist, who was one of the reviewers of this series of cases, felt that there was probably a background of infection. If this case had not come to autopsy, it would have been classified as silico-tuberculosis. The remaining 119 cases all showed evidence of complicating infectious disease, more or less extensive and in most cases probably tuberculosis.

While this is not an extensive series of cases and no definite conclusions can be drawn from it, it is believed that it agrees with most observers in that it supports the belief that disease of the lungs due to dust inhalation increases the susceptibility of these organs to tuberculosis, and that this susceptibility is increased in direct ratio to the extent of the industrial disease. The reviewers are of the opinion that the number of cases of industrial disease in this series is very small, considering the number of cases of pulmonary disease coming under the observation of medical officers of the Veterans' Administration. Only 370 cases were considered as potential cases, and nine of these were submitted in duplicate from different facilities. This review has shown that there is a need for more careful and detailed histories in cases of this type. Medical officers should familiarize themselves with this disease; they should inform themselves of the various sources of disease-producing dust, and should know what types of occupations are hazardous from this standpoint.

In the study of this series of cases, the writer was associated with Dr. LeRoy U. Gardner, pathologist and director of the Saranac Lake Laboratory for the Study of Tuberculosis, and Dr. Homer L. Sampson, roentgenologist, Trudeau Sanitarium, both of Saranac Lake, N. Y. A composite opinion of the three reviewers was appended to each questionnaire, after careful study of the available data. These reviewers were much interested in this study, and wish to express their thanks to the officials of central office, and to the medical officers of the various facilities, who cooperated in furnishing the data.

Volume 18 Number 3

The MEDICAL BULLETIN of the Veterans' Administration

FRANK T. HINES, Administrator of Veterans' Affairs
CHARLES M. GRIFFITH, M. D., Medical Director

JANUARY 1942

MARTIN COOLEY, M. D., Editor

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1941

PNEUMOCONIOSIS: A STUDY OF 379 CASES

Harry D. Williams, M. D., *Veterans' Administration, Oteen, N. C.*

A survey was recently conducted (while the author was on duty at Veterans' Administration Facility, Sunmount, N. Y.) to determine the relative incidence of pneumoconiosis in beneficiaries of the Veterans' Administration. The data for the study consisted of questionnaires, formulated by the chief, division of postgraduate instruction and medical research, which had been sent to and executed at field stations, in relation to beneficiaries who had been exposed to occupational dust hazards; radiograms of chests of affected beneficiaries; and, in a few instances, tissues from affected beneficiaries who had died.

A total of cases so collected from the field stations of the Veterans' Administration was 379. The beneficiaries in this series had been variously occupied: As miners of metal ores (lead, copper, gold, silver, iron, quartz), coal (anthracite and bituminous) miners, brickyard laborers, tunnel laborers, rock drillers, street cleaners, laborers on various types of construction work, automobile factory employees, blacksmiths, grinders, stonecutters, cement workers, railroad switchmen, machinists, sandblasters, pottery workers, quarrymen (limestone, sandstone, granite, marble, slate, etc.), laborers on stone crusher, tobacco-factory employees, bricklayers, silk-mill employees, steam-engine firemen, asbestos workers, molders, grain-elevator employees, textile workers, steel-mill employees, stone masons, grocery dealers, farmers, aluminum melter, clerk, tile presser, iron workers, foundrymen, carpenters, metal polishers, glass workers, smelter workers, and powder-factory employees. In a few cases no occupational history was given.

Modern study of dusty occupations has led to the rather definite conclusion that there are only two forms of dust which really cause pulmonary disease, namely free silica (SiO_2) or silicon dioxide and asbestos (magnesium silicate). Talc, also a silicate of magnesium, is closely allied chemically to asbestos and is under suspicion. As yet, however, it has not been definitely proven to be a factor in the production of lung disease. Coal-dust causes pigmentation (anthracosis) and occasionally slight fibrosis, but this has been proven to be relatively harmless from a pathological standpoint. Dust from the various minerals commonly mined is not considered a factor in the production of the disease. The silica-bearing rock encountered in mining is the source from which the disease is contracted. Workers in the cement industry, although exposed to dust, are not affected, because the materials which they handle contain little or no silica. Most of the various clays used in the pottery industry are innocuous, and there is some reason to believe that some of them modify or even inhibit the development of silicosis. Coal dust is also believed by some observers to modify or inhibit the progress of the disease. It

should not be understood from this that there is no dust hazard in the pottery industry, because certain employees in this industry are subjected to high concentrations of silica-bearing dust, especially the grinders, polishers, and furnace men. Dusts from hay, grain, flour, etc., encountered on farms, in grain elevators, mills, and bakeries constitute no real hazard so far as the production of chronic lung disease is concerned, although they may set up an acute bronchitis. They would also probably aggravate an existing tuberculosis. The same may be said of the dusts encountered in jute and textile mills. Road and street dust cannot be regarded as hazardous, as the amount of silica in such dust is very small and in low concentration.

After study of the data submitted, 171 cases of this group were classified (either definitely or probably) as having lung disease due to dust inhalation, either uncomplicated or complicated by infectious disease. The histories in many of these cases were rather inadequate, and, without a detailed history, it is difficult to form a definite opinion in the individual case. For instance, a man may have worked in a mine for many years and still have had little or no exposure to disease-producing dust. A history of this type of case should show not only where he worked, but what he did in detail, how long he did it, and to what form of dust he was exposed. In other words, the *production of disease by dust depends upon the form of dust, plus its* concentration, plus the time of exposure to it. Some of the films submitted were of poor quality and the lesions were not as sharply outlined as they should have been. However, the general average of the films was quite good.

The characteristic lesions in the lungs in silicosis are fibroid nodules varying in size from 2 to 5 mm. in diameter. These are discrete in the early cases, tending to become confluent in the far-advanced cases. In the extremely far-advanced cases these nodules tend to lose their *individual identity in dense masses of fibrous deposit.* These cases are almost invariably associated with infectious disease, usually tuberculosis.

The cases studied were classified as:

1. Silicosis, first stage (S1): Showing accentuation of the lung markings with fine discrete generalized nodulation.
2. Silicosis, second stage (S2): Showing marked extensive nodulation, still discrete, the individual nodules being generally larger than in the first stage.
3. Silicosis, third stage (S3): Showing very extensive nodulation with large nodules tending to become confluent.

4, 5, and 6. Silicosis, first, second, and third stages, plus infection: These cases were of the same types as 1, 2, and 3, with definite evidence of accompanying infectious disease.

7. Silico-tuberculosis (S TB): Far-advanced cases in which the individual nodules had lost their identity in dense fibrous masses of infiltration. These are considered the resultant of silicosis combined with tuberculous infection, but it is impossible to determine a separate background for either process.
8. Cases without definite evidence of silicotic involvement, but with definite evidence of lung disease, the appearance of which [illegible]

9, 10. Fibrosis: Cases showing no nodular deposits, with slight or well-marked accentuation of the lung markings. This condition cannot be regarded as characteristic of silicosis; it is often present in cases of respiratory infection, acute or chronic, in passive congestion due to cardio-renal disease, or in other conditions. These linear shadows are also subject to normal *variations in the adult chest.*

11. Asbestosis: This condition has been termed "silicatosis" in contradistinction to silicosis. Early cases of asbestosis are difficult to recognize as such. The radiographs usually show only minor changes indicating an interstitial fibrosis, similar in appearance to those cases in classifications 9 and 10. The more advanced cases show what has been described as a "ground glass" appearance; that is, a diffuse haze over the lower lung fields, together with a marked accentuation of the lung markings, but with little or no nodular deposit. This haze may be so dense as to obscure the cardiac borders and the domes of the diaphragm.

12. Negative: Cases in which there was no evidence of lung disease.

The following table shows the incidence of industrial lung disease according to the occupations represented:

	S1	S2	S3	S1-Inf.	S2-Inf.	S3-Inf.	S TB	Asb.	Total
Miners, metal ore [1]	11	7	1	11	20	7	15	......	72
Miners, coal [1]	22	3	1	12	7	4	7	......	57
Granite workers	1	1	......	2	1	1	2	......	8
Rock drillers	......	......	......	2	1	5	......	......	8
Sandblasters	......	......	......	......	2	1	1	......	4
Stonecutters	......	1	......	......	1	......	1	......	3
Pottery workers	......	......	......	......	2	1	......	......	3
Stone crushers	1	......	......	1	......	......	......	......	2
Molders	2	......	......	......	......	......	......	......	2
Bricklayer, furnace	......	......	......	......	......	......	1	......	1
Smelter	1	......	......	......	......	......	......	......	1
Stone mason	......	......	......	1	......	......	......	......	1
Asbestos carder	......	......	......	......	......	......	......	1	1
No industrial history [2]	......	......	......	1	3	......	......	......	4
Carpenter [3]	......	......	......	......	......	1	......	......	1
Aluminum melter [4]	......	......	......	......	......	......	......	1	1
Sheet-metal worker [3]	......	......	......	......	1	......	......	......	1
Total	38	12	2	32	38	20	27	2	171

[1] It will be noted that there is a preponderance of miners shown in this table. Hard-rock miners constitute the largest group of workers in dusty occupations. These could be subdivided into smaller occupational groups if more information were available.

[2] Although there was no industrial history given in these cases, the radiographic appearance was quite typical of silicosis and they were so classified.

[3] The industrial history of these cases is open to question. It is believed that more detailed histories would have furnished more appropriate information.

[4] Aluminum melters wear large asbestos aprons and gloves while working over the crucibles. The molten metal spatters on these, thus releasing considerable quantities of asbestos dust. In the rooms where a number of these men are at work there is probably a considerable concentration of this dust. It also seems likely that the friction of these garments incidental to the work would be an added factor in the release of asbestos particles.

Diagnosis.—The importance of a detailed occupational history cannot be emphasized too strongly. The symptoms exhibited by cases of uncomplicated silicosis are few and often absent. Cough and expectoration are not troublesome. In the far-advanced cases there may be dyspnea, anorexia, loss of weight, and cyanosis as a terminal manifestation. The same may be said of physical signs. Decreased resonance of various degrees may be elicited in the more-

advanced cases, together with signs of emphysema. The dearth of evidence of disease shown by symptoms and physical signs is striking when compared with the extent of disease shown by the radiograph. X-ray study is the most definite and satisfactory method of diagnosis. This, together with a carefully taken history, is absolutely necessary in making the diagnosis and in following up the individual cases. The great hazard in these cases is an intercurrent acute respiratory infection, such as pneumonia or influenza. In the cases complicated by tuberculosis it is often difficult to differentiate the shadows of the two diseases. Often, cases of tuberculosis will show nodular deposits very similar to those of silicosis; the appearance of the shadows of each disease may also be modified by the other. In these cases detailed histories are even more important, and the cooperation of the clinician and the roentgenologist is indispensable. Of course in these cases the symptoms, physical signs and laboratory findings of tuberculosis are present.

Of the 171 cases shown in the table, 52 or about 30 percent were classified as uncomplicated silicosis or asbestosis; 38 of these were in the first stage, 12 in the second stage, and only 2 were classified *in the third stage. A post-mortem examination of one of the last* cases showed a far-advanced silicosis without evidence of infection. Nevertheless, the pathologist, who was one of the reviewers of this series of cases, felt that there was probably a background of infection. If this case had not come to autopsy, it would have been classified as silico-tuberculosis. The remaining 119 cases all showed evidence of complicating infectious disease, more or less extensive and in most cases probably tuberculosis.

While this is not an extensive series of cases and no definite conclusions can be drawn from it, it is believed that it agrees with most observers in that it supports the belief that disease of the lungs due to dust inhalation increases the susceptibility of those organs to tuberculosis, and that this susceptibility is increased in direct ratio to the extent of the industrial disease. The reviewers are of the opinion that the number of cases of industrial disease in this series is very small, considering the number of cases of pulmonary disease coming under the observation of medical officers of the Veterans' Administration. Only 379 cases were considered as potential cases, and nine of these were submitted in duplicate from different facilities. This review has shown that there is a need for more *careful and detailed histories in cases of this type.* Medical officers should familiarize themselves with this disease; they should inform themselves of the various sources of disease-producing dust, and should know what types of occupations are hazardous from this standpoint.

In the study of this series of cases, the writer was associated with Dr. LeRoy U. Gardner, pathologist and director of the Saranac Lake Laboratory for the Study of Tuberculosis, and Dr. Homer L. Sampson, roentgenologist, Trudeau Sanitarium, both of Saranac Lake, N. Y. A composite opinion of the three reviewers was appended to each questionnaire, after careful study of the available data. These reviewers were much interested in this study, and wish to express their thanks to the officials of central office, and to the medical officers of the various facilities, who cooperated in furnishing

The
American
Ceramic
Society

February 15, 1993

I hereby certify that the attached copies of **Ceramic Abstracts, Volume 21, 1942**, are true and accurate copies, which are maintained in the normal course of business at the American Ceramic Society, 735 Ceramic Place, Westerville, Ohio 43081.

I cannot verify the accuracy of copies from **Medical Bulletin of the Veterans' Administration, Volume 18, 1942.**

Christine Schnitzer

Christine Schnitzer
Product Manager
Ceramic Information Center

735 Ceramic Place
Westerville, Ohio 43081-8720
614 • 890 • 4700
TWX: 7101109409