and choice in connection with such very simple material as they used, is much too limited to give an adequate idea of an observer's personality, and for this reason, unless the experimental material were enormously increased and the method so modified as to introduce other mental activities than will, I am confident the use of this method also, as regards the image method, would be one of control and support and perhaps of supplementation. Taken all in all, it seems to me, the image method is more information bringing than any of other methods which have been proposed.

In the way of a general summary and conclusion it may be said that the results everywhere show that images are not isolated entities, but are closely bound together, supporting and supplementing each other as information-bearers and that for this reason one gets through taking them apparently at random, typical examples of the entire range of an individual's imagery. Since images are in general the "high-points" of *unanschaulich* thinking, one may also obtain from them a very complete idea of an individual's general manner of thinking and acting. Stated briefly, the experiments show that the image method is a mode of "sampling" which is adequate for a satisfactory diagnosis of a personality.

LILLIEN J. MARTIN

STANFORD UNIVERSITY

THE INDUSTRIAL FELLOWSHIPS OF THE MELLON INSTITUTE[1]

IT is again my privilege to report to SCIENCE progressive growth in both the number of industrial fellowships in operation and the amounts subscribed for their support. This makes evident the confidence which industrialists have in the Mellon Institute and the genuine value to industry of the industrial fellowship system.

The following table presents the number of industrial fellowships which have been established at the Mellon Institute from March to March of each year, 1911 to 1917; the number of researchers, or industrial fellows, who have been employed thereon, and the total amounts of money contributed for their maintenance by the industrial fellowship donors.

March to March	Number of Industrial Fellowships	Number of Industrial Fellows	Amounts Contributed
1911–1912..	11	24	$ 39,700
1912–1913..	16	30	54,300
1913–1914..	21	37	78,400
1914–1915..	21	32	61,200
1915–1916..	36	63	126,800
1916–1917..	42	64	147,000

As indicated in last year's report,[2] when the industrial fellowship system passed out of its experimental stage—when the Mellon Institute occupied its permanent home in February, 1915—twenty-three fellowships were in operation, while on March 1, 1916, there were thirty-six fellowships. It was mentioned in that report that the growth of the institute had about reached the stage where we should be obliged to decline further industrial investigations temporarily, since our laboratories were almost filled up to capacity. Notwithstanding that fact, the impetus imparted to the investigational activity in American chemical manufacturing, the direct result of the appreciation of urgent action in industrial research, induced us to arrange for the acceptance of six new fellowships during the institute year, March 1, 1916, to March 1, 1917. At the present time (March 1, 1917) there are forty-two fellowships and four additional ones have recently been arranged for, to begin later in the year.

[1] For previous reports on the status of the system of cooperation between science and industry in operation at the Mellon Institute, see Duncan, SCIENCE, N. S., Vol. XXXIX. (1914), 672; and Bacon, *ibid.*, XLIII. (1916), 453.

[2] SCIENCE, N. S., Vol. XLIII. (1916), 453.

A LIST OF THE INDUSTRIAL FELLOWSHIPS IN OPERATION AT THE MELLON INSTITUTE ON MARCH 1, 1917

Numbers and Names of Industrial Fellowships in Operation	Industrial Fellows, Names and Degrees	Foundation Sums and Dates of Expiration
No. 28. *Fertilizer*	H. H. Meyers (B.S., University of Pennsylvania).	$2,500 a year for 1 year. Bonus: $5,000. January 5, 1918.
No. 48. *Bread*	*H. A. Kohman* (Ph.D., University of Kansas), Senior Fellow. T. M. Godfrey (B.S., University of Kansas). L. H. Ashe (B.S., University of Pittsburgh).	$6,500 a year for 2 years. Bonus: $10,000. March 1, 1917.
No. 51. *Yeast*	*Ruth Glasgow* (M.S., University of Illinois). T. A. Frazier (Chem.B., University of Pittsburgh).	$3,150 a year for 2 years. September 1, 1917.
No. 61. *Synthetic organic products*	*C. S. Palmer* (Ph.D., Johns Hopkins University), Senior Fellow. W. J. Harper (A.B., Ohio University). E. W. Reid (A.B., Southwestern College).	$6,000 a year for 2 years. Bonus: $3,500. November 10, 1917.
No. 63. *Canning*	E. H. Taylor (M.S., University of Illinois).	$1,200 a year for 1 year. November 1, 1917.
No. 67. *Bottle glass*	J. F. W. Schulze (Ph.D., Clark University).	$2,400 a year for 1 year. September 1, 1917.
No. 68. *Illuminating glass*	A. H. Stewart (A.B., Washington and Jefferson College).	$900 a year for 2 years. October 1, 1917.
No. 74. *Dental products*	C. C. Vogt (Ph. D., Ohio State University).	$2,300 a year for 1 year. July 1, 1917.
No. 76. *Glue and soap*	F. O. Amon (Sc.D., New York University). B. H. Nicolet (Ph.D., Yale University), Advisory Fellow.	$4,000 a year for 1 year. December 20, 1917.
No. 77. *Food container*	C. L. Weirich (M.S., University of Pittsburgh).	$1,800 a year for 1 year. Bonus: $6,000. March 31, 1917.
No. 78. *Iron ore*	F. M. McClenahan (M.A., Yale University).	$3,000 a year for 1 year. June 15, 1917.
No. 79. *Sand*	S. C. Ells (B.Sc., McGill University).	$5,000 a year for 1 year. June 1, 1917.
No. 82. *Medicinal products*	O. F. Hedenburg (Ph.D., University of Chicago).	$2,500 a year for 1 year. Bonus: 1 per cent. of profit for 5 years. June 14, 1917.
No. 84. *Copper*	H. P. Corliss (Ph.D., University of Pittsburgh). C. L. Perkins (B.S., New Hampshire College).	$5,400 a year for 1 year. July 1, 1917.
No. 85. *Copper*	E. D. Wilson (Ph.D., University of Chicago). A. S. Crossfield (B.S., University of California).	$3,600 a year for 1 year. July 1, 1917.
No. 86. *Pharmaceutical products*	*J. B. Churchill* (M.S., Pennsylvania State College), Senior Fellow. C. J. Herrly (B.S., Pennsylvania State College).	$4,600 a year for 1 year. July 7, 1917.
No. 87. *Washer waste*	C. B. Carter (Ph.D., University of North Carolina).	$2,500 a year for 1 year. August 7, 1917.
No. 88. *Soda*	C. W. Clark (Ph.D., University of Pittsburgh).	$3,000 a year for 1 year. September 1, 1917.
No. 89. *Organic synthesis*	H. A. Morton (Ph.D., University of Pittsburgh). H. J. Little (B.S., Delaware College).	$3,600 a year for 1 year. Bonus: $5,000. July 1, 1917.

(*Continued*)

Numbers and Names of Industrial Fellowships in Operation	Industrial Fellows, Names and Degrees	Foundation Sums and Dates of Expiration
No. 90. *Gas*	*J. B. Garner* (Ph.D., University of Chicago), Senior Fellow. F. W. Padgett (M.S., University of Pittsburgh). C. A. Neusbaum (A.B., Wabash College). D. F. Zimmers (B.S., University of Pittsburgh), Scholar.	$9,420 a year for 1 year. September 15, 1917.
No. 91. *Coke*	*F. W. Sperr, Jr.* (B.A., Ohio State University), Advisory Fellow. Marc Darrin (M.S., University of Washington). A. A. Kohr (B.S., Ohio State University). R. J. Montgomery (Cer. Eng., Ohio State University).	$5,640 a year for 1 year. January 1, 1918.
No. 93. *Collars*	H. D. Clayton (B.A., Ohio State University).	$2,300 a year for 1 year. October 1, 1917.
No. 94. *Coffee*	C. W. Trigg (B.S., University of Pittsburgh).	$1,500 a year for 1 year. Bonus: 2 per cent. of gross receipts. October 1, 1917.
No. 95. *Magnesia*	G. F. Gray (M.E. in E.E., Ohio State University).	$3,500 a year for 1 year. November 1, 1917.
No. 96. *Machinery*	Rudolph McDermet (E.E., University of Illinois).	$2,000 a year for 1 year. September 1, 1917.
No. 97. *Oil*	*B. T. Brooks* (Ph.D., University of Göttingen), Senior Fellow. Harry Essex (Ph.D., University of Göttingen). I. W. Humphrey (M.S., University of Kansas). D. F. Smith (M.S., University of Wisconsin).	$10,000 a year for 1 year. Bonus: $10,000. September 1, 1917.
No. 98. *Paints*	J. V. Thompson (A.B., Cornell University). C. E. Ruby (B.S., University of Kentucky).	$2,100 a year for 1 year. September 1, 1917.
No. 99. *Glyceryl phosphates*	F. F. Rupert (Ph.D., Massachusetts Institute of Technology).	$1,500 a year for 1 year. Bonus: 10 per cent. of profits. October 1, 1917.
No. 100. *Fiber*	C. E. Howson (B.S., Ohio State University).	$2,500 a year for 1 year. November 13, 1917.
No. 101. *Milling*	H. C. Holden (M.S., New Hampshire College).	$2,500 a year for 1 year. October 18, 1917.
No. 102. *Fruit juice*	R. R. Shively (Ph.D., University of Pittsburgh).	$5,000 a year for 1 year. October 1, 1917.
No. 103. *By-products recovery.*	Walther Riddle (Ph.D., University of Heidelberg).	$3,000 a year for 1 year. January 1, 1918.
No. 104. *Copper*	*G. A. Bragg* (B.S., University of Kansas), Senior Fellow of all *Copper* Fellowships. J. D. Malcolmson (B.S., University of Kansas).	$6,500 a year for 1 year. November 1, 1917.
No. 105. *Illumination*	*G. O. Curme, Jr.* (Ph.D., University of Chicago), Senior Fellow. G. D. Bagley (M.S. in E.E., University of Illinois). H. R. Curme (B.S., Northwestern University). C. N. Iry (B.S., Purdue University).	$8,000 a year for 1 year. Bonus: $5,000. November 15, 1917.

(*Concluded*)

Numbers and Names of Industrial Fellowships in Operation	Industrial Fellows, Names and Degrees	Foundation Sums and Dates of Expiration
No. 106. *Silverware*	H. E. Peck (B.S., Clarkson Memorial College of Technology).	$2,000 a year for 1 year. December 11, 1917.
No. 107. *Cottonseed*	F. W. Stockton (A.B., University of Kansas).	$3,600 a year for 1 year. Bonus: $5,000. October 16, 1917.
No. 108. *Insecticides*	C. O. Brown (M.A., Cornell University).	$3,000 a year for 1 year. January 1, 1918.
No. 109. *Glass refractories*	A. E. Blake (M.S., University of Pittsburgh).	$2,300 a year for 1 year. November 1, 1917.
No. 110. *Toilet articles*	L. M. Liddle (Ph.D., Yale University).	$3,000 a year for 1 year. December 1, 1917.
No. 111. *Distillation*	David Drogin (B.A., College of the City of New York).	$1,800 a year for 1 year. January 18, 1918.
No. 112. *Laundering*	H. G. Elledge (M.S., University of Pittsburgh).	$2,500 a year for 1 year. February 15, 1918.
No. 113. *Flavoring*	W. E. Vawter (B.S., University of Kansas).	$1,800 a year for 1 year. Bonus: $2,000. February 1, 1918.
Special research work.	E. O. Rhodes (M.S., University of Kansas) and R. W. Miller (M. S., Kansas State College).	

SUBJECT LIST OF INDUSTRIAL FELLOWSHIPS FROM THE INAUGURATION OF THE SYSTEM TO THE PRESENT TIME

University of Kansas, 1907–1911[3]

K–1. Laundering. K–2. Alfalfa. K–3. Salt-rising Bread. K–4. Casein. K–5. Oil. K–6. Enamel. K–7. Glass. K–8. Cement. K–9. Varnish. K–10. Borax. K–11. Adrenaline. K–12. Vegetable Ivory. K–13. Oil. K–14. Gilsonite. K–15. Fats. K–16. Leather. K–17. Copper. K–18. Copper (continuation of K–17).

University of Pittsburgh, 1911 to date

1. Bread. 2. Smoke. 3. Glass. 4. Bread. 5. Glue. 6. Soap. 7. Fruit Juice. 8. Composition Flooring. 9. Oil. 10. Gas. 11. Cement. 12. Foods. 13. Fatty Oils. 14. Electricity. 15. Coated Steel. 16. Copper (continuation of K–18). 17. Desert Plant. 18. Bread (continuation of 4). 19. Aluminum. 20. Glue (continuation of 5). 21. Soap (continuation of 6). 22. Glass. 23. Electricity (continuation of 14). 24. Copper (continuation of 16). 25. Yeast. 26. Fats (continuation of K–15). 27. Leather Waste (continuation of K–16). 28. Fertilizer. 29. Copper (continuation of 24). 30. Radiators. 31. Machinery. 32. Glass. 33. Copper (continuation of 29). 34. Fatty Oils (continuation of 13). 35. Copper (continuation of 33). 36. Copper. 37. Illumination. 38. Dental Products. 39. Compound Fats. 40. Stone. 41. Copper (continuation of 35). 42. Bottle Glass. 43. Laundering. 44. Land Development. 45. Copper (continuation of 35). 46. Organic Synthesis. 47. Soda. 48. Bread (continuation of 18). 49. Candy. 50. Paints. 51. Yeast (continuation of 25). 52. Copper (continuation of 36).

[3] The system of industrial research founded by

Subject List of Industrial Fellowships from the Inauguration of the System to the Present Time (continued)

53. Copper (continuation of 45). 54. Dental Products (continuation of 38). 55. Pharmaceutical Products. 56. Soap (continuation of 21). 57. Glue (continuation of 20). 58. Machinery (continuation of 31). 59. Milling. 60. Collars. 61. Inorganic Synthetic Products. 62. Gas. 63. Canning. 64. Oil (continuation of 9). 65. Compound Fats (continuation of 39). 66. Glyceryl Phosphates. 67. Bottle Glass (continuation of 42). 68. Glass (continuation of 22). 69. Linoleum. 70. Gum. 71. Stoves. 72. Copper (continuation of 53). 73. Illumination (continuation of 37). 74. Dental Products (continuation of 54). 75. Flavoring Materials. 76. Glue and Soap (continuation of 56 and 57). 77. Food Container. 78. Iron Ore. 79. Sand. 80. Laundering (continuation of 43). 81. Varnish. 82. Medicinal Products. 83. Cannel Coal. 84. Copper (continuation

of 52). 85. Copper (continuation of 72). 86. Pharmaceutical Products (continuation of 55). 87. Washer Waste. 88. Soda (continuation of 47). 90. Gas (continuation of 62). 91. Coke. 92. Leather Belting. 93. Collars (continuation of 60). 94. Coffee. 95. Magnesia. 96. Machinery (continuation of 58). 97. Oil (continuation of 64). 98. Paints (continuation of 50). 99. Glyceryl Phosphates (continuation of 66). 100. Fiber. 101. Milling (continuation of 59). 102. Fruit Juice. 103. By-products Recovery. 104. Copper (continuation of 85). 105. Illumination (continuation of 73). 106. Silverware. 107. Cottonseed. 108. Insecticides. 109. Refractories (Glass). 110. Toilet Articles. 111. Distillation. 112. Laundering (continuation of 80). 113. Flavoring (continuation of 75). 114. Enameling. 115. Bread (continuation of 48).

The Mellon Institute is now active in promoting the progress of science and in stimulating further inquiry by making available to the workers in pure and applied science complete and detailed reports of researches conducted under its auspices;[4] it maintains an attitude of welcome towards prospective industrial research organization[5] and has established stable cooperative relations with other research laboratories; and it is continuing its policy of educating the public to the realizable functions of research.[6] While effectively combatting pseudo-research in industry by reducing the cost of systematic investigation to a minimum, the Mellon Institute has been able to demonstrate to industrialists that, under favorable conditions, numerous manufacturing problems can be advantageously studied outside of plant laboratories. This has resulted in the extension of the practise of referring certain of the problems of industry to university laboratories for study.[7] However, this cooperative relation must be stabilized and promoted by the demonstration of its advantages by the institutional laboratories involved. About seventy per cent. of the problems assigned to the Mellon Institute for study during the five years, March, 1911, to March, 1916, were solved to the satisfaction of the donors, and like results can undoubtedly be obtained by similarly well-founded establishments. On every side the research men of our universities are needed for the execution of real attainment in the technical world with its difficulties, wastes and unexplored lines of manufacturing.

The administration of the Mellon Institute is now constituted as follows:

Raymond F. Bacon, Ph.D., Director;
Edward R. Weidlein, M.A., Associate Director;
Samuel R. Scholes, Ph.D., Assistant Director;
E. Ward Tillotson, Jr., Ph.D., Assistant Director;
John J. O'Connor, Jr., M.A., Assistant Director;
Martin A. Rosanoff, Sc.D., Head of the Department of Research in Pure Chemistry.

R. F. BACON

PITTSBURGH, PA.,
March 1, 1917

[4] Twenty-two journal contributions were made during the past Institute year. For a list of the scientific papers published by the Institute from 1911–1914, see Bacon, *J. Frankl. Inst.*, November, 1914, 629–32. Eighteen journal articles were published by the Institute during 1914–1915 (Sparks and Noyes, SCIENCE, N. S., Vol. XLV. (1917), 169).

[5] The following institutions have entered the field of industrial research: the universities of Kansas, Washington, Toronto and Akron, the Georgia School of Technology and the University of Finland (Helsingfors, Finland). The establishment of industrial fellowships in accordance with the practical system in operation at the Mellon Institute, is being considered by Massachusetts Agricultural College, Harvard University, Washington State College, McGill University, University of Sheffield (England), Sir John Cass Technical Institute (London), Sydney University (New South Wales, Australia), and University of Tokyo (Japan).

[6] See, in this connection, Bacon, SCIENCE, N. S., Vol. XLV. (1917), 34.

[7] For detailed presentments of the present-day technochemical problems which could be referred to university laboratories for investigation, see Bacon, *J. Ind. Eng. Chem.*, 7 (1915), 535; and *J. Soc. Chem. Ind.*, 36 (1917), 9.

SCIENTIFIC EVENTS

GRANTS FOR SCIENTIFIC AND INDUSTRIAL RESEARCH IN ENGLAND

WHEN the establishment of a separate department of scientific and industrial research was announced in December last, Lord Crewe