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THE INDUSTRIAL FELLOWSHIPS OF THE MELLON INSTITUTE[1]

I HAVE the honor, in the absence of Dr. Raymond F. Bacon, director of the Mellon Institute, who was commissioned as a lieutenant-colonel and is now in command of the Chemical Service Section of the National Army in France, to report to SCIENCE on the growth of the industrial fellowship system of the Mellon Institute, University of Pittsburgh.

During the past year, twenty-one members of the institute, including the director, as noted above, and an assistant director, Mr. William A. Hamor, who was commissioned as major and is aide to Lieutenant-Colonel Bacon, have entered government service in response to their country's call. The following is a list of the Industrial Fellows who have gone direct from the Institute into service:

F. O. Amon, First Lieutenant, Sanitary Corps.

H. S. Bennett, First Lieutenant, Sanitary Corps.

C. O. Brown, Captain, Ordnance Department.

A. S. Crossfield, First Lieutenant, Sanitary Corps.

R. F. Ferguson, Private, Ordnance Department.

G. F. Gray, Captain, Signal Corps.

R. B. Hall, Second Lieutenant, Chemical Service Section.

W. J. Harper, Second Lieutenant, Sanitary Corps.

C. E. Howson, First Lieutenant, Sanitary Corps.

C. N. Iry, Second Lieutenant, Engineers Corps.

E. H. Loeb, Second Lieutenant, Ordnance Department.

[1] For previous reports on this subject, see Duncan, SCIENCE, N. S., Vol. XXXIX. (1914), 672; Bacon, *ibid.*, XLIII. (1916), 453, and Bacon, *ibid.*, XLV. (1917), 399.

R. W. Miller, First Lieutenant, Sanitary Corps.
L. H. Milligan, Second Lieutenant, Ordnance Department.
R. V. Murphy, First Lieutenant, Sanitary Corps.
B. H. Nicolet, Captain, Chemical Service Section.
A. H. Stewart, Cadet, Aviation Section.
H. L. Trumbull, First Lieutenant, Ordnance Department.
W. E. Vawter, First Lieutenant, Sanitary Corps.
C. L. Weirich, First Lieutenant, Sanitary Corps.

In a number of instances, industrial fellows at the Institute, through the patriotism of the donors of their fellowships, have been giving part or, in some cases, all of their time to work on war problems which have been assigned to the institute by the National Research Council. The results obtained on some of the industrial fellowships have had opportune application to some pressing war problems. On these fellowships, no money is being spared by the donors or the institute to make the results of service to the government.

The institute, in most cases, has been able to fill the vacancies on the industrial fellowships, which were caused by the fellows entering military service. However, the shortage of research men, of the type demanded by the industrial fellowship system, has forced the institute to hold in abeyance a number of very desirable research problems. It is gratifying to report that, notwithstanding the unsettled condition of the business world, an increasing number of industrialists are assigning problems on their processes and products to the institute.

The following table shows the number of industrial fellowships which have been founded in the institute from March to March of each year—1911 to 1918; the number of researchers or industrial fellows, as they are called, who have been employed on these fellowships; and the total amounts of money contributed for their maintenance by industrial concerns:

March to March	Number of Fellowships	Number of 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	65	149,100
1917–1918	42	64	172,000

The number of industrial fellowships, noted in the table above, gives very little idea of the real scope of the service of the institute. At the present time there are six national trade associations which have fellowships in the institute. These associations have in their membership over two thousand firms. The institute especially welcomes fellowships from associations, as it is permitted in this way to be of service to a large number of companies which, individually, could not afford to found a fellowship. The institute is glad to note that national trade associations have been quick to realize the value of industrial research and are fostering it in a number of different ways.

The following is a list of the industrial fellowships in operation at the institute on March 1, 1918:

A LIST OF THE INDUSTRIAL FELLOWSHIPS IN OPERATION AT THE MELLON INSTITUTE ON MARCH 1, 1918

Numbers and Names of Industrial Fellowships in Operation	Industrial Fellows, Names and Degrees	Foundation Sums and Dates of Expiration
No. 92. Leather Belting	E. D. Wilson (Ph.D., University of Chicago).	$3,800 a year. April 1, 1918.
No. 95. Magnesia	G. D. Bagley (E.E., University of Illinois).	$4,750 a year. November 1, 1918.
No. 99. Glyceryl Phosphates	F. F. Rupert (Ph.D., Massachusetts Institute of Technology).	$1,500 a year. Bonus: 10 per cent. of profits. October 1, 1918.
No. 102. Fruit Juice	R. R. Shively (Ph.D., University of Pittsburgh).	$5,000 a year. April 1, 1918.

No. 114. Enameling	R. D. Cooke (M.S., University of Wisconsin).	$2,200 a year. April 1, 1918.
No. 115. Bread	*H. A. Kohman* (Ph.D., University of Kansas), Senior Fellow. R. R. Irvin (M. S., University of Kansas). (Vacancy.)	$7,500 a year. Bonus: $10,000. March 1, 1919.
No. 116. Refractories	*R. M. Howe* (M.S., University of Pittsburgh), Senior Fellow. (Vacancy.)	$6,000 a year. May 1, 1918. Bonus: $500.
No. 117. Window Glass	A. C. Nothstine (B.S., Ohio State University).	$3,000 a year. Bonus: $2,000. June 1, 1918.
No. 118. Leather Soling	C. B. Carter (Ph.D., University of North Carolina).	$3,500 a year. June 4, 1918.
No. 119. Iron Ore	F. M. McClenahan (M.A., Yale University).	$3,000 a year. June 15, 1918.
No. 120. Dental Products	C. C. Vogt (Ph.D., Ohio State University).	$2,400 a year. Bonus: Royalty on sales. July 1, 1918.
No. 121. Copper	C. L. Perkins (B.S., New Hampshire College). J. W. Schwab (B. S., University of Kansas).	$5,400 a year. July 1, 1918.
No. 122. Soda	C. W. Clark (Ph.D., University of Pittsburgh).	$3,500 a year. September 1, 1918.
No. 123. Oil	Harry Essex (Ph.D., University of Göttingen). I. W. Humphrey (M.S., University of Kansas). (Vacancy.)	$10,000 a year. Bonus: $10,000. September 1, 1918.
No. 124. Cement	E. O. Rhodes (M.S., University of Kansas).	$4,000 a year. Bonus: $3,500. August 1, 1918.
No. 125. Hair	B. A. Stagner (Ph.D., University of Chicago).	$3,000 a year. October 1, 1918.
No. 127. Collar	H. D. Clayton (B.A., Ohio State University).	$2,800 a year. October 1, 1918.
No. 128. Coffee	C. W. Trigg (B.S., University of Pittsburgh).	$1,800 a year. Bonus: 2 per cent. of gross receipts. October 1, 1918.
No. 129. Illuminating Glass	A. H. Stewart (A.B., Washington and Jefferson College). (On leave of absence.)	$900 a year. October 1, 1919.
No. 130. Food Container	F. W. Stockton (A.B., University of Kansas).	$5,000 a year. October 16, 1918.
No. 131. Gas	*J. B. Garner* (Ph.D., University of Chicago), Senior Fellow. (Vacancy.)	$7,500 a year. September 15, 1918.
No. 132. Yeast	F. A. McDermott (M.S., University of Pittsburgh). Ruth Glasgow (M.S., University of Illinois). T. A. Frazier (B. Chem., University of Pittsburgh). P. H. Brattain. I. S. Hocker (B.S., University of Pennsylvania).	$12,700 a year. Bonus. November 1, 1918.
No. 133. Glass	E. E. Bartlett (Pet.E., University of Pittsburgh).	$3,000 a year. November 1, 1918.
No. 134. Glycerine	J. E. Schott (M.A., University of Nebraska).	$3,000 a year. November 15, 1918.
No. 135. Fiber	J. D. Malcolmson (B.S., University of Kansas).	$2,500 a year. November 15, 1918.
No. 136. Copper	*G. A. Bragg* (B.S., University of Kansas), Senior Fellow of all Copper Fellowships. (Vacancy.)	$5,000 a year. November 1, 1918.
No. 137. Toilet Articles	L. M. Liddle (Ph.D., Yale University).	$3,500 a year. December 1, 1918.
No. 138. Silicate	M. G. Babcock (M.S., Iowa State College).	$2,500 a year. December 1, 1918.
No. 139–A. Organic Synthesis	*G. O. Curme, Jr.* (Ph.D., University of Chicago), Senior Fellow. J. N. Compton (M.S., Columbia University). H. R. Curme (B.S., Northwestern University). E. W. Reid (M.S., University of Pittsburgh).	$10,000 a year. Bonus: $5,000. January 1, 1919.
No. 139–B. Organic		

Synthesis	*H. A. Morton* (Ph.D., University of Pittsburgh), Senior Fellow. C. J. Herrly (B.S., Pennsylvania State College).	$5,000 a year. Bonus: $5,000. January 1, 1919.
No. 140. Silverware	H. E. Peck (B.S., Clarkson Memorial College of Technology).	$2,500 a year. December 11, 1918.
No. 141. Insecticides	O. F. Hedenburg (Ph.D., University of Chicago).	$3,000 a year. January 1, 1919.
No. 142. By-products Recovery	Walther Riddle (Ph.D., University of Heidelberg).	$3,000 a year. January 1, 1919.
No. 143. Coke	*F. W. Sperr, Jr.* (B.A., Ohio State University), Advisory Fellow. Marc Darrin (M.S., University of Washington). O. O. Malleis (M.S., University of Kansas). L. R. Office (B.S., Ohio State University).	$7,000 a year. January 1, 1919.
No. 144. Fertilizer	H. H. Meyers (B.S., University of Pennsylvania).	$3,000 a year. Bonus: $5,000. January 5, 1919.
No. 145. Soap	(Fellow to be appointed.)	$2,000 a year. January 5, 1919.
No. 146. Glue	R. H. Bogue (M.S., Massachusetts Agricultural College).	$2,500 a year. January 5, 1919.
No. 147. Distillation	David Drogin (B.A., College of the City of New York). H. F. Perkins.	$5,300 a year. January 18, 1919.
No. 148. Tobacco	W. B. Pattison (M.A., University of Nebraska).	$2,100 a year. Bonus: $2,000. February 1, 1919.
No. 149. Laundry	*H. G. Elledge* (M.S., University of Pittsburgh), Senior Fellow. K. R. Beach (A.B., Southwestern College).	$5,000 a year. February 15, 1919.

It required the cataclysm of the Great War to bring men to realize fully the part which applied science is playing and, more particularly, will play in the life of nations. As men have come to know that everything in modern warfare is controlled in a large measure by science—no gun of large caliber is located or fired without its aid—so they have come to know that in the making of things—in the economy and progress of manufacturing operations—science must have a place, an important place too. With this idea in mind, institutions of learning and industries in this country, but more especially abroad, are investigating and studying methods to bring about cooperation between science and industry. The Mellon Institute is proud that, while very young, it has been a pioneer in the field. Its principal claim to distinction, apart from its contributions to specific industries, is based on the service it has been able to render to other institutions in demonstrating the practicability of a system which brings together science and industry for the development of a future and more gracious civilization.

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

Raymond F. Bacon, Ph.D., Director (on leave of absence);

Edward R. Weidlein, M.A., Associate Director and Acting Director;

E. Ward Tillotson, Jr., Ph.D., Assistant Director;

John O'Connor, Jr., M.A., Assistant Director;

William A. Hamor, M.A., Assistant Director (on leave of absence);

David S. Pratt, Ph.D., Assistant Director;

Martin A. Rosanoff, Sc.D., Head of the Department of Research in Pure Chemistry.

E. R. Weidlein,
Acting Director
Mellon Institute of Industrial Research,
University of Pittsburgh,
March 1, 1918

THE EFFECT OF CATTLE ON THE EROSION OF CANON BOTTOMS

To every explorer in the arid cañon country of southern Colorado the steep-walled arroyo trenched in the center of the flat alluvium bottom is a familiar sight. Its vertical banks many times twenty or twenty-five feet high in the soft crumbling soil are no mean impediment to travel and its sandy or stony bottom is a source of constant anxiety to the freighter. Every storm fills this miniature