who has as his hobby the designing of special radio circuits may be more valuable to the nation as a communications engineer than in his own special field of professional competence.

It is recognized that selection of men for important governmental posts and, indeed, for less important specialized activities can not be reduced to a mechanical card-sorting procedure. It is therefore planned to organize committees in each of the specialized fields based upon nominations of those working in these fields. These special committees of experts are to be asked in certain instances to evaluate the names of individuals who are presented to them by the automatic process of the punch-card technique. These special committees are also to be charged with the duty of protecting present educational and research endeavors which are performing important public services to the maximum degree possible.

Fundamentally, the aim of the national roster is the development of a means for the efficient and rapid but appropriate use of the specialized brains of America in the service of the nation. As the English commission has said: "The National Service Department is fully alive to the consequences of the errors of assignments made in the war of 1914–18 and is anxious to avoid repetition of those errors and to insure that each man who offers his services is assigned to that task for which his knowledge, training and capacities best fit him."

Once started and organized, it seems that the value of the roster to many constructive activities of peace time, especially in connection with modern personnel and employment services, will be obvious. It seems clear that with the passing of the present emergency, this roster should not be abandoned, but rather, maintained as a continuing and always up-to-date census of the specialized brains of America. Even in a complete and continuing form, the development and maintenance of such a register will not be expensive in comparison with some of the other projects already undertaken for the preservation and effective use of our natural resources. Moreover, the procedures which will be based upon the use of the roster are at once effective and truly democratic.

The time has come when our nation must be efficient. The National Roster of Scientific and Specialized Personnel is certainly a necessary tool of an effective democracy.

THE PRODUCTION, RETENTION AND ATTRACTION OF AMERICAN MEN OF SCIENCE[1]

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THE facts reported in this article are based on the persons listed on 1,500 of the pages of the 1938 edition of "American Men of Science." Wherever a number is stated as for all the persons listed in that book, it is (unless otherwise stated) obtained by multiplying the number obtained from these 1,500 pages by 1.0667. The divergences between the rates reported and those which a complete count of all 1,600 pages would have produced are of no consequence.

Column 1 of Table 1 states the number of A.M.S. entries residing in each state. Column 2 of Table 1 states the number of A.M.S. entries residing in each state per million population in 1930. The median is 189. There is a wide variation, from 46, 57 and 67 for Miss., Ark. and Ala. to 461 for Nev., 482 for Md. and 1,179 for Del. Six states are below 100 and nine are above 300.

Column 3 of Table 1 states the number of members of the A.A.A.S. reported for 1934 (*Proceedings* of the A.A.A.S., Vols. 82 to 87). Even without allowance for the number of memberships by institutions and by amateurs not listed in American Men of Science, the differences between column 2 and column 3 show regrettably large numbers of men of science who fail to cooperate with the American Association.

Column 4 states the percentage which the A.A.A.S. membership is of the A.M.S. enrolment for each state. It has a median at 61, and ranges from 26 for Delaware to 96 for Connecticut; 43 of the states have percentages from 40 to 80.

Column 5 states the number of A.M.S. persons born in each state. When this number $\times 1{,}000{,}000$ is divided by the sum of the 1890 and 1900 populations the result is as given in Column 6. The numbers in Column 6 may be called approximate relative birth-rates. They are by no means perfect as measures of the comparative productivity of the states, but the errors are small in comparison with the differences among the states. It would be impossible to obtain for each state and each period the percentage of those born in the state who would, before they died, or before they reached some specified age, be enrolled in any specified list.

The birth-years of American men of science are

[1] The work reported here was one item of a project supported by the Carnegie Corporation.

TABLE 1

AMERICAN MEN OF SCIENCE IN THE 48 STATES

	Number residing	Number residing per million of 1930 population	Number of members of the A.A.A.S.	Percentage which A.A.A.S. membership is of A.M.S.	Number born	Number born × 1,000,000/sum of 1890 + 1900 populations	Number born per 100,000 white population in 1890	Percentage of those born in the state and residing in the U.S.A. residing in the state of birth	Per cent. which the entry of column 8 is of the corresponding percentage for all persons born in the state	Number (of A.M.S.) born in other states residing in the specified state	100,000 × the entry of column 10 divided by the number of all persons born in other states residing in the specified state	Number of A.M.S. born in foreign countries	Number of A.M.S. born in foreign countries × 100,000 divided by the total number of foreign-born in the specified state in 1930
	1	2	3	4	5	6	7	8	9	10	11	12	13
Ala.	177	67	34	51	157	47	19	23	30	132	43	8	50
Ariz.	131	301	248	82	20	95	36	17	24	114	57	12	18
Ark.	105	57	23	40	127	52	16	10	15	90	18	3	28
Cal.	1,817	320	257	80	555	206	50	52	57	1,302	50	225	21
Colo.	288	278	179	64	324	340	80	12	19	229	45	19	19
Conn.	577	359	343	96	460	278	63	18	23	422	138	69	18
Del.	281	1,179	302	26	49	139	35	18	26	247	377	21	123
Fla.	243	165	96	58	45	49	20	13	16	211	32	16	23
Ga.	239	82	40	49	177	44	18	31	41	179	60	7	49
Id.	86	193	88	46	63	252	77	9	14	77	35	4	12
Ill.	1,604	210	149	71	1,758	203	47	22	30	1,039	67	182	15
Ind.	515	159	91	57	1,138	242	53	17	24	333	48	39	27
Iowa	474	192	119	62	1,107	267	58	11	18	321	65	31	18
Kan.	314	167	94	56	695	240	50	10	16	223	34	24	30
Ky.	183	70	49	70	315	79	20	16	23	126	43	9	41
La.	255	121	90	74	122	49	22	39	48	189	70	18	49
Me.	148	186	104	56	347	256	53	13	18	94	150	11	11
Md.	787	482	274	57	503	226	61	27	35	572	177	70	73
Mass.	1,501	353	254	72	1,516	301	68	30	37	882	173	161	15
Mich.	884	183	112	61	896	198	43	22	27	598	53	90	11
Minn.	561	219	134	61	642	210	50	22	30	380	75	53	14
Miss.	92	46	22	48	150	53	28	21	28	58	23	2	25
Mo.	514	142	112	79	844	146	33	15	23	347	39	44	29
Mont.	110	205	121	59	96	249	75	9	14	95	40	6	8
Neb.	189	137	103	75	434	204	41	10	15	131	35	15	13
Nev.	42	461	329	71	15	167	38	29	58	36	78	1	7
N. H.	139	299	189	63	212	269	56	10	15	103	101	14	17
N. J.	1,076	266	165	62	450	135	32	18	21	831	79	153	18
N. M.	87	205	142	69	30	84	21	11	16	78	54	6	25
N. Y.	3,937	311	264	85	2,612	197	44	40	48	2,329	169	546	17
N. C.	369	116	57	49	268	76	25	29	35	269	85	22	245
N. D.	73	107	69	64	95	186	52	7	10	60	33	6	6
Ohio	1,331	200	134	67	1,775	227	50	23	29	812	60	111	17
Okla.	277	116	55	47	112	107	?	16	22	235	20	23	75
Ore.	225	236	128	54	159	218	53	13	18	186	41	20	18
Pa.	1,846	192	136	71	1,883	163	37	30	33	1,077	112	193	16
R. I.	147	214	163	76	163	211	48	15	19	107	91	15	9
S. C.	139	80	40	50	205	82	44	15	20	99	73	8	149
S. D.	71	102	42	41	192	256	59	3	4	62	27	3	5
Tenn.	271	104	63	61	240	63	18	17	24	210	50	20	151
Tex.	583	100	67	67	429	81	25	34	40	411	36	27	8
Utah	143	282	144	51	240	492	117	32	44	62	79	6	13
Vt.	78	217	117	54	195	288	59	10	15	53	89	6	14
Va.	443	183	111	61	439	125	43	25	35	297	90	32	131
Wash.	290	186	100	54	204	233	60	14	18	236	33	27	11
W. Va.	182	105	60	57	192	111	26	21	27	131	38	11	21
Wis.	540	184	119	65	855	227	51	16	21	357	94	43	11
Wyo.	70	310	102	33	37	139	63	11	20	65	50	2	9

approximately as shown in Table 2 for a random sample of 2,000 of them. The rates of Column 6 of Table 1 will be more or less unjust to certain states which had relatively larger populations in 1890 and 1900 than over the whole period during which the persons enrolled were born.

TABLE 2

AGE DISTRIBUTION OF AMERICAN MEN OF SCIENCE. NUMBER BORN AMONG TWO RANDOM THOUSANDS OF AMERICAN MEN OF SCIENCE, 1938

	I	II	Av.
Before 1860	3	10	6.5
1860–1864	22	26	24
1865–1869	28	43	35.5
1870–1874	75	70	72.5
1875–1879	55	81	68
1880–1884	92	88	90
1885–1889	113	127	120
1890–1894	148	133	140.5
1895–1899	153	156	154.5
1900–1904	166	148	157
1905–1909	124	104	114
1910 or later	21	14	17.5
			1000.0

For the sake of those who are interested in rates based on the white population, Column 7 of Table 1 shows the number of A.M.S. entries per 100,000 white population in 1890.

Column 8 of Table 1 states the percentage which the number born in a state and residing in it in 1938 is of the number born in it and residing anywhere in the United States. The mobility of American men of science is very great, the average percentage residing in the state of birth being 19, about a fourth that for the general population. The variation among states is wide, the percentages ranging from 3 for South Dakota to 52 for California, four being less than 10 and eight being 30 or more.

It is for certain purposes more important to know a state's retention of its future men of science in comparison with its retention of the generality of those born in it. Column 9 of Table 1 reports the ratio, *per cent. retained of A.M.S./per cent. retained of all persons born,* for each state. The variation is great.

The attraction of American men of science to each state is shown by columns 10 to 13. Column 10 states the number of A.M.S. men born in other states residing in each state. Column 11 states the ratio of this number to the total number of residents of the state who were born in other states. The variation among states in this ratio is very great. For every 100,000 immigrants from other states Arkansas has 18 men of science, Mississippi has 23, Oklahoma has 20 and South Dakota has 27, whereas Delaware, Maryland, Massachusetts and New York have respectively 377, 177, 173 and 169. The differences are obviously connected with differences in the amount of manufacturing relative to agriculture, but that is not the whole story. For Iowa, Louisiana, Maine, Minnesota, New Hampshire, North Carolina, South Carolina and Utah are high, Alabama is below Georgia, Pennsylvania is below Maryland, and there are other discrepancies. The number of men of science born in foreign countries is given for each state in column 12, and the ratio of this number to the total number of foreign-born residing in the state is given in column 13.[2]

Table 3 presents the facts of columns 6, 9, 11 and 13 as deviations + or − from the score of the median state for the fact in question.[3]

TABLE 3

THE FACTS OF COLUMNS 6, 9, 11 AND 13 OF TABLE 1 EXPRESSED AS DEVIATIONS FROM THE SCORE OF THE MEDIAN STATE FOR THE FACT IN QUESTION

	6 Birth	9 Retention	11 Attraction from other states	13 Attraction from foreign countries
Ala.	−17	7	−4	16
Ariz.	−12	1	1	0
Ark.	−17	−8	−12	5
Cal.	1	34	−2	2
Colo.	16	−4	−3	1
Conn.	9	0	26	0
Del.	−7	3	102	53
Fla.	−17	−7	−7	3
Ga.	−17	18	2	16
Id.	6	−9	−6	−3
Ill.	0	7	4	−2
Ind.	5	1	−2	5
Iowa	8	−5	3	0
Kan.	4	−7	−7	6
Ky.	−14	0	−4	12
La.	−17	25	5	15
Me.	6	−5	30	4
Md.	3	12	39	27
Mass.	11	14	37	−2
Mich.	0	4	−1	−4
Minn.	1	7	6	−2
Miss.	−16	5	−10	4
Mo.	−6	0	−5	5
Mont.	5	−9	−5	−5
Neb.	0	−8	−6	−3
Nev.	−4	35	7	−6
N. H.	8	−8	15	−1
N. J.	−7	−2	8	0
N. M.	−13	−7	0	3
N. Y.	0	25	36	−1
N. C.	−14	12	10	113
N. D.	−2	−13	−7	−6
Ohio	3	6	2	−1
Okla.	−10	−1	−11	28
Ore.	2	−5	−4	0
Pa.	−4	10	18	−1
R. I.	1	−4	11	−5
S. C.	−13	−3	6	65
S. D.	6	−19	−9	−7
Tenn.	−15	1	−2	66
Tex.	−13	17	−6	−5
Utah	33	21	8	−3
Vt.	10	−8	11	−2
Va.	−8	12	11	65
Wash.	4	−5	−7	−4
W. Va.	−10	4	−5	2
Wis.	3	−2	12	−4
Wyo.	−7	−3	−2	−5

[2] In this case, the numbers are for a complete count of all 1,600 pages of "American Men of Science."

[3] The scales for Table 3 are such that in each case 20 equals approximately the range required to include 32 of the 48 states.

The ranks of the states in the production, retention and attraction of men of science more than men in general seem chaotic to a casual inspection of Table 3. And closer study does not greatly alter this impression. Except for Maryland, no state is above the median in all four respects; and the status of Maryland may be influenced by its being suburban to Washington and surely is influenced by the presence of a great private university and hospital. Except for North Dakota and Wyoming no states are below the median in all four, and their low rank in births may be due to the use of the 1890+1900 populations as a base. Their populations in 1860, 1870 and 1880 were relatively small. There is a tendency for the states of the West and Northwest to produce many men of science; but they do not retain them in competition with manufacturing states, nor attract them from other states or abroad. So Idaho, Montana, Oregon, South Dakota, Washington are above the median in births and below it or at zero in the other three. Colorado and Nebraska can be put into this group.

In general the states that produce do not retain, but Massachusetts, Ohio and Utah are notable exceptions. Attraction from other states and attraction from foreign countries show a surprising lack of correlation. Connecticut, Massachusetts and New York are very high in the former but at or below the median in the latter. Retention and attraction are also much less closely related than would be expected.

The correlation coefficients witness to the generally confused pattern of the states.[4] They are as follows, all deviations being taken from the medians:

	Pearson coefficient	Sheppard coefficient	Average
Birth with retention	−.14	−.38	−.26
Birth with attraction from other states	.09	.20	.15
Birth with attraction from abroad	−.44	−.58	−.51
Retention with attraction from other states	.28	.43	.36
Retention with attraction from abroad	.21	.18	.20
Attraction from other states with attraction from abroad	.30	−.30	.00

TABLE 4

NUMBER OF AMERICAN MEN OF SCIENCE IN THE 48 STATES AND D. C. BORN IN FOREIGN COUNTRIES

Country	Number of American men of science in 48 states and D.C.	American men of science per million U.S.A. residents in 1930
England	280	346
Scotland	60	169
Wales	18	299
Ireland	21	23
Norway	52	149
Sweden	72	121
Denmark	47	262
Iceland	4	1,447
Netherlands	60	451
Belgium	20	312
Luxemburg	0	0
Switzerland	67	593
France	30	221
Germany	259	161
Poland	63	50
Czechoslovakia	32	65
Austria	98	264
Hungary	53	193
Yugoslavia	3	14
Russia	285	247
Latvia	15	726
Estonia	5	1,408
Lithuania	16	83
Finland	11	77
Rumania	18	123
Bulgaria	5	532
Turkey	14	286
Greece	15	86
Albania	0	0
Italy	22	12
Spain	5	84
Portugal	0	0
Danzig	1	674
Europe, not specified	2	135
Armenia	15	466
Palestine	3	489
Syria	10	175
China	29	629
Japan	26	366
India	34	5,812
Other Asia	21	1,998
Canada and Newfoundland	610	466
Cuba	3	162
Other West Indies	25	285
Mexico	16	25
Central America	5	476
South America	12	357
Africa	25	2,822
Australia	18	1,404
Azores and other Atlantic Islands	1	71
Pacific Islands	18	3,976
Puerto Rico, Hawaii, Philippines and Alaska	28	....

TABLE 5

PERSONS IN "AMERICAN MEN OF SCIENCE" BORN IN THE 48 STATES OR D. C. REPORTED AS RESIDING IN ALASKA, HAWAII, ETC.

Alaska	1
Territory of Hawaii	83
Philippines	13
Puerto Rico	21
Virgin Islands	1
England	16
Scotland	1
Norway	1
Denmark	1
Belgium	1
Switzerland	2
France	10
Germany	5
Austria	1
Hungary	1
Yugoslavia	1
Russia	1
Rumania	1
Turkey	2
Italy	2
Syria	10
China	27
Japan	1
India	9
Other Asia	4
Canada and Newfoundland	106
Cuba	2
Mexico	8
Central America	12
South America	16
Africa	10
Atlantic Islands	1
Pacific Islands	5

[4] They would be disturbed in any case by the skewness

Table 4 presents, for American men of science residing in the 48 states and the District of Columbia, the number born in each of various foreign countries and the proportion which this number is of the total number of persons born in that country and residing (in 1930) in the United States. These proportions (each of which is the number of American men of science from the country in question × 1,000,000 divided by the total number of U. S. A. residents in 1930 from that country) are not measures of the contributions of the nations listed, because of differences in the times at which the immigrations occurred, in the proportions which the children of Americans temporarily abroad (as missionaries, government employees, etc.) are of the numbers born in the countries in question, and in other respects. But they are instructive if used with wisdom and caution.

The men of science born in the 48 states and the District of Columbia who were reported as residing in Alaska, the Territory of Hawaii, the Philippines, Puerto Rico, the Virgin Islands and in foreign countries are enumerated in Table 5; but I am unable to estimate how many in any of the groups are permanently residents outside of the states.

The Cattell list includes 901 men of science residing in Canada. Of these 577 were born in Canada; 106 in the 48 states and D. C.; 110 in England; 30 in Scotland; 4 in Wales; 46 in other European countries.

OBITUARY

JOHN GERALD FITZGERALD

ON June 20, Dr. John Gerald FitzGerald, director of the Connaught Laboratories and of the School of Hygiene, University of Toronto, died in his fifty-eighth year. Dr. FitzGerald was internationally known as an authority on medical education, as a leader in preventive medicine, as a scientific investigator and as a director of medical research. As a result of his vision, initiative and leadership, there were established in the University of Toronto the Connaught Laboratories and the School of Hygiene. Returning to his alma mater in 1913 as associate professor of hygiene and preventive medicine, University of Toronto, he devoted himself to an endeavor to create, within this university, a non-commercial scientific institute to fulfil two functions in the interests of medical public-service, *viz.*, research in the field of preventive medicine, and the preparation of diphtheria antitoxin and certain other biological products so that these products might be supplied throughout Canada in such a fashion as would ensure their being of high quality and low price. His insistent perseverance soon yielded success in this endeavor, and the antitoxin laboratory which he established at that time, and which shortly became known as the Connaught Laboratories, later proved to be a major contributing factor in the establishment of a national School of Hygiene at the University of Toronto. The achievements of these two institutes, the Connaught Laboratories and the School of Hygiene, are due in no small measure to Dr. FitzGerald's constant encouragement and promotion of intimate relationships and integration among teaching, research and public-service activities.

Serving as a member of the International Health Board of the Rockefeller Foundation from 1923 to 1931, subsequently as a scientific director of the foundation's International Health Division, and as a member of the Health Committee of the League of Nations from 1930 to 1936, Dr. FitzGerald evidenced his keen interest in international public health. In 1933–34, he joined General F. F. Russell and Dr. W. W. Jameson in making, for the International Health Division of the Rockefeller Foundation, a survey of health conditions in India, Ceylon and Egypt. In 1936–37, at the instance of the Division of Medical Sciences of the Rockefeller Foundation and in company with Dr. C. E. Smith, he undertook a survey of the teaching of preventive medicine to medical undergraduates in Europe and North America. For four years, 1932–36, he served as dean of the Faculty of Medicine, University of Toronto.

He gave generously of his time to various important administrative and research undertakings in Canada—the Dominion Council of Health, of which he was one of the original members, the National Research Council of Canada, the Ontario Research Foundation and the Banting Research Foundation—and to various professional societies, including the Canadian Medical Association, the Canadian National Committee for Mental Hygiene and the Canadian Public Health Association. He was elected a fellow of the Royal Society of Canada in 1920 and was honored by Queen's University with the degree of LL.D. in 1925. He was one of the charter fellows of the Royal College of Physicians and Surgeons of Canada.

He made many contributions to scientific literature. To meet the needs of medical students he early published a "Laboratory Guide in Bacteriology," and later "An Introduction to the Practice of Preventive Medicine," an extensively used text-book.

Within and far beyond the institutes to which John Gerald FitzGerald devoted his life, his work will continue to live, and he will be remembered as one who

of the distributions, but if there were close resemblances in production, retention and attraction, the skewness would not reduce the coefficients greatly.