DOCUMENT RESUME

ED 111 682 SE 019 689

AUTHOR	Scopino, John A.; And Others
TITLE	Characteristics of Doctoral Scientists and Engineers in the United States, 1973.
INSTITUTION	National Science Foundation, Washington, D.C. Div. of Science Resources Studies.
REPORT NO	NSF-75-312
PUB DATE	May 75
NOTE	64p.; Small type used in appendices. For a related document, see SE 019 708
AVAILABLE FROM	Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Stock No. 038-000-00229-5, $1.15)
EDRS PRICE	MF-$0.76 HC-$3.32 Plus Postage
DESCRIPTORS	*Doctoral Degrees; Employment Statistics; *Engineers; National Surveys; *Occupational Surveys; Professional Occupations; Science Education; *Scientists; *Surveys
IDENTIFIERS	National Science Foundation; NSF

ABSTRACT

This publication presents data on the supply, utilization, and characteristics of U.S. doctoral scientists and engineers. The population surveyed consisted of individuals in the United States who held science or engineering doctorates, or who had received doctorates in nonscience and nonengineering areas but were employed in science or engineering positions. Included in the population were individuals who received their doctorates between January 1, 1930 and June 30, 1972, inclusive. Subsequent surveys in this biennial series will take account of new entrants into this segment of the nation's scientific and engineering manpower resources. The data on doctoral scientists and engineers in this report are presented in three parts: charts providing a broad perspective; tables presenting more specific, although selective, information; and appendices containing the questionnaire and specialties list used in the survey, plus notes on the survey methodology, coverage, concepts, and definitions used in the survey. (Author/MLH)

Characteristics of Doctoral Scientists and Engineers in the United States, 1973

A Report Based on the National Science Foundation's
Power Characteristics System

SCIENCE RESOURCES STUDIES
SCIENCE FOUNDATION

Related Publications

REPORTS	NSF No.	Price
Young and Senior Science and Engineering Faculty, 1974: Support, Research Participation, and Tenure	75-302	$1.70
Unemployment Rates and Employment Characteristics for Scientists and Engineers, 1971	72-307	$1.75
Scientific Human Resources: Profiles and Issues	72-304	$0.25
American Science Manpower, 1970	71-45	$2.00
HIGHLIGHTS		
"National Sample of Scientists and Engineers: Participation in National Programs and Changes in Educational Attainment, 1972-74"	75-317	—
"National Sample of Scientists and Engineers: Changes in Employment, 1970-72 and 1972-74"	75-309	—
"Federal Scientific and Technical Personnel Decline in 1973"	74-316	—
"Immigration of Scientists and Engineers Drops Sharply in FY 1973: Physician Inflow Still Near FY 1972 Peak"	74-302	—
"Selected Characteristics of Five Engineering and Scientific Occupational Groups, 1972"	73-306	—

Availability of Publications

Those publications marked with a price should be obtained directly from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Where no price is listed, single copies may be obtained gratis from the National Science Foundation, Washington, D.C. 20550

(See inside back cover for Other Science Resources Publications.)

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price $1.15

Stock Number 038-000-00229-5

FOREWORD

This report is a reference document providing data on the characteristics of 245,000 doctoral scientists and engineers in the United States. The report was produced from data generated by the National Science Foundation's Manpower Characteristics System which was established to provide manpower data essential to those engaged in science and engineering policy matters. A characteristic feature of the System is that information is collected from individual scientists and engineers rather than from other sources; e.g., employers, professional societies, etc. Consequently, many characteristics unknown to employers can be identified.

The basis of this report is the 1973 survey, the first in a biennial series, of the Doctoral Roster of Scientists and Engineers, conducted for the National Science Foundation and the National Institutes of Health, by the National Academy of Sciences' Commission on Human Resources. Surveys of the Doctoral Roster provide the data collection mechanism for one element of the Manpower Characteristics System which also includes the National Sample of Scientists and Engineers and surveys of New Entrants to Science and Engineering.

This report was prepared in the Foundation's Division of Science Resources Studies. General supervision was provided by Robert W. Cain, Head, Sponsored Surveys and Studies Section.

Charles E. Falk
Director
Division of Science Resources Studies

May 1975

acknowledgments

J. James Brown, Study Director, Manpower Characteristics System, provided the planning and direction for System activities. The report was prepared by John A. Scopino with the assistance of Gayle F. Barker and Nancy M. Conlon.

With support from the National Science Foundation and the National Institutes of Health, members of the Commission on Human Resources staff conducted the 1973 survey and maintained the roster of Doctoral Scientists and Engineers, under the direction of William C. Kelly. The Commission staff included Lewis C. Solmon, Porter E. Coggeshall, Lindsey Harmon, Doris E. Ragowski, and Herbert Soldz.

The doctorate-holding scientists and engineers who responded to the survey deserve our warmest thanks since it was their effort which made this report possible.

CONTENTS

		Page
INTRODUCTION		vi
PART I.	GRAPHIC HIGHLIGHTS	1
	General Characteristics	1
	Employment Characteristics	3
	Salaries	3
PART II.	MAJOR CHARACTERISTICS	6
	Total Doctoral Scientists and Engineers	7
	Total Employment and Salaries	9
	Employed in business and industry	11
	Employed in educational institutions	12
	Teaching in universities or colleges	13
	Employed in nonprofit organizations	14
	Employed in the Federal Government	15
	Receiving Federal support	16
	Women	17
APPENDIXES:		
A.	Technical Notes	19
B.	Detailed Statistical Tables[1]	27
C.	Reproduction of the 1973 Questionnaire and Specialties List	30

[1] See note on p. 18.

INTRODUCTION

This publication presents data on the supply, utilization, and characteristics of the Nation's doctoral scientists and engineers. The population surveyed consisted of individuals in the United States who held science or engineering doctorates or who had received doctorates in nonscience and nonengineering areas but were employed in science or engineering positions. Included in the population were individuals who received their doctorates between January 1, 1930 and June 30, 1972, inclusive. Subsequent surveys in this biennial series will take account of new entrants into this important segment of the Nation's scientific and engineering manpower resources.

The data on doctoral scientists and engineers in this report are presented in three parts: The charts in part I provide a broad perspective; more specific, although selective, information is presented in the tables in part II; and detailed tabulations appear in a separate volume.[1] The technical notes in appendix A contain information on the survey methodology, coverage, concepts, and definitions. The questionnaire and specialties list used in the survey are reproduced in appendix C.

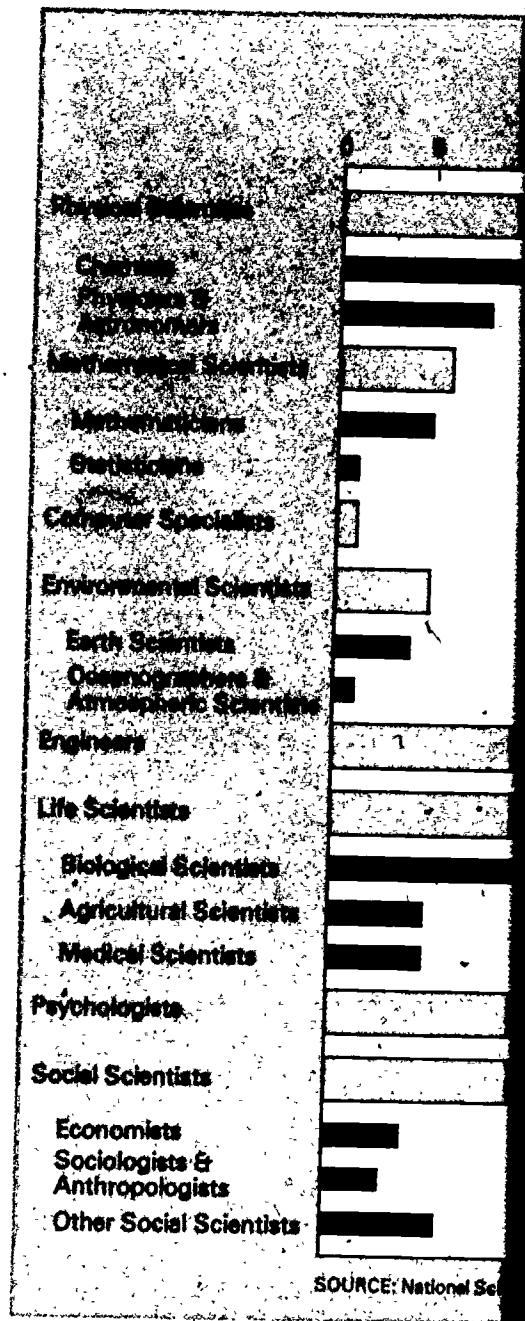
---

[1] National Science Foundation, *Detailed Statistical Tables, Characteristics of Doctoral Scientists and Engineers in the United States, 1973* (NSF 75-312-A) (Washington, D.C. 20550), 1974. These may be obtained gratis on request to NSF.

Part I.

GRAPHIC HIGHLIGHTS OF DOCTORAL SCIENTISTS AND ENGINEERS

GENERAL CHARACTE



Part I.

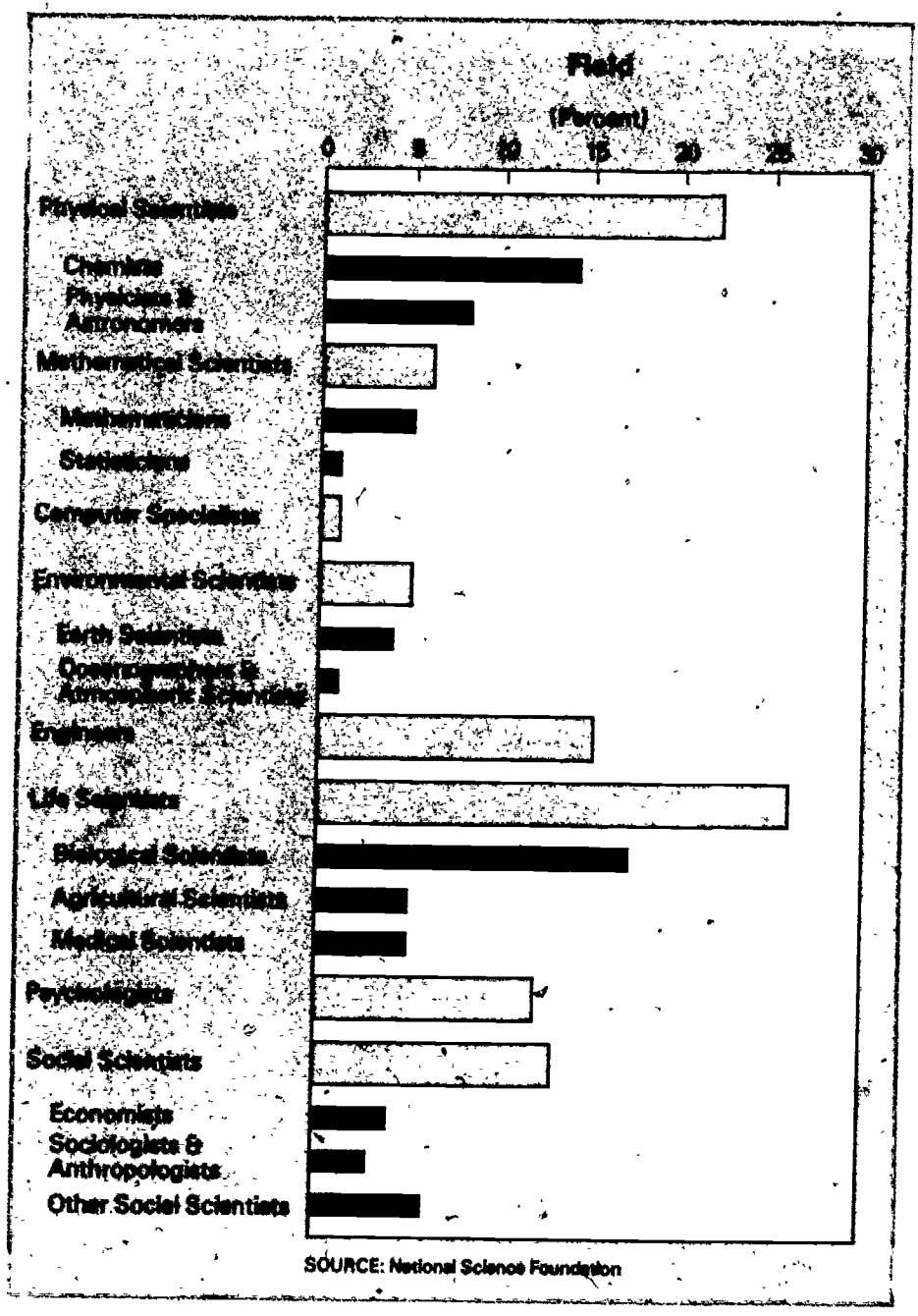
HLIGHTS

CTORAL

STS AND

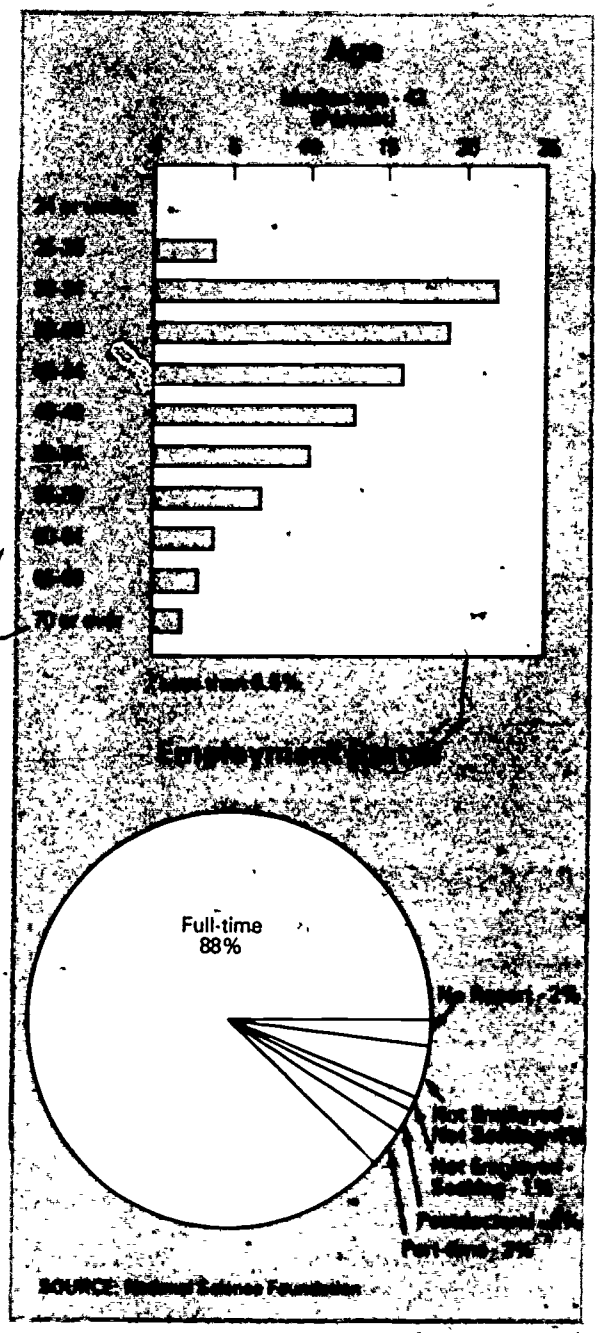
GINEERS

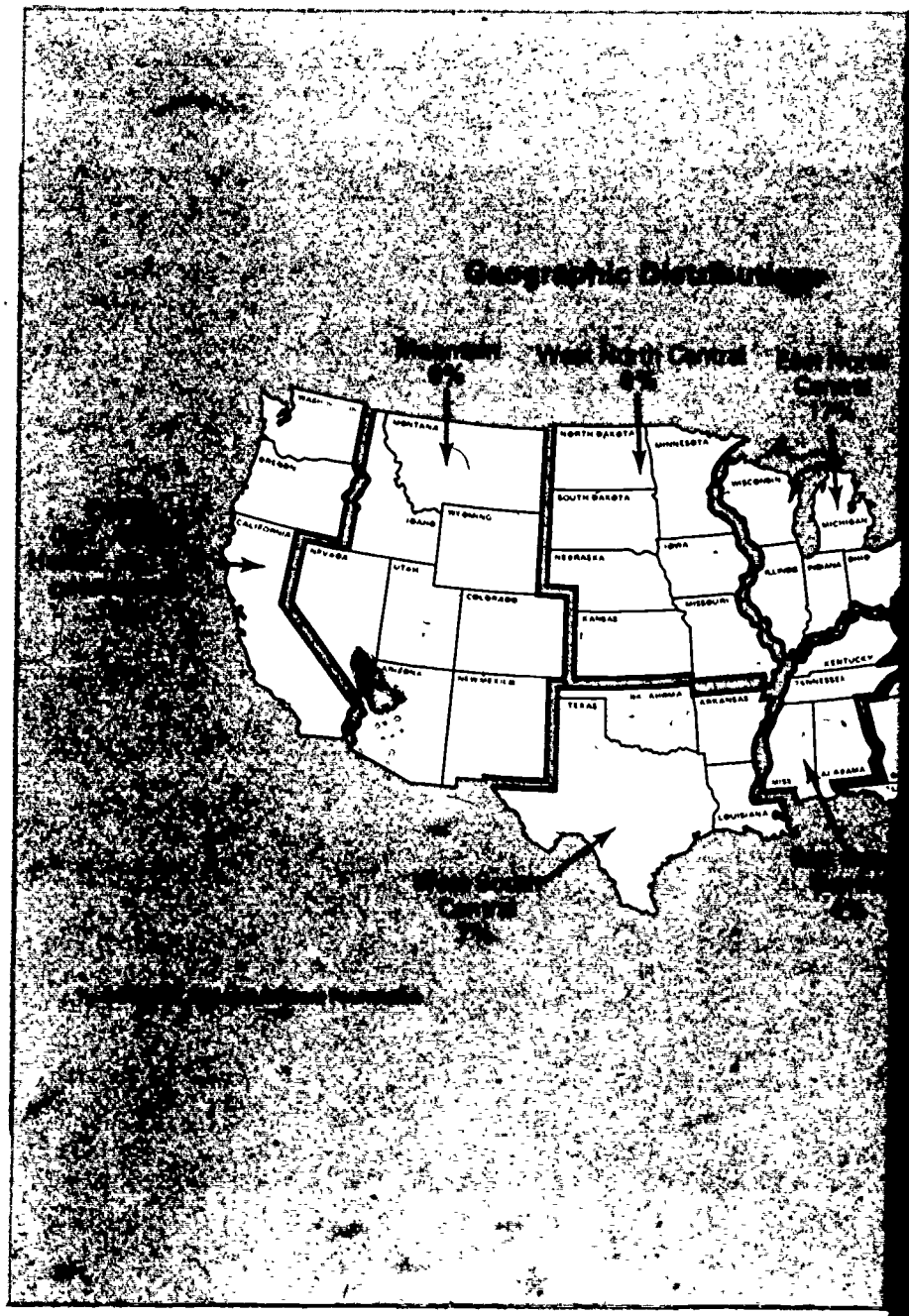
GENERAL CHARACTERISTICS

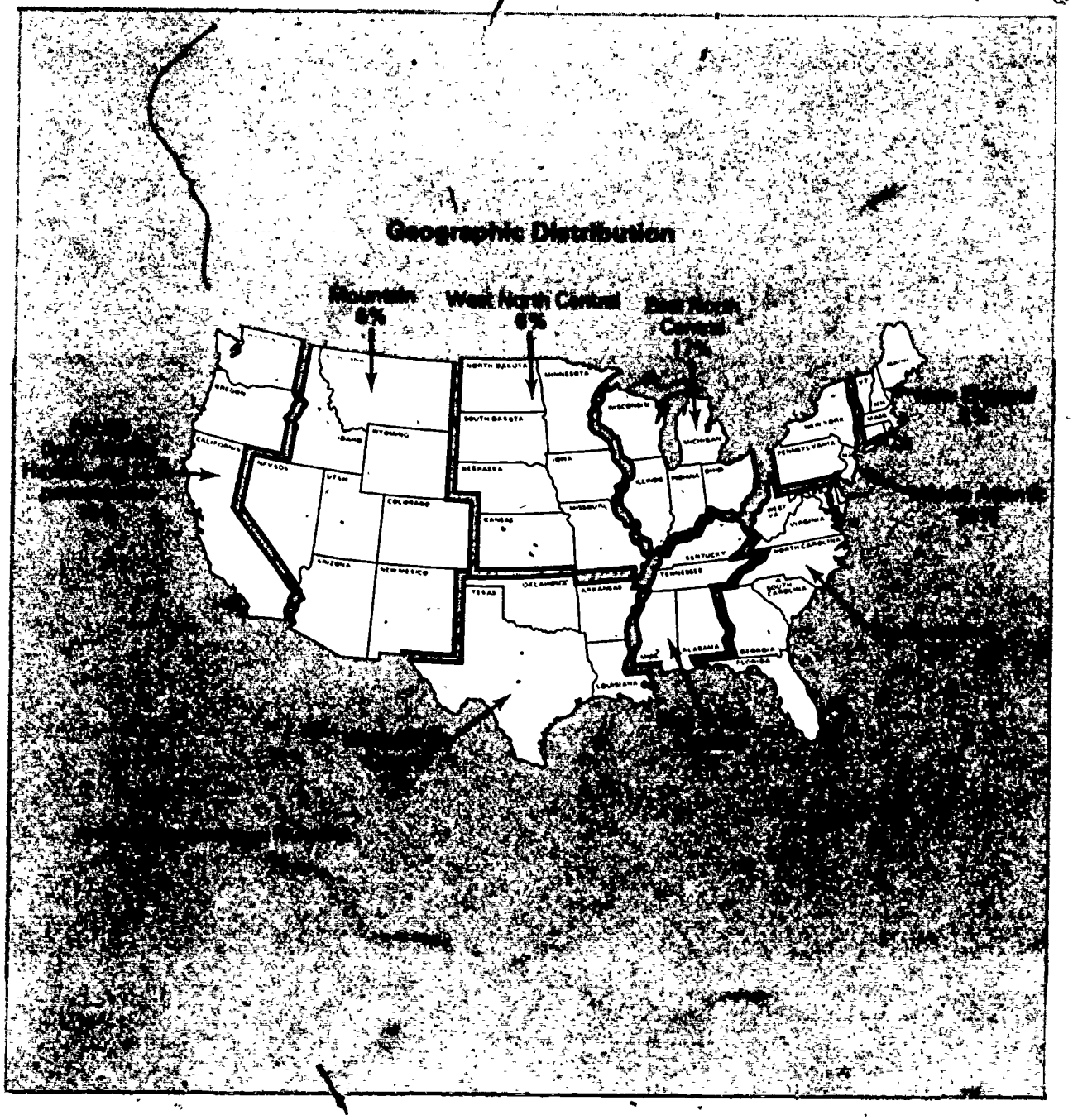


SOURCE: National Science Foundation

GENERAL CHARACTERISTICS



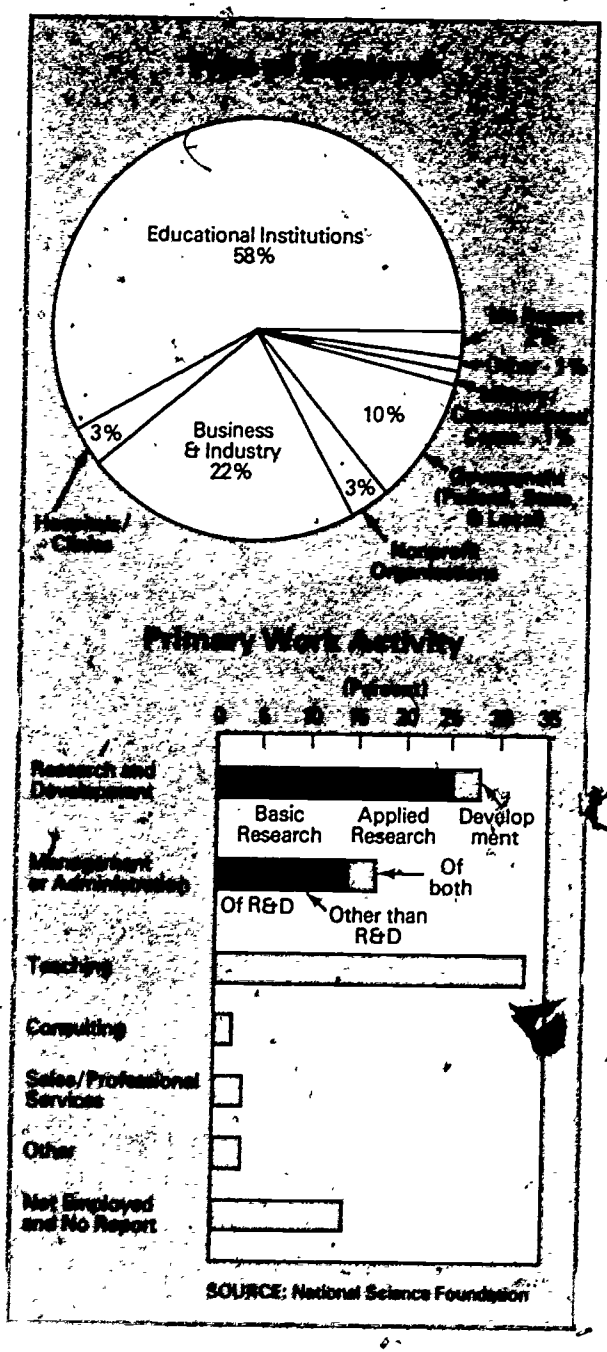


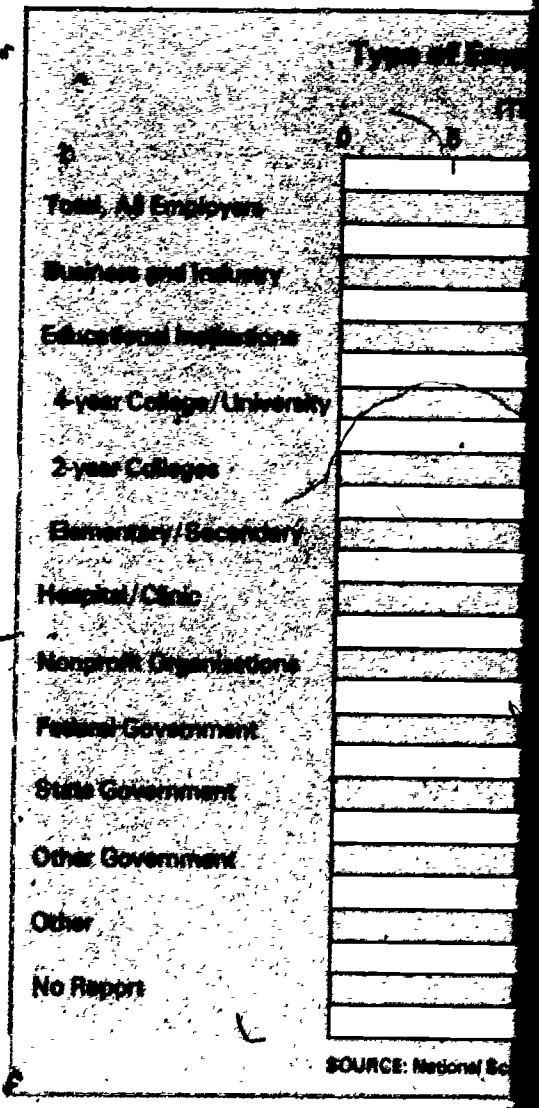

Geographic Distribution
Mountain
6%
West North Central
6%
East North Central
17%
NORTH DAKOTA
MINNESOTA
SOUTH DAKOTA
WISCONSIN
MICHIGAN
NEW YORK
PENNSYLVANIA
WYOMING
NEBRASKA
IOWA
ILLINOIS
INDIANA
OHIO
COLORADO
KANSAS
MISSOURI
WEST VIRGINIA
VIRGINIA
KENTUCKY
NORTH CAROLINA
TENNESSEE
SOUTH CAROLINA
NEW MEXICO
OKLAHOMA
ARKANSAS
TEXAS
ALABAMA
GEORGIA
LOUISIANA

EMPLOYMENT CHARACTERISTICS

Median Annual Salaries

Full-time Employed Civilians

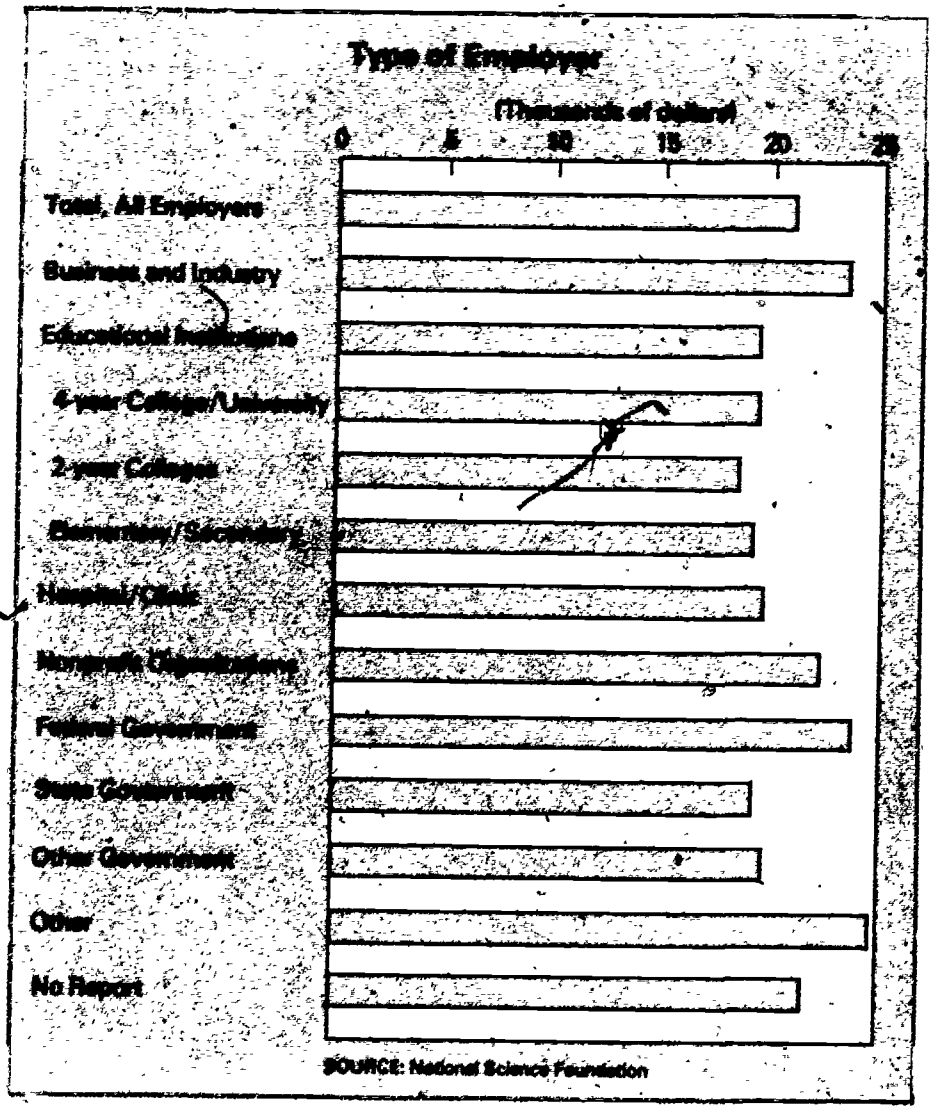




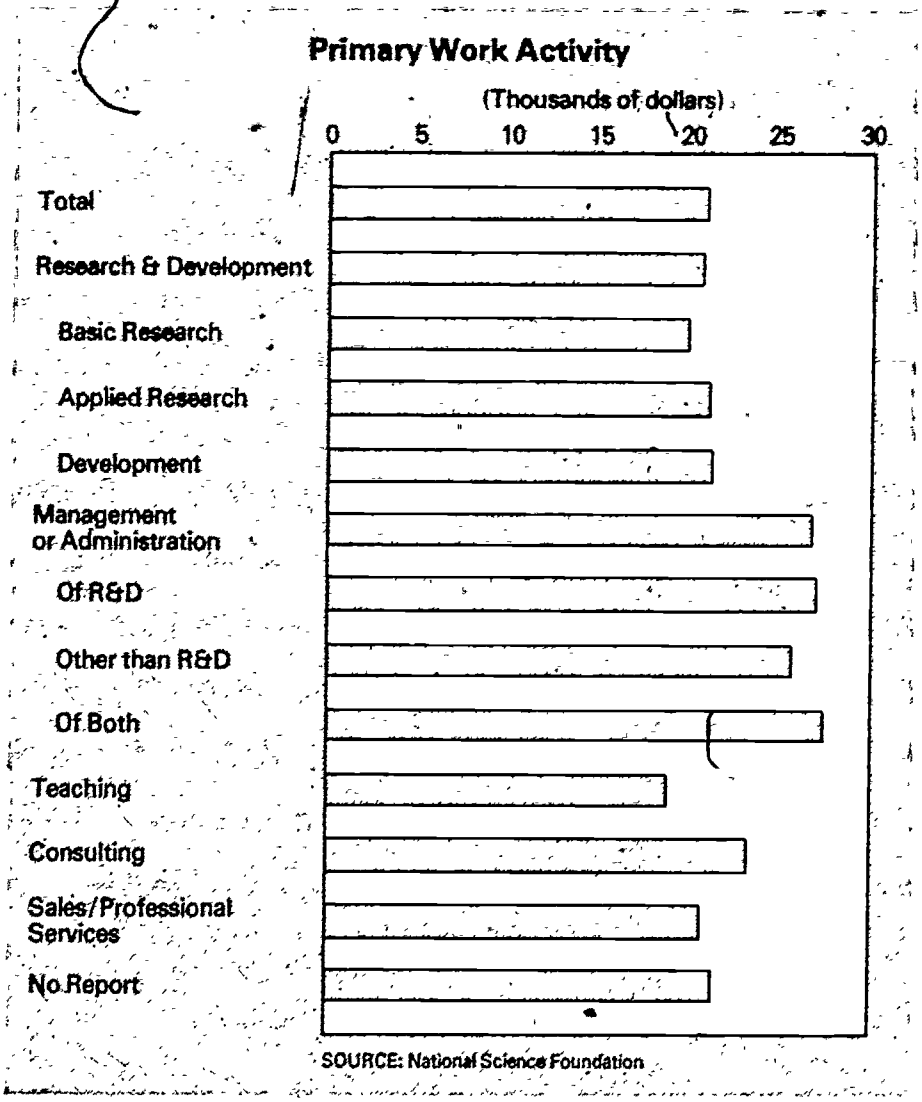
ries ARACTERISTICS

Median Annual Salaries

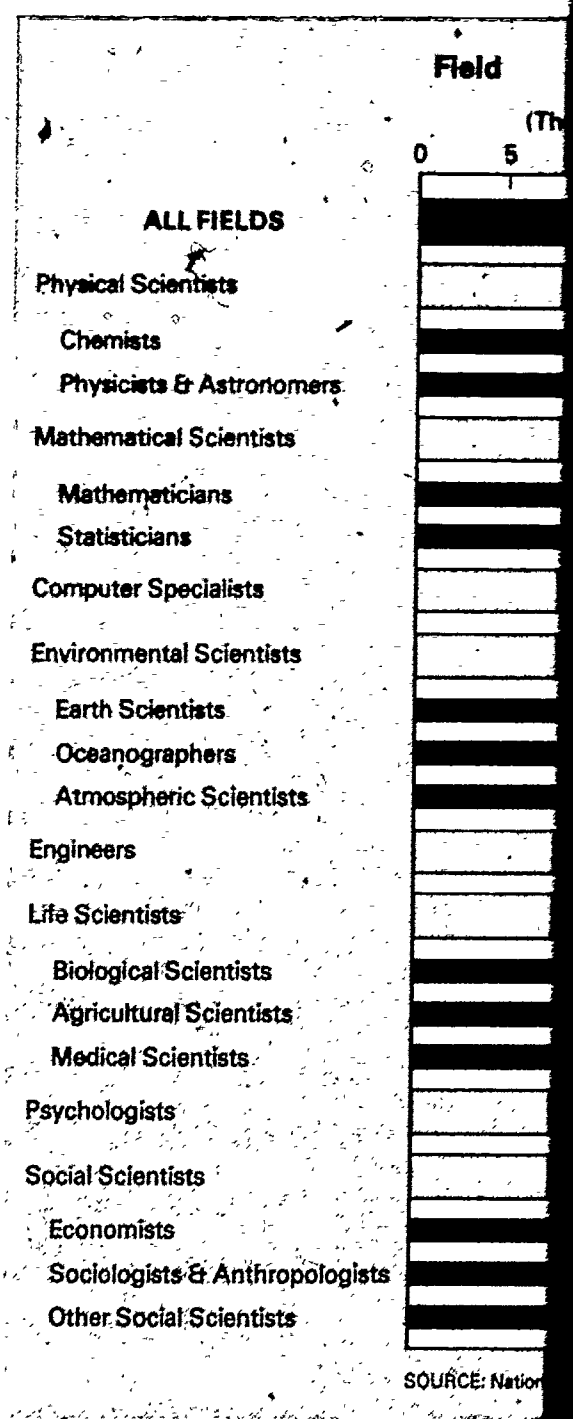
Full-time Employed Civilians



Median Annual Salaries—Con.

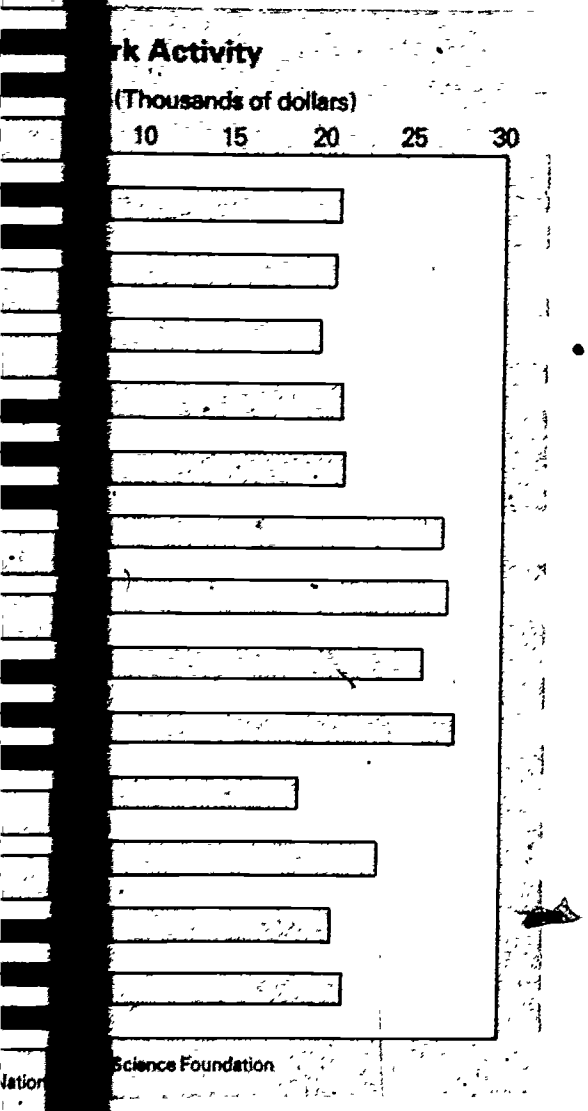


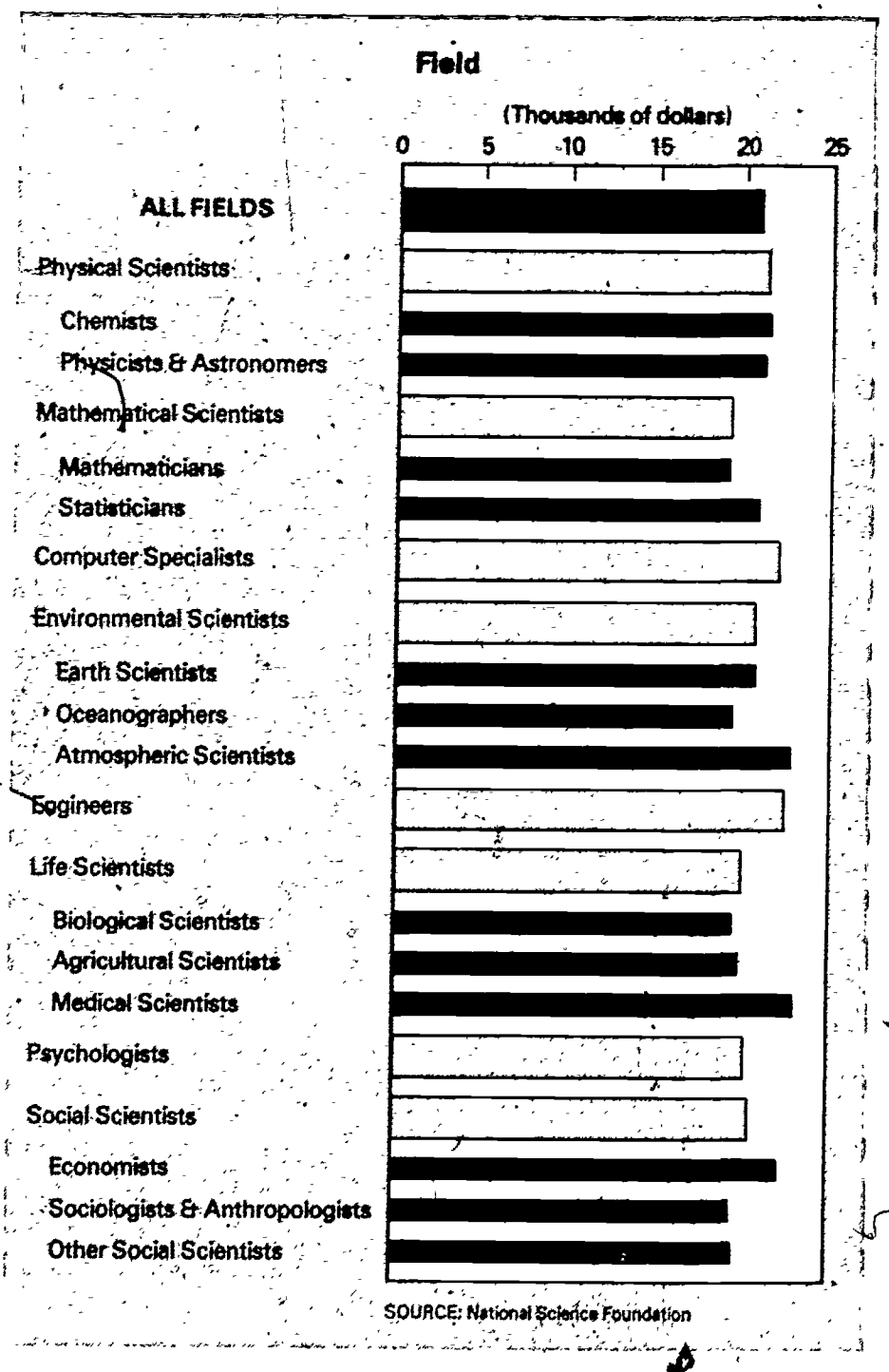
SOURCE: National Science Foundation



SOURCE: Nation

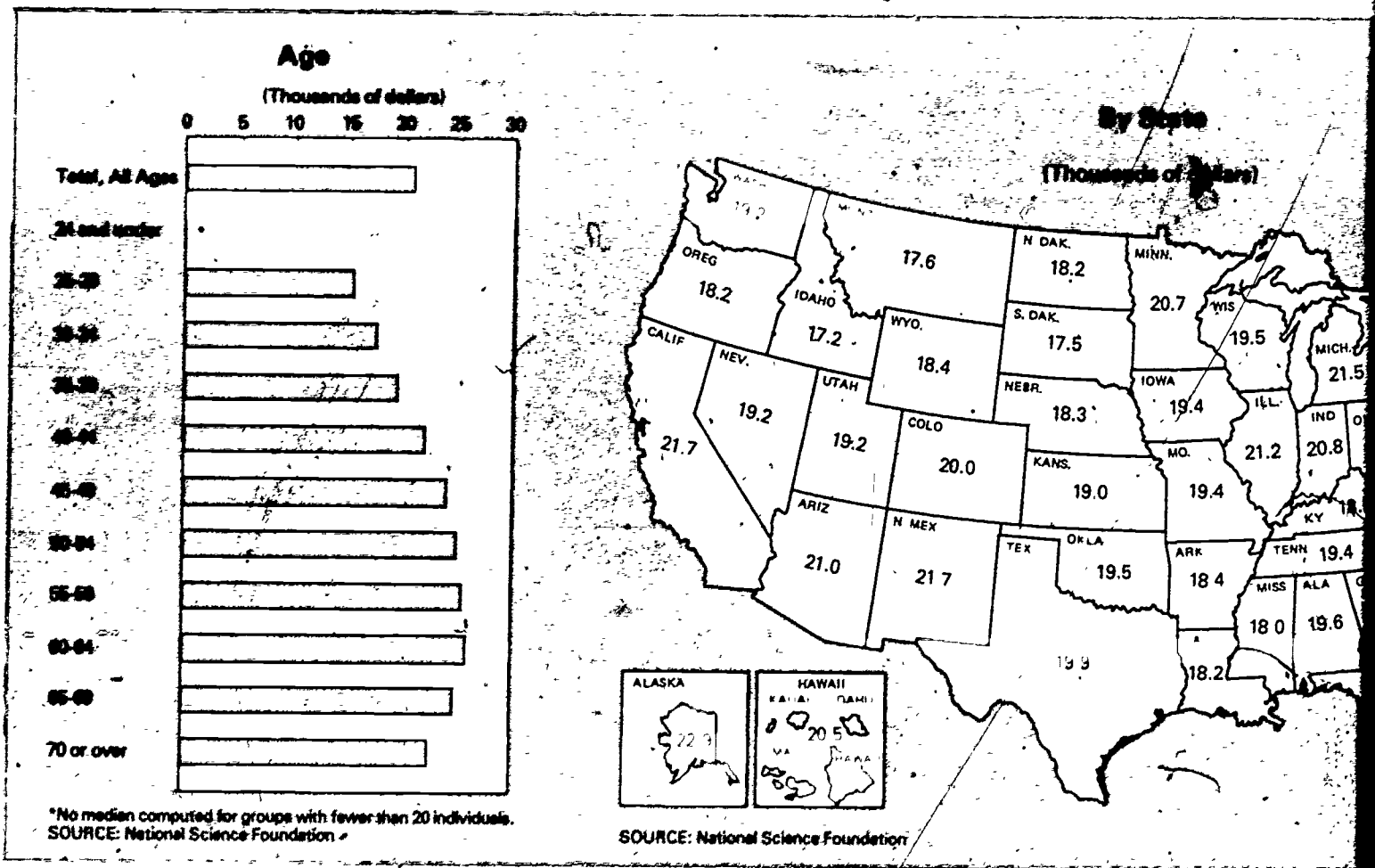
on.

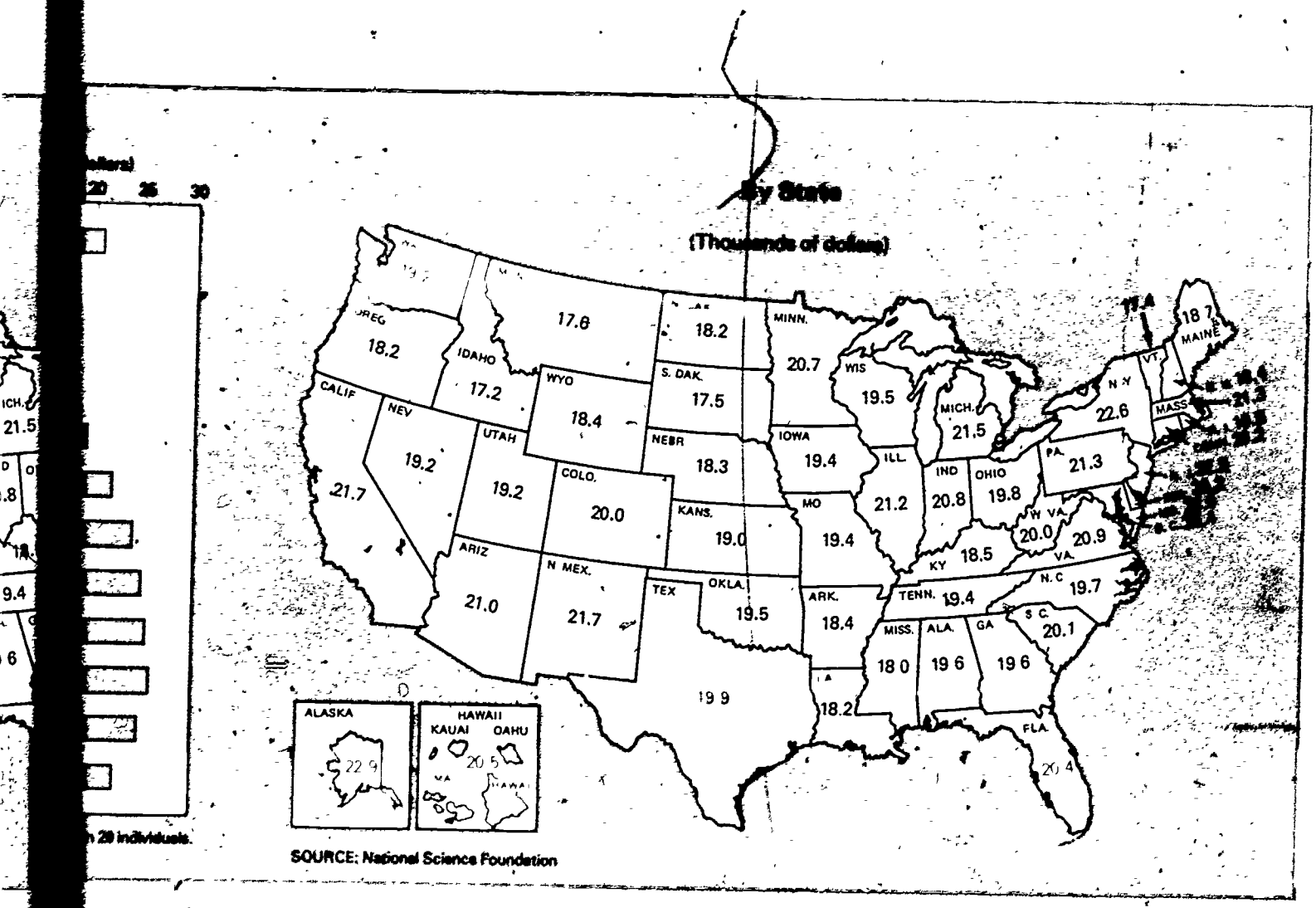

rk Activity
(Thousands of dollars)
10
15
20
25
30
Science Foundation


Field
(Thousands of dollars)
0
5
10
15
20
25
ALL FIELDS
Physical Scientists
Chemists
Physicists & Astronomers
Mathematical Scientists
Mathematicians
Statisticians
Computer Specialists
Environmental Scientists
Earth Scientists
Oceanographers
Atmospheric Scientists
Engineers
Life Scientists
Biological Scientists
Agricultural Scientists
Medical Scientists
Psychologists
Social Scientists
Economists
Sociologists & Anthropologists
Other Social Scientists
SOURCE: National Science Foundation

17

Median Annual Salaries—Con.





SOURCE: National Science Foundation

Part II.

MAJOR CHARACTERISTICS

notes

- Percents may not add to totals because of rounding.
- Median salaries were computed *only* for groups of full-time employed civilians of 20 or more individuals.
- For additional definitions see technical notes.

TOTAL DOCTORAL SCIENTISTS AND ENGINEERS

FIELD

Over one-fourth of the doctoral scientists and engineers were life scientists..

Field	Number	Percent
Total, all fields	244,921	100.0
Physical scientists	53,425	21.8
Chemists	33,881	13.8
Physicists/astronomers	19,544	8.0
Mathematical scientists	13,515	5.5
Mathematicians	11,984	4.9
Statisticians	1,531	.6
Computer specialists	2,943	1.2
Environmental scientists	11,074	4.5
Earth scientists	9,142	3.7
Oceanographers	1,227	.5
Atmospheric scientists	705	.3
Engineers	37,569	15.3
Life scientists	64,540	26.4
Biological scientists	41,035	16.8
Agricultural scientists	11,893	4.9
Medical scientists	11,612	4.7
Psychologists	28,286	11.5
Social scientists	32,773	13.4
Economists	9,678	4.0
Sociologists/ anthropologists	7,455	3.0
Other social scientists	15,640	6.4
No report	796	.3

RACE

Asians made up the largest racial minority group.

AGE

The median age in 1973 was 42.

EMPLOYMENT STATUS

Almost 90 percent were employed in science or engineering. The 1973 unemployment rate was 1.2 percent.

Rac	
Total	
White/Caucasian	
Black/Negro	
American Indian	
Asian	
Other	
No report	

Ag	
Total	
24 or under	
25-29	
30-34	
35-39	
40-44	
45-49	
50-54	
55-59	
60-64	
65-69	
70 or over	
No report	

Employme	
Total	
Full-time emplo	
Science/engin	
Nonscience/ nonenginee	
Part-time emplo	
Science/engin	
Nonscience/ nonenginee	
Postdoctorate	
Not employed, s employment	
Not employed, r seeking	
Retired	
Other	
No report	

L SCIENTISTS AND ENGINEERS

toral
ere life

r	Percent
	100.0
	21.8
	13.8
	8.0
	5.5
	4.9
	.6
	1.2
	4.5
	3.7
	.5
	.3
	15.3
	26.4
	16.8
	4.9
	4.7
	11.5
	13.4
	4.0
	3.0
	6.4
	.3

RACE

Asians made up the largest racial minority group.

AGE

The median age in 1973 was 42.

EMPLOYMENT STATUS

Almost 90 percent were employed in science or engineering. The 1973 unemployment rate was 1.2 percent.

Race	Number	Percent
Total	244,921	100.0
White/Caucasian	212,686	86.8
Black/Negro	1,860	.8
American Indian	106	—
Asian	11,001	4.5
Other	315	.1
No report	18,953	7.7

Age		
Total	244,921	100.0
24 or under	12	—
25-29	10,679	4.4
30-34	54,023	22.1
35-39	45,329	18.5
40-44	37,913	15.5
45-49	31,767	13.0
50-54	25,576	10.4
55-59	16,849	6.9
60-64	10,240	4.2
65-69	7,321	3.0
70 or over	4,481	1.8
No report	731	.3

Employment status		
Total	244,921	100.0
Full-time employed	213,611	87.2
Science/engineering	202,432	82.7
Nonscience/ nonengineering	11,179	4.6
Part-time employed	7,180	2.9
Science/engineering	6,420	2.6
Nonscience/ nonengineering	760	.3
Postdoctorate	5,959	2.4
Not employed, seeking employment	2,642	1.1
Not employed, not seeking	1,477	.6
Retired	6,266	2.6
Other	2,381	1.0
No report	5,405	2.2

TOTAL DOCTORAL SCIENTISTS AND ENGINEERS—CON.

Geographic location	Number
All locations	244,921
Selected States	145,188
California	28,049
New York	25,433
Pennsylvania	13,013
Illinois	11,742
Texas	10,944
Massachusetts	10,669
Ohio	10,659
New Jersey	10,511
Michigan	8,654
Maryland	8,278
District of Columbia	7,236

SELECTED STATES

Nearly three-fifths (59.3 percent) were located in 10 States and the District of Columbia.

Standard Metropolitan Statistical Areas	Number
All locations	244,921
Selected Metropolitan Areas	97,738
Washington, D.C. - Md. - Va.	14,072
New York, N.Y. - N.J.	11,882
Los Angeles - Long Beach, California	8,283
Boston, Massachusetts	7,655
Chicago, Illinois	6,939
San Francisco - Oakland, California	6,330
Philadelphia, Pa. - New Jersey	5,806
Newark, New Jersey	4,317
San Jose, California	3,247
Pittsburgh, Pennsylvania	3,139
Minneapolis-St. Paul, Minn. - Wisc.	3,042
Wilmington, Del. - N.J. - Md.	2,972
Raleigh-Durham, North Carolina	2,960
Houston, Texas	2,932
Denver-Boulder, Colorado	2,630
Baltimore, Maryland	2,464
St. Louis, Missouri - Illinois	2,331
Rochester, New York	2,316
Detroit, Michigan	2,211
Albany-Schenectady-Troy, New York	2,210

SELECTED SMSA

Two-fifths were located in 20 metropolitan areas.

TOTAL EMPLOYMENT AND SALARIES

FIELD

The highest median annual salary among doctoral scientists and engineers was reported by medical scientists; the lowest by mathematicians.

Field	Median annual salary
All fields	$20,900
Physical scientists	21,200
Chemists	21,300
Physicists/astronomers	21,100
Mathematical scientists	19,300
Mathematicians	19,100
Statisticians	20,800
Computer specialists	22,100
Environmental scientists	20,700
Earth scientists	20,700
Oceanographers	19,400
Atmospheric scientists	22,800
Engineers	22,500
Life scientists	20,000
Biological scientists	19,500
Agricultural scientists	19,800
Medical scientists	23,000
Psychologists	20,200
Social scientists	20,400
Economists	22,300
Sociologists/anthropologists	19,500
Other social scientists	19,600
No report	19,100

AGE

- Over three-fifths of those employed were under age 45.
- Median salaries increased up to ages 60 to 64; the overall median salary of $20,900 was reached between ages 40 and 44.

PRIMARY WORK ACTIVITY

- About two-fifths of those employed were engaged in some phase of research and development, including R&D management; over one-third reported teaching as their primary work activity.
- The highest median annual salary, $27,500 was reported for those managing or administering both research and development and non-R&D activities.

Age
All ages
24 and under
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 and over
No report

Primary work
Total
Research and development
Basic research
Applied research
Development
Management or administration
Of R&D
Of other than R&D
Of both
Teaching
Consulting
Sales/profession services
Other
No report

ENT AND SALARIES

ary among
neers was
the lowest

	Median annual salary
	$20,900
	21,200
	21,300
	21,100
	19,300
	19,100
	20,800
	22,100
	20,700
	20,700
	19,400
	22,800
	22,500
	20,000
	19,500
	19,800
	23,000
	20,200
	20,400
	22,300
	19,500
	19,600
	19,100

AGE

- Over three-fifths of those employed were under age 45.
- Median salaries increased up to ages 60 to 64; the overall median salary of $20,900 was reached between ages 40 and 44.

PRIMARY WORK ACTIVITY

- About two-fifths of those employed were engaged in some phase of research and development, including R&D management; over one-third reported teaching as their primary work activity.
- The highest median annual salary, $27,500 was reported for those managing or administering both research and development and non-R&D activities.

Age	Total employed	Percent	Median annual salary
All ages	226,750	100.0	$20,900
24 and under	12	—	—
25-29	10,199	4.5	15,500
30-34	51,535	22.7	17,500
35-39	43,704	19.3	19,600
40-44	36,388	16.0	22,000
45-49	30,442	13.4	24,100
50-54	24,315	10.7	25,000
55-59	15,664	6.9	25,300
60-64	8,850	3.9	25,900
65-69	4,207	1.9	24,900
70 and over	1,118	.5	22,500
No report	316	.1	21,400
Primary work activity			
Total	226,750	100.0	$20,900
Research and development	69,509	30.7	20,600
Basic research	32,275	14.2	19,900
Applied research	28,654	12.6	21,000
Development	8,580	3.8	21,100
Management or administration	40,408	17.8	26,700
Of R&D	22,529	9.9	27,000
Of other than R&D	12,097	5.3	25,700
Of both	5,782	2.5	27,500
Teaching	81,728	36.0	18,900
Consulting	4,014	1.8	23,200
Sales/professional services	8,242	3.6	20,700
Other	6,939	3.1	21,400
No report	15,910	7.0	—

TOTAL EMPLOYMENT AND SALARIES—CON.

TYPE OF EMPLOYER

- Four-year colleges and universities employed over one-half these doctorals.
- Those employed in elementary/secondary schools reported salaries $1,800 below the overall median.

Type of employer			Median annual salary
Total	226,750	100.0	$20,900
Business and industry	50,022	22.1	23,400
Educational institutions	132,692	58.5	19,300
4-year college/university	128,095	56.5	19,300
2-year college	3,061	1.3	18,400
Elementary/secondary schools	1,536	.7	19,100
Hospital/clinic	5,714	2.5	19,600
Nonprofit organizations	7,853	3.5	22,200
Federal Government	17,640	7.8	23,700
Military/Commissioned Corps	1,984	.9	—
State government	2,597	1.1	19,200
Other government	1,322	.6	19,600
Other	3,390	1.5	24,700
No report	3,536	1.6	21,600

SELECTED STATES

Those in Ohio and Texas had salaries below the $20,900 overall median.

SELECTED SMSA

Those in the Denver-Boulder, Colo.; Raleigh-Durham, N.C. and St. Louis, Mo.-Ill. metropolitan areas had salaries below the $20,900 overall median.

D SALARIES—CON.

versities
se doc-

entary/
salaries
an.

	Median annual salary
	$20,900
	23,400
	19,300
	19,300
	18,400
	19,100
	19,600
	22,200
	23,700
	—
	19,200
	19,600
	24,700
	21,600

SELECTED STATES

Those in Ohio and Texas had salaries below the $20,900 overall median.

SELECTED SMSA

Those in the Denver-Boulder, Colo.; Raleigh-Durham, N.C. and St. Louis, Mo.-Ill. metropolitan areas had salaries below the $20,900 overall median.

Geographic location	Median annual salary
All locations	$20,900
California	21,700
New York	22,600
Pennsylvania	21,300
Illinois	21,200
Texas	19,900
Massachusetts	21,300
Ohio	19,800
New Jersey	22,900
Michigan	21,500
Maryland	23,000
District of Columbia	25,400

Standard Metropolitan-Statistical Areas	Median annual salary
All locations	$20,900
Washington, D.C.-Md.-Va.	24,600
New York, N.Y.-N.J.	23,300
Los Angeles - Long Beach, California	22,100
Boston, Massachusetts	21,700
Chicago, Illinois	22,000
San Francisco - Oakland, California	22,200
Philadelphia, Pa.-New Jersey	21,400
Newark, New Jersey	23,500
San Jose, California	23,400
Pittsburgh, Pennsylvania	22,300
Minneapolis-St. Paul, Minn.-Wisc.	21,300
Wilmington, Del.-N.J.-Md.	23,200
Raleigh-Durham, North Carolina	20,600
Houston, Texas	21,600
Denver-Boulder, Colorado	20,400
Baltimore, Maryland	21,500
St. Louis, Missouri-Illinois	20,500
Rochester, New York	22,400
Detroit, Michigan	21,800
Albany-Schenectady-Troy, New York	23,100

EMPLOYED IN BUSINESS AND INDUSTRY

FIELD Primary employment for about 40 percent of all employed physical scientists and engineers was in business and industry as compared with less than 7 percent of mathematical scientists, social scientists, and psychologists.

Field	Total employed	Employed in business and industry: Number	Percent of total	Percent
All fields	226,750	50,022	22.1	100.0
Physical scientists	49,110	19,213	39.1	38.4
Chemists	30,859	15,294	49.6	30.6
Physicists/astronomers	18,251	3,919	21.5	7.8
Mathematical scientists	12,607	850	6.7	1.7
Mathematicians	11,112	686	6.2	1.4
Statisticians	1,495	164	11.0	.3
Computer specialists	2,914	1,050	36.0	2.1
Environmental scientists	10,537	2,030	19.3	4.1
Earth scientists	8,688	1,933	22.2	3.9
Oceanographers	1,166	74	6.3	.1
Atmospheric scientists	683	23	3.8	—
Engineers	36,187	17,348	47.9	34.7
Life scientists	59,350	6,821	11.5	13.6
Biological scientists	37,441	3,175	8.5	6.3
Agricultural scientists	11,116	1,828	16.4	3.7
Medical scientists	10,793	1,818	16.8	3.6
Psychologists	26,037	1,454	5.6	2.9
Social scientists	29,865	1,246	4.2	2.5
Economists	8,734	783	9.0	1.6
Sociologists/anthropologists	6,781	63	.9	.1
Other social scientists	14,350	400	2.8	.8
No report	143	10	7.0	—

Ag

Total
24 or under
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 or over
No report

AGE Almost two-thirds (64.3 p
and industry were under age 4

Primary wo

Total
Research and d
Basic researc
Applied resea
Development
Management or
administration
Of R&D
Of other tha
Of both
Teaching
Consulting
Sales/professio
Other
No report

PRIMARY WORK ACTIVITY
business and industry were pr
and development including R&

SINESS AND INDUSTRY

ment for about 40 percent of all tists and engineers was in business ared with less than 7 percent of ts, social scientists, and psy-

Total employed	Employed in business and industry: Number	Percent of total	Percent
226,750	50,022	22.1	100.0
49,110	19,213	39.1	38.4
30,859	15,294	49.6	30.6
18,251	3,919	21.5	7.8
12,607	850	6.7	1.7
11,112	686	6.2	1.4
1,495	164	11.0	.3
2,914	1,050	36.0	2.1
10,537	2,030	19.3	4.1
8,688	1,933	22.2	3.9
1,166	74	6.3	.1
683	23	3.8	—
36,187	17,348	47.9	34.7
59,350	6,821	11.5	13.6
37,441	3,175	8.5	6.3
11,116	1,828	16.4	3.7
10,793	1,818	16.8	3.6
26,037	1,454	5.6	2.9
29,865	1,246	4.2	2.5
8,734	783	9.0	1.6
6,781	63	.9	.1
14,350	400	2.8	.8
143	10	7.0	—

Age	Employed in business and industry: Number	Percent
Total	50,022	100.0
24 or under	10	—
25-29	1,966	3.9
30-34	11,855	23.7
35-39	10,201	20.4
40-44	8,117	16.2
45-49	6,445	12.9
50-54	5,696	11.4
55-59	3,412	6.8
60-64	1,600	3.2
65-69	481	1.0
70 or over	171	.3
No report	68	.1

AGE Almost two-thirds (64.3 percent) employed in business and industry were under age 45.

Primary work activity	Employed in business and industry: Number	Percent
Total	50,022	100.0
Research and development	23,157	46.3
Basic research	3,407	6.8
Applied research	12,836	25.7
Development	6,914	13.8
Management or administration	17,298	34.6
Of R&D	12,471	24.9
Of other than R&D	2,981	6.0
Of both	1,846	3.7
Teaching	90	.2
Consulting	2,268	4.5
Sales/professional services	1,435	2.9
Other	2,539	5.1
No report	3,235	6.5

PRIMARY WORK ACTIVITY Over 70 percent in business and industry were primarily engaged in research and development including R&D management.

EMPLOYED IN EDUCATIONAL INSTITUTIONS

FIELD Primary employment for over four-fifths of all employed mathematical and social scientists was in educational institutions as compared with about one-third of the engineers.

Field	Total employed	Employed in educational institutions		
		Number	Percent of total	Percent
All fields	226,750	132,692	58.5	100.0
Physical scientists	49,110	22,035	44.9	16.6
Chemists	30,859	11,870	38.5	8.9
Physicists/astronomers	18,251	10,165	55.6	7.7
Mathematical scientists	12,607	10,700	84.9	8.1
Mathematicians	11,112	9,596	86.4	7.2
Statisticians	1,495	1,104	73.8	.8
Computer specialists	2,914	1,506	51.7	1.1
Environmental scientists	10,537	5,314	50.4	4.0
Earth scientists	8,688	4,306	49.6	3.2
Oceanographers	1,166	693	59.4	.5
Atmospheric scientists	683	315	46.1	.2
Engineers	36,187	13,022	36.0	9.8
Life scientists	59,350	39,798	67.1	30.0
Biological scientists	37,441	26,933	71.9	20.3
Agricultural scientists	11,116	6,885	61.9	5.2
Medical scientists	10,793	5,980	55.4	4.5
Psychologists	26,037	15,956	61.3	12.0
Social scientists	29,865	24,260	81.2	18.3
Economists	8,734	6,283	71.9	4.7
Sociologists/anthropologists	6,781	6,187	91.2	4.7
Other social scientists	14,350	11,790	82.2	8.9
No report	143	101	70.6	.1

Age
Total
24 or under
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70 or over
No report

AGE Over three-fifths of the engineers employed in educatio age 45; about the same proportio group.

Primary work
Total
Research and deve
Basic research
Applied research
Development
Management or administration
Of R&D
Of other than
Of both
Teaching
Consulting
Sales/professional
Other
No report

PRIMARY WORK ACTIVITY
institutions were primarily engag quarter were primarily in resea cluding R&D management.

CATIONAL INSTITUTIONS

nt for over four-fifths of all
nd social scientists was in
mpared with about one-third of

	Employed in educational institutions			
	Total employed	Number	Percent of total	Percent
	6,750	132,692	58.5	100.0
	9,110	22,035	44.9	16.6
	0,859	11,870	38.5	8.9
	8,251	10,165	55.6	7.7
	2,607	10,700	84.9	8.1
	1,112	9,596	86.4	7.2
	1,495	1,104	73.8	.8
	2,914	1,506	51.7	1.1
	0,537	5,314	50.4	4.0
	8,688	4,306	49.6	3.2
	1,166	693	59.4	.5
	683	315	46.1	.2
	6,187	13,022	36.0	9.8
	9,350	39,798	67.1	30.0
	7,441	26,933	71.9	20.3
	1,116	6,885	61.9	5.2
	0,793	5,980	55.4	4.5
	3,037	15,956	61.3	12.0
	9,865	24,260	81.2	18.3
	3,734	6,283	71.9	4.7
	6,781	6,187	91.2	4.7
	4,350	11,790	82.2	8.9
	143	101	70.6	.1

Age	Employed in educational institutions	
	Number	Percent
Total	132,692	100.0
24 or under	1	—
25-29	6,251	4.7
30-34	30,074	22.7
35-39	25,725	19.4
40-44	21,382	16.1
45-49	17,848	13.5
50-54	13,849	10.4
55-59	8,992	6.8
60-64	5,322	4.0
65-69	2,583	1.9
70 or over	487	.4
No report	178	.1

AGE Over three-fifths of the doctoral scientists and engineers employed in educational institutions were under age 45, about the same proportion as in the total employed group.

Primary work activity	Employed in educational institutions	
	Number	Percent
Total	132,692	100.0
Research and development	28,200	21.3
Basic research	20,195	15.2
Applied research	7,355	5.5
Development	650	.5
Management or administration	11,384	8.6
Of R&D	3,295	2.5
Of other than R&D	5,708	4.3
Of both	2,381	1.8
Teaching	80,131	60.4
Consulting	491	.4
Sales/professional services	1,870	1.4
Other	1,795	1.4
No report	8,821	6.6

PRIMARY WORK ACTIVITY Three-fifths in educational institutions were primarily engaged in teaching; about one-quarter were primarily in research and development including R&D management.

TEACHING IN UNIVERSITIES OR COLLEGES

FIELD Almost one-half (47.6 percent) of the doctoral scientists and engineers teaching in universities or 4-year colleges were life or social scientists.

Field	Teaching in universities or 4-year colleges	
	Number	Percent
Total, all fields	101,809	100.0
Physical scientists	16,403	16.1
Chemists	8,841	8.7
Physicists/astronomers	7,562	7.4
Mathematical scientists	9,499	9.3
Mathematicians	8,516	8.4
Statisticians	983	1.0
Computer specialists	1,204	1.2
Environmental scientists	3,919	3.8
Earth scientists	3,251	3.2
Oceanographers	441	.4
Atmospheric scientists	227	.2
Engineers	10,656	10.5
Life scientists	27,442	27.0
Biological scientists	19,508	19.2
Agricultural scientists	3,949	3.9
Medical scientists	3,985	3.9
Psychologists	11,635	11.4
Social scientists	20,981	20.6
Economists	5,497	5.4
Sociologists/ anthropologists	5,291	5.2
Other social scientists	10,193	10.0
No report	70	.1

ACADEMIC RANK About 9
universities or 4-year college

Academic rank	
Total	
Professor	
Associate professor	
Assistant professor	
Instructor	
Lecturer	
Other	
No report	

NOTE: These data are based on doctoral scientists and engineers employed at universities or colleges and reporting teaching as a primary or secondary work activity.

IVERSITIES OR COLLEGES

(47.6 percent) of the doctoral scien-
eaching in universities or 4-year
cial scientists.

	Teaching in universities or 4-year colleges	
	Number	Percent
.....	101,809	100.0
.....	16,403	16.1
.....	8,841	8.7
ers ...	7,562	7.4
.....	9,499	9.3
.....	8,516	8.4
.....	983	1.0
.....	1,204	1.2
s	3,919	3.8
.....	3,251	3.2
.....	441	.4
s ...	227	.2
.....	10,656	10.5
.....	27,442	27.0
.....	19,508	19.2
.....	3,949	3.9
.....	3,985	3.9
.....	11,635	11.4
.....	20,981	20.6
.....	5,497	5.4
.....	5,291	5.2
....	10,193	10.0
.....	70	.1

ientists and engineers employed at universities or
or secondary work activity.

ACADEMIC RANK

About 95 percent of those teaching in universities or 4-year colleges held professorial rank.

Academic rank	Teaching in universities or 4-year colleges	
	Number	Percent
Total	101,809	100.0
Professor	39,352	38.7
Associate professor	30,201	29.7
Assistant professor	26,682	26.2
Instructor	711	.7
Lecturer	811	.8
Other	1,869	1.8
No report	2,183	2.1

EMPLOYED IN NONPROFIT ORGANIZATIONS

FIELD Three-fifths of the doctoral scientists and engineers employed in nonprofit organizations were engineers, physical or life scientists.

Field	Total employed	Employed in nonprofit organizations		
		Number	Percent of total	Percent
All fields	226,750	7,853	3.5	100.0
Physical scientists	49,110	1,636	3.3	20.8
Chemists	30,859	778	2.5	9.9
Physicists/astronomers	18,251	858	4.7	10.9
Mathematical scientists	12,607	191	1.5	2.4
Mathematicians	11,112	171	1.4	2.2
Statisticians	1,495	20	1.3	.3
Computer specialists	2,914	110	3.8	1.4
Environmental scientists	10,537	456	4.3	5.8
Earth scientists	8,688	293	3.4	3.7
Oceanographers	1,166	108	9.3	1.4
Atmospheric scientists	683	55	8.1	.7
Engineers	36,187	1,291	3.6	16.4
Life scientists	59,350	1,794	3.0	22.8
Biological scientists	37,441	1,402	3.7	17.9
Agricultural scientists	11,116	103	.9	1.3
Medical scientists	10,793	287	2.7	3.7
Psychologists	26,037	1,187	4.6	15.1
Social scientists	29,865	1,186	4.0	15.1
Economists	8,734	339	3.9	4.3
Sociologists/anthropologists	6,781	216	3.2	2.8
Other social scientists	14,350	631	4.4	8.0
No report	143	2	1.4	—

Age	
Total	
24 or under	
25-29	
30-34	
35-39	
40-44	
45-49	
50-54	
55-59	
60-64	
65-69	
70 or over	
No report	

AGE Almost one-half (48.9 perce
nonprofit organizations were und

Primary work ac	
Total	
Research and develo	
Basic research	
Applied research	
Development	
Management or administration	
Of R&D	
Of other than R&	
Of both	
Teaching	
Consulting	
Sales/professional s	
Other	
No report	

PRIMARY WORK ACTIVITY O
employed in nonprofit organiza
gaged in research and developme
ment.

ROFIT ORGANIZATIONS

ctoral scientists and engineers
ganizations were engineers,

	tal oyed	Employed in nonprofit organizations		
		Number	Percent of total	Percent
	750	7,853	3.5	100.0
	110	1,636	3.3	20.8
	859	778	2.5	9.9
	251	858	4.7	10.9
	607	191	1.5	2.4
	112	171	1.4	2.2
	495	20	1.3	.3
	914	110	3.8	1.4
	537	456	4.3	5.8
	888	293	3.4	3.7
	166	108	9.3	1.4
	683	55	8.1	.7
	187	1,291	3.6	16.4
	150	1,794	3.0	22.8
	141	1,402	3.7	17.9
	116	105	.9	1.3
	293	287	2.7	3.7
	137	1,187	4.6	15.1
	165	1,186	4.0	15.1
	134	339	3.9	4.3
	181	216	3.2	2.8
	150	631	4.4	8.0
	143	2	1.4	—

Age	Employed in nonprofit organizations	
	Number	Percent
Total	7,853	100.0
24 or under	—	—
25-29	375	4.8
30-34	2,024	25.8
35-39	1,440	18.3
40-44	1,188	15.1
45-49	1,048	13.3
50-54	823	10.5
55-59	456	5.8
60-64	303	3.9
65-69	153	1.9
70 or over	21	.3
No report	22	.3

AGE Almost one-half (48.9 percent) of those employed in nonprofit organizations were under age 40.

Primary work activity	Employed in nonprofit organizations	
	Number	Percent
Total	7,853	100.0
Research and development	4,121	52.5
Basic research	2,020	25.7
Applied research	1,883	24.0
Development	218	2.8
Management or administration	2,099	26.7
Of R&D	1,181	15.0
Of other than R&D	590	7.5
Of both	328	4.2
Teaching	109	1.4
Consulting	243	3.1
Sales/professional services	261	3.3
Other	485	6.2
No report	535	6.8

PRIMARY WORK ACTIVITY Over two-thirds of those employed in nonprofit organizations were primarily engaged in research and development including R&D management.

EMPLOYED IN THE FEDERAL GOVERNMENT

FIELD About one-third of the doctoral scientists and engineers employed in the Federal Government were life scientists.

Field	Total employed	Employed in the Federal Government: Number	Percent of total	Percent
All fields	226,750	17,640	7.8	100.0
Physical scientists	49,110	4,124	8.4	23.4
Chemists	30,859	1,635	5.3	9.3
Physicists/astronomers	18,251	2,489	13.6	14.1
Mathematical scientists	12,607	505	4.0	2.9
Mathematicians	11,112	383	3.4	2.2
Statisticians	1,495	122	8.2	.7
Computer specialists	2,914	120	4.1	.7
Environmental scientists	10,537	1,967	18.7	11.2
Earth scientists	8,688	1,542	17.7	8.7
Oceanographers	1,166	174	14.9	1.0
Atmospheric scientists	683	251	36.7	1.4
Engineers	36,187	2,679	7.4	15.2
Life scientists	59,350	5,844	9.8	33.1
Biological scientists	37,441	3,315	8.9	18.8
Agricultural scientists	11,116	1,801	16.2	10.2
Medical scientists	10,793	728	6.7	4.1
Psychologists	26,037	960	3.7	5.4
Social scientists	29,865	1,441	4.8	8.2
Economists	8,734	650	7.4	3.7
Sociologists/anthropologists	6,781	79	1.2	.4
Other social scientists	14,350	712	5.0	4.0
No report	143	—	—	—

Total ...
24 or under ..
25-29 .....
30-34 .....
35-39 .....
40-44 .....
45-49 .....
50-54 .....
55-59 .....
60-64 .....
65-69 .....
70 or over ..
No report ...

AGE About three-fourths (73
in the Federal Government w

Primary
Total ...
Research and
Basic resea
Applied res
Developme
Management
administrat
Of R&D
Of other
Of both
Teaching ...
Consulting
Sales/profess
Other .....
No report ...

PRIMARY WORK ACTIVITY
in the Federal Government
development including R&D

E FEDERAL GOVERNMENT

d of the doctoral scientists and the Federal Government were life

Total employed	Employed in the Federal Government: Number	Percent of total	Percent
226,750	17,640	7.8	100.0
49,110	4,124	8.4	23.4
30,859	1,635	5.3	9.3
18,251	2,489	13.6	14.1
12,607	505	4.0	2.9
11,112	383	3.4	2.2
1,495	122	8.2	.7
2,914	120	4.1	.7
10,537	1,967	18.7	11.2
8,688	1,542	17.7	8.7
1,166	174	14.9	1.0
683	251	36.7	1.4
36,187	2,679	7.4	15.2
59,350	5,844	9.8	33.1
37,441	3,315	8.9	18.8
11,116	1,801	16.2	10.2
10,793	728	6.7	4.1
26,037	960	3.7	5.4
29,865	1,441	4.8	8.2
8,734	650	7.4	3.7
6,781	79	1.2	.4
14,350	712	5.0	4.0
143	—	—	—

Age	Employed in the Federal Government: Number	Percent
Total	17,640	100.0
24 or under	—	—
25-29	634	3.6
30-34	3,609	20.5
35-39	3,220	18.3
40-44	2,852	16.2
45-49	2,639	15.0
50-54	2,172	12.3
55-59	1,450	8.2
60-64	672	3.8
65-69	295	1.7
70 or over	86	.5
No report	11	.1

AGE About three-fourths (73.4 percent) of those employed in the Federal Government were under age 50.

Primary work activity	Employed in the Federal Government: Number	Percent
Total	17,640	100.0
Research and development	9,898	56.1
Basic research	4,666	26.5
Applied research	4,765	27.0
Development	467	2.6
Management or administration	5,391	30.6
Of R&D	3,878	22.0
Of other than R&D	916	5.2
Of both	597	3.4
Teaching	236	1.3
Consulting	120	.7
Sales/professional services	340	1.9
Other	809	4.6
No report	846	4.8

PRIMARY WORK ACTIVITY About four-fifths of those in the Federal Government were engaged in research and development including R&D management.

RECEIVING FEDERAL SUPPORT

FIELD More than four-fifths of all employed oceanographers and atmospheric scientists were supported by Federal funds.

Field	Total employed	Doctoral scientists and engineers receiving Federal support		
		Number	Percent of total	Percent
All fields	226,750	105,050	46.3	100.0
Physical scientists	49,110	20,165	41.1	19.2
Chemists	30,859	8,348	27.1	7.9
Physicist/astronomers	18,251	11,817	64.7	11.2
Mathematical scientists	12,607	4,199	33.3	4.0
Mathematicians	11,112	3,429	30.9	3.3
Statisticians	1,495	770	51.5	.7
Computer specialists	2,914	1,281	44.0	1.2
Environmental scientists	10,537	6,201	58.8	5.9
Earth scientists	8,688	4,636	53.4	4.4
Oceanographers	1,166	959	82.2	.9
Atmospheric scientists	683	606	88.7	.6
Engineers	36,187	18,510	51.1	17.6
Life scientists	59,350	35,529	59.9	33.8
Biological scientists	37,441	21,963	58.7	20.9
Agricultural scientists	11,116	7,440	66.9	7.1
Medical scientists	10,793	6,126	56.8	5.8
Psychologists	26,037	10,344	39.7	9.8
Social scientists	29,865	8,776	29.4	8.4
Economists	8,734	2,613	29.9	2.5
Sociologists/anthropologists	6,781	1,999	29.5	1.9
Other social scientists	14,350	4,164	29.0	4.0
No report	143	45	31.5	—

TYPE OF EMPLOYER Nearly t
toral scientists and engineers.
organizations reported Federal su

Type of employer	Total employed
Total	226,750
Business and industry	50,022
Educational institutions	132,692
4-year college/university	128,095
2-year college	3,061
Elementary/secondary school	1,536
Hospital/clinic	5,714
Nonprofit organizations	7,853
Federal Government	17,640
Military/Commissioned Corps	1,984
State government	2,597
Other government	1,322
Other	3,390
No report	3,536

SUPPORT

r-fifths of all employed eric scientists were supported

	Doctoral scientists and engineers receiving Federal support		
al yed	Number	Percent of total	Percent
,750	105,050	46.3	100.0
,022	20,165	41.1	19.2
,692	8,348	27.1	7.9
,095	11,817	64.7	11.2
,061	4,199	33.3	4.0
,536	3,429	30.9	3.3
,714	770	51.5	.7
,853	1,281	44.0	1.2
,640	6,201	58.8	5.9
,984	4,636	53.4	4.4
,597	959	82.2	.9
,322	606	88.7	.6
,390	18,510	51.1	17.6
,536	35,529	59.9	33.8
	21,963	58.7	20.9
	7,440	66.9	7.1
	6,126	56.8	5.8
	10,344	39.7	9.8
	8,776	29.4	8.4
	2,613	29.9	2.5
	1,999	29.5	1.9
	4,164	29.0	4.0
	45	31.5	—

TYPE OF EMPLOYER Nearly three-fourths of the doctoral scientists and engineers employed by nonprofit organizations reported Federal support of their work.

Type of employer	Total employed	Doctoral scientists and engineers receiving Federal support: Number	Percent of total	Percent
Total	226,750	105,050	46.3	100.0
Business and industry	50,022	11,605	23.2	11.0
Educational institutions	132,692	60,345	45.5	57.4
4-year college/university	128,095	59,584	46.5	56.7
2-year college	3,061	376	12.3	.4
Elementary/secondary school	1,536	385	25.1	.4
Hospital/clinic	5,714	2,860	50.1	2.7
Nonprofit organizations	7,853	5,786	73.7	5.5
Federal Government	17,640	17,640	100.0	16.8
Military/Commissioned Corps	1,984	1,984	100.0	1.9
State government	2,597	1,556	59.9	1.5
Other government	1,322	571	43.2	.5
Other	3,390	1,450	42.8	1.4
No report	3,536	1,253	35.4	1.2

WOMEN

FIELD

- Four-fifths of the women doctoral scientists and engineers in the United States were life scientists, psychologists or social scientists.
- The highest median annual salaries of women are in the fields of engineering, statistics, and economics.

Field	Total	Women doctoral scientists and engineers			
		Number	Percent of total	Percent	Median annual salary
All fields	244,921	21,261	8.7	100.0	$17,600
Physical scientists	53,425	2,486	4.7	11.7	17,400
Chemists	33,881	1,950	5.8	9.2	17,300
Physicists and astronomers	19,544	536	2.7	2.5	17,700
Mathematical scientists	13,515	992	7.3	4.7	17,100
Mathematicians	11,984	915	7.6	4.3	16,800
Statisticians	1,531	77	5.0	.4	19,500
Computer specialists	2,943	90	3.1	.4	17,700
Environmental scientists	11,074	307	2.8	1.4	17,000
Earth scientists	9,142	236	2.6	1.1	16,700
Oceanographers	1,227	54	4.4	.3	—
Atmospheric scientists	705	17	2.4	.1	—
Engineers	37,569	165	.4	.8	19,600
Life scientists	64,540	7,697	11.9	36.2	17,300
Biological scientists	41,035	6,214	15.1	29.2	17,100
Agricultural scientists	11,893	175	1.5	.8	—
Medical scientists	11,612	1,308	11.3	6.2	18,300
Psychologists	28,286	5,777	20.4	27.2	18,200
Social scientists	32,773	3,582	10.9	16.8	17,600
Economists	9,678	610	6.3	2.9	19,300
Sociologists/ anthropologists	7,455	1,444	19.4	6.8	17,100
Other social scientists	15,640	1,528	9.8	7.2	17,400
No report	796	165	20.7	.8	—

Primary w
Total ....
Research and
Basic resear
Applied rese
Developmen
Management
administrati
Of R&D
Of other t
Of both ..
Teaching ....
Consulting ..
Sales/professi
Other .....
No report ....

PRIMARY WORK ACTIVITY

employed women were prima

Type o
All emplo
Business and
Educational i
4-year colle
university
2-year colle
Elementary/
school ..
Hospital/clinic
Nonprofit org
Federal Gover
Military/Comm
Corps ...
State governm
Other governm
Other .....
No report ...

TYPE OF EMPLOYER

Nea
women were affiliated with 4

n doctoral scientists and engineers in
fe scientists, psychologists or social

ual salaries of women are in the fields
s, and economics.

	Women doctoral scientists and engineers			
	Number	Percent of total	Percent	Median annual salary
	21,261	8.7	100.0	$17,600
	2,486	4.7	11.7	17,400
	1,950	5.8	9.2	17,300
	536	2.7	2.5	17,700
	992	7.3	4.7	17,100
	915	7.6	4.3	16,800
	77	5.0	.4	19,500
	90	3.1	.4	17,700
	307	2.8	1.4	17,000
	236	2.6	1.1	16,700
	54	4.4	.3	—
	17	2.4	.1	—
	165	.4	.8	19,600
	7,697	11.9	36.2	17,300
	6,214	15.1	29.2	17,100
	175	1.5	.8	—
	1,308	11.3	6.2	18,300
	5,777	20.4	27.2	18,200
	3,582	10.9	16.8	17,600
	610	6.3	2.9	19,300
	1,444	19.4	6.8	17,100
	1,528	9.8	7.2	17,400
	165	20.7	.8	—

Primary work activity	Employed women doctoral scientists and engineers	
	Number	Percent
Total	17,341	100.0
Research and development	4,517	26.0
Basic research	3,403	19.6
Applied research	971	5.6
Development	143	.8
Management or administration	1,472	8.5
Of R&D	524	3.0
Of other than R&D	699	4.0
Of both	249	1.4
Teaching	7,549	43.5
Consulting	324	1.9
Sales/professional services	1,686	9.7
Other	632	3.6
No report	1,161	6.7

PRIMARY WORK ACTIVITY More than two-fifths of the employed women were primarily engaged in teaching.

Type of employer	Employed women doctoral scientists and engineers	
	Number	Percent
All employers	17,341	100.0
Business and industry	892	5.1
Educational institutions	12,258	70.7
4-year college/university	11,192	64.5
2-year college	584	3.4
Elementary/secondary school	482	2.8
Hospital/clinic	1,171	6.8
Nonprofit organizations	722	4.2
Federal Government	849	4.9
Military/Commissioned Corps	23	.1
State government	279	1.6
Other government	199	1.1
Other	444	2.6
No report	504	2.9

TYPE OF EMPLOYER Nearly two-thirds of the employed women were affiliated with 4-year colleges or universities.

APPENDIXES

A. Technical Notes

B. Detailed Statistical Tables

C. Reproduction of the 1973 Questionnaire and Specialities List

NOTE

Appendix B, Detailed Statistical Tables, has been published separately and may be obtained gratis from the National Science Foundation, Washington, D.C. 20550.

Page 27 carries a listing of these tables.

APPENDIX A
Technical Notes

The Roster of Doctoral Scientists and Engineers was compiled from a number of sources, including: NAS-NRC's Doctorate Records File, an accumulated record of data on doctorate recipients from U.S. institutions; NSF's National Register of Scientific and Technical Personnel, which from 1954 through 1970 collected information on highly qualified personnel in science fields; *American Men and Women of Science*, 12th Edition; and numerous university and college catalogs. The 1973 Roster contained data on approximately 272,000 individuals of whom 252,000 had received science or engineering (S/E) doctorates from U.S. institutions, 10,000 were foreign doctorate holders, and an additional 10,000 were individuals who had received their doctorates in nonscience and nonengineering (non-S/E) areas, but who were subsequently employed in an S/E position.

Sampling Plan

From this population of doctorate-holders, a sample of approximately 59,000 was selected for the 1973 Survey. This sample was stratified according to (1) category within the 1973 Roster, i.e., U.S. S/E doctorate holders, foreign doctorate holders, and non-S/E doctorate holders, (2) sex, (3) size of doctoral institution (according to the number of S/E doctorates awarded) (4) field of doctorate and (5) year of doctorate (table A-1).

Category within the Roster—Due to procedures required to compile the Roster, it was necessary to treat those individuals who received their degrees from U.S. institutions, those who held doctorates from foreign institutions, and those who held non-S/E doctorates as separate segments for sampling purposes.

Sex—The number of women doctorate holders in science and engineering is significantly smaller than the number of men. This characteristic was therefore used to define a stratum, in order to ensure that women were adequately represented in the sample selected.

Size of doctoral institution—Scientists and engineers who had received their doctorates from 1930-1972 were included in this survey. During this period, marked changes in the size of doctorate-granting institutions had taken place. In order to create homogeneous cells, individual doctorate holders were classified with respect to the size of institutions from which their degrees were granted. Institutions granting less than 50 doctoral degrees in science and engineering were classified as *small;* those granting from 50 to 299 such degrees as *medium;* and those granting 300 or more science and engineering doctorates as *large*. Thus, as the size of an institution changed during the period 1930-72, its classification was changed accordingly and its graduates were grouped with graduates of other institutions of comparable size.

Field of doctorate—An individual's field of doctorate represents the major subject of the doctorate.

Year of doctora
cohorts, starting w
had fewer graduat
to form cohorts. A
of classes include
the 1972 class wh

To ensure repr
population, a var
quate representa
tables necessitate
cells whereas la
sampled to yield
increased, an inc
cases were inclu

From a total po
59,086 was select
ple were availab
mailed to this n
those who had
August 29, and C
on November 26

Response Ra

The survey yie
of the total samp
59,086 individua
3,386 were not a
pond to the su
responses from

Analysis of re
slightly lower ra
foreign institutio
tists, from those
1969 and from
institutions. Ex
who were unde
rates among ele
markedly from

Since the va
represented, it
achieve the sta
timates of total
so that the sta
results which w
tion had been

Definitions

A copy of th
included in app
to permit the e

The Roster of Doctoral Scientists and Engineers was compiled from a number of sources, including: NAS-NRC's Doctorate Records File, an accumulated record of data on doctorate recipients from U.S. institutions; NSF's National Register of Scientific and Technical Personnel, which from 1954 through 1970 collected information on highly qualified personnel in science fields; *American Men and Women of Science*, 12th Edition; and numerous university and college catalogs. The 1973 Roster contained data on approximately 272,000 individuals of whom 252,000 had received science or engineering (S/E) doctorates from U.S. institutions, 10,000 were foreign doctorate holders, and an additional 10,000 were individuals who had received their doctorates in nonscience and nonengineering (non-S/E) areas, but who were subsequently employed in an S/E position.

Sampling Plan

From this population of doctorate-holders, a sample of approximately 59,000 was selected for the 1973 Survey. This sample was stratified according to (1) category within the 1973 Roster, i.e., U.S. S/E doctorate holders, foreign doctorate holders, and non-S/E doctorate holders, (2) sex, (3) size of doctoral institution (according to the number of S/E doctorates awarded) (4) field of doctorate and (5) year of doctorate (table A-1).

Category within the Roster—Due to procedures required to compile the Roster, it was necessary to treat those individuals who received their degrees from U.S. institutions, those who held doctorates from foreign institutions, and those who held non-S/E doctorates as separate segments for sampling purposes.

Sex—The number of women doctorate holders in science and engineering is significantly smaller than the number of men. This characteristic was therefore used to define a stratum, in order to ensure that women were adequately represented in the sample selected.

Size of doctoral institution—Scientists and engineers who had received their doctorates from 1930-1972 were included in this survey. During this period, marked changes in the size of doctorate-granting institutions had taken place. In order to create homogeneous cells, individual doctorate holders were classified with respect to the size of institutions from which their degrees were granted. Institutions granting less than 50 doctoral degrees in science and engineering were classified as *small;* those granting from 50 to 299 such degrees as *medium;* and those granting 300 or more science and engineering doctorates as *large*. Thus, as the size of an institution changed during the period 1930-72, its classification was changed accordingly and its graduates were grouped with graduates of other institutions of comparable size.

Field of doctorate—An individual's field of doctorate represents the major subject of the doctorate.

Year of doctorate—Various years were grouped to form cohorts, starting with the 1930 class. Since the earlier classes had fewer graduates, a greater number of years were grouped to form cohorts. As the size of classes increased, the number of classes included in a cohort was decreased, culminating in the 1972 class which constitutes an individual cohort.

To ensure representativeness of small groups within the population, a variable sampling ratio was used. Thus, adequate representation of small cells within the stratification tables necessitated the inclusion of all available cases in those cells whereas larger cells did not need to be so heavily sampled to yield reliable statistics. Accordingly, as cell-size increased, an increasing number, but decreasing percent of cases were included in the sample (table A-2).

From a total population of 272,234 individuals, a sample of 59,086 was selected: current addresses for 55,700 of this sample were available. On March 30, 1973, survey forms were mailed to this number of individuals; followup mailings to those who had not yet responded took place on May 17, August 29, and October 17, 1973. The survey was terminated on November 26, 1973.

Response Rates

The survey yielded on overall response rate of 74.5 percent of the total sample and 79.0 percent of those contacted. Of the 59,086 individuals in the total sample, 1,561 were deceased, 3,386 were not able to be contacted, and 11,683 did not respond to the survey, resulting in a total of 42,456 usable responses from members of the sample.

Analysis of response rates by stratification criterion reveal slightly lower rates from individuals holding doctorates from foreign institutions and somewhat lower rates for social scientists, from those who received doctorates between 1958 and 1969 and from those who received doctorates from *small* institutions. Except for foreign doctorate holders, however, who were understandingly more difficult to locate, response rates among elements of the stratification table did not deviate markedly from the overall rate (table A-3).

Since the various cells in the sample were not equally represented, it was necessary to assign differential weights to achieve the statistics presented in this report which are estimates of total population; i e., each response was weighted so that the statistics represent, as nearly as possible, the results which would have been obtained if the entire population had been surveyed.

Definitions

A copy of the questionnaire and accompanying material is included in appendix C The following definitions are provided to permit the effective use of the data presented in the report.

Field of science or engineering—The date on *field* were derived from responses to question 17 which requested the name and code number of the specialty—selected from the Specialties List included with the questionnaire—most closely related to the respondent's principal employment. The grouping of specialties to form *fields* was accomplished in conformance with the scheme presented in table A-4. Individuals failing to respond to question 17 were assigned the specialty of their doctorate degree listed in item 9.

This *field* definition, which is used in all of the statistical tables presented in this report, differs from the *field* definitions used by the Commission on Human Resources in their report[1] based on this survey. Care should therefore be exercised in comparing data from these sources.

Type of employer—Derived from question 15. The term "Educational institutions" includes junior colleges, 2-year colleges, technical institutes, medical schools, 4-year colleges or universities, and elementary or secondary schools.

Geographic location—State data were derived from responses to question 11 on the location of employment. Individuals not reporting place of employment or not employed were classified by their mailing address.

University or 4-year college teachers—Defined as those individuals who reported "4-year college or university, other than medical school" as their type of principal employer under question 15 *and* also reported "teaching" as their primary or secondary work activity under item 16.

Primary work activity—Derived from responses to question 16. The term "development" encompasses the development of equipment, products, systems or data. "Sales/Professional Services" includes sales, marketing, purchasing, estimating, and professional services to individuals but *excludes* consulting which is treated as a separate work activity. The work activities listed under question 16 as "report or other technical writing, editing," "production," "quality control, inspection, and testing," have been aggregated with "other" to form a single category.[2]

Race—Derived from responses to question 7. Respondents reporting "East Indian" as their race were tabulated separately and in number tables, they were aggregated with Asians to form a single category labelled "Asians," in salary tables, "Orientals" and "East Indians" are listed separately.

Salaries—Derived from responses to question 12 which requested information regarding annual salary before deductions for income tax, social security, retirement, etc., but excluding bonuses, overtime, summer teaching or other payment for professional work. Salaries reported are median annual salaries, rounded to the nearest $100 and computed for full-time employed civilian scientists and engineers only. Differences between calendar year (11 to 12 months) and academic year (9 to 10 months) salaries for scientists and engineers employed in educational institutions have been accommodated by multiplying academic year salaries by 11/9 to adjust to a calendar-year scale.[3]

Sources of Error

No definitions or limitations, except for salary questions, were provided to the respondents since the terms used in the questionnaire were considered to be meaningful to doctoral scientists and engineers. A classification structure was included with the questionnaire to allow respondents to identify the science or engineering specialties associated with their current employment and academic degrees. Experience with previous surveys of this population has revealed that no significant bias is introduced using this approach.

Part of the information collected was processed using keypunching operations. In order to eliminate as many keypunching errors as possible, a process of 100-percent verification was utilized. The remainder of the information collected was reduced to magnetic tape by use of an optical mark reader. Several visual examinations of completed questionnaires were used as a basis for calibrating the optical mark reader to accommodate penciled responses of various densities, thereby holding errors to a minimum.

The estimates presented in this report also reflect random errors introduced due to sampling. The following formula was used to produce the range of sampling errors at the 90-percent level of confidence:

$$1.64 \sqrt{\frac{N_p - N_s}{N_p - 1}} \cdot \sqrt{\frac{pq}{N_s}}$$

The sampling errors reported are based on the assumption of random sampling from a finite population. Since the Doctoral Roster Survey employed startified sampling procedures, the sampling errors are somewhat overestimated.

[1] National Academy of Sciences. *Doctoral Scientists and Engineers in the United States: A 1973 Profile.* (Washington, D C , 1974.)

[2] This category is omitted from all salary tables.

[3] Except for table B-23 where salary base period is included as a variable

TABLE A-1. Classification scheme of 1973 Doctoral Roster Survey

	Total			U.S. S/E doctorates			Foreign doctorates		
	Population	Sample	Percent	Population	Sample	Percent	Population	Sample	Percent
TOTAL	272,234	59,086	21.7	252,190	48,870	19.4	10,375	5,206	50.2
SEX:									
Male	248,479	47,670	19.2	230,474	39,467	17.1	9,729	4,589	47.2
Female	23,755	11,416	48.1	21,716	9,403	43.3	646	617	95.5
SIZE OF INSTITUTION									
Small	15,190	6,615	43.5	15,190	6,615	43.5	—	—	—
Medium	98,404	18,479	18.8	98,404	18,479	18.8	—	—	—
Large	138,596	23,776	17.2	138,596	23,776	17.1	—	—	—
Unclassified	20,044	10,216	50.1	—	—	—	10,375	5,206	50.2
FIELD:									
Mathematics	15,919	4,409	27.7	14,005	3,232	23.1	672	496	73.8
Physics	24,659	5,139	20.6	22,529	4,181	18.6	1,911	735	38.5
Chemistry	43,114	7,907	18.3	40,265	6,751	16.8	2,587	889	34.4
Earth sciences	8,525	1,986	23.3	8,015	1,581	19.7	481	368	76.5
Engineering	38,518	6,362	16.5	37,466	5,693	15.2	915	531	58.0
Biosciences	68,955	17,091	24.8	66,423	15,865	23.9	2,183	880	40.3
Psychology	30,983	7,128	23.0	25,749	4,931	19.2	444	393	88.5
Social sciences	40,265	8,142	20.2	37,737	6,636	17.6	830	566	68.2
Other/unknown	1,297	922	71.1	—	—	—	354	348	98.3
YEAR OF DOCTORATE:									
30-35	9,926	2,393	24.1	9,215	1,938	21.0	542	363	67.0
36-41	12,259	2,787	22.7	11,356	2,248	19.8	570	371	65.1
42-45	6,501	1,773	27.3	6,013	1,433	23.8	269	221	82.2
46-49	10,088	2,356	23.4	9,207	1,842	20.0	504	324	64.3
50-53	21,771	4,266	19.6	19,868	3,358	16.9	954	460	48.2
54-57	24,920	4,847	19.5	22,660	3,826	16.9	1,249	514	41.2
58-61	26,039	5,733	22.0	23,617	4,668	19.8	1,540	603	39.2
62-63	17,711	4,695	26.5	16,031	3,882	24.2	978	452	46.2
64-65	22,481	5,488	24.4	20,184	4,456	22.1	1,216	501	41.2
66-67	27,529	6,244	22.7	25,025	5,055	20.2	1,210	507	41.9
68-69	33,402	6,978	20.9	31,235	5,822	18.6	742	412	55.5
70-71	39,371	7,481	19.0	38,013	6,652	17.5	131	123	93.9
72	19,774	3,699	18.7	19,767	3,690	18.7	9	9	100.0
Unknown	465	346	74.4	—	—	—	465	346	74.4

SOURCE: National Academy of Sciences—National Research Council

TABLE A-1. Classification scheme of 1973 Doctoral Roster Survey

Total			U.S. S/E doctorates			Foreign doctorates			Non-S/E doctorates		
Population	Sample	Percent	Population	Sample	Percent	Population	Sample	Percent	Population	Sample	Percent
272,234	59,086	21.7	252,190	48,870	19.4	10,375	5,206	50.2	9,669	5,010	51.8
248,479	47,670	19.2	230,474	39,467	17.1	9,729	4,589	47.2	8,276	3,614	43.7
23,755	11,416	48.1	21,716	9,403	43.3	646	617	95.5	1,396	1,396	100.0
15,190	6,615	43.5	15,190	6,615	43.5	—	—	—	—	—	—
98,404	18,479	18.8	98,404	18,479	18.8	—	—	—	—	—	—
138,596	23,776	17.2	138,596	23,776	17.1	—	—	—	—	—	—
20,044	10,216	50.1	—	—	—	10,375	5,206	50.2	9,669	5,010	51.8
15,919	4,409	27.7	14,005	3,232	23.1	672	496	73.8	1,242	681	54.8
24,659	5,139	20.6	22,529	4,181	18.6	1,911	735	38.5	223	223	100.0
43,114	7,907	18.3	40,265	6,751	16.8	2,587	889	34.4	267	267	100.0
8,525	1,986	23.3	8,015	1,581	19.7	481	368	76.5	37	37	100.0
38,518	6,362	16.5	37,466	5,693	15.2	915	531	58.0	138	138	100.0
68,955	17,091	24.8	66,423	15,865	23.9	2,183	880	40.3	349	346	99.1
30,983	7,128	23.0	25,749	4,931	19.2	444	393	88.5	4,790	1,804	37.7
40,265	8,142	20.2	37,737	6,636	17.6	830	566	68.2	1,698	940	55.4
1,297	922	71.1	—	—	—	354	348	98.3	943	574	60.9
9,926	2,393	24.1	9,215	1,938	21.0	542	363	67.0	169	92	54.4
12,259	2,787	22.7	11,356	2,248	19.8	570	371	65.1	333	168	50.5
6,501	1,773	27.3	6,013	1,433	23.8	269	221	82.2	219	119	54.3
10,088	2,356	23.4	9,207	1,842	20.0	504	324	64.3	377	190	50.4
21,771	4,266	19.6	19,868	3,358	16.9	954	460	48.2	949	448	47.2
24,920	4,847	19.5	22,660	3,826	16.9	1,249	514	41.2	1,011	507	50.1
26,039	5,733	22.0	23,617	4,668	19.8	1,540	603	39.2	882	462	52.4
17,711	4,695	26.5	16,031	3,882	24.2	978	452	46.2	702	361	51.4
22,481	5,488	24.4	20,184	4,456	22.1	1,216	501	41.2	1,081	531	49.1
27,529	6,244	22.7	25,025	5,055	20.2	1,210	507	41.9	1,294	682	52.7
33,402	6,978	20.9	31,235	5,822	18.6	742	412	55.5	1,425	744	52.2
39,371	7,481	19.0	38,013	6,652	17.5	131	123	93.9	1,227	706	57.5
19,774	3,699	18.7	19,767	3,690	18.7	9	9	100.0	—	—	—
465	346	74.4	—	—	—	465	346	74.4	—	—	—

tional Research Council

TABLE A-2. Sampling scheme of 1973 Doctoral Roster Survey

U.S. Science and Engineering Doctorates (male & female)

1930-71		1972	
Cell Size	Quota	Cell Size	Quota
1-16	All	1-16	16
17-20	16	17-19	17
21-25	17	20-29	18
26-31	18	30-39	19
32-37	19	40-49	20
38-43	20	50-59	21
44-49	21	60-79	22
50-59	22	80-99	23
≥ 60	Add one for every additional 10 cases	≥100 and <300	Add one for every additional 20 cases
		≥300	..... 10%

Nonscience and Nonengineering Doctorates

MALE

100% of cases for physics, chemistry, earth science, engineering, and biosciences.
50% of cases for social sciences, mathematics, and "other and unknown."
25% of cases for psychology.

FEMALE
All cases

Foreign Doctorates

MALE

Cell Size	Quota	Cell Size	Quota
0-20	All	83-86	56
21	20	87-91	57
22	21	92-96	58
23	22	97-100	59
24	23	101-105	60
25-26	24	106-111	61
27	25	112-117	62
28	26	118-123	63
29	27	124-129	64
30-31	28	130-135	65
32	29	136-141	66
33	30	142-148	67
34-35	31	149-155	68
36	32	156-162	69
37	33	163-169	70
38-39	34	170-176	71
40	35	177-183	72
41	36	184-190	73
42-43	37	191-198	74
44	38	199-206	75
45-46	39	207-214	76
47	40	215-222	77
48	41	223-230	78
49	42	231-238	79
50	43	239-246	80
51-52	44	247-255	81
53-54	45	256-264	82
55-56	46	265-273	83
		274-282	84

51-52	44	247-255	81
53-54	45	256-264	82
55-56	46	265-273	83

Nonscience and Nonengineering Doctorates

MALE

100% of cases for physics, chemistry, earth science, engineering, and biosciences.
50% of cases for social sciences, mathematics, and "other and unknown."
25% of cases for psychology.

FEMALE
All cases

Foreign Doctorates

MALE

Cell Size	Quota	Cell Size	Quota
0-20	All	83-86	56
21	20	87-91	57
22	21	92-96	58
23	22	97-100	59
24	23	101-105	60
25-26	24	106-111	61
27	25	112-117	62
28	26	118-123	63
29	27	124-129	64
30-31	28	130-135	65
32	29	136-141	66
33	30	142-148	67
34-35	31	149-155	68
36	32	156-162	69
37	33	163-169	70
38-39	34	170-176	71
40	35	177-183	72
41	36	184-190	73
42-43	37	191-198	74
44	38	199-206	75
45-46	39	207-214	76
47	40	215-222	77
48	41	223-230	78
49	42	231-238	79
50	43	239-246	80
51-52	44	247-255	81
53-54	45	256-264	82
55-56	46	265-273	83
57-58	47	274-282	84
59-60	48	283-291	85
61-62	49	292-300	86
63-65	50	301-309	87
66-68	51	310-319	88
69-71	52	320-399	28%
72-74	53	400-450	27%
75-78	54	≥ 451	26%
79-82	55		

FEMALE
All cases

NOTE: U.S. segment was stratified on cohort, field, sex, and institution size: non-S/E and foreign segments were stratified on cohort, field, and sex.
SOURCE: National Academy of Sciences—National Research Council

TABLE A-3. Population, sample, and response rates of 1973 Doctoral Roster Survey

	Doctoral Roster total[1] N	Survey sample					Response rates[4]	
		Total sample N	Response N	Deceased N	Non-response[2] N	Not contacted[3] N	A (percent)	B
Total	272,234	59,086	42,456	1,561	11,683	3,386	74.5	79.0
Category of doctorate:								
U.S. S/E	252,190	48,870	35,016	1,423	9,916	2,515	74.6	78.6
U.S. non-S/E	9,669	5,010	4,060	81	729	140	82.7	85.0
Foreign	10,375	5,206	3,380	57	1,038	731	66.0	76.8
Sex:								
Male	248,653	47,675	34,472	1,210	9,369	2,624	74.8	79.2
Female	23,581	11,411	7,984	351	2,314	762	73.0	78.3
Size of institution:[5]								
Less than 50	15,190	6,615	4,708	232	1,354	321	74.7	78.5
50 to 299	98,404	18,479	13,248	524	3,842	865	74.5	78.2
More than 299	138,596	23,776	17,060	667	4,720	1,329	74.6	79.0
Unclassified	20,044	10,216	7,440	138	1,767	871	74.2	81.1
Field:								
Mathematics	15,919	4,409	3,166	83	966	194	73.7	77.1
Physics/astronomy	24,659	5,139	3,670	109	1,087	273	73.5	77.7
Chemistry	43,113	7,907	5,830	202	1,460	415	76.3	80.5
Earth sciences	8,525	1,986	1,497	81	315	93	79.5	83.4
Engineering	38,518	6,362	4,633	97	1,306	326	74.3	78.4
Biosciences	68,955	17,091	12,368	478	3,044	1,201	75.2	80.8
Psychology	30,983	7,128	5,084	197	1,489	358	74.1	78.0
Social sciences	40,265	8,142	5,555	299	1,856	432	71.9	75.9
Nonsciences/ unknown	1,297	922	653	15	160	94	72.5	80.7
Year of doctorate:								
CY 1930-35	9,927	2,393	1,302	426	390	275	72.2	81.6
CY 1936-41	12,259	2,787	1,777	334	467	209	75.7	81.9
CY 1942-45	6,501	1,773	1,187	129	334	123	74.2	79.8
CY 1946-49	10,088	2,356	1,639	123	430	164	74.8	80.4
CY 1950-53	21,770	4,266	3,056	151	783	276	75.2	80.4
CY 1954-57	24,920	4,847	3,603	104	884	256	76.5	80.7
CY 1958-FY 61	26,039	5,733	4,126	110	1,252	245	73.9	77.2
FY 1962-63	17,711	4,695	3,410	69	996	220	74.1	77.7
FY 1964-65	22,481	5,488	3,977	36	1,155	320	73.1	77.7
FY 1966-67	27,529	6,244	4,566	33	1,285	360	73.7	78.2
FY 1968-69	33,401	6,978	4,999	23	1,509	447	72.0	76.9
FY 1970-71	39,371	7,481	5,652	15	1,475	339	75.8	79.3
FY 1972	19,774	3,699	2,975	5	617	102	80.6	82.8
Unknown	465	346	187	3	106	50	54.9	64.2

[1] Figures include those deceased and those employed in foreign countries and hence exceed the total population figures reported in other tables.

[2] Includes those to whom survey forms were mailed and not returned as well as those who indicated their reluctance to participate in the survey

[3] Includes those who were members of the sample but for whom no current addresses could be found.

[4] Both response rates combine the number deceased with the number of valid responses. Rate "A" is calculated on the total sample: Rate "B" is calculated on only those contacted.

[5] Size determined by the number of doctorates granted by an institution during a given time period (cohort).

SOURCE: National Academy of Sciences, *Doctoral Scientists and Engineers in the United States—1973 Profile*. (Washington, D.C.), 1974.

SOURCE: National Academy of Sciences, *Doctoral Scientists and Engineers in the United States—1973 Profile*, (Washington, D C), 1974.

Size of institution:[5]								
Less than 50	15,190	6,615	4,708	232	1,354	321	74.7	78.5
50 to 299	98,404	18,479	13,248	524	3,842	865	74.5	78.2
More than 299	138,596	23,776	17,060	667	4,720	1,329	74.6	79.0
Unclassified	20,044	10,216	7,440	138	1,767	871	74.2	81.1
Field:								
Mathematics	15,919	4,409	3,166	83	966	194	73.7	77.1
Physics/astronomy	24,659	5,139	3,670	109	1,087	273	73.5	77.7
Chemistry	43,113	7,907	5,830	202	1,460	415	76.3	80.5
Earth sciences	8,525	1,986	1,497	81	315	93	79.5	83.4
Engineering	38,518	6,362	4,633	97	1,306	326	74.3	78.4
Biosciences	68,955	17,091	12,368	478	3,044	1,201	75.2	80.8
Psychology	30,983	7,128	5,084	197	1,489	358	74.1	78.0
Social sciences	40,265	8,142	5,555	299	1,856	432	71.9	75.9
Nonsciences/ unknown	1,297	922	653	15	160	94	72.5	80.7
Year of doctorate:								
CY 1930-35	9,927	2,393	1,302	426	390	275	72.2	81.6
CY 1936-41	12,259	2,787	1,777	334	467	209	75.7	81.9
CY 1942-45	6,501	1,773	1,187	129	334	123	74.2	79.8
CY 1946-49	10,088	2,356	1,639	123	430	164	74.8	80.4
CY 1950-53	21,770	4,266	3,056	151	783	276	75.2	80.4
CY 1954-57	24,920	4,847	3,603	104	884	256	76.5	80.7
CY 1958-FY 61	26,039	5,733	4,126	110	1,252	245	73.9	77.2
FY 1962-63	17,711	4,695	3,410	69	996	220	74.1	77.7
FY 1964-65	22,481	5,488	3,977	36	1,155	320	73.1	77.7
FY 1966-67	27,529	6,244	4,566	33	1,285	360	73.7	78.2
FY 1968-69	33,401	6,978	4,999	23	1,509	447	72.0	76.9
FY 1970-71	39,371	7,481	5,652	15	1,475	339	75.8	79.3
FY 1972	19,774	3,699	2,975	5	617	102	80.6	82.8
Unknown	465	346	187	3	106	50	54.9	64.2

[1] Figures include those deceased and those employed in foreign countries and hence exceed the total population figures reported in other tables.
[2] Includes those to whom survey forms were mailed and not returned as well as those who indicated their reluctance to participate in the survey.
[3] Includes those who were members of the sample but for whom no current addresses could be found
[4] Both response rates combine the number deceased with the number of valid responses. Rate "A" is calculated on the total sample Rate "B" is calculated on only those contacted
[5] Size determined by the number of doctorates granted by an institution during a given time period (cohort).

SOURCE: National Academy of Sciences, *Doctoral Scientists and Engineers in the United States—1973 Profile*, (Washington, D C), 1974.

TABLE A-4. Science and engineering field classification of specialties—1973 Doctoral Roster Survey

FIELD	Specialty code
All fields	000 to 799
Physical scientists	101 to 299
Chemists	200 to 299
Physicists and astronomers	101 to 199
Mathematical scientists	000 to 060 082 to 099
Mathematicians	000 to 052
Statisticians	060, 082 to 099 055
Computer specialists	080
Environmental scientists	301 to 399
Earth scientists	301 to 360 388, 389, 391 398, 399
Oceanographers	370,397
Atmospheric scientists	380
Engineers	400 to 499
Life scientists	500 to 579
Biological scientists	540 to 579
Agricultural scientists	500 to 519
Medical scientists	520 to 539
Psychologists	600 to 699
Social scientists	700 to 799
Economists	720, 725
Sociologists/ Anthropologists	700, 710
Other social scientists	703, 708, 709, 729, 740 to 799
Out of scope	841 to 899

TABLE A-5. Sampling errors at the 90-percent level of confidence for:

Physical and life scientists

Size of estimate	Sampling error (±)
1,000	130
2,000	170
3,000	210
4,000	240
5,000	270
7,500	320
10,000	360
12,500	390
15,000	420
20,000	450
25,000	460
30,000	460
35,000	440
40,000	400
45,000	340
50,000	230

Chemists, social scientists, and psychologists

Size of estimate	Sampling error (±)
1,000	110
2,000	160
3,000	190
4,000	220
5,000	240
7,500	280
10,000	300
12,500	310
15,000	310
20,000	290
25,000	200

Biological scientists and engineers

Size of estimate	Sampling error (±)
1,000	140
2,000	190
3,000	230
4,000	260
5,000	290
7,500	340
10,000	370
12,500	400
15,000	410
20,000	420
25,000	400
30,000	340

Agricultural scientists, medical scientists, mathematical scientists, mathematicians, environmental scientists, earth scientists, economists, and sociologists/anthropologists

Size of estimate	Sampling error (±)
1,000	120
2,000	150
3,000	170
4,000	170
5,000	160

Computer specialists

Size of estimate	Sampling error (±)
500	80
750	90
1,000	100
1,250	110
1,500	110
2,000	100
2,500	80

Statisticians and oceanographers

Size of estimate	Sampling error (±)
250	50
500	70
750	70
1,000	50

90-percent level of confidence for:

Chemists, social scientists, and psychologists

Size of estimate	Sampling error (±)
1,000	110
2,000	160
3,000	190
4,000	220
5,000	240
7,500	280
10,000	300
12,500	310
15,000	310
20,000	290
25,000	200

Biological scientists and engineers

Size of estimate	Sampling error (±)
1,000	140
2,000	190
3,000	230
4,000	260
5,000	290
7,500	340
10,000	370
12,500	400
15,000	410
20,000	420
25,000	400
30,000	340

Physicists and astronomers, and other social scientists

Size of estimate	Sampling error (±)
1,000	120
2,000	170
3,000	200
4,000	220
5,000	230
7,500	250
10,000	240
12,500	200
15,000	100

Computer specialists

Size of estimate	Sampling error (±)
500	80
750	90
1,000	100
1,250	110
1,500	110
2,000	100
2,500	80

Statisticians and oceanographers

Size of estimate	Sampling error (±)
250	50
500	70
750	70
1,000	50

Atmospheric scientists

Size of estimate	Sampling error (±)
100	30
200	40
300	50
400	50
500	40
600	30
700	10

TABLE A-6. Sampling errors at the 90-percent level of confidence for:

Doctoral scientists and engineers employed in full-time non-S/E positions

Size of estimate	Sampling error (±)
1,000	120
2,000	160
3,000	180
4,000	200
5,000	210
7,500	200
10,000	130

University or 4-year college teachers

Size of estimate	Sampling error (±)
1,000	120
5,000	260
10,000	360
15,000	430
20,000	480
30,000	550
40,000	590
50,000	600
75,000	530
100,000	150

Postdoctoral appointees

Size of estimate	Sampling error (±)
1,000	100
2,000	130
3,000	140
4,000	130
5,000	100

Women doctoral scientists and engineers

Size of estimate	Sampling error (±)
1,000	70
2,000	100
3,000	120
4,000	130
5,000	140
7,500	160
10,000	170
12,500	160
15,000	150
17,500	130
20,000	80

TABLE A-7. Sampling errors of totals at confidence for doctoral scientist

Size of estimate	Sampl error (
1,000	120
5,000	260
10,000	370
20,000	510
30,000	620
50,000	760
75,000	870
100,000	930
125,000	940
150,000	920
175,000	850
200,000	730
240,000	260

TABLE A-8. Sampling errors of percent confidence for doctoral scienti

	Estimate			
Base of percent	1 or 99	2 or 98	5 or 95	10 or
1,000	1.2	1.7	2.6	3.6
2,000	.85	1.2	1.9	2.6
3,000	.69	.98	1.5	2.1
5,000	.53	.75	1.2	1.6
10,000	.38	.53	.83	1.1
15,000	.31	.43	.68	.93
20,000	.27	.38	.59	.81
30,000	.22	.31	.48	.66
50,000	.17	.23	.37	.51
60,000	.15	.21	.34	.46
100,000	.12	.17	.26	.36
150,000	.10	.13	.21	.29
200,000	.08	.12	.18	.25
240,000	.07	.11	.17	.23

90-percent level of confidence for:

University or 4-year college teachers

Size of estimate	Sampling error (±)
1,000	120
5,000	260
10,000	360
15,000	430
20,000	480
30,000	550
40,000	590
50,000	600
75,000	530
100,000	150

Women doctoral scientists and engineers

Size of estimate	Sampling error (±)
1,000	70
2,000	100
3,000	120
4,000	130
5,000	140
7,500	160
10,000	170
12,500	160
15,000	150
17,500	130
20,000	80

TABLE A-7. Sampling errors of totals at the 90-percent level of confidence for doctoral scientists and engineers

Size of estimate	Sampling error (±)
1,000	120
5,000	260
10,000	370
20,000	510
30,000	620
50,000	760
75,000	870
100,000	930
125,000	940
150,000	920
175,000	850
200,000	730
240,000	260

TABLE A-8. Sampling errors of percents at the 90-percent level of confidence for doctoral scientists and engineers

	Estimated percent						
Base of percent	1 or 99	2 or 98	5 or 95	10 or 90	20 or 80	25 or 75	50
1,000	1.2	1.7	2.6	3.6	4.8	5.2	6.0
2,000	.85	1.2	1.9	2.6	3.4	3.7	4.3
3,000	.69	.98	1.5	2.1	2.8	3.0	3.5
5,000	.53	.75	1.2	1.6	2.2	2.3	2.7
10,000	.38	.53	.83	1.1	1.5	1.6	1.9
15,000	.31	.43	.68	.93	1.2	1.3	1.6
20,000	.27	.38	.59	.81	1.1	1.2	1.3
30,000	.22	.31	.48	.66	.88	.95	1.1
50,000	.17	.23	.37	.51	.68	.73	.85
60,000	15	.21	.34	.46	.62	.67	.78
100,000	.12	.17	.26	.36	.48	.52	.60
150,000	.10	.13	.21	.29	.39	.42	.49
200,000	.08	.12	.18	.25	.34	.37	.42
240,000	.07	.11	.17	.23	.31	.33	.39

APPENDIX B

A Listing of Detailed Statistical Tables

GENERAL CHARACTERISTICS—NUMBERS AND SALARIES

B-1 Characteristics of doctoral scientists and engineers in the United States: 1973
B-2 Salary distribution of doctoral scientists and engineers, by field: 1973

NUMBER OF DOCTORAL SCIENTISTS AND ENGINEERS—DEMOGRAPHIC, EMPLOYMENT, AND FIELD OF SCIENCE AND ENGINEERING

B-3 By field and citizenship: 1973
B-4 By field, sex, race, and employment status: 1973
B-5 By field, age, and type of employer: 1973
B-6 By field, type of employer, and race: 1973
B-7 By field, age, and primary work activity: 1973
B-8 By field, primary work activity, and race: 1973
B-9 By field, type of employer, and primary work activity: 1973

MEDIAN ANNUAL SALARIES OF DOCTORAL SCIENTISTS AND ENGINEERS—DEMOGRAPHIC, EMPLOYMENT, AND FIELD OF SCIENCE AND ENGINEERING

B-10 By field, sex, and race: 1973
B-11 By field and age: 1973
B-12 By field and primary work activity: 1973
B-13 By field and type of employer: 1973

GEOGRAPHIC DISTRIBUTION OF DOCTORAL SCIENTISTS AND ENGINEERS—NUMBERS

B-14 By geographic division, State, and field: 1973
B-15 By Standard Metropolitan Statistical Area and field: 1973
B-16 By Standard Metropolitan Statistical Area and type of employer: 1973
B-17 By Standard Metropolitan Statistical Area and primary work activity: 1973

GEOGRAPHIC DISTRIBUTION OF DOCTORAL SCIENTISTS AND ENGINEERS—MEDIAN ANNUAL SALARIES

B-18 By geographic division, State, and field: 1973
B-19 By Standard Metropolitan Statistical Area and field: 1973
B-20 By Standard Metropolitan Statistical Area and type of employer: 1973
B-21 By Standard Metropolitan Statistical Area and primary work activity: 1973

UNIVERSITY AND COLL
ENGINEERS—NUMBER

B-22 Number of d
year college
B-23 Median ann
university d
academic ra

WOMEN DOCTORAL S

B-24 By field, em
B-25 By field and
B-26 By field and

WOMEN DOCTORAL
SALARIES

B-27 By field and
B-28 By field and
B-29 By field and

SELECTED CHARAC
ENGINEERS—NUMBER

B-30 By field, fu
B-31 Employed
field and re
B-32 Postdoctora
accepting p

NDIX B

sting of Tables

GENERAL CHARACTERISTICS—NUMBERS AND SALARIES

B-1 Characteristics of doctoral scientists and engineers in the United States. 1973
B-2 Salary distribution of doctoral scientists and engineers, by field: 1973

NUMBER OF DOCTORAL SCIENTISTS AND ENGINEERS—DEMOGRAPHIC, EMPLOYMENT, AND FIELD OF SCIENCE AND ENGINEERING

B-3 By field and citizenship: 1973
B-4 By field, sex, race, and employment status. 1973
B-5 By field, age, and type of employer: 1973
B-6 By field, type of employer, and race: 1973
B-7 By field, age, and primary work activity: 1973
B-8 By field, primary work activity, and race: 1973
B-9 By field, type of employer, and primary work activity: 1973

MEDIAN ANNUAL SALARIES OF DOCTORAL SCIENTISTS AND ENGINEERS—DEMOGRAPHIC, EMPLOYMENT, AND FIELD OF SCIENCE AND ENGINEERING

B-10 By field, sex, and race: 1973
B-11 By field and age: 1973
B-12 By field and primary work activity: 1973
B-13 By field and type of employer: 1973

GEOGRAPHIC DISTRIBUTION OF DOCTORAL SCIENTISTS AND ENGINEERS—NUMBERS

B-14 By geographic division, State, and field: 1973
B-15 By Standard Metropolitan Statistical Area and field: 1973
B-16 By Standard Metropolitan Statistical Area and type of employer: 1973
B-17 By Standard Metropolitan Statistical Area and primary work activity: 1973

GEOGRAPHIC DISTRIBUTION OF DOCTORAL SCIENTISTS AND ENGINEERS—MEDIAN ANNUAL SALARIES

B-18 By geographic division, State, and field: 1973
B-19 By Standard Metropolitan Statistical Area and field: 1973
B-20 By Standard Metropolitan Statistical Area and type of employer: 1973
B-21 By Standard Metropolitan Statistical Area and primary work activity: 1973

UNIVERSITY AND COLLEGE EMPLOYMENT OF DOCTORAL SCIENTISTS AND ENGINEERS—NUMBERS AND SALARIES

B-22 Number of doctoral scientists and engineers who are university or 4-year college teachers, by field, sex, and academic rank: 1973
B-23 Median annual salaries of doctoral scientists and engineers who are university or 4-year college teachers, by field, salary base, and academic rank. 1973

WOMEN DOCTORAL SCIENTISTS AND ENGINEERS—NUMBERS

B-24 By field, employment status, and race: 1973
B-25 By field and type of employer: 1973
B-26 By field and primary work activity: 1973

WOMEN DOCTORAL SCIENTISTS AND ENGINEERS—MEDIAN ANNUAL SALARIES

B-27 By field and race: 1973
B-28 By field and type of employer: 1973
B-29 By field and primary work activity: 1973

SELECTED CHARACTERISTICS OF DOCTORAL SCIENTISTS AND ENGINEERS—NUMBER

B-30 By field, funding agency, and type of employer: 1973
B-31 Employed in full-time nonscience and nonengineering positions, by field and reason for acceptance of such position: 1973
B-32 Postdoctorals by field, time since receipt of doctorate and reason for accepting postdoctoral position: 1973

APPENDIX C.

Reproduction of 1973 Questionnaire and Specialities List

NATIONAL RESEARCH

NATIONAL ACADEMY OF SCIENCES -NATIONAL

2101 CONSTITUTION AVENUE WASHINGTO

OFFICE OF SCIENTIFIC PERSONNEL

Dear Colleague

The National Science Foundation has aske
Sciences-National Academy of Engineering-Nationa
it in operating the Manpower Characteristics Syst
established the System to provide data needed to
resources in the sciences and engineering and guid
policies and programs

As our part of the task, we shall maintain
the earned doctorate in the natural and social sci
neering Already available data will be utilized to
We believe the Survey of Doctoral Scientists and
needed data bearing on the problem of utilizatio
scientists and engineers, the support of graduate
research and development and postdoctoral activi

We seek your help You are one of a car
scientists and engineers who are being asked to p
tionnaire on the following pages has been designe
upon your time and yet to provide data that in t
significant and useful Some data already availab
on the form to conserve your time

Information provided will be treated as p
purposes of statistical description Summaries w
of the results.

Please complete and return the questionn
envelope is enclosed for your convenience. Your
ciated and, indeed, is essential to the success of

Sincerely yours,

Robert A. Alberty

Robert A. Alberty
Chairman, Advisory Committee

PLEASE DO NOT WRITE ON

NATIONAL RESEARCH COUNCIL
NATIONAL ACADEMY OF SCIENCES NATIONAL ACADEMY OF ENGINEERING
2101 CONSTITUTION AVENUE WASHINGTON, D.C. 20418

OFFICE OF SCIENTIFIC PERSONNEL

March 1973

Dear Colleague

The National Science Foundation has asked the National Academy of Sciences-National Academy of Engineering-National Research Council to assist it in operating the Manpower Characteristics System The Foundation has established the System to provide data needed to assay this Nation's human resources in the sciences and engineering and guide in the development of national policies and programs.

As our part of the task, we shall maintain information about recipients of the earned doctorate in the natural and social sciences, mathematics, and engineering Already available data will be utilized to the greatest extent possible We believe the Survey of Doctoral Scientists and Engineers will provide critically needed data bearing on the problem of utilization and supply of doctoral scientists and engineers, the support of graduate education, and the support of research and development and postdoctoral activities.

We seek your help You are one of a carefully drawn sample of doctoral scientists and engineers who are being asked to provide current data. The questionnaire on the following pages has been designed to make minimum demands upon your time and yet to provide data that in the aggregate will be statistically significant and useful Some data already available to us have been preprinted on the form to conserve your time.

Information provided will be treated as privileged and used only for purposes of statistical description. Summaries will be published after analysis of the results

Please complete and return the questionnaire promptly. A self-addressed envelope is enclosed for your convenience Your assistance will be greatly appreciated and, indeed, is essential to the success of this project

Sincerely yours,

Robert A. Alberty

Robert A. Alberty
Chairman, Advisory Committee

PLEASE DO NOT WRITE ON THIS PAGE

SURVEY OF DOCTORAL SCIENTISTS AND ENGINEERS

CONDUCTED BY THE NATIONAL RESEARCH COUNCIL WITH THE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION

OMB No. 99-S7200
Approval expires Dec 31 1975

The letter on the adjacent page requests that you assist in this survey of doctoral scientists and engineers – including the fields of the natural and social sciences, mathematics, and engineering.

Please print or type your answers on this first page. If selected information has been printed by computer, check to be certain the entries are CORRECT and COMPLETE. The second page has special instructions. After the form has been completed, please return it in the enclosed envelope to: Manpower Studies Branch, Office of Scientific Personnel, National Research Council, 2101 Constitution Avenue, Washington, D. C. 20418.

NOTE ALL INFORMATION IS REGARDED AS CONFIDENTIAL AND WILL BE USED FOR STATISTICAL PURPOSES ONLY. IT WILL NOT BE RELEASED IN ANY WAY THAT WILL ALLOW IT TO BE IDENTIFIED WITH YOU.

If your name and address are incorrect, please enter correct information to the right. Include zip code.

(10)

If there is an alternate address through which you could be reached, please provide it in the space below (2 9)

C/O Number Street City State Zip Code (11)

VITA

1 Date of Birth (12 16) Mo Day Yr

2 State or Foreign Country of Birth (17 18)

3 State or Foreign Country of Secondary School Graduation (19-20)

4 Sex (21) ☐1 Male ☐2 Female

5 Citizenship (22) ☐0- USA ☐1 Non-USA (specify country) _____

6 Social Security No. (23-31)

7 Race (Please check one) ☐0- White/Caucasian ☐1 Black/Negro ☐2 American Indian ☐3- Asian, specify _____ ☐4- Other, specify _____ (32)

8 Ethnic Group (Please check one) ☐0- Puerto Rican American ☐1 Mexican American/Chicano ☐2 Spanish American ☐3- Afro-American ☐4- None of these (Please specify any other) _____ (33)

9 List in the table below all collegiate and graduate degrees that have been awarded to you, e.g., BA/BS, MA/MS, PhD. If some information has been entered by computer, please be sure it is CORRECT and COMPLETE (including the number and name of the specialty field from the list on the reverse side)

Type of Degree	Granted Mo	Granted Yr	Major Field (Use Specialties List) Name	Major Field (Use Specialties List) Number	Institution Name	City (or campus) and State
BS						
MS						
PhD						

10 Name of your doctoral thesis adviser (please print FULL name) (First Name) (Middle Initial) (Last Name) (23-44)

PROFESSIONAL EMPLOYMENT

11 Please give the name of your present principal employer (organization, company, etc. or, if self-employed, "self"), and actual place of employment.

Name of present principal employer (45-60) Actual place of employment (city, state and zip code) (61 66)

If employed by a university, college, or junior college, please check the rank of your present position: (56)

☐0- Professor ☐1 Associate Professor ☐2 Assistant Professor ☐3- Instructor ☐4- Lecturer ☐5- Other, specify _____

12 Please give the basic annual salary associated with your principal professional employment in 1972 and 1973. If you were on a postdoctoral appointment (e.g., fellowship, traineeship, research associateship) give your annual stipend plus allowances below

1972 $ _____ (57 58) 1973 $ _____ (60 62)

(Basic Annual Salary is your annual salary before deductions for income tax, social security, retirement, etc., but does not include bonuses, overtime, summer teaching, or other payment for professional work.)

If academically employed, check whether salary is for

	1972	1973
9-10 mos	☐	☐
11-12 mos	☐	☐

(63) (64)

PLEASE CONTINUE

Please Do Not Write In This Space

1 2 9 cu M C
10 11
V
12 13 14 15 16
17 18 19 20
21 22 23-31 SS M
32 33
S
34 35 36
37 38 39
40 41 42 43 44 45
M
46 47 48
49 50 51
52 53 54 55 56 57
D
58 59 60
61 62 63 64 65 66
67 68 69 70 71 72
C
2 2 9 cu M
O
10 11 12 13
14 15 16
17 18 19 20 21 22
23-44 Th Ad
E
45 46 47 48 49 50
51 52 53 54 55 56
57 58 59 60 61 62
63 64

PLEASE READ DIRECTIONS ON A

13 What is your employment status? 1972 1973

	1972	1973
Employed full-time, science or engineering related position	○	○
Employed full-time, nonscience or nonengineering related position. (Complete 13a below)	○	○
Employed part-time, science or engineering related position (Complete 13b below)	○	○
Employed part-time, nonscience or nonengineering related position (Complete 13b below)	○	○
Postdoctoral appointment (fellowship, traineeship research associateship, etc.) Complete 13c below	○	○
Unemployed and seeking employment	○	○
Specify number of months unemployed __ __		
Unemployed and not seeking employment	○	○
Retired and not seeking employment	○	○
Specify year of retirement __ __		
Other, specify _____	○	○

13a If you are employed full-time in 1973 in a position unrelated to science or engineering, what was the MOST important reason for taking the position? 1973

Prefer nonscience or nonengineering position	○
Promoted out of science or engineering position	○
Pay is better	○
Locational preference	○
Science or engineering position not available	○
Other, specify _____	○

13b If employed part-time in 1973, are you seeking full-time employment? 1973

Yes	○
No	○

13c If on postdoctoral appointment in 1973, what was the MOST important reason for taking the appointment? 1973

Sought additional research experience in field	○
Opportunity to change to another field	○
Employment position not available	○
Other, specify _____	○

14 If employed or on a postdoctoral appointment in 1973, please indicate the term of employment or appointment. 1973

Three months or less	○
More than 3 months, not more than one year	○
More than one year, not more than 3 years	○
More than 3 years, not more than 5 years	○
Permanent or tenured position	○

15 Which categories best describe the sector of the economy and type of organization of your principal employer or postdoctoral affiliation?

	1972	1973
A. Sector. Public	○	○
Private	○	○
B Type of organization:		
Business or industry	○	○
Junior college, 2-year college, technical institute	○	○
Medical school	○	○
4-year college or university, other than medical school	○	○
Elementary or secondary school system	○	○
Hospital or clinic	○	○
U.S. military service, active duty, or Commission Corps, e.g., USPHS, NOAA	○	○
U.S. government, civilian employee	○	○
State government	○	○
Local or other government, specify _____	○	○
International agency	○	○
Non-profit organization, other than hospital, clinic, or educational institution	○	○
Other, specify _____	○	○

SCIENTISTS AND ENGINEERS

OMB No. 99-S7201
(Approval expires Dec. 31 1975

HE SUPPORT OF THE NATIONAL SCIENCE FOUNDATION.

survey of doctoral scientists and engineers – including the fields of the natural and

formation has been printed by computer, check to be certain the entries are CORRECT
the form has been completed, please return it in the enclosed envelope to: Manpower
ouncil, 2101 Constitution Avenue, Washington, D. C. 20418.

TIAL AND WILL BE USED FOR STATISTICAL PURPOSES ONLY IT WILL NOT BE
E IDENTIFIED WITH YOU.

(10)

(2 9)

please provide it in the space below.

City State Zip Code (11)

r Foreign Country of (19-20) 4 Sex (21)
ary School Graduation

☐1 Male ☐2 Female

(22) 6 Social Security No. (23-31)

18. ☐4- Other, specify (32)

h American ☐4- None of these (Please specify any other)
American (33)

ees awarded to you, e.g., BA/BS, MA/MS, PhD If same
ECT and COMPLETE (including the number and name

Institution Name City (or campus) and State

(Middle Initial) (Last Name) (23 44)

n, company, etc. or, if self-employed, "self"),

al place of employment (city state and zip code) (51 55)

e rank of your present position

(56)
☐4- Lecturer
☐5- Other, specify

professional appointment and stipend

(60-62)

come tax, social security, retirement etc
payment for professional work)

If academically employed, check whether salary is for

	1972	1973
9-10 mos	☐	☐
11 12 mos	☐ (63)	☐ (64)

Please Do Not Write In This Space

1 2-8 ctr M
C
10 11
V
12 13 14 15 16
17 18 19 20
21 22 23-31 SS #
32 33
B
34 35 36
37 38 39
40 41 42 43 44 45
M
46 47 48
49 50 51
52 53 54 55 56 57
D
58 59 60
61 62 63 64 65 66
67 68 69 70 71 72
2+ 2e ctr M
O
10 11 12 13
14 15 16
17 18 19 20 21 22
23-44 Th Ad
E
45 46 47 48 49 50
51 52 53 54 55 56
57 58 59 60 61 62
63 64

PLEASE CONTINUE

PLEASE READ DIRECTIONS ON ADJACENT PAGE.

13. What is your employment status? 1972 1973

	1972	1973
Employed full-time, science or engineering related position	○	○
Employed full-time, nonscience or nonengineering related position. (Complete 13a below)	○	○
Employed part-time, science or engineering related position (Complete 13b below)	○	○
Employed part-time, nonscience or nonengineering related position (Complete 13b below)	○	○
Postdoctoral appointment (fellowship, traineeship, research associateship, etc.) Complete 13c below	○	○
Unemployed and seeking employment	○	○
Specify number of months unemployed. __ __		
Unemployed and not seeking employment	○	○
Retired and not seeking employment	○	○
Specify year of retirement __ __		
Other, specify _____	○	○

13a. If you are employed full-time in 1973 in a position unrelated to science or engineering, what was the MOST important reason for taking the position? 1973

Prefer nonscience or nonengineering position	○
Promoted out of science or engineering position	○
Pay is better	○
Vocational preference	○
Science or engineering position not available	○
Other, specify _____	○

13b. If employed part-time in 1973, are you seeking full-time employment? 1973

Yes	○
No	○

13c. If on postdoctoral appointment in 1973, what was the MOST important reason for taking the appointment? 1973

Sought additional research experience in field	○
Opportunity to change to another field	○
Employment position not available	○
Other, specify _____	○

14. If employed or on a postdoctoral appointment in 1973, please indicate the term of employment or appointment. 1973

Three months or less	○
More than 3 months, not more than one year	○
More than one year, not more than 3 years	○
More than 3 years, not more than 5 years	○
Permanent or tenured position	○

15. Which categories best describe the sector of the economy and type of organization of your principal employer or postdoctoral affiliation?

	1972	1973
A. Sector: Public	○	○
Private	○	○
B. Type of organization:		
Business or industry	○	○
Junior college, 2-year college, technical institute	○	○
Medical school	○	○
4-year college or university, other than medical school	○	○
Elementary or secondary school system	○	○
Hospital or clinic	○	○
U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA	○	○
U.S. government, civilian employee	○	○
State government	○	○
Local or other government, specify _____	○	○
International agency	○	○
Non-profit organization, other than hospital, clinic, or educational institution	○	○
Other specify _____	○	○

16. What are the primary (A) and secondary (B) work activities related to your position?

	1972 A	1972 B	1973 A	1973 B
Management or administration of				
Research and development	○	○	○	○
Other than research and development	○	○	○	○
Both	○	○	○	○
Basic research	○	○	○	○
Applied research	○	○	○	○
Development of equipment, products, systems, data	○	○	○	○
Design	○	○	○	○
Teaching	○	○	○	○
Report or other technical writing, editing	○	○	○	○
Production	○	○	○	○
Consulting, specify _____	○	○	○	○
Professional services to individuals	○	○	○	○
Quality control, inspection, testing	○	○	○	○
Sales, marketing, purchasing, estimating	○	○	○	○
Other, specify _____	○	○	○	○

17. From the specialties list on the adjacent page, select and enter both the number and title of the scientific specialty most closely related to your principal employment or postdoctoral appointment. Write in your specialty if it is not on the list.

1972 Number _____
1973 Number _____

18. Is ANY of your work being supported or sponsored by U.S. government funds?

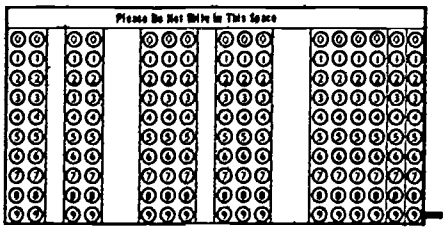
	Yes	No	Don't Know
1972	○	○	○
1973	○	○	○

If yes, which of the following federal agencies or departments are supporting the work? (Mark all that apply.)

	1972	1973		1972	1973
NASA	○	○	Dept. of Defense	○	○
NSF	○	○	Dept. of Commerce	○	○
EPA	○	○	Dept. of Agriculture	○	○
AEC	○	○	Dept. of Transportation	○	○
AID	○	○	Dept. of Justice	○	○
Dept. of Health, Educ., & Welfare			Dept. of Housing and Urban Development	○	○
NIH	○	○	Dept. of Interior	○	○
Health Services & Mental Health Admin	○	○	Other agency or dept., specify	○	○
Office of Educ.	○	○	_____		
Other HEW, specify _____	○	○	Don't know source	○	○

This is the end of the questionnaire Thank you

Please Do Not Write In This Space



DIRECTIONS: Your responses to this portion of the questionnaire will be read by an optical mark reader. Your careful observance of these few simple rules will be most appreciated.

- Use only black lead pencil (No. 2½ or less).
- Make heavy black marks that fill the circle.
- Erase cleanly any answer you wish to change.
- Make no stray markings of any kind.

EXAMPLE:

	Yes	No
Will marks made with ball pen, felt tip, or fountain pen be properly read?	○	●

PLEASE NOTE that we are requesting that you furnish the following information for both the current year, as of the time you receive this form, and last year, as of March 31, 1972. Fill in the category of each item which most appropriately describes your status in 1972 and 1973. Unless otherwise specified, mark only one category in each year.

SPECIALTIES LIST

MATHEMATICAL SCIENCES

000 Algebra
010 Analysis & Functional Analysis
020 Geometry
030 Logic
040 Number Theory
052 Probability
056 Math, Statistics (see also 644, 670, 725, 729)
060 Topology
080 Computing Theory & Practice
082 Operations Research (see also 477)
085 Applied Mathematics
089 Combinatorics & Finite Mathematics
091 Physical Mathematics
098 Mathematics, General
099 Mathematics, Other*

ASTRONOMY

101 Astronomy
102 Astrophysics

PHYSICS

110 Atomic & Molecular Physics
120 Electromagnetism
130 Mechanics
132 Aerodynamics
134 Fluids
135 Plasma Physics
136 Optics
138 Thermal Physics
140 Elementary Particles
150 Nuclear Structure
180 Solid State
198 Physics, General
199 Physics, Other*

CHEMISTRY

Lst A	Lst B
Fields used to classify academic degrees. Use for item 9 on questionnaire. Also see note below.	Fields used to classify present professional employment. Use for item 17 on questionnaire. Also see note below for the doctoral field in item 9.
200 Analytical	205 Analytical Chemistry
210 Inorganic	215 Synthetic Organic & Organometallic Chemistry
220 Organic	225 Synthetic Inorganic & Natural Products
230 Nuclear	226 Nuclear Chemistry
240 Physical	245 Quantum Chemistry
250 Theoretical	255 Structural Chemistry
260 Agricultural & Food	266 Thermodynamics & Material Properties
270 Pharmaceutical	275 Polymers
298 Chemistry, General	285 Chemical Dynamics
299 Chemistry, Other*	

NOTE: Please use Lst B fields to classify your doctoral degree in item 9. This is a classification which is requested in addition to the field chosen from Lst A. Print the Lst B field beside the doctoral code number from Lst A.

EARTH, ENVIRONMENTAL & MARINE SCIENCES

301 Mineralogy, Petrology
305 Geochemistry
310 Stratigraphy, Sedimentation
320 Paleontology
330 Structural Geology
340 Geophysics (Solid Earth & Atmospheric)
350 Geomorph. Glacial Geology
360 Hydrology
370 Oceanography
380 Meteorology
398 Environmental Sciences, General
399 Environmental Sciences, Other*
301 Applied Geology, Geol. Engr., Econ. Geol.
307 Marine Sciences, Other*
398 Earth Sciences, General
399 Earth Sciences, Other*

ENGINEERING

400 Aeronautical & Astronautical
410 Agricultural
415 Biomedical
420 Civil
430 Chemical
435 Ceramic
440 Electrical
445 Electronics
450 Industrial, Manufacturing
456 Nuclear
460 Engineering Mechanics
465 Engineering Physics
470 Mechanical
475 Metallurgy & Phys. Met. Engr.
477 Operations Research Systems (see also 082)
478 Fuel Technology, Petrol. Engr.
480 Sanitary/Environmental
486 Mining
497 Materials Science Engr.
498 Engineering, General
499 Engineering, Other*

AGRICULTURAL SCIENCES

500 Agronomy
501 Agricultural Economics
502 Animal Husbandry
504 Fish & Wildlife
505 Forestry
508 Horticulture
507 Soils & Soil Science
510 Animal Sciences
511 Phytopathology
517 Food Science & Technology (see also 573)
518 Agriculture, General
519 Agriculture, Other*

MEDICAL SCIENCES

520 Medicine & Surgery
522 Public Health
523 Veterinary Medicine
524 Hospital Administration
527 Parasitology
534 Pathology
536 Pharmacology
537 Pharmacy
538 Medical Sciences, General
539 Medical Sciences, Other*

BIOLOGICAL SCIENCES

540 Biochemistry
542 Biophysics
543 Biomathematics
544 Biometrics, Biostatistics (see also 056, 670, 725, 729)
545 Anatomy
546 Cytology
547 Embryology
548 Immunology
550 Botany
560 Ecology
562 Hydrobiology
564 Microbiology & Bacteriology
568 Physiology, Animal
567 Physiology, Plant
508 Zoology
570 Genetics
571 Entomology
572 Molecular Biology
573 Food Science & Technology (see also 517)
574 Behavior/Ethology
578 Biological Sciences, General
579 Biological Sciences, Other*

PSYCHOLOGY

600 Clinical
610 Counseling & Guidance
620 Developmental & Gerontological
630 Educational
635 School Psychology
641 Experimental
642 Comparative
643 Physiological
650 Industrial & Personnel
660 Personality
670 Psychometrics (see also 056, 644, 725, 729)
680 Social
698 Psychology, General
699 Psychology, Other*

SOCIAL SCIENCES

700 Anthropology
703 Archeology
708 Communications*
708 Linguistics
710 Sociology
720 Economics (see also 501)
725 Econometrics (see also 056, 644, 670, 729)
729 Social Statistics (see also 056, 644, 670, 725)
740 Geography
745 Area Studies*
750 Political Science, Public Admin.
756 International Relations
770 Urban & Reg. Planning
775 History & Phil. of Science
798 Social Sciences, General
799 Social Sciences, Other*

ARTS & HUMANITIES

841 Fine & Applied Arts (including Music, Speech, Drama, etc.)
842 History
843 Philosophy, Religion, Theology
845 Languages & Literature
846 Other Arts and Humanities*

EDUCATION & OTHER PROFESSIONAL FIELDS

998 Education

882 Business Administration
883 Home Economics
884 Journalism
885 Speech and Hearing Sciences
886 Law, Jurisprudence
887 Social Work
891 Library & Archival Science
896 Professional Field, Other*

899 OTHER FIELDS*

* Identify the specific field in the space provided on the questionnaire

Other Science Resources Publications

REPORTS	NSF No.	Price
Expenditures for Scientific and Engineering Activities at Universities and Colleges, Fiscal Year 1973	75-316	In press
Research and Development in Industry, 1973	75-315	In press
The 1972 Scientist and Engineer Population Redefined. Vol. I. Demographic, Educational, and Professional Characteristics	75-313	$3.70
Reviews of Data on Science Resources, No. 23, "R&D Expenditures of State Public Institutions, Fiscal Year 1973"	75-311	$0.35
No. 24, "Work Activities of Employed Doctoral Scientists and Engineers in the U.S. Labor Force, July 1973"	75-310	In press
R&D Activities of Independent Nonprofit Institutions, 1973	75-308	$1.90
National Patterns of R&D Resources: Funds & Manpower in the United States, 1953-1975	75-307	$1.15
Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1973	75-304	$3.25
Research and Development in State Government Agencies, Fiscal Years 1972 and 1973	75-303	$1.80
Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985	75-301	$1.30
Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1973, 1974, and 1975, Vol. XXIII	74-320	$1.70
Detailed Statistical Tables. Federal Funds for Research, Development, and Other Scientific Activities, Fiscal Years 1973, 1974, and 1975, Vol. XXIII	74-320-A	—
Graduate Science Education. Student Support and Postdoctorals, Fall 1973	74-318	In press
Detailed Statistical Tables. Graduate Science Education: Student Support and Postdoctorals, Fall 1973	74-318-A	—

REPORTS

Reviews of Data on Science Resources, No. 22, "The Federal Role in the Suppo Graduate Science and Engineering Education"

An Analysis of Federal R&D Funding by Fiscal Years 1969-1975

Immigrant Scientists and Engineers in th United States. A Study of Characteristi Attitudes

Papers and Proceedings of a Colloquium Research and Development and Econo Growth/Productivity

HIGHLIGHTS

"Separately Budgeted Academic R&D Ex Decline in Real Terms in FY 1974"

"The 1972 Scientist and Engineer P Redefined"

"Employment of Life Scientists Up Accounts for Nearly All Growth of and Engineers in Doctorate-Granti tions"

"NSF Forecasts Rise in Company-Funde and Development and R&D Employme

"Changes in Graduate Programs in Sc Engineering, 1970-72 and 1972-74"

"Total Scientific and Technical Per Industry Remains Level, R&D Perso in 1970"

sources Publications

	NSF No.	Price
ineering ges, ...	75-316	In press
try, 1973 ...	75-315	In press
pulation Re- cational, and	75-313	$3.70
ces, e Public In-	75-311	$0.35
ed Doctoral S. Labor	75-310	In press
rofit Insti-	75-308	$1.90
Funds & 53-1975 ...	75-307	$1.15
eges, , Fiscal	75-304	$3.25
Government 73	75-303	$1.80
ng Doctorate 85	75-301	$1.30
ment, and ears	74-320	$1.70
nds for Scientific and	74-320-A	——
Support and	74-318	In press
Science stdoctorals, ...	74-318-A	——

REPORTS	NSF No.	Price
Reviews of Data on Science Resources, No. 22, "The Federal Role in the Support of Graduate Science and Engineering Education"	74-317	$0.25
An Analysis of Federal R&D Funding by Function, Fiscal Years 1969-1975	74-313	$2.25
Immigrant Scientists and Engineers in the United States. A Study of Characteristics and Attitudes	73-302	$2.50
Papers and Proceedings of a Colloquium on Research and Development and Economic Growth/Productivity	72-303	$0.75

HIGHLIGHTS		
"Separately Budgeted Academic R&D Expenditures Decline in Real Terms in FY 1974"	75-306	——
"The 1972 Scientist and Engineer Population Redefined"	75-305	——
"Employment of Life Scientists Up in 1974—Accounts for Nearly All Growth of Scientists and Engineers in Doctorate-Granting Institutions"	74-315	——
"NSF Forecasts Rise in Company-Funded Research and Development and R&D Employment"	73-301	——
"Changes in Graduate Programs in Science and Engineering, 1970-72 and 1972-74"	72-311	——
"Total Scientific and Technical Personnel in Industry Remains Level, R&D Personnel Lower in 1970"	72-306	——