CURRENT
POPULATION
REPORTS

Special Studies
Series P-23, No.113

U.S. Department
of Commerce
BUREAU OF
THE CENSUS

Selected Characteristics of Persons in Life Science: 1978

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U.S. Department of Commerce
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Robert G. Dederick, Assistant Secretary for
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Bruce Chapman,
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BUREAU OF THE CENSUS
Bruce Chapman, Director
Daniel B. Levine, Deputy Director
Meyer Zitter, Acting Associate Director
for Demographic Fields

POPULATION DIVISION
Roger A. Herriot, Chief

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The principal participants for the National Science Foundation in developing and coordinating the survey were **J. James Brown**, Study Director, Demographic Studies Group, and **Alan Fechter**, Head, Scientific and Technical Personnel Studies Section, both members of the Division of Science Resources Studies. Assistance was provided by **Nancy M. Conlon**, Analyst, Manpower Characteristics Studies Group.

At the Bureau of the Census, **Anita Chiera**, Labor Force Statistics Branch, Population Division, had primary responsibility in planning and conducting the survey. This report was prepared by **Victor M. Valdisera**. The systems and processing procedures and programs were developed by **Ann M. Gifford** and **Patricia L. Marks**, of Population Division. Overall direction was provided by **Gordon Green**, Assistant Division Chief (Socioeconomic Statistics Programs), Population Division, and **Paula J. Schneider**, then Chief, Labor Force Statistics Branch, Population Division.

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Symbols Used in Tables

–	Represents zero.
X	Not applicable.
Z	Less than 0.05 percent.
*	Based on fewer than 20 sample cases.
27+	The median fell in the category 27 weeks or more.

Related Materials

Statistics from a related survey, the 1972 Professional, Technical, and Scientific Manpower Survey, are found in U.S. Bureau of the Census, Technical Paper No. 33, *Characteristics of Persons in Engineering and Scientific Occupations: 1972,* and U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 45, *Persons in Engineering, Scientific, and Technical Occupations: 1970 and 1972.*

The Census Bureau report based on the results of the 1974 National Survey of Scientists and Engineers is U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 53, *Selected Characteristics of Persons in Fields of Science or Engineering: 1974.* The Census Bureau report based on the 1976 survey is U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976.* This is the second report in a Series of reports based on the 1978 survey; the first report in the Series was U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 108, *Selected Characteristics of Persons in Physical Science: 1978.*

For a list of the National Science Foundation reports based on the above-mentioned 1972 and 1974 surveys, see National Science Foundation, *Characteristics of the National Sample of Scientists and Engineers 1974, Part III* (NSF 76-330); and National Science Foundation, *U.S. Scientists and Engineers: 1974* (NSF 76-329). Two National Science Foundation reports based on the results of the 1976 National Survey of Natural and Social Scientists and Engineers are Science Resources Studies Highlights, *National Sample of Scientists and Engineers: Changes in Employment, 1972-1974 and 1974-1976* (NSF 77-322); and *Characteristics of Experienced Scientists and Engineers, 1976* (NSF 78-305). A National Science Foundation report containing results from the 1978 survey, along with other data from the Manpower Characteristics System, is *U.S. Scientists and Engineers 1978* (NSF 90-304).

Selected Characteristics of Persons in Life Science: 1978

INTRODUCTION

The statistics in this report are based on the 1978 survey in a series of biennial surveys known as the National Sample of Scientists and Engineers. The series was sponsored by the National Science Foundation and was conducted by the Bureau of the Census. The series began with the 1972 Professional, Technical, and Scientific Manpower Survey; follow-up surveys of persons from the 1972 survey were conducted in 1974, 1976, and 1978. All persons in the National Sample were experienced workers who either had jobs in 1970 or were looking for jobs; new entrants to the labor force since 1970 were *not* included. Thus, almost none of the sample persons are less than 30 years old. In addition, the fields of science and engineering in the National Sample were limited to persons who met strict educational, occupational, and professional qualifications. For these reasons, persons in the National Sample in 1978 represented approximately 1.5 million scientists and engineers, only a part of the Nation's total scientific and engineering work force. The Department of Labor, for example, estimated that in 1978, based on occupational qualifications alone, there were 2.4 million scientists and engineers in the United States.[1]

This is the second in a series of reports based on data collected in the 1978 survey. Profiled here are the characteristics of the 81,323 persons represented in the 1978 National Sample's life scientists field: 30,301 agricultural scientists, 40,397 biologists, and 10,624 medical scientists.

COMPOSITION (Table 1)

- About 87 percent of the life scientists represented in the National Sample were males. Among the subcategories of life scientists, the proportion of males ranged from about 99 percent of the agricultural scientists to about 75 percent of the medical scientists.
- The median age in 1978 of the life scientists in the National Sample was 45 years.
- Among the four regions of the United States in 1978, life scientists were more concentrated in the West and less concentrated in the Northeast than the general population 25 years old and over. Specifically, about 18 percent of life scientists resided in the Northeast, 25 percent in the North Central Region, 31 percent in the South, and 24 percent in the West. Estimates from the March 1978 Current Population Survey[2] indicate that 24 percent of the U.S. Population 25 years old and over lived in the Northeast, 26 percent in the North Central Region, 32 percent in the South, and 18 percent in the West (See figure 1).
- The overwhelming majority of life scientists in 1978 were White (about 95 percent), 2 percent were Black, and 2 percent were Asian-American. Only about 1 percent indicated that their ethnic heritage was Hispanic. This general composition by race and Spanish origin did not vary greatly among the subcategories of life scientists.
- The fields of science or engineering (S/E) in the National Sample are more strictly defined categories than occupations. In general, to be classified into a field, a person had at least two of the following three characteristics: (1) employment in one of a set of specified occupations, (2) an academic degree among a set of specified academic disciplines, and (3) self-identification within a set of specified professions. Because of these criteria, persons in each field can be employed in a variety of occupations. However, 80 percent of the employed persons in the life science field were in life science occupations. Most of the remaining employed were in managerial or administrative occupations (about 16 percent).

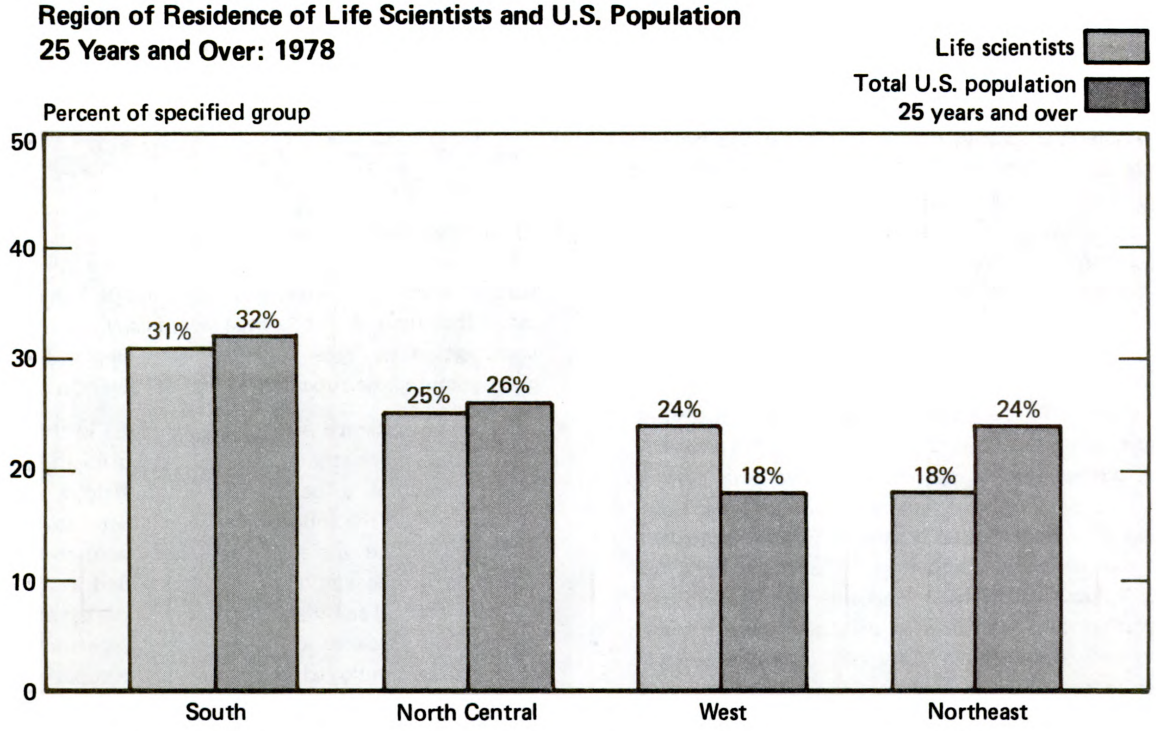
EDUCATION AND TRAINING (Table 2)

- Nearly one-half (47 percent) of the life scientists held doctorate degrees, while 30 percent had bachelor's degrees and 22 percent had master's degrees. Among the subcategories of life scientists, however, there was variation in degree distributions. For example, the majority (53 percent) of agricultural scientists held their highest degree at the bachelor's level, while about two-thirds (67 percent) of the medical scientists possessed either PH.D.'s or professional/medical degrees. (See figure 2)
- About 85 percent of the life scientists held their highest degree in an agricultural or biological science. About 5 percent received their highest degree in a medical science.
- About 44 percent of the life scientists received some type of supplemental training in 1977. Of these, about 58 percent received on-the-job training and about 29 percent participated in an employer's training program. (See figure 3)

[1] *Employment and Earnings,* U.S. Department of Labor, Bureau of Labor Statistics, Vol. 26, No. 1, January 1979.

[2] Current Population Reports, *Geographical Mobility: March 1975 to March 1978,* Series P-20, No. 331.

FIGURE 1.
Region of Residence of Life Scientists and U.S. Population 25 Years and Over: 1978



Source: Table 1 and **Current Population Reports,** Population Characteristics, Geographical Mobility: March 1975 to March 1978, Series P-20, No. 331.

PROFESSIONAL EXPERIENCE AND GROWTH OF THE FIELD (Table 3)

- Most life scientists have been involved in professional-level work, though not necessarily in the life sciences, for a number of years. The median number of years of professional experience for the group was 18 years. About 93 percent had more than 5 years of professional experience, 74 percent had over 10 years, and about 37 percent had more than 20 years.
- Column 3 of the first percent distribution of table A shows how the stock of life scientists in 1978 was created from the flow of persons from each component of the 1976 National Sample of Scientists and Engineers. These figures reveal that about 83 percent of the life scientists in 1978 were also life scientists in 1976; 9 percent of the 1978 field were not in any science or engineering field in 1976, while the remainder did not report their S/E status in 1976. The second percent distribution of table A displays the flows of persons from the components of the 1976 National Sample into the components of the 1978 National Sample.
- About one-fourth of the life scientists employed in both February 1978 and February 1976 changed jobs[3] during the 2-year period; about one-half changed their detailed occupation at the time that they changed jobs. Of those employed in both February 1978 and January 1974, about two-fifths (41 percent) changed jobs[3] during the 4-year period; of these, about one-half changed detailed occupations as well. Finally, of those employed in February 1978 and 1972, one-half had a different job[3] at the end of the 6-year period than at the beginning; of these, about one-half changed detailed occupations. Thus, job changers increased from one-fourth of the employed life scientists in 2 years, to two-fifths in 4 years, to one-half in 6 years. (See figure 4)

LABOR FORCE PARTICIPATION (Table 4)

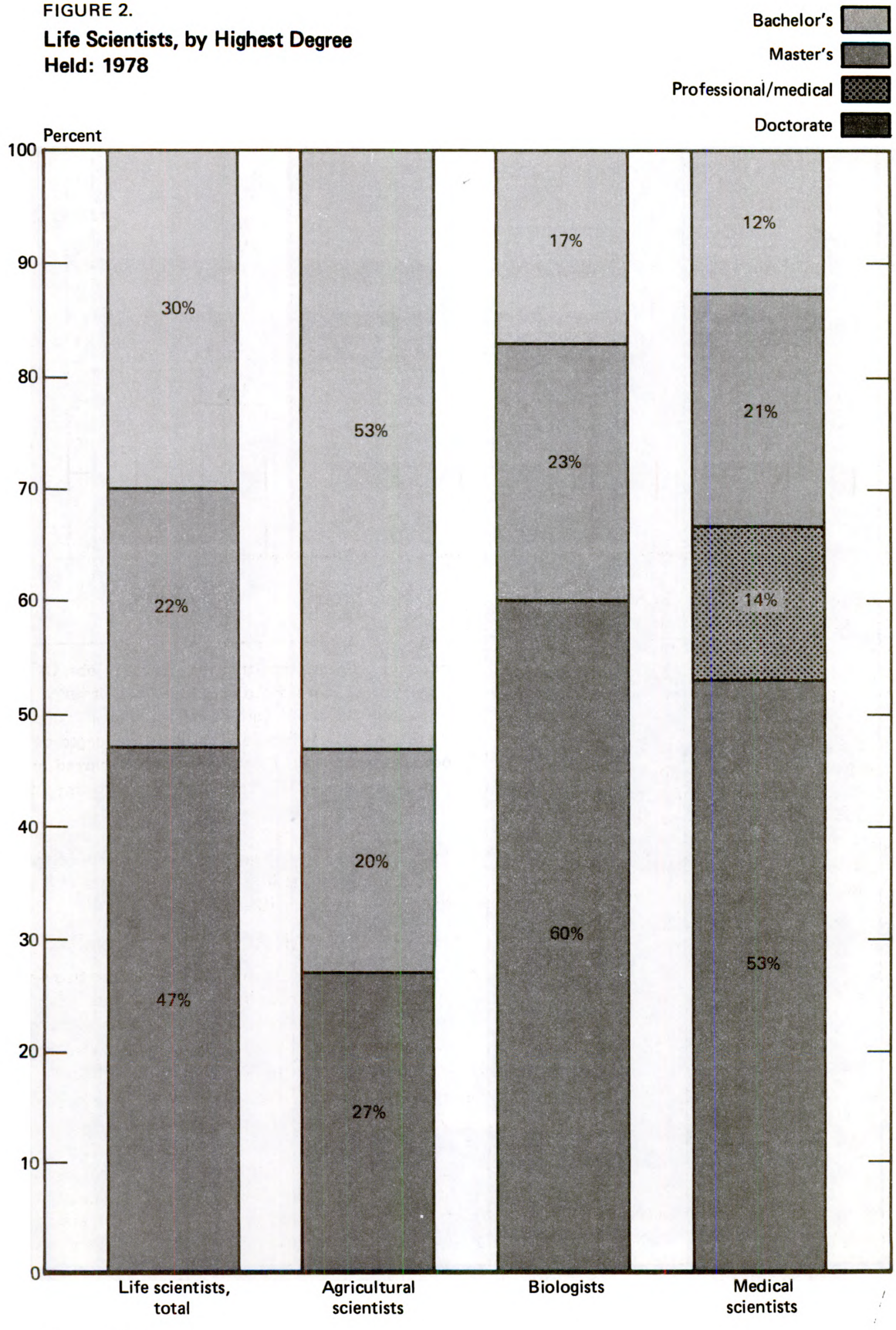
- In February 1978, 92 percent of the life scientists were in the labor force. About two-thirds of those not in the labor force were retired; around one-fourth (23 percent) of those outside the labor force reported family responsibilities as the reason for not working or seeking work.
- The unemployment rate (that is, the number unemployed as a percent of those in the labor force) for life scientists was a very low 1.3 percent in February 1978. The national unemployment rate (seasonally adjusted) for persons 25 years and older in February 1978 was 3.9 percent, that for males 25 years and over was 3.4 percent, and that for professional, technical, and kindred workers was 2.5 percent.[4] (See table B)

[3] That is, changed employers or remained with the same employers but had a significant change in their occupation, duties, or level of responsibility.

[4] U.S. Department of Labor, Bureau of Labor Statistics, *Employment and Earnings,* Vol. 25, No. 3, March 1978.

FIGURE 2.

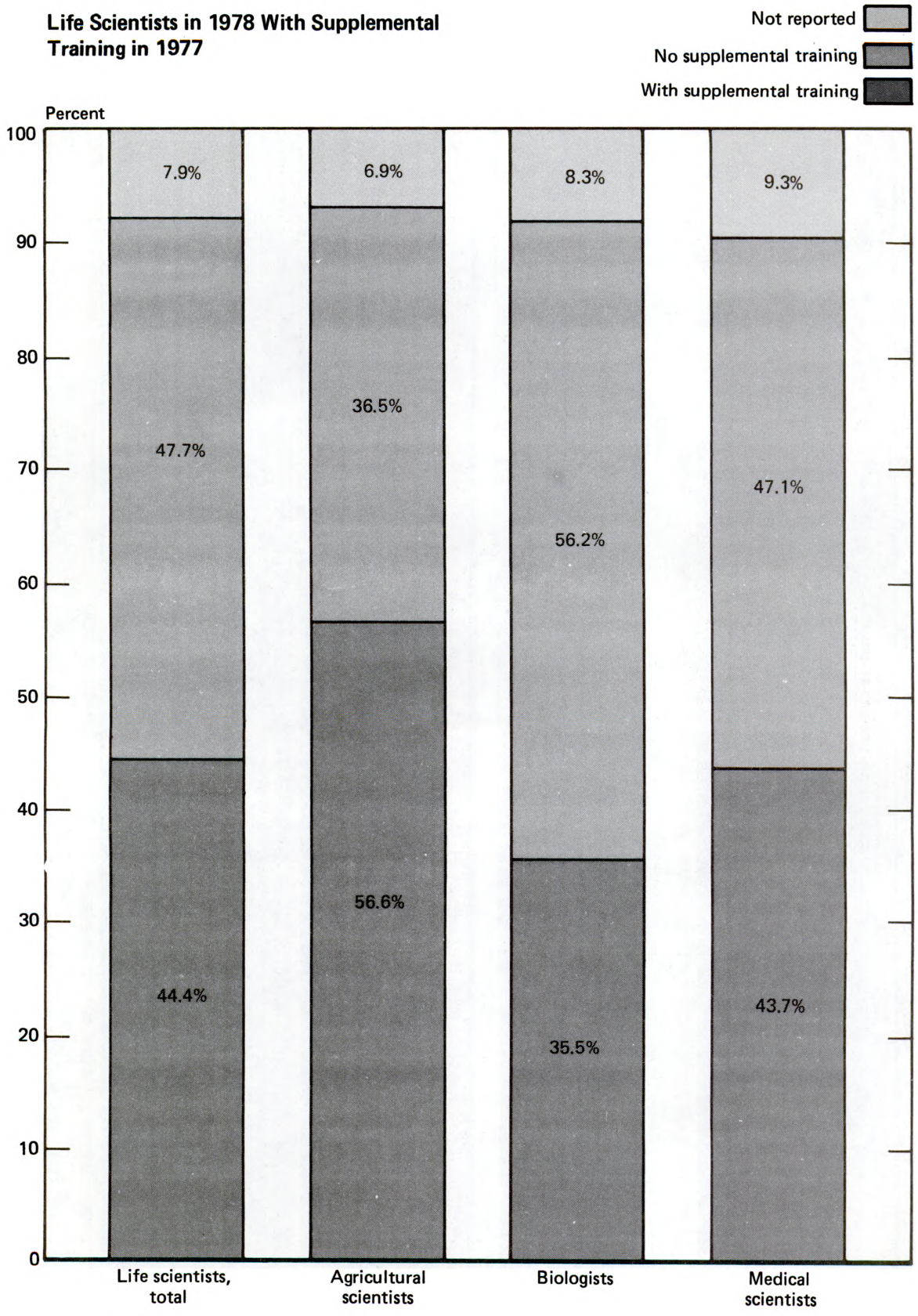
Life Scientists, by Highest Degree Held: 1978



Source: Table 2.

FIGURE 3.

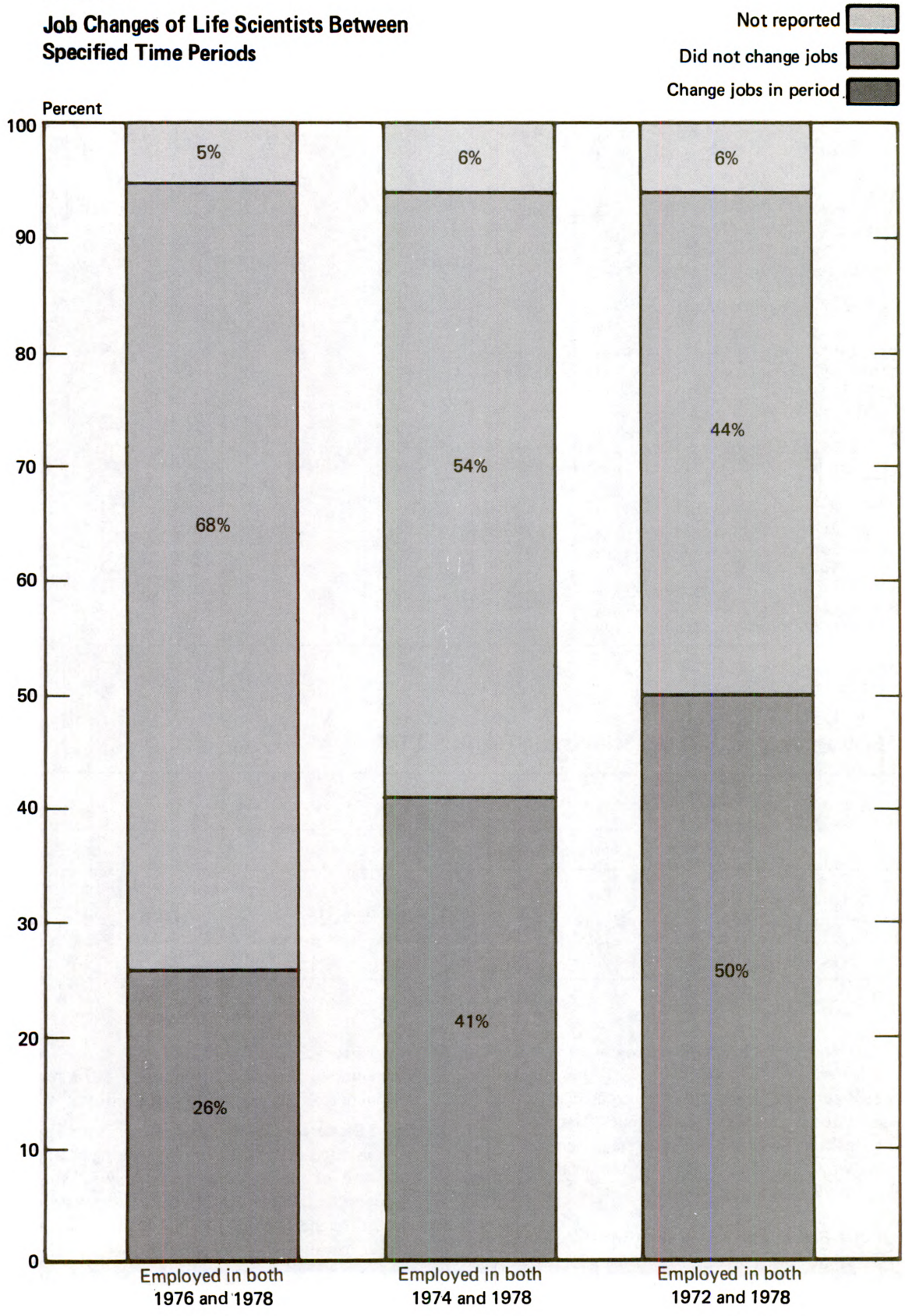
Life Scientists in 1978 With Supplemental Training in 1977



Source: Table 2.

FIGURE 4.

Job Changes of Life Scientists Between Specified Time Periods



Source: Table 3.

Table A. Field of Science or Engineering in 1978, by Field of Science or Engineering in 1976

(Numbers in thousands)

Field of science or engineering in 1976	Total National sample in 1978	In field of science or engineering in 1978				Not in S/E field in 1978
		Total	Life scientists	Other S/E field		
				Total	Engineers	
Total National Sample in 1976....	1,350	1,138	81	1,057	721	211
In S/E field in 1976.....	1,119	1,029	71	958	660	90
Life scientist.....	78	70	67	3	(*)	8
Other S/E field.....	1,041	959	4	955	660	82
Engineers.....	707	660	(*)	660	650	47
Not in S/E field in 1976.....	173	64	7	57	32	109
Did not report in 1976.....	57	45	3	42	30	12
PERCENT DISTRIBUTION						
Total National Sample in 1976....	100.0	100.0	100.0	100.0	100.0	100.0
In S/E field in 1976.....	82.9	90.4	87.7	90.6	91.5	42.7
Life scientists.....	5.8	6.2	82.7	0.3	-	3.8
Other S/E field.....	77.1	84.3	4.9	90.4	91.5	38.9
Engineers.....	52.4	58.0	-	62.4	90.2	22.3
Not in S/E field in 1976.....	12.8	5.6	8.6	5.4	4.4	51.7
Did not report in 1976.....	4.2	4.0	3.7	4.0	4.2	5.7
Total National Sample in 1976....	100.0	84.3	6.0	78.3	53.4	15.6
In S/E field in 1976.....	100.0	92.0	6.3	85.6	59.0	8.0
Life scientists.....	100.0	89.7	85.9	3.8	-	10.3
Other S/E field.....	100.0	92.1	0.4	91.7	63.4	7.9
Engineers.....	100.0	93.4	-	93.4	91.9	6.6
Not in S/E field in 1976.....	100.0	37.0	4.0	32.9	18.5	63.0
Did not report in 1976.....	100.0	78.9	5.3	73.7	52.6	21.1

- Represents zero.
* Less than 1,000 persons.

Table B. Employment Status of Life Scientists in February 1978

Employment status	Total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total in labor force in February 1978.....	74,453	100.0	28,159	100.0	36,755	100.0	9,540	100.0
Employed.....	73,502	98.7	27,849	98.9	36,270	98.7	9,384	98.4
Unemployed.....	951	1.3	310	1.1	485	1.3	156	1.6

Source: Table 4.

- About 3.0 percent of the life scientists were unemployed at some time in calendar year 1977, with the rate for biologists (3.8 percent)[5] being about twice as high as the rate for agricultural scientists (1.9 percent). The median number of weeks of unemployment among unemployed life scientists was 18. About one-third of the unemployed were jobless for 27 weeks or more.
- Almost all (97 percent) of the employed life scientists worked at full-time jobs (table C).
- Only about one-sixth (18 percent) of the life scientists who worked part time in February 1978 reported that they were seeking full-time employment (table C).
- About 96 percent of the life scientists employed full time were working in scientific or engineering positions. About 1 percent of the life scientists who were employed full time worked in non-scientific or non-engineering positions because science or engineering positions were not available or because the pay was better outside science or engineering.
- Employed life scientists were concentrated in two major industry groups: educational institutions (43 percent),

[5] The apparent difference between the 3.8 percent for biologists and the 3.0 percent for life scientists is not statistically significant.

particularly college and universities (30 percent); and agriculture, forestry, and fisheries (23 percent). About one-fifth (22 percent)[6] of the employed life scientists were working in research institutions, manufacturing, or public administration (about 7 percent in each of these industries). Among the subcategories of life scientists, the largest proportion of employed agricultural scientists (about 52 percent) worked in agriculture, forestry, and fisheries; the majority of biologists and medical scientists (54 and 63 percent, respectively) were employed in educational institutions.

- The 1978 National Sample survey asked persons to describe the type of organization of their principal employment or post-doctoral appointment. Among life scientists employed in February 1978, 44 percent specified their employer's organization as an educational institution, 28 percent as a branch of government (Federal, State, or local), and 24 percent as a private business or industry. A much higher proportion of employed agricultural scientists (44 percent) worked in government than did biologists (20 percent) or medical scientists (10 percent).

- When asked to describe their primary work activity, 29 percent of the employed life scientists reported research and development, 28 percent[7] reported management and administration, and 24 percent reported teaching. Around 4 out of every 10 employed life scientists were primarily involved in research and development, either directly or through their management or administration of research and development.

- Among life scientists directly involved in research and development, about 43 percent were in basic research, about 45 percent in applied research, and about 12 percent in development.

- Persons in the National Sample were asked to select, from a list of areas of critical national interest, the problem area to which they devoted the most professional time. For life scientists, 22 percent selected health, 19 percent chose education (mostly teaching); 18 percent indicated environmental protection and pollution abatement; and about 16 percent chose food production and technology.[8] Around one-sixth of the life scientists either did not report a national interest topic or indicated that this inquiry was not applicable to them.

- Among the groups of life scientists, 60 percent of the agricultural scientists selected environmental protection and pollution abatement or food production and technology as the area of critical national interest to which they devoted the largest part of their worktime, while around two-thirds (70 percent) of the medical scientists selected health. The distribution of biologists by national interest topics did not differ significantly from that of all life scientists.

- The U.S. Government supported or sponsored at least some of the work of 55 percent of the employed life scientists. Chief Government sponsors were the Department of Agriculture (which provided funds for 22 percent of the employed life scientists), the Department of Health, Education, and Welfare (which funded 17 percent), the National Science Foundation (6 percent), and the Department of the Interior (6 percent).

[6] The apparent difference between this 22 percent and the 23 percent for agriculture, forestry, and fisheries is not statistically significant.

[7] The apparent difference between 29 percent for research and development and the 28 percent for management and administration is not statistically significant.

[8] The apparent difference between the 19 percent for education and the 18 percent for environmental protection and pollution abatement is not statistically significant.

Table C. Full-and Part-time Work Status of Life Scientists in 1978 Employed in February 1978

Full or part-time work status	Total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Full time	71,020	96.6	27,268	97.9	34,616	95.4	9,136	97.4
Part time	2,383	3.2	555	2.0	1,580	4.4	248	2.6
Seeking full-time work	421	0.6	15	0.1	406	1.1	-	-
Not seeking full-time work	1,940	2.6	540	1.9	1,152	3.2	248	2.6
Seeking not reported	22	-	-	-	22	0.1	-	-
Full or part time not reported	99	0.1	26	(Z)	74	0.2	-	-

- Represents zero.
Z Less than 0.05 percent.

Source: Table 4.

INCOME (Table 5)

- The median basic annual salary in February 1978 of the life scientists employed full time in February 1978 was $24,669. The median for agricultural scientists was $23,682, that for biologists was $24,866, and that for medical scientists was $28,541. The median earnings in 1977, as estimated from the CPS[9] for male professional, technical, and kindred workers, 14 years old and over, who worked year round full time was $18,224; the comparable figure for women was $11,995. Male year-round, full-time workers 25 years old and over with 4 or more years of college (regardless of occupation) had mean earnings in 1977 of $21,441; those with 5 or more years of college had mean earnings of $25,782[10]. It should be noted that the CPS figures[11] are not strictly comparable with those for life scientists in the National Sample.
- Results from the 1976 survey of the National Sample showed that the median basic annual salary in February 1976 of life scientists employed full time in February 1976 was $20,893. Thus, between February 1976 and February 1978, the median basic annual salary of full-time life scientists rose by $3,776 (i.e., $24,669 – $20,893). However, when these figures are adjusted for inflation (i.e., when both the 1976 and 1978 basic annual salaries are expressed in constant 1977 dollars), the increase is approximately $1,145, or about 1 percent per year.[12]

[9] U.S. Department of Commerce, Bureau of the Census, Current Population Reports, *Money Income in 1977 of Families and Persons in the United States*, Series P-60, No. 118.

[10] Apparent differences between the following are not statistically significant: the $24,866 median for biologists and the $24,669 median for life scientists, total; and the $24,866 median for biologists and the $25,782 mean earnings for male year-round, full-time workers 25 years and over with 5 or more years of college.

[11] The CPS "earnings" concept includes more sources of remuneration than does the National Sample concept of "basic annual salary." There are also other differences between the National Sample's "basic annual salary" concept and the CPS "earnings" concapt, including differences in reference periods and data collection procedures. CPS figures for 1977 are cited because 1977 is the full year most nearly comparable with the reference year for the 1978 National Sample question on basic annual salary.

[12] The 1976-78 comparisons in terms of constant or 1977 dollars must be approached cautiously. Problems are introduced into the comparisons by, among other things, the way the basic annual salary data are defined and collected, the differences between the nonresponse adjustment procedures of the 1976 and 1978 surveys, and the difficulty of establishing appropriate time periods for the constant-dollar computations.

Table 1. Occupation, Professional Identification, and Selected Characteristics of Life Scientists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Occupation, professional identification, and selected characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Male	70,928	87.2	29,928	98.8	33,063	81.8	7,397	74.7
Female	10,395	12.8	374	1.2	7,334	18.2	2,688	25.3
Under 30 years	644	0.8	335	1.1	309	0.8	-	-
30 to 34 years	10,257	12.6	3,006	9.9	6,125	15.2	1,126	10.6
35 to 39 years	16,378	20.1	5,158	17.0	9,205	22.8	2,015	19.0
40 to 44 years	13,882	17.1	5,466	18.0	6,321	15.6	2,094	19.7
45 to 49 years	12,969	15.9	5,698	18.8	5,650	14.0	1,621	15.3
50 to 54 years	9,542	11.7	3,409	11.2	5,081	12.6	1,052	9.9
55 to 59 years	8,324	10.2	3,567	11.8	3,206	7.9	1,551	14.6
60 to 64 years	4,764	5.9	1,941	6.4	2,385	5.9	438	4.1
65 to 69 years	2,959	3.6	1,087	3.6	1,338	3.3	535	5.0
70 years and over	1,604	2.0	635	2.1	776	1.9	192	1.8
Median age	45	(X)	46	(X)	44	(X)	45	(X)
RESIDENCE IN 1978								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
United States	80,298	98.7	30,159	99.5	39,804	98.5	10,335	97.3
Northeast	14,838	18.2	2,955	9.8	9,007	22.3	2,876	27.1
New England	4,980	6.1	1,066	3.5	3,105	7.7	809	7.6
Middle Atlantic	9,858	12.1	1,890	6.2	5,901	14.6	2,067	19.5
North Central	20,664	25.4	7,404	24.4	10,737	26.6	2,522	23.7
East North Central	13,183	16.2	3,915	12.9	7,435	18.4	1,833	17.3
West North Central	7,481	9.2	3,489	11.5	3,302	8.2	689	6.5
South	25,462	31.3	10,572	34.9	11,719	29.0	3,171	29.8
South Atlantic	13,698	16.8	5,326	17.6	6,686	16.6	1,686	15.9
East South Central	5,031	6.2	2,319	7.7	2,107	5.2	605	5.7
West South Central	6,734	8.3	2,928	9.7	2,926	7.2	880	8.3
West	19,334	23.8	9,227	30.5	8,341	20.6	1,766	16.6
Mountain	6,199	7.6	3,757	12.4	2,043	5.1	399	3.8
Pacific	13,135	16.2	5,470	18.1	6,298	15.6	1,367	12.9
Outlying areas	43	(Z)	13	(Z)	15	(Z)	15	0.1
Foreign countries	982	1.2	129	0.4	579	1.4	274	2.6
Not reported	-	-	-	-	-	-	-	-
RACE								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
White	77,164	94.9	29,757	98.2	37,641	93.2	9,766	91.9
Black	1,500	1.8	170	0.6	1,070	2.6	259	2.4
American Indian	220	0.3	28	(Z)	192	0.5	-	-
Chinese, Japanese, Korean	1,847	2.3	347	1.1	1,092	2.7	408	3.8
All other races	593	0.7	-	-	402	1.0	191	1.8
HISPANIC HERITAGE								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Hispanic	983	1.2	167	0.6	677	1.7	138	1.3
Not Hispanic	77,775	95.6	29,089	96.0	38,511	95.3	10,175	95.8
Not reported	2,566	3.2	1,045	3.4	1,209	3.0	312	2.9
OCCUPATION IN 1978								
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Computer specialists, total	53	(Z)	-	-	53	0.1	-	-
Computer systems analysts	-	-	-	-	-	-	-	-
Computer scientists	53	(Z)	-	-	53	0.1	-	-
Computer programmers	-	-	-	-	-	-	-	-
Other computer fields	-	-	-	-	-	-	-	-
Engineers, total	190	0.3	104	0.4	86	0.2	-	-
Aeronautical and astronautical	-	-	-	-	-	-	-	-
Agricultural	26	(Z)	26	(Z)	-	-	-	-
Chemical	-	-	-	-	-	-	-	-
Civil and architectural	12	(Z)	12	(Z)	-	-	-	-
Electrical and electronic	-	-	-	-	-	-	-	-
Industrial	-	-	-	-	-	-	-	-
Mechanical	-	-	-	-	-	-	-	-
Metallurgical and materials	-	-	-	-	-	-	-	-
Mining, petroleum, and geological	-	-	-	-	-	-	-	-
Nuclear	-	-	-	-	-	-	-	-
Environmental and sanitary	92	0.1	52	0.2	41	0.1	-	-
Operations research/systems	-	-	-	-	-	-	-	-
Other engineering fields	60	(Z)	14	(Z)	45	0.1	-	-

See footnotes at end of table.

Table 1. Occupation, Professional Identification, and Selected Characteristics of Life Scientists: 1978—Continued

(Data may not add to total because of rounding. For meaning of symbols, see text)

Occupation, professional identification, and selected characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
OCCUPATION IN 1978--Continued								
Mathematicans and statisticians, total	42	(Z)	-	-	42	0.1	-	-
Mathematicians	-	-	-	-	-	-	-	-
Statisticians	29	(Z)	-	-	29	(Z)	-	-
Actuaries	-	-	-	-	-	-	-	-
Operations research	13	(Z)	-	-	13	(Z)	-	-
Life scientists, total	59,003	80.3	20,876	75.0	29,416	81.1	8,711	92.8
Agricultural scientists	21,462	29.2	20,713	74.4	749	2.1	-	-
Biologicial scientists	19,804	26.9	119	0.4	19,671	54.2	13	0.1
Biochemists	548	0.7	-	-	548	1.5	-	-
Biophysicists	1,067	1.5	-	-	1,067	2.9	-	-
Medical scientists	9,454	12.9	-	-	757	2.1	8,698	92.7
Other life scientists	6,666	9.1	43	0.2	6,623	18.3	-	-
Physical scientists, total	228	0.3	67	0.2	161	0.4	-	-
Chemists	138	0.2	38	0.1	100	0.3	-	-
Physicists and astronomers	13	(Z)	-	-	13	(Z)	-	-
Other physical scientists	77	0.1	29	0.1	48	0.1	-	-
Environmental scientists, total	26	(Z)	26	(Z)	-	-	-	-
Earth scientists	26	(Z)	26	(Z)	-	-	-	-
Atmospheric scientists	-	-	-	-	-	-	-	-
Oceanographers	-	-	-	-	-	-	-	-
Psychologists	-	-	-	-	-	-	-	-
Social scientists, total	-	-	-	-	-	-	-	-
Economists	-	-	-	-	-	-	-	-
Sociologists and anthropologists	-	-	-	-	-	-	-	-
Other social scientists	-	-	-	-	-	-	-	-
Health occupations	278	0.4	-	-	261	0.7	16	0.2
Physician or surgeon	114	0.2	-	-	98	0.3	16	0.2
Dental technician	16	(Z)	-	-	16	(Z)	-	-
Medical technician	38	(Z)	-	-	38	0.1	-	-
Other health occupations	109	0.1	-	-	109	0.3	-	-
Technicians and technologists, except medical	426	0.6	174	0.6	251	0.7	-	-
Teachers[1]	737	1.0	231	0.8	403	1.1	103	1.1
Administrators and managers	11,707	15.9	6,174	22.2	4,994	13.8	538	5.7
Other occupations	797	1.1	196	0.7	587	1.6	15	0.2
Not reported	15	(Z)	-	-	15	(Z)	-	-
PROFESSIONAL IDENTIFICATION IN 1978								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Computer specialists	43	(Z)	22	(Z)	22	(Z)	-	-
Engineers	149	0.2	74	0.2	35	(Z)	40	0.4
Mathematicians and statisticians	13	(Z)	-	-	13	(Z)	-	-
Life scientists	68,971	84.8	24,061	79.4	35,524	87.9	9,386	88.3
Physical scientists	366	0.5	84	0.3	282	0.7	-	-
Environmental scientists	123	0.2	82	0.3	41	0.1	-	-
Psychologists	104	0.1	-	-	104	0.3	-	-
Social scientitsts	45	(Z)	15	(Z)	-	-	29	0.3
Health occupations	676	0.8	82	0.3	249	0.6	345	3.3
Technicians, except medical	158	0.2	51	0.2	77	0.2	29	0.3
Teachers	574	0.7	57	0.2	486	1.2	31	0.3
Administrators	8,595	10.6	5,014	16.5	3,040	7.5	541	5.1
All other occupations	307	0.4	188	0.6	119	0.3	-	-

[1]College or university teachers of science or engineering are excluded from teachers and included in occupation corresponding to subject taught.

Table 2. Selected Educational Characteristics of Life Scientists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Selected educational characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
HIGHEST DEGREE HELD								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
With a degree	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Associate	-	-	-	-	-	-	-	-
Bachelor's	24,150	29.7	16,086	53.1	6,791	16.8	1,274	12.0
Master's	17,535	21.6	6,092	20.1	9,210	22.8	2,233	21.0
Doctorate	37,975	46.7	8,081	26.7	24,266	60.1	5,627	53.0
Professional/medical	1,662	2.0	42	0.1	131	0.3	1,489	14.0
Other	-	-	-	-	-	-	-	-
No degree	-	-	-	-	-	-	-	-
Not reported	-	-	-	-	-	-	-	-
MAJOR FIELD OF STUDY FOR HIGHEST DEGREE HELD								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Computer science and systems analysis	13	(Z)	13	(Z)	-	-	-	-
Engineering	380	0.5	53	0.2	208	0.5	119	1.1
Mathematical sciences	335	0.4	151	0.5	52	0.1	133	1.2
Agricultural sciences	27,525	33.8	24,758	81.7	2,676	6.6	91	0.9
Biological sciences	41,590	51.1	4,339	14.3	33,450	82.8	3,802	35.8
Medical sciences	4,424	5.4	-	-	498	1.2	3,926	37.0
Chemistry	1,259	1.5	40	0.1	571	1.4	648	6.1
Physics and astronomy	703	0.9	31	0.1	393	1.0	279	2.6
Earth, space, and marine sciences	166	0.2	13	(Z)	137	0.3	16	0.1
Psychology	479	0.6	-	-	175	0.4	304	2.9
Economics	128	0.2	115	0.4	13	(Z)	-	-
Sociology and anthropology	122	0.2	42	0.1	29	(Z)	51	0.5
Other social sciences	80	(Z)	66	0.2	13	(Z)	-	-
Business and commerce	121	0.1	56	0.2	13	(Z)	52	0.5
All other fields	3,323	4.1	454	1.5	1,947	4.8	922	8.7
All fields below BA	94	0.1	66	0.2	28	(Z)	-	-
Field not reported	581	0.7	104	0.3	195	0.5	283	2.7
SUPPLEMENTAL TRAINING IN 1977[1]								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
With supplemental training in 1977	36,137	44.4	17,146	56.6	14,353	35.5	4,638	43.7
On-the-job training	21,008	25.8	11,031	36.4	7,769	19.2	2,208	20.8
Military training applicable to civilian occupations	558	0.7	197	0.6	334	0.8	27	0.3
Extension or correspondence courses	4,490	5.5	2,622	8.7	1,422	3.5	446	4.2
Employer training programs	10,635	13.1	6,902	22.8	2,787	6.9	945	8.9
Adult education center	4,481	5.5	2,034	6.7	1,988	4.9	460	4.3
Other training	10,979	13.5	4,120	13.6	4,533	11.2	2,326	21.9
No supplemental training in 1977	38,754	47.7	11,064	36.5	22,690	56.2	4,999	47.1
Not reported	6,432	7.9	2,091	6.9	3,354	8.3	987	9.3

[1]Sum of types of training may exceed total with training because of multiple response.

Table 3. Years of Professional Experience, Field of Science or Engineering in 1976, and Job Mobility of Life Scientists in 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Professional experience, field in 1976, and job mobility	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
YEARS OF PROFESSIONAL EXPERIENCE								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
With years of professional experience reported	79,492	97.7	29,560	97.6	39,574	98.0	10,358	97.5
Less than 1 year	534	0.7	38	0.1	461	1.1	35	0.3
1 to 5 years	3,102	3.8	557	1.8	2,175	5.4	370	3.5
6 to 10 years	15,617	19.2	4,012	13.2	9,410	23.3	2,194	20.7
11 to 15 years	15,692	19.3	5,071	16.7	8,679	21.5	1,941	18.3
16 to 20 years	14,620	18.0	6,869	22.7	6,030	14.9	1,722	16.2
21 to 25 years	10,280	12.6	4,491	14.8	4,412	10.9	1,377	13.0
26 to 30 years	10,312	12.7	5,054	16.7	4,008	9.9	1,250	11.8
31 to 35 years	3,854	4.7	1,453	4.8	1,717	4.3	684	6.4
36 to 40 years	3,371	4.1	1,311	4.3	1,550	3.8	510	4.8
41 years or more	2,110	2.6	703	2.3	1,132	2.8	274	2.6
Median years of professional experience	18	(X)	20	(X)	16	(X)	18	(X)
Years of professional experience not reported	1,831	2.3	741	2.4	822	2.0	266	2.5
FIELD OF SCIENCE OR ENGINEERING IN 1976								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Computer specialists	140	0.2	22	0.1	118	0.3	-	-
Engineers	721	0.9	47	0.2	531	1.3	142	1.3
Mathematical specialists	46	0.1	-	-	46	0.1	-	-
Mathematicians	14	(Z)	-	-	14	(Z)	-	-
Statisticians	31	(Z)	-	-	31	0.1	-	-
Life scientists	66,726	82.1	25,454	84.0	33,839	83.8	7,433	70.0
Agricultural scientists	25,001	30.7	23,571	77.8	1,417	3.5	13	0.1
Biologists	33,680	41.4	1,870	6.2	30,638	75.8	1,172	11.0
Medical scientists	8,046	9.9	13	(Z)	1,784	4.4	6,248	58.8
Physical scientists	3,091	3.8	557	1.8	1,812	4.5	722	6.8
Chemists	2,305	2.8	234	0.8	1,485	3.7	586	5.5
Physicists and astronomers	209	0.3	-	-	162	0.4	47	0.4
Other physical scientists	577	0.7	323	1.1	165	0.4	89	0.8
Environmental scientists	382	0.5	243	0.8	139	0.3	-	-
Earth scientists	273	0.3	243	0.8	30	0.1	-	-
Atmospheric scientists	-	-	-	-	-	-	-	-
Oceanographers	109	0.1	-	-	109	0.3	-	-
Psychologists	130	0.2	-	-	33	0.1	97	0.9
Social scientists	245	0.3	66	0.2	85	0.2	94	0.9
Economists	66	0.1	66	0.2	-	-	-	-
Sociologists and anthropologists	49	0.1	-	-	14	(Z)	35	0.3
Other social scientists	130	0.2	-	-	71	0.2	59	0.6
Not in a field in 1976	7,331	9.0	2,818	9.3	2,558	6.3	1,955	18.4
Did not report in 1976	2,512	3.1	1,096	3.6	1,235	3.1	181	1.7
JOB MOBILITY								
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Employed in February 1976	70,057	95.3	26,745	96.0	34,303	94.6	9,009	96.0
Job change since 1976	18,299	24.9	6,629	23.8	9,106	25.1	2,565	27.3
Occupation change	8,509	11.6	1,874	6.7	5,239	14.4	1,396	14.9
No occupation change	9,763	13.3	4,740	17.0	3,854	10.6	1,169	12.5
Occupation change not reported	28	(Z)	15	(Z)	13	(Z)	-	-
Same job in 1976 and 1978	47,971	65.3	18,451	66.3	23,488	64.8	6,032	64.3
Not reported	3,787	5.2	1,665	6.0	1,709	4.7	412	4.4
Not employed or employment status not reported in February 1976	3,445	4.7	1,103	4.0	1,968	5.4	375	4.0
Employed in January 1974	69,596	94.7	27,092	97.3	33,774	93.1	8,729	93.0
Job change between 1974 and 1978	28,356	38.6	10,817	38.8	13,459	37.1	4,081	43.5
Occupation change	13,677	18.6	3,397	12.2	8,394	23.1	1,885	20.1
No occupation change	14,679	20.0	7,421	26.6	5,063	14.0	2,195	23.4
Occupation change not reported	-	-	-	-	-	-	-	-
Same job in 1974 and 1978	37,249	50.7	14,470	52.0	18,555	51.2	4,223	45.0
Not reported	3,991	5.4	1,804	6.5	1,762	4.9	425	4.5
Not employed or employment status not reported in February 1974	3,906	5.3	756	2.7	2,496	6.9	654	7.0
Employed in 1972	70,378	95.7	27,178	97.6	34,388	94.8	8,812	93.9
Job change between 1972 and 1978	35,241	47.9	13,550	48.7	16,856	46.5	4,834	51.5
Occupation change	16,560	22.5	4,628	16.6	10,064	27.7	1,868	19.9
No occupation change	18,681	25.4	8,922	32.0	6,793	18.7	2,966	31.6
Occupation change not reported	-	-	-	-	-	-	-	-
Same job in 1972 and 1978	31,057	42.3	11,805	42.4	15,686	43.2	3,566	38.0
Not reported	4,079	5.5	1,822	6.5	1,845	5.1	412	4.4
Not employed or employment status not reported in 1972	3,124	4.3	670	2.4	1,882	5.2	571	6.1

Table 4. Employment Status and Selected Job-Related Characteristics of Life Scientists: 1978

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
EMPLOYMENT STATUS IN FEBRUARY 1978								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
In labor force	74,453	91.6	28,159	92.9	36,755	91.0	9,540	89.8
Employed	73,502	90.4	27,849	91.9	36,270	89.8	9,384	88.3
Full time	71,020	87.3	27,268	90.0	34,616	85.7	9,136	86.0
Part time	2,383	2.9	555	1.8	1,580	3.9	248	2.3
Seeking full-time work	421	0.5	15	(Z)	406	1.0	-	-
Not seeking full-time work	1,940	2.4	540	1.8	1,152	2.9	248	2.3
Not reported	22	(Z)	-	-	22	(Z)	-	-
Full or part time not reported	99	0.1	26	(Z)	74	0.2	-	-
Unemployed	951	1.2	310	1.0	485	1.2	156	1.5
Not in labor force	6,870	8.4	2,143	7.1	3,642	9.0	1,085	10.2
Retired	4,539	5.6	2,020	6.7	1,950	4.8	569	5.4
Student	174	0.2	-	-	157	0.4	17	0.2
Family responsibilities	1,548	1.9	19	(Z)	1,219	3.0	310	2.9
Could not find work	208	0.3	91	0.3	117	0.3	-	-
Other	400	0.5	13	(Z)	199	0.5	188	1.8
FULL-TIME EMPLOYMENT IN SCIENCE OR ENGINEERING IN 1978								
Total employed full time in February 1978	71,020	100.0	27,268	100.0	34,616	100.0	9,136	100.0
In science or engineering	68,433	96.4	26,000	95.3	33,312	96.2	9,121	99.8
Not in science or engineering	2,545	3.6	1,241	4.6	1,289	3.7	15	0.2
Preferred nonscience or nonengineering	50	(Z)	-	-	50	0.1	-	-
Promoted out of science or engineering	1,198	1.7	494	1.8	704	2.0	-	-
Pay better in nonscience or nonengineering	473	0.7	191	0.7	282	0.8	-	-
Locational preference	213	0.3	213	0.8	-	-	-	-
Science or engineering position not available	90	0.1	-	-	75	0.2	15	0.2
Other reason	380	0.5	202	0.7	178	0.5	-	-
Reason not reported	141	0.2	141	0.5	-	-	-	-
UNEMPLOYMENT IN CALENDAR YEAR 1977								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Unemployed in calendar year 1977	2,452	3.0	581	1.9	1,518	3.8	353	3.3
1 to 4 weeks	306	0.4	29	(Z)	232	0.6	46	0.4
5 to 10 weeks	182	0.2	29	(Z)	153	0.4	-	-
11 to 14 weeks	520	0.6	159	0.5	360	0.9	-	-
15 to 26 weeks	407	0.5	151	0.5	181	0.4	75	0.7
27 weeks or more	777	1.0	36	0.1	530	1.3	211	2.0
Median weeks of unemployment	18	(X)	*15	(X)	15	(X)	*27+	(X)
Weeks of unemployment not reported	261	0.3	178	0.6	61	0.2	21	0.2
Not unemployed in calendar year 1977	77,360	95.1	29,232	96.5	38,111	94.3	10,018	94.3
Not reported	1,510	1.9	488	1.6	768	1.9	254	2.4
INDUSTRY IN 1978								
Total employed in 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Agriculture, forestry, and fisheries	16,992	23.1	14,451	51.9	2,449	6.8	93	1.0
Mining and petroleum extraction	167	0.2	141	0.5	26	(Z)	-	-
Construction	364	0.5	166	0.6	198	0.5	-	-
Manufacturing, total	5,118	7.0	1,230	4.4	3,236	8.9	651	6.9
Primary metal industries	324	0.4	-	-	324	0.9	-	-
Fabricated metal industries	16	(Z)	-	-	16	(Z)	-	-
Machinery, except electrical	35	(Z)	-	-	35	(Z)	-	-
Electrical machinery, equipment, and supplies	135	0.2	13	(Z)	122	0.3	-	-
Electronic machinery and computing equipment	64	(Z)	-	-	64	0.2	-	-
Aircraft and aircraft parts	87	0.1	40	0.1	33	(Z)	15	0.2
Motor vehicles and motor vehicle equipment	-	-	-	-	-	-	-	-
Ordnance	47	(Z)	-	-	33	(Z)	13	0.1
Chemicals and allied products	2,439	3.3	409	1.5	1,596	4.4	434	4.6
Petroleum refining and related industries	47	(Z)	-	-	47	0.1	-	-
Other manufacturing	1,923	2.6	769	2.8	965	2.7	189	2.0
Transportation, communications, and other public utilities	217	0.3	112	0.4	105	0.3	-	-
Wholesale and retail trade	195	0.3	93	0.3	102	0.3	-	-
Finance, insurance, and real estate	354	0.5	207	0.7	148	0.4	-	-
Educational institutions, total	31,464	42.8	6,077	21.8	19,510	53.8	5,877	62.6
College or university	22,287	30.3	5,676	20.4	14,704	40.5	1,907	20.3
Other	9,177	12.5	401	1.4	4,806	13.3	3,970	42.3

See footnotes at end of table.

Table 4. Employment Status and Selected Job-Related Characteristics of Life Scientists: 1978—Continued

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Employment status and selected job-related characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
INDUSTRY IN 1978--Continued								
Health services	3,537	4.8	26	(Z)	1,663	4.6	1,848	19.7
Services, except education and health, total	6,464	8.8	1,412	5.1	4,439	12.2	613	6.5
Engineering and architectural services	72	(Z)	-	-	72	0.2	-	-
Research institutions	5,410	7.4	1,137	4.1	3,681	10.1	591	6.3
Other	983	1.3	275	1.0	687	1.9	22	0.2
Public administration	5,198	7.1	2,758	9.9	2,256	6.2	184	2.0
Federal	2,615	3.6	1,588	5.7	958	2.6	69	0.7
Other	2,365	3.2	1,146	4.1	1,104	3.0	115	1.2
Military	218	0.3	24	(Z)	193	0.5	-	-
Other industries	3,164	4.3	1,063	3.8	2,000	5.5	102	1.1
Not reported	267	0.4	114	0.4	138	0.4	15	0.2
TYPE OF EMPLOYER IN 1978								
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Business or industry	17,436	23.7	8,590	30.8	7,650	21.1	1,196	12.7
Educational institutions, total	32,157	43.7	6,606	23.7	19,565	53.9	5,986	63.8
Junior or 2-year college, technical institute	2,759	3.8	294	1.1	2,231	6.2	234	2.5
Medical school	6,720	9.1	-	-	2,615	7.2	4,105	43.7
4-year college or university, except medical school	22,463	30.6	6,201	22.3	14,615	40.3	1,647	17.6
Elementary or secondary school system	215	0.3	111	0.4	104	0.3	-	-
Hospital or clinic	1,195	1.6	13	(Z)	336	0.9	845	9.0
Nonprofit organization	1,516	2.1	120	0.4	1,065	2.9	331	3.5
U.S. military service/commissioned groups	257	0.3	24	(Z)	193	0.5	39	0.4
Government, total	20,346	27.7	12,310	44.2	7,127	19.7	909	9.7
Federal	13,907	18.9	9,142	32.8	4,259	11.7	506	5.4
State	4,905	6.7	2,459	8.8	2,137	5.9	308	3.3
Local or other	1,534	2.1	708	2.5	731	2.0	95	1.0
International agency	150	0.2	43	0.2	68	0.2	40	0.4
Other	150	0.2	12	(Z)	138	0.4	-	-
Not reported	296	0.4	131	0.5	128	0.4	36	0.4
PRIMARY WORK ACTIVITY IN 1978								
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
Research and development	21,375	29.1	6,536	23.5	11,624	32.0	3,216	34.3
Basic research	9,149	12.4	941	3.4	6,287	17.3	1,921	20.5
Applied research	9,547	13.0	4,531	16.3	4,145	11.4	871	9.3
Development	2,667	3.6	1,064	3.8	1,179	3.2	424	4.5
Design	13	(Z)	-	-	13	(Z)	-	-
Management or administration, total	20,781	28.3	11,706	42.0	7,046	19.4	2,030	21.6
Research and development	6,686	9.1	2,224	8.0	3,529	9.7	933	9.9
Other	14,095	19.2	9,481	34.0	3,517	9.7	1,097	11.7
Teaching and training	17,329	23.6	1,973	7.1	12,435	34.3	2,921	31.1
Production and inspection	5,780	7.9	3,666	13.2	1,815	5.0	298	3.2
Quality control	1,246	1.7	565	2.0	594	1.6	88	0.9
Operations	3,880	5.3	2,571	9.2	1,098	3.0	211	2.2
Distribution-sales	654	0.9	530	1.9	124	0.3	-	-
Consulting	2,450	3.3	1,146	4.1	819	2.3	485	5.2
Clinical diagnosis	751	1.0	28	0.1	322	0.9	401	4.3
Consulting	1,699	2.3	1,118	4.0	497	1.4	84	0.9
Report writing, statistical work, and computer applications	2,882	3.9	1,456	5.2	1,274	3.5	152	1.6
Report writing	2,145	2.9	931	3.3	1,080	3.0	134	1.4
Statistical work	469	0.6	351	1.3	100	0.3	18	0.2
Computer applications	267	0.4	174	0.6	94	0.3	-	-
Other activities	2,267	3.1	1,149	4.1	914	2.5	203	2.2
Not reported	639	0.9	217	0.8	343	0.9	79	0.8
NATIONAL INTEREST TOPICS[1]								
Total	81,323	100.0	30,301	100.0	40,397	100.0	10,624	100.0
Health	17,590	21.6	180	0.6	10,019	24.8	7,391	69.6
Education, total	15,174	18.7	1,898	6.3	11,530	28.5	1,746	16.4
Teaching	13,614	16.7	1,352	4.5	10,643	26.3	1,620	15.2
Other	1,559	1.9	547	1.8	887	2.2	126	1.2
Environmental protection, pollution control	14,734	18.1	9,102	30.0	5,487	13.6	145	1.4
Space	93	0.1	-	-	93	0.2	-	-
National defense	266	0.3	-	-	266	0.7	-	-
Crime prevention and control	15	(Z)	-	-	15	(Z)	-	-
Food production and technology	12,802	15.7	9,098	30.0	3,583	8.9	120	1.1
Energy and fuel	892	1.1	509	1.7	383	0.9	-	-
Other mineral resources	139	0.2	124	0.4	15	(Z)	-	-
Community development and services	621	0.8	358	1.2	248	0.6	15	0.1
Housing	188	0.2	165	0.5	22	(Z)	-	-
Other	5,048	6.2	2,973	9.8	1,981	4.9	95	0.9
Not applicable	9,436	11.6	4,434	14.6	4,330	10.7	671	6.3
Not reported	4,327	5.3	1,460	4.8	2,426	6.0	441	4.2

See footnotes at end of table.

Table 4. Employment Status and Selected Job-Related Characteristics of Life Scientists: 1978—Continued

Employment status and selected job-related characteristics	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
FEDERAL SUPPORT IN 1978[2]								
Total employed in February 1978	73,502	100.0	27,849	100.0	36,270	100.0	9,384	100.0
With Federal support	40,109	54.6	16,452	59.1	18,127	50.0	5,531	58.9
Department of Agriculture	16,179	22.0	12,877	46.2	3,153	8.7	150	1.6
Department of Commerce	1,255	1.7	184	0.7	1,042	2.9	28	0.3
Department of Defense	1,971	2.7	371	1.3	1,360	3.8	240	2.6
Department of Energy	1,491	2.0	215	0.8	992	2.7	285	3.0
Department of Health, Education, and Welfare	12,520	17.0	418	1.5	7,408	20.4	4,694	50.0
Department of Housing and Urban Development	110	0.2	55	0.2	41	0.1	15	0.2
Department of the Interior	4,199	5.7	2,316	8.3	1,854	5.1	29	0.3
Department of Justice	41	(Z)	41	0.1	-	-	-	-
Department of Labor	185	0.3	87	0.3	85	0.2	12	0.1
Department of Transportation	292	0.4	15	(Z)	248	0.7	29	0.3
Agency for International Development	549	0.7	305	1.1	244	0.7	-	-
Environmental Protection Agency	2,866	3.9	1,082	3.9	1,686	4.6	98	1.0
NASA	554	0.8	15	(Z)	399	1.1	140	1.5
National Science Foundation	4,425	6.0	385	1.4	3,726	10.3	314	3.3
Nuclear Regulatory Commission	117	0.2	15	(Z)	86	0.2	16	0.2
Other department or agency	2,029	2.8	664	2.4	965	2.7	400	4.3
Agency not known	521	0.7	94	0.3	382	1.1	44	0.5
Agency not reported	476	0.6	81	0.3	214	0.6	181	1.9
No Federal support	29,341	39.9	10,525	37.8	15,701	43.3	3,115	33.2
Federal support not known	3,394	4.6	683	2.5	2,033	5.6	678	7.2
Not reported	658	0.9	188	0.7	409	1.1	60	0.6

[1]Area of national concern in which persons devoted the largest proportion of professional time.
[2]Sum of individual agencies support may exceed total with Federal support because of multiple response.

Table 5. Basic Annual Salary Rate of Full-Time Employed Life Scientists

(Detail may not add to total because of rounding. For meaning of symbols, see text)

Salary	Life scientists, total		Agricultural scientists		Biologists		Medical scientists	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total employed full time in February 1978	71,020	100.0	27,268	100.0	34,616	100.0	9,136	100.0
With salary[1] reported	68,374	96.3	26,248	96.3	33,347	96.3	8,779	96.1
Less than $8,000	379	0.5	-	-	289	0.8	89	1.0
$8,000 to $9,999	295	0.4	25	(Z)	269	0.8	-	-
$10,000 to $14,999	4,061	5.7	1,580	5.8	1,813	5.2	669	7.3
$15,000 to $19,999	11,036	15.5	4,977	18.3	5,113	14.8	946	10.4
$20,000 to $24,999	19,809	27.9	8,833	32.4	9,460	27.3	1,517	16.6
$25,000 to $29,999	14,084	19.8	4,952	18.2	7,628	22.0	1,504	16.5
$30,000 to $39,999	13,441	18.9	4,801	17.6	6,323	18.3	2,317	25.4
$40,000 to $49,999	3,776	5.3	796	2.9	1,896	5.5	1,084	11.9
$50,000 and over	1,494	2.1	283	1.0	557	1.6	654	7.2
Median salary (dollars)	24,669	(X)	23,682	(X)	24,866	(X)	28,541	(X)
Salary not reported	2,646	3.7	1,020	3.7	1,269	3.7	357	3.9

[1]Refers to salary for job held during the week of February 12-18, 1978.

Appendix A. Definitions and Explanations

The 1978 National Survey of Natural and Social Scientists and Engineers was the fourth survey based on the 1970 population of scientists and engineers. It was conducted by the Bureau of the Census for the National Science Foundation. The first survey, the 1972 Professional, Technical, and Scientific Manpower Survey,[1] was conducted among a nationwide sample of approximately 150,000 persons who were recorded in the 1970 Census of Population as being in the experienced civilian labor force in 1 of 63 engineering, scientific, or related occupations. The survey also included a small sample of persons who had completed 4 or more years of college, but were not in any of the specified occupations. Based on responses in the 1972 survey and on criteria established by the National Science Foundation, approximately 50,000 persons from the 1972 survey sample (excluding the small sample of college graduates) were chosen as the sample for the series of longitudinal surveys known as the National Sample of Scientists and Engineers. The 1978 National Survey of Natural and Social Scientists and Engineers was the third survey in this longitudinal series; it was preceded by surveys in 1976 and 1974.[2]

Questionnaires for the 1978 survey were mailed in February 1978. After all data collection activities, 81 percent of the sample (approximately 40,800 persons) completed their questionnaires. The 19 percent who did not complete their questionnaires included persons who refused to participate, the deceased, and persons who returned questionnaires with insufficient information to permit processing. For an analysis of response, see appendix E.

The estimates derived for this survey were prepared by using a ratio estimation procedure and an adjustment for nonresponse in 1978. For each sample case for which a completed questionnaire was obtained, the information from the 1978 survey was matched with the 1972 survey data and the 1970 census data for the same person. Weights applied to samples cases in the 1972 survey were then used to weight the resultant matched data file. The weighting procedure for the 1972 survey involved first the preparation of a preliminary estimate by weighting the results for each sample person by the reciprocal of the probability of selection. As a second step, these weights were adjusted by applying a factor for certain age-sex-race cells within each occupation category. Within each of the cells, the factor was computed as the ratio of the 1970 census count to the preliminary estimate. The final 1972 weight was this factor multiplied by the inverse of the probability of selection for each person. To the extent that the data being tabulated and the estimated count of persons in the cells are positively correlated, the ratio estimate procedure will improve the reliability of the estimate. A discussion of the reliability of the estimates, including a description of the standard errors of totals and percentages, is presented in appendix B.

A nonresponse adjustment was done in 1978 to reduce the bias in the survey estimates due to the high nonresponse rate in 1978. This adjustment was done separately for inscope[3] and out-of-scope[4] persons, and included an adjustment for the mortality in the longitudinal sample from 1972 to 1978. The first step in the nonresponse adjustment was to adjust the nonrespondents for mortality from 1972 to 1978 by means of mortality tables for age-race-sex groups. The second step was to determine the estimated proportion of nonrespondents that were in-scope and out-of-scope. To estimate these proportions, an intensive follow-up was conducted to obtain interviews for a subsample of the 1978 nonrespondents. This follow-up showed that approximately 80 percent of the nonrespondents were in-scope and the remaining 20 percent were out-of-scope. The final step was to determine a nonresponse adjustment factor for different age-race-sex cells. Within each of the cells, the factor was computed as the ratio of the weighted count, using the 1972 weights, of the estimated total (i.e., respondent and nonrespondent) in-scope or out-of-scope persons, divided by the weighted count of the respondent in-scope or out-of-scope persons.

The final weight for the 1978 survey was the product of the 1972 weight and the appropriate 1978 nonresponse adjustment factor.

The definitions for many of the characteristics shown in this report are self-explanatory or can best be understood by referring to the appropriate 1978 questionnaire items or reference lists (appendixes C and D). An explanation of the other subjects is provided below.

Age in 1978. The reference period for age in 1978 was April 1978. The age classification is based on the age of the person at his or her last birthday. The median age is that age that

[1] For a description of the 1972 survey and related matters, see U.S. Bureau of the Census, *Characteristics of Persons in Engineering and Scientific Occupations: 1972,* Technical Paper No. 33, U.S. Government Printing Office, Washington, D.C., 1974.

[2] Results from the 1974 survey were published in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 53, *Selected Characteristics of Persons in Fields of Science or Engineering: 1974,* U.S. Government Printing Office, Washington, D.C., 1975; results from the 1976 survey were published in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976,* U.S. Government Printing Office, Washington, D.C., 1978.

[3] "In-scope" means "in a field of science or engineering."

[4] "Out-of-scope" refers to the category "not in a field of science or engineering."

divides the distribution into two equal parts, one-half being older than the median age and one-half younger. Median ages were divided from an estimation process that distributed the subject populations into 5-year age groups.

Race. The data on race are based on responses in the 1970 Census of Population. The "other races" category includes all races not included in the specific categories listed.

Divisions of the United States. The divisions of the United States comprise the following States:

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

Middle Atlantic: New York, New Jersey, Pennsylvania

East North Central: Illinois, Indiana, Michigan, Ohio, Wisconsin.

West North Central: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota.

South Atlantic: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia.

East South Central: Alabama, Kentucky, Mississippi, Tennessee.

West South Central: Arkansas, Louisiana, Oklahoma, Texas.

Mountain: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming.

Pacific: Alaska, California, Hawaii, Oregon, Washington.

Outlying areas of the United States include Puerto Rico, Guam, Virgin Islands, American Samoa, and Canal Zone.

Fields of science and engineering. Science or engineering (S/E) fields are categories established by the survey sponsor, the National Science Foundation, to identify persons who could be classified as engineers or scientists under most definitions. In general, to be classified into one of the fields, a person had to have at least two of the following three characteristics: (1) employment in the field, (2) attainment of a specified educational level in an academic discipline related to the field, or (3) self-identification, based upon total education and experience, as being in the field. More detailed information on the criteria for membership in a scientific and technical field is given in U.S. Bureau of the Census, Current Population Reports, Series P-23, No. 76, *Selected Characteristics of Persons in Fields of Science or Engineering: 1976,* U.S. Government Printing Office, Washington, D.C., 1978.

Highest degree held. Highest degree held in 1978 refers to the highest academic degree awarded to the respondent in 1978 or earlier. Data on highest degree held were derived as follows: The level and the year of award of the highest degree received by the respondent between January 1972 and 1978 surveys (this degree will be referred to as degree "A") were compared with the level and year of award, determined from the 1976, 1974, and 1972 surveys, of the previously-designated highest degree held by the respondent (this is referred to as degree "B"). If degree A was at the same level or at a higher level than degree B, and if its date of award was later than that of degree B, degree A was designated as the highest degree held in 1978; otherwise, degree B was designated as the highest degree held in 1978.

The "other degree" category includes persons whose highest academic degree was one of the following: RN, LLB, MD, and academic degrees other than those shown in the tables.

Major field of study for highest degree held. The data on major field of study refer to the major subject associated with the highest degree held in 1978 determined by the method described above. For persons who received their highest degree held in 1978 after January 1972, the data are derived from question 3 of the 1978 questionnaire (see appendix C), or question 1, part b of the 1976 questionnaire or from question 2, part b5 of the 1974 questionnaire. For persons who received their highest degree in 1971 or earlier, the data on major subject are based on the 1972 survey.

Employment status. Employed persons are those who reported that they were employed, either full time or part time, on vacation, or otherwise temporarily absent from a job for health or personal reasons during the reference week (February 12-18, 1978). The unemployed are persons who marked the "unemployed and seeking work" category (box 3) of item 5a of the 1978 questionnaire (see appendix C), or who indicated in item 7 that they were on layoff from a job. All other persons were classified as "not in the labor force."

Unemployment in 1977. The data on unemployment in 1977 relate to the occurrence of unemployment during the entire calendar year rather than just during a reference week. Medians are based on the intervals shown in the tables.

Primary work activity in 1978. The data on primary work activity in 1978 were derived, in general, from answers to question 11b of the 1978 questionnaire. In certain instances of nonresponse to question 11b, however, the data were derived from an imputation procedure that used responses to question 11a.

Type of employer. The data on type of employer in 1978 are based entirely on responses to question 12 of the 1978 questionnaire.

Basic annual salary rate. The statistics on salary refer to the basic annual salary associated with the job held in February 1978. The figures relate to salary before deductions for income tax, Social Security, retirement, etc., but do not include bonuses, overtime pay, or earnings from secondary

jobs. For employees of educational institutions whose salary was for 9 or 10 months, the salary rate was adjusted to a 12-month basis. Median salaries were derived by an estimation process that distributed the subject population into $1,000 intervals.

Job and occupational mobility in 1976 and 1978. The data on mobility between 1976 and 1978 were derived from answers on both the 1976 and 1978 questionnaires. Persons were classified as with a "job change between 1976 and 1978" if they were employed in both 1976 and 1978 and reported in the 1978 survey that their current job began in 1976 or later. Persons were classified as "same job in 1976 and 1978" if the beginning date of their most recent job was in 1975 or earlier, and as "not reported" if they did not report the beginning date of the most recent job. For persons with a job change, the detailed occupation of the 1978 job was compared with that of the 1976 job, and persons were classified as with the same or a different occupation or as "occupation change not reported."

Job and occupational mobility in 1974 and 1978 and in 1972 and 1978. The data on mobility between 1974 and 1978 and between 1972 and 1978 were derived from answers on the 1974 and 1978 questionnaires and 1972 and 1978 questionnaires, respectively. The procedure was analogous to that described for the data on job and occupational mobility in 1976 and 1978.

Years of professional experience. Median years of professional experience are based on 1-year intervals.

Symbols. A dash (—) represents zero, and "X" means "not applicable." The symbol "Z" means less than 0.05 percent. The symbol "*" means based on fewer than 20 sample cases. For the characteristic "Unemployment in Calendar Year 1977," the symbol "27+" means that the median fell in the category "27 weeks or more."

Appendix B. Reliability of the Estimates and Standard Errors of Totals and Percentages

There are two types of possible errors associated with estimates based on data from a sample survey: sampling and nonsampling error. The following is a description of the sampling and nonsampling errors associated with the 1978 Survey of Scientists and Engineers.

SAMPLING ERRORS

The particular sample used for this survey is one of a large number of possible samples of the same size that could have been selected using the same sample design. Even if the same schedules and instructions were used, estimates from each of the different samples would differ from each other. The deviation of a sample estimate from the average of all possible samples is defined as the sampling error. The standard error of a survey estimate attempts to provide a measure of this variation among the estimates from the possible samples, and thus, is a measure of the precision with which an estimate from the sample approximates the average result of all possible samples.

As calculated for this survey, the standard error also partially measures the variation in the estimates due to response errors (nonsampling errors), but is does not measure, as such, any systematic biases in the data. Therefore, the accuracy of the estimates depends on both the sampling and nonsampling errors, measured by the standard error, and biases and some additional nonsampling errors not measured by the standard error.

The figures presented in tables B-1 through B-4 are approximations to the standard errors of the various estimates for this survey. A number of approximations and generalizations have been used so that the standard errors would be applicable to a wide variety of characteristics and still be prepared at a moderate cost. Thus, the standard errors in the following tables provide an indication of the order of magnitude, rather than precise measurements of the standard errors.

Standard errors on totals. Table B-1 presents the standard errors applicable to estimated totals for characteristics of life scientists. Linear interpolation can be used to determine standard errors for estimated totals not specifically shown in table B-1. In addition, standard errors for estimated numbers not shown in these tables may also be computed directly from the following standard error formula:

$$\text{standard error of } x = \sqrt{ax^2 + bx}$$

The "a" and "b" parameters for each life scientist group are:

Field	"a" parameter	"b" parameter
Life scientists, total	-.0000337	41.3
Agricultural scientists. . .	.000352	30.5
Biologists.	.000338	38.9
Medical scientists.	-.000921	45.9

For example, there are an estimated 4539 life scientists, total, who were retired in 1978. The above table shows that $a = -.0000337$ and $b = 41.3$ for life scientists, total. Thus, the estimated standard error of 4539 is

$$\sqrt{(-.0000337)\ (4539)^2 + (41.3)\ (4539)} = 432$$

Table B-1. Standard Errors of Totals

Size of estimate	Life scientists, total	Agricultural scientists	Biological scientists	Medical scientists
100.....	60	60	60	70
200.....	90	80	90	100
500.....	140	120	140	150
700.....	170	150	170	180
1,000.....	200	180	200	210
2,500.....	320	280	320	330
5,000.....	450	400	460	450
10,000.....	640	580	660	610
25,000.....	1,010	990	1,090	760
50,000.....	1,410	1,550	1,670	-
75,000.....	1,710	-	1,940	-
100,000.....	1,950	-	-	-

- Represents zero.

Standard errors on percentages. The reliability of an estimated percentage, computed by using sample data for both the numerator and the denominator, depends upon both the size of the percentage and the size of the total upon which the percentage is based. Estimated percentages are relatively more reliable than the corresponding estimates of the numerators of the percentage, particularly if the percentages are 50 percent or more.

Tables B-2 through B-4 present the standard errors of estimated percentages for life scientists. Two-way linear

interpolation can be used to determine standard errors for estimated percentages not specifically shown in the tables. In addition, the standard errors for percentages not shown in these tables can also be computed directly from the following formula:[1]

$$\text{standard error of the percentage p on a base of y} = \sqrt{(p)\ (100\text{-}p)\ \frac{b}{y}}$$

For example, an estimated 2.9 percent of the 81,323 life scientists, total, worked part time in 1978. The above table shows that b = 41.3 for life scientists, total. Thus, the standard error for the 2.9 percent on a base of 81,323 is

$$\sqrt{\frac{(2.9)\ (100 - 2.9)\ (41.3)}{81{,}323}} = .38 \text{ percent}$$

Standard error intervals. The sample estimate and its estimated standard error enable one to construct interval estimates that include the average result of all possible samples with a known probability. For example, if all possible samples were selected, each of these surveyed under identical conditions and an estimate and its estimated standard error were calculated from each sample, then:

1. Approximately 68 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average result of all possible samples;
2. Approximately 90 percent of the intervals from 1.6 standard errors below the estimate to 1.6 standard errors above the estimate would include the average result of all possible samples;
3. Approximately 95 percent of the intervals from two standard errors below the estimate to two standard errors above the estimate would include the average result of all possible samples.

The average result of all possible samples either is or is not contained in any particular computed interval. However, for a particular sample one can say with specified confidence that the average result of all possible samples is included within the constructed interval.

For example, of the 81,323 life scientists, total, in 1978, 21.6 percent have the master's degree as the highest degree held in 1978. The standard error of this percent as computed from table B-2 is .9 percentage points. Based on these data, we may conclude that the percentage of life scientists, total, with the master's degree as the highest degree held in 1978 lies between 19.8 percent and 23.4 percent with 95 percent-confidence, i.e., within 2 standard errors.

[1] The tables for the standard errors of percentages for most scientific and engineering fields (SEF's) were combined. The tables of standard errors given for such collapsed groups are always conservative, i.e., the table for the SEF with the largest standard errors were chosen to represent all the SEF's in the group. Because of this, the standard errors calculated directly from the formula may differ slightly from those found in the tables.

Standard errors of differences between estimates. The figures in these tables are not directly applicable to standard errors of differences between two sample estimates. The standard error of the estimated difference between two figures may be approximated by the square root of the sum of the squares of the standard error of each estimate. This approximation will yield an exact result when the two characteristics are uncorrelated. If the two characteristics are positively (negatively) correlated, the approximation will overestimate (underestimate) the standard error of the difference. For a difference between two sample estimates, one of which represents a subclass of the other, the table can be used with the difference considered as the sample estimate.

For example, of the 81,323 life scientists, total, in 1978, 46.7 percent have the Ph.D. as the highest degree held in 1978. The standard error of this percent as computed from table B-2 is 1.1 percentage points. The standard error of the difference between the percentage of those with master's degrees and the percentage of those with doctorates (i.e., 46.7 − 21.6 = 25.1 percent) is then approximately

$$\sqrt{(.9)^2 + (1.1)^2} = 1.4 \text{ percentage points}$$

Based on these data, we may conclude with 95 percent confidence that the average estimate of the difference of the percentages derived from all possible sample lies within the interval 22.3 percentage points to 27.9 percentage points.

Standard errors of medians. The figures in these tables are not directly applicable to standard errors of estimated medians. The sampling variability of an estimated median depends upon the size of the base as well as on the distribution from which the median is determined. An approximate method for measuring the reliability of a median is to determine an interval about the estimated median, such that there is a stated degree of confidence that the median based on all possible samples lies with the interval. The following procedure may be used to estimate confidence limits of a median based on sample data:

1. Determine the standard error of a 50 percent characteristic from the appropriate standard error table (tables B-2 through B-4) using the appropriate base.
2. Add this standard error to 50 percent to obtain an upper boundary percentage and subtract this standard error from 50 percent to obtain a lower boundary percentage.
3. Using the cumulative distribution from which the median is derived, read off the numbers corresponding to the boundary percentages. The interval between these two numbers (i.e., the confidence limits) will be the 68-percent confidence interval. A 95-percent confidence interval may be determined by finding the values corresponding to 50 percent plus or minus twice the standard error in step 1.

For example, the data for 1978 indicate that the estimate of the median age for agricultural scientists is 46.0 years. The

distribution of agricultural scientists by age is shown in the table below:

Age (years)	Percentage	Cumulative distribution
Under 30	1.1	1.1
30 to 34	9.9	11.0
35 to 39	17.0	28.0
40 to 44	18.0	46.0
45 to 49	18.8	64.8
50 to 54	11.2	76.0
55 to 59	11.8	87.8
60 to 64	6.4	94.2
65 to 69	3.6	97.8
70 and over	2.1	99.9

From standard error table B-3, the standard error of a 50 percent characteristic with a base of 30,301 is 1.7 percentage points. From the table of cumulative age distribution, the percentage point that corresponds to 45 years is 46.0 percent and to 50 years is 64.8 percent. The lower confidence limit corresponding to 48.3 percent (50 percent minus 1.7 percent) is found by linear interpolation between 45 years and 50 years to be 45.6 years, i.e.,

$$45 + [(50 - 45)\left(\frac{48.3 - 46.0}{64.8 - 46.0}\right)] = 45.6$$

Similarly, the upper confidence limit corresponding to 51.7 percent (50 percent plus 1.7 percent) is found to be 46.5 years:

$$45 + [(50 - 45)\left(\frac{51.7 - 46.0}{64.8 - 46.0}\right)] = 46.5$$

Consequently the 68 percent confidence interval, as shown by the data, is from 45.6 years to 46.5 years. Likewise, we could conclude that the 95 percent confidence interval is from 45.2 years (the distribution point corresponding to 46.6 percent) to 47.0 years (corresponding to 53.4 percent).

NONSAMPLING ERRORS

In general, nonsampling errors can be attributed to many sources: Inability to obtain information about all cases, definitional difficulties, differences in the interpretation of

Table B-2. Standard Errors of Percentages for Life Scientists, Total, and Biologists

(68 chances out of 100)

Base of percentage	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	25 or 75	50
100	6.4	9.1	14.1	19.4	23.1	28.0	32.4
200	4.6	6.4	10.0	13.7	16.3	19.8	22.9
500	2.9	4.1	6.3	8.7	10.3	12.5	14.5
700	2.4	3.4	5.3	7.3	8.7	10.6	12.2
1,000	2.0	2.9	4.5	6.1	7.3	8.9	10.2
2,500	1.3	1.8	2.8	3.9	4.6	5.6	6.5
5,000	.9	1.3	2.0	2.7	3.3	4.0	4.6
10,000	.6	.9	1.4	1.9	2.3	2.8	3.2
25,000	.4	.6	.9	1.2	1.5	1.8	2.0
50,000	.3	:4	.6	.9	1.0	1.3	1.4
75,000	.2	.3	.5	.7	.8	1.0	1.2
100,000	.2	.3	.4	.6	.7	.9	1.0

Table B-3. Standard Errors of Percentages for Agricultural Scientists

(68 chances out of 100)

Base of percentage	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	25 or 75	50
100	5.7	8.0	12.5	17.2	20.5	24.8	28.7
200	4.0	5.7	8.8	12.2	14.5	17.6	20.3
500	2.6	3.6	5.6	7.7	9.2	11.1	12.8
700	2.2	3.0	4.7	6.5	7.7	9.4	10.8
1,000	1.8	2.5	4.0	5.4	6.5	7.9	9.1
2,500	1.1	1.6	2.5	3.4	4.1	5.0	5.7
5,000	.8	1.1	1.8	2.4	2.9	3.5	4.1
10,000	.6	.8	1.3	1.7	2.0	2.5	2.9
25,000	.4	.5	.8	1.1	1.3	1.6	1.8
50,000	.3	.4	.6	.8	.9	1.1	1.3
75,000	.2	.3	.5	.6	.7	.9	1.0
100,000	.2	.3	.4	.5	.6	.8	.9
150,000	.1	.2	.3	.4	.5	.6	.7

questions, inability or unwillingness to provide correct information on the part of the respondents, mistakes in recording or coding the data, and other errors of collection, response, processing, coverage, and estimation for missing data. As the above list indicates, nonsampling errors are not unique to sample surveys, since they can, and do, occur in complete censuses as well.

The primary source of nonsampling error in the 1978 National Sample survey is probably the high nonresponse rate. An adjustment in the estimation procedure for the 23 percent noninterview rate in the 1972 survey and the additional 19 percent nonresponse rate in 1978 was made, but there still remains some unknown bias in the estimates due to differences in the characteristics of those who were interviewed in 1978 and those who were not.

It should also be pointed out that estimates for this survey do not represent those who have entered the labor force in scientific and engineering fields since 1970. In particular, this survey does not include the large numbers of graduates produced since 1970. This causes significant biases for such items as the relative distributions of sex, age, and race and the unemployment figures if the results are assumed to be indicative of the current scientific and engineering fields including new entrants since 1970.

Table B-4. Standard Errors of Percentages for Medical Scientists

(68 chances out of 100)

Base of percentage	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	25 or 75	50
100	6.8	9.6	15.0	20.6	24.5	29.7	34.3
200	4.8	6.8	10.6	14.6	17.3	21.0	24.3
500	3.1	4.3	6.7	9.2	11.0	13.3	15.4
700	2.6	3.6	5.7	7.8	9.3	11.2	13.0
1,000	2.2	3.0	4.7	6.5	7.8	9.4	10.9
2,500	1.4	1.9	3.0	4.1	4.9	5.9	6.9
5,000	1.0	1.4	2.1	2.9	3.5	4.2	4.9
10,000	.7	1.0	1.5	2.1	2.5	3.0	3.4
25,000	.4	.6	.9	1.3	1.6	1.9	2.2
50,000	.3	.4	.7	.9	1.1	1.3	1.5
75,000	.2	.4	.5	.8	.9	1.1	1.3
100,000	.2	.3	.5	.7	.8	.9	1.1
150,000	.2	.2	.4	.5	.6	.8	.9

Appendix C. Questionnaire and Reference Lists

O.M.B. No. 99-S77003; Approval Expires December 31, 1978

FORM PMS-26D (9-26-77)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

1978 NATIONAL SURVEY OF NATURAL AND SOCIAL SCIENTISTS AND ENGINEERS

NOTICE – Your report to the Census Bureau is confidential. It may be seen only by sworn Census employees and may be used only for statistical purposes.

Please read instructions carefully before answering questions.

Answer as accurately as you can by printing your reply clearly or by entering an "X" in the box next to the appropriate reply.

When the instructions for a question direct you to enter a code and description from a list, please refer to the reference list attached to this questionnaire.

PLEASE COMPLETE AND RETURN TO

Bureau of the Census
1201 East Tenth Street
Jeffersonville, Indiana 47132

A. Do you currently live in the State (or foreign country) printed in the above mailing label?

1 ☐ Yes, same State (or foreign country)

2 ☐ No, different State (or foreign country) – *Please enter your current State (or foreign country) of residence*_____ 3 ☐☐

FROM THE DIRECTOR
BUREAU OF THE CENSUS

This is the final questionnaire for the series of surveys known as the National Sample of Scientists and Engineers. The National Science Foundation, the project sponsor, and the Bureau of the Census wish to thank you for your invaluable contribution to this program. Each of the biennial surveys has given policymakers and planners an increasingly clearer view of the dynamics of the educational system and the job market for one of the Nation's central resources—highly trained persons. The goal of this final survey is to complete the picture for the decade of the 1970's.

Thus, we are asking you to provide one final report on your employment and related topics. The quesionnnaire is much shorter than previous ones. Please note that the sample includes many kinds of highly trained persons in addition to scientists and engineers. For the survey to be successful and yield truly representative information, it is important that each person fill out and return the questionnaire.

Please complete the questions which follow on pages 2 through 4 and return your questionnaire in the enclosed preaddressed envelope. For some questions you are instructed to enter a code and description from Reference List A, B, or C. These lists are attached to the questionnaire.

This information is being collected under the authority of the National Science Foundation Act of 1950, as amended. The information you provide is confidential and may be seen only by sworn employees of the Bureau of the Census. The information cannot be used for anything but statistical purposes and cannot be given to any other Government agency, private concern, or individual. The data will be released only in the form of statistical summaries from which it will be impossible to identify information about any particular person. Your response is entirely voluntary, and your failure to provide some or all of the requested information will in no way adversely affect you.

Thank you for your cooperation.

Sincerely,

MANUEL D. PLOTKIN

Enclosure

1. Since January 1972 have you attended any college, university, or other post high school institution?

1 ☐ Yes – *Continue with question 2a*
2 ☐ No – *Skip to question 4*

2a. What is the highest degree you have RECEIVED since January 1972?

Mark only one box

1 ☐ Associate
2 ☐ Registered Nurse (R.N.)
3 ☐ Bachelor's
4 ☐ Master's
5 ☐ First Professional Non-Medical (J.D., LL.B., Th.B.)
6 ☐ First Professional Medical (D.D.M., D.D.S., D.O., D.V.M., M.D.)
7 ☐ Doctorate
8 ☐ Other – *Specify* _____
9 ☐ None – *Skip to question 4*

b. When was this degree awarded?

If you received more than one degree at the same level (e.g., two master's degrees), enter the year of award of the most recent one.

19 ____

3. What was the major field of study of the degree you described in question 2?

Enter code and description from Reference List A.

Code ☐☐☐ Description from Reference List A _____

4. Aside from formal education, which of the following types of training did you receive in 1976 or 1977?

Mark the appropriate year for each type of training you have received.

	a. 1976	b. 1977
(1) On-the-job training	1 ☐	1 ☐
(2) Military training applicable to civilian occupations	2 ☐	2 ☐
(3) Extension or correspondence courses	3 ☐	3 ☐
(4) Courses at employer's training facility	4 ☐	4 ☐
(5) Courses at adult education center	5 ☐	5 ☐
(6) Other training	6 ☐	6 ☐
(7) None	7 ☐	7 ☐

5a. What was your employment status during the week of February 12–18, 1978?

1 ☐ Employed full time (including self-employed full time) – *Skip to 6a*
2 ☐ Employed part time (including self-employed part time) – *Answer 5b*
3 ☐ Unemployed and seeking work – *Go to Part III*
4 ☐ Not employed and not seeking work – *Skip to 7*

b. If you worked part time, were you seeking full-time work?

1 ☐ Yes
2 ☐ No

6a. Were you working in a position related to science or engineering during the week of February 12–18, 1978?

1 ☐ Yes – *Go to Part III*
2 ☐ No – *Answer 6b*

b. What was the most important reason for taking this position?

Mark only one box

1 ☐ Preferred nonscience or nonengineering position
2 ☐ Promoted out of science or engineering position
3 ☐ Pay was better in nonscience or nonengineering position
4 ☐ Locational preference
5 ☐ Science or engineering position not available
6 ☐ Other – *Specify* _____

(Go to Part III)

7. If you were not employed and not seeking work during the week of February 12–18, 1978, what was your most important reason for not seeking work?

Mark only one box

1 ☐ On vacation or otherwise temporarily absent from a job for health or personal reasons
2 ☐ On layoff from a job
3 ☐ Retired
4 ☐ Student
5 ☐ Tending to family responsibilities
6 ☐ Could not find work or believed no jobs available in my particular field
7 ☐ Other – *Specify* _____

(Go to Part III)

PART III – JOB ACTIVITIES

INSTRUCTIONS

a. Complete questions 8–15 for the job held during the week of February 12–18, 1978, or, if you did not hold a job during that week, complete these questions for your most recent job prior to that week.

b. If you held more than one job, please report only the job at which you worked the greatest number of hours.

Job held during the week of February 12–18, 1978, or most recent prior job.

8. Where did you work?

Write in city and State or foreign country of company, business, agency, or other employer.

City

☐☐ State or foreign country

9. What kind of business was this?

Enter code and description from Reference List B.

Code ☐☐☐ Description from Reference List B _____

10. What was your occupation?

Enter code and description from Reference List C.

Code ☐☐☐ Description from Reference List C _____

11a. What percent of working time did you devote to each of the following activities?

Entries should sum to 100%.

PLEASE NOTE

Basic research is study directed toward gaining scientific knowledge primarily for its own sake.

Applied research is study directed toward gaining scientific knowledge in an effort to meet a recognized need.

Development is direction of the knowledge gained from research toward production of useful materials, devices, systems, and methods.

01 _____ % Management or administration of research and development

02 _____ % Management or administration of other than research and development

03 _____ % Teaching and training – preparing and teaching courses, guiding and counseling students or trainees

04 _____ % Basic research

05 _____ % Applied research

06 _____ % Development – product, process, and technical development

07 _____ % Report and technical writing, editing, information retrieval

08 _____ % Clinical diagnosis

09 _____ % Design of equipment, processes, models

10 _____ % Quality control, testing, evaluation, or inspection

11 _____ % Operations – production, maintenance, construction, installation

12 _____ % Distribution – sales, traffic, purchasing, customer and public relations

13 _____ % Statistical work – survey work, forecasting, statistical analysis

14 _____ % Consulting

15 _____ % Computer applications

16 _____ % Other activities – *Specify* _____

TOTAL=100%

b. Among all these activities, which was your primary and which was your major secondary work activity?

Fill in the appropriate code numbers (01–16) from question 11a.

Code (01–16 from Question 11a).

☐☐ Primary work activity

☐☐ Secondary work activity

12. Which category best describes the type of organization of your principal employment or postdoctoral appointment?

Mark only one box

01 ☐ Business or industry, including self-employed

02 ☐ Junior college, 2-year college, technical institute

03 ☐ Medical school

04 ☐ 4-year college or university, other than medical school

05 ☐ Elementary or secondary school system

06 ☐ Hospital or clinic

07 ☐ Non-profit organization, other than hospital, clinic, or educational institution

08 ☐ U.S. military service, active duty, or Commissioned Corps, e.g., USPHS, NOAA

09 ☐ U.S. Government, civilian employee

10 ☐ State government

11 ☐ Local or other government – *Specify* _____

12 ☐ International agency

13 ☐ Other – *Specify* _____

PLEASE CONTINUE TO DESCRIBE THIS JOB ON PAGE 4 →

PART III – JOB ACTIVITIES – Continued

Job held during week of February 12–18, 1978, or most recent prior job

13. What was the basic salary associated with this position? (If not working during February 12–18, report ending salary of most recent prior job.)

If you were on a postdoctoral appointment, include stipend plus allowances. (Basic salary refers to salary before deductions for income tax, social security, retirement, etc. but does not include bonuses, overtime, summer teaching, or other payment for secondary jobs.)

a. $ _____ .00

b. 1 ☐ Per year
2 ☐ Per month
3 ☐ Per week

c. **If academically employed, mark whether salary is for –**
1 ☐ 9–10 months
2 ☐ 11–12 months

14. Between what dates did you hold this position?
Enter month and year

Consider a change in positions to have occurred if there were significant changes in your duties, level of responsibility, or occupation, even if you continued to work for the same employer.

a. Beginning month and year: _____

b. Ending month and year: _____ OR ☐ Present

15a. Was ANY of your work supported or sponsored by U.S. Government funds?

1 ☐ Yes – *Continue with 15b*
2 ☐ No
3 ☐ Don't know } *Skip to 16a*

b. Which of the following agencies or departments were supporting the work?
Mark as many as apply

01 ☐ AID (Agency for International Development)
02 ☐ Department of Agriculture
03 ☐ Department of Commerce
04 ☐ Department of Defense
05 ☐ Department of Energy
Department of Health, Education, and Welfare
06 ☐ Alcohol and Drug Abuse Mental Health Administration
07 ☐ NIH (National Institutes of Health)
08 ☐ Office of Education
09 ☐ Other HEW – *Specify* _____
10 ☐ Department of Housing and Urban Development
11 ☐ Department of the Interior
12 ☐ Department of Justice
13 ☐ Department of Labor
14 ☐ Department of Transportation
15 ☐ EPA (Environmental Protection Agency)
16 ☐ NASA (National Aeronautics and Space Administration)
17 ☐ NSF (National Science Foundation)
18 ☐ Nuclear Regulatory Commission
19 ☐ Other agency or department – *Specify* _____
20 ☐ Don't know source agency or department

PART IV – OTHER INFORMATION

16a. At anytime during calendar year 1977 were you without a job AND actively seeking employment?

1 ☐ Yes – *Continue with 16b*
2 ☐ No – *Skip to question 17*

b. For how many weeks were you seeking employment?

1 ☐ 1 to 4 weeks
2 ☐ 5 to 10 weeks
3 ☐ 11 to 14 weeks
4 ☐ 15 to 26 weeks
5 ☐ 27 weeks or more

17. How many years of professional experience, including teaching, have you had? *Enter number of years*

_____ Years

18. Based on your total education and experience, what do you regard yourself as professionally?
Enter code and description from Reference List C.

Code ☐☐☐ Description from Reference List C _____

19. Listed at the right are selected topics of critical national interest. If you devote a significant proportion of your professional time to any of these problem areas, please mark the box for the one on which you spend the MOST time.
Mark only one box

01 ☐ Health
02 ☐ Environment protection, pollution control
Education:
03 ☐ Teaching
04 ☐ Other
05 ☐ Space
06 ☐ National defense
07 ☐ Crime prevention and control
08 ☐ Food production and technology
09 ☐ Energy and fuel
10 ☐ Other mineral resources
11 ☐ Community development and services
12 ☐ Housing (planning, design, construction)
13 ☐ Other – *Specify* _____
14 ☐ Does not apply

20a. Are you physically handicapped?

1 ☐ Yes – *Continue with 20b*
2 ☐ No – *Skip to question 21*

b. What is the nature of your handicap(s)?
Mark as many as apply

1 ☐ Visual
2 ☐ Auditory
3 ☐ Orthopedic
4 ☐ Other – *Specify* _____

21. Is your ethnic heritage Hispanic? (Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture)

1 ☐ Yes
2 ☐ No

22. In the event that it is necessary to contact you to clarify some of the information you provided, may we contact you by telephone?

☐ Yes – *Enter number(s) on which you can be reached* → Area code | Telephone number
☐ No Area code | Telephone number

23. Please print your name here

Date prepared

☆ U.S. GOVERNMENT PRINTING OFFICE: 1977– 788-648

REFERENCE LIST A – MAJOR FIELDS OF STUDY

This list is to be used in answering question 3 about the field in which you have obtained study or training. It is divided into two sections: Section I is a list of fields of academic study generally leading to bachelor's or higher degrees; Section II is a list of fields of study and training below those generally leading to a bachelor's degree.

Please scan the entire list, choose the appropriate answer for the question and then enter the code and description in the appropriate section of question 3. If none of the categories listed below adequately describes what you were studying or being trained in, use the "Other" category (code 600 or 625) and enter a brief description of what you were studying in the space provided on the questionnaire.

PLEASE DETACH BEFORE RETURNING YOUR COMPLETED QUESTIONNAIRE

Section I – FIELDS OF ACADEMIC STUDY LEADING TO BACHELOR'S OR HIGHER DEGREES

Code	Description
	Biological and Agricultural Sciences and Related Fields
501	Agriculture, business
502	Agriculture, general
503	Agronomy, field crops
504	Anatomy and histology
505	Animal physiology
506	Animal science
507	Bacteriology, virology, mycology, parasitology
508	Biochemistry
509	Biology, general
510	Biophysics
511	Botany, general
512	Dairy science (dairy husbandry)
513	Entomology
514	Farm management
515	Fish and game or wildlife management
516	Food science (food technology and processing, dairy manufacturing and technology, food industry)
517	Forestry
518	Genetics
519	Horticulture
520	Immunology
521	Microbiology
522	Plant pathology
523	Plant physiology
524	Soil science (soil management, soil conservation)
525	Zoology, general
526	Biological and agricultural sciences, other fields
	Education
527	Biological sciences education
528	Mathematics education
529	Physical sciences education
530	Trade and industrial training
531	Education, other fields
	Engineering
532	Aerospace, aeronautical, astronautical, and related fields
533	Agricultural
534	Architectural
535	Chemical, petroleum refining
536	Civil, construction, transportation
537	Electrical, electronics
538	Engineering sciences, mechanics, physics
539	Engineering technology
540	Environmental/sanitary engineering
541	General or unified
542	Industrial
543	Mechanical
544	Metallurgical, materials, ceramics
545	Mining, mineral, geological
546	Naval architecture and marine engineering
547	Nuclear
548	Operations research/systems engineering
549	Petroleum
550	Engineering, other fields
	Health Fields
551	Medicine or premedicine, and clinical medical sciences
552	Nursing (4 year or longer program)
553	Pathology
554	Pharmacology
555	Pharmacy
556	Health professions, other fields (4 year or longer program)

Code	Description
	Mathematical Sciences
557	Mathematics
558	Statistics and actuarial sciences
559	Computer sciences and systems analysis
500	Operations research/management science
	Physical Sciences
560	Astronomy
561	Chemistry
593	Geography
563	Meteorology
564	Physics
565	Physical sciences, general
566	Geology and geophysics
567	Oceanography
568	Physical sciences, other fields
	Psychology
569	Clinical
570	Educational
571	General psychology
572	Psychology, other fields
	Social Sciences
573	Anthropology
574	Area studies, regional studies
575	Economics, agricultural
576	Economics, except agricultural
577	Foreign service programs
593	Geography
579	History
580	Industrial relations
581	International relations
582	Political science or government
583	Public administration
584	Social sciences, general
585	Social work, social administration, social welfare
586	Sociology
587	Social sciences, other fields
	Arts, Humanities, and Other Specialties
588	Arts, general
589	Business and commerce, including accounting, hotel and restaurant administration, and secretarial studies
590	English and journalism
591	Fine and applied arts, all fields
592	Foreign language and literature, all fields
593	Geography
594	Home economics, all fields
595	Law or prelaw
596	Library science
597	Military science, including merchant marine deck officer
598	Philosophy, all fields
599	Religion and theology, all fields
600	Other *(Describe briefly under the applicable item on the questionnaire.)*

Section II – FIELDS OF ACADEMIC STUDY AND OCCUPATIONAL TRAINING RELATED TO PROGRAMS BELOW THE BACCALAUREATE

Code	Description
	Data Processing-related fields of study or training
601	Computer programming
602	Computer operating
603	All other data processing fields of study or training
	Engineering-related fields of study or training
604	Drafting and design, all fields
605	Aeronautical technology
606	Architectural or building technology
607	Chemical technology
608	Civil technology
609	Electrical and electronics technology
610	Industrial technology
611	Mechanical technology
612	All other engineering-related fields of study or training
	Science-related fields of study or training
613	Agriculture
614	Forestry
615	Other science-related fields of study or training

Code	Description
	Other fields of study or training
616	Business and commerce-related fields of study or training
617	Craft (skilled) occupations-related fields of study or training (such as carpentry, bricklaying, tool and die making, etc.)
618	Educational-related fields of study or training
619	Home economics
620	Nursing and other health service-related fields of study or training
621	Operative occupations-related fields of study or training (such as machine operation, driving, inspecting, etc.)
622	Police technology or law enforcement
623	Sales and marketing-related fields of study or training
624	Service occupations-related fields of study or training (such as cook, beautician, firefighter, etc.)
625	All other fields of study or training *(Describe briefly under the applicable item on the questionnaire.)*

REFERENCE LIST B – KINDS OF BUSINESSES

This list is to be used in answering question 9 about the kind of business or industry for which you worked. Please scan the entire list, choose the appropriate answer for the question and enter the code and description from this list. If none of the categories listed below adequately describes the kind of business for which you worked, use the "Other" category (code 731).

Code	Description
	Manufacturing
701	Aircraft, aircraft engines, aircraft parts
702	Chemicals and allied products
703	Electrical machinery, equipment and supplies for the generation, storage, transformation, transmission, and utilization of electrical energy
704	Electronic apparatus, radio, television and communication equipment and parts
705	Electronic computers, accounting, calculating and office machinery and equipment
706	Fabricated metal products (except ordnance, machinery and transportation equipment)
707	Machinery (except electrical) including engines and turbines, farming and construction machinery, mining, metalworking and other manufacturing and service industry machines
708	Motor vehicles and motor vehicle equipment including trucks, buses, automobiles, railroad engines and cars
709	Ordnance, including manufacture of arms, ammunition, tanks, and complete guided missiles, space vehicles and equipment
710	Petroleum refining and related industries
711	Primary metal industries, including smelting, refining, rolling, drawing, alloying, and manufacture of castings, forgings and other basic metal products
712	Professional and scientific equipment and supplies
713	Other manufacturing including printing and publishing
	Educational Institutions
714	College or university (offering at least a bachelor's degree)
715	Junior college or technical institute
716	Medical school
717	Other educational institutions
	Health Services
718	Hospital or clinic
719	Other medical and health services
	Other Kinds of Business
720	Agriculture, forestry, and fisheries
721	Business, personal, and professional services
722	Construction
723	Engineering or architectural services
724	Finance, insurance, or real estate
725	Mining and petroleum extraction
726	Private, nonprofit organizations other than educational institutions and hospitals
727	Professional and technical societies
728	Research institutions
729	Retail and wholesale trade
730	Transportation, communication, or other public utilities
731	Other *(Describe briefly under the applicable item on the questionnaire.)*
	Public Administration (Include only uniquely governmental activities, such as the U.S. Postal Service, U.S. Air Force, State court, Department of Motor Vehicles, city building inspection, or city public welfare. For example, if you work for the U.S. Postal Service use code 733, Federal public administration; on the other hand, if you work at a Veterans' Administration Hospital, use code 718, Hospital or clinic; if you work at a State university, use code 714, College or university; if you work for a county road building agency, use code 722, Construction; if you work in a Defense Department research laboratory, use code 728, Research institution.)
732	Uniformed military service
733	Federal public administration
734	State public administration
735	Local public administration (city, county, etc.)
737	Regional government
736	Other government

REFERENCE LIST C – OCCUPATIONS

This list is to be used in answering questions 10 and 18 about your occupational classification. Please scan the entire list, choose the appropriate entry and enter the code and description from this list. If you cannot find exactly the right entry, please choose the one that comes nearest to it. If none of the entries is at all appropriate, use the "Other" category (code 475) and enter a brief description in the space provided on the questionnaire.

Code	Description
	Engineers, including college professors and instructors
401	Engineer, aeronautical and astronautical
402	Engineer, agricultural
403	Engineer, chemical
404	Engineer, civil and architectural
405	Engineer, electrical and electronic
406	Engineer, industrial
407	Engineer, mechanical
408	Engineer, metallurgical and materials
409	Engineer, mining, petroleum, and geological
410	Engineer, nuclear
411	Engineer, environmental and sanitary
412	Engineer, operations research/systems
413	Engineer, other fields *(Describe briefly under the applicable item on the questionnaire.)*
	Computer Specialist, including college professors and instructors
414	Computer programmer
415	Computer systems analyst
416	Computer scientist
417	Other computer specialist *(Describe briefly under the applicable item on the questionnaire.)*
	Mathematicians and Statisticians, including college professors and instructors
418	Actuary
419	Mathematician
420	Statistician
421	Operations research analyst
	Physical Scientists, including college professors and instructors
422	Chemist
423	Earth scientists including geologists, geophysicists, etc.
424	Physicist, astronomer
425	Atmospheric scientist, meteorologist
426	Oceanographer
427	Other physical scientist *(Describe)*
	Biological Scientists, including college professors and instructors
428	Agricultural scientists, including foresters and conservationists
429	Biological scientist
430	Biochemist
431	Biophysicist
432	Medical scientist, excluding persons who are primarily medical practitioners; see Health Occupations
433	Other biological scientist *(Describe)*
	Social scientists, including college professors and instructors
434	Economist
435	Psychologist
436	Sociologist or anthropologist
437	Other social scientist *(Describe briefly under the applicable item on the questionnaire.)*
	Health Occupations, including persons who are primarily practitioners. Persons engaged primarily in medical research, teaching, and similar activities use code 432, Medical scientist.
438	Physician or surgeon
439	Technician, dental
440	Technician, medical
441	Other health occupation *(Describe briefly under the applicable item on the questionnaire.)*
	Technicians and Technologists, except medical
442	Designer, electronic parts and machine tools
443	Designer, industrial
444	Designer, other
445	Draftsman
446	Surveyor
447	Technician, biological and agricultural
448	Technician, electrical and electronic
449	Technician, construction, highways, and architectural
450	Technician, mechanical
451	Technician, other engineering
452	Technician, physical science
453	Technician, other fields *(Describe briefly under the applicable item on the questionnaire.)*
	Teachers
454	Teacher, elementary school
455	Teacher, secondary school
456	Teacher, college and university, **excluding engineering and science** *(Engineering and science teachers see codes 401–437 above.)*
	Administrators, Managers, and Officials, excluding farm
476	Urban and regional planner
457	College president or dean
458	Administrator or manager, scientific and technical research and development
459	Administrator or manager, production and operations
460	Administrator, manager, or official, all other, excluding self-employed
461	Self-employed proprietor
	All Other Occupations
462	Accountant
463	Attorney or judge
464	Sales worker
465	Clerical worker (such as bookkeeper, secretary, etc.)
466	Clergy
467	Craft worker (such as baker, carpenter, electrician, mechanic, repair worker)
468	Farmer (owner, manager, tenant, or farm laborer)
469	Fire fighter or police
470	Laborer, except farm
471	Librarian
472	Merchant or shopkeeper, self-employed
473	Operative (such as assembler, factory worker, miner, welder, truck driver, etc.)
474	Postal worker
475	Other occupations, not specified above *(Describe briefly under the applicable item on the questionnaire.)*

Appendix D. Source of Data

Characteristic	Table number	Item number on 1978 questionnaire
Age in 1978*	1	(From the 1970 census response)
Sex	1	(From the 1972 survey response, if available; otherwise from the 1970 census response)
Race*	1	(From the 1970 census response)
Residence in 1978	1	A, page 1
Professional identification	1	Part IV, 18
Hispanic heritage	1	Part IV, 21
Occupation in 1978	1	Part III, 10
Highest degree held*	2	2a; otherwise from 1976, 1974, or 1972 survey response
Major field of study for highest degree held*	2	3; otherwise from 1976, 1974, or 1972 survey response
Type of supplementary training: 1977	2	Part I, 4b
Job and occupational mobility: 1976, 1978*	3	1976 survey response and Part III, 10, 14
Job and occupational mobility: 1974, 1978*	3	1974 survey response and Part III, 10, 14
Job and occupational mobility: 1972, 1978*	3	1972 survey response and Part III, 10, 14
Years of professional experience*	3	Part IV, 17
Type of employer	4	Part III, 12
Federal support	4	Part III, 15a, 15b
Unemployment status: 1977	4	Part IV, 16a, 16b
Employment status: February 1978*	4	Part II, 5a, 5b, 7
Full-time employment in science or engineering: February 1978	4	Part II, 6a, 6b
National interest topics	4	Part IV, 19
Industry in 1978	4	Part III, 9
Primary work activity*	4	Part III, 11b
Annual salary rate: 1978	5	Part III, 13

*For more information, see appropriate subject in appendix A.

Appendix E. Response Rates

Table E-1 presents response rates of various components of the sample for the 1978 National Survey of Natural and Social Scientists and Engineers. The characteristics presented here are based on the 1970 census or on the 1978, 1976, 1974, or 1972 surveys. Since the percentages in table E-1 are based on a complete count of the sample cases, no reference to the standard error tables is necessary.

Table E-2 presents distributions of respondents and nonrespondents by the set of characteristics shown in table E-1. The figures in table 2, unlike those in table E-1, have been weighted up to universe totals.

Table E-1 is the counterpart of table E-1 of appendix E of the first report in this series, *Selected Characteristics of Persons in Physical Science: 1978.* Table E-1 of that report, however, contained data for 362 respondents whose data were not represented in the tables and text of the report. Table E-1 of this present report for life scientists excludes data for these 362 respondents.

Table E-1. National Sample, by Field of Science or Engineering in 1976, 1974, and 1972, Age in 1978, and Sex, by Response in the 1978 Survey (Unweighted)

Sex, age in 1978 and field of science or engineering 1976	Response in 1978			
	Total			
	Number	Percent	Respondents	Nonrespondents
Total	50,093	100.0	81.4	18.6
SEX				
Male	46,877	100.0	81.6	18.4
Female	3,216	100.0	78.5	21.5
AGE IN 1978				
Under 30 years	287	100.0	76.0	24.0
30 to 34 years	6,264	100.0	75.7	24.3
35 to 39 years	9,226	100.0	78.1	21.9
40 to 44 years	8,075	100.0	81.3	18.7
45 to 49 years	7,644	100.0	83.1	16.9
50 to 54 years	6,994	100.0	84.9	15.1
55 to 59 years	5,183	100.0	85.8	14.2
60 to 64 years	3,193	100.0	85.5	14.5
65 to 69 years	1,930	100.0	82.2	17.8
70 years and over	1,297	100.0	76.2	23.8
FIELD OF SCIENCE OR ENGINEERING IN 1976				
Respondents in 1976	42,644	100.0	91.8	8.2
Total in scope in 1976	37,602	100.0	92.0	8.0
Computer specialists	2,064	100.0	90.8	9.2
Engineers	19,922	100.0	91.4	8.6
Mathematical specialists	1,486	100.0	92.6	7.4
Life scientists	3,800	100.0	93.9	6.1
Physical scientists	4,695	100.0	93.4	6.6
Environmental scientists	1,749	100.0	92.3	7.7
Psychologists	1,936	100.0	92.1	7.9
Social scientists	1,950	100.0	92.4	7.6
Total out-of-scope in 1976	5,042	100.0	89.8	10.2
Nonrespondents in 1976	7,449	100.0	21.9	78.1
FIELD OF SCIENCE OR ENGINEERING IN 1974				
Respondents in 1974	44,158	100.0	88.9	11.1
Total in scope in 1974	39,473	100.0	89.2	10.8
Computer specialists	2,291	100.0	87.4	12.6
Engineers	20,814	100.0	88.6	11.4
Mathematical specialists	1,612	100.0	89.3	10.7
Life scientists	4,026	100.0	91.0	9.0
Physical scientists	4,824	100.0	91.3	8.7
Environmental scientists	1,867	100.0	88.6	11.4
Psychologists	1,989	100.0	89.0	11.0
Social scientists	2,050	100.0	89.2	10.8
Total out-of-scope in 1974	4,685	100.0	86.2	13.8
Nonrespondents in 1974	5,935	100.0	25.6	74.4
FIELD OF SCIENCE OR ENGINEERING IN 1972				
Respondents in 1972	50,093	100.0	81.4	18.6
Total in scope in 1972	50,093	100.0	81.4	18.6
Computer specialists	3,391	100.0	76.7	23.3
Engineers	25,797	100.0	81.1	18.9
Mathematical specialists	2,185	100.0	81.9	18.1
Life scientists	4,891	100.0	84.1	15.9
Physical scientists	6,248	100.0	84.0	16.0
Environmental scientists	2,095	100.0	82.2	17.8
Psychologists	2,488	100.0	79.9	20.1
Social scientists	2,998	100.0	79.4	20.6

Table E-2. Respondents and Nonrespondents in the 1978 National Survey, by Field of Science or Engineering in 1976, 1974, and 1972, by Age in 1978, and Sex (Unweighted)

Sex, age in 1978, and field of science or engineering in 1976, 1974, 1972	Responded in 1978		Did not respond in 1978	
	Number	Percent	Number	Percent
Total	40,771	100.0	9,322	100.0
SEX				
Male	38,245	93.8	8,632	92.6
Female	2,526	6.2	690	7.4
AGE IN 1978				
Under 30 years	218	0.5	69	0.7
30 to 34 years	4,739	11.6	1,525	16.4
35 to 39 years	7,208	17.7	2,018	21.6
40 to 44 years	6,565	16.1	1,510	16.2
45 to 49 years	6,354	15.6	1,290	13.8
50 to 54 years	5,939	14.6	1,055	11.3
55 to 59 years	4,445	10.9	738	7.9
60 to 64 years	2,729	6.7	464	5.0
65 to 69 years	1,586	3.9	344	3.7
70 years and over	988	2.4	309	3.3
Median age	45	(X)	43	(X)
FIELD OF SCIENCE OR ENGINEERING IN 1976				
Responded in 1976	39,137	96.0	3,507	37.6
In scope in 1976	34,609	84.9	2,993	32.1
Computer specialists	1,875	4.6	189	2.0
Engineers	18,206	44.7	1,716	18.4
Mathematical specialists	1,376	3.4	110	1.2
Mathematicians	992	2.4	89	1.0
Statisticians	384	0.9	21	0.2
Life scientists	3,568	8.8	232	2.5
Agricultural scientists	1,446	3.5	94	1.0
Biologists	1,720	4.2	112	1.2
Medical scientists	402	1.0	26	0.3
Physical scientists	4,384	10.8	311	3.3
Chemists	2,692	6.6	171	1.8
Physicists and astronomers	1,443	3.5	124	1.3
Other physical scientists	249	0.6	16	0.2
Environmental scientists	1,615	4.0	134	1.4
Earth scientists	1,357	3.3	114	1.2
Atmospheric scientists	187	0.5	13	0.1
Oceanographers	71	0.2	7	0.1
Psychologists	1,784	4.4	152	1.6
Social scientists	1,801	4.4	149	1.6
Economists	750	1.8	70	0.8
Sociologists and anthropologists	484	1.2	38	0.4
Other social scientists	567	1.4	41	0.4
Out of scope	4,528	11.1	514	5.5
Did not respond in 1976	1,634	4.0	5,815	62.4

Table E-2. Respondents and Nonrespondents in the 1978 National Survey, by Field of Science or Engineering in 1976, 1974, and 1972, by Age in 1978, and Sex (Unweighted)—Continued

Sex, age in 1978, and field in science or engineering in 1976, 1974, 1972	Responded in 1978		Did not respond in 1978	
	Number	Percent	Number	Percent
FIELD OF SCIENCE OR ENGINEERING IN 1974				
Responded in 1974	39,252	96.3	4,906	52.6
In scope in 1974	35,212	86.4	4,261	45.7
Computer specialists	2,003	4.9	288	3.1
Engineers	18,450	45.3	2,364	25.4
Mathematical specialists	1,440	3.5	172	1.8
Mathematicians	1,041	2.6	131	1.4
Statisticians	399	1.0	41	0.4
Life scientists	3,663	9.0	363	3.9
Agricultural scientists	1,491	3.7	159	1.7
Biologists	1,755	4.3	160	1.7
Medical scientists	417	1.0	44	0.5
Physical scientists	4,402	10.8	422	4.5
Chemists	2,713	6.7	251	2.7
Physicists and astronomers	1,409	3.5	145	1.6
Other physical scientists	280	0.7	26	0.3
Environmental scientists	1,655	4.1	212	2.3
Earth scientists	1,399	3.4	176	1.9
Atmospheric scientists	186	0.5	22	0.2
Oceanographers	70	0.2	14	0.2
Psychologists	1,771	4.3	218	2.3
Social scientists	1,828	4.5	222	2.4
Economists	787	1.9	109	1.2
Sociologists and anthropologists	490	1.2	54	0.6
Other social scientists	551	1.4	59	0.6
Out of scope	4,040	9.9	645	6.9
Did not respond in 1974	1,519	3.7	4,416	47.4
Responded in 1972	40,771	100.0	9,322	100.0
In scope in 1972	40,771	100.0	9,322	100.0
Computer specialists	2,600	6.4	791	8.5
Engineers	20,927	51.3	4,870	52.2
Mathematical specialists	1,790	4.4	395	4.2
Mathematicians	1,315	3.2	289	3.1
Statisticians	475	1.2	106	1.1
Life scientists	4,113	10.1	778	8.3
Agricultural scientists	1,720	4.2	305	3.3
Biologists	1,798	4.4	341	3.7
Medical scientists	595	1.5	132	1.4
Physical scientists	5,249	12.9	999	10.7
Chemists	3,061	7.5	583	6.3
Physicists and astronomers	1,791	4.4	337	3.6
Other physical scientists	397	1.0	79	0.8
Environmental scientists	1,723	4.2	372	4.0
Earth scientists	1,553	3.8	345	3.7
Atmospheric scientists	132	0.3	18	0.2
Oceanographers	38	0.1	9	0.1
Psychologists	1,988	4.9	500	5.4
Social scientists	2,381	5.8	617	6.6
Economists	954	2.3	262	2.8
Sociologists and anthropologists	554	1.4	142	1.5
Other social scientists	873	2.1	213	2.3
Out of scope in 1972	-	-	-	-
Did not respond in 1972	-	-	-	-

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