Some Results of the 1962 PHYSICS ROSTER

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The National Science Foundation has maintained the National Register of Scientific and Technical Personnel for all of the natural sciences and psychology for the past decade. Originally designed to provide the basis for a pool of highly skilled manpower in times of national emergency, this function has been overshadowed by the value the Register has come to have as the best available source of statistical information on the American scientific community.

Data for the Physics and Astronomy Section of the National Register are collected by the American Institute of Physics under contract to NSF. In 1962, approximately 215 000 scientists furnished information about their professional characteristics to the National Register. Nearly 26 000 scientists indicated that their area of greatest competence was in physics or astronomy.

Included in that 26 000 total were 3500 graduate students who were then at a stage in their training where they could be considered to be an effective part of the national manpower resources. Included also were another one thousand individuals who were qualified for inclusion but were not professionally employed on a full-time basis at the time of the survey.

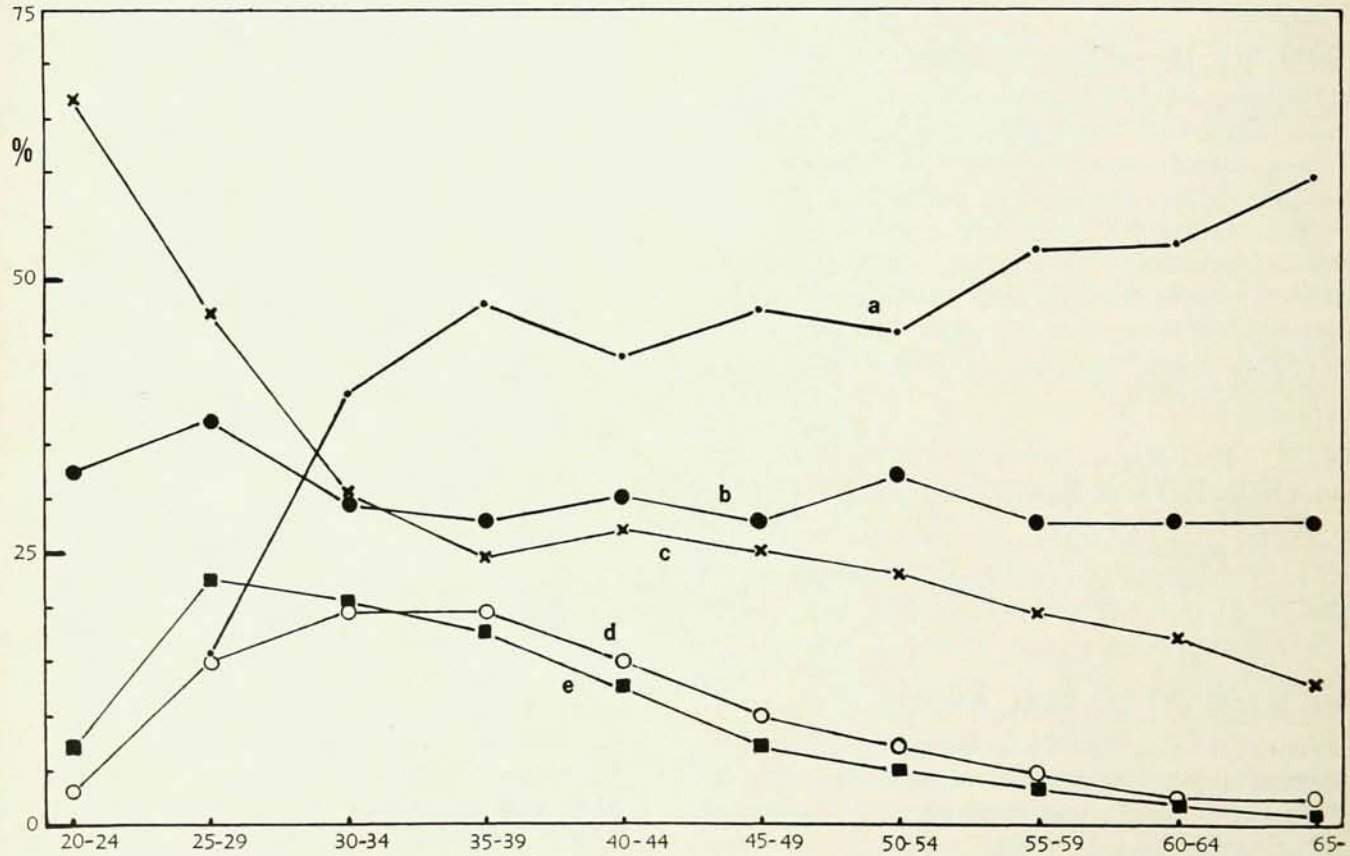


Fig. 1. Age distribution, showing levels of education of physicists. (a) PhD physicists; (b) MS physicists; (c) BS physicists; (d) all scientists; (e) all physicists.

Comparisons with all sciences

Physics continues to show up as a "young" science. The median age for the group in 1962 was thirty-four years as against thirty-eight years for the total group (Fig. 1). The fact that the survey includes a large proportion of the graduate students of physics does produce a slight bias. However, this lower age pattern has been a consistent one in previous rosters where only the full-time employed group were statistically analyzed.

Physicists held a higher percentage of advanced degrees in 1962 than were held in the combined sciences; in physics, 31 percent had the masters' and 35 percent the doctoral degrees, as compared with 26 and 31 percent, respectively, for all sciences. Here again the graduate-student group caused some distortion. For the full-time employed group of physicists and astronomers, the respective percentages were 28 and 41.

The distribution according to primary work activity was as follows:

Work Activity	*All Sciences*	*Total Physics*
Research, development or design	**35%**	**55%**
Management	**22**	**17**
Teaching	**16**	**20**
Other and no report	**27**	**8**

About forty-five percent of the full-time employed were employed by industry, thirty percent were employed by educational institutions, fourteen percent were in the employ of the federal government, and nine percent worked for nonprofit research organizations, including government-sponsored research institutions.

The median salary for physicists was $11 000 in 1962, which was $1000 higher than for all registrants in the National Register.

Areas of specialization

Competent physicists are capable of functioning in many areas of physics. Nevertheless, most tend to concentrate their talents in specific subfields, at least for a period of several years. The distribution of physicists in various specialized areas is shown in Fig. 2, together with information concern-

Table 1. Bachelor's Degree

		Salary by Years Experience					*Total Reporting Salary*	*Total Reporting Work Activity*
Work Activity		*1–4*	*5–9*	*10–14*	*15–19*	*20+*		
Research,	*No.*	70	39	22	6	11	151	926
Development,	*Q3*	$7K	$10K				$10K	
or Design	*Q2*	6K	9K				8K	
	Q1	5K	7K				6K	
Management,	*No.*	11	4	9	5	13	44	127
Administration,	*Q3*							
or Other	*Q2*						$10K	
	Q1							
Teaching	*No.*	254	85	45	22	76	500	923
	Q3	$6K					$7K	
	Q2	5K	$6K	$7K		$7K	6K	
	Q1	5K					5K	
Total Number		335	128	76	33	100	695	1976

Table 2. Master's Degree

		Salary by Years Experience					*Total Reporting Salary*	*Total Reporting Work Activity*
Work Activity		*1–4*	*5–9*	*10–14*	*15–19*	*20+*		
Research,	*No.*	47	58	45	15	26	198	1274
Development,	*Q3*						$11K	
or Design	*Q2*	$7K	$7K	$10K		$12K	8K	
	Q1						6K	
Management,	*No.*	8	11	13	11	30	76	167
Administration,	*Q3*							
or Other	*Q2*					$10K	$10K	
	Q1							
Teaching	*No.*	255	312	242	125	431	1400	1891
	Q3	$6K	$7K	$8K	$9K	$9K	$8K	
	Q2	6K	7K	7K	8K	8K	7K	
	Q1	5K	6K	6K	7K	7K	6K	
Total Number		310	381	300	151	487	1674	3332

Table 3. Doctoral Degree

		Salary by Years Experience					*Total Reporting Salary*	*Total Reporting Work Activity*
Work Activity		*1–4*	*5–9*	*10–14*	*15–19*	*20+*		
Research,	*No.*	328	395	295	116	219	1375	1581
Development,	*Q3*	$8K	$10K	$13K	$15K	$17K	$13K	
or Design	*Q2*	8K	9K	12K	13K	14K	10K	
	Q1	7K	8K	10K	11K	12K	8K	
Management,	*No.*	2	24	45	32	164	268	296
Administration,	*Q3*					$19K	$18K	
or Other	*Q2*			$15K	$16K	16K	15K	
	Q1					13K	13K	
Teaching	*No.*	196	487	401	221	628	1947	2084
	Q3	$8K	$9K	$11K	$12K	$14K	$11K	
	Q2	8K	8K	10K	10K	11K	9K	
	Q1	7K	8K	8K	9K	9K	8K	
Total Number		526	906	741	369	1011	3590	3961

NOTE: In Tables 1 to 12, quartiles 1 and 3 computed on 100 or more; quartile 2 on 25 or more.

Table 4. Bachelor's Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	319	206	154	43	65	813	880
Development,	Q3	$8K	$10K	$11K			$10K	
or Design	Q2	7K	9K	10K	$11K	$11K	8K	
	Q1	7K	8K	9K			7K	
Management or	No.	26	34	86	32	76	258	263
Administration	Q3						$14K	
	Q2	$8K	$9K	$12K	$12K	$14K	12K	
	Q1						10K	
Other	No.	65	27	17	10	12	138	155
	Q3						$9K	
	Q2	$7K					8K	
	Q1						7K	
Total Number		410	267	257	85	153	1209	1298

Table 5. Master's Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	103	144	153	41	68	529	589
Development,	Q3		$10K	$11K			$11K	
or Design	Q2	$8K	9K	11K	$12K	$12K	10K	
	Q1		8K	10K			8K	
Management or	No.	3	11	41	24	67	147	151
Administration	Q3						$14K	
	Q2			$12K		$14K	13K	
	Q1						12K	
Other	No.	11	12	12	6	15	62	70
	Q3							
	Q2						$10K	
	Q1							
Total Number		117	167	206	71	150	738	810

Table 6. Doctoral Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	74	148	135	49	82	501	523
Development,	Q3		$12K	$13K			$13K	
or Design	Q2	$10K	11K	12K	$13K	$14K	11K	
	Q1		9K	11K			10K	
Management or	No.	2	17	49	32	147	247	251
Administration	Q3					$18K	$17K	
	Q2			$14K	$15K	15K	15K	
	Q1					14K	14K	
Other	No.	3	6	9	4	18	40	42
	Q3							
	Q2							
	Q1							
Total Number		79	171	193	85	247	788	816

ing employers, educational background, work activities, and median years of professional experience.

Salary data

Salary information was voluntarily supplied by 20 431 of the 21 273 full-time employed physicists and astronomers. Since many factors affect salaries and since both physicists and their employers have time and again demonstrated an active interest in this kind of information, a five-variable grid method of reporting these data was developed by Fred Boercker of the AIP staff. The tables shown here were prepared from 1962 National Register tabulations by Dr. Boercker for *Physics Manpower and Educational Statistics* (Second Edition)[1] and report salary as a function of type of employer, level of educational training, primary work activity, and years of professional work experience.

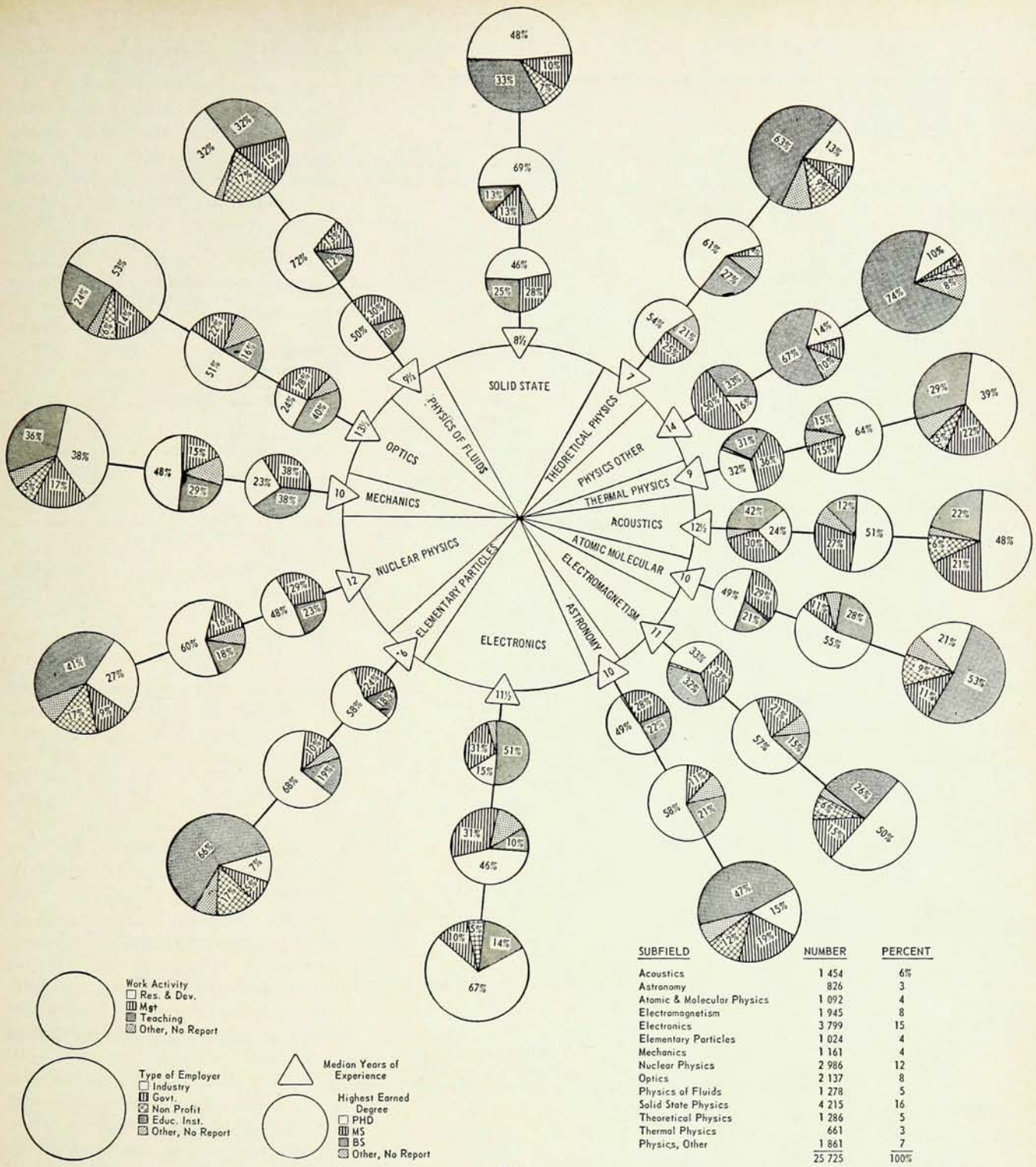
Interpretation of academic salaries depends heavily upon still another set of variables—academic rank and salary base. The table on page 51 lists median salaries paid to physics teachers by colleges and universities on both an academic-year base and a calendar-year base. College and university teaching salaries can thus be compared with calendar-year salaries reported by individuals employed by industry, government, or nonprofit organizations.

Women in Physics

From time to time, inquiries are received by the American Institute of Physics requesting information about women physicists. For the 1962 National Register some detailed information has been tabulated about women in physics and is presented here.

Median salaries were $3000 lower, upper quartile salaries $4000 lower, and lower quartile salaries $2000 lower for women than they were for men physicists. Part of the difference may be explained by the fact that the median number of years of professional

[1] "Physics Manpower and Educational Statistics—Second Edition" will be published in April 1964. A limited number of copies will be available for distribution by the Public Relations Department, American Institute of Physics, 335 East 45 Street, New York 17, N. Y.



SUBFIELD	NUMBER	PERCENT
Acoustics	1 454	6%
Astronomy	826	3
Atomic & Molecular Physics	1 092	4
Electromagnetism	1 945	8
Electronics	3 799	15
Elementary Particles	1 024	4
Mechanics	1 161	4
Nuclear Physics	2 986	12
Optics	2 137	8
Physics of Fluids	1 278	5
Solid State Physics	4 215	16
Theoretical Physics	1 286	5
Thermal Physics	661	3
Physics, Other	1 861	7
	25 725	100%

Fig. 2

Median Salaries of Physics Teachers

Highest Earned Degree	*Professor*	*Associate Professor*	*Assistant Professor*	*Instructor*	*Other & No Report*	*Total*	*Percent*
Bachelor's	11	22	50	189	507	779	8%
Master's	122	231	364	474	607	1 798	23%
Doctorate	1 339	830	764	129	223	3 285	69%
No report	1	1	3	5	4	14	—
Total	1 473	1 084	1 181	797	1 341	5 876	100%
Median Salary	$12 000	$ 9 000	$8 000	$6 000		$ 9 000	
Median-academic-year base	11 000	9 000	7 000	6 000		8 000	
Median-calendar-year base	14 000	11 000	9 000	7 000		10 000	

Table 7. Bachelor's Degree

Work Activity		*Salary by Years Experience* 1–4	5–9	10–14	15–19	20+	*Total Reporting Salary*	*Total Reporting Work Activity*
Research,	*No.*	91	64	50	17	21	246	317
Development,	*Q3*						$12K	
or Design	*Q2*	$7K	$10K	$12K			9K	
	Q1						7K	
Management or	*No.*	7	4	12	12	21	58	61
Administration	*Q3*							
	Q2						$14K	
	Q1							
Other	*No.*	10	9	13	4	5	44	59
	Q3							
	Q2						$9K	
	Q1							
Total Number		108	77	75	33	47	348	437

Table 8. Master's Degree

Work Activity		*Salary by Years Experience* 1–4	5–9	10–14	15–19	20+	*Total Reporting Salary*	*Total Reporting Work Activity*
Research,	*No.*	83	90	66	25	29	301	365
Development,	*Q3*						$12K	
or Design	*Q2*	$8K	$11K	$12K	$13K	$14K	11K	
	Q1						9K	
Management or	*No.*	2	11	33	9	11	66	72
Administration	*Q3*							
	Q2			$14K			$14K	
	Q1							
Other	*No.*	3	7	8	3	2	23	34
	Q3							
	Q2							
	Q1							
Total Number		88	108	107	37	42	390	471

Table 9. Doctoral Degree

Work Activity		*Salary by Years Experience* 1–4	5–9	10–14	15–19	20+	*Total Reporting Salary*	*Total Reporting Work Activity*
Research,	*No.*	126	306	220	104	97	860	902
Development,	*Q3*	$12K	$14K	$16K	$17K		$15K	
or Design	*Q2*	11K	12K	14K	15K	$16K	13K	
	Q1	9K	11K	13K	13K		11K	
Management or	*No.*	7	25	56	47	92	228	250
Administration	*Q3*						$20K*	
	Q2		$16K	$18K	$19K	$20K*	19K	
	Q1						16K	
Other	*No.*	3	9	10	5	3	30	35
	Q3							
	Q2							
	Q1							
Total Number		136	340	286	156	192	1118	1187

* Salaries of $20 000 and beyond were all tabulated as $20 000.

work experience was one year lower for women. Another factor which would have a very real effect on salaries was the percentage of advanced degrees. Whereas the total physics register contained thirty-one percent master's and thirty-five percent PhD's, comparable percentages for women were thirty-six and twenty-five percent.

Comparisons Between Men and Women in Physics Roster

	Men	*Women*
Number in Roster	24 966	759
Percentage in Roster	97%	3%
Employers:		
Educational Institutions	36%	51%
Government	12%	11%
Nonprofit Organizations	8%	8%
Industry	39%	18%
Other & no report	5%	12%
Work Activities:		
Research, development, design	55%	41%
Management	17%	4%
Teaching	20%	37%
Other & no report	8%	18%

The 1964 Register

The number of full-time employed physicists in the United States is estimated at about twenty-eight to thirty thousand, based upon the degree production at various levels over a period of years and allowing for attrition. This figure is substantiated by a count of roughly twenty-nine thousand for the unduplicated membership in AIP Member Societies. This would indicate that National Register coverage of the physics population is about seventy-five percent. While we have reason to believe that this group is representative of the whole, we would prefer to report on the entire physics community.

Shortly after this article appears, many physicists and astronomers will be receiving the 1964 National Register questionnaire. In the national interest of providing information about the scientific community today and to facilitate the following of manpower trends, we urge those eligible to register to complete these forms and return them as quickly as possible. The sponsoring organizations are most grateful to the thousands of individuals who cooperated with this effort in 1962, thus making it possible to compile the data summarized here.

Table 10. Bachelor's Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	851	686	401	116	174	2272	2438
Development,	Q3	$9K	$11K	$13K	$15K	$17K	$11K	
or Design	Q2	8K	10K	12K	12K	15K	9K	
	Q1	7K	9K	10K	11K	12K	8K	
Management or	No.	51	130	249	113	240	804	887
Administration	Q3		$13K	$17K	$19K	$20K*	$18K	
	Q2	9K	11K	15K	16K	18K	15K	
	Q1		10K	13K	14K	14K	12K	
Other	No.	206	141	96	27	63	557	632
	Q3	$8K	$11K				$11K	
	Q2	7K	9K	$11K	$12K	$13K	9K	
	Q1	7K	8K				7K	
Total Number		1108	957	746	256	477	3633	3957

* Salaries of $20 000 and beyond were all tabulated as $20 000.

Table 11. Master's Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	421	557	470	115	177	1781	1949
Development,	Q3	$10K	$12K	$14K	$15K	$16K	$13K	
or Design	Q2	9K	10K	13K	13K	14K	11K	
	Q1	8K	10K	11K	11K	12K	9K	
Management or	No.	11	88	231	128	186	656	738
Administration	Q3			$18K	$20K*	$20K*	$20K*	
	Q2		$13K	15K	17K	18K	16K	
	Q1			13K	15K	16K	14K	
Other	No.	37	33	34	22	29	159	199
	Q3						$14K	
	Q2	$9K	$10K	$12K		$15K	11K	
	Q1						9K	
Total Number		469	678	735	265	392	2596	2886

* Salaries of $20 000 and beyond were all tabulated as $20 000.

Table 12. Doctoral Degree

Work Activity		Salary by Years Experience 1–4	5–9	10–14	15–19	20+	Total Reporting Salary	Total Reporting Work Activity
Research,	No.	274	597	435	171	238	1732	1820
Development,	Q3	$13K	$15K	$17K	$18K	$20K*	$16K	
or Design	Q2	12K	13K	15K	16K	17K	14K	
	Q1	11K	12K	13K	14K	15K	12K	
Management or	No.	15	136	259	178	309	906	1003
Administration	Q3		$18K	$20K*	$20K*	$20K*	$20K*	
	Q2		16K	18K	20K*	20K*	20K*	
	Q1		14K	16K	17K	19K	16K	
Other	No.	5	8	9	8	25	57	81
	Q3							
	Q2					$19K	$15K	
	Q1							
Total Number		294	741	703	357	572	2695	2904

* Salaries of $20 000 and beyond were all tabulated as $20 000.