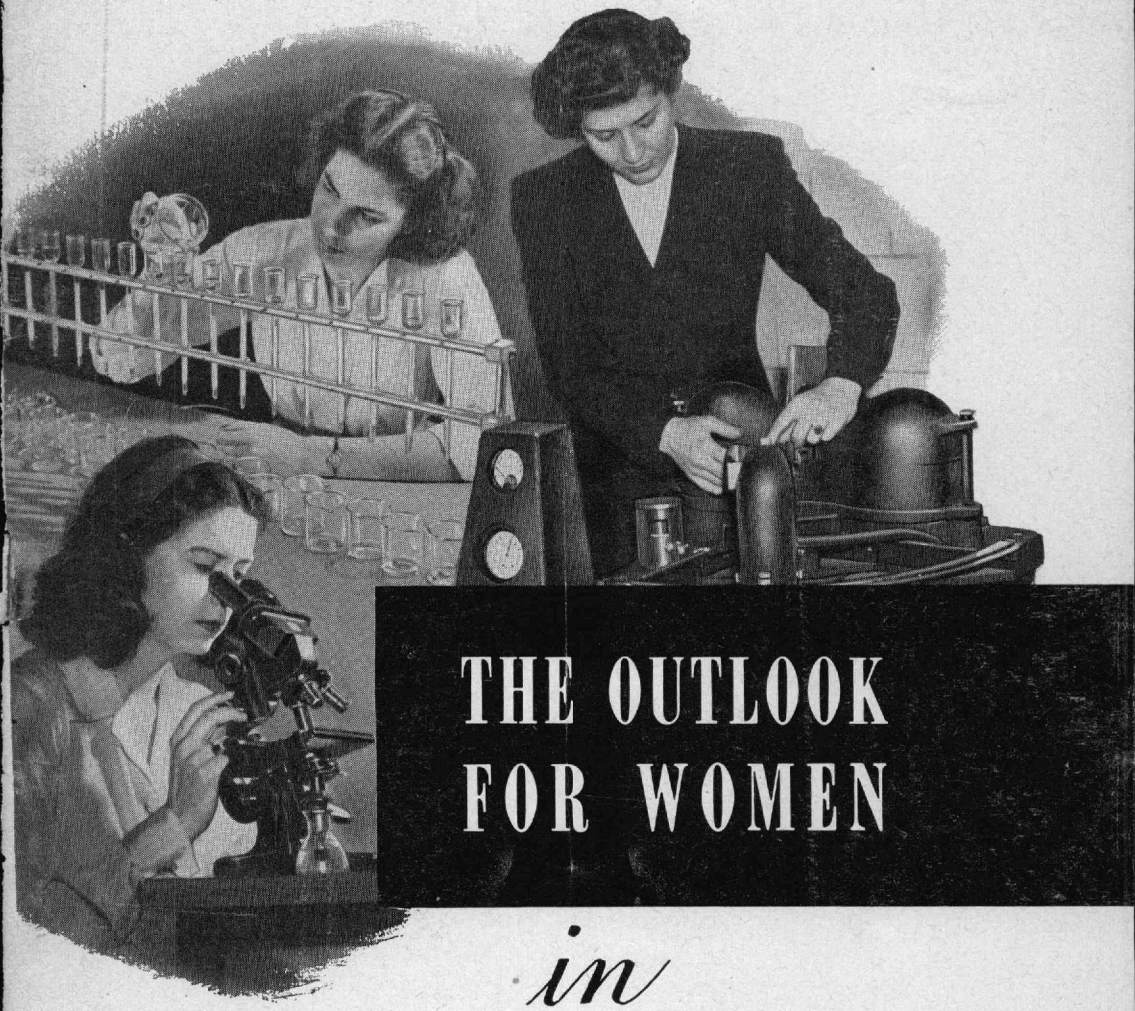

THE OUTLOOK FOR WOMEN

in

OCCUPATIONS RELATED TO SCIENCE

Bulletin No. 223–8

U. S. DEPARTMENT OF LABOR

WOMEN'S BUREAU

UNITED STATES DEPARTMENT OF LABOR
L. B. SCHWELLENBACH, SECRETARY
WOMEN'S BUREAU
FRIEDA S. MILLER, DIRECTOR

The Outlook for Women in Occupations Related to Science

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No. 223–1 *The Outlook for Women in Science*
No. 223–2 *The Outlook for Women in Chemistry*
No. 223–3 *The Outlook for Women in the Biological Sciences*
No. 223–4 *The Outlook for Women in Mathematics and Statistics*
No. 223–5 *The Outlook for Women in Architecture and Engineering*
No. 223–6 *The Outlook for Women in Physics and Astronomy*
No. 223–7 *The Outlook for Women in Geology, Geography, and Meteorology*
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Note on Pagination—Throughout the series, page numbers show both the volume number and the page number in that volume. For example, page 24 in volume 3 is shown as 3–24; in volume 6, as 6–24.

LETTER OF TRANSMITTAL

UNITED STATES DEPARTMENT OF LABOR,
WOMEN'S BUREAU,
Washington, December 22, 1947.

SIR: I have the honor of transmitting a description of the outlook for women in occupations related to science which has been prepared as a part of a study on the outlook for women in science. The extraordinary demand for women with scientific training during World War II and the resulting questions which came to the Women's Bureau prompted us to undertake this study. The paucity of published information on women in science and the encouragement of the scientists and educators who were consulted in the course of this study confirmed the need for the information here assembled and synthesized. The study was planned and directed by Marguerite Wykoff Zapoleon and completed with the assistance of Elsie Katcher Goodman and Mary H. Brilla of the Employment Opportunities Section of the Bureau's Research Division. Other members of the Bureau staff who helped to broaden the coverage of this study through interviews in the field were regional representatives Margaret Kay Anderson, Martha J. Ziegler, Rebecca G. Smaltz, and another member of the research staff, Jennie Mohr. Corinne LaBarre, Research Assistant, of the Western Personnel Institute, Pasadena, Calif., furnished the information obtained from western colleges.

The part of the study here transmitted was written by Marguerite Wykoff Zapoleon with the assistance of Elsie Katcher Goodman.

Respectfully submitted.

FRIEDA S. MILLER, *Director.*

Hon. L. B. SCHWELLENBACH,
Secretary of Labor.

FOREWORD

Much has been written about science and scientists, but little has been told about the work women trained in science have done and can do in the future.

Although these women are few in number when compared to men in science or to women in such occupations as teaching and nursing, their contribution to the national welfare, so strikingly demonstrated in World War II, goes forward daily in the laboratories, classrooms, offices, and plants in which they work.

The every-day story of where these women work, of what kind of work they are doing, and of what other young women who join their ranks in the future may do has been the subject of this report on the outlook for women in science. Unlike the usual monograph which describes an occupation in detail at a particular point in time, this study, like the Women's Bureau series on occupations in the medical and health services which preceded it, is concerned primarily with changes and trends.

Although more than 800 books, articles, or pamphlets were culled for background information, the principal raw material for the entire study of which this bulletin is a part came from such primary sources as scientific organizations, employers and trainers of women scientists, and men and women scientists themselves. Principal sources were as follows:

Scientific organizations: The National Research Council supplied useful directories of scientific laboratories and organizations. Helpful criticism and direction to other authorities were obtained from its Office of Scientific Personnel. Sixty separate organizations of scientists supplied information on their women members, by interview or correspondence.

Federal agencies: Unpublished information on personnel in scientific fields was supplied by:

The United States Bureau of Labor Statistics,
The National Roster of Scientific and Specialized Personnel,
The United States Office of Education,
The United States Civil Service Commission, and
The United States Public Health Service.

In addition, 52 separate bureaus, offices, or other operating units of the Federal Government known to employ scientists were solicited for information regarding the number of women

employed on jobs requiring scientific training and the type of work they were doing. Detailed statistics over a period of years were available from some agencies, while only fragmentary data were obtained from others. The women's military services likewise supplied information on the wartime use of women trained in science in the WAC, WAVES, and the Marine Corps.

Private industry: One hundred industrial firms were visited in 1945 and 1946 to obtain information, usually by interview with the director of research or the personnel director, on the women employed by any part of the organization in any capacity requiring scientific training of college level. Prewar, wartime, and postwar statistics were obtained where available, as well as suggestions and comments. In many instances, some of the women in scientific work were interviewed on the job. The firms visited included:

Seventy-eight firms listed in the National Research Council's 1946 directory of 2,443 firms having research laboratories. The firms visited are listed in the directory as employing 24,816 persons as scientific or technical personnel in their laboratories. This number represented 28 percent of the total personnel of this type estimated as employed in all the laboratories listed. In addition to this numerical coverage, an attempt was made to include among the 78 firms visited small as well as large firms, plants in all parts of the United States, and a variety of industries. However, the intricate industrial organization, inter-relationships, and variety of research revealed in the directory, added to the fact that some firms did not report personnel statistics and none reported women separately, made the selection of a true sample complicated beyond its value for this purpose. The firms visited were chosen rather as a clue to industrial firms most likely to be engaged in the type of work in which women trained in science are used. In all firms, information was requested for the entire organization rather than for the research laboratory only.

Eighteen commercial testing laboratories which offer testing services to industry and individuals and which employed women were also visited. Seven others contacted did not employ women. These 25 laboratories represented 10 percent of the 244 commercial testing laboratories listed in the National Bureau of Standard's 1942 Directory of Commercial Testing and College Research Laboratories. Since per-

sonnel is not reported in the Directory, there is no clue to the coverage of workers.

Three large additional industrial firms which employed women in laboratory work but were not listed as having research laboratories were visited, as was one biological supply house.

Research institutions: Eight research institutions or centers, some of them identified with a particular college or university, also supplied information on women members of the scientific staff.

Colleges and universities: Statistical information on the number of women graduated with degrees in science, mathematics, and engineering over a period of years from 1939–40 to 1946 was obtained from 30 colleges and universities and from 9 engineering schools. Again an attempt was made to obtain wide geographical coverage and to cover different types of institutions, such as women's colleges, State universities, and small liberal arts colleges. The information available from these sources, too, varied. Placement bureaus and heads of science departments as well as deans of women at these institutions and at 6 other colleges contributed reports on the demand for women trained in the sciences. The Western Personnel Institute made possible the inclusion of data which it collected for the Bureau from its affiliated colleges and universities in the far West.

Since no recent data were available on the number of women teaching science in the colleges, a count was made in 1947 of the women identifiable by name who were listed on science faculties in the catalogs of 330 institutions of higher learning which were then available in the United States Office of Education Library. These institutions were selected because they are believed by the United States Office of Education to be representative in their enrollments of the 1,749 institutions of higher education in the United States and, therefore, are likely to have faculties equally representative.

Other sources: In addition, 97 individuals not included in the afore-mentioned sources, most of them women scientists, contributed information, suggestions, or helpful criticisms of the preliminary manuscripts circulated before revision for publication.

While every effort has been made to obtain wide coverage, there remain some dark corners still unexplored because of the range and variety of these fields and the difficulty of obtaining information from widely scattered sources. Perhaps this beginning will result in further additions to our so-little knowledge.

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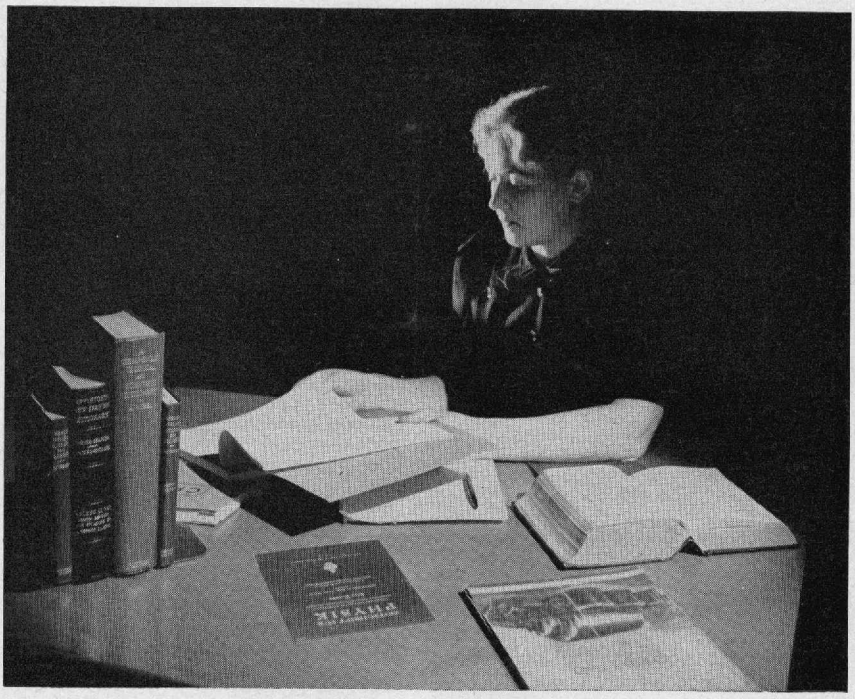

Courtesy Crane Co. Research Laboratories

Figure 1.—The technical librarian of the research laboratories of a large corporation with a few of the references and materials she uses in her work.

THE OUTLOOK FOR WOMEN IN OCCUPATIONS RELATED TO SCIENCE

INTRODUCTION

Many establishments engaged in scientific work employ not only scientists working directly in scientific research or observation, but also a number of other persons engaged in such occupations as those of: the technical librarian, the patent searcher, the technical writer or editor, the technical secretary, the technical artist or illustrator. In these, the possession of a particular nonscientific skill or knowledge is as important as scientific training.

There are similar types of work not elaborated upon here: the purchase and selling of scientific instruments and supplies; technical liaison between research and sales departments (interpreting research results in nontechnical language for salesmen's use); technical personnel work involving the selection of scientific personnel; and the teaching of science below college level. In these occupations, such qualifications as business acumen, training in personnel, or the ability to instruct in the classroom may be as essential as training in science.

The amount and kind of training required in science as well as the amount and kind of nonscientific skill or knowledge needed vary widely for particular positions in occupations of this type according to the needs and hiring habits of the employers.

For public high school teachers of science, for instance, the requirements differ in the various States and cities. In some States, teachers of high school physics are required to have only 1 year of college training in that science; in other States, a master's degree in physics is required. In small high schools, where a science teacher is expected to teach all the sciences offered and perhaps mathematics as well, a college background showing a variety of sciences is preferred to an intensive specialization in one. Opportunities in high school teaching have been mentioned in other parts of this series in the discussions of the separate scientific fields. However, it is well to remember that there were more than 50,000 teachers of science in the 28,000 high schools in the United States in 1945 (*11*). In size, this group is larger than any one of the scientific groups except for those in chemistry, engineering, and medicine. Moreover, the need for additional teachers of science in 1947

was still great, and indications were that opportunities for women in this field would continue in the years to come.

Although technical librarians, secretaries, illustrators, writers and editors, and patent searchers have also been mentioned in the discussions of the outlook for women in particular sciences, these occupations warrant separate treatment here not only because of the dual qualifications required to enter them and the little publicity that has been given them, but because women form a much higher proportion in them than in the laboratory phases of scientific work.

THE OUTLOOK FOR WOMEN IN TECHNICAL LIBRARY WORK

Many of the discoveries of modern scientific research have depended upon the library as well as the laboratory. At least part of the research behind most recent discoveries has taken place in a special library where the literature on a particular technical or scientific field appearing in all types of scientific and technical publications, periodicals, and trade journals is collected and classified. The librarian in charge is usually a technical librarian although, in her own organization, she may be called a chemical librarian, an engineering librarian, a special librarian, or even a library chemist.

Whatever her title, the technical librarian is usually a person trained in both science and library work. Unlike the general librarian who works primarily with books, her work is mostly with pamphlets, articles, unpublished treatises, and indices to such sources on scientific topics. In addition to locating, assembling, cataloging, and indexing these materials, and answering numerous reference questions on science or technology each day, the technical librarian is equipped to make exhaustive searches of the literature on particular scientific topics and to summarize her findings in special reports. Unless the library is one of the few large enough to have one or more translators, she is often required to translate scientific articles published in a foreign language, and to assist laboratory and other staff members by routing to them new articles relating to the problems on which they are working. Such service to a research staff saves time and reduces duplication by making available information on previous work done in a particular field. Its value to the laboratory scientist was well described some years ago by a member of the staff of the Mellon Institute of Industrial Research (*1*).

The scope of the services rendered in a technical library is revealed in a manual for the libraries of research laboratories prepared by a woman who serves as technical librarian of a large industrial company. Among the topics listed in the manual's index are: Over-the-counter service, literature searches, abstracts and bibliographies, translations, circulation of periodicals and reproduction literature (photographs, blueprints, etc.), interlibrary loan service, editing the library bulletin, special assignments, classification and cataloging, photostats and pamphlet files, orders and subscriptions, processing incoming literature, binding, microfilms, library notebook and printed forms, correspondence and library statistics, location of library hold-

ings, equipment, and budget (*4*). An idea of the clientele served and the variety of problems handled may be gleaned from a description by 2 women librarians in the chemical industry based on 20 libraries in that industry (*27*). The work of technical librarians employed in public and university libraries is similar in nature, although less concentrated on a particular industry.

A high percent of the membership of the Special Libraries Association in the Science-Technology Group are women, although the percent of men is higher in this group than in any other subject group in the Association.

The rapid growth of technical librarianship is evident as we look back to the prewar period.

Prewar Distribution

In 1940, about 900 technical librarians were active members of the Science-Technology Group of the Special Libraries Association. They comprised about two-fifths of the total membership of the Association, which included some 2,350 librarians (*25*).

Of the 765 special libraries of all types covering subjects ranging from accounting and acoustics to zinc and zoology and operated by a variety of organizations including industries, universities, museums, government agencies, and foundations, about two-fifths were in the field of science and technology (*21*). But all the special libraries taken together employed only about 7 percent of the 36,000 librarians reported by the Census in 1940, most of whom were employed in unspecialized services in public and school libraries.

Unlike other scientific fields, technical library work appeared to be a field in which women were in the majority. Nineteen of the 78 industrial research laboratories visited by the Women's Bureau in the course of this study employed women as technical librarians or literature searchers before the war; only a few of these and of the others had men employed in this work.

In one chemical manufacturing plant, the only woman employed in scientific work before the war was a technical librarian who did library searches, abstracting, and translating. In addition to a B. S. in chemistry she had had training in technical library work. In another chemical manufacturing plant a woman with a Ph. D. in chemistry had been in charge of the technical library for 15 years. Her assistant, who had been employed there for 3 years, also had a Ph. D. in chemistry. Most of the librarians had had technical library training, although occasionally, as in other libraries, the librarian had entered, often many years ago, as a subject specialist. In only a few laboratories

were the women librarians graduates of library schools who had acquired a knowledge of science on the job.

Before the war, many of the 365 women employed as librarians in the Federal Government (*29*) were undoubtedly working in specialized libraries, such as the Army Medical Library and the Patent Office Scientific Library. Technical librarians were also employed in chemistry, engineering, and other special departments of college and university libraries, in public libraries having technical departments, in museums, and in the highly specialized libraries maintained by some of the professional and scientific societies and associations.

Annual Addition to the Supply

Since those who enter this field come from two principal sources, schools offering degrees in science and library schools (for the graduates of both of which there are many other outlets), there is no way of estimating the number who normally became available each year for this work before World War II. There was, however, evidence of a scarcity of librarians qualified to fill positions requiring scientific backgrounds (*18*). Of the 1,400 librarians graduated from schools of library science each year before the war, few were subject-matter specialists, and fewer still had a background in science (*31*).

Wartime Changes

In spite of the increased number of opportunities available to men and women in technical library work during the war, the supply of new persons available each year for such work decreased. In 1943–44, there were only about 880 persons graduated with a degree in library science (*30*).

The other principal source of supply of technical librarians also was affected. Women just graduated from college with only the barest amount of training in chemistry, physics, or the biological sciences were hired for laboratory jobs, which most of them preferred to technical library work, where training in library science might become necessary. In some of the newer technical libraries, such as those in aviation and electronics, for example, it was almost impossible to secure librarians with adequate technical backgrounds (*26*) (*20*). Many positions of this type remained vacant. In 1943, the employment service of the Special Libraries Association was unable to fill 172 of the 413 openings reported to it. Although in some of these, low salaries were the principal deterrent, many were well-paid jobs vacant because of the lack of trained technical people (*31*).

The Special Libraries Association hesitated to encourage the formation of new libraries because of the lack of trained personnel (*19*). It concentrated its efforts in 1944 on an intensive recruiting program to attract properly qualified college students to the profession (*14*). That these recruiting efforts were successful in part is indicated by the fact that the number of technical librarians increased, while the library profession as a whole lost librarians during the war (*31*). In 1944, more than 1,100 librarians employed in some 800 technical libraries were members of the Science-Technology Group of the Special Libraries Association (*5*). In spite of this increase, the shortages became more acute as the demand grew faster than the supply (*13*).

More than one-third of the technical libraries registered in 1944 with the Special Libraries Association were maintained by industrial corporations (*17*). That such libraries were invariably small was revealed in the Women's Bureau study of industrial research laboratories, which showed at least 60 women employed during the war as technical librarians or literature searchers in 22 industrial concerns. Most of these employed only one or two women librarians; only a few had as many as four or five. However, one of the largest employed 30 to 40 women, with degrees in science, in technical libraries in widely scattered parts of its organization.

As in industry, the demand for technical librarians also increased in the Federal Government, in training institutions, and in research organizations working on war projects, although no statistics are available on the extent of the increase.

Earnings and Advancement

Until World War II, low salaries kept many women from entering this field. The salaries offered were almost invariably lower than those offered laboratory personnel of equivalent training (*18*). The range of salaries paid to all types of special librarians before the war was reported to be from $1,200 to $12,000. In New York, for example, the average salary for the heads of special libraries was said to be about $2,600 a year, and the average for assistants or beginners varied from $1,560 to $1,820 a year (*3*).

Differences in the duties and in the qualifications of special librarians in particular positions were reflected in the wide variation in their salary levels. According to one writer:

> Special library positions are even less standardized than positions in other types of libraries. As a result, qualifications offered and demanded vary so much that salaries are determined more by individual bargaining than by the market level (7).

During the war, salaries rose. The Special Libraries Association in a 1945 survey found that the average (mean) salary for 310 librarians in the Science-Technology Group was $3,050 a year. The range was from $1,340 to a high of $12,000. For the middle 50 percent of the group, the range was from $2,287 to $3,684. For the 60 technical library assistants covered in the survey who were members of the Science-Technology Group but who had beginning positions, the average (mean) salary was reported to be $2,490 a year (*7*).

The technical librarian is usually advanced in salary as she becomes more experienced in her work and gains greater knowledge of the needs of the organization in which she is employed. She may become so expert in a particular field as to become almost indispensable to her employer (*24*). But because most technical libraries are small, opportunities for advancement in position are limited to the larger libraries in which one or more assistants are employed. Women as a rule, however, are more likely to be found as head librarians in a research organization than they are as group leaders in the laboratory. A head librarian in a petroleum refining corporation visited by a representative of the Women's Bureau, for example, supervised four assistants, all of whom had a bachelor's degree in chemistry. She herself had a master's degree in chemistry and had been with the company for 10 years.

According to one woman technical librarian, women have a much better chance of rising to well-paid administrative jobs through technical library work than through laboratory work, because of their opportunities to engage in both administrative and research work (*23*). In Federal Government service, for example, women have held positions of technical librarians at a salary of more than $8,000, which only a few women scientists attain.

Organizations

The American Library Association, to which a librarian may belong by virtue of her library training and experience, has a special section for agricultural libraries and another for engineering school libraries in its division for college and reference libraries. There is also a business and technology section in its division of public libraries. In addition to this and such scientific organizations as the technical librarian's training and experience in science may qualify her for, there is the Special Libraries Association already mentioned. This was organized in 1909 primarily for those who work in specialized libraries or library departments built around special subjects to serve a restricted clientele. Membership in this association is open to in-

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dividuals actively engaged in library, statistical, or research work, or for those who have been so engaged, and there are special interest groups to meet their needs within the Association. Most scientific librarians who belong to the Association specify interest in the Science-Technology Group, in the Biological Sciences Group, the Geography and Map Group, or the Museum Group.

The largest of these, the Science-Technology Group, is further subdivided into a chemistry section, an engineering-aeronautics section, a petroleum section, and a pharmaceutical section. The members of this group in 1947 numbered more than 2,000. In the Biological Sciences Group, there were 418 members in 1947. The Geography and Map Group had 184 members.

The Outlook

The continuing shortage of technical librarians, the growing appreciation of their ability to utilize the knowledge incorporated in the vast storehouses of technical and scientific literature, and increasing salaries assure good opportunities for women in technical library work. Moreover, women are generally sought for technical library positions, although reluctance to employ women in laboratories, especially in research, continues in many places.

In 1947, membership in the Science-Technology Group of the Special Libraries Association totaled more than 2,000, an increase of more than 100 percent since 1940. However, the increased supply was still insufficient to meet the demand of the more than 900 science-technology libraries on the Association's roster, 350 of them in industrial firms and the remainder in institutional, university, and government libraries concerned with science. The Association expected the shortage to continue for a number of years. However, if laboratory jobs for women graduating with degrees in chemistry and physics again become scarce (as they were before the war), more women trained in science may again seek opportunities in technical library work.

More than 400 women were members of the Biological Sciences Group of the Special Libraries Association in 1947. More than half of them were working in industrial or pharmaceutical organizations, one-fifth in college libraries, and more than one-sixth in hospital libraries.

Of the 78 industrial research laboratories visited by the Women's Bureau in 1945–46, only a few employed men as librarians, but 25 employed women as technical librarians, literature searchers, or translators, as compared with 22 during the war and 19 before the war. In all, more than 100 women were employed by the 25 firms. Firms

manufacturing electrical machinery, chemicals, and chemical products employed most of the women; the other women were employed in a variety of other industries, including glass, foods, metal products, and paper manufacturing, and petroleum refining.

Practically all of the women employed as technical librarians, even those with relatively little training in science, were retained after the war or, if they left, were replaced by women. In contrast, some women laboratory workers were replaced by men. A woman chemist, for example, was retained as a technical librarian in one company which planned to release the women it hired during the war as research chemists. In only one instance did an industrial employer report that the woman chemist serving as a technical librarian would be replaced by a man when she left.

Several employers commented on the difficulty of locating women librarians with technical backgrounds; one reported an opening in his glass manufacturing firm for which he had been unable to find a qualified person. Many expressed a preference for women in technical library work because men lacked interest in this type of work. The head of a foods laboratory reported that women were neater and more satisfactory at this work than men.

About a year after the close of the war, the Women's Bureau found 111 women employed as librarians in technical libraries in 18 Federal agencies. This does not include library assistants. Most Federal librarians must be trained in library science. (See p. 8–26 for requirements for entrance position.) It is not known how many were also subject specialists in science. In many of the higher positions paying from $3,397 to $5,905 a year, however, specialized training in engineering, botany, or other scientific fields, or experience in special libraries devoted to such fields, plus knowledge of foreign languages are required.

In the Patent Office Scientific Library, 4 women librarians, whose training was primarily in library science, were employed in 1947. One had had some work in engineering; the others had acquired technical knowledge on the job. In the Office of Technical Services in the Department of Commerce, 17 women librarians with some knowledge of the sciences and some ability in German were engaged on a special project cataloging and classifying scientific material for deposit in the Library of Congress and the Department of Agriculture Library.

In the Department of Agriculture, there were 55 women librarians in 1947, some of whom held degrees in science in addition to their library training. A woman with an unusual background of botanical

training and language facility, for example, was responsible for the plant science portion of the Bibliography of Agriculture. Another woman botanist entered library work following the death of her husband. After experience in the library of a State college, followed by a position in a Federal Government library, she was, in 1947, reorganizing the library of a national park in the West.

The Fish and Wildlife Service, the Bureau of Mines, the Geological Survey, the War and Navy Departments, the Tennessee Valley Authority, the National Advisory Committee for Aeronautics, and the National Bureau of Standards are other Federal agencies which employed women as technical librarians or as bibliographers in 1946–47.

Women were head librarians in technical libraries in the following: the Bureau of the Census; the Coast and Geodetic Survey; the National Bureau of Standards; the Smithsonian Institution; the Fish and Wildlife Service; the Hydrographic Office, the Naval Observatory, the Naval Research Laboratory and the Bureaus of Aeronautics, Ordnance, Ships, and Yards and Docks in the Navy Department.

Although exact statistical information was not available on women employed as technical librarians in the Library of Congress, which increased its total personnel about 50 percent from 1940 to 1947, some women were employed there in 1947 as technical librarians in its Descriptive Cataloging, Subject Cataloging, and General Reference and Bibliography Divisions, in addition to a few in the Science Technology project. These women classified and cataloged scientific books and periodicals, did reference work, and abstracted technical material.

For beginning technical library jobs at the Library of Congress, persons with a degree in one of the sciences who have graduated from a library school and who have knowledge of a foreign language are preferred. In 1947, there were several openings for higher grade technical librarians in specialized fields in the Library of Congress, which reported a scarcity of properly qualified personnel. Salaries ranged from $2,644 to $7,102.

Opportunities for technical librarians also exist in the libraries of research organizations and professional associations (*16*) (*15*). One such library in 1947 employed 19 persons, 7 of whom had to have technical background. Of the 7 women, 1 had a mathematics major with a considerable amount of physics and chemistry. Another was trained in chemistry and geology. Both had graduated from library school. A third was not a college graduate but had "grown up" in the library and had acquired a technical knowledge exceeding that of many college graduates. This library, too, had an unfilled opening for an additional person with technical training, either a woman or a man. University and public libraries are employing an increasing number of

technical librarians to head special technical or scientific departments, which not only service the general public but supply special research services to industrial companies and other organizations ready to pay for such service.

It has been suggested by many writers that women planning to enter technical library work have, as a minimum of training, a bachelor's degree in chemistry, physics, mathematics, or any other scientific field in which they plan to specialize. Their undergraduate training should also include the study of French and scientific German. The knowledge of Russian is becoming a more and more important asset (*19*) (*2*). Although there are very few courses in the use of technical literature, they are growing in number, and such a course is desirable for technical librarians (*6*) (*2*). Hunter College in New York City and Drew University at Madison, N. J., were among the schools offering such courses in 1947. In 1945, only a few of the 34 schools which conformed to the standards of the Board of Education for Librarianship of the American Library Association offered special training for technical librarians (*22*). Information on such training and a list of accredited library schools are available from the Special Libraries Association. At least a year's work in an accredited library school with special facilities to meet the needs of the special student plus opportunity for practice work in a technical library are recommended (*19*).

Women who combine a thorough technical background and training of this type with resourcefulness, adaptability, an analytical mind, and an interest in assisting others with their work will find in technical library work opportunities for satisfying and continuous employment.

THE OUTLOOK FOR WOMEN IN PATENT WORK

Among the nonlaboratory occupations which offer good opportunities to women trained in science or engineering is that of the patent searcher. Because the preparation of an application for a patent is a highly complex procedure, persons with highly specialized technical training are employed for this work. Before a firm applies for a patent for a new device, process, or invention, it makes a search to determine its originality, the possibility of its infringement of the claims of unexpired patents already issued, and its validity, if patented. It later submits to the United States Patent Office a complete description of the device accompanied by technical illustrations. A patent examiner in that office then determines if the device or invention described can be patented according to the law, which gives the originator the right to exclude all others from making, using, or selling his invention for a term of 17 years (*28*).

Most industrial firms depend on the technical librarian for preliminary patent searching. The librarian, for example, may be responsible for selecting patents of interest from the Patent Office Gazette, ordering copies for examination, and circulating them to appropriate staff members. The later stages of searching and preparation, then, are sometimes handled by a member of the research staff who has had patent experience or by a firm of patent lawyers who specialize in this type of work. Large industrial firms, however, have a special patent staff, including one or more patent lawyers who may be assisted by patent searchers. How the literature searching for a patent department is done was described at a 1947 meeting of the American Chemical Society (*8*). The patent lawyer obviously needs legal training, and such training is helpful even in the assisting work in this field because of the importance of the legal aspects of the search and because of the legal terminology used.

Although women have worked on patents on wearing apparel, toilet articles, and along other feminine lines, there is no restriction in this field upon their usefulness. They have also worked on patents for such items as: farm machinery, metal working machines, plumbing supplies, electromagnetic switches, and heavy chemicals.

Eight of the 78 industrial research laboratories visited by a representative of the Women's Bureau in 1945–46 employed women trained in science on patent work. All but 1 of the 16 women employed by 7 of these firms that supplied exact statistics had a bachelor's degree in science; some had graduate degrees in science combined with training

in law. Most of them were patent searchers, but 4 were patent attorneys, and 1 was a patent clerk.

Their work varied according to the size of the total patent staff and the nature of the work of the firm. One woman trained in mathematics and physics who had gained practical experience in engineering during World War I assisted the patent engineer of the firm by assisting with the writing of the patents for a large metal products company. In addition, she did most of the patent searching and kept other staff members informed of new patents issued in fields of their interest.

In one chemical firm there were 5 women chemists and 1 woman biologist employed in the patent and abstract division; in another chemical firm 4 women were among the 50 persons engaged in patent work. They varied considerably in background and in assignments. One was a patent attorney who had a Ph. D. in addition to her license to practice law. Another was a chemist, and the third, a chemical engineer, did much of the drafting on patent illustrations. The fourth had had 2 years of college followed by a course in medical technology and was assisting on the searching.

According to the personnel director of one of the largest industrial research laboratories, the patent department is a good place for women. One of the 2 women on the patent staff of 60 in that organization came to the company as a stenographer in 1919, with a college degree in physics. Nine years later she secured an LL. B. degree and was admitted to the bar. She has been employed as a patent attorney with this company ever since.

A few women are employed in patent law firms. A few others practice patent law independently. One woman physicist, for example, after work in the Federal Government as a patent examiner and legal training, became a patent attorney for a radio manufacturer and later practiced independently in Washington, D. C. (*10*). One with similar background also taught patent law in a Washington, D. C., law school. In 1947, according to the President of the Women's Patent Law Association, approximately 50 women were on the roster of attorneys registered to practice before the Patent Office. Most of them were conducting their own law practice or were employed by reputable patent firms; a few were patent experts in scientific or research establishments.

Even before the war, a few women were employed in the United States Patent Office, which in 1947 had 19 women on its staff of patent examiners. (See p. 8–26 for requirements for beginning civil service position as patent examiner.) Half of the women employed as patent examiners in 1947 held degrees in chemistry, 4 were trained in physics,

Courtesy Women's Patent Law Association

Figure 2.—A patent examiner at her desk in the U. S. Patent Office

2 in engineering, and the others included in their background various combinations of the sciences. Five were assigned to chemical divisions and 13 to mechanical divisions, while 1 headed the Classification Division. Although legal training is not required to qualify for the job, those employed as patent examiners in the Federal Government, like the patent searchers in industry, are encouraged to study law at night in order to qualify for more responsible work. Drafting is another useful tool. In 1947, 4 of the women patent examiners were members of the bar, and 3 were enrolled in law schools.

Several other Federal agencies engaged in scientific work employ women as patent experts. In one of them, a woman heads the patent section. In the Patent Office, as noted before, one woman is a division chief; another is an assistant chief of a division.

The fact that few men as well as few women who specialize in science plan at the outset of their careers to enter this field is probably due more to lack of information than to lack of opportunity. Only 1 percent of more than 1,000 chemists who sought employment through the American Chemical Society's clearing house at 3 of its wartime meetings checked patent work as a field of interest. However, more than 10 percent were interested after the requirements of patent positions were explained to them (*9*).

In 1947, the Patent Law Association, a national organization of patent attorneys, had approximately 1,026 members. Three women, one each in New York, Chicago, and Washington, have been admitted to membership, all in 1947. In Washington, D. C., there is a Women's Patent Law Association which had 10 members in 1947. This Association includes in its membership only women who are patent attorneys or Patent Office examiners.

The total number of men and women engaged in patent work as attorneys, examiners, and searchers is not known. It has been estimated that technical librarians spend about one-third of their time on patent work. However, the total number of persons engaged full-time in this work and the total amount of time devoted to it by others are known to be steadily increasing. The number of women in this field has likewise grown and will continue to do so. This field of work can be recommended to women, but it requires perseverance in the early stages of the work as well as the scientific and legal knowledge so obviously needed.

THE OUTLOOK FOR WOMEN IN TECHNICAL WRITING AND EDITING

Women trained in science are employed in practically every type of technical writing and editing, although they are few in number. They write specifications for technical manuals, serve as technical correspondents, and write and edit research reports. They are employed by publishers of scientific books and periodicals and by scientific organizations. They write copy for technical advertising and write and edit technical information for radio, newspaper, and magazine use.

Seven of the 78 industrial research laboratories visited by a representative of the Women's Bureau in 1945–46 employed women as technical writers. Some of this employment originated out of war needs and was expected to terminate. Work of this type included the preparation of instruction manuals in aircraft companies and the writing of specifications in firms manufacturing military supplies. Engineering aids were also used on work of this type both in industry and government.

Among those on permanent assignments, however, were 7 women employed along with 17 men as technical writers and editors in a firm manufacturing electrical equipment. They wrote instructions on the installation, operation, and maintenance of various types of radio receiving, testing, and transmitting equipment. A thorough technical knowledge of radio communications was required, so that the customer as well as the service engineer could understand the descriptions. A college degree with work in mathematics or physics or some experience in radio work as well as the ability to write clearly were required for this work.

In a chemical firm visited, the editor of research reports was a woman Ph. D. who had been with the firm for 11 years and had two editorial assistants.

In some industrial firms, the technical librarian assisted in this work, and in at least one firm, the woman assistant to the director of research was responsible for the final editing of research reports.

In some research institutions the entire publications staff, responsible for the editing and printing arrangements for the publications of staff members, were women. In the Rockefeller Institute, for example, the publications staff in 1946 consisted of three women, each of whom had a bachelor's degree with training in chemistry and biology.

Five of the Federal agencies reporting women in scientific jobs in 1946 indicated that they employed women as technical editors or writers. The Agriculture, Commerce, Interior, and Navy Departments and the National Advisory Committee on Aeronautics employed some 28 women in such jobs as physical science editor, science report analyst, biological editor, technical writer, or technical editor. (See p. 8–27 for requirements for a civil service position as technical editor, biological sciences option.) In addition there were a number of women doing technical writing and editing who were classified as information specialists. This government work varies from the editing of popularized scientific material such as that in the Farmers' Bulletins to the editing of technical publications like the Journal of Agricultural Research.

Perhaps the largest number of women science writers and editors are employed by publishers of scientific and technical journals, professional or commercial in nature (*12*). Professional journals in geology, geography, morphology, anatomy, engineering, and botany, for example, were among those which in 1946 employed women as staff writers, assistant editors, or editors.

There are also possibilities in this field for women to do free lance writing, ghost writing for executives, or popular writing for scientific and technical magazines. Writing on science subjects for children and for teachers and young students of science is an especially difficult but interesting task in which a few women have already specialized.

Although much scientific writing and editing requires a high degree of specialization, this is usually acquired on the job. Initially, it is best for women interested in this field to acquire a broad background in many sciences, with specialization in one, and journalistic experience.

THE OUTLOOK FOR WOMEN IN TECHNICAL ILLUSTRATION

In science and technology, as in other fields, the use of pictorial drawings and photographs has been steadily increasing. Modern printing and other reproduction processes have encouraged the use of more illustrations not only in scientific and technical books and periodicals but in ephemeral training manuals, pamphlets, guidebooks, and reports.

To prepare some of these illustrations requires no special knowledge of science on the part of the artist or photographer. But the more technical, detailed drawings and photographs are usually prepared by those who combine a knowledge of the subject field illustrated with artistic training. Among those who specialize in scientific photography, women are rare. But more women are found among scientific artists. Women interested in this field of work, however, will increase their chances of employment by adding photography to their skills. Some large industrial plants and organizations employ photographers on technical work, and, in 1946, almost 300 clinical photographers were employed full-time in hospitals in the United States. Scientific photography, however, is more marketable by women if it is accompanied by art training than if it is offered alone. A number of women have worked as artists and photographers. The New York Botanical Garden and Carnegie Institution, for example, have in the past employed women in this dual capacity.

Although there is an infinite variety of scientific or technical drawings, the two principal groups are those which fall in the biological sciences and the applied field of medicine and those which relate to the physical sciences and the applied field of engineering.

The demand for medical illustrations is greater than that for other types of zoological illustrations or for botanical illustrations. Physicians, in their training, in their practice, and in their research, utilize an unusual volume of scientific publications, many of which carry illustrations. These usually originate in hospitals, medical schools, and other institutions engaged in medical research or in the illustration department of a publishing house. Sometimes they are drawn by a physician, but the service of an illustration department is now available in most medical organizations that have a large volume of research and publication.

At least 3 colleges and universities in the United States in 1947 offered a course in medical illustration: Johns Hopkins University

Courtesy Baltimore Sunday Sun Magazine
Photograph by A. Aubrey Bodine

Figure 3.—An assistant professor who directs the Department of Art as Applied to Medicine at a medical school gives instruction to a student.

(Baltimore, Md.); the Southwestern Medical College (Dallas, Tex.); and the University of Illinois (Urbana, Ill.). The 2-year course in art as applied to medicine at the University of Illinois is open to students trained in art who have completed at least 2 years of college with emphasis on the subjects included in the premedical curriculum.

In 1947, the Association of Medical Illustrators had about 67 members, about two-thirds of them women.

Biological supply houses, museums, as well as publishers employ scientific artists to prepare exhibits, museum mounts, and illustrations for publications. These artists are usually trained in science as well as in art.

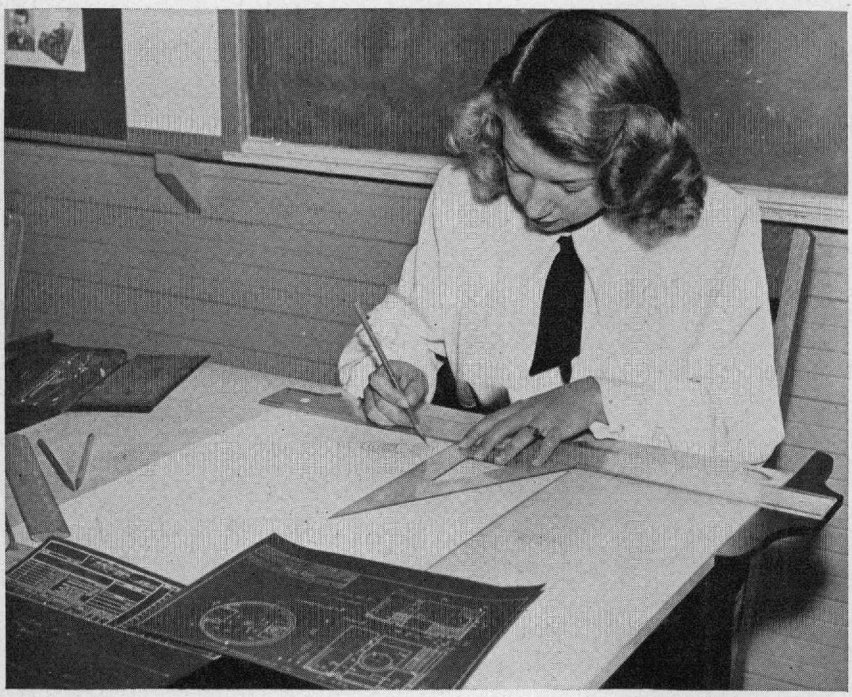
This dual training is not generally found among women who do botanical illustration for botanical texts, books on wildflowers and gardening, and such periodicals as the National Geographic Magazine, many of whom have not had formal botanical training. They have usually spent a considerable amount of time in plant study and observation, usually at a botanical garden. Several of the most outstanding women in this field, however, have been both botanists and artists.

Some scientific illustrators, like other artists, do free lance work; others have staff jobs. Two sisters with a flair for drawing who were majoring in biology in a midwest college earned their way through college on free lance work by illustrating biology texts. The one, having graduated, had a staff job in 1947 as illustrator at a museum of natural history; the other was completing her Ph. D. on a fellowship.

The United States Department of Agriculture at the end of 1946 employed 8 women as scientific illustrators in the Washington area, and the United States Geological Survey employed 20. Eleven other women were employed as illustrators in agencies engaged in technical or scientific work, such as the Ordnance and Engineer Corps in the War Department, the Naval Research Laboratory, the Civil Aeronautics Administration, and the National Advisory Committee on Aeronautics. (For the requirements for entrance to a beginning position as technical illustrator in the latter agency, see p. 8–28.)

The type of illustrating done in these Federal agencies is more akin to that done in engineering departments of industrial firms than to that done by medical artists. Most of the drawing done in industry is drafting work based on an engineer's conception which may have been aided in presentation by an industrial designer. Most industrial designers are men, although 2 of the 78 firms having research laboratories visited by a representative of the Women's Bureau in 1945–46 employed women as designers. One, a glass company, employed a woman with a bachelor's degree in design, and a firm manufacturing packaging materials employed 6 women in its Department of Design. All had training in design, art, or architecture.

To supplement the detailed drawings prepared in the drafting room, industry is using more and more 3-dimensional production drawings which show how the top, sides, and bottom of a part will look when completed. During the war, the airplane industry supplied illustrated



Courtesy Santa Monica Technical School

Figure 4.—A student at a western technical school at work on a 3-dimensional drawing in perspective.

catalogs to the users of planes showing every part as it actually appeared, with corresponding numbers and descriptions to simplify ordering and replacements. The drawings were superior to photographs and so true that crews and mechanics who could not read English could identify parts needed. These illustrations, which prevented many costly delays during the war, were developed from rough sketches and engineering blueprints, which guided the artist in visualizing the parts and in preparing the original drawings of each part. One aircraft company, in 1943, in service illustration of this type, employed 24 women who prepared drawings and photographs to illustrate manuals for aviation flight and ground crews. A background in commercial art, fine arts, or architecture was preferred for this work. An additional 14 women in this plant, who were assigned to production illustration, finished pictorial illustrations by drawing in the smaller detail parts and doing the lettering. Two years of architectural training were preferred as background for this work. Another aircraft company in 1946 still employed 6 women as technical illustrators out of a wartime total of 20. They prepared perspective and 3-dimensional drawings for catalogs, sales manuals, and advertising layouts and did some technical photography. Most of them had obtained their principal training in technical art schools. Additional knowledge of engineering, architecture, or physics was considered helpful.

Many colleges and art schools offer courses in industrial design, and courses in production illustration are becoming more common. In the art department of a western junior college in 1947, 34 women were studying perspective illustration and 3-dimensional production drawing as preparation for work in advertising. Only a very few schools outside of industry, however, offer training in scientific or technical illustration. The Cleveland School of Art is one of the few and offers a 1-year certificate course in scientific illustration. Hunter College in New York City also offers training in this field.

Although there are altogether few women employed in work of this type, opportunities exist and offer interesting work to those who have both artistic ability and interest and aptitude in science.

THE OUTLOOK FOR WOMEN IN TECHNICAL SECRETARIAL AND OTHER CLERICAL WORK

There has always been a great demand for women trained in science to serve as technical secretaries or stenographers. But their knowledge of science must be offered to supplement expertness in stenographic skills rather than to offset a deficiency in them. Executives in chemical manufacturing plants, heads of laboratories, and directors of research institutions are among those who prefer secretaries with scientific training if they can find them.

Before the war, women with bachelor's degrees in chemistry or other sciences who were unable to secure laboratory positions often took stenographic training and became technical secretaries or stenographers. Some of them later became laboratory workers; some had charge of technical files and ultimately were trained as technical librarians. During the war, when better-paying jobs in industrial and government laboratories became available to women with a minimum of training in science, almost none of the oncoming college graduates took secretarial jobs.

Very few of the 78 industrial firms having research laboratories visited by the Women's Bureau in 1945–46 had women secretaries with college training in science, although many of them preferred secretaries with such background. Only one technical personnel director said there were no secretarial jobs in his firm for which science background was desirable. Fourteen of the firms had women secretaries trained in science. In a chemical manufacturing firm, one of the two women with bachelor's degrees in science who were employed as technical secretaries to research men had been there for 15 years. Another technical secretary employed in a chemical manufacturing firm for the past 13 years started as a high school graduate and then acquired college training in chemistry at night school. About 75 percent of her time was devoted to secretarial work for laboratory chemists, for whom she typed reports, maintained files, handled correspondence, and ordered supplies. The remainder of her time she spent assisting in the laboratory, taking down observations, and performing limited and simple tests under the supervision of the chemists.

Secretarial jobs may lead to full-time positions in the laboratory if scientific training qualifications are met. For example, a woman who had majored in chemistry at a teachers college took a position as a stenographer in the laboratory of a foods manufacturing plant in 1942. At that time, the scarcity of men trained in science enabled her to transfer to the laboratory within a month.

At the end of the war, one firm attempted to retrain some of its wartime laboratory assistants with limited background in science by transferring them to secretarial work. Twelve girls on routine analytical work, some of whom had partial college training in science and others who were high school graduates, were selected for half-time training in secretarial work while they continued with their jobs on a half-time basis. Eleven of the girls completed the 5-month course, but only five proved to be sufficiently well trained to be placed in technical secretarial positions immediately.

According to the director of an industrial research laboratory in a firm manufacturing metals and metal products, the demand for women as scientific secretaries in 1946 was greater than that in any other technical occupation. He considered the best basic training to be graduation from high school, with an academic diploma, followed by a secretarial course. Women who added 1 year of general college chemistry and 1 year of the fundamentals of organic chemistry to this basic training could, he felt, qualify for a technical secretarial position paying from $45 to $50 a week ($2,340 to $2,600 a year) to start.

Research organizations and institutions also employ college-trained women as technical stenographers and secretaries, and the heads of science departments in colleges and universities sometimes have permanent secretaries who are technically trained. Women with administrative ability have also served as executive secretaries of technical and trade organizations. At least two companies covered in the study had women with bachelor's degrees in science working on technical files in a special technical files department. These women receive, distribute, route, compile, file, abstract, index, and search all the confidential technical correspondence and reports in the research department.

It was generally agreed by most laboratory directors and college placement directors that women with bachelor's degrees in science prefer laboratory positions to technical secretarial or other clerical positions, although salaries in 1947 were about equal in beginning jobs, and secretarial positions offered greater security. One director of a college placement bureau said she had not had a girl trained in science going into secretarial work in 20 years, although orders for persons to fill technical secretarial jobs were frequent.

For the young woman trained in science who prefers the satisfaction of becoming an almost indispensable assistant to a technical executive or a scientist to working on a project of her own, technical secretarial work will continue to offer varied and stimulating opportunities for employment. If trained in the biological sciences, she will find her background most valuable in such establishments as medical institutions, pharmaceutical companies, and biological supply houses. If trained in chemistry, she will be welcomed by manufacturers of chemi-

cals, foods, and a variety of other industries using chemical processes, by chemical testing laboratories, and most scientific research institutions. If trained in physics, mathematics, or engineering, she could find work in public utilities, electrical manufacturing firms, instrument and machinery manufacture, and firms producing transportation equipment, as well as in institutions and agencies engaged in research in the physical sciences. If her training has been in astronomy, or geology, or one of the other smaller fields, her chances for utilizing her scientific training in secretarial work will be more limited: for example, in astronomy, to observatories and universities; or in geology, to oil and mining companies and universities. A broad but unspecialized background in the sciences may also be useful and even preferred where the work of the executive or department served is diversified.

APPENDIX

Minimum Education and Experience Requirements for Application for Beginning Federal Civil Service Position as Junior Professional Assistant Librarian ($2,644 a year)

(As taken from Civil Service Announcement No. 75, issued October 14, 1947, closed November 4, 1947)[1]

Applicants must have successfully completed *one* of the following:

A. A full 4-year course, in a college or university of recognized standing, including or supplemented by either 30 semester hours of study in library science or 1 full year of training in an accredited library school; *or*

B. Four years of successful and progressive experience in library work. This experience must have provided training in the use of the tools essential to effective library service, and it must demonstrate an understanding of methods and techniques of standard library practices and their practical application to professional library work, equivalent to that which would have been acquired through completion of a standard library science curriculum in a college or university of recognized standing; *or*

C. Any combination of experience and training which will be the equivalent of A or B above. In combining education and experience, the applicant must show for each year of education for which credit is claimed an average of 8 semester hours in library science.

No credit will be given for experience in rental or club libraries, or for courses in the practical use of libraries and library facilities.

Minimum Education and Experience Requirements for Application for Beginning Federal Civil Service Position as Junior Professional Assistant With Option as Patent Examiner ($2,644 a year)

(As taken from Civil Service Announcement No. 75, issued October 14, 1947, closed November 4, 1947)[1]

Applicants must have successfully completed *one* of the following:

A. A full curriculum of study leading to a bachelor's degree in engineering or in technology, in a college or university of recognized standing, *or* a full curriculum of study leading to a bachelor's degree,

[1] For more complete and later information, consult latest announcements of the Civil Service Commission posted in first- and second-class post offices.

in a college or university of recognized standing, including or supplemented by 30 semester hours of study in chemistry or 24 semester hours of study in physics; *or*

B. An adequate experience background which has included at least 4 years of successful and progressive experience in engineering, technology, chemistry, or physics. This experience must have been of such a nature as to demonstrate that the applicant possesses an intimate working knowledge of the fundamental scientific principles of the field involved, to the same extent and degree that such a knowledge would have been acquired through successful completion of a full curriculum leading to a bachelor's degree in a college or university of recognized standing as described in "A" above.

C. Any time-equivalent combination of A and B above.

Minimum Experience and Education Requirements for Application for Beginning Federal Civil Service Position as Technical Editor, Biological Sciences Option ($3,397 a year)

(As taken from Board of U. S. Civil Service Examiners, Army Chemical Center, Md., Announcement No. 4–47–223, issued September 9, 1947, closed September 22, 1947)[1]

Experience:

Five years of responsible experience in preparing or editing and reviewing technical specifications reports or documents in chemistry, chemical engineering, mechanical engineering, biological sciences, Chemical Corps matériel, or other appropriate technical fields. This experience must have been of such a nature as to enable applicants to perform successfully at the professional level and must have included 1 year of such professional experience.

Substitution of education for experience:

Successfully completed study in a college or university of recognized standing leading to a bachelor's degree in chemistry, chemical engineering, mechanical engineering, biological science, or any other appropriate field of science may be substituted, year for year, for the general experience required for all grades. Graduate work in an appropriate science successfully completed in a college or university of recognized standing may also be substituted, on the same basis up to a maximum of 2 years, for the general experience or for the professional experience required. To substitute graduate study for 2 years of experience, applicants must have received the Ph. D. degree.

[1] For more complete and later information, consult latest announcements of the Civil Service Commission posted in first- and second-class post offices.

Minimum Experience, Education, and Work Sample Requirements for Application for Beginning Federal Civil Service Position as Technical Illustrator ($3,021 a year)

(As taken from Board of U. S. Civil Service Examiners, National Advisory Committee for Aeronautics, Langley Field, Va., Announcement No. 4–47–244, issued August 18, 1947)[1]

Sample of work:

Each applicant must submit with his application at least one sample of his illustrative work, representative of the type of illustrating in which he is most proficient. This sample may be either an original drawing or a print.

Experience:

Credit will be given for all valuable experience of the type required, regardless of whether compensation was received or whether the experience was gained in a part-time or full-time occupation. The applicant's record of experience or training must show that he has the ability to perform completely the duties of the position. Four and a half years of total experience, with 12 months of specialized experience, are required.

Substitution of education for experience:

No substitution permitted for the 12 months of specialized experience referred to above. Education may otherwise be substituted for experience as follows:

(1) Successfully completed study at a college or university of recognized standing, in illustrative design or commercial art, may be substituted for the required experience year for year, up to a maximum of 4 years.

(2) Pertinent residence study which included one or more courses in illustrative design or commercial art successfully completed at a college or university, an art institute, a school specializing in illustrative design or commercial art, or a technical high school, may be substituted for experience. A list of courses completed should be furnished together with the number of semester hours' credit received for each course and a statement of total number of actual classroom hours devoted to study and work specifically appropriate.

[1] For more complete and later information, consult latest announcements of the Civil Service Commission posted in first- and second-class post offices.

SOURCES TO WHICH REFERENCE IS MADE IN THE TEXT

(1) Adams, F. W. Opportunities for women as research bibliographers. Journal of chemical education 16: 581–83, December 1939.

(2) Alexander, Mary; Corbin, Nancy; and Egloff, Gustav. Scholastic training for a career in chemical literature research. Journal of chemical education 21: 615–19, December 1944.

(3) Alexander, Mary Louise. The special librarian: what she is; what she can do; where to find her; how much to pay her. Special libraries 31: 248–50, July–August 1940.

(4) Basil, Helen. Research laboratories library manual. Chicago, Ill., Crane Co., 1945.

(5) Cibella, Ross C. Introductory remarks (round-table discussion on technical library service presented before the Division of Chemical Education of the American Chemical Society, 107th meeting, Cleveland, Ohio, April 4, 1944). Journal of chemical education 21: 367, August 1944.

(6) Egloff, Gustav; Alexander, Mary; and Van Arsdell, Prudence. Problems of scientific literature research. Journal of chemical education 20: 587–92, December 1943.

(7) Hausdorfer, Walter. Special Libraries Association salary survey. Special libraries 37: 142–47, May–June 1946.

(8) Hoffman, Thelma. Techniques employed in making literature searches for a patent department. Unpublished material scheduled to appear in Journal of Chemical Education in 1948.

(9) Hollabaugh, C. B. Patent work as a field for chemists. Journal of chemical education 21: 276–78, June 1944.

(10) Hunter, Elizabeth. Women as patent attorneys. Journal of chemical education 16: 589–90, December 1939.

(11) Johnson, Philip G. The National Science Teachers Association as a force for the future. Education 65: 399–405, March 1945.

(12) Kirkpatrick, Sidney D. Chemical editing. Journal of chemical education 21: 272, June 1944.

(13) Leonard, Ruth. Training and Professional Activities Committee. Special libraries 36: 24, January 1945.

(14) ———. S. L. A. plans a recruiting program. Special libraries 35: 23–24, January 1944.

(15) Lewton, Lucy O. An industrial research library. Scientific monthly 65: 390–94, November 1947.

(16) ———. Libraries, advance scouts for research. Chemical and metallurgical engineering 53: 112–113, March 1946.

(17) ———. A technical librarian in industry. Executives service bulletin of the Metropolitan Life Insurance Company 22: 3–4, February 1944.

(18) Oille, Hazel Ohman. Employment opportunities for special libraries. Special libraries 33: 45–49, February 1942.

(19) Orton, Floyd Emory. A preparatory program for science and technology librarians. Special libraries 35: 11–15, January 1944.

(20) Paradis, Adrian A. Aviation needs the special library. Special libraries 34: 119–21, April 1943.

(21) Savord, Ruth. Special librarianship as a career. New London, Conn., Institute of Women's Professional Relations, 1942. 15 pp.

(22) ———. Special librarianship as a career. Sponsored by the Special Librairies Association. New London, Conn., Institute of Women's Professional Relations, 1945. 16 pp.

(23) Schulze, Else L. Wanted: more library chemists. Journal of chemical education 23: 176–78, April 1946.

(24) Shorb, Lura and Beck, Lewis W. Opportunities for chemists in literature service work. Journal of chemical education 21: 315–18, July 1944.

(25) Special Libraries Association. Report of the Membership Committee. Special libraries 31: 213–15, July–August 1940.

(26) Strieby, Irene M. The meaning of technical library training. Library journal 70: 463–67, May 15, 1945.

(27) Strieby, Irene M. and Cole, Betty Joy. Finding facts for a chemical clientele. Chemical industries 57: 1064–68, December 1945.

(28) U. S. Department of Commerce, Patent Office. General information concerning patents. Washington, D. C., U. S. Government printing office, 1946. 21 pp.

(29) U. S. Department of Labor, Women's Bureau. Employment of women in the Federal Government, 1923–39. Washington, D. C., U. S. Government printing office, 1941. 60 pp. (Women's Bureau bulletin No. 182.)

(30) U. S. Federal Security Agency, U. S. Office of Education. Biennial survey of education in the United States, 1942–44. Statistics of higher education 1943–44. Chapter IV. Washington, D. C., U. S. Government printing office, 1946. 75 pp. (*See* Tables X and XI.)

(31) U. S. Senate, 78th Congress. 2d Session. Hearings before a subcommittee of the Committee on Education and Labor. Wartime health and education. On S. Res. 74, Part 3, Washington, D. C., January 25–29, and February 9, 1944. Fixed incomes in the war economy. Washington, D. C., U. S. Government printing office, 1944. (*See* Exhibit 10.—Placement experience in library profession. By Miss Eleanor Cavanaugh, President, Special Libraries Association, page 1523.)

CURRENT PUBLICATIONS OF THE WOMEN'S BUREAU

FACTS ON WOMEN WORKERS—issued monthly. 4 pages. (Latest statistics on employment of women; earnings; labor laws affecting women; news items of interest to women workers; women in the international scene.)

EMPLOYMENT OUTLOOK AND TRAINING FOR WOMEN

The Outlook for Women in Occupations in the *Medical and Other Health Services*, Bull. 203:

1. Physical Therapists. 14 pp. 1945. 10¢.
2. Occupational Therapists. 15 pp. 1945. 10¢.
3. Professional Nurses. 66 pp. 1946. 15¢.
4. Medical Laboratory Technicians. 10 pp. 1945. 10¢.
5. Practical Nurses and Hospital Attendants. 20 pp. 1945. 10¢.
6. Medical Record Librarians. 9 pp. 1945. 10¢.
7. Women Physicians. 28 pp. 1945. 10¢.
8. X-Ray Technicians. 14 pp. 1945. 10¢.
9. Women Dentists. 21 pp. 1945. 10¢.
10. Dental Hygienists. 17 pp. 1945. 10¢.
11. Physicians' and Dentists' Assistants. 15 pp. 1945. 10¢.
12. Trends and Their Effect upon the Demand for Women Workers. 55 pp. 1946. 15¢.

The Outlook for Women in Science. Bull. 223: (In press.)

1. Introduction.
2. The Outlook for Women in Chemistry.
3. The Outlook for Women in the Biological Sciences.
4. The Outlook for Women in Mathematics and Statistics.
5. The Outlook for Women in Architecture and Engineering.
6. The Outlook for Women in Physics and Astronomy.
7. The Outlook for Women in Geology, Geography, and Meteorology.
8. The Outlook for Women in Occupations Related to Science. (Instant publication.)

Your Job Future After College. Leaflet. 1947.

Training for Jobs—for Women and Girls. [Under public funds available for vocational training purposes.] Leaflet 1. 1947.

EARNINGS

Earnings of Women in Selected Manufacturing Industries, 1946. Bull. 219. 14 pp. 1948. 10¢.

EMPLOYMENT

Employment of Women in the Early Postwar Period, with Background of Prewar and War Data. Bull. 211. 14 pp. 1946. 10¢.

Women's Occupations Through Seven Decades. Bull. 218. (In press.)

Women Workers After VJ-Day in One Community—Bridgeport, Conn. Bull. 216. 37 pp. 1947. 15¢.

INDUSTRY

Women Workers in Power Laundries. Bull. 215. 71 pp. 1947. 20¢.
The Woman Telephone Worker [1944]. Bull. 207. 28 pp. 1946. 10¢.
Typical Women's Jobs in the Telephone Industry [1944]. Bull. 207–A. 52 pp. 1947. 15¢.
Women in Radio. Bull. 222. 30 pp. 1948. 15¢.

LABOR LAWS

Summary of State Labor Laws for Women. 7 pp. 1947. Mimeo.

Minimum Wage

State Minimum-Wage Laws and Orders, 1942: An Analysis. Bull. 191. 52 pp. 1942. 20¢. Supplements through 1947. Mimeo.
State Minimum-Wage Laws. Leaflet 1. 1948.
Map showing States having minimum-wage laws. (Desk size; wall size.)

Equal Pay

Equal Pay for Women. Leaflet 2. 1947. (Rev. 1948.)
Chart analyzing State equal-pay laws and Model Bill. Mimeo. Also complete text of State laws (separates). Mimeo.
Selected References on Equal Pay for Women. 9 pp. 1947. Mimeo.

Hours of Work and Other Labor Laws

State Labor Laws for Women, with Wartime Modifications, Dec. 15, 1944. Bull. 202. (Supplements through 1947. Mimeo.)

I. Analysis of Hour Laws. 110 pp. 1945. 15¢.
II. Analysis of Plant Facilities Laws. 43 pp. 1945. 10¢.
III. Analysis of Regulatory Laws, Prohibitory Laws, Maternity Laws. 12 pp. 1945. 5¢.
IV. Analysis of Industrial Home-Work Laws. 26 pp. 1945. 10¢.
V. Explanation and Appraisal. 66 pp. 1946. 15¢.

Map of United States showing State hour laws. (Desk size; wall size.)

LEGAL STATUS OF WOMEN

International Documents on the Status of Women. Bull. 217. 116 pp. 1947. 25¢.
Legal Status of Women in the United States of America.
United States Summary, January 1938. Bull. 157. 89 pp. 1941. 15¢.
Cumulative Supplement 1938–45. Bull. 157–A. 31 pp. 1946. 10¢.
Pamphlet for each State and District of Columbia (separates). 5¢ ea.
Women's Eligibility for Jury Duty. Leaflet. 1947.

WOMEN IN LATIN AMERICA

Women Workers in Argentina, Chile, and Uruguay. Bull. 195. 15 pp. 1942. 5¢.
Women Workers in Brazil. Bull. 206. 42 pp. 1946. 10¢.
Women Workers in Paraguay. Bull. 210. 16 pp. 1946. 10¢.
Women Workers in Peru. Bull. 213. 41 pp. 1947. 10¢.
Social and Labor Problems of Peru and Uruguay. 1944. Mimeo.

RECOMMENDED STANDARDS for women's working conditions, safety and health:

Standards of Employment for Women. Leaflet 1. 1946. 5¢ ea. or $2 per 100.
When You Hire Women. Sp. Bull. 14. 16 pp. 1944. 10¢.
The Industrial Nurse and the Woman Worker. Sp. Bull. 19. 47 pp. 1944. 10¢.
Women's Effective War Work Requires Good Posture. Sp. Bull. 10. 6 pp. 1943. 5¢.
Washing and Toilet Facilities for Women in Industry. Sp. Bull. 4. 11 pp. 1942. 5¢.
Lifting and Carrying Weights by Women in Industry. Sp. Bull. 2. Rev. 1942. 12 pp. 5¢.
Safety Clothing for Women in Industry. Sp. Bull. 3. 11 pp. 1941. 10¢.
Supplements; Safety Caps; Safety Shoes. 4 pp. ea. 1944. 5¢ ea.
Night Work: Bibliography. 39 pp. 1946. Multilith.

WOMEN UNDER UNION CONTRACTS

Maternity-Benefits under Union-Contract Health Insurance Plans. Bull. 214. 19 pp. 1947. 10¢.

HOUSEHOLD EMPLOYMENT

Old-Age Insurance for Household Employees. Bull. 220. 20 pp. 1947. 10¢.
Community Household Employment Programs. Bull. 221. 70 pp. 1948. 20¢.

REPORTS OF WOMEN IN WARTIME: 16 reports on women's employment in wartime industries; community services; part-time employment; equal pay; recreation and housing for women war workers.
Changes in Women's Employment During the War. Sp. Bull. 20. 29 pp. 1944. 10¢.
Women's Wartime Hours of Work—The Effect on Their Factory Performance and Home Life. Bull. 208. 187 pp. 1947. 35¢.
Women Workers in Ten War Production Areas and Their Postwar Employment Plans. Bull. 209. 56 pp. 1946. 15¢.
Negro Women War Workers. Bull. 205. 23 pp. 1945. 10¢.
Employment Opportunities in Characteristic Industrial Occupations of Women. Bull. 201. 50 pp. 1944. 10¢.
Employment and Housing Problems of Migratory Workers in New York and New Jersey Canning Industries, 1943. Bull. 198. 35 pp. 1944. 10¢.
Industrial Injuries to Women [1945]. Bull. 212. 20 pp. 1947. 10¢.

REPORTS ON WOMEN WORKERS IN PREWAR YEARS: Women at work (a century of industrial change); women's economic status as compared to men's; women workers in their family environment (Cleveland, and Utah); women's employment in certain industries (clothing, canneries, laundries, offices, government service); State-wide survey of women's employment in various States; economic status of university women.

THE WOMEN'S BUREAU—Its Purpose and Functions. Leaflet. 1946.
Women's Bureau Conference. 1948. Bull. 224. (In press.)
Write the Women's Bureau, U. S. Department of Labor, Washington 25, D. C., for complete list of publications available for distribution.