Lecture 15

Biochemistry: Books and Serials

For this special application of the science, the chemistry of living matter, there are various designations; the older term, physiological chemistry, was given when it was considered as a subdivision of physiology; now the word biochemistry is used rather more often, and the tendency is to regard it as an application of chemistry. The classification of the books and serials is affected by this double relationship, so that while most of the books are classified in 612.01, and the older series in 612.05, the newer books are scattered among 547. organic, 614. pharmacological, 616. pathological with a few in 543, and some in the encyclopaedic subdivisions of these; the serials started more recently are in 540.5 in part, with some in special phases as, Rinderkeriologie, in 612.645.

The literature may be divided as follows:

A. Books
   1. General works
   2. Laboratory manuals
   3. Monographs on special topics
   4. Encyclopaedic works, including methods

B. Serials
   1. "Original paper" serials
   2. Reference serials

A.I. General works

The most recent one here is T. H. Robertson's Principles of biochemistry, for students of medicine, agriculture and related sciences, 1921; this is particularly valuable for its discussion of the general chemistry of the cell, without special medical application; there is much descriptive material, with some tests; lists of references are given at the close of the chapters, including both books and serial articles. Of some year is Mathews' Physiological chemistry, Ed. 3, 1912, with even more descriptive material and longer lists of references; Ed. 2, 1916, is here.

Differing slightly in that it contains experiments and work for the laboratory is Plummer, Practical organic and biochemistry, 1918; this is really the third edition of his Practical and physiological chemistry, being originally designed for use in the laboratory, it has less discussion of theories than the Robertson and Mathews, and much space is given to directions for laboratory work. A similar volume by an American author is Hawk's Practical physiological chemistry; this is revised often, Ed. 6, 1918, Ed. 7, 1921; the latest revision should always be noted. In the work by McLeod and Pearce, Physiology and biochemistry in modern medicine, 1918, the attempt is "to present biochemical knowledge in terms rather than the physiologist's standpoint as an integral part of his subject, and there is naturally more physiology than biochemistry. Even the latest edition of Long is rather old; Ed. 7 of Hummelsbein, in English here, is 1914; this is more like Mathews than Hawk, Bottazzi, 1902, is here in German; Lautmuller, French, 1911, is not very comprehensive.

67
Of the German texts the newest is the fourth edition of Abderhalden's Lehrbuch, (originally thirty lectures) now in two volumes, 1929; this gives many references, and some tests. Hooge-Seyler's Handbuch der physiologischen und pathologisch-chemischen Analyse, edited by Thierfelder, Ed. 8, 1909, is easier of a reference book, but is a miniature encyclopedia for biochemistry. Older works, on the order of Abderhalden's Lehrbuch are in Ger-
man, Bunge, second English from the fourth German edition being 1902.
Tindall's, 1972, Lehmann, Ed. 2, 1909; also Wurtz, Traité de chimie bio-

A. 2. Laboratory manuals

Hawk and Pleixer of the works just mentioned are intended for use in
the laboratory; Cole, Practical physiological chemistry, Ed. 4, 1914, is abut as large; Cramer, Directions, Ed. 3, 1917, for the medical students is about 300 very small pages; Jackson, Directions, Ed. 2, 1903, is a tribe less than Cole. Salterwood's laboratory manual, is here in the edition of 1903 in English.
Scholz's Praktikum, Ed. 3, is of 1908; Abderhalden's Physiologisches Praktikum is here in the edition of 1912, but this has probably been revised.

A. 3. Monographs on special topics

Here perhaps the first in importance is the English series. Monographs on biochemistry, published by Longmans, Green & Co., the plan of the series was to provide small works, moderate in price, revised thoroughly at frequent intervals, giving the newest information; these were to contain lists of the most recent lit-
arture, and this plan has been followed very closely, but the price has ceased to be small. Some notable authors are, Leather, The fats, Horvitt, Alcohol fer-
mentation, Barlow, Nature of enzyme action, MacLean on lecithin, Osborne, Veg-
table proteins, Pleixer on proteins, and Armstrong on carbohydrates.

There are a host of other works published as individuals, upon the sub-
divisions of biochemistry, as metabolism, dynamics, amino acids, enzymes, effect of disease, special problems of nutrition, the processes of normal and diseased plant and animal matter. Some of these special works are Van't Hoff's and medicine translated from the German: von Fürth, Probleme der physiologi-

Some upon a different phase are Fränkel, Dynamische Biochemie, 1911, Holborn on physical chemistry of cells, Ed. 2, 1911, in German; Arrhenius, Quantit-
tative laws in biological chemistry, 1915, McLean, Physical chemistry of vital phenomena, 1917, Robertson, Physical chemistry of the proteins, Ed. 2, 1918.

Pleixer on proteins is in the Monographen in biochemie series; others are Mason, Chemistry of the proteins, 1906; F. Fischer, Untersuchungen über Aminosäuren, 2. Aminosäuren, 1908; the works of Schreiber; two on Abderhalden, Sehrere Ergebnisse in den Gebiete der speziellen Kieselsäure, 1909, and Synthese der Leimstoffwechsel in Plasmen und Tier, 1912; und Underhill's Physiology of the amino acids in 1915.

The older works of Collinson on enzymes may be profitably supplemented by

68
Buss Eder (Chelpln), General chemistry of the enzymes, 1912, with Jacobson's dissertation on proteose fever in Sweden, 1899; they are the fourth edition of Oppenheimer, Die Immuno, 2 vol., 1923, the English version of Effects of biological chemistry, 1917; and the latest edition of Effect on enzyme action in the Monographs of biochemistry; Ehrlich's new work in the series of the American Chemical Society is of 1921.


Some of the more useful works on the chemistry of plants and their products are these: Practical plant biochemistry, M. Wheble and Osborn, 1920, a small book having references after each chapter: her The anthocyanin pigments of plants, 1916, is a study of the origin, distribution and chemistry of these coloring matters; Thatcher, Chemistry of plant life, 1921, is an American publication. Two that have been the foundation for much other work are Czapek, Biochemistry of Pflan- zen, 2 vol., first published in 1895, and Eder, Grundlagen der Erbepflanzen, 1896, translated into German from the original Swedish. These and Hill, Introduction to the chemistry of plant products, Ed. 1, 1913, has now Ed. 2, 1917, and Ed. 1 of 1917 appeared early in 1921; two by Krenos, Science and Applied Science and pharmaceutical, 1915, Ed. 2, 1920, and Applied science and economic botany, Ed. 2, 1916, are not wholly chemical, but have importance here; these may be used. Manual, History of medicinal plants, 1916.

Peckin and Everest, Natural organic colouring matters, 1918, is an attempt to present the present knowledge of this field in English, since Ruge's Die Chemie der natürlichen Farbenstoffe, 2 vol., 1908-1909, is now old and available only in German. Some chemistry of plant products is found also in the works on perfumes and flavoring essences, such as these: Gildemeister and Hoffmann, The volatile oils, Ed. 2, in 3 vol., 1913-21 (1), Askim, Perfumes and cosmetics, Ed. 4. 1915; both these are translated from the German; Walter, Manual for the essential oils, Ed. 1, 1916, is never and seems to have been written originally in English. Pflanzen on plant alkaloids has been almost superseded by Henry, Plant alkaloids, 1913. The work of Cross with Hervat and others on cellulose belongs rather to industrial chemistry.

Shape the largest of the German works is Wehmer, Die Pflanzenstoffe betalinosystematisch bearbeitet, 1911; in this are discussed the chemical constituents of plants and their products, including however only the phanerogams. This work, as a lexicon of the composition of plants, is the first to be consulted in discriminating the probable physiological action of the plant. 1

A. 4. Encyclopedic works, including as such... The oldest and the smallest is the Hoppes, *Chemie* Handbuch, Ed. 8, noted under...
A: I next in point of time is Opferbrucher, Handbuch der Biochemie, 1908-10, 4 vol. in 7, with Ergänzungsband, 1 vol., 1913; this is actually a set of monographs by various authors; the form of publication makes it less easy of revision than the English series. The Handbuch der biochemischen Arbeitsmethoden, edited by Abderhalden, 9 vol., in 11, 1910-19, has a more limited field in accordance with its title, but gives considerable descriptive matter; it is a working encyclopaedia for all procedures in biochemistry. There is at present being published a new edition of this under the title, Handbuch der biologischen Arbeitsmethoden, also edited by Abderhalden, to be in 13 parts.

The second up to 1928 and in some ways most useful in the Biochemisches Handbuch, 6 vol. in 7, and two supplementary volumes, 1913 15, edited by Abderhalden; this is updated after Bélestan, in part, but it gives material in more detail and is more recent than the third edition of Belestan; it has no collective index, but the volume indexes are good; it usually gives structural formulas for organic compounds, and has many references to the literature of the topics considered.

II. Serials containing original papers, chiefly

Before 1877, there was no special serial, and the literature is scattered through the serials upon chemistry, medicine, and physiology. In that year Hoppe-Seyler’s Zeitschrift für physiologische Chemie was started; there were some brief abstracts in the first ten volumes, but none since. The volumes may be one to four a year, and there are two collective indexes, including the first 60 volumes. Hofmann’s Beiträge für physiologische und pathologische Chemie (original papers only) appeared 1862-98, eleven volumes with a collective index for the first ten. It was then merged in the Biochemische Zeitschrift, 1906-date. Original papers only; this has had up to eleven volumes in the calendar year, and has three collective indexes, including the first ninety volumes. Two very recent ones in German are the Internationale Zeitschrift für physikalisch-chemische Biologie, edited by Träge and others and Verhandlungen, the latter under the direction of Abderhalden, both started in 1914; none of the first since the number of April, 1917, has been received; the second seems to be continuing, and makes a special feature of the work done by Abderhalden and his students on his own topic, protective formulas.

Much work upon physiological chemistry, particularly on the side dealing with animal life has been published in the following:

Archiv für die gesamte Physiologie (Pettenkofer)
Archiv für experimentelle Pathologie und Pharmacologie
Archiv für pathologische Anatomie und Physiologie (Virchow)
Archiv für Physiologie (Du Bois-Reymond)
Zeitschrift für klinische Medizin

Also in:

Archives Italiennes de biologie
Journal de physiologie et de pathologie générale

American Journal of Physiology
Journal of Physiology

Physiological Reviews

The oldest serial for this field in English is the Journal of Biological Chemistry, founded by C. A. Herter and J. J. Abel in 1905; it has original papers only, publishes usually three or four volumes a year, and has a collective index for the first twenty-five volumes. It generally contains the proceedings of the American Society of Biological Chemists, published separately with Roman numerals.

The Biochemical Journal, 1906-date, from the University of Liverpool, is an abstract, has always paid much attention to plant chemistry; it appears at irregular intervals, and has a collective index for the first ten volumes. The Biochemical Bulletin, 1911-16 (5), from Columbia University seems to have ceased with vol. 5, in May, 1916; it had abstracts that were little more than a subject index to current literature and gave news items, personal notes, chiefly.

Two recent fairly general serials are these:

Journal of Laboratory and Clinical Medicine, 1915, with original papers, laboratory notes on methods, and signed editorials; and, Journal of General Physiology, 1918, bimonthly, original papers only: the articles are often upon topics in physiological chemistry.

These very specialized ones are:

The Journal of Pharmacology and Experimental Therapeutics, 1898. The Journal of Urology, 1917-, and Endocrinology, 1917-; the first and second have original papers, and the second contains the Transactions of the American Urological Association and its branches; the third has abstracts and book reviews also; both the second and third are bimonthly.

II. Reference serials

The principal index serial to be considered here is the Index Medicus, 1895-date; it includes many papers on medical topics that are also biochemical; giving the reference in full but no abstract. The Index catalogue of the U. S. Surgeon General's Library is also of use for special topics, giving references to both serials and books. The section on biochemistry in the International Catalogue of Scientific Literature: Chemistry, 1901, is very complete for the years included.

Before 1850, the abstract serials were not specific; thus one has to use the various general abstract serials, as Berghaus' Jahresbericht for the early period, Chemisches Zentralblatt, Journal of the Chemical Society, Jahresbericht (Liebig and Kopp).

The oldest special one is Jahresbericht über die Fortschritte der Tier-Chemie, edited by Dr. Richard Malý, 1870-1918; the later volumes include bacteriology, pharmacology and other related topics as well; there are collective indexes for the volumes 1-40, i.e., annual ten-year indexes through 1900, only annual indexes since then. This serial is sometimes referred to as Malý's Jahresbericht, from its founder; it is a very complete record for the year, including books, these, and papers in serials, the articles of importance are abstracted, often at some length, while papers considered of less value are dismissed with a few lines or even the reference alone. Malý's Jahresbericht ceased publication in 1918, being merged
in the new one, Berichte über die gesamte Physiologie und experimentelle Phe
nomenologie, noted below.

The second in importance of the abstract serials upon biochemistry began in
1902 as Biochemische Centralblatt; it kept this title till 1909, then became Zent
ralblatt für Biochemie und Biophysik, and in 1917, absorbed the Mal's Jahres
bericht and the Jahresbericht über die Fortschritte der Physiologie, and is now
Berichte über die gesamte Physiologie und experimentelle Phan

The first few volumes had some original papers in the nature of reviews sum
marizing the progress in some field of biochemistry, but soon dropped these; the
first four volumes had also, companion volumes, Biophysikalisches Centralblatt,
and for these there is a collective index; then this set ceased. The volumes of
the Berichte under any name have never coincided with the calendar year; and
it seems never to have several each year. There are volume indices, a collective
index for the first nine volumes, i.e., the Biochemisches Zentralblatt; the special
feature is that the titles of articles are given in the language of the original, not
in that of the abstract serial.

The serial now called (or at least in 1914; some received since) Zentralblatt
für experimentelle Medizin, started in 1900 as the Centralblatt für Stoff
wechsel- und Verdauungskrankeiten, has good abstracts, always with emphasis
on nutrition and metabolism: it has annual and later semiannual indices, but no
collective one. In French, good abstracts are found in the Journal de physiologie
et de pathologie générale, 1899, and in the Archives italienne de biologie
1883; both these are here in the Natural History Library. In English, see the
Journal of the Chemical Society, the Chemical Abstracts, and other general ab
stract serials, including the Experiment Station Record. The new one is Physi
ological Abstracts, 1916, a cooperative affair by the English and American
Physiological Societies, with some other organizations; the abstracts are of fair
length, and so far cover the literature very well, with indices for each volume.
Physiological Reviews, 1911, new and excellent so far, is to be rather a place for
the publication of reports on progress, somewhat similar to those making up the
old Ergebnisse der Physiologie, 1892-14.

LECTURE 16
SUGGESTIONS UPON LOOKING UP THE LITERATURE FOR A TOPIC IN ORGANIC,
ANALYTICAL, PHYSICAL CHEMISTRY, OR BIOCHEMISTRY

This material may be found in a large number of places so that it is difficult
to say when the search has covered all possible sources. Books and serial articles
must both be investigated, but the method varies a little for each of these di
visions of chemistry.

In general, if the topic seems large enough or of sufficient importance try the
specific subject heading in the card catalogue; next, consult the indices in the
more comprehensive works in that field. When this has been done, turn to the
72
reference books, or similar works where material from many sources is collect.
ed. The plan of attack will vary somewhat.

I. Organic Chemistry

Here, if you know the name, in German, begin with the collective index of Beilstein, Handbuch, Ed. 3; if the English name only is known, look in Richter's textbook, Chemistry of the carbon compounds, the most recent edition in English and here if it is given, you will find the formula, and this will make possible the use of Richter's Lexikon, that in turn, gives a reference to Beilstein. Thus, finding the substance in Beilstein, you have there a fair summary of the information available at the date of publication of that volume; later work, through 1933, may be found in the Literatur-Registrierer, by looking under the formula.

If the formula only be known, go to Richter's Lexikon first, then look up the reference given to the volumes, original and supplementary, of Beilstein's Handbuch. Articles since 1913 will at present require the use of annual indexes, or the decennial index of Chemical Abstracts; here too, it is advisable to employ the formula indexes for their own original papers in those. Annalen, Annalen, Berichte, Journal für praktische Chemie, Journal of the Chemical Society, Berichte, and Recueil; if the name is known, look under that also in the newest annual index, and going backward in time to the most recent collective index, in each case.

If for any reason a thorough search of the literature is to be made, the process is much like that for general chemistry.

A. Before 1840.

1788, Annales de chimie
1792, Jahresbericht (Berzelius)
1832, Annalen der Chemie
1832, Chemisches Zentralblatt (then Pharmaceutisches Centralblatt)
1834, Journal für praktische Chemie

All these except the fourth have collective indexes.

B. 1840 to 1870.

Add to the ones above the following:
1840-58, The Chemist
1842-59, Chemical Gazette; continued by Chemical News, 1859 on.
1847, Jahresbericht (Liebig and Kopp)
1858, Bulletin de la Société chimique de Paris (now de France)
1867, Berichte der deutschen chemischen Gesellschaft.

Note that Berzelius' Jahresbericht ceases with 1849; Chemist and Chemical Gazette have only annual indexes. The abstracts in Annalen ceased before 1870, and those in Annalen and the Journal für praktische Chemie by 1873; for this period no collective index for Chemisches Zentralblatt has been published.
C. 1870 to 1906.

For this period, there are several good collective indices, and their use facilitates the search in the literature. The more important ones might be:

a. Jahresbericht (Lüling and Kopp); slow to appear but very complete
b. Journal of the Chemical Society
c. Bulletin de la Société chimique de France
d. Chemisches Zentralblatt; collective index for 1878-81, 1886-1906
e. Jahrbuch der Chemie (Meyer) 1891, collective index, vol. 1-10
f. Journal of the Society of Chemical Industry, indexes 1862-1905
g. Zeitschrift für angewandte Chemie, index of 1897-1907
h. Jahresbericht (Wagner); collective indexes 1895-97

Use fig. 18, and h, only for topics in applied (industrial) chemistry; annual indexes of other serials having abstracts or reviews may be used, with the Chemistry section of the International Catalogue of Scientific Literature from 1901 on Wagner’s Jahresbericht might also be used for the preceding period for topics not in pure chemistry or theory.

D. 1907 to 1921.

Here, the order for covering the literature rapidly, might be:

a. Chemical Abstracts, decennial, then annual indexes
b. Journal of the Chemical Society, collective index and annual ones
c. Bulletin de la Société chimique de France, annual indexes
d. Chemisches Zentralblatt, index 1897-1911, and semimannual ones since

England usually with the most recent annual or volume index, and work back to the newest collective one; the Jahresbericht has here, only 1897-1921 completely, but part at least of 1911 has been published, and this should be used before b, and if it is available. Consult also the annual indexes of Jahrbuch der Chemie and the Chemical Society’s Annual Report of Progress of Chemistry. The annual indexes of the serials in c, f, g, h, may be used if the topic is one not of pure chemistry or art.

Obtain the final list by the volumes of the Chemistry section of the International Catalogue of Scientific Literature also, to make sure no item is overlooked.

Patents in the organic literature may be looked up in the reference serials under the subject title, if the number only is known, the indexes by patent number in:

Chemical Abstracts
Chemisches Zentralblatt
Jahresbericht (Lüling and Kopp), through 1910
Zeitschrift für angewandte Chemie, through 1918
Jahresbericht (Wagner), only through 1914

For any product not for chemical, Privatländer, Fortschritte der Teerfarbenfabrikation, beginning with the newest volume, since these have collective indexes including material in the earlier volumes; if the substance has been known for some time, see also Winterthurer Zusammenstellung der Patente auf den Gebieten der organischen Chemie, 1877-1915, 5 vol., published 1908-19. From 1918 on the volume indexes of Chemische Industrie will be of use.

74
II. Applied chemistry

A. Before 1849
Use the same reference serials as for organic chemistry.

B. 1849 to 1870:
Check out the monthly list, Jahresbericht (Wagner), 1855 on.

C. 1870 to 1890:
For this period, collective indexes are available for only part of the time in the serials of applied chemistry; the best plan would be this:

b. Jahresbericht (Wagner) index, v. 11-15, 1865-90
c. Jahresbericht (Liebig and Kopp), index, 1887-1908
d. Zeitschrift für angewandte Chemie, index, 1887-1907
e. Chemisches Zentralblatt, index, 1896-1906
f. Jahresbericht der Chemie (Meyer), 1891 on; index, 1891-1900

Prizes for individual years for Wagner's Jahresbericht may be found for years after 1894, to check the other serials and make certain that nothing has been overlooked.

D. 1897 to 1921:
Here, start with the domestic index of Chemical Abstracts, 1907-1916, and the annual indexes of it for later years; the order would be as follows:

a. Chemical Abstracts, index, 1897-1916
b. Chemisches Zentralblatt, index, 1907-11
c. Jahresbericht (Liebig and Kopp), 1905-10, inclusive, 3 indexes
d. Journal of the Society of Chemical Industry, annual indexes
e. Zeitschrift für angewandte Chemie, 1908-18, annual indexes
f. Jahresbericht der Chemie, annual indexes

Such d and e will probably have collective indexes for all or part of this period; the annual indexes of the Chemische Zeitung: Berichte, 1914 on, and the indexes of the volumes of Chemie et Industrie, 1916 on should be used to check up for safety, as the foreign serials were sometimes difficult for American and English subscribers to obtain during these years. Use also the Reports of Progress of Applied Chemistry, 1916 to date.

III. Physical chemistry

Here for all periods the serials advised in Lecture 7 for general chemistry should be used; it might be well to add, as a further check for completeness, the collective index of Zeitschrift für physikalische Chemie, v. 1-50, 1887-1906, and that of the Physikalische chemische Zeitschrift (zentralblatt, 1904-06, and that of Journal de physique v. 1-10, 1901-12. If the topic is electrochemical use also the index of Zeitschrift für Elektrochemie, v. 1-10, 1894-1904, and the individual volumes of the Jahresbericht der Physikalischen und physiographischen Chemie, 1894 on, 1907 being the latest here.

IV. Biochemistry

For the years before 1849, and 1849 to 1870, use the serials advised under these years for general chemistry, in Lecture 7.

C. 1870 to 1906.
75
At present, for rapid work and completeness, this is best:

a. Jahresbericht (Maly), collective indexes, through 1900
b. Biochemisches Centralblatt, collective index, v. 1-9, 1902-09
c. Journal of the Chemical Society, collective indexes
d. centralblatt für Stoffwechsel- und Verdauungs Krankheiten
e. Archives Italiennes de biologie, 1882 on; collective indexes for v. 1-60, 1881-1932; index for 41-60, 1906-1915 is in press
f. Journal de physiologie et de pathologie générale, annual indexes of volumes, 1889 on

D. 1907 to 1921.

a. Chemical Abstracts, decennial index, and annual indexes since
b. Jahresbericht (Maly), annual volumes
c. Centralblatt für Biochemie und Biophysik, continued by Berichte über die gesamte Physiologie und experimentelle Pathologie; volume indexes only since now
d. Physiological Abstracts, 1916 on, volume indexes only.

The volume indexes of e and f in C may also be used, as a check particularly in the case of European work.

The sources of other libraries may be made use of by means of the system of interlibrary loans mentioned at the close of Lecture 7. New serials are often started and these are to be watched as new sources of abstracts or reviews of progress; such a one is the new Physiological Reviews, (that seems to take the place of the Ergebnisse der Physiologie, 1902-14), giving summaries of progress with bibliographies.

Knowing books exist is not enough—they must be used. * * *