Report on the Meeting with The American Medical Association's Joint Committee to Study Paramedical Areas in Relation to Medicine

In February, the American Association of Clinical Chemists, the American Chemical Society, the American Society of Biological Chemists, and the American Board of Clinical Chemistry, among other organizations of scientists working in the field of health, received invitations to a meeting, in Chicago on April 4 and 5, of a Joint Committee to Study Paramedical Areas in Relation to Medicine. The Joint Committee had been appointed by the Board of Trustees of the American Medical Association. It included representatives of that Board, of the A. M. A. Council on Medical Education and Hospitals, and of the A. M. A. Council on Mental Health. Its purpose was to "consider how physician leadership can best be activated in relationships with professional and technical personnel closely related to medicine" and "to study . . . liaison at the professional and technical level leading to the above objective."

The AACC and the American Chemical Society welcomed the opportunity to discuss with a responsible group, representing the medical profession, problems that have long existed in the field of clinical chemistry. These problems have caused considerable concern to chemists. They vitally affect the public welfare. The writer was invited by Dr. O. H. Gaebler, President of the AACC to serve as an official representative. The Joint Committee invited the attendance of Dr. John F. Polli, Secretary of the Chicago Section of the American Association of Clinical Chemists, who also was appointed an official representative of the Association by Dr. Gaebler. In addition, Drs. Armand Quick and E. P. Kennedy attended as representatives of the American Society of Biological Chemists; and Dr. Joseph Routh for the American Board of Clinical Chemistry. The writer also served as representative of the American Chemical Society.

Other organizations represented included the American Association for the Advancement of Science, the American Academy of Microbiology, American Society of Professional Biologists, Society of American Bacteriologists, American Society for Pharmacology and Experimental Therapeutics, the Federation of Societies for Experimental Biology, American Physiological Society, Ameri-
can Psychological Association, American Board of Examiners in Professional Psychology, Association of State and Territorial Public Health Laboratory Directors, Conference of State and Provincial Public Health Laboratory Directors, American Speech and Hearing Association, American Society of Bioanalysts, and the Intersociety Committee on Laboratory Services Related to Health.

Plans were announced for a separate meeting of the Joint Committee and technologist and technician groups.

The meeting on April 4 opened with a statement by Dr. McKeown, Chairman of the Joint Committee, who explained that the purpose of the meeting was to obtain facts and explore means for establishing closer liaison among professions participating in medical education, research, and care of patients. Each representative was asked to make a statement concerning areas of disagreement, to summarize current thinking and to suggest remedial action. The statement made by the writer in behalf of the American Chemical Society and of the American Association of Clinical Chemists follows this report. A few corrections have been made; additions are in parentheses; omissions shown by dots.

It was evident from the reports and discussion at the meeting that dissatisfaction with the status quo existed among virtually all of the groups represented. Numerous references were made concerning the inadequacy of clinical laboratory services now being offered to the public. The writer pointed out that chemical disturbances associated with disease are so numerous and complex, and the challenge offered by human illness so great, that many sciences and skills must be enlisted to cope with the problems presented. As an example, chemists have provided many of the analytic methods that constitute the basis for chemical examination of blood, and have developed in collaboration with physiologists, physicians and others, an extensive body of knowledge concerning the chemical composition of body fluids in various states of health. This comprises the new science of clinical chemistry. However, such cooperative efforts are unlikely to develop or succeed unless scientists are respected and treated as equals. Chemists are resolved not to accept inferior status and will if necessary carry to the public the issue of their right to practice chemistry. Competence, and not possession of a medical degree or membership in a certain group, must be the criterion for good laboratory practice and service to the public.

It was brought out by several speakers that no problems were encountered by scientists in their professional relationships with individual physicians and that excellent relationships generally prevailed between professional groups at the local level. It was only the policies established nationally by certain medical organizations, leading to encroachments on the rights of scientists to practice their profession, that caused resentment and impaired interprofessional relations.
The writer strongly advocated licensure of scientists and technicians; and a statement covering this phase of the discussion follows this report.

Finally, the Intersociety Committee for Laboratory Sciences Related to Health was proposed as the medium for discussions of the problems affecting relationships among the professions.

What is the significance of this meeting of the Joint Committee of the A. M. A? The most encouraging feature is the recognition by a responsible group within the American Medical Association that the present state of clinical laboratory direction and performance is unsatisfactory and that it fails to fulfill the needs of the medical profession and of the public. The tone of the meeting and the attitude of the members of the Joint Committee toward the representatives of the sciences allied to medicine was sympathetic. It remains to be seen whether this auspicious beginning will eventually restore the harmonious relationships between the professions that existed at one time.

JOHN G. REINHOLD

Relationships Between Chemical and Medical Professions

Statement to A. M. A. Joint Committee to Study Paramedical Areas, in Behalf of the American Chemical Society and American Association of Clinical Chemists

Prepared by John G. Reinhold.

In universities and research laboratories there are cordial relations and close cooperation among scientists and doctors of medicine. Good feeling and mutual respect prevails too between scientists and physicians in private practice. Unfortunately, there are groups within the medical profession whose attitude has complicated the relationships among the professions.

There has been one official relationship between the American Chemical Society and the American Medical Association. In 1924, a joint committee representing these organizations, and the American Association of Pathologists and Bacteriologists, met to discuss the status of the clinical laboratory. The Committee made the report which appeared in the Journal of the American Chemical Society in 1924, included as Addendum 1.

The report was approved by the Council of the American Chemical Society,
by the House of Delegates of the American Medical Association, and by the
Council of the American Association of Pathologists and Bacteriologists. So
far as the writer knows, this agreement has never been rescinded by the House
of Delegates of the American Medical Association. (Note: It was learned
shortly before the meeting in Chicago, and after this statement was submitted,
that in 1939 the House of Delegates had revoked adherence to the 1924 Agree-
ment.)

However, the American Medical Association through its Council on Medical
Education and Licensure failed (for many years before 1939) to adhere to its
agreement. It listed as "Approved" only laboratories directed by physicians.
(J.A.M.A. 1928, 1933). Laboratories not directed by physicians were con-
demned as a jeopardy to the patient in a statement of the Council (J.A.M.A.
105, 1937). Instead of supporting legislation to insure competence of person-
nel in laboratories as stipulated in the 1924 Agreement, such legislation was
opposed by the Council and by State Societies affiliated with the American
Medical Association.

The gradual repudiation of the 1924 agreement by agencies of the American
Medical Association was accompanied by efforts to evolve a new doctrine,
namely, that the performance of laboratory examinations constituted the
practice of medicine. This culminated in a ruling by the State Board of
Medical Education and Licensure in Pennsylvania in 1936 that "all persons—
whether teachers, research workers, or practitioners of medicine—must be
licensed (to practice medicine) in order to perform their work legally, pro-
vided they enter into the welfare of the patient." The Board (composed of
disabled doctors and members of the A. M. A.) attempted to enforce this
ruling by ordering dismissal of Ph.D. chemists in certain hospitals and by
attempting to exclude qualified non-medical scientists from direction of cli-
ical laboratories. In its efforts, the State Board received support from the
State Medical Society. Intervention by the American Chemical Society, how-
ever, prevented fruition of this campaign against the scientists who were not
practitioners.

While criticism of clinical chemists has been outspoken on numerous oc-
casions (vide supra and see the Bulletin of the College of American Pathologists,
especially in 1955) particularly because of the presence in the field of allegedly
unqualified persons, opposition to legislation that would by licensing enable
evaluation of the qualifications of non-physician scientists, and hence elimina-
tion of those alleged to be unqualified, has been actively supported by the
American Medical Association and certain organizations of pathologists and
State Medical Society affiliates of the American Medical Association. On the
other hand, when an Act was passed by the legislature in Iowa in 1957 re-
quiring that hospital laboratories be directed by a doctor of medicine, surgery
or osteopathy, this was noted with approval in an editorial in the Journal
of the American Medical Association. Recently, a number of State Medical
Societies have adopted resolutions claiming that direction of clinical laboratories is a medical function requiring the director to have a medical degree.

Chemical, microbiological and other types of clinical laboratory examinations are now performed as they have been for the past forty years almost entirely by technicians, technologists, and scientists who are not physicians. The performance of these examinations involves application of chemical and biological sciences. The facts they yield do not come within the scope of medical practice until they are applied by a physician to diagnosis and treatment. Unless they are so applied they remain scientific facts and nothing more. Moreover, to apply them, a physician must integrate them with his clinical findings in the light of his own clinical experience. Not until these actions are taken is medicine practiced.

The claim that the performance of laboratory examinations is the practice of medicine cannot be substantiated. Nevertheless, this claim has been prosecuted with such insistence by certain groups within the medical profession that it has discouraged the entry of able chemists and biologists into a field that is badly in need of scientific skills. Laboratory performance in many hospital and private laboratories is limited in scope and lacking in reliability. The contributions that analytical and biological chemistry could make to the solution of problems presented by human illness cannot be realized until adequate numbers of chemists of superior skill and training are attracted to clinical laboratories. This will not occur until the principles of the 1924 Agreement are accepted and fulfilled by the medical profession.

In 1953, the Council of the American Chemical Society adopted a resolution on professional regulation which favored licensure of chemists working in fields related to health. Partly, as a result of this action, the Committee on Clinical Chemistry of the American Chemical Society has been studying legislation for licensure of chemists, scientists and technologists working in these areas. In 1955, it submitted to the Board of Directors of the Society a revised draft of Principles of Legislation for Regulation of the Practice of Clinical Chemistry. These were approved by the Board. Although the Committee on Clinical Chemistry has been concerned primarily with licensure of chemists, it believes that all non-physician scientists working in fields related to medicine should be licensed, excepting those whose work is predominantly research or teaching; or who are employed by federal, and possibly state, or municipal governments.

Liaison with scientists in other fields has been established through the Intersociety Committee on Laboratory Services Related to Health. Except for the Intersociety Committee, there is no liaison with medical technologist organizations. Recognition that many problems of the latter are shared by the (non-physician) scientist is leading to unofficial and largely personal consultations with increased frequency.
Certification vs. Licensure of Clinical Laboratory Personnel

Remarks made by Dr. John G. Reinhold, April 5, 1959, at the meeting of the Joint Committee to Study Paramedical Areas

Certification, by which a technologist or scientist voluntarily submits his qualifications to a board composed of his peers for review, is one method that has been proposed for evaluating the qualifications of persons working in clinical laboratories. A second method under consideration is the restriction of the performance of laboratory examinations to persons who have demonstrated competence to a governmentally sponsored licensing agency. The two have been regarded as alternates. Actually, they are not; and a clear distinction must be made between them. Licensure establishes minimal requirements, and it is the only method by which those whose standards of education and training are inadequate can be excluded from the field. Certification is a method by which standards may be raised, a special recognition for having achieved a higher standard of competence than the minimum. Certification has been feasible in the medical specialties because all physicians are licensed. Certainly, it could not prevent any inadequately trained medical graduate from practicing medicine. This is accomplished by the State licensing agency. Thus both are desirable but licensure is indispensable if the public is to be protected.

These considerations led the Council of the American Chemical Society to recommend that chemists who provide factual information to physicians be licensed. The Committee on Clinical Chemistry of the A.C.S. subsequently drafted principles of legislation which were approved by the Board of Directors of the A.C.S. in 1957. These have been submitted previously to the Joint Committee.

Legislation for licensure of chemists or of any professional group has two fundamental purposes (1) the protection of the public and (2) the protection of the licensee against challenge or encroachment by others. Legal recognition of clinical chemistry is important in view of the history of attempts by certain groups within the medical profession to undermine the right of chemists to make chemical examinations. I believe that these goals are accomplished by the Principles of Legislation.

In regard to licensure of medical technologists the Committee on Clinical Chemistry has been reluctant to intervene in a matter affecting an allied profession. However, the writer finds it incredible that persons as vital to the health and welfare of patients as technicians should remain unlicensed in nearly all of the 50 states. This alarming situation exists because of the opposition of the American Society of Clinical Pathologists and the College
of American Pathologists and their insistence that the Registry of medical technologists of the A.S.C.P. adequately establishes the competence of medical technologists. I have great respect for the A.S.C.P. Registry which enrolls 23,000 registrants. However, it does not exert any control over another group of medical technicians, at least as large, working in the field. Many of the latter are as competent and dedicated as are the A.S.C.P. registrants. However, many should not be allowed, because of inadequate training, to do work which is to be used by physicians in diagnosis and treatment and which may affect the very life of the patient. Other than licensure there is no method that can prevent any person, who in response to a whim or other trivial motive, from attending an unregulated, inadequate school of medical technology. After a few months such a person, poorly trained in every respect, emerges as a medical technologist; and because of shortages can find employment in a laboratory without difficulty. I have discovered students dismissed from our hospital technician training courses, because of dishonesty or of incompetence, to be employed as technicians in laboratories of physicians or of other hospitals. Such an occurrence could be prevented by licensure.

We find there a field of vital importance to the patient, physician and public remaining unregulated. The quality of laboratory service being rendered as a result is often poor and at times dangerous. Although the major fault is with the medical profession, specifically the pathologists and their leadership, all of us must share the responsibility for not challenging their opposition. The need for action to safeguard the public is urgent.

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TO EDINBURGH BY CHARTERED AIRPLANE IN 1960

Plans are under way to charter a plane for members of the American Association of Clinical Chemists and their families who wish to attend the International Congress of Clinical Chemistry in Edinburgh, August 9 to 14, 1960. The proposal originated at the March meeting of the Philadelphia Section and was discussed further at the Atlantic City meetings.

The advantages of group travel are considerable, that of economy being foremost. Round trip fares for 60 passengers would be about $340 per person. If 70 passengers participated, the cost would be less than $300 per person. This is about half of the Tourist fare rate and $200 less than that for Economy flights, the lowest rate. Yet amenities such as cocktails, wine and meals superior to those of Tourist class would be included. Baggage allowances would be about 55 pounds as compared with 44 pounds for Tourist and Economy flights.

Plans are still in preliminary form but a total of 28 days in the United Kingdom is contemplated. Tentatively, three plans are under consideration: Plan A would call for departure
on August 7 and arrival in Edinburgh the following day. Departure would be from London on September 7. Plan B would include departure for London August 1 and departure from Edinburgh on August 31. Plan C would provide for departure on July 21 for London and return from Edinburgh August 21. Plans A and B would enable attendance at the Edinburgh Festival of music, drama, dance, etc. which follows the Congress for two weeks. Plan C would permit only one week of Festival attendance. British Railways offer low cost travel vouchers for visitors from abroad so that travel from London to Edinburgh will be inexpensive.

Yet another advantage is offered by travel as a group in that a stopover could be arranged in Montreal for the proposed one or two day 1960 Joint Meeting of Clinical Chemists from Canada and U. S. A. The date of the later is not yet established but could be set to make such participation possible.

About 30 persons have already indicated that they intend to travel with the group. Others who are interested are advised to notify Dr. John G. Reinhold, Pepper Laboratory of Clinical Medicine, 711 Maloney Building, University of Pennsylvania, Philadelphia 4, Pa.

REPORTS FROM THE SECTIONS

Boston

The fourth meeting of the Boston Section of the American Association of Clinical Chemists was held on March 11, 1959 at the New England Center Hospital. Dr. Aaron Feldstein of the Worcester Foundation of Experimental Biology discussed “The Relation of Serotonin to Schizophrenia.” He illustrated the relationship between serotonin levels in blood and brain tissue and schizophrenia. The effects of Marsalid, chlorpromazine and related compounds on the excretion and metabolism of serotonin and some of the 5-hydroxy indole compounds were described. The application, methodology and use of the Amino Spectrophotofluorometer in the analyses of blood serotonin led to a general discussion of the various methods employed for serotonin and 5-HIAA estimations.

Officers for the coming year will be:

Chairman: Murray Golub
Vice-Chairman: Grace Margaret Rourke
Secretary: James E. Barlow, 12 Warren Road, Framingham, Mass.
Treasurer: Joseph Benotti
James E. Barlow

Cleveland

The Cleveland Section of the American Association of Clinical Chemists met on April 1, 1959 at Western Reserve University. Dr. Gerald T. Evans, Department of Clinical Pathology, University of Minnesota School of Medicine spoke on “Quality Control in the Clinical Chemistry Laboratory.” He reviewed the literature of this subject and discussed the types of measures taken at the University of Minnesota Hospital laboratories to maintain the accuracy of chemical analyses.

Willard R. Faulkner
New York—Metropolitan

A meeting was held by the New York-Metropolitan Section of the American Association of Clinical Chemists in New York on May 19, 1959. This meeting was held at 8 P.M. at the New York Academy of Sciences, and was devoted to the subjects of "Hemoglobin" and "Bile Pigment Metabolism." The speakers were Dr. John G. Reinhold, of the Pepper Laboratory of Clinical Medicine of the University of Pennsylvania, and Drs. Irwin M. Arias and Ernst R. Jaffe of the Albert Einstein College of Medicine in New York City.

Dr. Reinhold discussed recent spectrophotometric and analytic studies on bilirubin which are being carried out in his laboratory; Dr. Arias described recent work on the formation of bilirubin and its metabolism and excretion, whereas Dr. Jaffe's talk dealt with the synthesis of hemoglobin from precursors and the maintenance of this substance in a functional state in the erythrocyte.

JACOB KREAM

Philadelphia

The 56th scientific meeting of the Philadelphia Section of the American Association of Clinical Chemists was addressed by Dr. Robert Hamilton, Professor of Physiological Chemistry at the Temple University Medical School, and the subject was "The Use of Isotopes in the Hospital and in the Clinical Laboratory." Including in his address some aspects of his recent tour of the Oak Ridge Laboratories, Dr. Hamilton gave a brief introduction to atomic physics, a description of the production of radioactive isotopes, methods of analyses, and precautions in handling radioactive materials. Those elements found most useful in hospital diagnostic and therapeutic work were discussed, and limitations noted.

The 57th scientific session was held on March 24, 1959 at the University of Pennsylvania. "The Use and History of Versatol-A" was discussed by Stephen J. Koziol of the General Diagnostics Division of Warner-Chilcott. The speaker discussed the precautions followed in preparing Versatol and Versatol-A in order that these materials would be adequate to serve as either controls or standards. During the general discussion questions were posed as to whether this type of control or standard was adequate for maintaining laboratory quality control.

PEACE PAUBIONSKY

Southern California

The section met at the Long Beach Veterans Hospital on February 3 to hear Warner H. Florsheim speak on "Problems Involved in the Diagnostic Use of Radioisotopes." The difficulties of obtaining unambiguous clinical data without exposing patients to significant amounts of radiation were discussed. Dr. Florsheim is Assistant Director of the Radioisotope Research Unit at the Long Beach Veterans Hospital and Assistant Clinical Professor of Physiological Chemistry at the University of California Medical Center, Los Angeles.

"Some Aspects of Serum Lipids and Atherosclerosis" were discussed
by David Blankenhorn at the March 3 meeting held at Childrens Hospital, Los Angeles. Arterial changes considered and illustrated were plaque formation, types of calcification, thromboses and ulcers, including the role of carotene, blood transport processes and the use of fluorescence and x-ray technics of study. Dr. Blankenhorn emphasized that more attention should be given to the early detection of lipid disorders by checking the families of known patients and by looking for lipid disease as secondary to diabetes, thyroid and other diseases. He also suggested that the clinical laboratory might well routinely report any turbid serum samples they receive. Dr. Blankenhorn is Assistant Professor of Medicine at the University of Southern California School of Medicine.

The January and April meetings (the latter held March 31) were devoted to business and professional matters, particularly the improvement of cooperative relationships between the physician and the clinical chemist.

CLYDE A. DUBBS

Texas

The new section officers of the Texas Section of the American Association of Clinical Chemists are:

Chairman: RUSSELL O. BOWMAN
Chairman-Elect: JOHN K. KIRBY
Secretary-Treasurer: H. O. NICHOLAS, The Rice Institute, Houston 1, Texas.

H. O. NICHOLAS

Upstate New York

The Upstate New York Section of the American Association of Clinical Chemists met on March 20, 1959 at the Edward J. Meyer Memorial Hospital in Buffalo. After lunch the group toured the laboratories of the Hospital.

The subject of transaminases, SGO and SGP, was presented by Dr. W. B. Elliott of Buffalo who discussed the DPN method and inhibitors to the reaction, while Dr. Max Chilcote of Buffalo discussed the colorimetric method. Both presentations treated the advantages and disadvantages of each procedure and evaluated them for various laboratory requirements. Drs. Nathan Radin and Martin Murray, both of Rochester, treated the subject of acid and alkaline phosphatase in a similar manner, the first speaking on the p-nitrophenol and the other on the glycerophosphate methods. During the discussion the group presented its evaluations of other substrates and discussed inhibitors and accelerators to the reactions.

Dr. Raymond Vanderlinde of Syracuse discussed galactose metabolism, galactosemia, and the estimation of red blood cell galactose-1-phosphate uridine transferase. He presented a case of galactosemia in a 7 year old child and the findings in a study of the patient's family.

Dr. Royden N. Rand of Rochester talked on the determination of the leucine aminopeptidase activity in patients with carcinoma of the head of the pancreas and the diagnostic value of the determination of isocitric dehydrogenase in liver involvement and extrahepatic obstruction.

LEONA HUDSON
The eleventh annual meeting of the American Association of Clinical Chemists will be held in Cleveland, Ohio, August 27-29, 1959. The scientific meetings are to be held in the newly constructed, airconditioned Newton D. Baker Memorial Building on the Western Reserve University campus. Housing has been arranged on the American Plan at the Tudor Arms Hotel, which is a short walk from the campus. Each room in the Tudor Arms is airconditioned and is supplied with a television set.

Western Reserve University is situated along with the Case Institute of Technology about five miles east of Public Square in downtown Cleveland. In the vicinity, one may find the Cleveland Institute of Art, the Natural History Museum and Severance Hall, the home of the Cleveland Orchestra. Registrants will receive information which will be of value in making connections between transportation depots and the University area.

**Scientific Exhibits**

Scientific exhibits are welcomed. Details may be obtained from

**Dr. Willard R. Faulkner**
Microchemistry Laboratory
Cleveland Clinic
Cleveland 6, Ohio

Application for exhibit space must be made by July 15, 1959.

**Registration and Fees**

To expedite organization of the meeting, pre-registration by mail will be of great assistance to the local committee. The registration blank will be found in the back pages of this issue. Additional blanks may be obtained from:

**Dr. J. Waide Price**
Institute of Pathology
Western Reserve University
2085 Adelbert Road
Cleveland 6, Ohio

A non-returnable registration fee of $7.50 will be assessed, which will include the cost of the program, abstracts, badge, and miscellaneous expenses incident to registration. For those not attending the scientific sessions, the registration fee will be $1.00. Completed registration forms must be returned to the local committee no later than August 1, 1959.

A special rate of $38.50 has been granted to the Association by the Tudor Arms Hotel for room and board as follows:

1. Occupancy of double rooms (2 to a room) from noon Wednesday, August 26, to 3 P.M. Saturday, August 29.
2. Buffet supper Wednesday, August 26, served from 7:00 to 10:00 P.M.; breakfasts Thursday, Friday and Saturday; the annual banquet Thursday evening; and dinner Friday evening. (Lunches may be obtained at the University cafeteria or other restaurants in the area.)

A limited number of suites are
available where children can be housed in a room adjoining that of their parents and share the facilities of their parents’ room. The rate for children under 10 years of age so accommodated is $19.25 including meals as outlined above. Children over 10 years will be charged at the full rate.

Those desiring to make their own arrangements for housing may take their meals in the headquarters hotel or elsewhere in the vicinity at regular rates and may so indicate on the registration blank. It is the hope of the local committee, however, that all registrants will avail themselves of the excellent facilities and reasonable rate of the headquarters hotel. The fee for room and board may be remitted with the registration fee or at the time of arrival at the hotel.

The cost of the banquet alone for those not staying at the hotel is $5.75 and may be paid at the meeting.

A limited number of late registrations can be accepted at the time of the meeting, but since the low cost of the hotel accommodations is predicated on an accurate estimate of the number attending, it may be necessary to close registrations on short notice. Pre-registration as outlined above is, therefore, strongly recommended.

Individuals desiring to share a room with a specific person should so indicate on the registration blank and, if possible, send the registration blanks together. These requests will be honored if both registrations are received within a reasonably close interval.

See Meeting Registration Blank in this issue.

SCIENTIFIC SESSIONS
ELEVENTH ANNUAL MEETING
SYMPOSIUM ON THE APPLICATIONS OF SPECTROPHOTOMETRIC ANALYSIS IN CLINICAL CHEMISTRY

Moderator: JOSEPH I. ROUTH, Ph.D.,
Professor of Biochemistry University of Iowa, Iowa City, Iowa.

1. “Ultraviolet Spectrophotometry in Clinical Chemistry,” BENNIE ZAK, Ph.D., Assistant Professor of Clinical Chemistry, Wayne State University, Detroit, Michigan.
2. “The Use of Flame Photometry as an Analytical Technique in Biochemistry,” THEODORE E. WEICHSELBAUM, Ph.D., Assistant Professor of Experimental Surgery.
3. “Infrared Techniques and Their Application in Clinical Chemistry,” WILLIAM BURKEET MASON, M.D., Ph.D., Assistant Professor of Biochemistry and Medicine, University of Rochester, Rochester, N. Y.
4. “Application of Fluorometry to Chemical Analysis,” SIDNEY UDENFRIEND, Ph.D., Chief, Laboratory of Clinical Biochemistry, National Heart Institute, Bethesda, Maryland.