# A. U. B.

# APOTHECARY

VOL. 7
1952

# THE EDITORIAL BOARD



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The Apothecary is published as a yearbook
by the faculty and students of the
School of Pharmacy of the
American University of Beirut, Beirut
Republic of Lebanon
JUNE 1952

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The sketch on the front cover represents Avicenna as he appears on a commemorative Iranian stamp. (Pharm. J., **166**, 58, 1951). The sketch has been drawn for the Apothecary by Mr. Hovannes S., Donabedian B. Sc. Engineering, Department of Grounds and Buildings, A.U.B. Thanks are also due to him for supplying the sketch of the Nami Jafet Memorial Library which appears on page 2.

IMP. ACHKAR FRÈRES

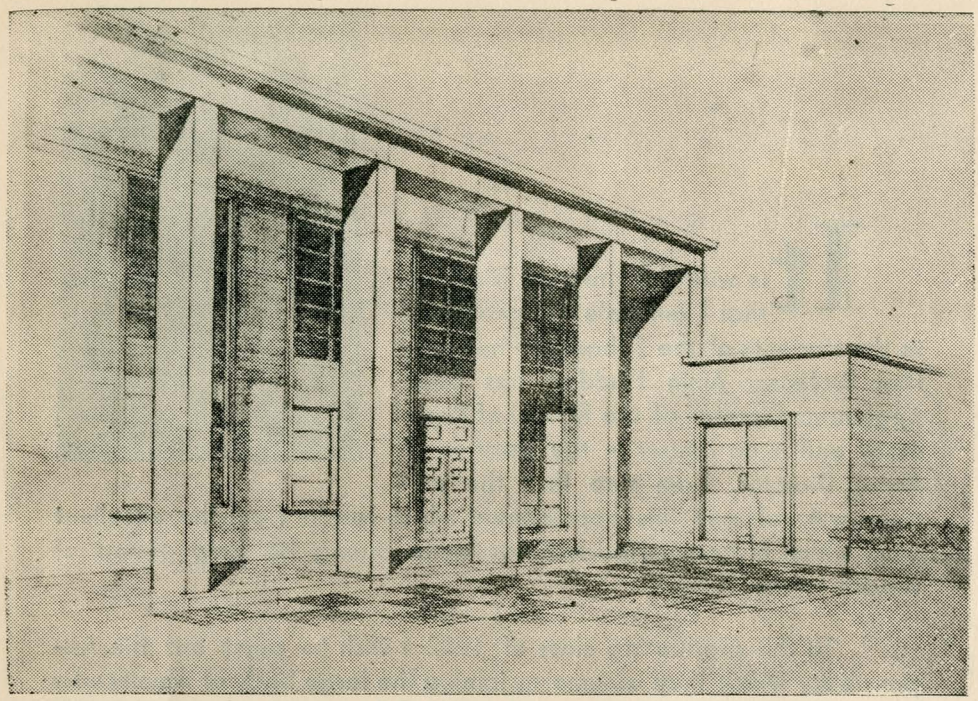
It is with the greatest pleasure that I am able to announce to the students of the School of Pharmacy that Professor Amin Haddad has been appointed Director of the School of Pharmacy and is no longer in the position of Acting Director. I am sure that the students will welcome this appointment which results from the excellent work which Professor Haddad has done during his long period of service to the School.

To the graduating class of 1952 I wish to point out the responsibility which they assume in joining the large body of Alumni who have carried the reputation of the AUB School of Pharmacy far and wide over the world. It may not be generally known that your School has had a major influence in the establishment of high standards in the field of Pharmacy throughout the Middle East. It is my very strong hope that the graduates of 1952 will undertake to hold high the reputation which has previously been established for them, and if possible to raise it still higher.

To do this it is essential that each graduate recognize that he is entering a profession and not a trade; that his major function is service to his fellow men and not profit for himself. The profession of Pharmacy is an honored one, and I trust that the graduates of 1952 as members of that profession will willingly and consistently labor to uphold the quality of their calling.

Unlike some other professions, the Pharmacist is intimately associated with human welfare and human suffering. Yours is a selfless calling whose interest and devotion is directed at others rather than at yourself. I congratulate the graduates of the School of Pharmacy on their decision to enter this profession with its spirit of service, and I wish them well as they enter on their careers in the many countries to which they will go.

**STEPHEN B. L. PENROSE**
President



*That they may have life and have it more abundantly*

**A. U. B. MOTTO**

The Nami Jafet Memorial Library, officially dedicated on May 5, 1952, stands as a living tribute to the memory of a dutiful son of his University and his Country.

**Pharmacy** is a profession. To profess is to teach. The privilege of practicing a profession carries the responsibility to teach. No true pharmacist is satisfied being merely a technician.

In both social and business intercourse a pharmacist is expected to give of his knowledge, in advice and guidance. In doing this he shall not violate medical ethics nor shall he presume to give advice beyond his understanding. As a man of honor the welfare of those with whom he comes in contact is his primary concern.

To the members of the graduating class of 1952 I extend the hand of welcome into the group of professional people concerned primarily with health. Accept your responsibility with seriousness of purpose and humbleness of approach. Strive continually to elevate the standards of your profession. Accept your community responsibility and be a leader in health matters.

As members of the profession of medicine, dream the dream of true medicine, which "dreams of a time when there shall be no unnecessary suffering and no premature deaths; when the health and welfare of our people shall be our first concern; when love and kindness shall replace greed and selfishness; and it dreams of this, not with the end that you or I should profit, but with the end that a happier and healthier life shall come to our children and our children's children."

**NORMAN B. NELSON, M. D.**

Dean of the Medical Faculty

# To the Graduating Class of 1952

As a result of your diligence, intelligence and hard work, you have been awarded the pharmaceutical degree which will give you the right to enjoy all the privileges and assume all the responsibilities of the profession you have rightfully chosen as a life career. Your teachers and I wish to extend to you on this occasion our heartiest congratulations and sincerely wish you all the happiness and success that life can bring you.

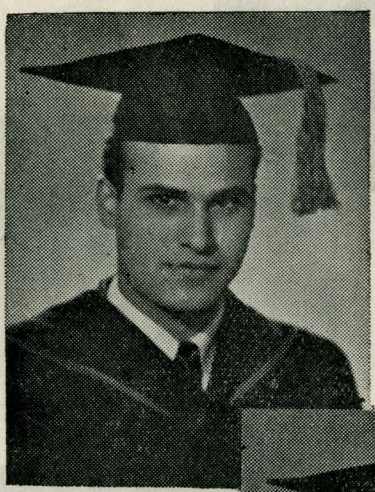
At this commencement of your career, I would like to warn you that it will not be very long before you will inevitably have to go through the world's usual tests of your fitness to survive. Your success in these tests and your ultimate place in your community will be determined not only by the courage, the ability, and the qualifications you possess, but also by your social and professional integrity and dignity, by your ability to keep abreast with the developments in your profession and allied professions and, above all, by the amount of hard work you are willing to do in order to build a career.

As professional men you have manifold obligations towards your profession, your colleagues, your Alma Mater, yourself and your God. As much as it is your duty to make a contribution to the welfare of public health through your unselfish service as a pharmacist, it is also your duty to apply your trained intellect and social consciousness to the molding of a better community, intellectually, socially and spiritually. Our experience with you make us feel confident that you are well equipped and determined to accept these obligations cheerfully and to fulfill them willingly.

**AMIN F. HADDAD**

# Graduating Class

*This is the first class to receive the degree of* ***Bachelor of Science in Pharmacy, B. Sc. (Pharm.),*** *which now replaces the* ***Pharmaceutical Chemist*** *degree.*



**SAMIH ALI AFIFI**

Beirut, Lebanon

Pharmaceut. Soc., Secretary 1950-51 ; Student Council Representative, Pharm. IV, 1951-52 ; "Pharmacy News", Managing Editor 1950-52.

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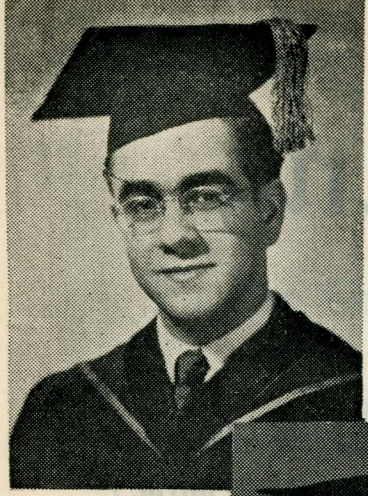
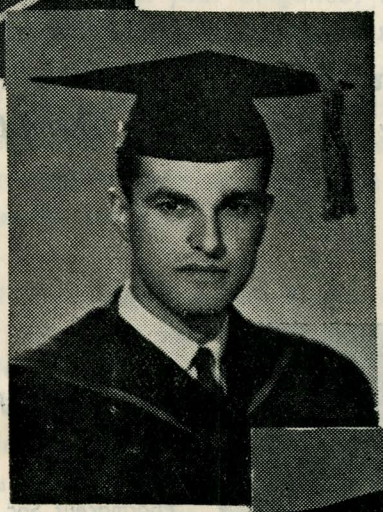
Heliopolis, Egypt

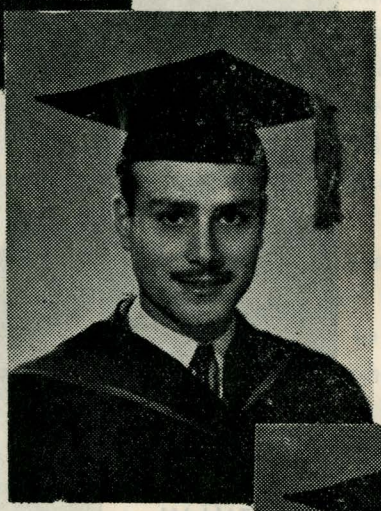
"The Apothecary", Secretarial Associate 1950-52 ; Pharmaceut. Soc., First Vice-President 1951-52.



**ABDEL-AL MAHMOUD AWAD**
Port-Said, Egypt

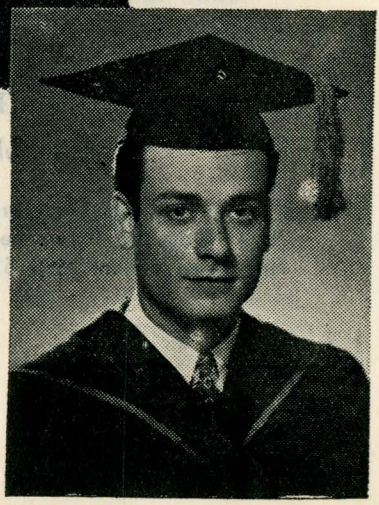


**MUSA MUSTAPHA AWAD**
Jerusalem, Jordan



**ELIAS SAM'AN HAWA**
Beirut, Lebanon

Student Council Representative, Pharm. I 1948-49 & Pharm. III 1950-51; Secretary 1950-52: Student Life Committee Representative 1950-52; University Students Union of Lebanon Representative 1950-52; Secretary 1950-52; Palestinian Students Aid Fund Representative 1950-51.



**VICTOR FUAD HITTI**
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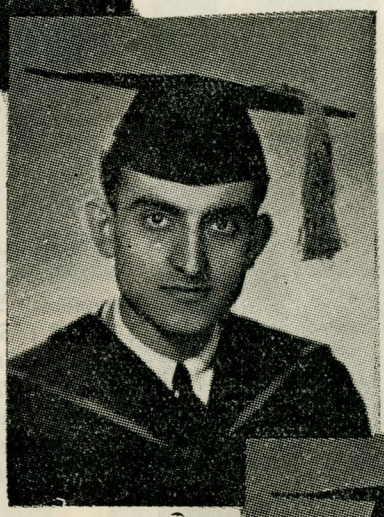
AMIN KAMAL ISMAIL

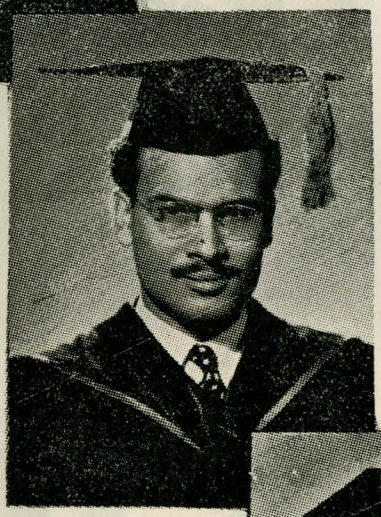
Tulkarm, Jordan

Student Council Representative,
Pharm. II 1949-50.



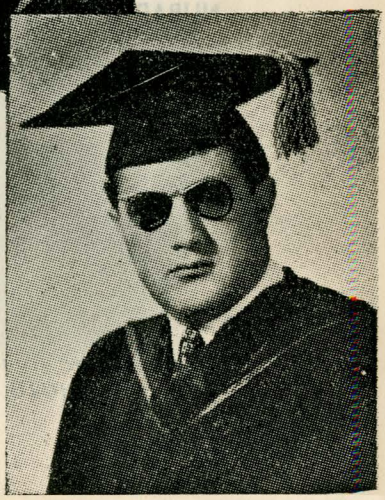
MORRIS KARAM KARAM

Beirut, Lebanon



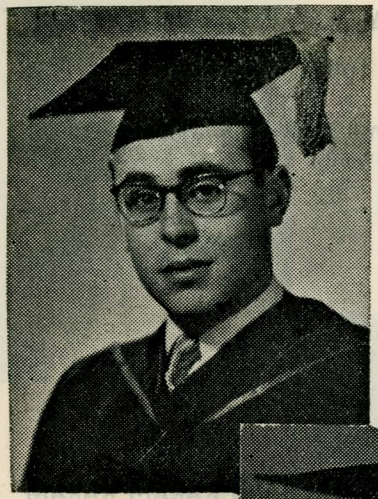
MOHAMMAD ALI AL-KURDI

Amman, Jordan



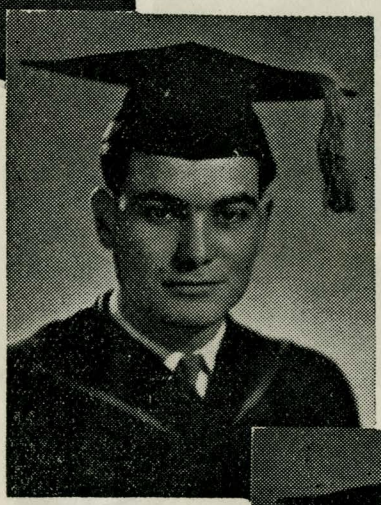
SAFWAT DAVID KUTOB

Bethlehem, Jordan



**RIZKALLAH ABDALLAH MAZLOUM**

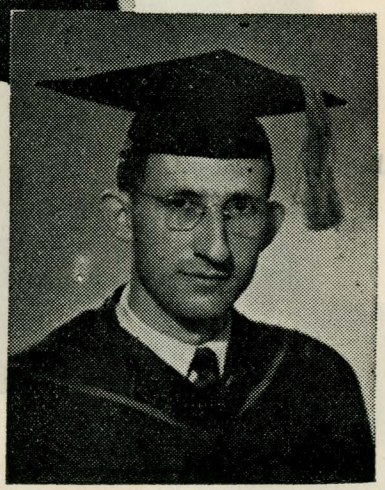
**Aleppo, Syria**



**ELIE SAMI NUWAYSER**

**Beirut, Lebanon**

Pharmaceut. Soc., Treasurer 1949-50 ; Second Vice-President 1950-51 ; President 1951-52 ; "Pharmacy News", Editor 1950-52 ; "The Apothecary", Assistant Editor 1951-52.



**NUBAR ARAM TEPELIAN**

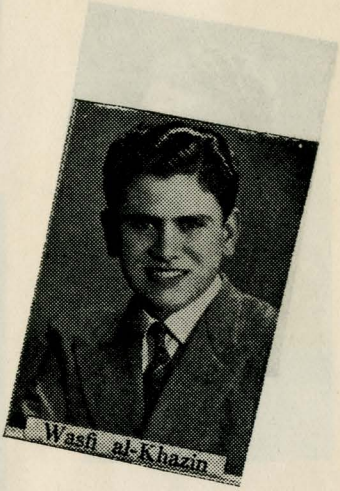
**Damascus, Syria**

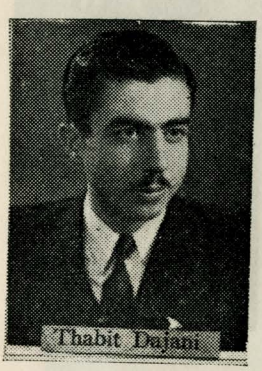
*Members of the graduating class were photographed at the studios of PHOTO PARAMOUNT, Bab Edriss, Beirut.*

# Third Year


Nicolas Trochalakis


Joseph Andonian


Wasfi al-Khazin


Thabit Dajani

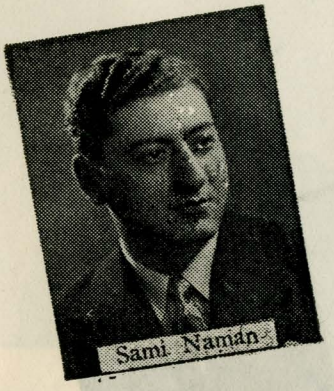

Eugenie Abu-Shadid


Anis Wahbah


William Habashi

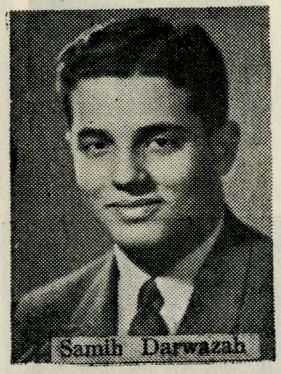

Nuha Baddurah


Edward Burtkush


Sami Naman


Berin Tutunji


Ilyas Farah


Samih Darwazah

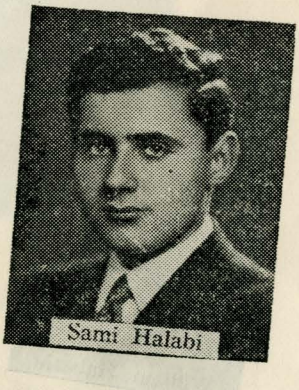

Muhammad Nimr


Amal Abu-Ghazalah


George Dayian


Anis Muashshir

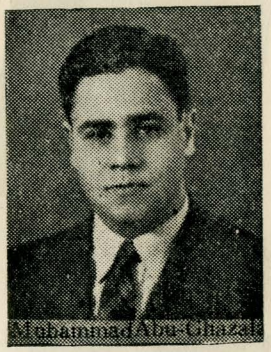

Anwar Husayni


Sami Halabi

# Second Year


George Slim


Charles Nassar


Mohammad Abu-Ghazal


Fadlu Shaban


Nazir Azmy


Adnan al-Jabshah


Panos Titizian


Naim Jandali Farraj

Arthur Yuhanna

Ilyas Bikhazi

Nicolas Athanassiades

Sulayman Abu-Khadra

Khalil Samir Bishuti

Fadl Abdallah

Ibrahim Duri

Hamid Jabr

Nizar Daghir

Agop Marcarian

# *Editorial*

This is the seventh volume of The Apothecary. Its general plan follows that of previous issues except for few changes intended to render it more useful and more interesting to its readers.

In general, the "Abstracts from Current Literature on Newer Drugs" and the individual abstracts of the "Seminars" were made longer. The cooperation of many Alumni made it possible for us to enlarge the "Alumni News" section. The new section "Excerpts from Our Mail" will, it is hoped, encourage more of the Alumni to keep in touch with the School through correspondence.

The policy and purpose of The Apothecary has not changed: to keep the Alumni informed on new professional advances and in touch with their Alma Mater and with each other, to provide the graduating class with a souvenir of their year of graduation and the undergraduates with a record of their activities at school and information on topics which may not have been included in their class work, and lastly, to provide a link between this School and other pharmacy schools, here and abroad.



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# TO HEALTH

*O Health, thou oldest of the blessed,*
*With thee would I gladly reside*
*For the rest of my stay on this earth;*
*Wouldest thou also*
*Abide as my much-honoured guest.*
*For if wealth dwells with grace,*
*If the children flourish and thrive,*
*And if power*
*Be lustered with justice and piety,*
*If love be kind —*
*Pursued by thine own subtle mesh,*
*And if God should bless thee with joys*
*Other than these, the comfort of sleep*
*After the work of the day —*
*O blessed goddess,*
*By thy grace alone do these gifts blossom forth,*
*With the lustre and beauty of spring-time.*

**ARIPHON** (4th century B. C.)

# PHARMACOPOEA INTERNATIONALIS

by

**Prof. Charles Abou Chaar**

**One** of the most significant events in the pharmaceutical world if not the most significant is the recent publication of the first volume of the International Pharmacopoeia. Its appearance marks the fulfilment of a desire expressed some 68 years ago at the first International Pharmaceutical Congress organized by the pharmacists of Southern Germany in Brunswick in 1865 — one item on the agenda being «How is it possible to realize by degrees a uniformity in the prescriptions of the pharmacopoeias for galenical preparations ? » (1).

«The various national pharmacopoeias, being produced independently to meet the needs of different countries, exhibit differences in standards, strengths, and nomenclature of drugs in accordance with differences in national medical and pharmaceutical practice. Such differences in national standards for widely used materials constitute a source of danger to travellers who may need to have the same prescription dispensed in different countries, not only because the supply of a drug may differ in strength from that to which the patient is accustomed, but also because of delays in receiving medicines that may have to be specially made or procured. Such differences, also, by causing confusion and misunderstanding, are a hindrance to the spread of medical and pharmaceutical knowledge and to international commerce. A state of affairs under which the same supply of a drug or chemical may be accepted in one country and rejected in another may lead to the retension of lower standards in manufacture, whilst the maintenance of a common high standard would tend to economy of production and would facilitate commerce between nations» (2).

Dr. Hampshire, the chairman of the Expert Committee on the Unification of Pharmacopoeias of the World Health Organization, until 1950 secretary of the British Pharmacopoeia Commission and in charge of the English edition of the International Pharmacopoeia, said the following, in an address given at an evening meeting of the Pharmaceutical Society of Great Britain (3) «The International Pharmacopoeia has been prepared in the hope that its nomenclature, descriptions and standards will be adopted by the national pharmacopoeia commissions. Its acceptance by those countries which already have a complete and up-to-date pharmacopoeia would do much toward unification of drug standards throughout the world. The book, in addition, should be especially useful to countries which have yet to develop a national pharmacopoeia, or where the national pharmacopoeia is in need of revision in order to bring it up to date. It is obvious that the International Pharmacopoeia cannot

be in legal conflict with the national pharmacopoeias, since in any country, it can have only the authority which the Government of that country decides to give it. The General Assembly of the World Health Organization has formally recommended the acceptance of the book by its 68 Member States. All countries are at liberty to make use of the material in the International Pharmacopoeia, when compiling their national pharmacopoeias, without consultation with the World Health Organization. But when it is desired to publish a translation of the book in some other language under the title of the International Pharmacopoeia this can only be done with the consent of the World Health Organization and the World Health Organization must approve the translation.»

At present there are two editions of the International Pharmacopoeia, one in English and one in French — the French edition being the charge of Professor Hazard of Paris. A Spanish edition is in preparation. Only volume 1 of the Ph.I. is now available and it is hoped that volume 2 which will complete the pharmacopoeia will be made ready during this year. In an announcement of the Ph.I. in the Bulletin of the World Health Organization (4) the following statement appears «.... It is hoped that the health and pharmacopoeial authorities of ... countries which have not yet developed a national pharmacopoeia ... will decide to adopt the book as a whole as their official pharmacopoeia. A supplement could be prepared by the country concerned so as to complete the Ph.I. according to national requirements. In such cases, arrangements could be made for any of the editions to be supplied in large quantities at special low rates.»

This golden opportunity offered by the World Health Organization should be taken advantage of by the proper authorities in this country. The production of a pharmacopoeia is a very difficult and costly undertaking and for a small country like ours it is well nigh impossible. Many republics of South America have adopted Spanish versions of the U.S.P., Egypt recognized the B.P. and the French Codex and in this country the B.P., U.S.P. and French Codex are required to be kept by every pharmacist. By the publication of the International Pharmacopoeia, we no longer have to require the pharmacist to go into the cost of buying three pharmacopoeias. But much more important than the monetary consideration is the unification of galenicals and pharmaceutical preparations so as to bring about a uniformity in their strength when dispensed by the graduates of the different schools. At the same time, the availability of English and French editions of the same book, makes it admirably suited to a country where both languages seem to split the country into those who know one or the other of the two languages better. I wish to strongly urge the Pharmacy Syndicate and the Health Department to give serious consideration to the proposal of the World Health Organization for the adoption of the International Pharmacopoeia by this country which is a Member State of that Organization. According to the president of the American Pharmaceutical Association (5), the second Pan-American Congress of Pharmacy, held in Lima, Peru, during the first week of last December, «... adopted the idea of utilizing the International Pharmacopoeia ... with a Pan-American supplement rather than attempting to write a separate Pan-American Pharmacopoeia as was recommended at the previous Congress». In the words of Professor Dunlop, Chairman, The British Pharmacopoeia Commission (6) «... the Pharmacopoea Internationalis is a landmark in the progress of scientific international relations ..., a long step has been taken to resolve these national differences ..., ... is an important and admirable work, the production of which can only have been achieved by patient compromise and general co-operation.»

For a history of the development of the International Pharmacopoeia see (1, 7, 8, 9, 14). For a review of the monographs and titles of volume 1 of

the Ph.I. see (10, 11, 12, 13, 14).

*The price of volume 1 of the Ph.I. is 35 shillings, 20 Swiss francs or 5 dollars. It may be obtained directly from the World Health Organization, Sales Section, Palais des Nations, Geneve, Switzerland; or from representative booksellers such as Librairie Universelle, Beirut and Damascus, Librairie «La Renaissance d'Egypte» Cairo; Mackenzie's Bookshop, Baghdad. The Pharmaceutical Society of Great Britain is also a distributor of the English edition. When placing orders be sure to specify the edition you want.*

*REFERENCES*


(1) The International Pharmacopoeia, Pharm. J., 167: 351 (1951).
(2) Pharmacopoea Internationalis, Editio Prima, Volumen I (1951), p. xiii.
(3) Hampshire, C.H., Pharmacopoea Internationalis, Pharm., J., 167: 437 (1951).
(4) Pharmacopoea Internationalis, Bull World Hlth. Org., 4: 632 (1951).
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(8) International Pharmaceutical Federation, The International Pharmacopoeia, Pharm. J., 167: 247 (1951).
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(10) The International Pharmacopoeia, A General Review, ibid., 167: 397 (1951).
(11) The International Pharmacopoeia-Monographs on Chemical Substances, ibid., 167: 423 (1951).
(12) The Ph.I. and the B.P., Comparison of Maximum Doses, ibid., 167: 457 (1951).
(13) The Ph.I. and B.P., Comparison of Titles, ibid., 168: 76 (1952).
(14) Hazard M.R., Présentation du Premier Volume de la «Pharmacopée Internationale», Ann. Pharm. Franç., 11: 755 (1951).


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*Alumni of the School and readers who wish to examine the International Pharmacopoeia will find a copy at the Medical Library and another at the School.*

# FLUORESCENCE ANALYSIS IN ULTRA-VIOLET LIGHT*

## *an abstract of a book review*

by SAMIH AFIFI

Light is a form of energy. In a broad sense, it consists of electromagnetic radiations and may be classified into six regions :

1. the region of molecular and atomic dimentions, having a wave-length below 140 Angstrom units (1 A°. = 0.1 millimicron) — this includes cosmic rays (0.0005 A°.), gamma rays from radioactive substances (1-0.005 A°.) and X-rays (0.1-1000 A°.);

2. the ultra-violet region with a wave-length of 136-4000 A°.;

3. the solar and visible regions — the former having a wave-length of 3000 to 300,000 A°. and the latter a relatively small range of 4000-8000 A°. and constituting the visible spectrum which is made up of the following colors, in order of increasing wave-length; violet, indigo, blue, green, yellow, orange and red — the combination of which gives visible or «white light»;

4. the infrared and heat-ray region extending to 0.05 cm. (5,000,000 A°.);

5. the Hertzian region extending between 0.01 cm. to 50,000 m. — this includes radio waves which are themselves subdivided into the short (waves below 100 m.), medium, and long (waves above 1000 m.); and

6. the region of slow oscillation of wave-length about 10,000,000 m.

Certain substances absorb ultra-violet light over a characteristic range of wave-lengths, and many emit or re-emit such radiations, thus exhibiting the phenomenon of luminescence. Luminescence is shown by solids, liquids, or gases and is classified as a. fluorescence — if it lasts during the period of excitation only and b. phosphorescence — if it persists when the exciting source is removed.

Where the fluorescence produced is characteristic of the irradiated substance i.e. when the substance is examined in ultra-violet light, the fluorescence may be used as a means of analysis. For ordinary work it is sufficient to note the intensity and color of the fluorescence when the substance is viewed in light within a particular wave-length of the ultra-violet region. Fluorescence analysis is important not only qualitatively but the intensity of the fluorescence, over a restricted range of concentrations, is proportional to the amount of the fluorescent substance making it possible to determine the quantity of the substance photometrically.

To illustrate to the reader the wide and possible range of application of fluorescence analysis in the various fields of science, I shall enumerate few examples from the various chapters of the book to arouse his interest and stimulate him to consult the book itself which is exhaustive, well written and has an extensive bibliography.

*Drugs.* Many vegetable drugs and their galenicals exhibit characteristic colors when examined in filtered ultra-violet light. Many examples of this were taken in pharmacognosy. Not only the identification of the drug but also the detection of its adulteration is possible. Traces of alkaloids, sometimes too small to give precipitates with alkaloidal reagents, can be detected by their fluorescence with or without special treatment. Many other types of plant constituents can also be detected by fluorescence analysis.

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* *Book by J. A. Bradley and J. Grant, Chapman & Hall, London,* 1939.

*Foods and Food Products.* The fluorescence test is an important criterion of purity of certain oils and fats, and if taken in conjunction with other physical and chemical tests, a reliable decision can be made as to the genuineness of the sample tested or its age. Butter adulterated with margarine or coconut oil will show, in ultra-violet light, a blue fluorescence in contrast to a yellow one given by a pure sample. As low as 5 % can be detected easily. Chicory and taraxacum exhibit yellowish white and blue colors respectively and thus can be detected when used to adulterate coffee. Ergot in flour, preservatives in foods and drinks and toxic materials in food products can be detected by fluorescence analysis.

*Legal and Criminological Work.* Those employed in the prevention and detection of crime can often obtain valuable information by the use of filtered ultra-violet light. Finger prints are rendered fluorescent by dusting with zinc sulfide or anthracene. Forgeries, erasures and alterations to documents are detected by assistance of the lamp. Different types of paper which appear alike in ordinary light appear different in ultra-violet light. Some articles of commerce are sometimes marked with a highly-fluorescent substance to detect imitations. Invisible inks e.g. saliva, vinegar, fruit juices, urine, milk, etc., fluoresce under the lamp revealing the secret writing. Blood and other stains on garments, made visible under ultra-violet light, may release or convict a suspect.

*Museum Work.*

Distinction between spurious and genuine specimens can often be made, especially in the case of documents, stamps and paintings. Documents or books, either forged, restored, or altered in places, often show variations in fluorescent light at places where the originals were altered. Written matter, which has become faint in the passage of time often show up clearly under the lamp. Fossils and remains provide an example of an extremely interesting and valuable application of the lamp — small amounts of organic remains, incorporated in stones, often fluoresce distinctly and photography in ultra-violet light will reveal a great wealth of detail.

If applied with discretion and under standard conditions, fluorescence analysis is a most valuable aid to the scientific worker in the fields of agriculture, medical and biological sciences, inorganic and organic chemistry and in most industries such as those of leather, paper, glass, rubber, textile, etc.; in addition to the other fields already mentioned.

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## *What Counts:*

*Only that which is truly given. Only that good which is done for the love of doing it. Only those labors in which the sacrifice is greater than the reward. Only those gifts in which the giver forgets himself.*

**Henry Van Dyke** - "The Mansion"

# Detailing The Physician

by SAMIH NA'MANI Ph. C.*

*Introduction*

Every one of us is aware of the changes that the pharmacy profession has and is still undergoing. With the introduction of ampuls, sera, biological standardization, vitamins, hormones, the new chemotherapeutic agents and the antibiotics, the trend of prescription writing has naturally been toward those products prepared, packaged and labeled under the trade marks of pharmaceutical manufacturers and known as *specialities*. Moreover the extensive research conducted by the pharmaceutical firms is continually resulting in the contribution of new and valuable medicinal agents so that the medical profession is no more able to keep up to date with all recent developments. Manufacturers have therefore found it necessary, in order to keep the physicians well informed about their products, to pass to them all new information through some media and these include: detailing, advertisement in medical papers, exhibitions, and direct mailing of literature and samples. The most important of these is detailing which we may define as acquainting the doctor with the important facts about a product or products through personal calls. In Lebanon we usually use the term *medical prospection* and a detail man is known as a *medical representative* or *medical visitor*. The primary purpose of detailing, in reality, is to promote the sale of the product through its proper trade channel, which naturally means through the pharmacy.

*Functions of a Detail Man*

A detail man has two main functions. He is a publicity agent for his firm and its products and a reporter. He should gather and communicate to his principals :

1. information on the medical profession,

2. information of scientific value— new discoveries, new uses for known drugs, results of research work, etc.,

3. commercial information — prices, packings, etc.,

4. information on competing products — new drugs, new dosages or presentations of products and publicity activities, gifts, films, etc., of competing firms.

*Qualifications Required*

Pharmacy graduates are usually most successful in the field of detailing because their background makes it easier for them to assimilate knoweldge dealing with pharmaceutical specialities and their applications in therapeutics. They are not, however, the only people who could do the job to perfection as some of the most successful detail men in town are without any special degrees in the sciences. They are equipped, however, with a good general education plus an ability to apply themselves to the acquisition of the knowledge necessary to present the products intelligently, and a determination to succeed. But, whatever the qualifications are, successful detailing requires hard work, thinking, study, and planning.

*Training Period*

In the United States, Europe and England large manufacturing houses have their own training schools where every new detail man has to spend few months to get the necessary experience and knowledge before he is sent on his

*Mr. Na'mani joined the I.C.I. (Export) Ltd., Beirut, just after graduation in 1947. He worked as a detail man for some time and covered Lebanon, Syria and the Jordan. In June 1950 he was sent to England where he spent three months visiting the laboratories and the plant of the Firm. At present he is in charge of the pharmaceutical section, and does detailing occasionally.*

own. The adoption of this required period of training for new men is very important and will safeguard the firm against incompetence and at the same time will reduce difficulties of the representative during his first days in the field.

In Lebanon, the new detail man usually has to train himself and has to study the products he will promote by reading all the literature and information supplied by the manufacturers. Supplementary reading of medical papers is sometimes necessary in order to get acquainted with the original reports about the products as published by investigators or clinicians. This usually takes several weeks and will depend on the number of the products available at the agent. No attempt to visit doctors should be made until all the products are well known to him and could be presented clearly, intelligently and briefly. It is preferable not to learn or memorize the text of a piece of literature or a reference book but only the facts which could then be put in his own words.

*First Days in the Field*

Before starting his calls the detail man should secure the list of physicians in the assigned territory and all necessary details concerning their addresses, specialities, clinic hours and appointments. This list should always be brought up-to-date because there is a continuous change in the addresses or appointments.

A medical visit needs preparation. The names of the physicians to be seen and the products to be detailed must be prepared in advance. In order to save time, the detail man should place on his daily program those doctors who are in the same street or district.

The first few visits are in general the most difficult ones because, as it is for a beginner in any kind of job, one lacks the experience. What might make it more difficult is to fall on the kind of doctors who are discourteous, cold and unresponsive. If the new detail man could secure the help of an old timer for the first few weeks, then he could avoid a lot of embarrassment. In any case he should assume a positive mental attitude before starting his visits, and should overcome the so called *doctor fright* which is so common in beginners. The first step on the road to do it is to know the subject thoroughly and to be able to talk about it in a convincing manner. He should feel at ease in the presence of any and all physicians because there is one thing he can truly knows more about than the person to whom he is talking and that is the manufacture and properties of the product he is detailing. But he should realise that the man to whom he is talking should know more about its clinical applications.

During the first visit the detail man should get as much information on the physician he is visiting as possible. This could be obtained mainly through observation, and one can develop this sense with experience. The appearance of the reception room and the clinic is very suggestive. The following information is usually required by the firm:

1. name — correct way of spelling, address, speciality, title, appointment;

2. character — simple or snob, agreeable or not, active or passive;

3. inclinations — proressive or conservative, curious or indifferent, confident or skeptical;

4. clients — importance and number;

5. knowledge of the products and their uses;

6. scientific activities — articles or books written, any work or research in progress.

*Technique of Detailing*

An intelligent presentation of a product is essential in order to gain the doctor's interest. A simple, clear, truthful statement is much more intelligible and holds the interest better than a complex description employing

lengthy technical terms or difficult chemical names. After all, the physician is more interested in the clinical application of the product than in its chemical structure. Occasionally, one will meet a doctor who wants to go into the chemistry of the drug and that is why it is important not to start visiting before completion of the training period which prepares the detail man to face such a situation.

The presentation of two or three products in one visit is sufficient although in certain cases one single important product is just enough. It is important not to detail as though one is trying to teach the physician how to practice medicine. Moreover, it is advisable to avoid formulating statements that are so positively conclusive, because from experience, it is known that one cannot be hundred per cent. sure of the behaviour of a drug in every case.

*The Second Call*

The first visit to a doctor is usually followed after sometime by a second call intended as a reminder. Various firms hold different views regarding the length of time which should separate the two visits — the period varying from four to twelve weeks. During the second call the detail man should find out if the doctor remembers his products, whether he used them and if so, what the results were. If the answer is negative, then he should remind the doctor of his promise to give the product a trial.

A detail man should expect to be asked any kind of questions to which in the majority of cases he may reply with competence, according to the information he gathered during his training period. He should not, however, be ashamed to confess not to be able to answer those questions on which he has no information. In such a case he should note the question and tell the doctor that the medical department in his firm will answer him directly.

When a failure of a product or an accident is reported, the representative should collect all the details of the case. These include the way the treatment was conducted, the method of administration, the dosage used, the diet, etc. Moreover, he has to note all the symptoms that were noticed, and inquire about the patient to see whether his case was not a contraindication to the use of the product. After collecting all this information it will be found that in most cases, what appeared to be very serious was not so in reality. Many failures could be traced to faulty dosage or unobserved precautions. If the reason is not clear, the detail man should report the case to his firm, sending back, if possible, what remains of the medicament in the original bottle. In case this is not feasible, the batch number appearing on the package will enable the laboratories of the firm to analyse the specimen they keep as reference in view of investigating the reason of complaint.

*Samples*

Oftentimes during a visit, the doctor asks for samples. It is advisable to supply him with his requirements. It is a better policy to give a good number of samples of one or more products than one sample of each of several products. Moreover, a request for personal use should never be refused, because when the doctor uses a drug in his family, we are almost sure that he will use it also for his patients.

*Dealing with Competition*

This is a delicate question which should be dealt with very carefully keeping in mind all the time the principles of pharmaceutical ethics. Often, when presenting a product, the doctor will mention a competitive preparation he is using. It is very unwise and unethical to make uncomplimentary remarks about it. Moreover, the doctor may resent it if it is suggested that the product he prescribes is inferior. One's own product can be best defended by an intelligent presentation, bringing out its advantages, overlooking, at the same time, the disadvantages of the rival product. Such conversation may turn

out to be very interesting because the doctor may disclose certain information regarding the competitive product and its drawbacks or its advantages and such information could be very useful to the firm and has to be reported to it, always.

*Some Useful Details*

Among the medical profession, the detail man will meet a great variety of characters. There are few types that are rather classical. For example, there is the *yes man* who is ever smiling, ever gracious, who claims that he is one of the good prescribers, but who is actually a poor supporter. Another type is what is usually called the *sample grabber* who always asks for more and more samples which he usually sells. In this case his requests should not be satisfied always. There is also the antagonistic doctor, who, as soon as the detail man finishes presenting the product, will take the literature and sample saying « I shall see about it, good-bye». One would not expect much from such a call, but strangely enough, this same doctor does start prescribing the product. One way of breaking the doctor's reserve is to find out his hobby and to seize some opportunity to discuss it with him. In many cases this procedure succeeds in making this type of person very friendly.

*Visiting Hospitals and Pharmacists*

Visits to the medical staff of hospitals is very important becuase the consumption of drugs in these establishments is very large. Moreover, in some teaching hospitals, detailing the interns will give good results in the future when they will start on their own. Special attention should be given to the hospital pharmacist who may help in the introduction of one's products.

The retail pharmacist must be contacted regularly, to keep him informed on all the products that are being detailed, and to insure that he gets supplies to satisfy his demands. Very useful information on the doctor's business, on what he prescribes, and on the activity of competitors is usually obtained from the pharmacist. A detail man should therefore see to it that his friends among this profession will inform him about any new development of interest.

*Detailing as a Career*

Now that we know what is detailing and what are its principles one question arises immediately: what is the future of a detail man ? Certainly it is not the best in the land, but the rewards of successful detailing are numerous and include, among others, a remuneration which is sufficient to provide most of life's comforts and few of its luxuries, and will permit him to enter the civic life of his community as a citizen of standing.

In the actual work in the field, there is the opportunity of reaching an executive position or being assigned the management of a pharmaceutical department. Besides, the experience one gets will enable him to start a drug business, if he decides one day to work on his own.

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**Not education, but character, is man's greatest need and man's greatest safeguard**

*— Herbert Spencer —*

# Radioactive Isotopes

## IN THERAPY AND DIAGNOSIS

by **EDWARD VORPERIAN Ph. C.**

The atoms of naturally occurring radioactive elements spontaneously disintegrate emitting alpha and beta particles from the nucleus thus becoming a new element with a new nuclear composition. A new element is produced only if the positive charge of the nucleus is changed without an accompanying change in the atomic number thus resulting in an isotopic form of the element under consideration.

It has been shown by Mme Curie, F. Joliot and other workers that certain ordinary non-radioactive elements, after being bombarded by alpha particles (Helium nuclei) exhibited radioactivity. It is believed that the alpha particle combines with the nucleus of the stable element thus forming an unstable isotope of the same element, but with a higher mass. Rutherford was the first person who accomplished such an atomic transmutation by bombarding Nitrogen atoms (atomic weight 14) with alpha particles and, as a result, produced oxygen of atomic weight 17 (instead of the usual 16). These changes can be written in the form of an equation in which the atomic weights are designated by superscripts and atomic numbers by subscripts, thus :

$$_{7}N^{14} + {}_{2}He^{4} \longrightarrow \text{Mass } 18 \longrightarrow {}_{1}H^{1} + {}_{8}O^{17} + \text{energy.}$$

or another example would be

$$_{5}B^{10} + {}_{2}He^{4} \longrightarrow {}_{0}n^{1} + {}_{7}N^{13} \longrightarrow {}_{6}C^{13} + {}_{1}e^{0}$$

This latter equation tells us that when ordinary boron atoms are combined with alpha particles (positively charged Helium-ions), a neutron is released and an isotope is obtained — Nitrogen 13, which disintegrates further to give rise to Carbon 13 and release an electron. Now the C13 thus obtained is unstable and undergoes radioactive disintegration until the stable form C12 is finally attained.

The radioactivity, produced by the bombardement of various elements by suitable projectiles, in atomic transmutation, is called «Induced» or «Artificial radioactivity» to distinguish it from the natural radioactivity of the Uranium, Thorium and Actinium radioactive series.

The use of radioactive radiations and radioisotopes in Medicine has a longer history than is generally realized. In 1905, R. Abbé and G. Fabre dis-

covered the growth restraining property possessed by radium rays. They noted that wheat grains as well as many other seeds lost their power of germination after sufficient exposure to beta and gamma rays. Bergonie and Tribondeau after exhaustive studies observed that immature cells and cells in an active state of subdivision were more sensitive to such radiations than those cells with a fixed adult morphologic and physiologic characteristics. James Ewing's intensive work on the effects of radium and radioactive isotopes in different types of cancer opened a wide field of tumor radio-sensitivity.

Artificially produced radioisotopes did not become available until the invention of the cyclotron in the early nineteen thirties. Even though many radioisotopes were being produced by the cyclotron, yet they were not easily available due to the high cost of production and the time consuming methods of preparation. Thus to obtain a millicurie of C14 one had to pay one million dollars and wait almost a year or more before it would reach him. Had it not been for the invention of nuclear reactors which made volume production possible, at a reasonable cost, radioisotopes would have remained solely research tools and therapeutic curiosities. By the help of these nuclear pile reactors, since 1946, more than 10,000 shipments of radioisotopes have been made from the Oak Ridge National Laboratories. More than 40 per cent of these shipments have been devoted for medical research, diagnosis and therapy.

When an adequate source of a radioisotope is left in contact with the skin for a certain period of time it will produce sores very similar to deep burns. Prolonged exposure to these radiations may finally lead to the ultimate atrophy of the exposed parts. Both radioactive substances and X-ray affect all the cells within the path of their radiations. The fact that immature cells or cells in an active state of division are more readily affected by these radiations, it follows therefore, that if we could only modulate the intensity of these radiations to such a borderline limit as to be harmless to the healthy tissue but fairly toxic to the mitotic cells, then we could ultimately destroy the malignant tumors without any major harm to the normal tissues. Upon this very principle are based all the refined methods of radiation therapy using radium, X-ray and radioisotopes. However, the above mentioned method might be applicable only to the superficial radiosensitive tumors but not to the deep-seated ones. In the latter case radioisotopes can be administered by mouth or by injections in such amounts or dilutions as to be almost completely harmless to the normal tissues, but selectively concentrated in the afflicted cells, thus exerting their effects on the tumor tissues. Therefore, there are two major methods of using radioisotopes therapeutically. First, a focal or local curietherapy which results in the production of a local action in the form of a limited field of irradiation. Under this form one may mention intracavital, interstitial, juxtacutaneous and distant radiotherapies. And second, general curietherapy in which an imponderable quantity of radioactive substance is introduced into the living organism to become concentrated in the diseased tissue.

There are many criteria that enter into the evaluation of a therapeutic radioisotope for general curietherapy. Besides the usual pharmacological criteria such as toxicity, metabolic utility, selective absorption, rate of excretion etc., there is a new factor which has to be taken into consideration, namely, the radiant energy which, in itself, is the therapeutic agent. An easy conventional way to characterize the potential radiant energy of any given radioisotope is to express its decay constant in terms of the amount of time required for fifty percent of its atoms to disintegrate. This is known as the «half life» of that particular radioisotope under consideration. Some radioisotopes decay very rapidly, with a half life measured in seconds, while others disintegrate very

slowly with a half life measured in thousands of years. It is apparent, therefore, that an isotope which has a half life measured in seconds can not be used therapeutically since it loses its effective radiation before it can be delivered to the area to be irradiated. Likewise, isotopes with extremely long half life are not suitable therapeutically as they only emit a small fraction of their radiant energy during a human life span. It is difficult to state dogmatically the range of half life which would qualify an isotope for therapeutic consideration. It has been found best to consider only those having a half life of 12 hours to 60 days.

Radioisotopes are more useful when made into compounds than when used in their elemental form. In fact, the activity of biological processes is of such nature that even if the isotopes were to be introduced into the living system in their elemental form, they would in a short time, be incorporated into organic compounds. In point of fact standard biosynthetic procedures have been developed to build up the more complex organic compounds containing the radioisotopes.

The selective localization of some compounds or elements in certain tissues has lead to the use of artificially made radioactive isotopes in therapeutics. The following are few clinical applications of some of these radioisotopes as gleaned from experimental results.

*Radioactive Iodine.* The thyroid gland absorbs Iodine to a very high degree. Actually, the concentration of Iodine in this gland is about 10,000 times higher than in any other tissue of the body. This can be easily shown by administering radioactive Iodine in the form of food or by injection and then placing the tube of the Geiger counter in the vicinity of the thyroid gland. The counter will shortly indicate the absorption of the total amount of the radioactive Iodine originally administered. Hamilton and Soley have shown that it is possible to destroy almost completely the thyroid glands in rabbits by administering a large dose of radioactive Iodine. Subsequent studies have lead to the successful use of radioactive iodine in the treatment of hyperplastic thyroid diseases such as toxic goiter. It has also been found that, in certain cases, cancer of the thyroid can be successfully treated by the use of radioactive iodine, especially in cases where surgery fails to be effective.

*Radioactive Phosphorus.* Since 1936 radioactive Phosphorus 32, in the form of Sodium phosphate, has been used in the treatment of chronic leukemia and polycythemia rubra vera. This treatment is based on the fact that there is a selective absorption and concentration of radioactive phosphorus in the leukemic tissues and in the bone marrow, therefore, resulting in a concentrated irradiation of those diseased regions. The lethal beta-rays exert their destructive effects on the diseased bone marrow thus stopping the proliferation of the neoplastic tissues. Radioactive phosphorus has also been used for local irradiation of the skin in conditions such as radiosensitive skin cancer and hyperkeratosis. Both radioactive phosphorus and iodine are effective diagnostic aids in localizing the site of primary tumors or metastases.

*Radioactive Sodium.* This has proved most successful in diagnosis, particularly to determine the extracellular fluid volume and to diagnose disorders of the peripheral circulation.

*Carbon* 14. It possesses great potentialities in medical diagnosis and therapy. But to date, efforts to discover compounds which will specifically localize themselves in certain cells and tissues have not been very successful.

*Radioactive Cobalt.* This is used as a source of gamma radiations in

place of radium, with the advantage that it can be made more radioactive than radium and can be produced more economically.

Radioactive isotopes have been used with results equal or superior to other forms of treatment in cases of chronic myelogenous leukemia, chronic lymphatic leukemia and giant follicular lymphoma. They also have some value in Hodgkin's disease, but have not proved useful in acute leukemia and multiple myeloma. Some types of carcinoma of the thyroid, breast and testes are favorably influenced by treatment with radioactive isotopes.

There remain, for intensive research, many more isotopes with possible potentialities for therapeutic use. The value of most radioisotopes is not apparent and much additional investigation will be necessary before they can be adapted to therapeutic purposes.

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# The Modern Pharmacist

Dr. Elliot, director of the pharmaceutical survey says :

«The distinctive and historic professional responsibility of the individual practitioner of pharmacy — that of the compounding of medicines for the physician's prescription — was diminished by the development of large-scale, scientifically controlled production and distribution of medicinals. At the same time, his professional responsibility was enlarged by an ever increasing number of new therapeutic agents and by the development of modern diagnostic methods and tests. For the preparation of many of these therapeutic agents new technical knowledge, and complexe mechanisms not usually possessed by the individual pharmacist, were required.»

«Scientific progress and economic changes served both to expand and to rearrange the structure of pharmacy. The individual pharmacist became less a compounder of medicinals and more a scientific purveyor and technical adviser. Specialization in various phases of pharmacy increased as did specialization in many other technical and professional activities. Obsolete medicaments and methods gave way to the new The scope of scientific knowledge required by the pharmacist expanded, and his opportunities for application of professional abilities increased in number, though changed in form.» Amer. J. Pharm. Ed., 15: 15 (1951).

# ABSTRACTS

## FROM CURRENT LITERATURE ON NEWER DRUGS

by Prof. Amin F. Haddad

### ADRENERGIC BLOCKING AGENTS

In 1910 Dale observed that ergotoxine (an ergot alkaloid) has anti-adrenaline activity. This alkaloid, however, as well as other adrenolytic alkaloids such as yohimbine, ethylyohimbine and ergotamine are little used therapeutically for their adrenergic blocking action because of their side effects on the central nervous system. Recently, several new synthetic adrenolytic compounds have been introduced and are now designated by the term «adrenergic blocking agents» which describes more correctly their pharmacological action. Out of the many compounds synthesized during the last two decades, relatively few have reached the stage of being used therapeutically. So far, only five members of the group have achieved a place in therapeutics. These are: *Prosympal,* (883 F)—Specia; *Piperoxane* (933 F)—NNR; *Priscol* — Ciba, Tolazoline—B.P. approved name; *Dibenamine* — Smith, Kline and French; *Regitine* (C 7337) — Ciba.

Adrenergic blocking agents have two actions. They oppose the effects of circulating adrenaline and nor-adrenaline — adrenolytic action, and abolish the effect of sympathetic excitation which is mediated by these two substances — sympatholytic action. Because of their adrenolytic action these drugs, except Priscol, are valuable diagnostic aid for the detection of adrenaline-producing tumors (pheochromocytomas). These are found in the medulla of the adrenal gland. As a result of the growth of one of these tumors, an abnormal secretion of adrenaline and nor-adrenaline is produced which causes an abnormally high blood pressure. When an adrenergic blocking agent is given to a patient suffering from hypertension and who is suspected of having a pheochromocytoma, a fall in blood pressure will show that there are excessive amounts of adrenaline and nor-adrenaline circulating in the blood, thus indicating a probable presence of such a tumor. In other cases of hypertention the blood pressure is not affected or it rises slightly. These drugs are thus useful in differentiating hypertension due to adrenaline-producing tumors from hypertension due to other causes. Due to their sympatholytic action, these drugs are used in the treatment of vascular diseases caused by a spasm of the blood vessels of which Reynaud's disease is a typical example, since they bring about vasodilation by removing the constrictor influence of the sympathetic nervous system. Priscol is the most used member of the group for these conditions because it has a reliable action when taken orally. *Prosympal* is diethylamino methyl benzodioxane hydrochloride. It is available in tablet form 0.01 gm. each and in 2 cc. ampuls containing 0.05 gm.

*Priscol Hydrochloride* is 2-benzyl-imidazoline. It has a multiplicity of actions which make it unsuitable for pheochromocytoma diagnosis. Its main use at present is in the treatment of peripheral vascular diseases. The dose is 10 to

50 mg. orally every four hours and 25 to 50 mg. parenterally 1 to 4 times daily.

*Dibenamine Hydrochloride* is N-phenoxy iso-propyl-N-benzyl-beta - chlorethy lamine. It is a strong adrenergic blocking agent with a prolonged action lasting between 36 and 96 hours. Its action, however, is slow in onset. It is useful in the treatment of peripheral vascular diseases. It has a disadvantage in that it is unreliable when given orally. Clinically, it is suitable as a diagnostic agent in pheochromocytoma.

*Regitine* is an imidazoline derivative like Priscol, but differs from it, in that it is very suitable for the diagnosis of pheochromocytoma. It is effective orally and is useful in the treatment of peripheral vascular disorders. This product is marketed in the form of tablets 20 mg. each and in 1 cc. ampuls containing 10 mg. each.

*Piperoxane* Hydrochloride is 2- (-1 piperidyl-methyl) -1, 4-benzodioxane hydrochloride. This drug was discovered in 1933 but because of its toxic side effects it was not used in medical practice as an adrenergic blocking agent until lately when its property of acting as a diagnostic agent in pheochromocytoma became known. For this purpose it is administered intravenously, the recommended dose being 0.25 mg. per kg. body weight up to a maximum total dose of 20 mg. The product is available in 10 cc. vials containing 2 mg. piperoxane hydrochloride per cc.

## ANTIBIOTICS

Progress in the antibiotics continues. Many new members have been discovered of which Neomycin, Polymixin, Fumagillin and Viomycin will be briefly discussed. Some progress has been made also in the clinical use and pharmaceutical presentation of the older antibiotics. These developments will be briefly discussed.

*Neomycin* was isolated in 1949 by Waksman and Lechevalier from Streptomyces fradiae cultures containing peptone, meat extract, glucose and sodium chloride. Neomycin is isolated from this medium by the methods used for the isolation of streptomycin. This antibiotic appears to be a complex compound, which has been shown to consist of two components Neomycin A and Neomycin B. The latter is considerably less active than the former. Neomycin is active in vitro against numerous Gram-positive and Gram-negative bacteria, especially mycobacteria, but not against fungi. The drug is used in the form of powder, ointment and ophthalmic ointment. The ointment or the powder in aqueous solution may be applied locally in treating impetigo, sycosis (barber's itch), otitis externa, paronychia (infection of the skin on the side of the fingernail), herpes simplex (fever blister, cold sores), infected ulcers, infectious eczematoid dermatitis, seborrhea, pustules, pustular acne, and boils. The ointment is employed as a dressing for burns both to prevent infection and to treat any secondary infection. The ophthalmic ointment is indicated in the therapy of infections of the eyelids and the conjunctiva, sties and marginal blepharitis (inflammation of the eyelids). *Myciguent Ointment* — Upjohn, contains 5 mg. per gram, of finely divided neomycin sulfate in a bland, greasy-type base designed to preserve stability. The ointment is stable at room temperature for at least one year. A combination of neomycin 10,000 units and bacitracin 2,000 units in tablet form is being tested by C.S.C. Pharmaceuticals for the treatment of infantile diarrhea.

*Polymixin.* In 1947 it was independently reported in the U.S.A. by the Northern Research Laboratory and by the American Cyanamid Co., that antibiotic substances were obtained from the soil organism Bacillus polymyxa. During

the same year the Wellcome Research Laboratories in England, described *Aerosporin,* an antibiotic produced by Bacillus aerosporus Greer, which is considered identical with B. polymyxa. For the sake of uniformity in nomenclature it was agreed by the investigators to adopt polymixin as the generic name for the antibiotics isolated in the U.S.A. and England, and to differentiate the specific antibiotics by appending letters of the alphabet to the generic name; thus aerosporin was named polymixin A and the original polymixin isolated in the U.S.A. was renamed polymixin D. Later, three related antibiotics were isolated and were designated respectively polymixin B, polymixin C and polymixin E. The polymixins appear to be basic polypeptides and the five known members are distinguished chemically by variation in their amino-acid content. They are being investigated clinically but their toxicity has seriously limited their usefulness. Aeorosporin is the least toxic in therapeutic doses; in some cases, however, when given parenterally, it may cause some disturbances in the kidney function.

*Aeorosporin Sulfate* is marketed by Burroughs Wellcome and Co. in the form of tablets containing 500,000 units each (equivalent to 50 mg. polymixin standard) and in the form of vials containing 200,000 units (20 mg.) of sterile powder for topical use only. The parenteral product is available to hospitals only. Aeorosporin is a creamy white powder, standardized biologically against the official polymixin standard which, for convenience, is assigned the potency of 10,000 units per mg. Solutions of this antibiotic are not stable on long standing but can retain their potency for two weeks, even at room temperature. Heat is destructive to this drug and, therefore, its solutions can not be sterilized by heating. «It is bactericidal for many Gram-negative organisms and, therefore, is recommended for the treatment of systemic, meningeal, enteric or local infections caused by B. pyocyanus, H. influenzae, A. eorogenes, E. coli, Kl. pneumoniae, and Shigella. It may be administered intramuscularly and intrathecally (to hospitalized patients only), orally and topically».

*Viomycin* is an antibiotic isolated from a Streptomyces of Cuban soil. It is still under investigation. In vitro, experiments show that this antibiotic acts primarily against the acid fast bacteria among which are included certain strains of the mycobacteria organisms or tubercle bacilli which are resistant to other chemotherapeutic agents such as streptomycin, neomycin, and para-amino salicylic acid.

*Fumagillin* is another new antibiotic, isolated from a species of Aspergillus. Experiments in vitro with E. histolytica have shown that this antibiotic has considerable amebicidal activity. It has little antibacterial, antiviral or antifungal activity. This antibiotic is still under clinical investigation.

*Chloramphenicol* (Chloromycetin — P.D. & Co.) has a broad antibiotic spectrum. It is used in many diseases caused by bacteria, rickettsia, and viruses. As a further example of chloramphenicol wide usefulness is the discovery of its specific action against trachoma and its value in the treatment of certain infections in the head and neck regions. Chronic otitis media for example can be efficiently treated with chloramphenicol. Good results have been observed in the treatment of bacterial conjunctivitis as well as other forms of conjunctivitis by the use of ophthalmic preparations of chloramphenicol. For ophthalmic use chloramphenicol is available in the form of ophthalmic ointment 1% and in the form of ophthalmic powder for solution, 25 mg. in 15 cc. vial with borate buffer equivalent to 100 mg. boric acid.

For its systemic effect chloramphenicol is administered orally in the form of capsules. Chloramphenicol is intensely bitter, and it has been extremely difficult to administer it to children between the ages of 1 to 3 years. Suppository form was used with some success, but it has not yet been possible to obtain any consistent blood levels by this method. This difficulty has been overcome by the introduction of a tasteless ester of Chloramphenicol (*Pediatric*

*Chloromycetin Palmitate* — P.D. & Co.), which is put in a pleasantly flavoured suspension 8 cc. of which represent approximately 250 mg. of chloromycetin.

The use of chloramphenicol parenterally is still under investigation. Because chloramphenicol has no acidic or basic groups, it can not form salts which are soluble in aqueous vehicles. Propylene glycol has been used as a solvent with approximately 15% of the antibiotic. This solution, however, when diluted with an aqueous vehicle will precipitate chloramphenicol. It could not be given in concentrated solution as propylene glycol as the concentrated form may cause phlebitis and sclerosis. Recent investigations lead to the discovery of acetyldimethylamine as a powerful solvent for chloramphenicol. It is possible to prepare a 50% solution of the antibiotic in a 50% aqueous dilution of this solvent, and which, on further dilution with water or saline solution, does not precipitate. The formula now used is 25% chloramphenicol in a 50% aqueous dilution, of acetyldimethylamine.

*Penicillin.* Recently some new salts and pharmaceutical forms of penicillin have been introduced. A new repository form of penicillin known generically as 1-ephanamine penicillin G, has been introduced for use on patients known to be sensitive to other forms of penicillin. This new product is the penicillin salt of the base N-methyl-1, 2-diphenyl-2-hydroxyethylamine which was found to possess certain antiallergic properties not related to any true antihistaminic effect. This salt is now marketed by the C.S.C. Pharmaceuticals under the name of *Compenamine.* It is prepared in the form of a white powder and distributed in 10 cc. vials. A 5 cc. suspension containing 300,000 units of penicillin per cc. is formed by adding to the vial 4.4 cc. of sterile distilled water. An oily suspension is also available. The stability of the suspension compares favourably with other forms of penicillin injections. In powder form the product appears to be completely stable. In the clinical investigation of over 2,000 patients, this new type of penicillin salt decreased the incidence of reaction to less than 1%. Clinically, this new product is as effective as procaine penicillin G. It is administred intramuscularly and it is reported that practically no pain is felt at the time of the injection.

In Denmark the hydroiodide of the diethylaminoethyl ester of penicillin has been introduced under the name of *Leocillin.* In England this product is available from Glaxo Laboratories under the name of *Estopen.* The same product under the name of *Neopenil* is being investigated by Smith, Kline and French (U.S.A.). This ester of penicillin is not inactivated by penicillinase, and, because it has preference for lung tissue, it produces in this organ concentrations five times higher than either sodium or procaine penicillin. Therefore, it becomes valuable in the treatment of lung diseases. It is administred subcutaneously. A considerable quantity of it is excreted with the sputum.

Combinations of penicillin G with sulfonamides and with streptomycin are now available for clinical use. A mixture of penicillin G with sulfadiazine, sulfamerazine is available in the form of tablets and suspension. The suspension is supplied in single dose packages each containing the sulfonamides in suspension in one bottle and a vial of penicillin G, which must be mixed together before dispensing. It is recommended for the treatment of mixed infections caused by pathogens of the Gram-positive and Gram-negative groups. This combination consists of crystalline procaine-penicllin G 300,000 units, buffered crystalline sodium penicillin G 100,000 and dihydrostreptomycin sulfate 1 Gm. The two antibiotics have a synergistic effect and when combined together become rapidly bactericidal.

*Aureomycin* is available from Lederle Laboratories in the following forms : nasal for preparing solutions— aureomycin hydrochloride 10 mg. in one vial with one vial of diluent containing 0.5% paredrine; vaginal powder containing 200 mg. aureomycin hydrochloride with

8% methylparaben and 2% propyl paraben and talc; vaginal suppositories containing 250 mg. aureomycin hydrochloride with 200 mg. methylparaben and 50 mg. propylparaben in a readily dispersible base; capsules — 50, 100 and 250 mg.; dental cones — 5 mg.; dental paste — 30 mg. per gm.,; intravenous aureomycin hydrochloride in vials containing 100 mg. and 500 mg. buffered with sodium glycinate; ointment — 3% in petrolatum and wool fat base; ophthalmic ointment — 1% in a petrolatum-wool fat base; ophthalmic for preparing solutions — aureomycin HCl 25 mg., sodium chloride 62.5 mg., sodium borate 25 mg.; Aureomycin Otic — 1 vial Aureomycin 50 mg., 1 vial diluent 10 cc.; pharyngets — 50 mg. in each; spersoids 50 mg. per 3 gm.; Surgical powder — consisting of 1 gm. crystalline aureomycin hydrochloride in a special base; troches — 15 mg. in each. Suppositories can be prepared by using cacao butter as the base. The aureomycin is incorporated with the base at room temperature or in a chilled mortar. The mass is shaped into a rod and cut into the desired number of suppositories which are shaped by hand. If the fusion process must be used, do not allow the temperature to exceed 45-50 deg. C. This product is kept in a refrigerator.

*Terramycin* is available at Chas Pfizer & Co. in the following forms : capsules — 50, 100 and 250 mg.; elixir, one package consisting of one vial terramycin HCl containing 1.5 gm. and one bottle containing 1 oz. of vehicle—to be mixed before use; Terramycin HCl Intravenous, vials containing 0.25 gm. and 0.5 gm., buffered with 0.23 gm. and 0.45 gm. of sodium glycinate respectively; ophthalmic ointment — 1 mg. terramycin HCl per gm.; ophthalmic solution — 25 mg. of terramycin HCl with 62.5 mg. of sodium chloride buffered with 25 mg. sodium borate. This is to be diluted with 5 cc. of distilled water; topical ointment; troches — 15 mg. per troche; otic solution, for the treatment of external ear infections, consists of a vial containing 25 mg. crystalline terramycin HCl and a dropper bottle containing 5 cc. of mixture of 95% propylene glycol and 5% benzocaine— the two mixed together, form a clear solution stable for 48 hours if stored in a refrigerator; soluble tablets containing 50 mg. terramycin hydrochloride each intended for use in dressings, cough syrups, and topical solutions; and a nasal solution.

*Dia-Discs* are diagnostic tablets containing measured amounts of antibiotics for use in determining the antibiotic to which an infectious organism is most sensitive. These are manufactured by C.S.C. Pharmaceuticals. Six Dia-Discs are available including penicillin, bacitracin, streptomycin, chloromycetin, aureomycin and terramycin. The technique for using them is briefly as follows: up to six tablets may be placed equidistant from each other on a previously streaked Petri plate which is then incubated overnight. The diameter of the inhibition zone surrounding each tablet gives accurate indications of qualitative and quantitative sensitivity of the organism to the individual antibiotics. A sensitivity chart has been prepared to translate the findings into terms of clinical significance. This chart is supplied with each package.

## ANTICOAGULANTS

«Anticoagulant therapy with heparin or dicumarol, or both, is effective in preventing or inhibiting intravascular clotting. The action of these drugs is to impair the clotting mechanism to an extent sufficient that pathologic clotting will not occur. Experimental evidence has been presented recently to show that these agents actually do have some further effect which brings about partial dissolution of early thrombus material in vivo. During treatment, careful, supervision of the patient and frequent testing of the clotting mechanism

are necessary to avoid the hemorrhagic complications which sometimes occur. Anticoagulants are employed in the treatment of venous thrombosis or pulmonary embolism, myocardial infarction, and acute arterial embolism of the extremities. Their use is being studied and evaluated in the treatment of frostbite, cerebral thrombosis, and multiple sclerosis, and in the prophylaxis of coronary occlusion in patients with a history of one or more attacks. Further study is being carried out in attempts to prevent venous thromboembolic disease and embolic phenomena from intracardiac thrombi.» (Merck's Manual 8th. ed.)

*Cumopyrin* (Abbott's name for Cyclocumarol) is a new synthetic anticoagulant for oral use. «Its chemical structure is 3, 4-(2'-methyl-2'-methoxy-4'-phenyl)- dihydropyranocoumarin. It is chemically related to Dicumarol and produces its therapeutic activity. It is claimed to be two to three times as potent as Dicumarol and in addition it has the following advantages: the action of a given dose is more predictable, it is easier to maintain the desired prothrombin level, the onset of action is more rapid, the effect is more prolonged, there is less capillary toxicity, little or no gastro-intestinal disturbances, also, patients resistant to Dicumarol effect are often less resistant to Cumopyrin effect. Administered orally in the form of tablets, the initial dose is 100 to 200 mg. depending on the size and condition of the patient. Subsequent doses — 12.5 to 50 mg., should be given daily or as required. Onset of effect generally occurs in about 24 hours. After the patient's reaction to the drug is known, determination of prothrombin activity may be made at intervals of 5 to 7 days.»

*Heparin Sodium* has been used for many years as an anticoagulant. It is now marketed in a new form known as Depot-Heparin Sodium-Upjohn, which is a sterile preparation of heparin sodium dissolved in an aqueous vehicle containing gelatin and dextrose which slows the absorption and prolongs the anticoagulant action of heparin. Each cc. contains 200 mg. heparin sodium, 180 mg. gelatin, and 80 mg. anhydrous dextrose.

It has been announced lately that heparin, which is considered to be inactive orally, can be administered sublingually in the form of wafers (a form of cachets) containing 125 mg. of sodium heparin. The wafer is placed in the sublingual pouch where it rapidly disintegrates and the absorption is usually complete in 10 minutes. In a series of 10 cases, therapeutic level was obtained within 1/2 hour and was maintained for four hours.

*Dextran Sulfate.* Dextran being a polymer of glucose can be obtained in a variety of molecular structures varying tremendously in size. Some of the raw dextrans have a molecular weight as high as 2,000,000 or even 3,000,000. The raw dextrans can be hydrolysed and molecules of suitable size can be obtained. The sulfates of dextran of m.w. of 25,000 and up and those of dextran of m.w. of 20,000 and below, were tried on animals for their anti-coagulant action. Dextran sulfate of m.w. 35,000 and above behaved differently from those of m.w. 20,000 and less. The first group, which was found to be unsuitable for therapeutic use, caused precipitation of fibrinogen, agglutination of platelets, and deposition of granular material in the reticulo-endothelial cells. The sulfates prepared from dextran of m.w. 20,000 and less are free from the undesirable effects described under the first group. One such compound is being submitted to clinical trials and, if found satisfactory, may serve as a cheap synthetic analogue of heparin.

*Treburon*-Hoffman-La-Roche. Treburon is the sodium salt of sulfated polygalacturonic acid methyl ester methyl glycoside. It has a heparin like activity, but has the advantage of being less toxic than heparin in acute and subacute tests. Its activity in human subjects is about one-third that of heparin and it is well tolerated. Like heparin, Treburon can be neutralized by protamin sulfate which is an antidote for overdosage of heparin.

# ANTI-EPILEPTICS

The first chemical introduced for the treatment of epilepsy was potassium bromide, first used by Sir Charles Lacock on May 11, 1857 in the treatment of seizures associated with menses in hysterics. During that period the causes of seizures were considered to be sexual excess and masturbation and therefore it was logical for Lacock to reason that an anaphrodisiac would be effective in controlling epilepsy. Consequently he used potassium bromide in the treatment of cases where there was definite relation of sex to seizues. No other chemical was introduced for treating epilepsy until 1912 when Hauptmann in Germany reported that phenobarbital was more efficacious and less toxic than bromides. In the meantime, however, clinical studies of this disease resulted in a clarification of the nature of epilepsy. In general, three types of epilepsy were differentiated; grand mal or major epilepsy — a fit in which there are severe convulsions, and loss of consciousness, or coma; petit mal or minor epilepsy — in which dizziness or other sensations take the place of convulsions; psychomotor seizures are lapses of consciousness lasting anywhere from a few minutes to several hours and characterised by repetitive movements and activities which often seem intentional but are actually unconscious. This classification forms the basis for the treatment of epilepsy.

In 1937 it was reported by Merrit and Putman that seven hundred compounds were tested for their anticonvulsant properties on cats. Of the seven hundred some seventy were able to protect the cats against convulsions. Further investigation of the seventy compounds showed that the majority were toxic or unpalatable and were rejected. Only one compound, diphenyl-hydantoin sodium (*Dilantin, Epanutin*) was clinically studied and was found to be effective and safe to use in the treatment of grand mal. This discovery lead to an intensive study of related compounds some of which were found to be a valuable addition to the drug treatment of epilepsy. At present, the anti-epileptic drugs can be classified into four groups all of which are urea derivatives. First are the barbituric acid derivatives. Of this group only two are effective in the treatment of grand mal, *phenobarbital* (5, 5-phenyl-ethyl barbituric acid) and *mephobarbital* (5-ethyl-1-methyl-5-phenyl barbituric acid).

The second group are the hydantoin derivatives (*Hydantoin* is a condensation product of glycolic acid and urea.) To this group belong *diphenylhydantoin sodium* (*Dilantin, Epanutin*) and *Mesantoin* both of which are effective in the treatment of grand mal and psychomotor seizures. Recently Eli Lilly introduced *Thiantoin Sodium* (Sodium 5-phenyl-5-(2-thienyl) hydantoinate) which shares the antiepileptic action of other hydantoin compounds, but differs in that it may be used to control petit mal as well as grand mal epilepsy and psychomotor seizures. This product is marketed in the form of capsules of 0.13 and 0.26 gm. The dosage varies according to the needs of the patients.

The third group are the oxazolidine-2, 4-dione derivatives. These are prepared by the condensation of esters of dialkyglycolic acids and urea in the presence of sodium hydroxide. To this group belong : Trimethadione U.S.P. (Tridione — Abbott); Paramethadione (Paradione — Abbott); and Epidon. The first two are effective in petit mal and the third in grand mal.

One drug belongs to the fourth group namely *Phenacemide — N.N.R.* (*Phenuron* — Abbott). Chemically it is phenylacetylurea which has anticonvulsant properties with only minor sedative action. Clinical studies show that phenacemide is effective in relieving certain patients of seizures not affected by any other form of anti-epileptic therapy. This drug, however, has serious side effects and must be used with extreme caution and the patient undergoing treatment must

be carefully observed by the physician. The drug is available in 0.5 gm. tablets.

*Milantin* — P.D. & Co. is methylphenylsuccinimide, recently introduced for the treatment of petit mal epilepsy. It is said to be more active than trimethadione. The drug is administered orally in the form of capsules 0.3 gm. each. Average daily dose 2.4 gm.

## ANTI-THYROID DRUGS

Anti-thyroid drugs which retard or inhibit the rate of formation of thyroxine in hyperthyroidism are included in this very brief discussion. The drugs already in use, though they act at different stages of the process of thyroxine formation, yet the end results are the same. Thiocyanates act at the first step in the biochemistry of the thyroid. They cause release of iodine already present in the thyroid and markedly decrease further uptake of iodine by the thyroid from the blood. They have been reported as the cause of hypothyroidism in patients treated with thiocyanates for their hypertension.

The thiol derivatives, thiouracils and 2-mercaptoimidazoles act at the second stage in the formation of thyroxine; they retard the activity of the peroxidase enzyme system thus decreasing the rate of oxidation of iodides to iodine and, therefore, with less free iodine available for combination with tyrosine, the rate of formation of thyroxine is greatly retarded.

Iodine, though not an «antithyroid drug» as defined above, if administered simultaneously, potentiates the action of antithyroid drugs. The mechanism of the action of iodine is not clear; the acceptable explanation at present is that the iodine, administered in the form of Lugol's solution, inactivates the thyrotropic hormone which is essential in stimulating the release of thyroxine to the blood stream from the gland where it is stored as thyroglobulin. In recent years the administration of one of the unstable isotopes of iodine, usually I (131), has proved quite promising as a therapeutic method of treating hyperthyroidism, giving permanent effects. The thyroid gland takes up iodine rapidly from the blood stream, especially when the patient has hyperthyroidism. Therefore, if a carefully calculated dose of NaI (131) is administered to the patient, the radiation of I (131) absorbed in the thyroid causes partial destruction of the hormone-producing cells. The chief difficulties with the use of radio-isotopes are the problems of supply, transport, short life of the radio-active isotope and difficulty of determining the proper dose. This type of therapy is only safe when used by experts.

The following are the anti-thyroid drugs already in use; thiouracil, methylthiouracil, propylthiouracil, 2-aminothiazole (Abadol-Specia, see Apothecary 1950 p. 31), and the most recent drug, *Itrumil*—Ciba, which is discussed below.

*Itrumil* is the sodium salt of 5-iodo-2-thiouracil supplied in the form of tablets containing 50 mg. It is administered orally in 150-300 mg. divided doses daily. It causes rapid remission of the thyrotoxicosis, but is non-goitrogenic in most cases.

## ANTI-TUBERCULOUS DRUGS

In 1912 two Austrian Chemists, Meyer and Nally, synthesized and described the properties of isonicotinic hydrazides whose value against tuberculosis was not discovered until recently. A few years ago research workers at Hoffmann-La Roche and E. R. Squibb & Sons, working independently of each

other on a series of chemicals that might be useful against TB, reported separately that the isonicotinic acid hydrazide (isonicotinylhydrazine) was the best. Isonicotinyl-hydrazine is a chemically pure, synthetically produced substance of the general formula C6 H7 N3 O. It is obtained in almost colorless crystals which are highly soluble in water. The product is supplied for investigation under the following names : *Ditubin*—Schering, *Nidaton*—Organon, *Nydrazid* — Squibb, *Pyricidin* —Nepara, and *Rimifon*—Roche.

A closely related derivative, which was studied for its antituberculous properties, is the isopropyl derivative supplied by Hoffmann-La Roche under the name *Marsilid.* After several experiments this product, however, has now been more or less deserted for the original isonicotinylhydrazine. Other compounds related chemically to isonicotinylhydrazine, in being nicotinic acid derivatives, are Pyrazinamide—*Aldinamide* Lederle) and Amithiozone — *Tibione* Schenley). Both of these products have antituberculous properties. Tibione, Thioacetazone B.P. accepted name, was discussed in the Apothecary 1951, p. 39. Aldinamide when given orally reduces fever, coughing and sputum in many cases. It has been found effective in advanced cases which have been resistant to streptomycin and PAS. However, resistance to the drug can develop within 42 days.

The present status of isonicotinylhydrazine can be summarized as follows. The product is administered orally in the form of tablets containing 50 mg. each. Its average daily dose is 50 mg. per 10 kg. body weight administered in three portions, after meals. Within one hour or so after administration the drug appears to be well distributed throughout the body fluids, blood serum, cerebrospinal fluid, pleural fluid. The maximum concentration in the blood is attained within two hours after its administration. It is completely eliminated through the urine within 24 hours. Therefore it is not cumulative. In therapeutic doses, preliminary observations in man indicate that there is little significant or serious toxicity. «The following have been observed but on a more or less transitory basis even though administration is continued: constipation, difficulty in starting micturition, increased reflexes, positional hypotension and dizziness, eosinophilia (in about 10% of cases), slight drop (0.5 — 1 mg.) in hemoglobin concentration, occasional casts and traces of albumen and reducing substances in the urine. Toxic effects on the eighth cranial nerve, impairment of renal or hepatic functions, or dermatologic manifestations associated with the drug have not been observed so far. During treatment routine laboratory precautions should include frequent blood counts and urinalyses, neurologic examinations, and tests for renal and hepatic insufficiency.»

Clinical results so far obtained with the drug are: reduction of fever if present, reduction in cough and in volume of sputum, gains in appetite, weight and strength. X-rays of the lungs revealed slight changes such as only a slight diminution of the cavity process despite the fact that no tubercle bacilli were found in the gastric contents and sputum. Thus the drug must be tested further for its effect on cavity healing. In its report of March 5, 1952 on the «Current Status of Isonicotinic Acid Hydrazide in the Treatment of Tuberculosis», the American Trudeau Society gives the following summary. «After a review of available data on the action of isonicotinic acid hydrazide and its isopropyl derivative upon the tubercle bacillus in vitro, and upon the course of experimental tuberculosis in animals and clinical tuberculosis in man, it may be stated that their demonstrated action, although highly encouraging, appears in no way to alter the basic principles of the treatment of tuberculosis as presently understood. Much more work will need to be done to ascertain the exact place of these drugs in the treatment of the disease. With several carefully coordinated studies in prospect, it is anticipated that further information will accumulate rapidly.»

# BLOOD AND PLASMA SUBSTITUTES

«Transfusion with whole blood and the several blood fractions (cells, plasma, and serum) has become increasingly frequent in the treatment of acute and chronic hemorrhage, secondary shock, blood dyscrasias, acute and chronic infections and various other pathologic states. Preserved whole blood and blood fractions are readily available to all physicians, although direct transfusion with compatible whole blood is less likely to cause untoward reactions in the recipient.

«Whole blood is used for transfusion when it is desirable to administer the cellular blood elements as well as to increase the volume of the fluid portion of the blood of the patient. Concentrated, compatible blood cell suspensions in pyrogen-free isotonic solutions can be used to replenish blood cell volume diminished by hemorrhage or blood dyscrasias.

«The cell-free fluid portion of uncoagulated blood is plasma; the fluid portion which remains when the cellular elements have been removed by coagulation is called serum. Blood plasma contains the proteins albumin, globulin and fibrinogen; blood serum contains albumin and globulin only, the fibrinogen having been removed during the process of coagulation. Serum and plasma retain, in addition to proteins, the fats, inorganic and organic salts, immune bodies and other soluble elements of the fluid portion of whole blood. Serum and plasma are employed for transfusion when it is not necessary to restore the cellular elements of the blood, and when it is desirable to supplement the blood volume and to reduce proteinemia. Serum and plasma can be reduced by lyophilisation to sterile dry powders which are easily reconstituted by the addition of sterile, pyrogen-free water.

«Untoward reactions may follow transfusion of whole blood, serum, plasma or their fractions. Errors and inadequate blood grouping technics, too rapid administration, toxic changes in stored blood, reaction to sodium citrate, toxic substances in the transfusion equipment, allergic idiosyncrasy and bacterial pyrogens may be responsable» (N.N.R. 1951).

Because of the untoward reactions mentioned above, a long and continuous search has been made for blood substitutes. Of the various substances studied in the past, or presently under extensive investigation, may be mentioned: isinglass, pectin, acacia, gelatin, animal plasma, dextran, and polymers of polyvinyl pyrrolidone such as *Periston* and *Subtosan* — the latter was discussed in the Apothecary 1950.

Acacia, pectin and isinglass have been largely discarded. They are foreign substances which the body can not metabolise and therefore accumulate in the tissues and if large amounts are used serious consequences will develop.

*Gelatin.* Gelatin is an animal protein which can be produced from hard bone, calfskin and pork skin. The quality of gelatin used in preparing plasma substitutes is specially prepared from refined beef bone collagen. Recent experiments indicate, however, that gelatin produced from pork skin may be as satisfactory as bone gelatin in the preparation of plasma substitutes. It must be mentioned that the size of the gelatin molecule can be varied over a wide range, roughly from 35,000 up to more than 150,000. The most suitable size of gelatin molecule seems to be between 50,000 and 100,000. Solutions of gelatin are apparently stable indefinitely if stored under refrigeration or even at 25°. At high temperatures, above 45°, there is some question of its storage over long periods. The N.N.R. recognizes a 6% Special Intravenous Gelatin Solution which is odorless, clear, amber colored and slightly viscous at temperatures above 29°, but gels at

ordinary room temperature. It has a saline taste due to added sodium chloride (0.9%). The pH of the solution is between 6.95 and 7.40.

*Periston, Suotosan* and *Plasmosan* are 3.5% solutions of a synthetic substance of high molecular weight (20,000 to 80,000) which is produced by controlled polymerization of vinyl-pyrrolidine, product of acetylene chemistry. The initial raw materials are acetylene and formaldehyde. *Plasmosan* has the following formula per 100 cc. of the product: polyvinyl pyrrolidone 3.5 gm., sodium 361 mg., potassium 22 mg., calcium 9 mg., magnesium 0.06 mg., chloride 582 mg., bicarbonate 17 mg., dissolved carbon dioxide 75 mg. The mineral constituents make it isotonic and the carbon dioxide increases its stability.

*Dextran* (see p. 35) is a water-soluble polysaccharide of high molecular weight produced in solutions of sugar inoculated with a special bacterium — Leuconostoc mesenteroides. This bacterium metabolises the fructose part and polymerises the glucose part of the sucrose, producing large molecules. Dextran is now produced by growing L. mesenteroides on a substrate of glucose and phosphates. After removal of protein and inorganic salts from the culture fluid, dextran is precipitated as a syrupy gum by organic solvents such as acetone. So obtained, it is a polysaccharide composed entirely of glucose units. The molecules of this raw dextran are too large for infusion purposes and therefore they are hydrolysed by acid under controlled conditions to produce molecules of smaller size. The fraction used as a plasma substitute contains molecules ranging from 40,000 to about 100,000. Dextran is used as 6% solution to which 0.9% sodium chloride has been added. (see Apothecary 1950 p. 29).

*Okra,* the garden vegetable, is reported to be the source of a plasma substitute. The product is made in powder form and less than one ounce of it, added to one quart of isotonic sodium chloride solution, will produce an equivalent of a quart of human plasma. The powder is stable indefinitely and can be stored at any temperature. The product is still in the experimental stage.

## PEDICULOCIDES AND SCABICIDES

*Benzyl Benzoate* is official in the U.S.P. and for a long time fas been used as an effective scabicide. It is applied externally in the form of a 10 to 30% emulsion or lotion. The U.S.P. gives the following formula for Benzyl Benzoate Lotion: benzyl benzoate 25% v/v, triethanolamine 1/2% w/v, oleic acid 2% w/v, water up to 100% by volume. This lotion is applied with a swab or brush over the entire surface (except the face) while the skin is still damp immediately following scrubbing of the lesions in a ten minute bath in soap and warm water. Care should be taken to insure application to and around the nails. The first application is allowed to dry and a second application is made to the most involved areas. Twenty four hours later a bath is taken and clean clothes are worn.

Benzyl Benzoate is also used in conjunction with Chlorophenothane (DDT, Dicophane B.P.) in the form of a lotion for the treatment of pediculosis and scabies. The U.S.P. Benzyl Benzoate Chlorophenothane Lotion has the following formula : chlorophenothane (medicinal quality) 1% w/v, benzyl benzoate 11.5% v/v, ethylaminobenzoate (benzocaine) 2% w/v, polysorbate «80» 2.5%, water up to 100% by volume. The primary ingredient chlorophenothane destroys lice, the benzocaine is an effective ovicide, the benzyl benzoate is effective as a scabicide and to a lesser extent as a pediculocide; the polysorbate «80» is a nonionic emulsifying agent. For scabies, this lotion is used

in the same manner as the simple benzyl benzoate lotion. «For pediculosis this lotion should be evenly applied by rubbing in such an amount just sufficient to dampen all hair of the region involved and to anoint the underlying scalp or skin. This should remain in contact with the affected areas for 24 to 48 hours and then be removed by washing hair or bathing skin with soap and warm water. All clothing should be thoroughly laundered or dry cleaned and uncontaminated clothing used after treatment.»

*Isobornyl Thiocynoacetate, Technical-N.N.R.,* is one of the thiocyanates effective as a pediculocide. «An emulsion containing 5% of this compound, 0.6% dioctyl sodium sulfosuccinate (Aerosol OT), in 5% liquid paraffin, 0.6% gelatin and water, is applied externally in amounts of 30 to 60 cc., depending on the site (amount of hair), worked into a lather and allowed to remain for ten minutes. In treatment of the scalp, the hair is then combed with a fine-tooth comb and washed with soap and water. On the body, the emulsion is worked well into the hair and then washed off with soap and water. Care should be taken that the emulsion does not remain in contact with the skin too long. More than two such applications should be avoided.» (N.N.R. 1951).

*Gamma Benzene Hexachloride* (*Gexane,* Gamophen, Gammexane) is applied to the skin as a scabicide and pediculocide in the form of a lotion or ointment containing 1%. The preparation is applied directly to the involved areas of the skin or hair and to a sufficient surrounding noninvolved areas to insure adequate treatment. Twenty four hours later a bath is taken. All clothing and bed linen should be thoroughly sterilized by boiling to prevent reinfection. A second application may be made after one week if the first is not successful. It is recommended that this drug should not be applied more than three times as repeated use may irritate the skin. Lorexane (I.C.I.) head lotion contains 0.2% w/v gamma-benzene hexachloride in a pleasantly perfumed solution.

## SCLEROSING AGENTS

Various solutions, such as hypertonic glucose, hypertonic saline, sodium salicylate 20%, quinine and urethane, quinine and urea hydrochloride, 5% sodium morrhuate and others have been used in the treatment of varicose veins in the form of injections in areas below the knee. Recently the following compounds were added to the list of sclerosing agents.

*Sodium psylliate — N.N.R.,* is a mixture of the sodium salts of the liquid fatty acids prepared by saponification of the vegetable oil of plantago seed. It is used in the form of a 5% solution as a sclerosing agent for the treatment of varicose veins of the lower extremities and of selected internal hemorrhoids which are not prolapsed or thrombosed. It is not recommended for other types of hemorrhoids. Available in 5% solution with 2% benzyl alcohol. It is marketed by Searle.

*Sodium Ricinoleate Solution — N.N.R.,* containing 2% of purified sodium ricinoleate in water is used as a sclerosing agent. All patients should be tested for possible sensitivity to sodium ricinoleate by injection of 0.5 cc. of the 2% solution into a small varicosity four or five days before the actual treatment is started. It should not be used in patients who show a reaction to the test dose.

*Sodium Tetradecyl Sulfate — N.N.R.,* is an anionic surface-active agent useful as a wetting agent to increase the surface activity of solutions of certain externally applied antiseptics to which it may be added. It also possesses sclerosing properties useful for the treatment of varicose veins and internal he-

morrhoids which are not prolapsed or thrombosed. It is employed in the form of buffered solutions in concentrations of 1, 3, or 5% depending on the size of the vein to be treated. Patients should be tested for possible idiosyncrasy.

## SULFONAMIDES

Though the introduction of the antibiotics has diminished the popularity of the sulfonamides as the drugs of choice for the treatment of bacterial infections, yet research in the sulfonamides continues to produce more valuable compounds. To refresh the memory of the reader it will be in order to review very briefly these compounds according to their therapeutic uses.

*Sulfonamides used for the treatment of generalized infections.* To this group belong a large number of compounds, of which only the following are used in modern medical practice: four pyrimidine derivatives, sulfadiazine, sulfamerazine (methyl sulfadiazine), sulfamethazine (di-methyl sulfadiazine or methyl sulfamerazine), sulfadimetine ( an isomer of sulfamethazine), and two other compounds sulfisoxazole (*Gantrisin* — see. Apothecary 1950) and sulfacetamide. Sulfathiazole and sulfapyridine are no more used in modern medical practice since they are more toxic than the pyrimidines. The pyrimidines may be used each one alone or combined together in equal proportions in the form of triple-sulfa tablets. Tablets of penicillin G with sulfadiazine, sulfamerazine and sulfamethazine are now available.

*Sulfonamides used for the treatment of intestinal infections.* To this group belong the sulfonamides which are poorly absorbed from the intestinal tract namely, succinylsulfathiazole, phthalylsulfathiazole, phthalylsulfacetamide, sulfaguanidine and nitro-sulfathiazole. All are administered orally in the form of tablets except nitro-sulfathiazole (Nisulfazole) which is administered intrarectally in the form of 10% suspension in the treatment of ulcerative colitis.

*Sulfonamides used topically for the treatment of local infections.* The use of the sulfonamides externally in the form of ointments, lotions, creams, dusting powders should be discouraged in modern medical practice, because patients may become sensitized. This sensitization may preclude the use of the drug at a later date in severe systemic infections, should they occur. There are two compounds, which are not used systemically but are applied topically. Sodium sulfacetamide, in the form of an opthalmic ointment and in a 30% buffered opthalmic solution, is used in the treatment of eye infections. The second sulfonamide used externally is *Sulfamylon* — Winthrop-Stearns. This drug first known by the name of Marfanil was used during World War II by the German army for the prophylaxis of wounds, as a dusting powder mixed with sulfanilamide, or sulfathiazole. The drug is said to be specific for anaerobic organisms. It is not effective when taken by mouth and differs from sulfa drugs in its mechanism of action by not being antagonised by p-aminobenzoic acid and pus. This drug is marketed in the form of 1% solution, or 5% solution combined with streptomycin sulfate. The solution is used in the treatment of upper respiratory and ocular infections (1% solution), and chemotherapy of local infections by instillation, irrigation and wet dressings. Here below is a brief discussion of the newer sulfonamides.

*Nisulfadine* is 2-(-p-nitrobenzene sulfonamido)-pyridine, differing from sulfapyridine in the substitution of a nitro group for the amino group. The poor absorption of the drug from the intestines suggested its use in intestinal infections. Initial dose 4-6 gm. in 24 hours, reduced later to 2 gm.

*Nisulfazole* — N.N.R., is 2-(-p-nitrobenzene sulfonamido)-thiazole, differing from sulfathiazole in the substitution of a nitro group for the amino group. It is absorbed and reduced even to a less extent than Nisulfadine. Experiments with dogs have shown that after 7 hours, only a trace of sulfathiazole appeared in the blood. This drug has been tried in the treatment of ulcerative colitis. «A 10% stabilized suspension undiluted, or diluted with an equal volume of water, is injected rectally by means of a bulb syringe, preferably with the patient in the knee-chest position. The average initial dose is 10 cc. of the 10% suspension administered after each stool and at bed time. After improvement is observed, 15 to 30 cc. is usually given once daily at bed time or less often as needed to maintain freedom from symptoms. Maintenance treatment is advised for two to four weeks after the mucosa appears normal.»

*Sulfadimetine,* Elkosine — Ciba, is an isomer of sulfamethazine. The manufacturers report that this drug has a «polyvalent anti-bacterial action, prolonged maximum blood concentration, uniform diffusion in the organism, high level of excretion.» It is outstandingly well tolerated and is thus especially indicated in pediatrics. It is exreted almost entirely in the urine, only a small percentage (10%) being acetylised. Supplied in 0.5 gm. tablets and in 5 cc. ampuls containing 1 gm. in the form of sodium salt.

*Phthalylsulfacetamide,* Thalamyd — Schering, is poorly absorbed from the intestinal tract and therefore it is possible to produce by oral administration, the necessary high concentration of the drug in the intestines without the danger of producing appreciable tissue concentration any where else in the body. This drug has the advantage of having a relatively high solubility and therefore it can diffuse through the intestinal contents into the tissues of the intestinal walls without being absorbed into the blood stream. It is useful in the treatment of intestinal infections and as an antiseptic in both pre- and post-operative treatment in gastro-intestinal surgery. It is interesting to note that this drug is useful in the treatment of cholera if used early in the course of the disease. The possibility of its use in mass prophylaxis in the event of an epidemic of cholera is discussed in the American Journal of Tropical Medicine, 29: 425 (1949). It was suggested that if every member of the population received 0.2 Gm. per kg. body weight for 30 days the epidemic would be terminated. It is supplied in tablets 0.5 gm. each.

## MISCELLANEOUS

*ACTH.* Repository forms of ACTH are being investigated. Suspension of the hormone in a medium consisting of 5% beeswax in arachis oil, as at one time used for penicillin, increased the effectiveness of daily injection by ten times or more as compared with solution in saline or suspension in oil alone. A medium consisting of 2% aluminium stearate and 4.5% beeswax in arachis oil was tried and found to be not as good as the plain 5% beeswax in arachis oil. Armor Laboratories are manufacturing ACTH in a repository form under the name of *ACTHAR Gel* to eliminate the need of repeated injections. After initial treatment with the lyophilized powder, the gel form is injected every one to three days instead of as many as four times daily. The equivalent amount of units needed of the lyophilized form, are administered in the gel form.

*Arobon.* Certain fruits and products prepared from them have been used for some years in the treatment of diarrhea. Fully ripe apples and bananas, in particular, have been recommended and are found in the dried state in a number of preparations. During the Spanish civil war and at the beginning

of the World War II, Ramos of Barcelona, Spain, faced with the increasing difficulty of procuring such dietetic products, sought other materials for therapeutic use. He had noticed that during the war in Spain the children of the poorer classes in Barcelona who ate the fruit of the carob tree had fewer diarrheal disturbances than did those of the wealthier class. Based on this observation, he employed with success the dried pulp of the roasted carob, mixed with starch, for the treatment of diarrhea. The carob flour, as is now prepared by Nestle under the name of *Arobon,* contains 12% added starch. Its taste is somewhat similar to that of cacao, being pleasant only if sweetened with saccharin.

*Dormison* is a non barbiturate hypnotic having the chemical formula of 3-methyl-pentyneol-3. It is indicated in simple insomnia where severe pain or agitated psychotic states do not exist and is said to have the following advantages: is free from the habit forming properties of the barbiturates, is rapidly metabolised, has no cumulative action, has no toxic effects on prolonged use, and it has no prolonged suppressive effect. It is supplied by Schering in the form of capsules.

*Dromoran* is a new synthetic analgesic similar in activity to pethidine and methadone. Chemically it is dl-3-hydroxy-N-methyl morphinan hydrobromide, and supplied by Hoffman-La-Roche. It is recommended for the relief of severe pain, especially in tumors, biliary and renal colic, myocardial infarction, neuritis, and for pre-and postoperative pain relief. The recommended dose is 2.5 to 5 mg. (0.5 to 1 cc.) by subcutaneous injection. It is habit forming and is considered as a narcotic.

*Hexamethonium Salts* are being used widely in the clinical treatment of hypertension. The first salt to be used was the bromide and later, the iodide and chloride were reported in medical literature. It was then reported that the use of the iodides and bromides produced certain undesirable side effects in a number of cases owing to the effect of the bromide or iodide anion. On the other hand, the chloride which was suggested as a substitute for the bromide and iodide, is deliquescent and therefore can not be presented in a suitable form for oral administration. In a search for a substitute of the hexamethonium bromide Barber and Gaimster (May and Baker) prepared a series of hexamethonium salts using commercially available acids. As a result of preliminary experiments, four salts of the fifteen prepared remained as candidates for further examination: methosulphate, bisulphate, bitartrate, and dihydrogen phosphate. On further investigation of the physical properties of these four salts, the bitartrate seemed to fulfill all the pharmeceutical requirements previously set by investigators for the most suitable salt to replace the bromide. The bromide is marketed by Squibb & Sons under the name of *Bistrium bromide* also known as C6. It is a ganglionic blocking agent effective in the treatment of peripheral vascular disease to abolish the effects of reflex vasospasm, in severe hypertension. The product is injected intravenously, intramuscularly or subcutaneously. It is supplied in vials of 10 cc. each containing 25 mg. of hexamethonium ion or 44.74 mg. of anhydrous salt.

*Mytolon* a curare-like compound supplied by Winthrop Stearns in the form of 5 cc. ampuls containing 3 mg. per cc. Chemically, it is 2, 5-bis-(3-diethylaminopropylamino ) - benzoquinonebisbenzylchloride. It is used as a muscle relaxant and electroshock therapy.

*Multergan* — Specia, R.P. 3554, or Thiazinamium the approved French Codex name, is a new synthetic antihistaminic compound possessing marked anticholinergic activity and is devoid from hypnotic effect. Chemically, it is a quaternary ammonium derivative of phenothiazine having the following chemical structure: (1-(10-pheno-thiazinyl)-2-propyl) -N-trimethylammonium sulfate. Because of its combined antihistaminic activity and its anticholinergic action Multergan is particularly

recommended for the treatment of asthma, acute eczema and in allergic and hyperchlorhydric gastritis. It is also effective in other conditions requiring an antihistaminic therapy. This product is marketed in the form of tablets containing 0.10 gm. each and in the form of 2 cc. ampuls containing 0.05 gm.

*Parsidol* — Specia, R.P. 3356, is (2-diethylamino-propyl) - N-dibenzoparathiazine hydrochloride. This new synthetic product is used in the treatment of Parkinson's syndrome and was found effective in cases of dystonia, congenital athetosis and Wilson's disease. The dose varies with the severity of the case and it is administered in gradually increased doses until the optimal effects have been obtained. The product is marketed in the form of tablets containing 0.05 gm.

*Protamine Sulfate.* Protamines are simple proteins consisting of a relatively small number of amino-acids among which arginine predominates. In contrast to proteins of high molecular weight protamines do not cause anaphylactic shock in human beings. Protamine sulfate is used as an antidote for overdosage of heparin. It combines with the heparin to form insoluble salts without inhibitive action on blood coagulation. Approximately 1 mg. protamine sulfate is necessary for the neutralization of 100 I.U. heparin (approximately 1 mg.). It is administered intravenously and is ineffective intramuscularly or subcutaneously. Supplied by Hoffmann-La-Roche in 5.3 cc. ampuls of 1% solution.

*Quinidine.* Quinidine sulfate has been used orally for many years. Injections of it were made available only recently. A 20% solution of quinidine sulfate in propylene glycol has been found to be a satisfactory injectable preparation for treating disorders of c a r d i a c rhythm. Quinidine injections are especially valuable in the following cases: those in which the oral administration gives rise to diarrhea or other gastrointestinal symptoms, patients in coma, and for the prevention and treatment of disorders of heart rhythm during surgery and anesthesia. Quinidine gluconate is also available for intramuscular or intravenous administration of quindine in the form of 10 cc. ampuls containing 0.3 gm. of the salt (equivalent to 0.5 gm. of quinidine) in Water for Injection.

*Selsun suspension* — Abbott is a preparation containing 2.5% of selenium sulfide in a suspension form for use in the treatment of seborrheic dermatitis of the scalp and common dandruff.

*Tensilon Chloride* is a curare antagonist. Chemically, it is (3-hydroxy-phenyl) dimethylethyl ammonium chloride. It is useful whenever a curare antagonist is needed either to terminate the action of curare, d-tubocurarine, or Flaxedil when no longer required or, to counteract overdosage. It is administered intravenously. It is marketed by Hoffmann-La-Roche in 10 cc. multiple dose vials containing 10 mg. per cc.

*Triethylene Melamine,* TEM, is a new synthetic compound possessing toxicological and therapeutic properties similar to those of nitrogen mustard. Experimental studies on animals revealed that this compound has greater activity by weight as compared with nitrogen mustard, and it does not produce central nervous system or cholinergic stimulation. It also offers the advantage that it can be administered orally while nitrogen mustard must be injected intravenously. The drug is being investigated clinically by oral administration. Preliminary results revealed that indications for it are similar to those already established for nitrogen mustard. Investigations are being carried by the Memorial Center for Cancer and Allied Diseases and Lederle Laboratories (U.S.A.).

*Thiocarbarsone* is 4-carbamidophenyl di-(carboxymethylthio)-arsenite containing 19.1% trivalent arsenic. It is said to have a more pronounced amebicidal action than carbarsone. It is used in the treatment of E. histolytica infec-

tions in the bowel and intestines. It is administered for ten days, orally — in the form of enteric coated tablets or by retention enema. It is supplied by Eli Lilly & Co. in the form of tablets containing 25 and 50 mg. each, and in the form of solubilized powder in vials containing 0.5 gm. thiocarbarsone and 1.8 gm. sodium bicarbonate.

*Varidase* (Streptokinase-Streptodornase) contains in a dessicated form, two enzymes elaborated by hemolytic streptococci, group C. The enzymes are separated from the culture medium, purified and filtered, before freezing and drying, to obtain a sterile product rich in streptokinase and streptodornase. The product is supplied by Lederle in vials containing 100,000 units of Streptokinase and 25,000 units of Streptodornase with a sufficient quantity of a buffer to produce solutions having a pH of about 7.5. «Through their catalytic and enzymatic properties, these two enzymes bring about liquefaction of fibrin and of desoxyribose nucleoprotein in places where it is possible to bring these compounds in direct contact with fibrin or pus for a period of time. As they have no effect on living tissue, the liquefaction of fibrin and pus not only eliminates the medium in which the infection grows but also facilitate the formation of healthy granulation tissue. Thus, the secondary closure of infected wounds and of cold abcesses can be done earlier, infected denuded areas can be cleaned up preparatory to skin grafting, and accessible clots and fibrin may be liquefied promptly.»

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**A University** *is a community of independent thinkers composed of a Faculty and a Student Body — a community dedicated to the acquisition and dissemination of knowledge. It is a community of scholars who consider it their function to inquire, discuss, learn and teach.*

*The life of such a community is dependent upon its freedom — freedom of inquiry, freedom of discussion, freedom of learning and freedom of teaching.*

*From the "Report of the Senate Disciplinary Committee", A. U. B.*

# AVICENNA'S MILLENIUM

by Elie S. Nuwaysir

Abu 'Ali al-Hussain ibn 'Abdallah ibn al-Hasan ibn 'Ali IBN SINA, (6) called ash-Shaykhu'r Ra'is-«The Chief Master» or al-Mu'allimu'th Thani — «The Second Master», i.e. after Aristotle (1). He is better known to the West as Avicenna and is considered the greatest and most famous of Arabic physicians and philosophers.

His father was from Balkh and his mother from Afshena, a village in the Iranian province of Bukhara (1), now part of the Usbek Soviet Republic, where IBN SINA was born in 980 A.D. (370 Hegira). Thus a millenium, in Hegira years, has passed since he was born. As a child he was a prodigy with a highly developed memory. In a few weeks in school, he outranked his competitors and teachers and had to look for more advanced instruction. At the age of ten he knew the Koran and many other Arabic classics by heart. During the next six years he devoted most of his time to research; and by the time he was sixteen he had already acquired a knowledge of Moslem jurisprudence, philosophy, natural science, mathematics, astronomy and had studied logic and Euclid. That same year he turned his attention to medicine and found it easy. However, although he had read his books on metaphysics many times, he was still unable to understand them, until by chance he obtained at an auction a small and cheap manual of al-Farabi's book, which solved his difficulties (1, 3).

By the time he was seventeen he had already become a skilful physician and his reputation was such that he was asked to operate on the Samanid ruler Nuh ibn Mansur, who gave him the privilege of using his large royal library. «Ibn Sina entered the library where he found several large rooms filled with cases containing books on all subjects. There was a large number of index books which he consulted.. After memorizing all the knowledge he could obtain from its books, his enemies accused him of burning the library so that others could not obtain the knowledge contained therein.» (6).

At the age of 21 — the year he lost his father — he mastered all the knowledge of his time (6) and wrote his first book — being «an encyclopaedia of all the sciences excepting mathematics»(2). «He would keep on reading and re-reading his studies until he had put them to memory. Many of his problems were solved during his sleep.» Whenever he found any difficulty in solving a problem he would go to the mosque for guidance (6).

In the year 1004 the Samanid dynasty came to an end. He then served the ruler of Khwarizm. However, his political ambitions kept him moving about in the country from one ruler to another and from one town to the other until he came to Jurjan near the Caspian where he lectured on logic and astronomy. From there, after a few more wanderings, he at last passed to Hamadan where he became prime minister to its ruler Shamsu'd-Daula, whom he cured from colic. Owing to his pleasure-seeking, some sedition, and the intrigue of his enemies, he was imprisoned. Later he fled from prison and took refuge in the house of a friendly apothecary, where he wrote a great part of his «Canon» (7).

After this incident, he passed into the service of the ruler of Isfahan as court physician, general scientific and literary adviser, and a lecturer in philosophy and medicine (2, 3). His life there was very strenuous, and he overworked himself. During the day he was busy in the ruler's service and most of the night he spent in lecturing and dictating for his books with many intervals of wine drinking and pleasure-seeking. It was said then that all his philosophy failed to make him moral and later, when he was seized with colic, all his knowledge of medicine left

him unable to take care of his own health. Thus, worn out by overwork and hard living, he died in 1038 A.D. (429 Hegira) at the relatively early age of 58 and was buried in Hamadan (2).

Avicenna is said to have written 99 books on almost every field of knowledge. He wrote on philosophy, medicine, theology, astronomy, geometry, philology, metaphysics, logic, physics, music, mathematics, religion, language, literature, geology, poetry etc... (1, 6).

His chief and largest contribution— and the chief contribution of Arabic medicine — was his perfect classification and clear systematic arrangement of all ancient medical knowledge up to his time. He collected the material from numerous and different Greek, Indian, Persian, Arabic and other sources, and put them into one book which he called *al-Qanun fi't Tibb* — the *Canon of Medicine,* better known as the *Canon.*

Written in a «meticulous style» and almost «Mathematical accuracy», the book contains some one million words, and is elaborately divided and subdivided. Sir William Osler called it « The medical bible for the longest period than any other book». The original Arabic text was translated to Latin by Gerard of Cremona, and was reprinted repeatedly. For several centuries it was the final authority in Europe and constituted half the medical curriculum of European universities. It was taught at the universities of Leipzig, Bologna, Padua, Vienna, Frankfort and was still in use up till 1650 A.D. in the universities of Montpellier and Louvain. Campbell (2) claims that «it even reached the Gaelic speaking people of the British Islands». Browne (1) mentions that in 1887 he was permitted to attend a meeting of the «Majlis a's Sihhat» or «The Council of Public Health» of Teheran, and found that «a majority of the physicians present at that time knew no medicine but that of Avicenna».

The Canon is divided into five main books. «The first treats of principles; the second of simple drugs arranged alphabetically; the third of particular organs and members of the body, from the head to the feet; the fourth of diseases which, though local and partial in their inception, tend to spread to other parts of the body, such as fevers» (1); and the fifth, «the antidotarium, deals with medicaments and pharmaceutical preparations» (5) and includes Avicenna's personal observations (3).

Avicenna is said to have been the first to describe the preparation and properties of sulfuric acid and alcohol (4). He wrote a great deal on drugs and remedies and often prescribed camphor and corrosive sublimate, the latter only externally (8). He is the first to use silver internally, and to introduce the silvering and gilding of pills, not to make them more palatable, but with the object of adding to their medicinal value. He is also the first authority to describe one of the parasitic infestations of the body (the guinea worm) and also the first to note the sweet taste of the urine of diabetic patients (7). His description of the origin of mountains fully entitles him to be called the «Father of Geology» (4).

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# PHOTOMETRY AND ITS APPLICATION IN PHARMACEUTICAL ANALYSIS

by **AFTIM ACRA Ph. C.** *

## Introduction

The idea of «you push the button and the machine does the rest» has been, with certain reservations, approximated in the recent introduction of photometers for purposes of analysis. In modern analytical chemistry, the spectrophotometer is replacing the filter photometer, just as the latter replaced the visual colorimeter which, in turn, outmoded the comparator block.

There are many problems encountered by the practicing analyst which are not amenable to conventional methods of analysis. The determination of traces, analysis of small samples, and determination of complex or unstable materials, constitute a conservative list of examples. In such cases, instrumental or photometric methods are necessarily used. On the other hand, certain analyses that may be performed by conventional methods are often more easily carried out through the use of special techniques as in the determination of purity and identity.

Considering the comparatively short time in which photometry has been used for other than research work, a step forward has been established by the inclusion of photometric methods in the latest editions of some pharmacopoeias such as the U.S.P. XIV, the B.P. '48 and the Codex Français '49. As it is the aim of the pharmacopoeial workers to evolve methods which are specific for the substances being determined, many pharmacopoeial methods of analysis have undergone, and are still undergoing, a process of evolution towards this goal. It is worthy of note, that the trend in modern pharmacopoeial procedures is towards more exact methods, since only in this way can the demands of modern pharmacy and medicine be met.

## Theory

When an incident beam of light traverses a medium, some of the light may be absorbed by the molecules in the medium, while the unabsorbed portion may be transmitted. Since the concentration of the molecules in the medium governs the intensity of both the absorbed and transmitted light, it has been possible to render this phenomenon the basis for quantitative analysis by the direct measurement of the relative transmission. The various methods employed depend on the optical characteristics of the medium intercepting the incident light. Consequently the chemical and physical properties of the interposing medium has a bearing on the method used as exemplified in the following definitions.

*Colorimetry* deals with the measurement of the relative color intensity of a colored solution. This is accomplished by means of comparators or visual colorimeters which are appliances for matching a colored solution of unknown concentration with a colored standard of known concentration.

*Photometry* involves the determination of the light absorbing material present in the medium, which may or may not be a colored solution, by way of direct measurement of the light transmitted

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by the solution. Photometry differs from Colorimetry, mainly, in that the incident beam is approximately monochromatic and of predetermined wavelength at which maximum absorption occurs, and in that it is applicable to all portions of the spectrum,including the ultraviolet and the ultrared.

Colorimetry and photometry have been used interchangeably in the literature, and so the proper definitions may clarify the differences and help to avoid confusion.

*Fluorometry* is the determination of concentration by direct measurement of the intensity of light transmitted by a medium containing substances capable of transmitting light of a higher wave-length than that of the incident beam, which is usually in the ultraviolet region of the spectrum. Substances capable of stepping up the wave-length of the transmitted light are said to be fluorescent, and the instruments used for the measurement of fluorescent light are known as fluorometers. Thus fluorometry may be considered a special form of photometry.

*Turbidimetry* is the determination of concentration by the measurement of the intensity of scattered light which is brought about by the suspended particles in a turbid medium. Turbidimetry and *nephelometry* are about the same. The instruments used are known as turbidimeters or nephelometers.

**Laws**

There are two fundamental laws underlying the practice of colorimetry and photometry. They are Lambert's law and Beer's law. Lambert's law states that the absorption of monochromatic light varies directly with the depth of the solution. *Beer's* law states that the absorption of monochromatic light varies directly with concentration. The combination of both is known as the *Lambert-Beer Law.*

**Instruments**

Many varieties and designs of instruments have been described and are available commercially. The main difference lies in the method used for establishing the intensity of light i.e. either by visual or photometric means. Of these, the latter is the most common, most accurate, and has largely displaced the former.

*Colorimeters,* or color comparators, are instruments designed to aid one to compare the intensity of color of one substance with that of a standard. The simplest instrument may consist of little more than two matched tubes, whereas more complicated devices may employ the following essential parts : a source of light, a pair of adjustable cups and plungers for varying the depth of the solution through which the light passes, an optical arrangement for looking down through the plungers and for matching the two fields of light from the solutions being compared. The original colorimeter of this type was designed by Duboscq and still carries his name.

One of the greatest improvements in the design of colorimeters has been the use of photoelectric cells or thermocouples to measure the intensity of light. Thus errors due to personal characteristics of each observer have been largely eliminated. Instruments employing such devices are called *photometers.* Photometers may be divided into *filter-photometers* and *spectrophotometers,* depending on the device employed for purifying the incident beam to obtain monochromatic light. Filterphotometers make use of glass filters whereas spectrophotometers are provided with a device known as a monochromator or spectrometer. Photometers may be further subdivided as to whether they are provided with one or two photoelectric cells.

Photometers, in general, usually consist of the following essential parts : a source of light, light filters or monochromator, holders or cells for the substances under investigation, a device to receive and measure the light intensity — such a device is sometimes known as a «photometer» and

consists essentially of a photoelectric cell and a galvanometer. Thus the light transmitted by the solution is intercepted by the photoelectric cell which causes a current to flow through the galvanometer.

**Fundamentals of Instrument Operation**

Regardless of design, the basic principle upon which all analytical photometers operate is fundamentally the same, and may be described as follows : light of suitable wave-length—usually expressed in terms of millimicra — is allowed to pass through a reference solution or reagent blank, held in a container of fixed dimensions, known as a cuvette. The intensity of light emerging from the reference solution is registered by the galvanometer index. The latter is adjusted so that the reading is hundred per cent transmittance (transmission). The reference solution is then replaced by the solution whose transmittance is to be determined. The emergent light intensity is measured relative to that established for the reference solution. This relation gives the transmittance T. of the solution under examination. Transmittance is thus a relative value and is always less than one if light absorbing material is present. It is usually expressed in terms of per cent. Another common way of expressing transmittance T of a solution is in terms of the value of -log T. This expression has been given several names in the literature viz. optical density D, extinction E, and absorbancy A. These three terms are synonymous — the one used in the three pharmacopoeias previously mentioned is absorbancy or absorption. In practice, certain usages have become conventional in respect to the terms and units involved in photometric calculations, but some confusion exists concerning the symbols employed. Determinations of absorbancy are usually carried on very dilute solutions. In the pharmacopoeia, however, results are expressed in terms of Specific Absorbancy which is the absorbancy of a one per cent. w/v solution when the path of monochromatic light passing through it is one cm. in depth. This is expressed by the symbol

$$E^{1\ \text{per cent.}}_{1\ \text{cm.}}\ \text{X millimicrons}$$

where X is the wave-length at which the absorbancy (extinction or optical density) has been determined. This value is calculated by simple proportion from readings of the instrument in terms of absorbancy. Most galvanometer scales read in terms of both *T* and *A*. However, to use this method of calculating results with photometers whose scale reads only in terms of per cent, transmittance, it is necessary to change the T value into its equivalent A value, where A=—log T.

In practically all of the common colorimetric or photometric procedures, the substance being determined is subjected to a series of reactions leading either to the final production of a color which is used as the basis for the estimation of the substance or the isolation of the substance into a solution of known composition. The concentration of the substance may be calculated by comparing the absorbancy of the substance with the absorbancy of a solution of the same substance of known concentration or of known specific absorbancy. Calculations of photometric results by the method described can be used only over the range of concentration where Beer's law is valid. In those cases where there is no agreement with Beer's law a calibration curve must be constructed. This constitutes another commonly used method for obtaining results in photometric analysis. A calibration curve is established by determining the absorbancy A or transmittance T of a series of standards of varying concentrations. A graph is then obtained by plotting concentration against absorbancy. In future analyses, the absorbancy or transmittance of an unknown is determined, and its concentration is then found from the graph or calibration curve. There are, however, other types of graphs in photometry. The graphs relating A to wave-lenght are

known as absorption spectra. It has been found that absorption varies in a complicated manner with wavelength. Thus the absorption spectrum of a substance in solution has a peculiar shape and is usually characteristic of the substance. The presence of an impurity of adulteration may change the shape of the absorption spectrum of a certain substance. Therefore, measurement of absorption at different wave-lenghts may assist in the determination of the identity and purity as well as the concentration of the substance. However, the principal value of absorption spectra is to indicate that wave lenght at which the substance shows maximum absorption. Photometric procedures should always indicate the optimum wave-lenght at which absorbancy should be measured.

**Application**

Photometric methods are most generally used for the analysis of solutions whose concentration is so low that ordinary gravimetric or volumetric methods would involve large errors, although the methods are applicable when the concentration is well within the range of conventional methods. The shape of an absorption specturum is a good criterion of identity and frequently reveals the presence of chemically similar impurities in a sample of supposed purity. Briefly, photometric methods are applicable, in general, to the following types of problems :

1. quantitative analysis of certain cations, anions, and organic groups in concentrations ranging from a few thousandths of one per cent. in 1 or 2 ml. quantities;

2. vitamin assays and qualitative and quantitative analysis of certain complex organic molecules;

3. measurement of pH, dissociation, etc.;

4. investigation of molecular structure.

The literature has been enriched with hundreds of publications on photometric and colorimetric methods. It is not uncommon to find descriptions of quantitative photometric methods sensitive to 0.01 micrograms of the substance with an accuracy of one or two per cent. Turbidimetry and fluorometry have been found to be convenient and rapid methods for the determination of a number of specific substances. Riboflavin and thiamin are commonly determined by fluorometry. Riboflavin fluoresces in an aqueous solution, a fact which is made use of in the U.S.P. XIV as a basis for its assay. Thiamin, on the other hand, must first be oxidized by alkaline ferricyanide solution to the thiochrome which fluoresces in isobutyl alcohol. Moreover, several inorganic molecules fluoresce, especially the salts of aluminium, zinc, and magnesium with 8-hydroxy-quinoline. These compounds can be determined either as a turbidity which fluoresces or in solution in some organic solvent.

Biochemical procedures have been influenced to a great extent by photometry. Analyses of biological fluids and tissues for different constituents have been largely adapted to photometric procedures. Photometric methods of analysis have been also introduced in the pharmacopoeias. The following are some of the important drugs that are identified or assayed photometrically: vitamins A, B1, B12, C, D, and E; methyl testosterone; progesterone; testosterone propionate; digoxin injections; nicotinamide capsules; ox-bile extract; epinephrine bitartrate; ergonovine injections and tablets; ergotamine injections and chloramphenicol.

**Conclusion**

With a fertile field of possibilities in the field of photometry, one can hardly quench the eagerness to see some color reactions, at present used in the different pharmacopoeias for qualitative purposes, developed into quantitative photometric methods. That this will inevitably, but gradually, come true is our prediction.

# ICHABOD

*Sparse-haired and closely shaven, softly spoken,*
*The modern pharmacist*
*Behind his counter stands.*
*Benign and scientific, wordly wise,*
*His sterile hands and spotless coat betoken*
*A like perfection in his merchandise;*
*And, that their pristine virtues be retained,*
*Ampoule and capsule, elixir, confection*
*Are for your sure protection*
*Cellophaned.*
*For this much thanks. Yet may men grieve to see*
*That from the chemist's arts*
*The mystery of the master-craft departs*
*And Medicine's cheated of its poetry.*
*Where now the rare medicaments that charmed*
*Our great pre-scientific ancestors ?—*
*Which, if they failed to cure, but seldom harmed*
*(Save Antimony and the Hellebores).*
*What Arabella in her crinoline*
*Would soil her lips with Antihistamine ?*
*Would Dr. Johnson subjugate his pride*
*And bronchially demand Sulphonamide ?*
*Would Byron condescend to save his skin*
*By sending out for Chloromycetin ?*
*Yet lingers on the poetry and the grace*
*In this unlikely place.*
*The chemist's face*
*Is tinted as the softy-coloured light*
*Streams from the carboys in their hallowed site;*
*While on the drawers and pots around the shelves—*
*The sweet nostalgic names reveal themselves—*
*Aloes and Cassia, Gentian, Lavender,*
*Mallow and Chamomile, and Sandalwood and Myrrh,*
*Saffron and Cinnamon, Clove and Feverfew,*
*Absinthe, Angelica and Rhatany and Rue,*
*Fruit of the Fennel, fragrant Orris Root—*
*These but few of many that salute*
*The leisured past, and tarry with us still,*
*Evoking by their names a bygone grace*
*And chiding us who fill*
*Our unromantic frames with Phenobarb.,*
*And Bismuth Carb.,*
*And Acetyl Salicyl.*

—from Punch
through Pharm. J. **168**, 96, 1952.

# HOSPITAL PHARMACY

by ELIAS HAWWA

Pharmacy and medicine date , as far back as the beginning of man and are as old as pain itself. However, in their early history, they were not separated into two distinct professions. They were first practiced by the ordinary man himself trying on himself whatever he found in nature, then by an experienced man of the tribe, then by the priest-physician and later on by specially trained men. The first real separation of the two professions was brought about by the Arabs who, no doubt influenced Frederik II, the German emperor, to issue his famous edict regulating the practice of the two professions in the kingdom of the Two Sicilies in 1240 A.D. which became the basis of later rules and regulations governing the practice of the two professions. With the real separation of pharmacy and medicine as two distinct professions, there came specialization even within each profession. As the first real retail pharmacies to open were in Baghdad during the Arab Empire, so the first hospital pharmacies were again first opened by the Arabs who were careful to attach them to the hospitals they opened in Baghdad and elsewhere in the nineth, tenth and eleventh centuries. This was the earliest recognition of the need and importance of a hospital pharmacy to the hospital it serves.

In Europe, during the Renaissance and the centuries that followed, hospital pharmacies were established everywhere and they became a natural component of the hospital. They were luxuriously furnished and staffed by highly educated licenced pharmacists. At present, the pharmacy departments of hospitals in most European countries including England, are staffed with competent licenced pharmacists who have full responsibility of the supply and preparation not only of medications but also of such items as surgical dressings and instruments. In some modern Swiss hospital pharmacies the pharmacy department occupies several floors with departments for manufacturing, research and analysis.

Recognition of the importance of the hospital pharmacy, in the United States, is, however, very recent. It is only in the last two decades or so that American hospitals have begun to recognize the importance of making use of the specialized training of the pharmacist and of establishing properly equipped hospital pharmacies. This is probably in consequence of the raising of standards of pharmaceutical education—a process which, in Europe, had started much earlier.

When the thorough, high and technical training which the pharmacist receives before he is licenced to practice becomes better known by the medical profession, the role of the hospital pharmacy becomes very evident. Hospital pharmacy has also become a specialized branch of pharmacy itself affording, in our countries, a new outlet besides retail pharmacy. In this connection, it is significant to note that many schools of pharmacy in the United States are now offering special postgraduate courses and internships in hospital pharmacy.

I shall attempt, therefore, to indicate briefly some of the functions and duties of the hospital pharmacy and pharmacist, for the information of pharmacists who may wish to go into this branch of the profession. Hospital pharmacy, because of its inherent nature, offers certain allurements which will not fail to attract new graduates. Among these advantages may be mentioned lack of commercial competition, chance of practicing real pharmaceutical activity, and the opportunity to carry a certain amount of phamaceutical research and keep up with modern aspects of treatment. Also the hospital pharmacist has the oportunity of introducing and making properly known to the doctors, with whom he comes in contact, the real face of pharmacy. Efficient operation of the hospital pharmacy cannot but appeal to the hospital administration interested in the financial aspect of the whole hospital organization. This will become clear from the discussion which follows.

One of the first duties of the hospital pharmacist is to establish good relationships and ultimately gain the respect and confidence of the medical, nursing and administrative staff. This is essential if he is to perform efficiently his responsibilities. He must have knowledge, personality, open mindedness and a

gift for understanding and dealing with people. He must be accurate in his work and in the statements he makes; he must also be careful and tactful.

In addition to his usual duties of supplying medications and compounded prescriptions to the wards, to the nurses and the resident staff, to out-patients and other hospital divisions and the supply of surgical dressings and related professional items such as thermometers, syringes, etc. and may be surgical instruments, the hospital pharmacist will have other duties the extent of which will depend on the size and development of the whole hospital organization. The following are some of these other responsibilities.

Because of his specialized knowledge, the pharmacist is usually asked to be on the hospital drug committee if not its chairman. The compilation of a hospital formulary thus becomes his responsibility. The value of the formulary is three fold: it provides a ready reference for doctors and nurses, it provides for saving by preventing duplication in specialities and reduces great diversity in prescriptions for the wards; thus time and money are saved.

A well informed hospital pharmacist is an invaluable asset to the physicians and nurses. He will have detailed information on the availability, properties and cost of newer medications, he will advise on the best ways of compounding drugs so as to make them pleasant to take, he will also advise on incompatibilities of drugs. He will acquaint the medical interns with drugs and help the new graduates in the art of prescription writing. He could best teach certain courses to the nurses such as chemistry, materia medica and arithmetic, etc. As a corollary to all this, the hospital pharmacist must gradually build up an adequate reference library on drugs and their uses.

Often the pharmacist will find it more profitable to the hospital if the pharmacy would undertake the manufacture of certain items that are consumed in a large quantity by the hospital or which require to be supplied in special sizes or forms. Thus he may have to manufacture certain tablets, ampuls, injections, etc. which are best prepared locally.

Not least among the duties of the hospital pharmacist is the purchase of drugs, chemicals and other professional supplies which he is technically informed upon. His advice in this matter can save the hospital unnecessary expenditure and insure that the drugs are of the proper quantity and grade.

The hospital pharmacist will also have the responsibility of keeping a record of the narcotics kept in the wards, of seeing that drugs in the ward cabinet are in good condition and that certain drugs are not misused. He may be called upon to prepare laboratory and diagnostic reagents and to analyze and assay tablets, solutions, medications, etc. used in the wards.

The hospital pharmacist has full opportunity to put his whole education into practice. He is called upon to solve problems of all kinds. He is called upon to experiment and find new methods of combining drugs, improving existing formulas, introducing new procedures and suggesting new techniques, etc. The nature of dispensing will vary according to the type of hospital—whether a general hospital, a children's hospital, a sanitarium, etc. The extent to which a pharmacist may apply his professional knowledge and ingenuity remains, however, unlimited.

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*A new revised edition . . .*

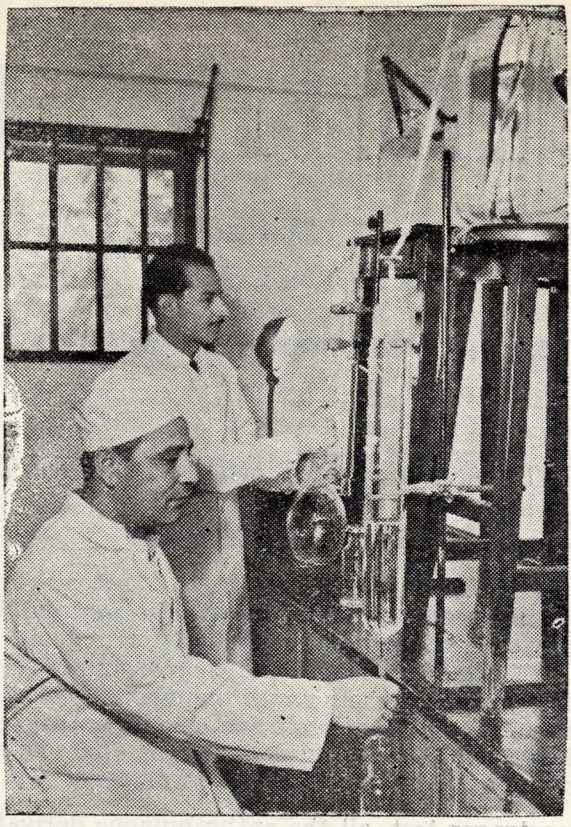
## HISTORY OF PHARMACY by Edward Kremers & George Urdang

**pp. xiv + 622. J.B. Lippincott Co., 1951, dollars 7.5**

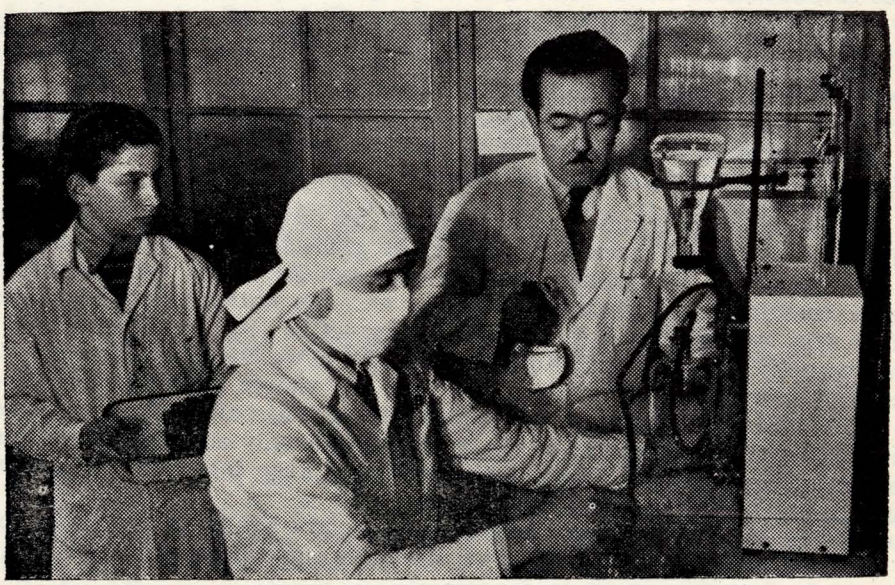
This second edition has been fully revised by Dr. Urdang and a section on pharmacy in Spain has been introduced.

**Left to right :** Jamil I. Barghash, Ph. C., University Pharmacist ; Mrs. Seraphine Sivinsky, Secretary.

**Left to right :** Marun Costantin, errand boy ; John Adil, Dispenser ; Hagop Derghazarian, Ph. C., Assistant Pharmacist ; Ahmad Zantut, orderly.



Standing in the back Nadim Khalluf Ph. C., responsible for the Hospital Solution Room ; seated Salim Tabib, assistant.



**Left to right :** François Nahhas, orderly ; Hani Sha'ar, junior technician ; Butrus Musa, technician.

# seminars

## ABSTRACTS OF PAPERS PRESENTED BY MEMBERS OF THE SENIOR CLASS *

**ARRANGED ALPHABETICALLY BY TITLES**

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## THE ACTIVITY AND ASSAY OF ANTHRAQUINONE DRUGS

by Muhammad al-Kurdi

The commonly used vegetable purgatives containing anthraquinone derivatives are aloes, cascara sagrada, cassia pulp, frangula, rhubarb, and senna leaf and fruit. These drugs may contain free anthraquinone compounds such as emodin, aloe-emodin or rhein; anthranquinone glycosides such as frangulin; free anthranol compounds such as aloe emodin anthranol; dianthranol or dianthrone glycosides such as sennosides A and B; and sometimes oxanthrone compounds such as the oxanthrone glycosides in cascara.

In the Borntrager test, all the anthraquinone derivatives are converted to the free anthraquinones by hydrolysing the glycosides and oxidizing the anthranols. The free anthraquinones are then tested for by extracting them in ether and shaking the ethereal extract with an alkaline solution. This qualitative color reaction has been modified into a quantitative colorimetric method for the estimation of total anthraquinones.

White mice and guinea pigs have been used in the biological assay of these drugs by counting the pellets of wet feces discharged at regular intervals or by weighing the fecal output per unit time.

It has been observed by many researchers that determination of total anthraquinones chemically did not give a true measure of the activity of the drug as observed by biological assay.

Fairbairn concludes, as a result of his investigations on senna leaf and fruit, rhubarb and cascara barks, on the glycosides of senna leaf and on pure anthraquinone derivatives such as aloe-emodin, aloe emodin anthranol, frangula emodin, chrysophanol and rhein, « ... the anthracene derivatives are highly active as anthranol glycosides; less active as free anthranols and much less active as free anthraquinones ... the more complex aglygone (dianthranol) of sennoside A is more active than the simple anthranol of aloe-emodin.» J. Pharm. Pharmacol. 1: 683 (1949). Fairbairn also proposes the theory that «the sugar moiety of the glycoside not only acts as a «transporter» of the active aglycone, enabling it to reach the large intestine, but is also a

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* The original texts of these seminars are available for reference at the Director's Office. The abstracts have been prepared by Prof. Abou Chaar.

«protector» which prevents oxidation of the aglycone to the relatively (orally) inactive anthraquinone.»

It has been observed, also, that while the single free anthraquinones had little or no purgative effect the combination of the two or more exhibited a synergistic action and produced purgation.

It is important to remember that while the aglycones (the free anthraquinones) are soluble in ether, the glycosides are insoluble. This provides a means for isolating and determining each chemically.

Fairbairn and Saleh found that senna leaf contains a smaller proportion of sennosides than the fruit. The leaf, however, showed a higher activity. This, they found was due to a third glycoside or glycosides (unnamed) which amounted to 10-15 per cent. of the total glycosidal content of the leaf and only 2-5 per cen. of that of the fruit. The third glycoside was found to be as active as the sennosides and when mixed with sennosides A & B in a proportion of about 14 per cent, it increased their activity by 1.7 times, while if it is mixed in an amount less than 5 per cent. it did not exert a synergistic effect. The total glycosides in senna accounted for 60-70 per cent., only, of the activity of the leaf — the remainder of activity is not yet accounted for.

Fairbairn and Michaelis (ibid., 2: 807, 1950) say «... the active principles are incompletely soluble in water alone, but dissolve entirely and without loss when the infusion is maintained at a temperature approaching 100°C for 10-15 minttes followed by the addition of alkali to pH 6 to 7. Immersion for longer than 20 minutes results in gradual decomposition of the active principles.». «The active principles are almost completely soluble in 70 per cent. acetone, 70 per cent. ethyl alcohol, and 70 per cent. methyl alcohol.» (ibid., 2: 813, 1950). Thus galenicals of senna prepared with 70 per cent. alcohol will contain the whole activity of the drug.

Fairbairn and Lou believe that the main purgative activity of rhubarb is due to the combined rhein-like compounds and found that the biological activity runs parallel with these combined rhein-like compounds. They further found that English rhapontic rhubarb contains less of the active material than Chinese rhubarb, while samples of Austrian and French rhapontic contained only traces. Some believe rhubarb to contain active principles, other than anthraquinone glycosides, responsible for part of the activity of the drug.

Frangulin and glucofrangulin of frangula bark are active compounds, the latter possessing a greater purgative effect than the former. Jorgensen (J. Pharm. Pharmacol., 2: 970, 1950) recently isolated from frangula an anthrone-anthranol glucoside complex which on hydrolysis and oxidation gave rise to an anthraquinone glucoside complex B. The latter yields on hydrolysis difrangulin which on further hydrolysis yields frangulin.

## AGAR AND OTHER SEAWEEDS AND ALGINATES

### by Morris Karam

Red and brown seaweeds and lichens have been used by man for many centuries as sources of food. More recently he has learned to utilize them industrially by making use of their mucilages which can be extracted from them and utilised as adhesives, as a sizing for paper and fabrics, as bacteriological media, as emulgents, as stabilizers in food products such as ice-

cream and chocolate milk and even as surgical dressings. The term «phycocolloids» has been applied to the isolated mucilaginous substances obtained by extraction from the seaweeds.

Best known of these phycocolloids is agar which, before the last war, came principally from Japan. Japanese agar was prepared from some 34 different species of red algae but chiefly from species of Gelidium and to a small extent from some Gracilaria species. It is considered the best for use in bacteriological media. When Japanese sources became scarce, search for other sources of agar began. The following commercial varieties of agar are now available. They differ greatly among themselves in gel strength (highest in Japanese agar) and in their suitability as culture media. Their ash exhibits diatoms different from those found in Japanese agar and thus makes their identification possible within certain limits. Forsdike (J. Pharm. Pharmacol. 2: 796 (1950) says: «New Zealand, South African and Australian agars are of the same type as Japanese agar. New Zealand agar is generally superior to Japanese, South African is about equal to Japanese, Australian is much inferior in gel strength and color, and contains more ash and insoluble matter. The so called British and Danish agars, on the other hand, apart from their inferiority in gel strength and in melting and setting temperatures, are of quite different character from the Japanese material and are to be regarded as substitutes for, rather than as varieties of agar». New Zealand agar is prepared from Pterocladia species; Australian agar from Gracilaria species; South African agar from species of Gelidium, Gracilaria and Suhria; Danish agar seems to be from species of Chondrus. American agar, from the U.S.A., is prepared from Gelidium species but has about half the gel strength of Japanese agar.

Carrageenin is a phycocolloid similar in composition to agar and is obtained from Irish moss — another red alga, so familiar to pharmacists. Agar and carrageenin are calcium sulfate esters, chiefly of polymers of galactose. Iridophycin, another closely related substance, has been recently obtained from species of Iridophycus growing around the coast of California.

The most important phycocolloid obtained from the kelps or brown seaweeds is algin or sodium alginate which is obtained mainly from species of Laminaria and to a lesser extent from species of Fucus, by extracting the kelps with soda ash solution, reprecipitating the alginic acid and again converting it into the sodium salt after purification. It is a polymer of d-mannuronic acid. «Algin is useful where ever a hydrophilic colloid possessing marked gelling, suspending, emulsifying, thickening and water holding properties is required». «Many of the present industrial uses of algin are based on the fact that the addition of a calcium-salt to an algin solution produces an immediate precipitate of gelatinous calcium alginate. Therefore if we control the release of calcium ions, through the use of a relatively insoluble calcium salt such as calcium citrate, the algin solutions may be either thickened or converted into rigid gels in accordance with the amount of the calcium salt added. The rate of the setting of the gel may also be controlled by the introduction of salts, such as soluble phosphates, which form calcium salts more insoluble in water than calcium alginate. In preparing algin solutions .... water should be warmed to about 60 C. ... and preservatives added to prevent bacterial growth». Algin finds use in stabilizing ice-creams, chocolate milk and whipping creams. It is used also in cream cheese and spreads, as a gelling agent in milk puddings, jellies, etc., Pharmaceutically, it is used to emulsify creams and ointments with a petrolatum base, as a pill and tablet excipient and in vitamin emulsions. Algin may be used to advantage in hand lotions of the saponified type, in tooth pastes and greaseless water soluble ointments.

As a surgical dressing, algin has been made very recently into alginate fiber and gauze, into alginate wool and an alginate glove powder has been prepared containing 1% boric acid. Algin has also been suggested for use as a dental impression material. Sodium and ammonium alginates are used in preparing vehicles for resin emulsion paints. Copper alginate is used as a dressing for canvas to prevent mildew. Algin is used in a new type of fire retarding compound, in the rubber industry as a latex-creaming agent, in boiler-water to prevent incrustation, in printing pastes, as an activating substance in an insecticidal spray, in purifying beet juices in sugar manufacture, as a binder for printers ink, etc.

## ANTIPARKINSONIAN DRUGS

### by Amin Ismail

A definition of parkinsonism or paralysis agitans is followed by a history of its treatment. According to a report in the seminar, the compounds investigated and found of more or less value in parkinsonism fall into the following classes:

1. Atropine, Scopolamine and synthetics such as Trasentine, Pavatrine, Syntopan, and Parpanit (Panparnit).

2. Curare, tubocurarine and other drugs which have a curariform action such as dihydro-beta-erythroidine. Also, compounds such as Mephenesin (Myanesin, Tolserol, Oranixon, Lissephen, Toloxyn, Avosyl, BDH 312, Glykresin, Dioloxol) and Flaxedil.

3. The antihistaminic drugs which have anticholinergic activity such as Benadryl and Thephorin.

4. Other drugs such as Artane, Diparcol and Lysivane.

*Information on most of these compounds was published in The Apothecary* 1950 *pp.* 28-29.

## HOSPITAL PHARMACY

### by Ilyas Hawwa

Hospital pharmacy and the opportunities which this specialized branch of pharmacy offers to new graduates, is first taken up. The hospital pharmacy itself is then discussed as to its location, economical value, administration and organization, standards, and equipment. Then follows a review of the hospital pharmacist, his qualifications, his responsibilities and his duties. *See article by Hawwa on p.* 54

## KHELLAH

### by Elie Nuwaysir

The seminar paper is a comprehensive review of the history, botany and active constituents of *Ammi visnaga* as well as a review of the chemistry,

pharmacology, therapeutic uses and preparations of the active principles of khellah. Since a brief review of khellah, by Nuwaysir has already been published (see Apothecary 1951, p. 28), the abstract, here, will limit itself to material not included in the previously published review.

*Isolation of the active principles of khellah.* «In 1938 Spaeth and Gruber obtained pure khellin by extracting the fruits with ether. Evaporation of the ether, addition of petroleum ether and chilling, yielded colorless crystals and a greenish material. The latter was separated from the petroleum ether, treated with boiling water, and the filtrate was concentrated until it crystallized. All crystalline material was conbined and extracted with chloroform; concentration of the chloroform extract gave crude khellin. After recrystallization from methyl alcohol it had a melting point of 154-155 C. Visnagin was isolated by evaporating the mother liquor of khellin to dryness. The residue was then dissolved in benzene, the solution was heated and petroleum ether added till turbidity appeared. On cooling, khellin precipitated out and was filtered off; upon further addition of petroleum ether, a crude fraction of visnagin was obtained which after recrystallization from methanol had a melting point of 144-145 C. Pure khellol glucoside was obtained by extracting the fruits first with ether and then with methanol. The methanol fraction, on addition of water, yields hydrous khellol glucoside. Anhydrous khellol glucoside melts at 174-176 C.».

*Identity tests.* Several test-tube and spot-tests are given for the identification of the constituents. Of these the phosphoric acid test may be mentioned. Phosphoric acid B.P., in a test tube or on a drop plate, gives orange-red crystals with khellin, a pale yellow color with visnagin and an intense yellow color with khellol glucoside.

*Assay.* The following methods of assay were described and evaluated: gravimetric, acid hydrolysis colorimetric, alkaline hydrolysis colorimetric, spectrophotometric, polarographic, infrared, and pyrone content methods.

*Related plant.* Finally, Nuwaysir, brings the attention to a close relative of khellah, *Ammi majus,* which is often mistaken for true khellah. It is called *khellah-shaytaniya, Regl-el-ghrab* or *gazar-el-shaytan.* Macroscopic and microscopic and microscopic differentiation between the two plants is given. Among several differential chemical tests, the test with solid sodium hydroxide gives a pink color with powders or extracts of khellah fruits but does not give this color with the fruits of *Ammi majus.* Three constituents have so far been isolated from the latter: ammoidin or xanthotoxin, ammidin or imperatorin, and majudin or bergaptene. «The crude plant extract is toxic while ammoidin is non-toxic in therapeutically effective doses. Pure ammoidin has been successfully used in the treatment of leucoderma by oral administration of 0.5 g. three times daily or in the form of a 1% ointment or liniment applied topically to leucoderma patches». Of the long list of khellah specialities appended to the seminar paper, may be mentioned those introduced in Lebanon by the Egyptian firm «The Memphis Chemical Co.», and the French firm «Delalande».

*Action of khellin.* Khellin causes a conspicuous and prolonged relaxation of all bronchial and visceral smooth muscles. It possesses, also, a mild diuretic action, a remarkable quality of decreasing intestinal tone without affecting peristalsis, and a potent vasodilating action on the vessels of the heart. These qualities make khellin useful in the treatment of kidney stones, angina pectoris and bronchial asthma.

# NEW QUATERNARY AMMONIUM COMPOUNDS AND THEIR USES

by Nubar Tepelian

They may be simply defined as ammonium salts in which all the hydrogen atoms of the ammonium cation are replaced by various organic radicals.

The quaternary ammonium bactericides fall into the following classes :

1. compounds containing the cyclic amines pyridine, picoline, lutidine etc... e.g. Cetyl Pyridinium Chloride N.N.R. Ceepryn.

2. compounds in which long chain alkyl radicals are introduced on the nitrogen atom to give a series of alkyl-dimethyl-benzyl-ammonium chloride e.g. Benzalkonium Chloride U.S.P. — Zephiran.

3. compounds in which oxygen atoms are introduced in the long chain as amide linkages e.g. lauric acid esters of colaminoformyl methyl pyridinium chloride.

4. compounds containing an aromatic ring in the long chain e.g. p-tertiary-octyl-phenoxy-ethoxyethyl-dimethyl-benzyl-ammonium chloride — Benzethonium Chloride N.N.R., Phemerol Chloride, Hyamine 1622.

5. compounds containing unsaturated links in long chain alkyl groups e.g. 9-octadecenyl-dimethyl-benzyl-ammonium chloride.

Aqueous solutions of these compounds are colorless, odorless, stable to storage and to high temperature, froth considerably and are used as detergents. Those of them that are bactericidal are active against both gram-positive and gram-negative organisms, higher concentrations being required to kill the latter. Their solutions are non-irritating to wounds and relatively non-toxic to the tissues in the concentrations used. These cationic bacteriostatics inhibit the metabolism of the microorganisms in concentrations ranging from 1 in 3,000 to 1 in 60,000. Their high surface activity partly explains many of the theories advanced for their bactericidal effect. It is important to note that they are not very good at killing bacterial spores and acid-fast bacteria; that their activity is susceptible to variation in temperature — losing much activity at low temperatures, and that the following tend to inactivate them: hard water, anionic compounds such as soap, sodium lauryl sulfate and other similar detergents, and other substances as serum, lecithin, ox-bile, etc...

The compounds may be used for the sterile storage of metallic and rubber instruments (e.g. Benzalkonium Chloride, Benzethonium Chloride, Cetyl Pyridinium chloride); as sanitizing agents for equipment and utensis in hospitals (e.g. Benzalkonium Chloride — Roccal); to prevent diaper rash (e.g. di-isobutyl-cresoxy-ethoxy-ethyl-dimethyl-benzyl-ammonium chloride or Methyl Benzethonium Chloride N.N.R. — Diaparene); as general detergents; emulsifying agents; in the treatment of peripheral vascular diseases (e.g. tetraethyl-ammonium chloride—Etamon, and Benzethonium Chloride); in symptomatic relief in head colds; as fungicides (e.g. Benzalkonium Chloride and trimethyl-cetyl-ammonium pentach lorophenate); as a throat spray or a germicidal gargle (Cetyl Pyridinium Chloride-Ceepryn, and Benzalkonium Chloride); in ear infections (e.g. diisobutyletlhoxyethyldimethylbenzyl ammonium chloride, and Benzalkonium Chloride); as skin and mucous disinfectants (e.g. myris-

tylgamma-picolinium chloride—Quatrecin, Cetyl Pyridinium Chloride, cetyl trimethyl ammonium bromide, and Benzalkonium Chloride); as genitourinary antiseptics (e.g. Benzalkonium Chloride); against hypertension (e.g. tetraethyl ammonium chloride, and hexamethonium salts); as a curare antagonist (e.g. 3-hydroxy-phenyl-dimethyl-ethyl ammonium chloride — Tensilon Chloride); etc...

In addition to the compounds already mentioned, compounds of the following types are also discussed: aryloxy-ethoxy-ethyl-benzyl-dimethyl ammonium chlorides, duodecyl quaternary amines, and p-toluidine quaternary ammonium compounds.

## NEWER ANTIMALARIALS

by Musa Awad

The following classification of antimalarials was presented. The newer members of each group were discussed briefly as to chemistry, description, action and dosage. The official as well as well known members were not discussed.

A. Quinoline derivatives.

a. 4-aminoquinoline derivatives (the first two are not discussed):

1. Quinine.

2. Chloroquin, SN 7618, 3377 R.P., Nivaquin (sulfate), Aralen (diphosphate). It is 7-chloro-4-(4-diethylamino-1-methylbutylamino) quinoline.

3. Santoquine, Santochin, Nivaquin M, SN 6911, R.P. 3308. It is the 3-methyl (-quinoline) derivative of Chloroquin.

4. Camoquin, SN 10,751, Amidoquin. It is 4 -(3'-diethylaminomethyl-4'-hydroxyanilino)- 7- chloroquinoline dihydrochloride.

5. SN 8137. It is 7-chloro-4-(3-diethylamino-2-hydroxy-propylamino-) quinoline.

b. 8 - aminoquinoline derivatives (the first one is not discussed):

1. Pamaquin, Plasmochin, Praequine. It is 6-methoxy-8-(1-methyl-4-diethylamino)-butylamino quinoline. Its naphthoate is Pamaquin B.P.

2. Pentaquine. It is 6-methoxy-8-(5-isopropylaminoamylamino)-quinoline.

3. Isopentaquine, SN 13,274. It is 6-methoxy-8- (4-isopropylamino-1-methylbutylamino) -quinoline.

4. Rhodoquine, Fourneau 710. It is 6-methoxy-8-(diethylamino-n-propyl-amino)-quinoline.

B. Para-chlorophenyl derivatives (the first is not discussed):

1. Paludrine, Proguanil, Chloroguanide, Guanatol, M 4888. It is 1-(p-chlorophenyl)-5-isopropyl biguanide.

2. Compound 3349. It is 2-p-chlorophenyl-guanidino-4-beta-diethyl amino-ethylamino-6-methylpyrimidine.

3. Compound M, 4430. It is 1-(p-chlorophenyl)-5-methyl-5-isopropyl biguanide.

C. Acridine derivatives (not discussed).

1. Mepacrine, Quinacrine, Atebrine.

It is 3-chloro-7-methoxy-9-(1-methyl-4-diethylamino-butylamino) acridine.

D. Pyrimidine derivatives:

1. 2:4-Diaminopyrimidines.

## NEWER FUNGICIDES AND THEIR APPLICATION

by Rizkallah Mazlum

The seminar paper was received too late to make it possible to prepare a detailed abstract from it.

The following fungicides were discussed: sodium propionate, salts of capric, caprylic and undecylenic acids, napthoquinones and thiocarbamate derivatives such as disodium ethylene bisdithiocarbamate, calcium dimethyldithiocarbamate, ferric dimethyldithiocarbamate and phenanthraquinone-9. The fungicidal power of Antibiotic xG, of Bacillomycin, of penicillin and the sulfonamides and of Coparaffinate N.N.R., Salicylanilide N.F., and Diphenylpyralin is mentioned.

## NEWER PEDICULOCIDES AND SCABICIDES

by Safwat Kutub

A brief description of scabies, of its causative organism and of lice. Firstly, a review is given of older remedies such as sulfur and its preparations, beta naphthol, mild mercury ointment and Peru balsam. Secondly, an account is given of the newer remedies such as benzyl benzoate, chlorophenothane or dicophane (DDT), gamma hexachloro-cyclohexane (gammexane), isobornyl thiocyano acetate (thanite) — for these see page 40, toxaphene tetraethyl thiuram monosulfide and chlordane. Thirdly, remedies of plant origin are reviewed also, such as pyrethrum and pyrethrins, derris and rotenone, staphysagria and larkspur. Lastly, a list of some specialities containing the newer scabicides is given. Enbin Lotion and Enbin Emulsion, Benylate Lotion and Tenntex contain benzyl benzoate — the first two also contain chlorophenothane; Jacutin, Kwell Ointment and Gexane contain gamma benzene hexachloride; Bornate Lotion contains isobornyl thiocyanoacetate.

## THE NEWER SULFONAMIDES

by Abdul-al Awad

The history, description, chemistry, assay, and uses of the following sulfonamides are discussed in so far as known: phthalyl-sulfathiazole, sulfisoxazole, phthalylsulfacetamide, sulfapyrazine, nisulfazole, sulfamethazine (sulfa mezathine, sulfadimidine), sulfamerazine, sulfadimetine, marfanil, fontamide.

*For a brief review of these, see page* 42

## THE NITROGEN MUSTARDS

by Jubran Atallah

The nitrogen mustards are so called because of the similarity in structure between them and mustard gas (dichlorodiethyl sulfide) which was one of the gases used during the first World War. In the nitrogen mustards, the sulfur is replaced by nitrogen.

At present, the most commonly used nitrogen mustard compound is mustine which is di-(2-chloroethyl) methylamine.

According to Remington, 10th ed., these compounds « ... induce remissions lasting weeks to months in Hodgkin's disease, lymphosarcoma, and chronic leukemia. The blood picture improves and the spleen, liver, lymph nodes, and tumor masses recede. Fever subsides and appetite improves with consequent increase in body weight. The nitrogen mustards are of particular benefit in the radio-resistant stages of these diseases. After a course of nitrogen mustards, the normal sensitivity of the neoplasm to X-ray may be restored.»

Mustine (the name was selected by the British Pharmacopoeia Commission) is available in 10 mg. bottles and should be dissolved immediately before injection to avoid hydrolysis. The solution should not stand for more than five minutes. To prevent thrombosis when injected, the intravenous solution is not injected directly in the vein but in the tubing of a fast running intravenous saline drip infusion. A new technique has been developed whereby a special fine 18 gauge catheter is used to inject the solution into the femoral artery serving the liver.

The compound has many toxic side effects.

## PAPER PARTITION CHROMATOGRAPHY

by Daniel Abdulian

The seminar paper, while enumerating and defining the various methods of chromatographic analysis, is a detailed review of the history, scope, methods, and applications of paper partition chromatography.

Paper partition chromatography or paper chromatography is par-

ticularly useful in the qualitative analysis of microgram quantities of materials. In a very recent review of this subject, Partridge (J. Pharm. Pharmacol. 4: 221, 1952) gives the following description : «In this process, a small spot of solution containing one microgram to several milligrams of the mixture is placed near the top of a strip of filter paper, the end of the paper near the spot is inserted in a trough containing a solvent saturated with water, and the whole is suspended in a suitable chamber whose atmosphere is saturated with the vapours of water and of the solvent. When the solvent has flowed a suitable distance down the paper, the position of the solvent front is marked and the paper is dried. The components of the fractionated mixture are then treated with an appropriate reagent, usually applied by spraying, and finally characterized by comparison of their Rf values with the simulaneously determined values for authentic materials. In developing a two-dimentional paper chromatogram, the spot of solution is placed near one corner of a square sheet of filter-paper and one edge is inserted in the solvent trough. After the solvent has flowed nearly to the opposite edge of the sheet, the paper is removed, dried and devloped at 90° to the direction of the sheet, the paper is removed, dried and developed at 90° to the direction two solvents, the degree of fractionation is enhanced.»

This chromatographic method has a high resolving power compared with other chromatographic methods. The spots on the various chromatograms can be identified by comparing them with standard chromatographic «maps» of known substances.

This method of analysis is being applied at present in the investigation and analysis of protein structure, the determination of free amino groups in proteins, protein analysis in general, the quantitative analysis of amino-acids, protein metabolism, thyroid metabolism, carbohydrate studies, the quantitative analysis of sugars, the study of antibiotics, the separation of purines and pyrimidines, the separation and estimation of organic acids, the analysis of alkaloidal salts, the analysis of cardiac glycosides and anthraquinone glycosides, in inorganic chemistry, etc. *Both the seminar paper and the review article by Partridge (the latter appeared just before going to press) have extensive bibliographies.*

## PLANT GROWTH HORMONES AND COMPOUNDS OF SIMILAR ACTION

by Victor Hitti

«As in the animal kingdom, growth, movement, and maturation of plants are regulated by chemical substances (hormones) produced by the organism itself .... In plants the terminal bud produces a substance which regulates growth of axillary buds» — Zimmerman, in *Growth of Plants* by Crocker.

«The type example of plant growth substance is the compound Indoleacetic acid (IAA) which is known to occur widely in the tissues of higher plants and which is physiologically active in the promotion of cell elongation, the induction of new roots, and in the introduction of at least nineteen other morphological or histological changes .... In the intact plant synthesis of indoleacetic acid takes place ... in ... the apical bud and young leaves ... in relatively large amounts and the material is exported to other lower regions of the plant .... There are, in addition to indoleacetic acid, substances with structures more or less resembling that of indoleacetic acid which possess

qualitatively similar physiological activity. Thus the application to a plant or plant tissue of a-naphthaleneacetic acid (NAA) induces cell elongation or the formation of new roots very much as does the application of indoleacetic acid itself. Many synthetic compounds are now known which can simulate the effects of indoleacetic acid ... » — Bonner, in *Plant Biochemistry.*

Auxins «a» and «b» are other naturally occurring plant hormones besides indoleacetic acid. These naturally occurring plant hormones are responsible for the familiar bending of plants toward a source of light. Light causes the hormone to migrate to a point opposite the source of light thus stimulating increased growth on that side with resultant bending of the organ coward the source of light.

Excised sections of the Avena coleoptile are extremely sensitive to minute quantites of these hormones indicating their presence by elongating when placed in a solution containing as little as 0.01 mg. per liter. Urine is a rich source of indoleacetic acid. Other biological tests for the qualitative and quantitative estimation of these growth promoting substances are the Avena curvature test, the split-pea and tomato petiole bending tests.

According to Bonner, the active synthetic plant growth substances fall into four groups :

«1. indole derivatives other than indoleacetic acid itself;

2. naphthalene derivatives such as naphthalene acetic acid;

3. phenoxyacetic acid derivatives, including 2, 4-dichloro-phenoxyacetic acid;

4. the substituted benzoic acids;

5. other compounds such as phenylacetic acid.»

The activity of these compounds varies e.g., naphthaleneacetic acid and indolebutyric acid are, in general, more effective than indoleacetic acid itself in inducing the formation of roots on cuttings. 2, 4-Dichlorophenoxyacetic acid (2, 4-D) is very effective in inhibiting apple drop of some apple varieties by inhibiting the formation of the abscission layer, while naphthaleneacetic acid may be satisfactory to other varieties.

Among the applications of the plant growth hormones, the following may be mentioned :

1. Stimulation of root formation on cuttings. Many commercial preparations are available as water solutions or as talc dusts. These products usually contain a single hormone chemical or a mixture. Among the most commonly used compounds may be mentioned: indoleacetic acid (hetero-auxin), indolebutyric acid, indolepropionic acid, naphthaleneacetic acid, naphtalene acetamide and naphthalenebutyric acid.

2. Improving of fruit set and production of seedless fruits. Among the most effective available compounds may be mentioned : indolebutyric acid, beta-naphthoxyacetic acid, 2:4-dichlorophenoxyacetic acid, beta-naphthoxypropionic acid, etc. Lanolin pastes, water solutions, emulsions and aerosols are forms of application of these compounds. For more details on 1 & 2 see Ellis & Swaney, *Soilless Growth of Plants,* 2nd. ed.

3. According to Zimmerman, another use for these compounds is the prevention of preharvest drop of fruits. As already mentioned, a-naphtha-

leneacetic acid is the most effective substance for preventing preharvest apple drop. «The Mc Intosh variety is very resistant (to the action of the hormone) ... the Williams variety is perhaps among the most sensitive, the treatment preventing practically all the apples from dropping. Variations are also reported for a given variety in different locations over the country».

4. A further use in the inhibition of growth. «The same chemicals which stimulate root growth may be used also to inhibit growth» Zimmerman. Dusting potatoes with a talcum powder preparation of the methyl ester of a-naphthaleneacetic acid prevents their sprouting during storage. a-Naphthalene acetic acid, in the form of a spray, can cause bud inhibition to delay flowering of fruit trees until danger of frost is past.

5. Frear, in Chemistry of *Insecticides, Fungicides and Herbicides,* points out the effective and selective use of 2, 4-dichlorophenoxy-acetic acid as a herbicide for the eradication of broad-leaved weeds. This compound is now available commercially for such use.

The effects of colchicine and of vitamin B1 on plants were also described. Colchicine induces polyploidy in different plants, induces thickening of roots and coleoptiles in some plants, causes deformation of leaves and stems and increased fruit size in others. Its application to apical meristems doubled the rate of apical growth in the oak, chestnut and the hazelnut. Vitamin B1 is essential for root growth. It is produced by the plant, but different plants have different requirements. Artificial addition of vitamin B1 to many seedlings will make them grow much taller than controls.

## POLYETHYLENE GLYCOLS AND CARBOWAXES

### by Samih Afifi

A condensed review of this subject, appeared on page 43 of last year's Apothecary and on page 34 of The Anothecary 1950. Afifi's seminar is a detailed discussion of the nature, preparation, structure, physical and chemical properties, absorption and excretion, toxicity and physiological action, assay and applications of the important liquid and solid polyethylene glycols — the latter being called carbowaxes.

It is interesting to note that polyethylene glycol 400, polyethylene glycol 400 monostearate, polyethylene glycol 4000 and polysorbate 80 are official in the U.S.P. XIV.

Polyethylene Glycol Ointment U.S.P. XIV, consists of equal parts of polyethylene glycol 4000 and polyethylene glycol 400. «Heat the polyethylene glycol 4000 and the polyethylene glycol 400 on a water bath to 65°. Remove from the water bath and stir until congealed. If a softer preparation is desired, not more than 100 Gm. of polyethylene glycol 4000 may be replaced by an equal amount of polyethylene glycol 400»—U.S.P. XIV. Afifi describes it as «a homogeneous, white semisolid, similar to petrolatum in consistency and liquefies at 52°. It is completely water-soluble and non-staining. It remains relatively unchanged upon storage at room temperature for indefinite periods. It has been demonstrated that lower concentrations of antiseptic agents in this type of base are as effective as much higher concentrations of the same agent in oleaginous bases. It is miscible with water. However, the high solubility of the base in water, precludes the addition of aqueous solutions in excess of 3 per cent. of the total formula. Addition

of 5 per cent. cetyl or stearyl alcohol inhibits the solubilizing effect of water, alcohol or the salicylates.

Polyethylene glycol 400 and polyethylene glycol 400 monostearate are ingredients of Calamine Lotion U.S.P. XIV which now has the following composition:

| | |
|---|---|
| Calamine | 80 Gm. |
| Zinc Oxide | 80 Gm. |
| Polyethylene Glycol 400 | 80 cc. |
| Polyethylene Glycol 400 monostearate | 20 Gm. |
| Water | 900 cc. |

«Heat the polyethylene glycol 400 monostearate to 70° on a water bath. Add the water, previously heated to boiling, to the monostearate. Stir with an electric mixer, or other suitable device, until the temperature drops to 40°. Mix th zinc oxide and the calamine in a mortar and make a paste with the polyethylene glycol 400. Gradually add the cooled monostearate emulsion, and continue trituration until a uniform suspension is formed» — U.S.P. XIV. This formula will give a viscous lotion that leaves no supernatant liquid even after standing for two weeks.

In the February 1952 issue of the practical edition of the J. Amer Pharm. Assoc., Ward and Sperandio propose the following formula for a Powdered Ointment Base which, when mixed with water in the proportion of 6 parts of the Powder to 4 parts of water, will give an ointment base of good consistency which may be varied by altering the proportion of powder and water. The resulting ointment base is washable with water.

| | |
|---|---|
| Polyethylene Glycol 4000 (Carbowax 4000) | 236.00 Gm. |
| Sodium Stearate | 236.00 Gm. |
| Stearic Acid | 468.30 Gm. |
| Cholesterol | 11.80 Gm. |
| Sodium lauryl sulfate | 47.20 Gm. |
| Methyl Paraben (Methyl-p-hydroxy-benzoate) | 0.45 Gm. |
| Propyl Paraben (Propyl-p-hydroxy-benzoate) | 0.25 Gm. |

The mixed powders must be passed through a very fine sieve to give a smooth ointment.

A mixture of one part carbowax 1500 and two parts carbowax 4000 gives a suitable suppository base which can be easily molded or compressed. The resulting suppository does not melt at body temperature but dissolves in the body cavity to liberate the medicaion.

# ADIB DAOUD NAHOUL 1886 - 1951

**B. A. 1908, Pharm. M. 1915**

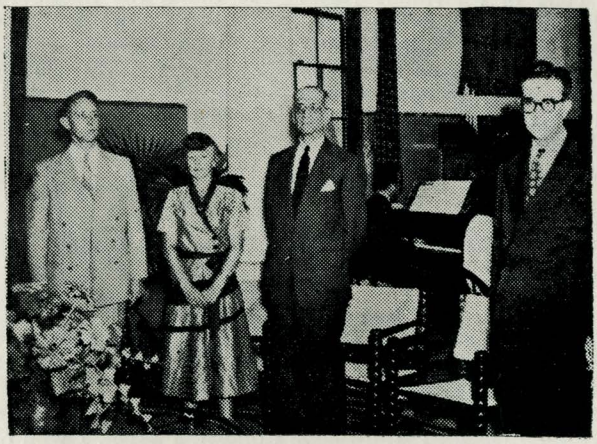
The passing away of the late Adib Daoud Nahoul in Beirut on Oct. 4, 1951 was a real loss to pharmacy in Lebanon. He passed away at a time when he was most needed to help implement the new pharmacy law which was ratified only few months earlier. He had given heart and soul to bring about the enactment of that law and had worked tirelessly with his colleagues to write it up and see to it that it be finally brought before the legislature.

Mr. Nahoul was very active in pharmaceutical circles and ever since 1933 he had been reelected yearly as president of the Syndicate of Beirut Pharmacists and later on was unanimously elected president of the Syndicate of Lebanon Pharmacists when that body was granted an official charter by parliament in 1950.

He was tireless, fearless, and ardent fighter for the cause of Lebanese Pharmacy. He was a beloved leader who knew how to rally around him people devoted to the profession and like him inflamed with an ideal not only to restore protect the rights of pharmacists but also to elevate the status of the profession and increase its usefulness to the public whom it serves.

May his selfless devotion and loyalty continue to inspire his colleagues to emulate him in his love for his profession, ior science and art, and for his fellowmen.

(For a short biography of his life see The Apothecary 1949, p. 21).



In this photograph, taken in West Hall on June 14, 1949, on the occasion of the reception held in honor of Dr. R. J. Pauly in West Hall, the late Mr. Adib Nahoul stands to the left of Mrs. R. J. Pauly. Pauly. President S. B. L. Penrose is to the right. of Mrs. Pauly. Prof A. Haddad is seen on the other side.

# THE PHARMACEUTICAL SOCIETY

The cabinet has, from the beginning of the year, tried its best to keep up the interest of its members in their Society, and encourage them to take a greater part in its activities.

The following officers were elected on November 6, to serve on the cabinet for the year 1951-52: Messrs. Elie Nuwaysir, President; Jubran Atallah, First Vice-President; Anis Muashshir, Second Vice-President; Nicolas Trochalakis, Secretary; Charles Nassar, Treasurer.

Later in the year, Mr. Trochalakis resigned his post, and Mr. Sami Halabi was elected by the House to replace him.

An outstanding event this year was the publication of **Pharmacy News:** the fortnightly organ of the Society. Last year, **Pharmacy News** was posted on the various bulletin boards of the Society. This year, however, the cabinet took up the possibility of its circulation among its members. As a result, every single member of the student body and the faculty of the School of Pharmacy received his first copy of Pharmacy News on Tuesday December 18, 1951. Said President Nuwaysir in his Editorial: «Its (Pharmacy News) success or failure is up to the members of the Society. It has already lived through its most difficult stages and will survive the later ones only by your constant help and cooperation.» The following served on the Board of Pharmacy News: Elie Nuwaysir, Editorial Editor; Samih Afifi, Managing Editor; Ibrahim Durr, Science Editor; George Slim, Make-up Editor; Edward Bordcosh, Humour and Business Manager.

The Society had the pleasure to receive and entertain, for the first time, a group of faculty and students from the Royal College of Pharmacy and Chemistry, Baghdad, Iraq. Dr. Yahya Safi '38— Director of the College, Dr. Fuad Stephan '32, Mr. Abdulla Kassab-bashi '39 and Dr. Bowman accompanied the students.

An important change was made in the Constitution. Election of officers now takes place in May rather than in October. This gives the incoming cabinet the opportunity of planning early for the activities of the year.

The Cabinet wishes to thank Professor Amin Haddad — their Adviser-for his constant guidance. It also wishes to thank the members of the Social Activities Committee whose voluntary help and suggestions contributed to the success of the various activities. The Cabinet also extends its thanks to the members of the Faculty and Student body for their cooperation and constructive criticism.

The following is a list of activities sponsored by the Society. A pictorial record appears on the following pages.

1. Nov. 6, 1951 — Election Meeting, 208 Pharmacy Bldg.
2. Nov. 19, 1951 — Opening Reception, W.H.C.R.
3. Nov. 22, 1951 — Trip to Tripoli, the Refinery, Zogharta and Byblos.
4. Dec. 1, 1951 — Dancing Party, B.C.H.
5. Dec. 12, 1951 — Lecture by Mr. Vorperian, «Students in the U.S.A.».
6. Dec. 21, 1951 — General Knowledge Contest, Pharm. I won over Pharm. II.
7. Jan. 18, 1952 — General Knowledge Contest, Pharm. IV won over Pharm. III.
8. Jan. 19, 1952 — Dancing Party with the B.C.W., Medical Lounge.
9. Feb. 20, 1952 — Lecture Demonstration by Dr. Munir Kanaan, «Poisoning by Barbiturates».
10. Feb. 28, 1952 — Final General Knowledge Contest, Pharm. IV won over Pharm. I, and declared Champions.
11. Mar. 4, 1952 — General Knowledge Contest, Pharmacy won over Medicine, 102 MSB.
12. Mar. 17, 1952 — General Business Meeting, 102 MSB.
13. Mar. 18, 1952 — General Knowledge Contest, School of Arts and Sciences

won over Pharmacy.

14. Mar. 22, 1952 — Dancing Party with the B.C.W., Eagles Club.
15. Mar. 24, 1952 — General Knowledge Contest, Pharmacy won over the Beirut College for Women.

16. Apr. 2, 1952 — Reception in honor of Iraqi Pharmacy Students and Staff, W.H.C.R.

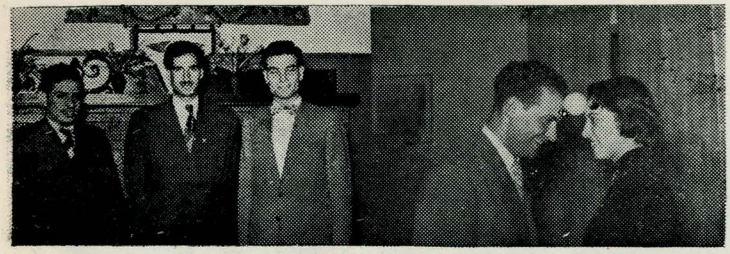
17. Apr. 25, 1952 — Interclass Debate, Pharm. II won over Pharm. I, «Resolved that Every Man and Woman should be Married».

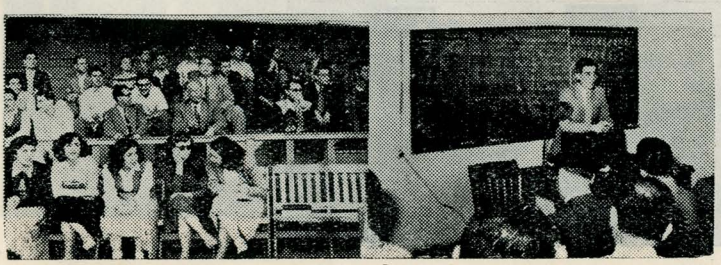
18. Apr. 30, 1952 — Lecture by Dr. Mirhij, «Eugenics and Marriage».
19. May. 2, 1952 — Interclass Debate, Pharm. III won over Pharm. IV, «Resolved that 20th Century Science has contributed to Man's Happiness».

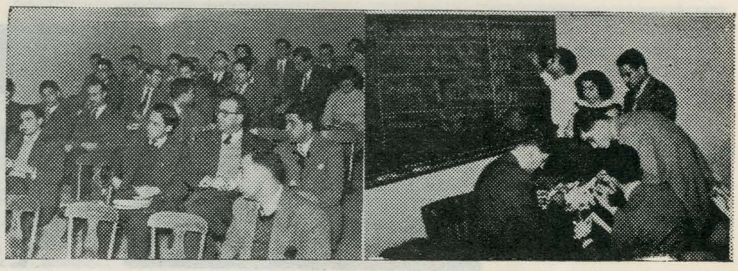
20 May. 6, 1952 — Trip to Baalbeck, Zahleh and Shtourah.
21. May. 16, 1952 — Final Interclass Debate, Pharm. II won over Pharm. III and declared Champions for the year 1951-52. «Resolved that Industrialization is Better than Agriculture for the Progress of the Arab World».

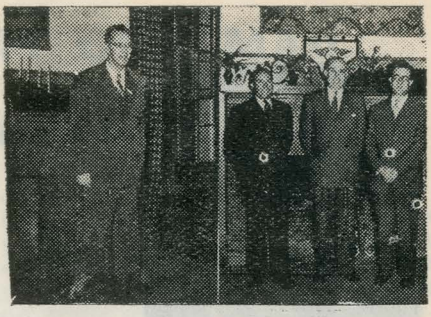
22. May. 17, 1952 — Inauguration Ball at the New Alumni Club.
23. May. 30, 1952 — Farewell Reception, W.H.C.R.
24. May. 31, 1952 — Election of officers for the year 1952-53.

Our Football Team









# ATHLETIC ACTIVITIES

by **LEVON M. KARAMANUKIAN Ph. C.**

**Staff Athletic Representative on the Intra Mural Athletic Committee.**

We were fortunate this year to have as our athletic representative on the Intra Mural Athletic Committee, an energetic person, Mr. Nadim Masri, Pharmacy I. He was able, after great effort, to form teams in basket ball, volley ball, and football. At the start, nobody could believe that our teams would be able to stand against other teams on the campus, as most of the members were out of practice for a long time, some for five or eight years. Even, there were some on the teams who had not played at all before.

After a few challenge matches in football, our school team participated in the Minor League tournaments in football, volleyball and basketball. From the start, the football team showed promise, and remained in the Minor League championships for the finals with the Freshmen Outsiders. The game with the latter, was played on the green field ending with a tie of 1:1. By mutual agreement, the match was extended twenty more minutes, but again, neither side could raise his score. Few days later, a second match was played. This time our team lost with a score of 2:0. Our team should be congratulated, as our opponents had at least three Varsity players on their team.

Our football team consisted of Messrs. Amin Ismail (Captain), Anwar Husayni, William Habashi (reserve), Samih Darwazah (reserve), Fadl Abdallah, Naim Farraj, Hamid Jabr, Agop Marcarian (reserve), Varoujan Etyemezian, Samir Jurjus, Adib Kuttah, Nadim Masri, Hussayn Tazziz, Simon Simonian.

We were also fortunate this year to have among us the former Aleppo Homenetmen Basketball coach, who was kind to give us of his time and to advise us in our training.

This year's experience has taught us that we have in our school the necessary athletes for the formation of good teams. However, we wish to have a better support by the student body—to go to the field and cheer their teams. We have great hopes in the coming year and wish the different teams a better luck.

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*Our football team played against the students of pharmacy of the Faculté on May 18 and lost 2:0.*

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**ARSENIC is the name of a new monthly publication put out in French by the students and graduates of the School of Pharmacy of the Faculté Française de Médecine et de Pharmacie of Beirut. It is intended for general reading not only by the students of pharmacy but also by the student body of other French speaking university students and by the pharmacists of the country.**

# EXCERPTS FROM OUR MAIL

## ORAL PENICILLIN

**Mr. Zuhayr Annab Ph.C. '48, in charge of Altounian Hospital Laboratory, Aleppo,**

Since Penicillin is one of the drugs most widely used, a method to administer it orally is met with appreciation by doctor and patient alike.

Few weeks ago Dr. E.H.R. Altounian F.R.C.S., received samples of oral penicillin from a certain firm. He tried them on patients to find out if the drug reached the blood in appreciable amounts. The penicillin was in a liquid andhydrous base. Each fluid drachm contained 50.000 units of potassium penicillin G. The manufacturers claimed that the penicillin will not be released until it reaches the alkaline digestive juices in the small intestine. 400,000 units of this drug were given to a patient in one dose. Two hours later a sample of blood was drawn for analysis. The serum of the patient exerted no inhibition on the growth of Staphylococcus **pyogenes** «Oxford».

More recently a new brand of penicillin was presented to the hospital for trial. It was in the form of an oily suspension in enteric coated gelatin capsules each containing 50,000 units of potassium penicillin G. The makers claim that highest levels are reached in the blood 1-2 hours after the administration of the drug. Six such capsules were given on an empty stomach. One and a half hours later the serum obtained from the patient exerted definite inhibition on the growth of Staphylococcus pyogenes «Oxford» up to a dilution of 1:4. As a control on the method, 200,000 units of intramuscular potassium penicillin G were given. Two hours later the serum obtained from the patient exerted an inhibition on the growth of the same microorganism up to a dilution of 1:8.

From the above data it is concluded that the penicillin administered in enteric coated gelatin capsules is satisfactory and is to be prefered to the liquid oral form.

I owe many thanks to Dr. Altounian for his valuable advice and help.»

## COLLEAGUES

**Mr. Daud Shakhashir Ph. C. '45 of Nablus wishes to convey the following message to his «Colleagues Everywhere»:**

«Greetings and sincerest good wishes. I am very much concerned about the status of the profession particularly in the Hashemite Kingdom. The financial situation has been greatly deteriorating lately due to various causes. Among these are the acute competition of pharmacists with each other, the great increase in the importation of numerous proprietary prepartions, the presence of very many loosely organized pharmaceutical associations and the lack of cooperation among the pharmacists themselves. I believe the establishment of a Pharmacists' Syndicate to which all pharmacists will belong will help bring about cooperation among them and help raise their professional status with consequent better service to the community.

I, therefore, call upon all colleagues, young and old, to remember and to kindle anew the spirit of cooperation and brotherhood which we experienced so well at our alma mater, the A.U.B., and to pledge themselves with me to take all measures possible to keep our sacred profession highly respected and supreme.»

**Miss Maria Widacka Ph. C. '50, writes from England:**

«Since October 29th I have been working as a dispenser in one of the

branches of Timothy, Whites and Taylors, Ltd... The prescriptions we receive here are all written in Latin, the ingredients and the directions as well. Ninety per cent of the dispensed drugs are the preparations included in the National Formulary (A small book, 128 pages, published by the British Medical Association, and the Pharmaceutical Society)... We dispense gallons of the N.F. mixtures and tinctures each day. The prescriptions are of the National Health Service, mostly, very few are from private doctors.... The pharmacies or, as they are called here, the chemists' shops, differ from those in Lebanon. The shop sells cosmetics, soaps, laundry powders, coffee, cameras, films, sunglasses, Christmas cards, manicure sets etc...»

**And in another letter** «...For the past few weeks I was working harder than ever. Two of our staff got sick and the manager—a qualified chemist—had to go behind the counter (that means he had to sell in the shop) and all the dispensing was left on my hands. I've managed it all right but this was very tiresome indeed. We dispense a lot. This may change because the government wants to introduce some changes in the National Health Service and wants the N.H.S. prescriptions to be charged (they are free of charge now)—this of course would bring down the number of prescriptions dispensed..... The revision classes keep me very busy too. I must solve problems, write exercises and prepare each week's assignments. We are following the chapters in «Dispensing for Pharmaceutical Students» by Cooper and Gunn. This is the new (1950) edition of the previous Cooper and Dyer, the one we used at the A.U.B..... I tried to listen to Beirut broadcasts but in vain—I know the wave-length of Beirut's station, but it is impossible to get it. I listen to the Arabic music from Tunis, and the news in Arabic from Rome—of course I don't understand anything from the news but it gives me a pleasure to hear the Arabic language. I forget then that I am miles away from Lebanon, I close my eyes and I see Beirut so very, very clearly..... I am enclosing a 10 shilling note as my contribution to the (Apothecary)..... I wonder if the Library is finished by now? How beautiful must our campus be now with all the spring flowers in bloom... To be there now... I can only dream of it—but sometimes dreams come true. And I may visit Lebanon some day.» **Miss Widacka will sit for the licence examination in June.**

**Hamdi Dürüst Ph. C. '51, writes from Istanbul:**

«...I have been asked by President Black of Robert College to take care of the Chemistry Lab. until I am drafted in the Army. I have already signed a contract, effective Sept. 1st. It gives me great pleasure to return to the comely atmosphere of this institution, where I believe I have been trained to be ready to take up the study of a profession. After a lapse of four years I return to Robert College as a staffite, but still better as a fresh, young pharmacist.— You cannot imagine how happy I am for being a Pharmaceutical Chemist; for Turkey is one of those few countries that respect the members of my profession, and gives them a high status in society. In Turkey, a pharmacist is known in his community, respected by the people, trusted by the authorities and—yes, feared (by small children). Like the gown of the lawyer or the judge, the white apron of a pharmacist is a uniform that commands confidence, respect...»

**In another letter,** ....«Now I teach exact science to Juniors and qualitative chemistry to Freshmen Engineers, and admit that preparing 75 unknowns a week, is no fun! I also assist in Senior Organic Lab..... I am the co-adviser of the Robert College Yearbook, THE RECORD, which is approximately a 15,000 Lira-a-year affair! This definitely takes up most of my extra-curricular time... Then come all sorts of committees and sub-committees... As an alumnus on the Staff, and one who happens to know more about Near East Colleges than any other Robert College graduate living on the campus, I was literally pushed into the «Faculty-Alumni Relations Committee», as a co-adviser of the Record, I am an ex-officio member of the Student Activities Committee, Publications Sub-Committee..and so on, ad nauseam!... And another bit of bad news: I am putting on weight at a tremendous rate! Comparing myself in the mirror with my commencement pict-

ures at AUB, I cannot believe my eyes—12 Kilos! So, I guess I have made up all that I lost in the anxiety of finals, comprehensives, Outlook, Society affairs, the Apothecary, etc. Robert College food had always been admirable in its quantity, and quality, more so in the staff dining hall. No doubt I am taking full advantage of the situation... My heart was with you all as I lived through the day of October 16, thinking of the Convocation, of another academic year at my Alma Mater—the University.»

**Later, in February Mr. Dürüst wrote about the colloqium:**

«Before being presented to the Jury, I was introduced to the inspector general of pharmacies, also an examiner on the jury, who wished to go through my credentials in advance. He was very satisfied with the curriculum and grades as recorded in my transcript of record from AUB, and expressed satisfaction at my four summers of practice, plus eight months in the AUB Pharmacy, plus this summer... When I was admitted, I was asked the number of years I had spent in Beirut, the subject of my seminar, which foreign languages I could speak, whether I could read prescriptions written here, whether I knew Turkish Laws, what I have studied in Ethics and Jurisprudence. Then, turning to the inspector and the Jury, the chairman asked whether anybody wished to ask me any professional or academic questions. The inspector's reply: «I am much too satisfied with their curriculum, I had previously heard of the institution, I have no questions». So I was congratulated by the jury, and without any questions on the text of our art and science of healing, I was accepted... The armed forces will call me up in autumn. I will join the Reserve Officers Training School at Ankara (medical section), and after four months of training will be an officer (Lt.) ready to serve in a hospital for six or eight months. When this comes up, I will dissolve my contract with the College.» **In his last letter, Mr. Dürüst announces his marriage to Miss Sahavet Sadikoglu on April 11, 1952.**

**Mr. John Shakarjian '51 writes from Aleppo:**

«For the time being I am the technical director of C. Catafago's Droguerie in Aleppo.. I am sure you will be astonished when I tell you that I do almost nothing these days but read Botany, get plants and study them.» **Mr. Shakarjian and Miss Gladys Simon were married in Baghdad on Dec. 24, 1951.**

**Mr. Manouk Kemelian '51 writes from Aleppo:**

«I am teaching this year chemistry, zoology and botany (at Aleppo College), and I think from my limited experience that if someone wishes to know a subject thoroughly he must teach that subject.» **Mr. Kemelian is also the manager of Adrouny's Pharmacy in Aleppo.**

**Mr. Hanna Araj. '48 writes**

«I am glad the Apothecary is still going strong, and sincerely hope it will continue to do so; especially that it is one of the best sources of information for us alumni on other colleagues and on recent progress in the pharmaceutical field.» **Mr. Araj is now engaged and plans to get married in the near future. He has a dispensary in Beit Jala and is also a co-partner in a pharmacy in Hebron. He keeps thinking of the «triple axis» of «his happiest days of life «Annab-Araj-Kalbian».**

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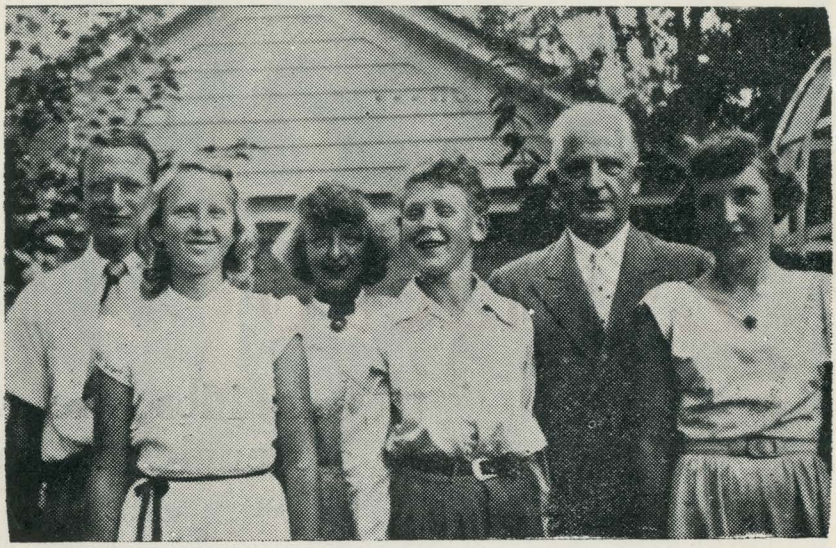


Dr. R. J. Pauly is now Director of the Pharmaceutical Division of the Sterling-Winthrop Research Institute at Rensselaer.

We are very happy to announce the engagement of Dr. Fouad Stephan to Miss Olga Jahil of Deir-el-Kamar, Lebanon. Dr. Stephan, to our great regret, resigned his post at A.U.B. School of Pharmacy last September and is now teaching at the Royal College of Pharmacy in Baghdad. An article, "Volumetric Methods for the Assay of Amidines", abstracted from his thesis, was published in *Analytical Chemistry*, **24**, 180, 1952.

★ ★ ★

Mr. Edward Vorperian Ph. C.' 44, and Miss Azadouhie Erdekian were married on Dec. 23, 1951.

Mr. Uthman Kanafani Ph. C.' 49 and Miss Radiah Mughrabi were married on April 12. 1952.

Mr. Hamdi Dürüst and his bride

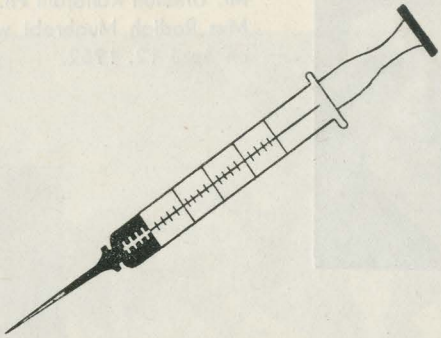
# BOOK REVIEWS 1951 - 52

Members of the Fourth Year Class were assigned the following books to read and then present a 50-minute report on each before the class, during each week of the first semester.

1. Abdulian, D. — Surface Active Agents by Swartz & Perry.
2. Afifi, S. — Fluorescence Analysis in Ultra-Violet Light by Radley.
3. Atallah, G. — How plants get their names by Bailey.
4. Awad, A. — U.S.P. XIV.
5. Awad, M. — Birth of a new drug, J.A.Ph.A., Prac. Ed. Mar. '47.
6. Hawwa, E. — Modern Cosmetics by Thomssen.
7. Hitti, V. — The Basis of Chemotherapy by Work & Work.
8. Ismail, A. — Hair Dyes & Hair Dyeing by Redgrove.
9. Karam, M. — Ion Exchange by Nachod.
10. Kurdi, M. — Drugstore Management by Nolen & Maynard.
11. Kutub, S. — Adhesives by Braude.
12. Mazlum, R. — The New Fibres by Sherman.
13. Nuwaysir, E. — The Chemical Senses by Moncrieff.
14. Tepelian, N. — Pharmacopée Française 1949 (VII ed.).

Attendance at the book reports and at the seminars (given during the second semester) was open to members of the second and third year classes, also.

# BELAMYL



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# ALUMNI NEWS

**The Apothecary takes pleasure in extending the greetings and sincere good wishes of the Director and Faculty of the School to all its graduates where ever they may be.**

**Daniel Abdulian** '52 has been working as assistant technician at the Hospital Clinical Biochemistry Laboratory, A.U.B. during 1951-52 while finishing course and residence requirements. His portrait appears in the Apothecary 1951. He receives the degree of Bachelor of Science in Pharmacy.

**Maurice Karam** '52 and Miss Alice Isa were married on Sunday April 13, 1952.

**Bedros Alahaydoian** '51 is now managing a pharmacy in Tyre.

**Riyad al-Alami** '51 is now studying for his M.S. in Ann Arbor, Michigan.

**Badi Batshon** '51 is working for the National Drug Store, Amman. He lately visited the School.

**Movses Bezirganian** '51 is employed as an analyst with the TAPLINE in Sidon.

**Tahir Faydi** '51 has been sent by his government to take the Medical Technology course at A.U.B. in connection with Point Four.

**Theodorus Hembekides** '51 is working at his father's pharmacy in Beirut.

**Salamah Kayyali** '51 has recently bought the Petra Pharmacy in Amman, Jordan.

**Sarkis Kevorkian** '51 is running his own pharmacy in Aleppo.

**Albert Krikorian** '51 is detailing for Organon in Beirut. He came to the School early this year and paid a two-year subscription to the Apothecary.

**Adel Maksad** '51 is the manager of Lutfi's Pharmacy in Omdurman, Sudan. He is happy in his work and is still enthusiastic about civic welfare and tries to practice it in his new community. He lately sent in L.E. 1.5 to pay for a copy of the Apothecary 1951 and subscription to that of 1952 and 1953.

**Samuel Manushakian** '51 is operating his own pharmacy in Aleppo.

**Milad Milad** '51 is operating a pharmacy in Alexandria.

**Subhi Khuri Nasr** '51 is now working at Munir Sukhtyan's Pharmacy in Tulkarm.

**Nazar Nazarian** '51 expects to return to Beirut in the near future where he plans to open a drugstore. After graduation, he left first to England and then to the States where he has been in charge of his father's office in New York.

**Karekin Sagherian** '51 is working as a control chemist at the Dassam Factory -- «The National Fats and Oil Co.».

**Hagop Yazigian** '51 is co-proprietor of the modern Select Pharmacy at Bab-Edriss, Beirut. He also takes a course in philosophy at A.U.B.

**Abdul Kadir Buhairy** '50 now looks after his orange orchards in Tripoli.

**Anwar Hakim** '50 obtained his pharmacy doctorate from Switzerland.

**Fouad Hakim** '50 is the responsible pharmacist for the Central Medical Store at the I.P.C. Legoult Camp, Tripoli.

**Hagop Ishkhanian** '50 is the manager of the al-Hurieyeh Pharmacy in Aleppo.

**Hagop Mekhtchian** '50 is working at Attallah's Pharmacy in Jerusalem.

**Raouf Salfiti** '50 is a partner and manager of the Jordan Medical Supplies Co. Ltd. in Amman.

## Syndicate of Lebanese Pharmacists

The president and three members of the Cabinet of the Syndicate are A. U. B. graduates: Messrs. Muhyiddin Mahmasani Ph. C. '28; President; Hagob Chaglassian Ph. C. '29; Muhyiddin Raad Ph. C. '34; Adib Kaddurah Ph. C. '38.

Prof. A. F. Haddad is a member of the Disciplinary Committee and lately succeeded Mr. Bahij Baroody Ph.M. '14, as chairman of the Scientific Committee of the Syndicate due to illness of Mr. Baroody.

* * *

## Acknowledgement

The Editorial Board wishes to acknowledge the help of the following in the collection of subscriptions: Messrs. Anwar Husayni, Muhammad Abu-Ghazaleh , Ilyas Sartan and Onnig Keshishian.

* * *

## Class Representatives 1951 -1952

**Pharmacy IV** — Samih Afifi
**Pharmacy III** — Thabit Dajani
**Pharmacy II** — Fadl Abdallah (Abraham E. Abdallah Ramirez)
**Pharmacy I** — Nadim Masri

**Majid Yarid** '50 is now Majid Bey Yarid and is still Inspector of Pharmacy in the Jordan.

**Zaki Abu Ghazalah** '49 is working at the Government Hospital in Jeddah, Saudi-Arabia. He paid a visit to the School on his way to his home in the Jordan.

**Nabih Attiyah** '49 is the pharmacist in charge of the I.P.C. Hospital in Tripoli.

**Adib Bashour** '49 is planning to open a pharmacy in Safita, Syria.

**Adib Jidawn** '49 and Miss Mary Khawwam were married in Cairo last March. Adib is newly established in Damascus where he is responsible for a branch of Charles E. Frosst & Co.

**Abdul-Rahman Kadri** '49 reported to be the only bachelor pharmacist in the city of Nablus, is running a dispensary in Qualquilieh in addition to El-Kadri Pharmacy in Nablus. He is also secretary of the Pharmaceutical Society of Nablus.

**Hani Kawar** '49 is in charge of Amirate Pharmacy in Amman.

**Miss Helena Perucka** '49 and Mr. Fadeusz Rybezynski were married on June 30, 1951, in London, England. She has been working as a dispensing pharmacist with Timothy, Whites & Taylors and recently gave birth to a baby girl.

**George Tarazi** '49 has left Al-Sha'b New Pharmacy in Jerusalem.

**Wasfi Awn** '48 is a partner in the Pharmaceutical & Trading Co. which has branches in Beirut and Tripoli and is the agent of Estro Chemical Co. Inc. Awn is now in Kuwait.

**Najib Jamal** '48 is working with his classmate Wasfi Awn.

**Nizar Jardanah** '48 is manager of the Jordan Drugstore for whole-sale business.

**Haigazoun Kalaidjian** '48 is the responsible pharmacist at Tutunjian Pharmacy in Jerusalem and is the agent of some dental products. He expects to leave to the U.S.A. this coming summer for further study.

**Miss Ludmilla Kregiel** '48 and Mr. Frank J. Stass were married in Baltimore, Maryland, on July 2, 1951.

**Antoine Mas'ad** '48 operates the Government Hospital Pharmacy in Jerusalem. He plans to open a pharmacy in Ramallah in the near future.

**Miss Maria Michajlow** '48 and **Miss Julia Federowicz** '48 will sit for the licensing examination in May, in Montreal, Canada.

**Ahid Naffa** '48 will be leaving to Kuweit, as a government pharmacist. Subhi Khuri Nasr will replace him as responsible pharmacist at the National Pharmacy (owned by Naffa), Jenin, Jordan.

**Muhammad Rifi** '48 is owner of Rifi Pharmacy in Tripoli. He hopes to get married in 1953. He now owns a car and is happy in spite of competition, dead stock and endless accounting.

**Samih Adham** '47 is operating his own pharmacy in Zarka, Jordan. He paid a visit to the School.

**Ramiz Afifi** '47 is working for Bayer, in Beirut.

**Mamduh Abu-Hijlah** '47 operates his own pharmacy in Nablus.

**Elias Shammas** '47 is in charge of the Hospital Clinical Biochemistry Laboratory at A.U.B.

**Garabed Demerjian** '46 operates his own pharmacy in Aleppo.

**Fathi Jardani** '46 is the responsible pharmacist at the el-Chifa Pharmacy in Nablus.

**George Brusalian** '45 is at Columbia University.

**Hagop Der-Ghazarian** Ph. C. '45 is assisting part time at the University Pharmacy. The rest of the time he spends in assisting his father run their pharmacy in Beirut. He and Mrs. Der-Ghazarian are the proud parents of a baby boy Nichan.

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1. Slinger, W. N., and Hubbard, D. M. (1951), Arch. Dermat. & Syph., 64:41, July.
2. Slepyan, A. H. (1951), Communication to Abbott Laboratories.
3. Ruch, D. M. (1951), Communication to Abbott Laboratories.

**Daud R. Shakhashir** '45 is the owner of Najah Pharmacy in Nablus; a dispensary in Qualquilieh; and is the Secretary of the Pharmaceutical Society at Nablus.

**Radi Shakhashir** '45, in addition to operating his Raghadan Pharmacy in Amman, takes active part in working for a pharmaceutical association of the Jordan.

**Adli Suleiman** '45 is now at the London Pharmacy in Khartoum, Sudan.

**Ibrahim Tarazi** '45 is manager of Daudi's Pharmacy in Jericho. He is married and has two sons Charley and Ramzi. He recently paid a visit to the School.

**Naim Abdo** '44 is manager of Droguerie Ara & Co. in Aleppo.

**Mamduh Abu-Laban** '44 is running his own pharmacy in Idlib.

**Bisharah Azzam** '44 is the scientific representative of Parke Davis & Co. in Aleppo.

**Shafiq Habashi** '44 is owner of Ahlieh Pharmacy in Om Durman. He has a daughter Camelia.

**Alexander Hananiyya** '44 is operating his pharmacy in Jerusalem and also teaches at the F.B.S. Ramallah.

**Nazim Sukhn** '44 and **Abdul-Ghani Anabtawi** '49 are partners in the el-Razi Pharmacy in Nablus and are share-holders in the National Drugstore at Amman. Both are recently married. Sukhn recently came to the School.

**Jabour Habayib** '43 is public analyst in Amman working with the government.

**Nur-ud-Din Isa** '43 is the scientific representative of Ciba in Aleppo.

**Ahmad Kamilah** '43 runs his own pharmacy in Jerusalem.

**Isa Salah** '43 runs his own pharmacy in Ramallah.

**Yusuf Sukhtyian** '43 operates his own pharmacy in Jenin. He has a son Samir.

**Anis Haddad** '40 is bacteriologist of the I.P.C. Hospital in Tripoli and is married.

**August Khuri** '40 is working for Sharpe and Dohme with the Eastern Distributors & Forwarders Corporation in Beirut.

**Hovig Eteymezian** '39 has sold his pharmacy and plans to leave for the U.S.A.

**Zaven Hadidian** '38 will settle in Albany N.Y., U.S.A. He has sold his pharmacy in Beirut and expects to leave for the States around the end of June with his wife, son and daughter.

**Fahmi Nahhas** '38 is agent for Bayer products in the Jordan. He is established in Amman.

**Hrant Seraydarian** '38 is owner of a manufacturing laboratory in Aleppo.

**Shawkat Yanni** '38 is running his «New Jordan Pharmacy» in Amman

**Jacob Tlil** '37 is in Amman working with A. Halaby Bros.

**Krikor Juljulian** '36 runs his own pharmacy in Aleppo. For a number of years he has been volunteering to distribute the Apothecary to the Alumni in Aleppo.

**Hasan Kawwaf** '36 is running his own pharmacy in Lattaquieh.

**Vartkess Simonian** '36 is chairman of the pharmacognosy department at Duquesne University, School of Pharmacy, Pittsburgh Pa. U.S.A. Dr. Simonian also offers graduate courses in the field of Biological Sciences (Pharmacy) and Pharmacy graduate work leading to M.Sc. degree.

**Munir Sukhtyan** '34 is owner of a pharmacy in Tulkarm and now directs a large drugstore in Amman with branches in Amman and Nablus.

**Elias Atallah** '33 is working with Kettaneh in Jerusalem.

**Manuel Kizirian** '29 is the pharmacist of the Syrian State Railways in Aleppo.

**Yervant Nazarian** ,21 runs his own pharmacy in Lattaquieh

**Yakub Nazarian** '11 runs his own pharmacy in Aleppo

**Salim Hilal** '10 is a director of a pharmacy in Aleppo.

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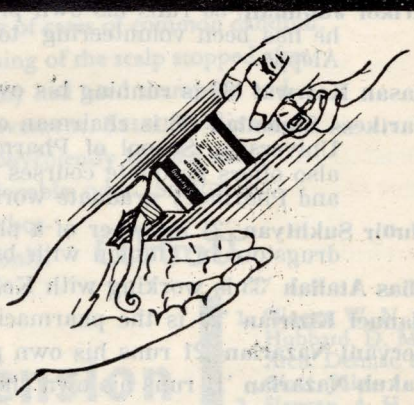

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# FACULTY & STAFF TEACHING PHARMACY STUDENTS 1951—52

## From the School of Pharmacy

| No | Name | Courses taught by him | Class |
|---|---|---|---|
| 1. | **Amin Farid Haddad,** Ph. C., M.S. Director | Jurisprudence & Ethics | Pharm. IV |
| | | Pharmacy IV | Pharm. IV |
| | | Seminar | Pharm. IV |
| | | Pharmacy II | Pharm. II |
| | | Pharmacy I | Pharm. I |
| 2. | **Charles Abou Chaar,** Ph. C., M.S. (Abu-Shar) | Drug Chemistry | Pharm. IV |
| | | History of Pharmacy | Pharm. IV |
| | | Seminar | Pharm. IV |
| | | Pharmacognosy | Pharm. III |
| | | Pharmaceutical Botany | Pharm. II |
| 3. | **Edward Vorperian,** B. A., Ph. C. | Inorganic Pharmaceutical Chemistry | Pharm. III |
| | | Organic Phamaceutical Chemistry | Pharm. III |
| | | Theory of Solutions | Pharm. II & I |
| 4. | **Levon Karamanukian,** B.A., Ph. C. | Drug Chemistry Lab. | Pharm. IV |
| | | Pharmacy III | Pharm. III |
| | | Qualitative Chemistry | Pharm. II & I |
| | | Quantitative Chemistry | Pharm. II & I |
| 5. | **Uthman Kanafani,** Ph. C. | Pharmacy III Lab. | Pharm. III |
| | | Pharmacy II Lab. | Pharm. II |
| | | Pharmacy I Lab. | Pharm. I |

## From the School of Medicine

| No | Name | Courses taught by him | Class |
|---|---|---|---|
| 6. | **Stanley E. Kerr,** Ph. D. | Biological Chemistry | Pharm. IV |
| 7. | **Zeken Shakhashiri,** M. S., M. D. | Public Health | Pharm. IV |
| 8. | **Munir As'ad Kan'an,** M. D. | Pharmacology | Pharm. IV |
| 9. | **Joseph Dabbas,** M. D. | Physiology | Pharm. III |
| 10. | **Hanna B. Doany,** Ph. C. | Biological Chemistry Lab. | Pharm. IV |
| | | Microbiolgy | Pharm. III |
| 11. | **George Abu-Haydar,** B. A., M. A. | Biological Chemistry Lab. | Pharm. IV |
| | | Microbiology | Pharm. III |

cont. next page

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## From the School of Arts and Sciences

| No | Name | Courses taught by him | Class |
|---|---|---|---|
| 12. | **Nicholas D. Constan,** Ph. M., D. Sc. | Organic Chemistry | Pharm. II |
| 13. | **John I. Mirhij,** Ph. D. | Biology | Pharm. I |
| 14. | **Levon H. Melikian,** M. A. | Psychology | Pharm. |
| 15. | **Kenneth Christiansen,** B. A., Ph. D. | Biology | Pharm. I |
| 16. | **Miles Prescott,** B. A., M. A. | Saciology | Pharm. I |
| 17. | **Mufid Abu Khadra,** B. B. A. | Business Methods | Pharm. IV |
| 18. | **Sadik M. Umar,** B. A. | Organic Chemistry Lab. | Phorm. II |
| 19. | **John H. Rosengren,** B. A. | Biology Lab. | Pharm. I |

Members of the Staff teaching Physics and General Chemistry are not included here, since these two courses are given in the Freshman class of the School of Arts and Sciences before the student is admitted to the School of Pharmacy.

Dr. Bahij Azouri, M. D., gave a few lectures in First Aid to Pharmacy IV.

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Mr. Haigaz B. Artinian, University Photographer has taken the photographs on pages 56, 57.

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### INTERCLASS DEBATE CHAMPIONS

Pharmacy II

S. Abu-Khadra  I. Durr  G. Slim

---

### INTERCLASS GENERAL KNOWLEDGE CHAMPIONS

Pharmacy IV

S. Afifi  J. Atallah  E. Nuwaysir

---

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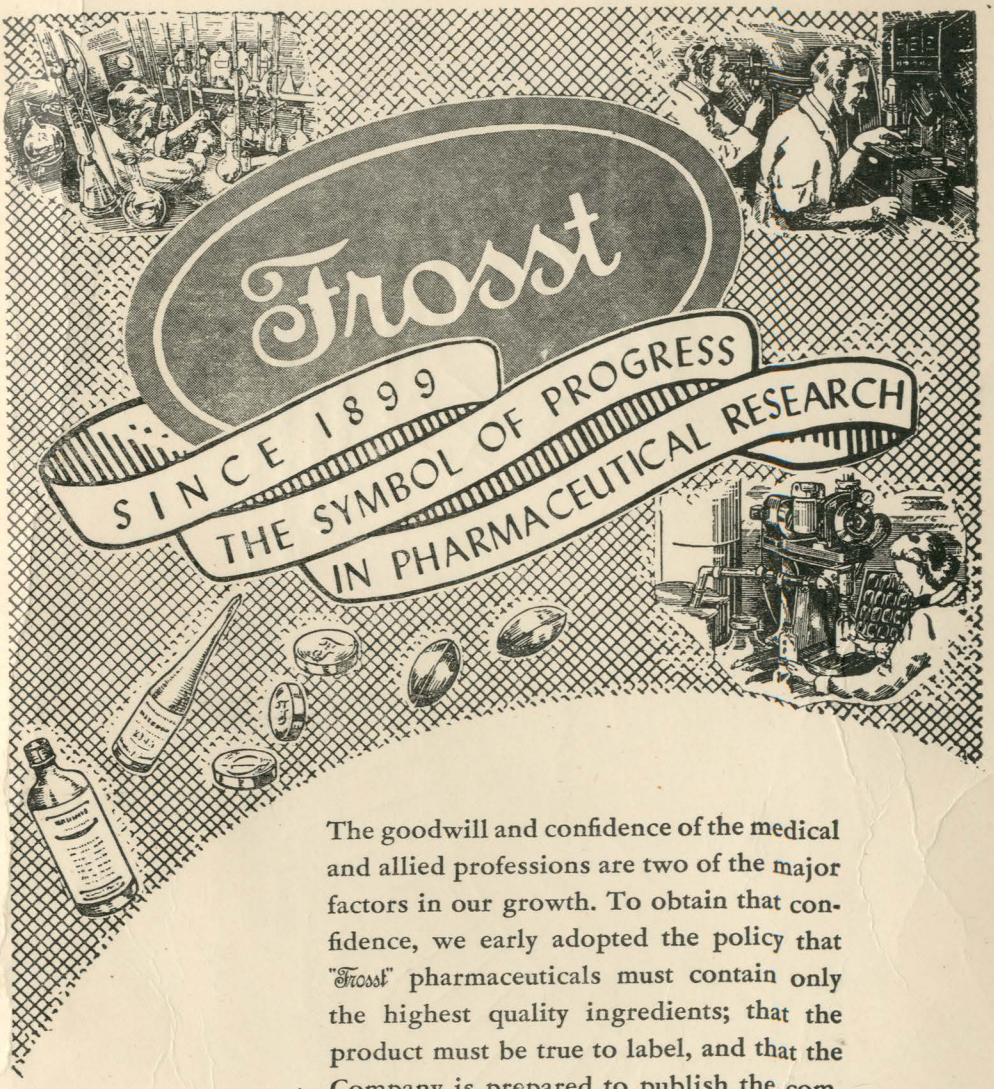


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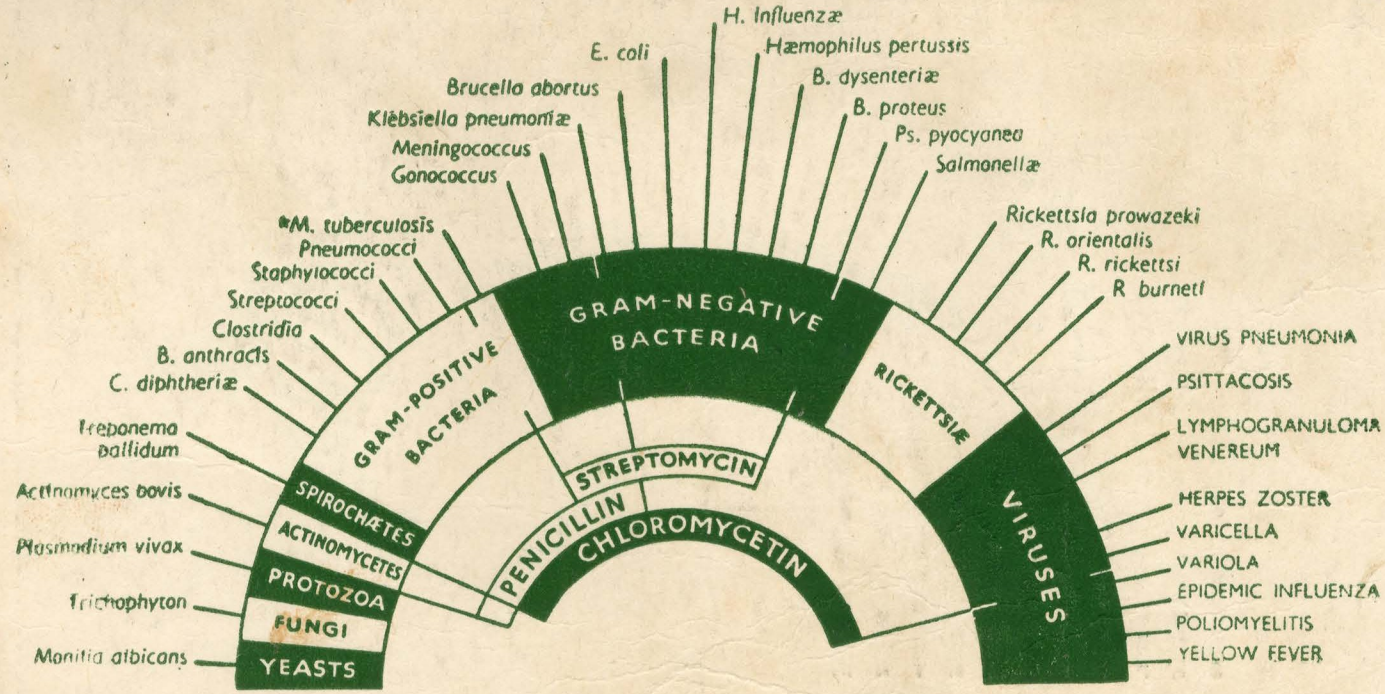


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