A condição referida na alínea *a*) poderá ser dispensada em casos excepcionais.

Artigo 4.º — A candidatura é apresentada mediante requerimento ao Presidente da Comissão Reguladora dos Produtos Químicos e Farmacêuticos acompanhado dos documentos exigidos.

Artigo 5.º — Os subsídios são atribuídos em reunião de Secção da Comissão Reguladora.

§ único — A Comissão Reguladora reserva-se o direito de não conferir os subsídios.

Artigo 6.º — O subsídio será abonado mensalmente e terá a duração que em cada caso for fixada.

§ único — Poderá ser concedida a prorrogação do prazo estabelecido por razões ponderosas desde que requerida em tempo oportuno.

Artigo 7.º — São obrigações dos técnicos subsidiados:

a) Apresentar relatórios dos trabalhos realizados com a periodicidade que for estabelecida;
b) Não publicar quaisquer trabalhos que abranjam matéria do plano referido na alínea *c*) do artigo 3.º, sem autorização da Comissão Reguladora;
c) Cumprir as normas administrativas exigidas pelos Serviços Administrativos da Comissão Reguladora;
d) Não interromper o estágio sem consentimento prévio da Comissão Reguladora.

Artigo 8.º — É causa de suspensão ou cessação do subsídio, o não cumprimento dos deveres consignados no artigo 7.º

• A pedido do Secretário da União Técnica Italiana de Farmácia transcrevemos o programa geral das 7.as Jornadas Farmacêuticas Italianas, do XV Congresso do U. T. I. Far. e da IPHARMEX 72, manifestações que terão lugar em Génova entre 31 de Maio e 4 de Junho.

Mercredi 31 mai

21.30 h. — Soirée de Rencontre et de l'Amitié (Yacht Club)

Jeudi 1 juin

9.30 h. — Inauguration officielle des VIIémes Journées Pharmaceutiques.
Théme: «LES FONCTIONS DU PHARMACIEN EN ITALIE ET DANS LE MONDE».
Salutations des Autorités — Conférence inaugurale.
11.30 h. — Inauguration de l'IPHARMEX 72.
16.00 h. — Excursion à Camogli. La fête du poisson.

Vendredi 2 juin

Le matin et l'aprés-midi — Continuation des travaux do jour précedent, avec la participation du Dr. J. H. M. Winters, Président de la F. I. P.

Samedi 3 juin

Le matin et l'aprés-midi — XVéme Congrès National U. T. I. Far.
Théme: «LA PHARMACIE: CENTRE D'INFORMATION EXPRESSION D'UN SERVICE SOCIAL».
Dans cette séance on abordera une gamme de sujets touchant:

1) Documentation et informations pour le Pharmacien.
2) Documentation et informations pour le public.
3) Documentation et informations pour le rapport avec les Medicins.

21.30 h. — Soirée de Gala

Dimanche 4 juin

Le matin — Journés IPHARMEX — Table Ronde sur:
«INFORMATION POUR LE PHARMACIEN: REALISATIONS PRESENTES ET FUTURES (possibilités d'initiatives communes)».
Moderateur: Prof. D. Ponte, V. Président de la F. I. P.
Prendreront part à la Table Ronde les Présidents des Associations qui organisent l'IPHARMEX dans les pays respecitfs:

— Dr. J. Brudon (Francia)
— Dr. H. D. Wendt (Germania)
— Dr. F. Maggioni (Italia)
— Dr. A. Bédat (Svizzera)

Le programme du Congrés de Gênes sera agrémenté par de réceptions et excursions. Ainsi il y aura:
Une réception organisée par la Municipalité de Gênes; Visites aux Musées; Show aquatique; Tour du Port.

Pour informations et inscriptions:

AVIOMAR: Via E. Vernazza 48 r. — 16121 — GENOVA

• Vai realizar-se em Copenhagen (Dinamarca) durante os dias 19-23 de Junho do corrente ano o 8.º Congresso Internacional de Química Clínica.

Trata-se da maior reunião internacional sobre bioquímica aplicada tendo sido elaborado um programa científico de grande interesse analítico.

A par das sessões científicas decorrerá uma grande exposição internacional de material científico de interesse para os laboratórios de análises clínicas.

Os colegas que desejem assistir a este congresso poderão dirigir-se ao:

8 th Internacional Congress on Clinical Chemistry
Departament of Clinical Chemistry
Rigshospitalet, Blegdamsvej 9
DK-2100 Copenhagen, Denmark

• Para o próximo ano vai realizar-se na cidade de Genéve o V Simpósio Internacional de Controlo de Qualidade em Química Clínica. Foi resolvido a constituição de grupos de estudo segundo afinidades geográficas (Portugal, Espanha, Itália e França), tendo sido convidado o colega Dr. Henrique dos Santos Silva como representante português do grupo latino. Para esse efeito assistiu a uma reunião preparatória em Paris no Laboratório de Química Clínica do Hospital de S. Luís (Prof. Dreux) em Maio findo.

Foi-lhe solicitado informações sobre o controlo de qualidade em Química Clínica em Portugal tendo sido pedido que fosse apresentado um relatório sobre os resultados analíticos, uma vez que sob a sua direcção vai ser promovido o 1.º Programa de Controlo de Qualidade em Química Clínica no posso País.

• Realiza-se em Jerusalém e Telavive entre 20 e 25 de Agosto próximo o 2.º Congresso Farmacêutico Israelita que versará as seguintes alíneas:

— Análise de drogas e controlo de qualidade
— Farmacologia
— Farmácia em geral
— Biofarmácia e Farmácia Clínica

As línguas oficiais serão o inglês, francês e hebraico, havendo ainda a realçar a existência de um programa social reservado aos acompanhantes e uma exposição de material. A inscrição para os participantes é de 40 dólares e 20 para os acompanhantes. Toda a correspondência deve ser dirigida para:

The Organizing Commitee
2nd Congress of the World Alliance for Israel Pharmacy
P. O. Box 16271
Tel Aviv
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• Realizou-se em Genéve (Maio de 1971) o IV Simpósio Internacional de Controlo de Qualidade em Química Clínica que compreendeu os seguintes constituintes químicos: Hemoglobina, Trigliceridos, Creatinina, Glicose, Fosfatase Ácida, Ácido Úrico e Creatinia Fosfoquinase.

A este Simpósio assistiu o nosso colega Dr. Henrique dos Santos Silva, que foi encarregado de fazer a crítica dos resultados da Fosfatase Ácida, de colaboração com os Profs. Richterich (Suíça) e Wilkinson (U. V.).

As conclusões deste Simpósio vão ser editadas em livro pela Academic Press de New-York.

BIBLIOGRAFIA

ACTUALITÉ PHARMACOLOGIQUES — Fundadas por: René Hazard, 1 Vol. br., 242 págs., 24 série, edt. por: Masson & Cie. Paris.

Com o aspecto gráfico das séries anteriores aparece-nos agora a 24.ª, com 8 capítulos, tratados por professores qualificados de diferentes universidades da Europa. No fim de cada um destes capítulos encontra-se uma lista geralmente com mais de uma centena de referências bibliográficas.

O primeiro capítulo — A Gerontologia. Estudo experimental — é tratado por Brunaud, professor do Centro de Pesquisas Clin Byla em Paris. Nele o Autor estuda os fenómenos celulares de envelhecimento e separa a manutenção da vida da própria função celular.

A segunda parte — O Metabolismo da Dopa em relação com a terapêutica do sindroma de Parkinson — esteve a cargo de A. Pletscher e G. Bartholini, ambos do Departamento de Investigação da Hoffmann-La Roche na Suíça. Os AA afirmam que a terapêutica biológica do sindroma de Parkinson com a L-Dopa marca uma data feliz para a medicina e concluem ser a L-Dopa e o seu metabolismo L_3-0 — metildopa activos, tendo no entanto o metabolito uma acção mais prolongada mas menos marcada.

Histamina e cérebro — é o título do terceiro capítulo apreentado por J. R. Boissier, professor da Faculdade de Medicina de Paris que afirma estar a histamina «periférica» já muito bem estudada ao contrário da histamina «central» que é ainda muito mal conhecida. O A. faz uma análise dos conhecimentos actuais sobre o metabolismo cerebral e o seu papel e conclui que se alguns aspectos são já bastante precisos outros põem ainda muitas interrogações aos bioquímicos e aos famacologistas antes de se poder classificar a histamina como mediadora da transmissão neuronal ao nível S. N. C.

A cargo do prof. Schmitt da Faculdade de Medicina de Paris aparece o quarto capítulo intitulado — Acção dos Alfa-simpaticomiméticos sobre as estruturas nervosas em que o A. aborda um aspecto ainda mal conhecido que é o das acções dos alfa-simpaticomiméticos sobre as estruturas nervosas centrais.

A quinta parte, com o tema — Agressividade no rato e cobaia. Aspectos de comportamento e bioquímicos — coube a L. Valzelli, professor e director da secção de fisicofarmacologia do Instituto de Investigação Farmacológica «Mario Negri» de Milão.

O A. considera o problema da agressividade uma das grandes preocupações dos sociólogos de hoje e procurou criar esse estado em animais de experiência, cujas repercussões analisou sob um ponto de vista bioquímico.

Aparece-nos agora o sexto capítulo — Correntes Iónicas através das membranas das células cardíacas — trabalho de Coraboeuf da Faculdade de Ciências, laboratório de fisiologia comparada, em Orsay. Fez um registo das correntes iónicas através das membranas ao nível das células cardíacas o que permite um melhor conhecimento dos fenómenos eléctricos provocados por essas correntes.

H. Herken, director do Instituto de Farmacologia da Universidade de Freien, Berlim é o A. do sétimo capítulo intitulado — processos bioquímicos durante a regeneração renal após lesão pelos derivados da pteridina. — O A. provocou, em animais de laboratório, lesões renais devidas aos compostos pteridínicos e estuda o mecanismo bioquímico da sua regeneração concluindo que a síntese proteica produzida, está ligada aos núcleos celulares, estimulando os sistemas dos ácidos nucleicos.

Finalmente, coube a V. V. Zakuzov, professor do Instituto de Farmacologia e Quimioterapia, Academia das Ciências Médicas em Baltiyskaja, Moscovo, o trabalho que preenche o oitavo e último capítulo — as modificações farmacológicas da transmissão sináptica ao nível encefálico — Medindo a velocidade de transmissão nas sinapses centrais, o A. analisa as modificações devidas a certas substâncias neurotropas nas vias reflexas.

Em face desta apresentação da obra podemos concluir tratar-se duma série de trabalhos de nível bastante especializado e que será muito útil para quem trabalhe no campo da Farmacologia.

M. M. Luz Clara

INTRODUCTION A LA PHARMACODYNAMIE — Carraz, Bériel, Boitard e Lebreton, 1 vol., 280 págs., Ed. Documentation Technique Pharmaceutique. Paris, 1971.

Entre os numerosos e notáveis serviços prestados à Farmácia francesa pela «Union Technique Intersyndicale Pharmaceutique», cuja obra notabilíssima tivemos ocasião de conhecer através da exposição feita pelo nosso colega francês J. Bideau, nas últimas «Jornadas Farmacêuticas Portuguesas» realizadas no Porto, não é certamente dos menores a resolução tomada de editar um livro de Farmacodinamia destinado ao farmacêutico, com o objectivo de «tenir le pharmacien au courant de ce médicament dont il est à la fois le créateur, le detenteur et le distributeur».

Elaborado sob a direcção do Professor Carraz, e com a colaboração de farmacêuticos e médicos especialistas nessa matéria, a obra pode ser na verdade extremamente útil ao farmacêutico que na sua farmácia queira ser, não só o guardião indispensável contra o uso indevido ou abusivo dos medicamentos, hoje tão frequente e perigoso, mas também o conselheiro sanitário que o possa esclarecer em qualquer oportunidade. É precisamente o que o Professor Carraz exprime nas curtas mas expressivas palavras com que abre o presente volume: «un des rôles essenciels d'une societé civilisée est de garantir la santé de la population. Elle doit donc compter sur celui auprès de qui cette population, spontanément, s'informe pour être conseillée. Le pharmacien doit pouvoir, en particulier, mettre en garde contre les dangers d'une thérapeutique qui deviendra de plus en plus difficile à manier, au fur et à mesure qu'elle sera plus efficace.»

O volume que agora se publica constitui o primeiro tomo da obra, compreendendo os medicamentos do sistema nervoso central, os medicamentos do sistema nervoso autónomo e os medicamentos do sistema cárdio-vascular.

O primeiro dos três capítulos trata dos psicodislépticos, dos analgésicos, dos antitússicos e expecturantes, anestésicos locais, anestésicos gerais, curarisantes, alucinogénicos, psicolépticos, hipnóticos, tranquilisantes, anfetaminas, antiepilépticos, antiparkinsonianos, etc.

No segundo capítulo do volume, depois de uma exposição sumária sobre o sistema nervoso autónomo, o volume trata dos dos medicamentos do sistema adrenérgico — simpaticolíticos e adrenolíticos —, dos medicamentos do sistema colinérgico — para-simpaticomiméticos e para-simpaticolíticos — e, seguidamente, dos ganglioplégicos.

Finalmente, no capítulo dos medicamentos do aparelho circulatório, são tratados assuntos de particular importância como

os cardiotónicos, os analépticos cardiorespiratórios, os medicamentos regularizadores do rítmo cardíaco, os dilatadores coronários, anticoagulantes, fibrinolíticos e trombolíticos, medicamentos da fragilidade capilar, etc.

Cada um destes capítulos, cuja importância terapêutica é naturalmente indiscutível, apresenta uma exposição, se bem que resumida, por vezes bastante completa sobre mecanismos de acção, agentes terapêuticos mais usados e sua aplicação, processos de ensaio farmocodinâmico, etc. Embora num ou noutro aspecto, especialmente no critério da classificação dos fármacos e sua sistematização, possa merecer alguma discordância, não há dúvida que a obra pode ser extremamente útil para o farmacêutico que na farmácia do oficina tem a obrigação de esclarecer, aconselhar, orientar o público — e por essa razão o farmacêutico é insubstituível — mesmo numa época de industrialização tão acentuada.

Uma iniciativa como esta, e, afinal, como tantas outras que têm sido tomadas pela UTIP, só é pena que não possa tornar-se extensiva ao nosso país. Bem andariam os nossos organismos corporativos farmacêuticos se se resolvessem pôr ao serviço da Farmácia portuguesa, e com ela ao serviço da Saúde Pública e da Comunidade nacional que constituímos, o plano da UTIP, hoje em plena evolução em França, na Itália e em Espanha.

A. Correia da Silva

SAUNDERS, Leonard and FLEMING, Robert — Mathematics and Statistics for use in the Biological and Pharmaceutical Sciences, 2nd edn. London, The Pharmaceutical Press, 1971. 3,50 libras.

A necessidade tão frequente para o analista e o biólogo de recorrer aos métodos estatísticos com a finalidade de avaliar da confiança que lhe devem merecer os seus resultados, tem dinamizado a tendência para introduzir no curriculum dos cursos respectivos as noções teóricas que são base imprescindível para a compreensão da linguagem e das técnicas da estatística.

Entre nós, os cursos de Biologia das Faculdades de Ciências, comportam de há muito uma Cadeira de Matemática Gerais, onde se ministram as noções de base consideradas necessárias para a compreensão do significado que deve ser atribuído aos resultados do Cálculo estatístico, nem sempre fácil de aprender.

Os cursos de Farmácia, mantendo uma estrutura inalterada desde há cerca de 4 decénios, continuam alheios à importância desta matéria, e, a introdução no Suplemento da Farmacopeia Portuguesa de uma monografia sobre o assunto, se é de molde a permitir realizar um certo número de cálculos estatísticos, não é suficiente para permitir a compreensão do significado e aplicabilidade dos números obtidos, ou para a selecção de um critério válido de utilização.

Reformas recentes do ensino da Farmácia têm levado noutros países à introdução de Cadeiras de Matemáticas Gerais e de Estatística Aplicada nos respectivos Planos de Estudos, e as obras que focam o assunto com a intenção de preparar os utilizadores dos métodos estatísticos com a base teórica indispensável para permitir uma compreensão cabal das operações efectuadas, têm aparecido nos escaparates das livrarias com apreciável frequência.

SAUNDERS & FLEMING, considerando que, sem formação matemática de base, não há possibilidade de utilizar racionalmente a estatística como instrumento eficiente de trabalho, publicaram através da editora *The Pharmaceutical Press*, a segunda edição do seu excelente e bem concebido livro *Mathematics & Statistics for use in the Biological and Pharmaceutical Sciences*.

Considerando que da edição anterior foi publicada uma reimpressão em 1966, e que a segunda edição que temos presente, é de 1971, faremos ideia da magnífica

audiência com que a obra tem sido acolhida junto dos interessados.

Esta segunda edição, alargada no seu conteúdo, para incorporar uma introdução às técnicas dos computadores, apresenta-se como um volume encadernado, com aprazível capa de resguardo e X-130 páginas de execução cuidada, não só no excelente aspecto gráfico, mas especialmente no modo correcto e agradável como as expressões matemáticas são apresentadas, a par de uma sucessão de assuntos seleccionados com muito critério.

A uma exposição clara e equilibrada das noções fundamentais de álgebra, geometria analítica, trigonometria e cálculo infinitésimal, seguem-se as noções fundamentais do domínio da estatística, com aspecto relevante em alguns casos de interesse especial, como sejam as aplicações aos ensaios biológicos e bacteriológicos e em particular à Farmácia, com exemplos relativos a ocorrências normais relacionadas com as operações industriais de fabrico.

Em apêndice, apresentam-se tabelas de natureza diversa, relacionadas com os assuntos expostos ao longo da obra.

Oportunamente, e conforme os casos, são introduzidas as noções fundamentais do método de programação Fortran, para o cálculo por computadores electrónicos, nos termos em que os grandes complexos industriais o vêm realizando.

A linguagem usada é clara, os assuntos são escolhidos com critério e cada capítulo vem acompanhado de exercícios numéricos de aplicação, resolvidos e para resolver, a apoiar e esclarecer o texto, sempre que tal foi julgado conveniente.

Somos de parecer que se trata de uma obra moderna, clara e com boa exposição, cujo estudo é de recomendar aos que pretendam fazer um uso consciente da estatística, libertando-se do empirismo de manejadores de números, e das dificuldades que resultam de um mau entendimento dos seus princípios fundamentais, bem como ainda àqueles que desejem tomar contacto com as modernas técnicas da informática, adquirindo uma panorâmica da evolução que a estatística aplicada vem a realizar.

Dâmaso Gomes

ESTUDOS SOBRE FLUORESCÊNCIA

I. VARIAÇÃO DA INTENSIDADE DE FLUORESCÊNCIA DAS SOLUÇÕES DE METIL-UMBELIFERONA COM A CONCENTRAÇÃO E O PH DO MEIO

Revista Portuguesa de Farmácia, **21**, 54 (1971)

ERRATA

Pág.	*Linha*	*Onde se lê*	*Deve ler-se*
Capa	4	Investigar	Investigador
1	4	Investigar	Investigador
7	27	0,0156	aproximadamente 0,020
7	28	$0,8 \times 10^{-4}$	aproximadamente $1,1 \times 10^{-4}$
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13	10	de 0,0156	aproximadamente de 0,020
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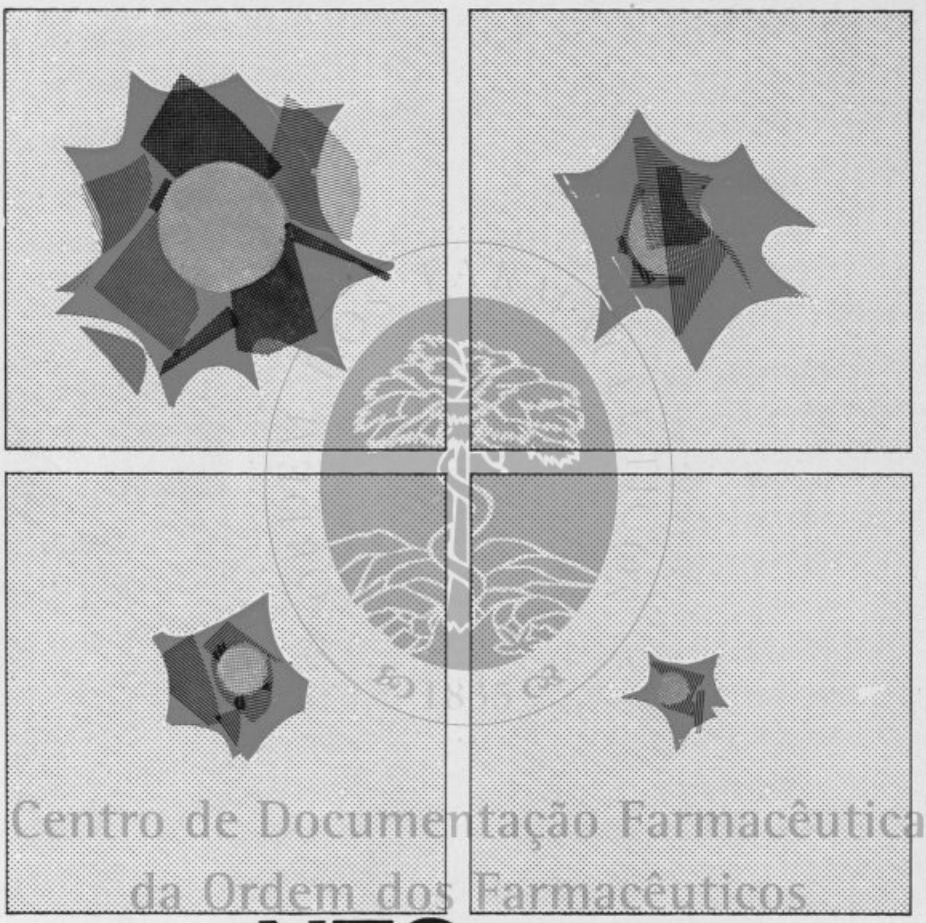

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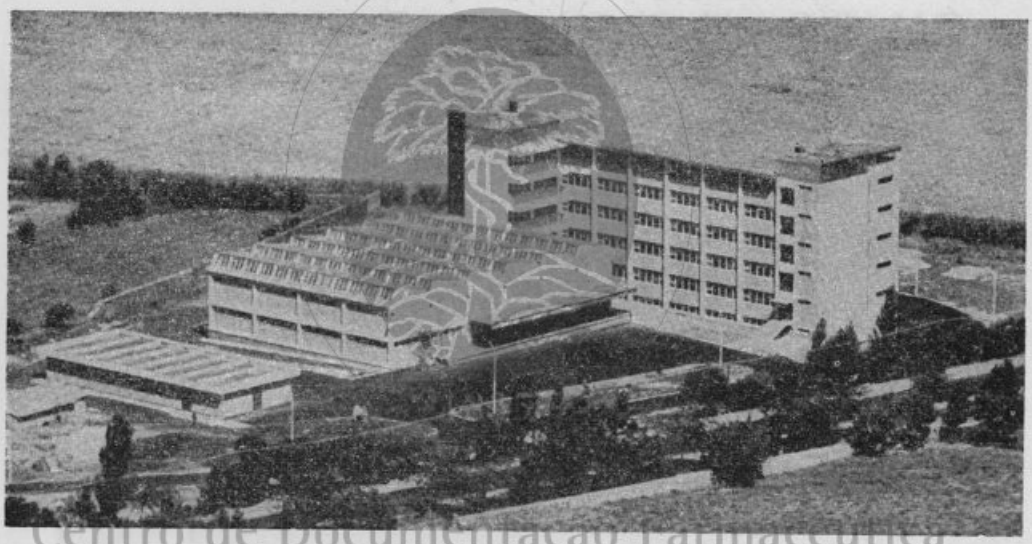

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EDITORIAL

A realização do 32.º Congresso Internacional de Ciências Farmacêuticas e da 24.ª Assembleia da Federação Internacional Farmacêutica em Portugal é um acontecimento de tão excepcional relevo na vida farmacêutica nacional que bem pode ser considerado como o seu ponto mais alto. Mas não só a Farmácia Portuguesa se sente honrada com a presença de um tão elevado número de congressistas de numerosos países estrangeiros que aqui vieram participar nos Trabalhos do Congresso, como o próprio país se prepara para os receber condignamente, dentro de uma tradição de hospitalidade de que Portugal justamente se orgulha.

E é nesta cidade de Lisboa, tão rica de pitoresco e de história, cidade ao mesmo tempo tumultuosa e calma, ao mesmo tempo alegre, na claridade ofuscante das suas paisagens, e triste, na nostalgia dos seus cantares, debruçada sobre um do mais belos estuários do Mundo, de onde um dia partiram para a descoberta da terra as frágeis caravelas de quinhentos cujas quilhas sulcaram os caminhos do mar desconhecido, que se vêm juntar para os trabalhos árduos das suas reuniões de estudo e para os momentos agradáveis de fraterno convívio, os nossos Colegas dos quatro cantos do Mundo.

Uma única expressão nos ocorre neste instante da sua chegada — que sejam bem-vindos! Bem-vindos a esta terra que se lhes abre sem reservas, na oferta espontânea da sua hospitalidade, bem-vindos a esta cidade aonde vêm passar alguns dias que bem desejamos sejam calmos e agradáveis, proporcionando-lhes tão boas recordações que tornem possível uma nova visita a Portugal para um mais largo e melhor conhecimento da sua terra e das suas gentes.

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As páginas que em seguida vos oferecemos são, na sua simplicidade, uma prova daquilo que atrás deixamos dito: uma espécie de apresentação sumária da Farmácia portuguesa, encarada em alguns aspectos da sua complexa personalidade. Através destes artigos que vos dedicamos procurou-se dar uma ideia sumária do que é a Farmácia em Portugal.

MESSAGE

AN ACT OF WELCOME

The holding of the 32nd International Congress of Pharmaceutical Sciences and the 24th Assembly of the International Pharmaceutical Federation in Portugal is an event of such exceptional importance in our natioal pharmaceutical life that it may well be considered as its highest peak.

But it is not only Portuguese Pharmacy which feels honoured at the presence of such a large number of congressionalists from so many foreign countries who have come here to take part in the work of the Congress, but also the country itself which is preparing to receive them worthily, with the tradional hospitality of which Portugal is justly proud.

And it is in this city of Lisbon, so rich in picturesqueness and history, a city at the same time tumultuous and calm, at the same time gay with the dazzling clarity of its scenery, and sad in the melancholy of its songs, looking down on one of the most beautiful estuaries in the world, from which one day in the fifteen hundreds the fragile caravels left on voyages of discovery, their keels ploughing the unknown seas, that our Colleagues from the four corners of the globe have come together for the arduous work of their meetings for study and for pleasant moments of fraternal social intercourse.

One expression only comes to mind at this moment of your arrival — YOU ARE WELCOME. Welcome to this land which offers itself to you without reserve, in the spontaneous offer of its hospitality: welcome to this city where you will spend some days which we hope will be calm and pleasant, and will leave with you such good memories that you will want to visit Portugal again to obtain a more ample and better knowledge of our country and its people.

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The pages which we offer you next are, in their simplicity, a proof of what we have said above: a kind of concise presentation of Portuguese pharmacy, viewed in some aspects of its complex character. By means of these articles, which we dedicate to you, we have tried to give you some idea of Pharmacy in Portugal.

ARTICLES

PHARMACY IN PORTUGAL

ALBERTO CORREIA DA SILVA

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Pharmacy in Portugal has a long history. The oldest known document dates from the end of the XV century and is a letter by King Afonso V granting special privileges to some Arab apothecaries, eminent among them Mestre Ananias, who came to Portugal from Ceuta. This does not mean that Pharmacy began at that time, as not only does this document indicate the existence of apothecaries, who, by the way, were insufficient in number for the necessities of the population, but some authors believe that even in the XIV century there were examinations for apothecaries in Portugal.

Teaching

The teaching of pharmacy must have begun at the commencement of the XVI century, in the old Coimbra University, but it was only in the XVIII century, in the reign of King José I, that the So-called Pombaline Reform really instituted it, constituing a starting point for a series of reforms which were to culminate, in the time of the Republic, in the creation of degrees in Pharmacy.

At present the teaching takes place in three Faculties belonging to the Universities of Lisbon, Oporto and Coimbra, which afford two types of courses, the Professional, three years, and the degree course, five years. The plan of studies, although it has suffered various adjustments, resulting from the progressive changes in the programmes, is out of date, being more than thirty years old. A new plan of courses, embracing a cycle of basic studies lasting four years, is being elaborated at present, an authentic general pharmaceutical course, and a complementary specialization course which will prepare candidates for three pharmaceutical careers — pharmacy, industrial pharmacy and pharmaceutical analyses as applied to medicine.

Each of these careers is justified by a long tradition of several decades, although owing to its recent progress, the pharmaceutical

industry has taken on great importance in the field of the various activities carried out by pharmacists.

The present plan of studies comprises: General chemistry, pharmaceutical physics, botany, pharmacognosy, chemical, analyses, inorganic pharmaceutical chemistry, organic pharmaceutical chemistry, cryptogamy and fermentations, pharmaceutical technique, galenic pharmacy, pharmaceutical industry, biochemistry, toxicology, bromatology, hydrology, deontology and pharmaceutical legislation etc.

For the new plan of studies a development in the basic preparation is anticipated, comprising applied mathematics, new biological subjects, expansion of chemical preparation and new subjects, such as economy, administration and sociology. As a complement to the degree in pharmacy, there exists a finishing course in chemical-biological analyses, authentic specialization in analyses as applied to medicine, the pharmaceutical degree-holder also having the possibility of taking his doctor's degree in pharmacy, generally limited to a teaching career, but which can be extended to pharmacists not connected with university life.

As well as teaching, the Faculties carry out activities in the domain of scientific investigation, very numerous being the works published in their private reviews («Anais da Faculdade de Farmácia do Porto», «Boletim da Faculdade de Farmácia de Coimbra») or in the professional scientific press, national or foreign, the subjects treated more extensively being those of chemical or pharmacodinamic investigation on plants of the Portuguese home or overseas flora, cellular biochemistry, microbiology, galenic pharmacy and pharmaceutical technology, physico-chemical methods of analyses, etc.

The Faculties of Pharmacy also lend technical support to the pharmaceutical industry and to other industries by means of work executed in their laboratories or by scientific and technical advice given by their professors and assistants.

Professional Practice

Of the activities exercised by pharmacists, the most common is that in pharmacies. Approximately 1980 pharmacies exist on the mainland of Portugal serving a population of about 10 million, spread all over the country, but much more densely in the principal cities, Lisbon, Oporto and Coimbra. Besides the pharmacies, there exist in rural districts so-called first-aid posts «postos de Medicamentos» which are dependent on pharmacies existing in places not far distant, and whose functions are limited by law, no preparation of drugs being allowed to be made in them. The existence of these posts has been the object of much criticism on the part of pharmacists and professional organizations, although from the practical point of view, it must be admitted they have come advantages.

The property of the pharmacies is exclusively the pharmacists' so that the respective charter can only be granted to pharmacists or to co-partnerships or joint-stock companies if all the partners are

pharmacists. On the other hand, not more than one charter may be granted to any one pharmacist or company, nor may any pharmacist belong to more than one company or belong to one and be the individual proprietor of a pharmacy at the same time. Therefore, as far as concerns the ownership of the pharmacy, the principle on which Portuguese law is based is that which, in pharmaceutic law, it is the custom to call principle of indivisibility between the ownership and the management.

Portuguese legislation considers that the function of preparing, storing and distributing medicines to the public is of public interest, as a hygienic activity (1) laying down the principle that this duty is incumbent on the pharmacist. No pharmacy may, therefore, according to the law, work without a responsible pharmacist, who carries out and permanently assumes the exercise of its technical management, which must be guaranteed by the pharmaceutic owner.

Pharmaceutic practice is regulated by legal dispositions forming part of the law of the practice of pharmacy, revised and published relatively recently and by the Deontological Code, included in the same law, which establishes that the pharmacist is «at the service of public health and should therefore consider that the professional mission to which he is dedicated demands his entire devotion to the sick, whatever category or social position they may belong to» and that, within the limits of his knowledge, the pharmacist «should dispense help to any person in iminent danger, if medical help cannot be immediately given», in the same way being obliged to lend his aid and to collaborate actively in State initiatives aiming to protect and preserve public health, contributing with all the means within his power to the diffusion of the knowledge of hygiene and health, more especially in rural districts». Besides other duties, the Deontological Code imposes on all pharmacists professional secrecy as a matter of moral and social interest.

As well as the function of preparing, storing and distributing medicines, the law establishes that it is also incumbent on the pharmacist to carry out analytical decisions on medicines and physico-biological analyses, that is, analyses applicable to medical practice.

In spite of the legal dispositions referred to and others which may be considered as a protection for pharmacy, the pharmacist in a pharmacy is not in an easy position at present and, as a consequence of many causes, among which bulks large the extreme industrialization of medicine and the measures taken by the State in matters of social prophylactics, the pharmacy situation still causes anxiety to professional managers and to the state organisations most directly in touch with the problem. Many of these problems have

(1) In Portugal, in accordance with legislation in force, pharmacies supply the public, apart from medicines and medical substances, only with products for the purpose of hygiene and prophylaxis, dietetic, optic, acoustic and prosthetic products in general, as also Phytochemistry products when presented in suitable packages.

been profoundly analysed by national pharmaceutic congresses which have been taking place for some years, under the name of Portuguese Pharmaceutical Tours (Jornadas Farmacêuticas Portguesas) in the three Portuguese university towns with the presence of a large number of pharmacists. But so far no really efficient measures have been taken, at least, not measures of a general or official character, which might effectively influence the critical situation of the pharmacy.

Another section of pharmacy which in Portugal has seen in recent decades a notable development is that of the pharmaceutical industry. A very important part of the medicine consumed in the country is produced in Portugal and although some of the laboratories existing here are foreign, the national laboratories have experienced a great development and may be considered as occupying an important position in the national industry, producing high quality medicines which, although on a relatively reduced scale, can be found on foreign markets. The criticism which has been levelled at the national pharmaceutical industry is that it does not show great originality in the products it prepares, with, of course, some exceptions. Laboratories are on the whole well installed, possess modern equipment and are endowed with quite satisfactory control systems. Some of the national laboratories have gone so far as to voluntarily solicit the inspections of their installations by foreign state departments, such as the Food and Drug Administration, which approved them, sometimes after some modifications which were indicated to them.

The hospital pharmacy has also registered marked progress in recent years, being provided with very dedicated professionals on a good technical level, periodically organising study sessions and conferences where technical and scientific problems are discussed with great competence.

Some installations are well equipped and carry out, in the teaching hospital, for example, functions of great responsibility and importance.

An appreciable number of Portuguese pharmacists devote themselves to clinical analyses, in the service of hospitals, in official laboratories of hygiene and public health, or privately, in their own laboratories. The functions they carry out in this sector have been recognised and praised by the sanitary authorities, even at ministerial level, undeniable services being rendered by them in the sanitary coverage of the country, as regards analyses as applied to medicine. The practice of analyses is not, however, properly regulated and the medical analysts have for years developed a resistance against the recognition of the legal competence of the pharmacist in this domain, in spite of there being dispositions in the legal diplomas permitting the practice of these analyses by pharmacists. There not being a sufficient number of medical analysts to ensure these services all over the country, especially in rural districts and in provincial hospitals, it is to the pharmacist that we owe at the present moment (and possibly for a long time to come) the functioning of laboratories of analyses away from the large centres. Therefore it must be concluded that there exists in this respect a kind of pro-

tection or discrimination in favour of the doctor, which is inexplicable and, in many aspects, flagrantly unjust.

Portuguese Pharmacopoeias

Numerous Pharmacopoeias have been published in Portugal since 1704, the year in which the Lusitanian Pharmacopoeia (Farmacopeia Lusitana) appeared, the first Pharmacopoeia pblished in our country, produced by an apothecary monk belonging to the Royal Monastery of Saint Cross (Real Mosteiro de Santa Cruz) in Coimbra.

In 1794 the first official Pharmacopoeia was published and only in 1876 the first Portuguese Pharmacopoeia (Farmacopeia Portuguesa) in the present sense of the term.

The Farmacopeia Portuguesa at present in force is the fourth, the second edition of which was published in 1946. With the creation of a Permanent Committee of the Portuguese Pharmacopoeia (Comissão Permanente da Farmacopeia Portuguesa) there began a new epoch in the history of Pharmacopoeias in Portugal, from which resulted the publication of an extensive supplement to the Pharmacopoeia, in loose leaf system and up-to-date, at present in force.

The Committee of the Farmacopoeia has, besides this, other functions, having very recently, in 1971, edited the National Galenic Formulary (Formulário Galénico Nacional) in two volumes, the elaboration of which is due to the Committee itself, and which represents a great step forward to the advantage of public health and to the prestige of the pharmaceutic profession and the pharmacist in the pharmacy, it now being up to the pharmaceutical class to profit by it.

Professional Organization

The organization which is in charge of the study and defence, in its moral, scientific, economic and social aspects, of the professional interests of degree-holders in Pharmacy, is the National Syndicate of Pharmacists (Sindicato Nacional dos Farmacêuticos). This organization succeeded (and continues to use officially, as sub-title, its name) the old, illustrious Lusitanian Pharmaceutic Society (Sociedade Farmacêutica Lusitana) founded 136 years ago, and which, for about a century, presided over the destinies of Portuguese Pharmacy. To this old Society the country owes notable services in the field of public health as it was by its initiative that the first chemical toxicological, bromatological and hydrological analyses, analyses of minerals and metal alloys, the study of plants and drugs of Portuguese continental and overseas origin were made in Portugal.

The National Syndicate of Pharmacists (Sindicato Nacional dos Farmacêuticos) with headquarters in Lisbon, with a regional department in Oporto, recently underwent an appreciable transformation with the publication of a new statute, defined in the report which preceded the legal diploma in which it was published, in the follow-

ing terms: «if it is agreed that Pharmacy as an institution embraces in its essential structure high moral and social values, from this it follows that the pharmaceutical practice implies the interest of the community in such a way that there arises the imperious necessity of the existence of a discipline and a control corresponding to the value in question. It is precisely these disiplinary aspects that the new diploma aims at, as its legal structure is very similar to that of the Orders, it being anticipated shortly that the Syndicate will be transformed into the Order of Pharmacists.

The practice of pharmacy is permitted only to those pharmacists enrolled in the Syndicate, which carries out its functions through the following bodies: General meeting, management, watch committee, disciplinary committee.

The Syndicate has departments dedicated to definite branches of specialized pharmaceutical practice, as analyses applicable to medicine, pharmaceutical industry, hospital pharmacy, etc. which work with advisory bodies of the management.

Of the disciplinary bodies, the Disciplinary Higher Council (Conselho Superior Disciplinar) is presided over by a judicial magistrate. Among other functions, the Syndicate exercises a cultural action through finishing and modernizing courses, the publication of reviews and books, consulting services, organization of lectures etc.

Pharmaceutical Press

In the course of more than a century numerous Portuguese pharmaceutical periodical publications have appeared, among them one which is considered among the oldest pharmaceutical reviews in the world, the Journal of the Lusitanian Pharmaceutical Society (Jornal da Sociedade Farmacêutica Lusitana).

At present the following periodical pharmaceutical publications are issued in Portugal: «Revista Portuguesa de Farmácia, «Anais da Faculdade de Farmácia do Porto», «Boletim da Faculdade de Farmácia de Coimbra», «Eco Farmacêutico», «Boletim do Grémio Nacional das Farmácias», «Boletim de Informação do Sindicato Nacional dos Farmacêuticos». The first three publications are of a technical and scientific character, publishing original works of scientific investigation, conjoint revisions, scientific lectures etc. The last four are of a professional character, but sometimes broaching technical problems.

SOME NOTES ON THE ORIGINS AND DEVELOPMENT OF PHARMACY IN PORTUGAL

ALBANO PEREIRA JR.

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As everywhere else, Pharmacy as a part of the empiric art of healing, amalgamated with incipient Medicine, Surgery and Nursing, must have made its appearance in this area of the westernmost part of Europe, which has been Portugal since the 12th century, in such a remote period that it is impossible to say exactly when.

Its development must have run parallel to the sociocultural development of the populations. Being an art restricted at first to the family group and then widened to the tribe, the chieftain or patriarch was no doubt the sole person or at least the person better acquainted with the means of preserving or restoring health. Based on notions gradually enriched and traditionally handed down throughout the centuries, the art of healing must have become little by little a social function, and was for many centuries an exclusive attribute of the ministers of religion.

The first inhabitants of the Peninsula we know of — outstanding among them being the Iberians, the Celts and the Celtiberians and, according to later sources, the Lusitanians — held a magical view of disease and possessed already some rudimentary therapeutical knowledge derived from experience.

Our polytheistic ancestors, the Lusitanians, who believed in the forces of Nature, worshipped the woods, the wind, the promontories, the rivers (Tagus, Mondego, Lima), the stars and the moon. The altar for worshipping this latter planet was the hill of Sintra. The medicinal waters which abounded and still abound in the territory were the basis of the treatments they practised in that harmonious environment.

It is likely that contact with the Phoenicians from Tyre who in the 31th century B.C. began to appear in the Mediterranean and Atlantic shores of the Peninsula enabled the local populations to derive some benefit from the more advanced culture and knowledge of the people to which we are indebted for the marvelous invention of the alphabet. Later on, the same happened through the influence of the Carthaginians, Phoenicians from Carthage.

The same could be said perhaps of the Phocian Greeks who, in their search for tin, set up settlements in some points of the littoral — namely the mouth of some of the most important rivers of the present Spanish territory — it being probable that they had at least trade contacts with the west of the Peninsula.

After 25 B.C. Lusitania, after more than a century and a half of heroic resistance and finally overrun and converted into a province of the Empire, began to receive the influence of Roman civilization, including the art of healing. Gradually some reflexes reached it of the teachings of Asclepiades, Celsus, Menecrates, Andromache (all of the 1st century B.C.), Pliny and Dioscorides (1st century of the Christian era) and later on, in the 2nd century, Galen, the greatest name in Pharmacy and whose influence is still felt.

Despite the Barbarian invasions in later times, it may be said that both in the art of healing and in other aspects of Graeco-Latin civilization the retrocess was not very marked.

Indeed, after more than four centuries of unbroken Roman domination Lusitania was occupied in 411 as far as the south bank of the Douro by the Alani, and north of that river by the Vandals and Suevi, the latter choosing Bracara Augusta (modern Braga) as capital of their kingdom, and the former crossing over to North Africa in 418. A Visigoth army under Roman orders destroyed the Alani to a man. There remained only the Suevi when the army retreated, and they soon occupied the whole of Lusitania.

The domination of the Suevi was rather long; it did not end until 585, when they were defeated by the armies of Leovigild, the Visigoth king, in battles fought in the vicinity of Portu-Cale and Bracara Augusta. In the kingdom of the Suevi there was considerable cultural advance partly due to the influence of Martinho, Bishop of Dume and Archbishop of Braga, who died in 579 and was later made a saint (S. Martinho de Dume). Meanwhile, the Byzantines established themselves in the south of the Peninsula.

When the Suevi and, later on, the Byzantine troops were defeated, the whole Peninsula fell under Visigothic domination until the beginning of the 8th century.

In the early 7th century, Isidore of Seville (560-636), later canonized, produced his famous *Etymologies*, a compilation of existing classical knowledge, including the art of healing.

Incidentally, in the early Middle Ages, in the Iberian Peninsula as in the rest of Europe, the art of healing was predominantly or even exclusively practised in monasteries. Some of the monks cultivated a literary genre generically known by the name of «hortuli» — texts which described the medicinal properties of botanical species. Outstanding in this field were the Benedictine monks, who made extensive use of vegetal species (the «simples») in the preparation of drugs. The Benedictine monastery of Montecassino (Italy) — where in the 6th century Cassiodorus gave inception to the study of the

Graeco-Latin medical codices and much later, in the 11th century, Constantine the African began to translate the Arabe medical texts into Latin — became celebrated in this respect. In the Peninsula, the first Benedictine monasteries seem to date from the 10th and 11th centuries: Sahagún and Santa Maria de Ripoll, in Spain; and Rates, Santa Justa de Coimbra and Vimieiro, in Portugal.

In 711 the Arabs crossed the Strait then called of Hercules and won the battle of Crisus; two years later they had overrun the whole of Hispania, with the exception of the mountains to the northwest. There followed their long politico-administrative and religious rule, whose last stronghold, Granada, fell only in the late 15th century (1492), but their contribution to the progress of the art of healing was tremendous.

Like the Christian monks, also the Arabs contributed to the spreading of the medical and pharmaceutical knowledge of Antiquity. Tneir influence was even more far-reaching because tney transmitted to the West knowledge from the Hindu, Chaldaeo-Assyrian and Hebrew civilizations. In addition, they spread in the West the remarkable medical science which the Nestorian Christians, well versed in the works of Hippocrates, Dioscorides and Galen, transmitted to them there when they migrated to Persia after the schism.

The Arabs, however, did more than communicate the culture they received or assimilated from other peoples, however important mere transmission would be in itself. They greatly contributed to the advance of pharmaceutical science, and it may be even asserted that it was chiefly from the Iberian Peninsula that Arab culture radiated to the rest of Europe after the 8th century.

Outstanding among them were Geber or Jabir (Abu Muça Sábar Açufi), a notable alchemist of the 8th century considered to have been a pioneer in the field of chemistry for the discoveries ascribed to him: the nitric and sulphuric acids and aqua regia; extraction of arsenic and antimony from the respective sulphides; the preparation of lead carbonate; the description of steel manufacture; the obtaining of acetic acid through the distillation of vinegar; the dyeing of cloth and leather. His famous work «Summa Perfectionis» may be considered the first treatise on chemistry;

Rhazés (Abu Becre Muhâmade ben Zacaria Arrazi), alchemist, philosopher and physician of the 8th and 9th centuries, who was the author of two medical encyclopaedias which for a long time were adopted in Europe as textbooks for teaching; his «Treatise on Smallpox and Measles» contains the first exact description of smallpox;

João Mesué (Abu Zakaria Iáhia ben Maçuia), a Christian Arabe of the 8th and 9th centuries, strongly influenced by the Nestorian school, physician to the celebrated Caliph Harun and to his six immediate successors. His most important works in the field of Pharmacy and Medicine were the «General Pharmacopoea» and «Great Compilations of Medicine», which were widely known and even translated

into Latin. He translated into Arabic Greek, Syrian and Persian scientific and literary works.

Albucasis, in 980, in his treatise «Liber Servitoris», described the distillation of water and also that of wine and vinegar to obtain alcohol and acetic acid respectively.

Avicenna (Abu Ali al-Huceine ben Sina, or simply Ibne Sina), in the year 1000, in his extremely famous work «Canon of Medicine», which became rapidly popular in Europe and was adopted as a text-book in the uiversities until as late as the 17th century, devotes part of it to simple and compound medical drugs; he was the first to whom the idea of applying a golden or silvery coating to pills occurred.

Also the work «De Simplicibus», by Serapião the Younger, which appeared in 1050, was a manual consulted throughout the Middle Ages.

Avenzoar (Abu Maruane ben Zohr, or just Ibne Zehr) (1073--1162), an Andalusian Arab who lived in Seville, the author of «Teisir», studied the composition of medical drugs and was an opponent of polypharmacy. His disciple Averroes (Abu Alvalide Muhâmade ben Ahmad ben Muhâmade ben Rox, or simply Ibn Roxd) (1126-1198), born at Cordova and who died at Marrakesh, besides having been a magistrate and a philosopher and commentator of Aristotle, was also versed in medicine and the composition of medical drugs. He wrote the treatise «Colliget».

Maimonides (Moxeh Ben Maymon) (1135-1204), born at Cordova, though a Jew by ancestry and belief, was, besides a philosopher and a theologian, one of the most remarkable experts in the art of healing in the Arab world. Outstanding among his writings are «Aphorisms of Medicine», a treatise on hygiene and dietetics, and the text of a highly ethical and impressive oath for «physicians» and «apothecaries on entering their professions.

In the midst-13th century, Ibn el Baytar described more than 1,400 drugs of vegetal origin.

We would think that the above-mentioned names are the most representative of the development attained by the Arabs in the art of healing.

It is true that the brilliance of Arab cultural centres in the East was of comparatively short duration, though Baghdad was not conquered by the Persians until 1258. However, as they waned, their counterparts in Hispania grew brighter, with the spreading of the fame o fthe Schools of Cordova, Seville and Granada, whose influence was felt not only in the Peninsula but also beyond the Pyrenees, chiefly in the Schools of Montpellier and Salerno.

It may be said that, at cultural level and especially in the art of healing, the Christian monasteries and the Arab Schools were the centres which contributed most to the enrichment and spread of knowledge. Thus, after the 10th century, Arab texts were translated into Latin in the Benedictine monastery of Santa Maria de Ripoll

and elsewhere. In the 12th century, the Archbishop of Toledo, Don Raimundo, created a school for the translation of classical scientific texts — a work in which, in true ecumenical fashion, there co-operated Arab, Jewish and Christian scholars. It was at this school that Gerard of Cremona translated into Latin the «Canon of Avicenna and several texts of Rhazés and other Arab authors.

This explains why in the last centuries of the Middle Ages the whorks of Galen and Avicenna's «Canon» were the basis of the professional training of both pharmacists and physicians.

Still in that period of history, an art of healing derived from multiple sources was widely practised by the common people — Pre-Roman magical medicine, popular Graeco-Latin medicine, the cult of miracle-performing saints and Arab-Oriental medical astrology.

Reference should also be made to a medical literature we could likewise label as popular since it aimed at the spread of elementary therapeutical precepts. A good example is the «Thesaurus Pauperum», by Petrus Hispanus, a Portuguese physician and priest born in Lisbon around 1220, one of the greatest scholars of his time, Archbishop of Braga and doctor to Gregory X, to whom he succeeded on the pontifical throne in 1276 under the name of John XXI.

In 1139 the former Portucalensian County became independent. The new kingdom gradually increased in territorial size and by 1250 had defined its peninsular limits by reconquering territories which had been under Arab rule for many centuries. In those territories pharmacy was, no doubt, practised at the very highest level of the time, and very probably as an activity already independent from medicine since in the Baghdad School, of Moslem origin, the separation of the two great branches of the art of healing probably occurred prior to the invasion of the Peninsula (1).

It would seem likely, therefore, that Pharmacy was already a differentiated profession in the reconquered territories when the Portuguese nation was founded. Though there is lack of documentation which states it clearly, a passage from the text of the «Laws of the Seven Parts» (13th century) by Alfonso X, the Wise, king of Leon and Castile, reveals that Pharmacy and Medicine were already unmistakably differentiated: «apothecaries who give men scammony to eat or drink, or any other strong medicine except by order of the physicians ...»

So far, no legislative documents prior to the mid-15th century and which expressly refer to the pharmaceutical profession have been found in Portuguese historical archives. But, as we pointed out, it may be concluded that throughout that period Pharmacy in Portugal was on the same level as in the other (Christian and Arab) Peninsular kingdoms and even in the rest of Europe. Indeed, it would

(1) Moñoyerro, A. — Codigo de Deontologia Farmaceutica, H — 13, Ed. Fay, Madrid, 1955.

find itself constrained by necessity as a result of the great periodical epidemics that swept the kingdom, of the wars the country was forced to fight and of the minute preparations for the overseas expansion outlined in the first half of the 14th century with the voyage to the Canary Islands, resumed in 1414 with the first expedition to Morocco and with the settlement in Ceuta, and, in 1427, with the discovery of the Azores.

In 1449 there appeared the famous chart of privileges issued by King Afonso V granting to all pharmacists the same rights of nobility accorded to physicians, and thus given to reward the merits of Master Ananias and other Arab apothecaries who, at the instant invitation of Prince Henry the Navigator, had come with him from Ceuta in 1438 to establish apothecaries' shops and teach their art at the request of the 1st Duke of Braganza, Dom Afonso, after the great plague epidemic which, coming from North Africa, appeared in this country in 1414-15 and claimed many lives, including Queen Philippa of Lancaster.

This fact confirmed the Arab origins of Portuguese Pharmacy. The document further reveals that the teaching of Pharmacy at the time was tutorial in type and conducted in the apothecaries' shops themselves.

In 1461, the same monarch Afonso V enacted a law regulating the pharmaceutical profession in Portugal and granting to pharmacists the exclusive right of preparing and dispensing medical drugs in these precise terms: «that no one else may sell medicinal preparations to the people.»

The first known apothecary's charter dates from 1515. However, long before then apothecaries must have been subject to examinations, as in the case of physicians — in 1392 King John I had enacted a law whereby no man or woman could practise Medicine without undergoing an axamination.

In the Regulations of the Chief Medical Authority in the Kingdom, enacted by King Manuel I in 1521, it is expressly stated that no apothecary may set up a shop or engage in his profession without prior examination by the Chief Medical Authority, the Court Physicians and the King's Apothecary. The Regulations of the Lisbon Apothecaries, enacted by King Sebastian in 1562, textually determine that «no person may be an apothecary or have an apothecary's shop without holding a certificate for the purpose.»

From at least the 13th century to the 19th the Chief Medical Authority wielded the highest powers in the field of public health. His duties were a combination of those of the modern President of the Medical Association and of the Director General of Health. He presided at the examinations to which medical doctors and pharmacists were subjected and supervised their activities.

The great voyages and geographical discoveries of the Portuguese explorers and the studies of the pharmacists, physicians, naturalists and scholars generally who accompanied them or settled in

the newly discovered eastern and American regions contributed to the growth and development of Pharmacy and Therapeutics in Portugal. The result was the knowledge and the coming to Europe of valuable exotic pharmaceutical drugs. Together with the coveted spices, the ships of Vasco da Gama brought over many of those products, described by Álvaro Velho (2), who sailed with the fleet in the capacity of «reporter» at that time (1497-1499).

The pharmacist Tomé Pires — factor of drugs successively at Cananor, Cochin and Malacca, and finally ambassador of King Manuel I at the Court of Pekin from 1512 to 1516 — describes in his «Suma Oriental» (3) and in his Letter to King Manuel I (4) about thirty important drugs. The same may be said of Duarte Barbosa in 1516 (5).

No less valuable was the contribution of the pharmacist Simão Álvares, factor of drugs at Goa, in his «Enformação», written between 1456 and 1458 (6), where he describes many pharmaceutical drugs and clears up important problems like that of the nature of «white pepper».

The major work in this field, and no doubt the most important one in the whole world in the 15th century about eastern drugs, is that produced by Garcia de Orta (7), published in 1563 and later translated into Latin, Spanish, French, Italian and English. Fifteen years later (1578) there appeared also an important treatise by the Portuguese naturalista Cristóvão da Costa (8), based on the work of Garcia de Orta.

Non-specialist contributions which, however, had great informative value were those of João de Barros and Diogo de Couto in «Décadas da Ásia», Gaspar Correa in «Lendas da Índia», Fernão Lopes de Castanheda in «História do Descobrimento e Conquista da Índia pelos Portugueses», Fernão Mendes Pinto in «Peregrinação» and

(2) Álvaro Velho — Roteiro da Primeira Viagem de Vasco da Gama — With notes by A. Fontoura da Costa — Published by the Agência Geral do Ultramar, Lisbon 1960.

(3) Silva, Pedro José — Elogio Histórico e Notícia Completa de Tomé Pires — Gazeta de Pharmacia, nos. 7 and 8 (1868).

(4) Cortesão, A. — The Suma Oriental of Tomé Pires and The Book of Francisco Rodrigues, vol. II — Hakluty Society, London, 1944.

(5) Duarte Barbosa — Livro em que Dá Relação do que Viu e Ouviu no Oriente. With notes by Augusto dos Reis Machado — Published by the Agência Geral das Colónias — Lisbon, 1946.

(6) Jaime Walter — Simão Álvares e o seu rol das drogas da Índia — Studia, No. 10, pp. 117-149 — Lisbon, 1962.

(7) Garcia de Orta — Colóquios dos Simples e Drogas e Cousas Medicinais da Índia — Impr. Joannes de Endem — Goa — 1563.

(8) Cristóvão da Costa — Tratado das Drogas e Medicinas das Índias Orientais — Impr. Martin de Victoria — Burgos, 1578.

even the great epic poet Luís de Camões in «The Lusiads», not to speak of many others.

Amato Lusitano, the famous Portuguese physician who treated Pope Julius III, was amongst the first in Europe to introduce in therapy exotic drugs from the East and Brazil.

In the reign of King Sebastian (1568-1578), Pharmacy began to be taught at the University of Coimbra under the name of «Faculty of Apothecaries» and grades were defined for the respective students. The Regulations for Physicians and Apothecaries of 1604 confirmed these grades and determined that those who intended to become Pharmacists should study Latin; only after that and after a period of training could they sit for examinations conducted by two lecturers in Medicine and two apothecaries nominated by the Rector of the University.

Until 1656 prescriptions were written in Latin. In the preparation of medical drugs Portuguese pharmacists, for the most part, continued to resort to «Dispensatórios» written in Latin. In the early 18th century, however, there began to appear pharmacopoeias written in Portuguese. Being published by private initiative without any official character, apothecaries were not under the obligation of acting on them, though their publication continued to require adequate authority, including royal permission.

It was certainly not by mere chance that in the early 18th century (1704) the first of the series was a «Pharmacopoeia Lusitana — Método prático de preparar e compor os medicamentos na forma Galénica com todas as receitas mais usuais» (Pharmacopoeia Lusitana — A Practical Method of Preparing Medical Drugs in Galenic Form, with all the more usual prescriptions) — a famous work by Dom Caetano de Santo António, monk of the Order of St. Augustine and Apothecary first of the Royal Monastery of Santa Cruz, at Coimbra, and later of São Vicent de Fora, in Lisbon.

There were three editions of this Parmacopoeia: 1711, 1725 and 1755.

Besides that original work, in 1713 the same Apothecary-Friar Dom Caetano de Santo António translated from Latin into Portuguese the «Farmacopeia Bateana» containing almost eight hundred drugs derived from the practice of George Bateo, Physician to Charles II of England. Of this work there appeared in 1763 another edition greatly enlarged by an anonymous professor supposed to have been Dom António dos Mártires, who taught Pharmacy at Coimbra.

In 1772 there appeared in two volumes the «Farmacopeia Dogmática — Médico-Química e Teórico-Prática», by Father João de Jesus Maria, of the Order of St. Benedict, Pharmacist and administrator of the apothecary's workshop of the Monastery of Santo Tirso.

Of this same Benedictine friar-pharmacist there exists an interesting still unpublished manuscript dated 1777 and bearing the title

«História Pharmacêutica das Plantas Exóticas, seus Produtos, Naturalidades e Virtudes» (9).

It is our belief that these factos clearly show and reassert the contribution of the pharmacist friars to the development of Pharmacy in Portugal in the 17th century.

In 1716, already after the publication of two editions of the «Farmacopeia Lusitana» and one of the «Farmacopeia Bateana», there appeared the «Farmacopeia Ulyssiponense — Galénica e Chymica», by João Vigier, Court Apothecary.

In 1735, another Court Apothecary, Manuel Rodrigues Coelho, published in two volumes the «Farmacopeia Tubalense Chimico-Galénica», of which there were new editions in 1751 and 1760.

In 1766 the «Farmacopeia Portuense» was published, the author being Rodrigues Portugal.

In 1785 there appeared the «Farmacopeia Lisbonense — Colecção dos Simplices, Preparações e Composições mais Eficazes e de Maior Uso», by Manuel Joaquim Henriques de Paiva, a second augmented and corrected edition being printed in 1802.

The end of the 18th century marked the beginning of a new era in the development of Portuguese Pharmacy, with the publication in 1794 (in the reign of Queen Maria I) of the first Official Pharmacopoea to serve as a standard for national pharmacists — the «Pharmacopeia Geral para o Reino e Domínios de Portugal». It remained in force for over forty years, as only in 1835 (in the reign of Queen Maria II) was it superseded by the «Código Pharmacêutico Lusitano» (the second official phamacopoeia). The latter, in sucessive editions, was valid until 1876 (reign of King Luís), when the «Farmacopeia Portuguesa» was published — the third official pharmacopoeia, a remarkable work at the time and which remained in force until 1936. In this year there appeared in up-to-date form the «Farmacopeia Portuguesa IV», with a second edition in 1945 which is still in force with the respective Addenda permanently augmented through the periodical regular publication of new monographs.

Though a Pharmacopoeia was officially adopted in the late 18th century, there continued to appear for some decades others published by private initiative which, by supplementing it, surely contributed to a better performance and progress of pharmaceutical activities. Thus in 1805 the Court Apothecary António José de Sousa Pinto published a «Farmacopeia Chymica, Médica e Cirúrgica» describing simple and coupound drugs, their virtues, mode of preparation, doses and diseases to which they were applicable.

In 1819, and for the exclusive use of the Navy and the Army, a «Pharmacopoeia Naval e Castrense» was officialized, in two tomes, corresponding to the modern Formularies of the respective Pharmaceutical Services.

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(9) Rosendo, J. — Farmacopeias Portuguesas, 1 — 14, Lisbon (1952).

In 1833-34 there appeared, also in two volumes, a «Pharmacopeia das Pharmacopeias», by B.J.O.T. Cabral. Being in a way a repository of all the pharmacopoeias then in existence with the exception of the Portuguese official one, it had great importance and constituted, so to speak, a Comparative Study of Pharmacopoeias, a discipline which is still embodied in the structure of the teaching of Pharmacy in Portugal.

As regards pharmaceutical education, parallel to the university one instituted, as said above, in the 16th century there survived always another predominantly practical one in the line, so to say, of the school of Master Ananias, and taught in the workshops themselves on a tutorial basis. The charter of approval in this type of education had also to be issued by the Chief Medical Authority.

In the early 18th century four posts of visiting and examining apothecaries were created for the jury of examinations held in the «Fisicatura». One of these posts was filled by the King's Apothecary who, since the Regulations of 1521, was the examiner of the Court of the Chief Medical Authority. These posts still existed in the early 19th century and disappeared automatically with the final abolition of the «Fisicatura».

In 1772, during the government of the Marquis of Pombal, the University was reformed but the new statutes did not favour the teaching of Pharmacy, which waas considered subordinate to Medicine.

Ten years later, when the «Fisicatura-Mor» was replaced by the «Junta de Proto-Medicato» (board of doctors in charge of the Health Board), the latter, assuming the functions of the former, became a court.

In the same year when the first legal Pharmacopoeia was published (1794), the Intendant Pina Manique instituted at the «Casa Pia» of Lisbon the teaching of Pharmacy on the same lines as at the University of Coimbra.

In 1809 the «Junta de Proto-Medicato» was extinguished and the «Fisicatura-Mor» was restored. In the following year a Regulation for its delegates was published, new articles being introduced as to examination procedure for Pharmacists.

In 1824 a chair of Chemistry was created at the Lisbon Mint, and many pharmacists anxious to improve their knowledge began to attend it. In its turn, the Sociedade Farmacêutica Lusitana, immediately after its foundation in 1835, launched an energetic campaign to unify the teaching of Pharmacy and improve its standards. The result was a reform in 1836, enacted by the Minister of the Realm Passos Manuel, who founded Schools of Pharmacy attached to the Medico-Surgical School of Lisbon and Oporto. In 1842 a Medico-Surgical School was created in Goa, including the teachning of Pharmacy.

The duality of the courses (1st and 2nd grade pharmacists) continued, however, until 1902, when under the reform of the Minister Hintze Ribeiro the teaching of Pharmacy was unified, the prepa-

ratory courses requiring a prior Higher Lycée Course or the General Course followed by three years of pharmaceutical practice, and also the Courses in General Chemistry, Analytical Chemistry and Botany, taken at the Faculty of Science or at the Polytechnic Schools. The Course in Pharmacy proper was spread over two years and included: Natural History of Medical Drugs, Pharmaceutical Chemistry, Pharmaceutical Technique, Toxicological Chemistry, Bromatological Chemistry and Analysis of Medical Drugs. Approval was through a general qualification examination.

Another reform enacted in 1911 introduced a 240-day training period in hospital pharmacy and increased the scope and duration of the course, while allowing of admittance solely with the General Lycée Course.

In 1915 Schools of Pharmacy became autonomous, and three years later, through another reform, the range of studies was considerably augmented, comprising a General Course in Botany, Pharmaceutical Physics, General Course in Chemistry, Qualitative and Quantitative Chemical Analyses, Pharmaceutical Chemistry (Organic and Inorganic), Biochemical Analyses and Toxicological Analyses, Hydrology, Cryptogamy and Fermentations, Bacteriology, Pharmacognosy, Pharmaceutical Technique, Galenic Pharmacy and Pharmaceutical Ethics and Legislation.

Nevertheless, this reform suppressed the training period which had been introduced in 1911 — no doubt a negative side.

In 1921, the Higher Schools of Pharmacy became Faculties which, after a four-year course, awarded a Licentiate degree on approval in the last examination of the course. Five years later new subjects were introduced, such as Biological Chemistry, Pharmacodynamics and Pharmaceutical Industry, revealing a trend towards the training of pharmacists for industrial pharmacy, which was developing already.

In 1932, a reform which did not prove very satisfactory re-established the duality of the courses. However, in Lisbon and Coimbra, where the Faculties became Schools, there remained only the General Course of three years. The Oporto Faculty of Pharmacy was maintained, however.

Thirty-six years later (on November 22, 1968) the Faculties of Lisbon and Coimbra were again restored, but teaching is still in two cycles: the first, with a duration of three years, leading to a degree of Bachelor with the title of pharmacist; the Complementary Course, two further years, leading to a degree of Licentiate with the professional title of Pharmaceutical Chemist.

At the present moment, parallel to the re-organization of the universities included in the general educational reform, the Faculties of Pharmacy are studying a thorough change in structure and curricula with the introduction of new basic chairs, as, for instance, Mathematics, animal Anatomy and Physiology. It is contemplated that,

after a common period of three years, teaching be diversified into Pharmaceutical Industry, Chemo-Biological Analyses ancillary to clinical practice, and Bromatological and Toxicological Analyses, with a view to increasing and more efficient specialization with the ensuing benefits for the community and the prestige of the noble profession of Pharmacy.

THE TEACHING OF PHARMACEUTICAL SCIENCES IN PORTUGAL

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The sources on the teaching of Pharmaceutical Sciences in the early days of our Nation and in the following decades are not abundant. However, they are of precious assistance to the legislation compiled by TELLO DA FONSECA and especially to the valuable works published by PEDRO JOSÉ DA SILVA, PROF. DOCTOR GUILHERME DE BARROS E CUNHA, ALVES DA SILVA AND OTHERS. The Coimbra professor — who developed studies on History, Legislation and Deontology with rare proficiency — considered that in 1392, in the reign of King João I, there already existed the obligation of an examination for those who wished to exercise the profession of Apothecary (Botica).

A law charter in the above-mentioned year gave the physicist Master MARTINHO (Mestre Martinho) powers to examine in Physics — at that time sub-divided into Dogmatics and Ministrants (Dogmática e Ministrantes), this latter being equivalent to Pharmacy. In 1448 the Statute of Chief Surgeon (Regimento do Cirurgião-Mor) establishes the obligation of an examination for those who wish to practise the «Arts of Physics and Surgery» and later on, in the Charter of Apothecaries' Rights (Carta de Privilégios de Boticários) the possibility of «fixed apothecaries» (Boticas) was discussed.

It is the reasonable opinion of Prof. BARROS e CUNHA that the first charter of pharmacy known, and published in 1515, transcribed by PEDRO JOSÉ DA SILVA, does not correspond to the first pharmacy examination, all the more so since the dispositions of 1514 already referred to apothecaries who had been examined. Moreover, PEDRO JOSÉ DA SILVA also admits, in his valuable history, «that there were pharmacy examinations before 1521», dating the respective legislation between 1515 and 1521, therefore at an earlier date. There is no doubt that 1521 is simply the date of the publication of regulations for examinations already in existence.

Also in 1535, in King João III's reply to the People's Claim (Reclamação dos Povos) asking that the New Christians should not be allowed to be doctors and apothecaries, the responsibility is emphasized that only those individuals approved by the chief physicist (físice-mor) might open an apothecary's.

It is believed that the coming to Portugal of Master (Mestre) ANANIAS, an Arab from Ceuta, contributed greatly to the learning of the art of Apothecary. The Charter of Privileges (Carta de Privilégios), 1449, signed by King Afonso V, refers to his influence and to «all the others who came with him and those who will come after him or learn with him, or with others from any of our territories».

There were possibilities of teaching the respective art and science not only in private Apothecaries' (Boticas), but also in those in monasteries, or even with the Court apothecaries. Thus, some names stand out as early as the end of the XV century and from the beginning of the XVI century, such as GONÇALO BAIÃO, apothecary to King João II, and Friar JOÃO, in the Monastery of Alcobaça, who came from France to the Order of St. Bernard. And what are we to say about the profound knowledge of TOMÉ PIRES who gave so much prestige to pharmacy, who became a well-known ambassador in India, celebrated for his letters of the first quarter of the XVI century on Indian drugs? And his famous «Suma Oriental»?

To some apothecaries, among the most learned, delicate overseas missions were entrusted. Thus, SIMÃO ÁLVARES distinguished himself in 1546 for the great services rendered by his apothec during the attack on the fortress of Diu.

In older days the study of pharmacy was based on practice in an apothec and, after some years, when the candidates were considered skilled, they presented themselves for examination by the Chief Physicist, Court Physicists and Apothecaries (Físico-Mor, Físicos e Boticários da Corte). And, if the presence of these was not possible, others were chosen from the Town, village or hamlet. (Cidade, Vila or Lugar). After which a Charter to «exercise their office» was granted.

In the Statutes given by KING MANUEL, governing the Lisbon University, there exist studies in Medicine, as also in those by KING JOÃO III, at the time of the removal to Coimbra, although attendance was not numerous, because it was easir to «make» doctors through the Institution of Physicians (fisicatura). Diplomas granted in the time of the Philips are known from 1585 and 1618 which refer to pharmaceutical studies in the Faculty of Pharmacy at Coimbra University — a Faculty which already existed in the reign of KING SEBASTIÃO.

In order to encourage these studies King SEBASTIÃO created grants for students in the only University in the Country, as witnessed by a charter of 1585 and a Statute of 1604. It was his intention that they should have quality and ability for the good of the said science. Charters were granted to Town Halls and Misericordias with the intent that the apothecaries should benefit from the grants and gain honours and rewards.

The Statute of 1604 already referred to 20 places established for the above mentioned students for a 6 year course. They learnt Latin for two years and 4 years practice in Apothecs with the Apothecaries (Boticários) in the town of Coimbra and other towns and villages in the Kingdom. These grants were of 20 thousand reis each, 16 ex-

pended on the Apothecaries who taught and the rest on the apprentices themselves. When they were considered skilled, the candidates were examined by a jury consisting of the Lente de Prima and de Véspera de Medicina, two assistants and two city apothecaries. This Statute of 1604 stressed the fact that such apothecaries did not need to be examined by the Chief Physician (Físico-Mor) for the exercise of their profession.

The places for students of pharmacy were not always provided and were often given to students of medicine.

Candidates for Apothecary encountered two great obstacles: lack of provision of scholarships and the ease with which the Chief Institution of Physicians (Fisicatura-Mor) of the Kingdom continued to «make» professional men without the necessity of passing through the University. And what difficulties the professional men encountered, too, in establishing grants in the Town Halls! The doctors, although with some difficulty, always succeeded in obtaining endowments. For the Apothecary it was more difficult, although provisions stated that the local taxes «derramas» were intended for the support of doctors and apothecaries. Also there was no lack of measures relative to the establishment of equality of rights among the students who learned in the Faculty of Pharmacy and Medicine. (Charter of 1618). However, it is worthy of emphasis that, by the Statute of the University of Coimbra, 1654, all poor students received monthly gratuities from the University Pharmacist.

The facts mentioned, about the diversion of funds, contributed to the stagnation of teachning and the professional practice of Pharmacy, to the benefit of Medicine.

Things diverged in different directions: the number of doctors qualified by the University increased with a decrease in the number of those created by the Chief Institution of Physicians in the Kingdom (Fisicatura-mor do Reino), but in the case of Pharmacy, exactly the contrary proved to be the case. This is affirmed by the illustrious historians PEDRO JOSÉ DA SILVA and GUILHERME DE BARROS E CUNHA.

Protests against the great power of the Chief Physician and the Chief Surgeon were not rare.

In 1656 King JOÃO decreed that medical prescriptions should no longer be written in Latin, but in Portuguese. This gave more power to the Chief Institute of Physicians (Fisicatura-mor) to the detriment of the University Pharmacy Courses. It stimulated the publication of books in the vulgar language and one of these referred to the Pharmacy examination. All this fed still more the desire to receive the fees and emoluments that they had to pay to the Chief Physician of the Kingdom (Físico-mor do Reino) and his officers, and the donations to be offered to Saints Cosmos and Damian.

The pharmacist's learning perfected, the necessity arises of the elaboration of works which might be guides to a certain uniformity of household remedies and to study.

One pharmacist — JOSEPH COELHO — with an apothec in the Rua Larga de Coimbra, left a valuable work, written in Latin and

Portuguese, dated 1668. Other pharmaceutical authors transmitted their knowledge, as early as the 17th century, through the publication of various works: JOSEPH HOMEM DE ANDRADE, of Lisbon (1691 and 1692); in the 18th century, DON CAETANO DE SANTO ANTÓNIO, canon of the religious order of Saint Augustine, teaching in the Monastery of the Holy Cross (Mosteiro de Santa Cruz) in Coimbra, with his editions of the Pharmacopoeias, based on Lemery's chemistry books: (1704-1711-1713-1725-1755); JOÃO VIGIER, a French naturalised Portuguese (Works dated 1714-1716-1718-1745), one of them the Pharmacopoeia Ullyssiponense): MANUEL RODRIGUES COELHO, author of Pharmacopoeia Tubalense (1735-1751), considered by Pedro José da Silva as a truly colossal monument to polypharmacy.

The 18th century is fertile in works concerning the art of pharmacy, and we must not forget other translators and authors: ANTÓNIO LOPES DA SILVA translated Apothecary's examination: (Exame de Boticários), DOM ANTÓNIO DOS MARTYRES, a native of Coimbra (Pharmaceutical Anthology) (Collectaneo Pharmaceutico) 1735-1763; Pharmacopoeia Bateana: 1768) by Father Friar JOÃO DE JESUS MARIA, a Santo Tirso monk (Pharmacopoeia Dogmática: 1772).

Pombal's Reform was extremely courageous and, in certain aspects, it revolutionized the methods of teaching then existing. But in the field of pharmacy it was not very significant. It was considered wise for the Hospital Administration to request an Apothec for the purpose of preparing remedies for the sick, for the Medical Students to practise in pharmaceutical processes, and to create «Professional pharmacists with the intelligence necessary for the exercise of the Art in a sound manner». Thus the Pharmaceutic Dispensary (Dispensário Farmacêutico) was instituted, giving instruction on its aims and keeping of medicines in the respective houses, not forgetting a room for the Dons' Lessons in Medical Matter and inherent Demonstrations. The necessity of a pharmacist very skilled in his art was stressed.

These Statutes of 1772 prescribed that to enter a Dispensary for the purpose of training for the profession of Apothecary, a candidate must have practised for two years in the Chemical Laboratory, matriculating in the quality of craftsmen («operários»). Only after this were they admitted to the Dispensary, as pharmaceutic probationers, working in the workshop under the orders of the Pharmacist for two years. When they were considered skilled, they took an examination, in the presence of the Professor of Medical Matter (Lente de Matéria Médica) and his Demonstrator (Demonstrador), and Dispensary Pharmacist (Boticário do Dispensatório). Tests on chemical and pharmaceutical operations were drawn by lot and carried out in the presence of the three members of the Jury, either passing or failing. These pharmacists did not need any further examination in order to open a Pharmacy.

In order to promote this teaching, the Pombal Reform created ten grants for students of pharmacy: five for those who frequented

the Chemical Laboratory in the first two years and five for the last two years.

Besides this, the Pombaline Statutes facilitated access to the Botanic Gardens for the study of medical plants.

But the ten grants for Pharmacists were instituted more for the purpose of having workers responsible for the indispensable demonstrations for the teaching of Medicine and Philosophy rather than with the object of providing pharmaceutic teaching. This is to say, the 20 grants in the reigns of KING SEBASTIÃO and the Philips were reduced to half. As PEDRO JOSÉ DA SILVA says, instead of calling them pupils or students, they are referred to as workers and their speciality is considered «subordinate to Medicine». And as a disagreeable measure: the grants for students of medicine, Mathematics and Philosophy were of 50 thousand Reis and those of the art of pharmacy 30.

Contemporary with the Pombaline Reform we must emphasize the publications of the pharmacist-botanist of the Apothec Our Lady of Carmo (N. S. do Carmo) in Braga, Friar CRISTÓVÃO DOS REIS (1779).

The teaching of pharmacy was extended to Lisbon by an edict of 1794 by Superintendent PINA MANIQUE. A School of Apothecaries was created in the Casa-Pia, Lisbon, as desired by the students of Coimbra University, with instruction in Chemistry and Botany and practice in the art of Prarmacy. Medicaments were prepared according to the «General Pharmacopoeia» (Pharmacopeia Geral). This was a work edited by imposition of the Pombaline Statutes but was only obtained in 1794, although without the responsibility of the Faculty of Medicine in Coimbra, as was incumbent. Its author would appear to have been the Professor of Medicine, FRANCISCO TAVARES, son of an accredited pharmacist established in Coimbra.

The «making» of Pharmacists continued simultaneously by means of a simple examination, without frequenting any university course. A dispatch dated 23rd May 1800 established the Plan of examinations proposed by the Royal Council of Proto-Medicato, signed among others by the above mentioned Doctor FRANCISCO TAVARES. An edict by the same Council, in 1804, prescribed the obligation of a knowledge of Latin in order to understand Books written in that language.

On 22nd January 1810 the noxious Chief Institution of Physicians (Físicatura-Mor) was once more created, and the Council of Proto-Medicato abolished, while the Court was in Rio de Janeiro. Thus the «making» of pharmaceutics without erudition continued.

The struggle unleashed in Lisbon by the more learned degree-holders in defence of their prerogatives in understandable and among the number of their desires we find «adequate teaching».

This brilliant group of Pharmacists gathered together under the name of Lisbon Pharmaceutical Society (Sociedade Farmacêutica de Lisboa) and later under that of «Lusitanian Pharmaceutical Society» (Sociedade Farmacêutica Lusitana), was installed formally on 24th

July 1835. Ist outstanding personality was JOSÉ DIONÍSIO CORREIA. This Society, right from the date of its inception, carried out a truly monumental work, so much so that QUEEN MARIA II consented to be their protectress, and later KING LUIZ and KING CARLOS I became their Protectors.

The great instigator of public instruction in the 19th century, MANOEL DA SILVA PASSOS, known as PASSOS MANOEL, ordered the suspension of the «making» of Pharmacists by the Chief Physician (Físico-Mor) and about a month later, on 5th December 1836, established a new organisation of scientific courses for Coimbra University. In the chapter which refers to the School of Pharmacy, it was stated that only those candidates who presented documents proving they have frequented, even if only as listeners, the classes on Zoology, Botany, Physics and Mineralogy in the Faculty of Philosophy, Grammar schools or establishments with similar studies, would be admitted to sit for the final examination.

The same statesman, by Decree of 29th December 1836, remodelled the Lisbon and Oporto Schools of Surgery and, in addition, instituted Schools of Pharmacy, with theoretical courses in Botany, Natural History of Drugs (2 years), Chemistry and Pharmacy. This instruction was completed with a two year practical course, which consisted of practice in pharmaceutical operations, in the Pharmaceutical Dispensary of the respective Medico-Surgical Schools — as they began then to be called. This practical course could take place in approved and accredited laboratories.

This 1836 Reform also prescribed the establishment of National Grammar Schools in the chief city of a district and so after 5 years, entrance to the University. To study pharmacy, there were 6 preparatory subjects. At the same time, certain protective measures for the university course were instituted.

The Law of 1836, with reference to Medico-Surgical Schools in Lisbon and Oporto, was regularized in 1840 and presented some details on the practical classes in Chemistry, Botany, Toxicology etc. and the respective examinations.

Soon there appear appointments of pharmacists as professors in the Pharmaceutic Dispensaries, some becoming notable through their lectures on Pharmacy and toxicology. Such is the case of JOSÉ TEDESCHI, in Lisbon (1845).

A Pharmaceutic course was also created in the Medico-Surgical School in Nova Goa in 1847. Information exists about the enrolment of students of Pharmacy in the Medico-Surgical School in Funchal (1850).

A Law of 12th August 1854 established the qualifications necessary for pharmaceutical candidates for admission to pharmacy examinations for those candidates who had not frequented the theoretical and practical courses in any of the three Schools. They were required to have passed examinations in primary education, translation of the French or English language, in arithmetic and geography, the principles of physics and chemistry, and introduction of natural his-

tory of the three kingdoms. The same Law granted a special emolument to candidates with four years of good practice.

The Charter of Law of 19th July 1902 reorganized pharmaceutic teaching administered in Schools, annexed to the Faculty of Medicine in Coimbra and the Medico-Surgical Schools in Lisboa and Oporto.

The following subjects were introduced:

1st year — Natural History of Drugs, Posology, Chemical Pharmacy, microscopic and chemical analyses applied to medicine and pharmacy. Practice in the respective laboratories.

2nd year — Pharmacotechnic, sterilization and practice in the pharmaceutic laboratory; toxicologic analyses, legal chemistry, alterations and falsifications of medicines. Practice in the chemical laboratory.

Entrance into these schools was made by passing the Grammar School complementary course or general course and three years of practical pharmacy.

With the establishment of the Republic, new legislation was published on 26th May 1911, distributing the subjects over eight semesters:

First Group — Courses in Inorganic Chemistry; Organic Chemistry; Chemical Analyses; Physics; Mineralogy; Geology; Hydrology; General Botany; Pharmaceutic Botany, Cryptogamy and Zoology.

Second Group — Natural History of Drugs; Posology; Pharmacotechnic; Biologic Chemistry; Pharmaceutical Chemistry; Bacteriology; Toxicologic Analyses and legal Chemistry; Bromatological Analyses and Legislation and Pharmaceutical Deontology. This list of subjects was completed by 240 days of pharmaceutical practice in hospital service during the last two semesters.

In 1918 the teaching of pharmacy suffered a further remodelling, still continuing in Schools, but independent and autonomous. The subjects were distributed over 4 years, with a list markedly similar to former legislation, distributed in four sections:

A) — General Chemistry: — General Course in Chemistry, two semesters; Qualitative chemical analyses, two semesters; Quantitative chemical analyses, two semesters.

B) — Applied Chemistry: — Inorganic chemical pharmacy, two semesters; Organic chemical pharmacy, two semesters; Biochemical analyses, one semester; Bromatology and bromatological analyses, two semesters; Toxicology and toxicological analyses, two semesters; and Hydrology, two semesters.

C) — Natural History: — General Course in Botany, two semesters; Cryptogamy and fermentations, two semesters; Bacteriology, one semester; Natural History of Drugs, two semesters; Pharmaceutic Zoology, two semesters.

D) — Pharmacy: — Pharmaceutic Physics, one semester; Pharmaceutic techniques one semester; Galenic Pharmacy, three semesters; and Deontology and Pharmaceutic Legislation, one semester.

It must be pointed out that, on 29th April 1919, the Schools proceeded to confer the degree of licenciate.

At the beginning of 1921 the Schools were raised to Faculties, the same plan of studies as in 1919 being maintained.

A new reform occurred in 1926, distributing the subjects over four years, but with the express condition of one preparatory year in the Faculty of Sciences, and a minimum of three years in the Faculty of Pharmacy. It may be said that the principal innovations are the introduction of Pharmacodinamy, Pharmaceutic Industry, and Physico and Physico-chemical Analyses, instead of Pharmaceutic Physics. Bacteriology was augmented by the addition of micrology and fermentations.

A Reform published in 1930 included the subject of Hygiene and gave new nomenclature to some subjects, the 4 years course being maintained.

The Reform of 1932 organized the teaching in two cycles, one of 3 years, followed by another of 2, a total of 5 years, for the degree of licenciate. The latter was taken at Oporto University (considered the only Faculty in the Country) and in Coimbra and Lisbon only the first cycle of 3 years was established, and is considered a Professional Course. In this first cycle the following subjects were appointed:

1st Year — General course in chemistry (1 year), in the Faculties of Sciences; Course in chemical analyses — 1st part (1 year) in the Faculties of Sciences; General Course in Botany (1 year) in the Faculties of Sciences; Pharmacognosy — 1st part (1 year), in the Schools of Pharmacy; Course of Pharmacophysics (1 semester), in the Schools of Pharmacy.

2nd Year — Course in Chemical Analyses — 2nd part (one year), in the Faculties of Sciences; Inorganic Pharmaceutic chemistry (one year), in the Schools of Pharmacy; Pharmacognosy — 2nd part (one year), in the Schools of Pharmacy; Course in Pharmaceutic technics (one semester), in the Schools of Pharmacy; Galenic Pharmacy (the first semester) in the Schools of Pharmacy.

3rd Year — Cryptogamy and Fermentations (one year) in the Schools of Pharmacy; Organic Pharmaceutic Chemistry (one year) in the Schools of Pharmacy; Galenic Pharmacy (2nd and 3rd semesters), in the Schools of Pharmacy; Course of Deontology and Pharmaceutic Legislation (1 semester), in the Schools of Pharmacy.

And in the second cycle:

4th Year — Physico-chemical analyses (one year); expirimental pharmacodinamy (one year); Course in Applied Microbiology (1 semester); Course in Hydrology (one semester); Course in Pharmaceutic Industry (one semester).

5th Year — Biologic chemistry and biochemical analyses (one year); Toxicology and toxicologic analyses (one year); Bromatology and bromatologic analyses (one year); Course of Hygiene (1 semester); Comparative study of the Pharmacopoeias (one semester).

In November 1968 the Schools of Pharmacy in Coimbra and Lisbon were raised to Faculties, the granting of degree being put on the same level as the one of the Faculty of Pharmacy in the University of

Oporto. The three Faculties in the country can grant the titles of Professional Course (at present Bachelor of Pharmacy), Licenciate and Doctor. It is the intention of the Government shortly to publish another reform of pharmaceutic teaching with a plan of studies more integrated with the desires of the present times.

There are many who teach in the old Schools and in the Faculties of Pharmacy, some with the title of Pharmacists and others licensed by similar Faculties, which is not surprising because certain preparatory subjects have been given in the Faculties of Sciences. Several personalities stand out, not only in the pedagogic field but also in the field of scientific investigation and in the publication of didactic works, courses of improvement, and even in the field of politics.

The enumeration of all the professors in the list of subjects in the three Schools and Faculties of Pharmacy would be an extensive work which would not interest the nature of this report. All the same, Portuguese Pharmacy has striking personalities who teach with great authority.

BRIEF NOTES FOR THE HISTORY OF THE LUSITANIAN PHARMACEUTICAL SOCIETY

ANTÓNIO AFONSO PALLA CARREIRO
President of Portuguese Pharmaceutical Society

Introduction

It was in the reign of King Afonso V — Charter of 22nd April 1449 — that the art of pharmacy was regulated for the first time in Portugal, giving apothecaries privileges and obligations equal to those of physicians. From this measure there resulted a notable advance for pharmacy, competent professionals appearing at once. But as from 25th February 1515 — First Statute of the Chief Physicist in the Kingdom (1st Regimento do Físico-Mor do Reino) the examinations of physicists and apothecaries were dependent on that discriminating authority. The medical and administrative powers over the apothecaries were exercised with a rod of iron, which led José Tedeschi, learned pharmacist of the last century, to nickname the Fisicatura-Mor «The Pharmacy Inquisition».

It was only in 1772 that the reform signed by the Marquis de Pombal opened up some perspectives, permitting to students of pharmacy a period of work and study in the new «Dispensatório Farmacêutico» at the University of Coimbra. Meanwhile, in 1782, in the reign of Queen Marie I, the Chief Institution of Physicians (Fisicatura-Mor) was substituted by the Royal Council of Proto-Medicato (Real Junta do Proto-Medicato) which, in 1809, was abolished and the former re-established in the following year, still stronger, to continue its former mission, now defended by the «most complete document which was published for the purpose of *honestly extorting* money from the Portuguese apothecary» who, in view of the protests and claims, brought about the publication of the royal Charter of 30th January 1811, by which the duties and Fisicatura taxes and super taxes on apothecaries were reduced by more than 50 %. It was in this atmosphere that Pharmacy lived, ill-treated by the Chief Institution of Physicians and subordinated to Medicine. Only with the coming of Liberalism and the coronation of Queen Mary II, did new horizons open to the pharmaceutical profession.

Foundation of the Pharmaceutical Society

Preceded by a movement initiated in the previous year, 38 pharmacists assembled in the dispensary of the S. José Hospital, proceeded, on 24th July 1835 — the anniversary of the entrance in Lisbon of the liberating troops under the command of the Duke of Terceira — to the solemn institution of the Lisbon Society of Pharmacists, as the result of a struggle against a subjection for more than 3 centuries. The principal aim of the new Society was to promote to the greatest extent, the progress of pharmacy, to contribute to the betterment of everything relating to public health, to the limits of science and to aid those of its members, widows and children, who in the future should need help.

Its statutes were approved on 12th January 1836. Two years later, on 7th May 1838, they were modified, the association now being named: Lusitanian Pharmaceutical Society (SOCIEDADE FARMACÊUTICA LUSITANA).

The first headquarters of the Society was in the above mentioned dispensary in the S. José Hospital and, thanks to Queen Mary II, protrectress and benefactress of the Institution — moved to the Monasteries of the Barefooted Carmelites and of S. John Nepomuceno, from where they were later successively transferred to different suitable places (rented houses). In 1900 the Society was installed in its own building, which it built in the street to which the Lisbon Town Hall, under the presidency of Count Restelo (who was a Pharmacist) in a session on 30th January 1901, gave the name of Pharmaceutical Society.

The first Board was presided over by the pharmacist José Vicente Leitão, who had as first secretary the great driver and «soul» of the Society, José Dionísio Corrêa and as second secretary, António de Carvalho. His Permanent Committees (Comissões Permanentes) which for decades contributed with valuable studies and work which gave much prestige to the Society, were called: *Natural History, Physics, Chemistry and Pharmacy*. Later those of: *Editorial* (of papers) and *Professional Interests* were added.

In obedience to the statutory aims, the Society organised the Pharmacists' Widows and Orphans Fund (O Montepio Farmacêutico) which did valuable work of a mutualist nature until the middle of the 19th century and took an active part in the administration of the work of charity «Savings of Widows and Orphans» (Mealheiro das Viúvas e Órfãos) for many years.

Activity of the Lusitanian Pharmaceutical Society

A) — *In the Regularization of the Public Health Services.*

After the abolition of the Fisicatura-Mor of the Kingdom (Fisicatura-Mor do Reino) the Society established a new life for Portuguese Pharmacy. With the medical regulations published in 1837, the Council of Public Health (Conselho de Saúde Pública) was created,

which defined and regulated the profession, establishing rights and duties — the Government praising the Society for its collaboration (8th August 1838).

The Society also contributed with the opinions and proposals for the improvement of the Country's health legislation, having had representatives in official Organisations of Public Health for a century. It elaborated the project of the laws promulgated in 1926 and 1929 on the Practice of Pharmacy and the creation of the Inspection of the Practice of Pharmacy (Inspecção do Exercício Farmacêutico). It collaborated in the regularization of the National Health services (1911). It always maintained active representation on the official committees appointed to elaborate the Portuguese Pharmacopoeia and regulation of prices of medicines. It took a relevant part in the elaboration of proposals on pharmaceutical assistance through mutualist institutions (1919). It elaborated the project of reform of the military pharmceutical service (28 October 1910).

In its laboratory, adjoining its headquarters, the Society also promoted — in a spirit of pioneering which it revindicated — the analyses of mineral-medicinal and potable waters, commissioned by the Government, in many hundreds of cases. As to the professional aspect it had fought for since 1909 for the establishment of the permanent service of pharmacies (in turns), weekly rent, hours of work, etc.

B) — *On Pharmaceutic teaching.*

Of the activities of the Society, in the field of Pharmacy teaching, may be pointed out: the suspension, in 1836, of the examinations in Pharmacy given by the Chief Physician and his delegates; the project of the reform of the university studies and the creation of Schools of Pharmacy, annexed to the Medical-Surgical Schools founded in 1825 in Lisbon and Oporto; the institution of practical courses in pharmacy in the pharmacies of the S. José Hospital in Lisbon and the Santo António Hospital in Oporto, taught by professors José Tedeschi, Felix da Fonseca Moura and Cândido Xavier Cordeiro, as a starting point for the establishment of a University course in Pharmacy.

Together with other pharmaceutic collectivities planned the reform of teaching under the responsibility of the Minister of Interior (10th January 1901), which was presented to Parliament on 26th February 1902, by the then President of the Council, Counsellor Hintze Ribeiro and which was made effective by the law of 19th July of the same year legalised by that great statesman. (At last the teaching of pharmacy was raised to University level!) Attention is focused, by the way, on the celebrated representation to the Government made on 2nd August 1901 by the Society and which was memorable for suggesting a source of revenue to cover the expenses of the maintenance of the Higher Courses of pharmacy: the stamp on pharmaceutical patent medicines. (At last, the aspiration, since

1835, of the Lusitanian Pharmaceutical Society had been realised: the creation of a single course qualifying pharmacists.)

The Republic proclaimed, the Provisional Government, through the Minister of Interior, Dr. António José de Almeida, requested the collaboration of the Society for the reform of the teaching, which came into force in 1911. Only in 1918, however, by the reform known as that of Sidónio Pais, were the Schools of Pharmacy, existing since the reform of Hintze Ribeiro (1902), raised to the title of Higher Schools. One year later, in 1919, the Degree of Licentiate (Chemical Pharmacists) was instituted — the 50th anniversary of which was deservedly commemorated in 1969 by the Lusitanian Pharmaceutical Society, in the presence of His Excellency the President of the Republic, Admiral Américo Tomas; a representative of Brazilian professors (Prof. Liberalli); the Life Secretary of the Academy of Sciences and the Portuguese Professors (various professors of the Faculties of Pharmacy of Oporto, Coimbra and Lisbon). Finally, on 13th January 1921, Dr. António José de Almeida being President of the Republic and Prof. Augusto Nobre Minister of Education, the Higher Schools of Pharmacy were raised to the category of Faculties, in the three Universities, the presence of the Society in these events in the history of Portuguese Pharmacy being well known.

C) — *In the diffusion of culture.*

The activity of the Lusitanian Pharmaceutical Society has been extraordinarily notable during its hundred years of existence in the field of Culture and Diffusion, as may be appreciated by the following summary:

— Promoted innumerable lectures and lessons, on scientific and professional subjects, on a scale of unmatched diffusion;

— Published from 1835 to 1933 the Lusitanian Pharmaceutical Society Journal (Jornal da Sociedade Farmacêutica Lusitana), which constitutes the most complete repository of scientific, technical and professional works on patent medicines existing in Portugal;

— Instituted the José Dionísio Corrêa prize, given for works of a scientific nature (1885);

— Organised, with the co-operation of the Portuguese pharmaceutical bodies, the first National Congress of Pharmacy and the first Exhibition of the Pharmaceutical Industry in 1927, inaugurated by the former President of the Republic, Marshal Fragoso Carmona;

— Organised a Library which is the most complete in the country in works on Pharmacy and Chemistry, being the library which possesses the greatest collection of Pharmacopoeias, national and foreign, of all times in Europe, including one unique example in manuscript of the Third Part of the Dogmatic

Pharmacopoeia (Terceira Parte da Farmacopeia Dogmática) by Frei João de Jesus Maria, as well as innumerable publications, scientific and professional, periodicals, from all over the world;

— Took part in many International Pharmaceutical Congresses; in the centenary commemorations of the Royal College of Surgeons, etc.;

— Belonged to the Portuguese Association for the Progress of the Sciences and to the International Pharmaceutical Federation as from 1913.

— Organised a Museum of ancient Pharmacy, where there are some pieces of valuable ceramics, diplomas and various other objects.

Integration of the «Society» in the National Syndicate of Pharmacists.

By the institution of the corporative regime in Portugal, in 1933, the Lusitanian Pharmaceutical Society — enjoined by the law — was incorporated in the National Syndicate of Pharmacists which is its legitimate continuator, in the terms of the respective Statute, compulsorily using, and as an exception, as sub-title, the name of the Lusitanian Pharmaceutical Society.

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HOSPITAL PHARMACY IN PORTUGAL

MARIA LUISA SANTOS

Technical Pharmacist of Governing Body of the Hospitals

The Carreer of Hospital Pharmacist

Portuguese Hospital Pharmacy with its place in our central, regional and sub-regional hospitals, led an unco-ordinated existence until February 1962, the month in which by Decree-Law n.º 44 204 prepared with the collaboration of the majority of our hospital pharmacists and in close understanding with the National Syndicate of Pharmacists were published the first official tenets and on a national level on hospital pharmacy, establishing regulations, functions, structure of service, rules anent competition for admission of staff, diagram of list of staff, etc.

Also the evolution attained by the Portuguese hospital organization, the building of new hospitals, remodelling and adding to many of the existing ones, and also the isolation in which each worked, in mutual ignorance of the different activities developed in each of its sectors, made the necessity felt of creating an official department to guide and co-ordinate from above, at a central and regional level and in its respective steps, the whole metropolitan and insular hospital organization so as to make it more efficient in its functioning.

Governing Body of the Hospitals (Direcção-Geral dos Hospitais)

With this in mind, Decree-Law n.º 43 853 was published creating the Governing Body of Hospitals and later Decree-Law n.º 44 320 and Order in Council n.º 19 221 which ensured its installations, functioning and regulations.

So it was that the Portuguese Hospital Pharmacy saw some of its greatest aspirations realized almost simultaneously:

— The creation of the career of hospital pharmacist, regularized on a national level in all its categories;
— And the co-ordination from above of its activities exercised by an official organisation — the Governing Body of the Hospitals.

Among the technical Services of this Governing Body is included the Hospital Pharmacy Service directed by a Superior Inspector with the collaboration of technical pharmacists, who act both in the central

Services and in each of the Hospital Zones. For the purpose of the hospital organization and with a view to attaining, within the hospital policy outlined, a greater efficiency of the whole, the country was divided into zones, regions and sub-regions. The Hospital Zones constitute technical units equipped in the different branches of hospital activity Thus in each Zone ther is a technical pharmacist.

Hospital Zones

Each of the technicians in the respective Hospital Zones (until lately 3 — the centre, the south and the north) promotes frequent visits to each of the pharmaceutical services in the hospitals in his zone, whether regional or sub-regional, not only for the purpose of checking how the services are organised and how they are functioning, but also to give the advice and suggestions considered sound for the better efficiency of the sector, especially as regards orderliness, distribution and safe-keeping of the medicines in the pharmacy and in the various services of the hospital, special care with drugs, etc.

The activities of the pharmaceutic technicians in the Hospital Zones are controlled by reports elaborated by them, meetings with the central services of the Governing Body of the hospitals, also by visits and meetings which the technicians of the central services promote.

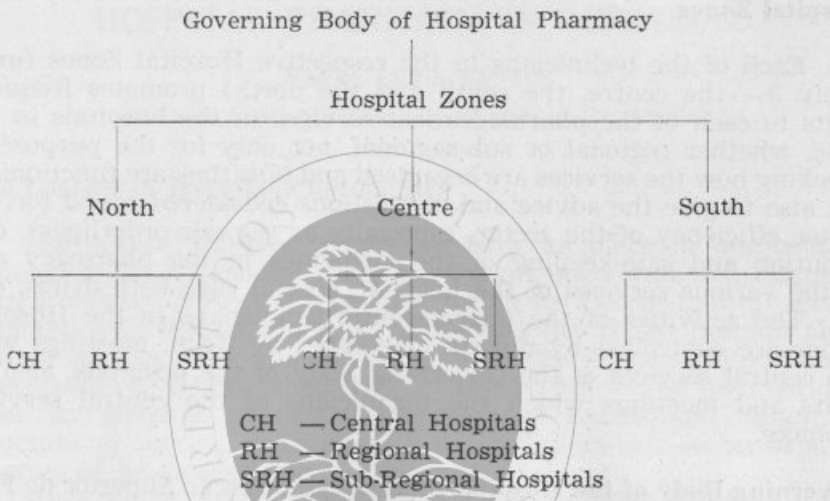
Governing Body of the Hospital Pharmacy (Direcção Superior de Farmácia Hospitalar)

It is especially incumbent on the hospital Pharmacy Service of the Governing Body, at present entitled Governing Body of Hospital Phamacy:

— To direct the installation, organization and functioning of the Pharmaceutic Services in the hospitals dependent on the Governing Body;
— To keep a close watch on the same and supervise the carrying out of pharmaceutic activity;
— To collaborate in the elaboration of programmes of construction, remodelling and equipment of the hospital pharmaceutic services;
— To prepare formularies, textbooks and other elements normal to the Hospital Pharmaceutic Services;
— To investigate the needs of the pharmaceutic staff and helpers in the Hospital Pharmaceutic Services;
— To promote the realization of competitions of qualification of the staff of the hospital pharmaceutic career and those for filling vacancies which should be published by the Governing Body;
— To encourage the relisation of activites with a view to bringing up to date the scientific and professional value of the pharmaceutic staff;

— To render, within the scope of its technical specialization, to the various services of the Ministry of Health and Assistance, the collaboration it may be asked for and authorised give from above;

DIAGRAM



— To give technical and administrative support to the Committee of Hospital Formulary of Medicine (Comissão do Formulário Hospitalar de Medicamentos);
— To direct the technical pharmacists of the departments of the Governing Body technically;
— To represent the Governing Body on the committees, congresses and other meetings, national and international, of the pharmaceutic activity;
— To propose all measures judged necessary or convenient for the greater efficiency of the hospital pharmacy services.

Hospital Re-equipment

The Governing Body of the Hospital Pharmacy Services also gives its technical collaboration in the plans of hospital re-equipment, estimating and deciding on the material intended for the hospital pharmaceutic services.

Permanent Committee of the Formulary of Medicines (Comissão Permanente do Formulário de medicamentos)

In close connection with the Governing Body of the hospitals, a permanent committee will function with it to proceed to the revision and bringing up-to-date the Formulary of Medicines in the hospitals,

which is authorised by higher authority and is constituted by professors of the Faculty of Medicine, hospital pharmacists and those of public health.

Centralization of Purchases

The Governing Body of the Hospitals, through SUCH (Serviço de Utilização Comum dos Hospitais) Service of Common Utilization in the Hospitals, with a view to reducing the huge sums which each one of the hospitals spends on medicines and materials for dressings and sutures and also to give them due technical support, some years ago organised the centralization of purchases of medicines and materials for dressings and sutures for the regional and sub-regional hospitals, preparing, for this purpose, the whole structure of this activity and finally informing the hospitals of the results of their choice and the prices of the products in question.

Settling Staff in the Periphery

Under cover of the Third Plan of Progress (III Plano de Fomento) and by means of the financial subsidy given to the Plan of Fixing Staff on the Periphery (Plano de Fixação de Pessoal na pariferia), which includes doctors, pharmacists, nursing and administrative staff, it has been possible to overcome some difficulties of different kinds met with on attempting to place technical staff in the peripheral hospitals, thus more or less remote from the large centres. The regional hospitals integrated in the hospital network, thus have pharmacists to direct their services.

Hospital Pharmaceutic Services

The pharmaceutic services of the hospital establishments constitute departments with technical autonomy, although subject to general guidance by the administrations; and their physical and functional dimensions are different according to whether they are central, regional or sub-regional hospitals.

	N.º of beds	N.º of Pharmacists	Annual value of consumption of medicines
Central Hospitals	8 000	56	80 000 contos
Regional and subregional hospitals ...	15 000	29	60 000 contos
TOTAL	23 000	85	140 000 contos

Table of Type of Staff in the Career of Hospital Pharmacist

Superior Management of Hospital Pharmacy	Central Hospitals	Regional Hospitals	Annual Salaries	
			In Escudos	In Dollars
High Inspector	—	—	156,000$00	$5,500
—	Director	—	134,000$00	$4,800
—	Chief	—	122,400$00	$4,370
Pharmaceutic Technician 1st Class	Pharmaceutic Technician 1st Class	Pharmaceutic Technician 1st Class	112,800$00	$4,000
Pharmaceutic Technician 2nd Class	Pharmaceutic Technician 2nd Class	Pharmaceutic Technician 2nd Class	93,600$00	$3,350
—	Pharmaceutic Technician 3rd Class	Pharmaceutic Technician 3rd Class	85,200$00	$3,000
—	Pharmaceutic Technician Trainee	—	78,000$00	$2,800

In the central hospitals and some of the regional ones, the pharmaceutical services have departments for storing, production, testing, care, maintenance and consumption of medicine, documentation and archives.

It is incumbent on them, therefore, to acquire, produce, distribute and control the medicines for use not only in the service of the establishments in which they are integrated, but also sometimes to those of others — aid from the central to the regional and sub-regional — if its capacity for acquisition and production permits.

In the sub-regional hospitals, the pharmaceutic services are simple and in some even reduced to small stores of medicines, they being essentially distributing agencies of the same.

Committee of Pharmacy and Therapeuticas (Comissão de Farmácia e Terapêutica)

In order to establish the normal connection between the pharmaceutic, medicine, nursing and supply services, the Committees of Pharmacy and Therapeutics were created which function in each of the central, regional, and in some cases in the subregional hospitals, if of larger dimensions.

These committees, which are presided over by the clinical director of the hospital and have, as voting members doctors and pharmacists are qualified to:

— act as consultive organs and as links between the medical and pharmaceutic services;
— give notive of the plans of acquisition of medicines and direct their consumption;
— give an opinion on new medicines to be acquired;
— elaborate the list of emergency medicines which should exist in the medical departments;
— elaborate the private addendas of the formulary of medicines and the Pharmacy Manual.

PHARMACY IN THE ARMY AND NAVY

CARLOS SILVEIRA e NUNO ESTEVES DA ROSA
Frigate-captain *Colonel-pharmacist*

In the Navy

The dispensing of medicaments to the ships practically began with the long course sea — journeys, in the heroic age of Discoveries. Both the precarious conditions of lodging and higyene of those frail vessels that set off to discover the wide unknown Ocean and the deficient food gave way not only to various deseases but also to epidemics that killed a great amount of travellers. Therefore, not only for humanitary reasons but also because of the increasing number of those who got ill and died could compromise the success of those missions, the fleets carried the so called «boticas». They were boxes made of wood or tin, containing the medicaments of that time.

The first «botica» whose contents are known dates from 1519 (1), and it belonged to Fernão de Magalhães's fleet, who was the first to attempt the circumnavigation travell. That box contained a rather complete list of medicaments, which proves an already large experience.

Since the beginning, the preparing of those «boticas» was probably the responsability of the Court Apothecary, though statements referring to this fact only later on were made. Afterwards, when the appointement of new Court-Apothecaries ceased, the «boticas» were supplied by the *Casa Pia Laboratory*. After the foundation of the Navy Hospital the medicaments were supplied to the fleet through its Pharmaceutical Dispensary.

Besides the strict order that every ship should be provided with the «*botica*» cointaining the *drugs used in medicine* at that time, it was the King's wish to have aboard someone who knew how to use them. However, the number of phisics, surgeons and apothecaries was at that time very small so it was not always possible to accomplish such a wish. In fact, it was only in 1449 that the Arabian *Mestre Ananias* settled in Portugal, bringing along with him other apothecaries from Ceuta. This Arabian man is considered the father of the

Pharmaceutical profession in our country. It is easily understandable why in the era of sea discoveries apothecaries were scarce. Nevertheless, mentions of apothecaries aboard are frequent.

On the 16th of November, 1803, it was determined that the surgeons serving in the Navy when on board a ship had to get a licence from the *Real Junta do Proto-Medicato*. To obtain this licence, that allowed them *to practise medicine and the Art of Pharmacy aboard ships*, they had to sit for an examination in both matters.

Because of this determination and of the foundation of the Navy Hospital it is quite natural that the pharmacists on board may have decreased in number. However, until the 24th of November, 1836, when the post of pharmacist in the Royal ships was suppressed by a law, there were still many of them serving aboard. The same Act adjoined to the Navy Hospital one apothecary and two assistants. A later Act established that these assistants must also be apothecaries, being the older in charge called first apothecary.

In 1842, two pharmacists of the Navy Hospital were issued to the post of Officers. This Act, dated from the 20th of December 1842, says as follows:

> «Granting the request of the pharmacists of the Navy Hospital, dated from the 22nd of April of the present year, and according to references given about them by the President of the Navy Health Council, we issue first apothecary Bernardo José dos Reis to the post of first Lieutenant of the Navy and Assistant Calixto Gaudêncio Feio is issued to the post of second Lieutenant.
>
> The Minister and Interin Secretary of the Navy Affairs and the Overseas,
>
> Paço das Necessidades, the 20th of December, 1842
>
> (*a*) The Queen
> *José Joaquim Falcão*»

In the following years, after several Acts by which the pharmacists of the Navy Hospital are appointed as first and second class pharmacists, or as first and second pharmacists. The first staff of the Navy pharmacists is established by the Act n.º 11 306, dating from the 30th of November, 1925. Four lieutenant captains and two first or second lieutenants formed that staff.

On the 28th of December, 1929, the Navy Officers Statute is published. In the referred statute the staff of Pharmacist Officers is suppressed on the ground that only those performing military duties had right to a military rank.

However, by an Act of the 26th of Setember, 1946, the pharmacist staff is reestablished being composed by one captain lieutenant, two first lieutenants and two second lieutenants and it was incorporated in the Navy Health Service Staff.

Respectively on the 31st of December, 1952, and on the 31st of March, 1964, the staff of Pharmacist-Officers was enlarged by one

frigate-captain, three first lieutenants and two second lieutenants. Nowadays, the staff has been enlarged again and includes one frigate--captain, two lieutenant captains, six first and six second lieutenants. In the present difficult days the Navy is enduring, this staff is accomplishing its mission of dignifying the prestige of the Navy Pharmacy.

In the Army

The Army Pharmaceutical service has its roots in the dispensaries of the Army Hospitals, established in 1805, as well as in the Pharmaceutical Department of the Sanitary Equipment General Store-house.

During the first world war it was necessary to take measures in order that the Army Pharmaceutical Service could satisfy efficiently and economically the increasing demands of the Health Army Services. As the above mentioned department could not correspond to those demands, it was then replaced by the Army Central Pharmacy (Act n.° 3864 of the first of April, 1918), organized as a Factory and having a staff of Officers including a lieutenant-colonel, a major, four captains and five subalternes. It had adjoined branches in Oporto and Coimbra.

Two years later, on the 26th of March, 1921, the law n.° 1129 establishes the following departments of the Army Pharmaceutical Service:

General Inspection of Pharmaceutical Service.

7th bureau of the 2nd General Direction of the Secretary of War.

Central Army Pharmacy.

Besides its branches already existing in Oporto and Coimbra, that law created delegations attached to first and second class Army Hospitals as well as delegations attached to third class Army Hospitals in towns where there was a Division Headquarter.

The staff of the Pharmaceutical Officers included therefore one colonel, two lieutenant colonels, three majors, twelve captains and twenty-two subalternes, totalizing fourty-sixe officers, forty-one of them working for the Army Central Pharmacy and its delegations and branches.

Afterwards this staff was reduced along the years, specially the one concerning the Army Central Pharmacy, whose delegations were confined only to Lisbon, Oporto, Coimbra, Évora and Tomar. In those towns were the Headquarters of the correspondent Territorial Commands.

The Law n.° 42 564 of the 2nd of October, 1959, by fixing the general organization of the Army Ministery, created one Inspection and one Department in the Pharmaceutical branch of Health Service Direction.

The training of the Pharmacy staff is given in the Army Health Service School, as well as in the Chemical and Pharmaceutical Army Laboratory.

The programme of the corporals' training includes general notions of chemistry, water depuration, study of vegetal and animal drugs, antibiotics, serums, hormones, vaccines, galenics and generalities about Pharmaceutical Service in the Army.

The programme of sargents course includes, in its general part, notions about atomic war, mainly protection against atomic explosions, notions about biological war, gases and water depuration. In the specialized part of this course, lectures are given about pharmaceutical industry, storage of medicaments and sanitary equipment as well as about disinfection and disinfestation of barracks.

The Army Chemical and Pharmaceutical Laboratory is one of the most important branches of the Army Pharmaceutical Service. Established in 1918, under the name of Army Central Pharmacy, it has taken the present designation since 1947 and was the first Industrial Pharmacy in the country, having carried out a very remarkable scientific activity. In this respect, for example, it can be said that the Portuguese Pharmacopoeia adopted to a co-considerable extent the analytic methods used for the controle of drugs which were studied by army pharmacists in the Army Central Pharmacy.

The assignements of the Army Laboratory as a Factory organization have been fixed in legislation. Nowadays, by the Act. n.° 41 892 of the 3rd of October, 1958, the Army Laboratory has the following duties:

a) The preparing and manipulation of medicine, surgical dressings and other chemical products demanded by the Army Forces or necessary to satisfy the private needs of their staff.

b) Chemical and Physical analysis of anti-gas stuff, and, when possible, the manufacturing of filtering cartridges with their respective loading.

c) Disinfectation and disinfestation of barraks and other Army buildings as well as the research of products concerning chemical and biological war or used to neutralize chemical weapons.

d) Chemical, Toxicological and Bromatological analysis necessary to the Army Forces and its staff, plus water chemical and bateriological analysis.

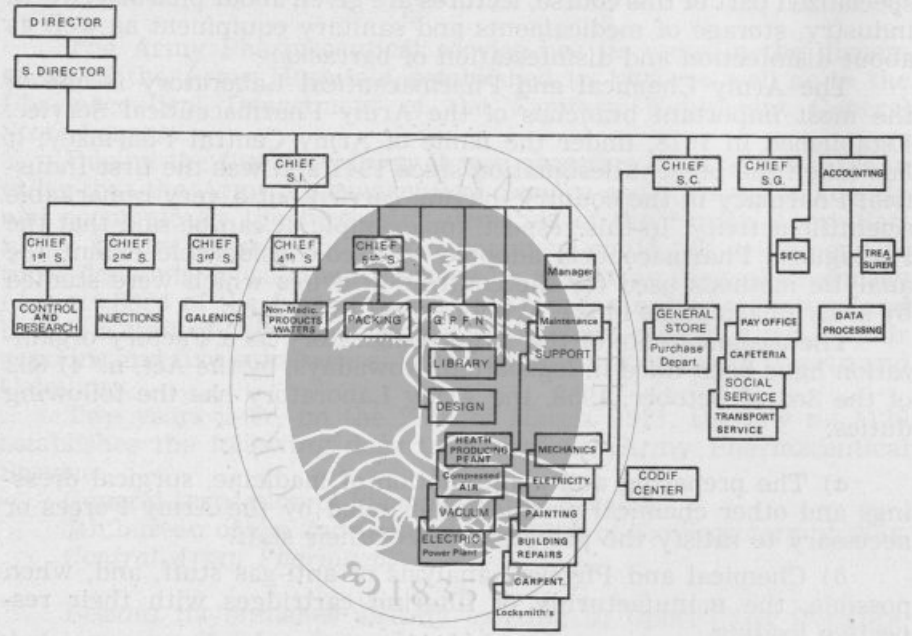
By the 9th item of the same law it can also be entrusted by the Army Ministery with the realization of specialized military problems, along with organization of technical courses.

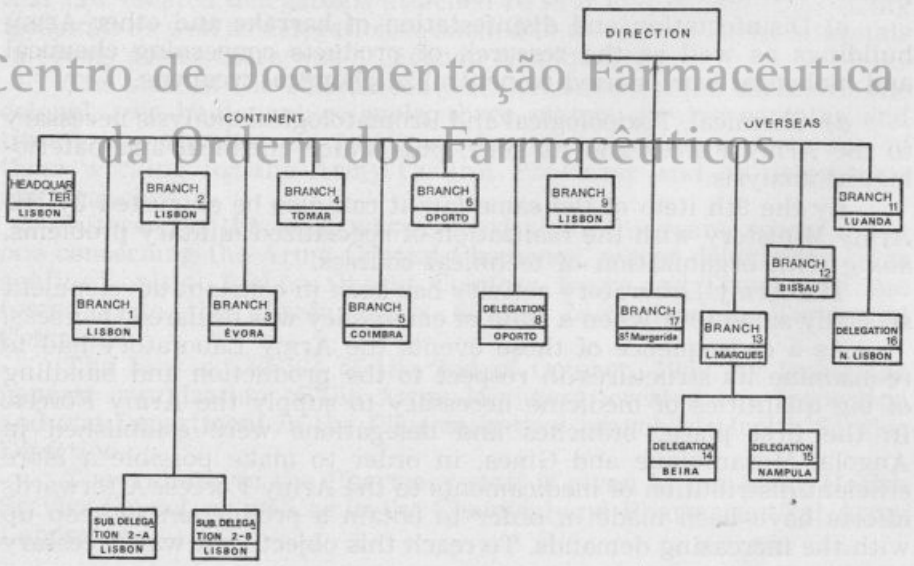
The Army Laboratory activity has been in constant development specially since 1961 when a state of emergency was declared Overseas.

As a consequence of those events the Army Laboratory had to re-examine its structures in respect to the production and handling of big quantities of medicine necessary to supply the Army Forces. In the first place, branches and delegations were established in Angola, Mozambique and Ginea, in order to make possible a more efficient distribution of medicaments to the Army Forces. Afterwards efforts have been made in order to obtain a production to keep up with the increasing demands. To reach this objective it was necessary

to set up new buildings and equipment, according to the most modern techniques of pharmaceutical industry.

As the attached diagram shows, the Army Laboratory can be considered as one of the best Portuguese Pharmaceutical Laboratories. It follows the honourable tradition of the remarkable technical and scientific work carried out during the twenties and thirties, in Campolide, by its antecessor, the Central Army Pharmacy.





CONTROL OF PHARMACEUTICAL PREPARATIONS

M. J.

The legislation which is concerned more directly with the control of the quality of pharmaceutical preparations in Portugal is as follows:

— Decree N.° 19 331 of 6th February 1931, relative to the sale of foreign patent medicines.

— Decree-Law N.° 29 537 of 18th April 1939 on the subject of the Pharmaceutic industry.

— Decree N.° 39 633 of 5th May 1954 which conditions the Pharmaceutic Industry.

— Decree N.° 41 448 of 18th December 1957 which governs the introduction on the Portuguese market of new pharmaceutic patent medicines, national or foreign.

— Decree-Law N.° 48 547 of 27th August 1968, which concerns the exercise of the pharmaceutic profession.

Patent medicines may be prepared in the pharmacies or in the industrial laboratories of pharmaceutic patent medicines.

The pharmacies and the laboratories have, as responsible technicians in the preparation of medicines, pharmacists holding a Portuguese university degree.

For the installation of a pharmacy or a laboratory of pharmaceutic patent medicines, an authorisation from the Ministry of Health and Assistance is necessary.

The pharmacies and laboratories must always be clean, as also the personnel who work in them.

The pharmacist shall watch over all operations from the preparation of the medicines until their distribution.

It is forbidden to supply the public with medicines and medicinal substances in wrappings which have not been properly labelled.

On the label must be shown the name of the medicine, the qualitative and quantitative formula, the price, the register number of the Governing Body of Health (Direcção Geral de Saúde) the lot

number, the quantity contained in each wrapping, the name of the pharmacist and of the pharmacy or laboratory which prepared it, if it should be dispensed without medical prescription, and the special conditions for conservation.

The medicines or the medicinal substances registered in the Portuguese Pharmacopoeia, in the National Galenic formulary may be supplied only with the names inscribed therein.

On the wrappings of medicines for external use, it is obligatory to place a label, printed on a red background, with the indication «for external use». On the wrappings of medicines for veterinary use, a label must be attached printed on a green background with the indication «for veterinary use».

Requests for authorisation to install a laboratory for pharmaceutic patent medecines are addressed to the Ministry of Health and Assistance with the following details:

a) Name, nationality and address of the applicant;

b) Legal nature of the enterprise constituted or to be constituted to ensure its exploitation;

c) Place chosen for the installation;

d) Specification of the industry and the products, with indication of the respective pharmaceutic forms;

e) Specification of the machines and other elements of production to be installed;

f) Processes of manufacture and usage;

g) Kind and source of the raw materials to be used;

h) Capacity of production;

i) Estimation of the prices of industrial cost of the products;

j) Indication of the markets to be supplied;

k) Amount and origin of capital to be invested;

l) Permanente staff who are to take part in the production with their time-table of work;

m) Period considered necessary for the installation and start of production.

In a laboratory of pharmaceutic patent medicines, the following rooms, at least, are obligatory:

a) Analizing laboratories for the raw materials and the checking of the purity and the activity of the industrial medicines;

b) A room for each one of the pharmaceutic forms to be prepared;

c) Suitable compartments with ventilation for the installation of boilers, stills, sterilizers, stoves and such like material;

d) A special compartment for the washing of material;

e) Sanitary installations for the Staff;

f) Packing room;

g) Stores.

No patent medicine of foreign origin may be sold to the Public before its qualitative and quantitative composition has been examined as to its active substances.

This examination should be carried out on at least one unit of each lot imported as follows:

a) That on serums, vaccines and similar products at the Câmara Pestana Bacteriological Institute, in the terms of its rules;

b) That on all other products by Portuguese pharmacists in pharmacies or laboratories of patent medicines.

The examination may also be carried out in official laboratories of patent medicines on a dispatch from he Ministry of Health and Assistance and proposal of the Governing Body of Health.

Importers shall send to the Governing Body of Health copies of the respective analytical reports.

When the analytical method to appraise the composition is unknown and if it is considered necessary, the Governing Body of Health may dispense with the presentation of the report of analyses after consulting the Superior Council of Social Activities (Conselho Superior de Acção Social).

The labels on foreign medicines must state the name of the representative, of the preparer and of the pharmacist or laboratory which carried out the analysis. A foreign language may be used, so long as the Portuguese language occupies the principal place.

National or foreign medicines are authorized by the Governing Body of Health and their selling price to the public is approved by the Regulating Committee of Chemical and Pharmaceutical Products. (Comissão Reguladora dos Produtos Químicos e Farmacêuticos).

For each of the requests for authorisation to sell to the public, the Governing Body of Health will consult, from the economic point of view, the Regulating Committee of Chemical and Pharmaceutical Products.

To study and then give an opinion on the requests for authorisation, the Technical Committee of New Medicines was created, which functions in Dr. Ricardo Jorge's National Institute of Health, constituted as follows:

a) The Director of the National Institute of public Health of Dr. Ricardo Jorge — Presidente;

b) A representative of the Regulating Committee of Chemical and Pharmaceutical Products;

c) A doctor representing the Medical Council;

d) A professor or assistent from the Faculty of Pharmacy;

e) A professor or assistent from the Faculty of Medicine;

f) A pharmacist indicated by the National Syndicate of Pharmacists.

The request for authorisation shall be accompanied by the following documents:

1 — Application addressed to the Director General of Health, on stamped paper accompanied by a fiscal tax stamp of 5$00, on which shall be indicated: the name of the medicine, the qualitative and quantitative composition, the pharmaceutic form and the presentation. The applicant's signature must be witnessed by a Notary.

2 — Descriptive report in Portuguese, signed by the technical preparer if it deals with a foreign medicine, of which the pharmacological characteristics are known.

3 — A document justifying the advantage to public health, of the introduction of the medicine on the Portuguese market.

4 — Scientific documentation, in Portuguese, justifying the therapeutic interest of the medicine. This document should include all the information possible concerning the pharmacological, accessory and toxic actions on the therapeutic efficienty, the dosage, and the contra-indications of the medicine. These documents should be accompanied by photocopies of the integral text of the respective publications. If the medicine has already been described in a foreign pharmacopoeia or if it has already been studied by an organization of the nature of the «Council on Drugs» or by the American Association, this fact should be mentioned and confirmatory documents attached.

5 — Two samples of the medicine and the active pure substances as a standard when the preconized analitical technicians demand it.

6 — Design of the label.

7 — Project of literature. If it is not desired to include this in the wrapping, the fact should be mentioned in the Application.

8 — Methods of analysis, signed by the pharmacist responsible for the analysis of the product, which should specify:

a) The technicians employed in the testing of the raw materials used;

b) Methods followed in the identification or in the physico-chemical or biological determination of the active substances of the product;

9 — Methods adopted in the testing of the toxicity of the product and report on the study effected;

10 — Methods adopted to verify the conditions of conserving the product, report on the experiments effected and indication of the periode of availability for the product, if this is necessary;

11 — In the case of a foreign medicine, official document officially translated proving the legal existence of the preparer laboratory and the legal sale of the medicine in its country of origin. The expression «for export» is not permitted on the labels or receptacles.

The Technical Committee of New Medicines (Comissão Técnica dos Novos Medicamentos) may demand other details which they consider necessary. The Committee, in its report, must give information on the therapeutic interest of the medicine, on the advantage of its manufacture and its introduction on the market. They must also take into consideration the necessity of limiting the excessive number of similar medicines.

The laboratory research which was considered necessary for the information of the Technical Committee of New Medicines shall be effected in the laboratory of the Regulating Committe for Chemical and Pharmaceutic Produts or other official laboratory of patent medicines.

The Director General of Health, after considering the opinions of the Regulating Committee for Chemical and Pharmaceutic Products and of the Technical Committee of New Medicines, will decide on the process in question.

If the applicant does not agree with the decision, he may appeal to the Minister of Health and Assistence, who will consult the Superior Council of Social Action.

There is a list of medicines which are examined compulsorily in the laboratory of the Regulating Committee for Chemical and Pharmaceutic Products after preparation. As to other medicines, the Governing Body of the Pharmacy and Medicine Services, of the Governing Body of Health, wil pick samples on the market, with some regularity, and have them analized in patent medicine laboratories.

Laboratories and pharmacies are inspected by functionaries, with a degree in pharmacy, of the Governing Body of Pharmacy and Medicine Services. They inspect the processes and the files of manufacture, the methods of testing the raw materials and the finished products.

They will investigate, also, if the manufacturers are exercising the necessary control on the lots of all the preparations intended for commerce, if the staff possess the qualifications necessary to carry out the functions attributed to them, and the hygienic conditions of the installations.

THE DISTRIBUTION OF MEDICINES IN PORTUGAL

MARIA DO CASTELO MENDES CORREIA

Member of Direction of National Pharmacy Corporation

Although Law 2125 of 20/3/65 states «1. The function of preparing, keeping and distributing medicines to the public as a medical activity is considered to be of public interest. 2: It is incumbent on chemists to ensure the function referred to in the previous number, without detriment to the regime proper to the chemist's or the laboratories of pharmaceutical products and the State specialized services», it is not always the pharmacist who superintends the distribution of medicines. The decree 48 547 of August 1968 contains identical principles, the wording of Art. 29 being: 1) The preparation of prescriptions or the delivery of medicines or medicinal substances to the public are acts to be exercised exclusively in chemists' by chemists or by their lawful collaborators, under the full responsibility of the former.

But n.° 2 of the same article contradicts the idea that only the pharmacist should distribute medicines, stating: — The Directors of the Health Services (A Direcção-Geral de Saúde) may authorise medicines to be supplied by *pharmacists or not* in the institutes of medical assistance and in the institutes of social assistance which possess stocks of medicines intented for the people to whom they give assistance.

With due respect, the law is inconsistent with its own dispositions, unless the health and the life of the public who go to private chemists' deserve better care than those who make use of the pharmaceutical services of the institutions where medicines may be supplied by *pharmacists or non-pharmacists.*

From what we state, the distribution of medicines in Portugal is liable to a duality of rules, which we do not understand.

Should the medicine only be distributed by the chemist or under his direct responsibility? Obviously yes: Medicine is not just any kind of goods, it is something «sui-generis», something specific which necessitates profound knowledge in the one who prepares it and in the one who distributes it. The doctor who prescribes it has not always time to explain in a way to make himself understood how the product is to be administered: he has to reckon with patients from less educated classes who understand with difficulty, or who

don't understand at all, what the doctor tells them, and go to the chemist's to ask if it will not harm this or that from which they also suffer.

How could anyone reply conscientiously who doesn't know what he is handing over, anyone who doesn't know its effects and the contrary symptoms?

We must not forget that a medicine is a two-edged sword.

There are of course products immensely more valuable (if we consider medicine only for its cost, if we don't consider its inestimable value when it represents the price of a life) but so far as we know there is no university training for either the most precious gem, or for the rarest metal or for the most deadly weapon that exists, for those who distribute them.

This factor alone puts medicine in a place apart, as a very important product, and justifies the exigency.

And nevertheless, we can affirm without fear of being contradicted, as we may verify at every step, that besides the institutions provided for by the law, other doors open for the outlet of medicines.

On account of the irresponsibility of many and the money-making of others, illegal centres of distribution of medicine are created which have not passed through the Chemists'.

The phenomenon occours on a national scale both in the large city as in the small centre, wherever there exists a private enterprise or a state enterprise which has founded a Sports Group or a Centre of «Joy through Work», the aim of which, among others, is to acquire medicine at illegal discounts by whatever method.

Thus these pass directly from the Laboratory or from the wholesaler to a «store» of medicines in a factory or office, where anyone without adequate preparation proceeds to distribute them.

And thus we see how products which the chemist refuses to supply for the lack of a medical prescription are delivered «ad hoc», favouring the self-medical-treatment which is at present one of the great preoccupations of medical authorities all over the world, especially to the Organization of World Health.

We have seen personally, as part of requisitions emanating from these Institutions, a whole series of medicines including antibiotics, anovulatories, tranquilizers and stimulants.

If, from the economic point of view, this causes anxiety to the pharmacist owner of a chemist's on account of the competition it represents, from the point of view of public health, it should be the object of severe suppression by the authorities on account of the danger it constitutes to health, often creating addiction, almost always irreversible.

Others, besides the Sport Groups and Recreational Groups, are responsible for the illegal outlet of medicine: aid centres, today completely unnecessary owing to the creation of Medical Welfare Centres (Caixas de Previdência), Parochial Centres, which no longer have any reason to give medical and pharmaceutical assistance, but which continue to distribute medicines in complete contravention of the

law, although with the complaisance of those who formerly authorized it.

Statistics recently proved that about one million of the three million six hundred thousand contos of pharmaceutical patent medicines fiscally stamped by the Governing Committee of Medical and Pharmaceutical Products in our country did not pass through the chemists'.

It is true that we must count with the hospitals and other organized bodies authorized to get their supplies direct.

But the value of the illegally obtained medicines represents about 25 % of the total.

How do they leak away?

We call upon the medical authorities for the sake of the Chemist and for the sake of public health to stop the illegal circulation and distribution of medicines by means of efficient fiscalisation and severe sanctions.

And we have only mentioned those that are illegally sold. But there are more: there are the hundreds, the thousands of quantities that the laboratory propagandists pour out daily on the desks of the doctors who visit them.

Isn't this a wrong outlet for the pharmaceutic speciality?

What is the purpose of these samples?

Are they always for clinical experiment? Does the doctor continue to experiment with products which have been on the market for many years?

Many, we have no doubt, will get old in a drawer, from which one fine day they will be thrown straight into the dust-bin. Others, forgotten by the doctor, will be at the disposition of employees of the consulting rooms, who will distribute them among acquaintances and friends, who knows how often, administered to people to whom they had been completely contra-indicated.

And isn't this another means of obtaining samples, another open door to self-treatment and to addiction?

When will clinical samples be subjected to regulations conditioning their distribution, limiting them in quantity and time?

Why are samples not given only to hospitals, where they can be widely tested, with the added advantage of representing an economy for those services, and for only one year after their appearance on the market? This period appears to us to be sufficient for the doctors to estimate the therapeutic value of the product, and meanwhile a fresh avalanche will issue from the laboratories.

Only after the problem created by the illegal outgoings of medicines have been seriously faced, for which it will be necessary:

1. To re-examine: The entities who have the right to obtain their own supplies;
2. To order: The efficient fiscalization of wholesalers and laboratories in order to put an end to illegal distribution;

3. To promote: Medical educational campaigns for the directors of the social services of enterprises in order to make them aware of the danger of acquiring and distributing medicines outside the Chemists'.

can the distribution of medicines be carried out as determined by N.º 1 of Art. 29 of the law in force: in the chemists' and under the responsibility of the pharmacist.

Decree N.º 48 547, which is four years old, is, after all, an old law.

«In 1514, in the reign of King Manuel I, a law is published which regulates commerce in toxic substances and prohibits anyone whatsoever to have them in his house, except the apothecaries who may apply them in their household remedies according to the prescription of the physician.»

This is proof, therefore, that more than four centuries ago a trilogy was created «Pharmacy-Pharmacist-medicine» difficult to separate.

If matters are put in order, there is no doubt that the dispensing of medicine will be made legally.

We know that to-day, unhappily, there are chemists less scrupulous in requiring a medical prescription for certain products, which should only be supplied on these conditions. And why do they do so? I do not believe that chemists have ever disregarded the necessity of presenting a medical prescription for the sale of drugs. This provision is carried out because there is no evasion for this type of product: the wholesaler knows that he is responsible to the authorities, and the chemist can obtain the product only against a signed and stamped receipt. So he is scrupulous in giving it, in filing the prescription and registering it in a special book.

Why is not everybody equally dutiful in dispensing other products which need prescriptions?

How to insist on it, if the same can be obtained without any control through those afore-mentioned illegal suppliers?

The decree we are quoting says:

Chemists are forbidden to supply to the public without medical prescription:

a) Medicines and medicinal substances, drugs or others which may be used as anovulatory or abortives specified in the list approved by the Ministry of Health (Direcção-Geral de Saúde).

b) All medicines in general which compulsorily have a label stating that they cannot be supplied without medical prescription.

And Art. 59:

1) Each medical prescription which prescribes medicines which should only be supplied to the public in this way, in the terms of the former article, may only be made use of once, *except in the case of special indication by the doctor, written by him on the prescription itself, stating in full, the number of times or the frequency with which it may be made use of.*

2) Whenever a medical prescription is to be made use of more than once, the chemist, at each repetition, should observe the dispositions of Art. 67 (registration of prescription) and indicate on the prescription itself the repetition made and the respective date thereof, stamping it with his rubber or metal stamp.

We ask: How many doctors observe this disposition and indicate the number of times that a prescription may be made use of?

How can the pharmacist decide between his conscience and the exigency of the law, in the face of a prescription which he knows is for a chronic sufferer, who consulted a specialist in a big centre and who now wishes to make use of it in the small place in which he lives as many times as is necessary (or the doctor has told him verbally) if there is no indication to that effect?

And, what hurts the pharmacist more, is the knowledge that the product he doesn't give the patient in order to obey the law, can be acquired by him illegally and with total impunity from whoever supplies it to him.

The list referred to in paragraph *a*) was published in the Official Gazette of 6th April 1971, and is a list which appears to exceed the legal bounds of the decree quoted, seeing that a vast list of pharmacologic groups have been published comprising nearly all the medicines used by chronic sufferers.

This has led one of the organizing bodies of the pharmaceutical class to set the matter forth to the authorities since, in order that chemists may be obliged to fulfil such vast restrictions, the ceding of medicines to all entities who are not chemists must definitely be put an end to.

We know that at this moment the elaboration of a new list is being studied which we hope will be made in such a way that the chemists will be able to respect it, safeguarding themselves for the so many urgent cases in which the pharmacist, owing to his scientific preparation and his professional ethics, when he may and when he may not supply a given medicine. Otherwise it would be a denial of the reason of his presence in the Chemist's.

When the medical authorities succeed in making the law respected and medicine does not reach the public except through the chemist, the latter will also fulfil his part in dispensing products which need a prescription, and the old Portuguese pharmacy, which for centuries has been governed by the traditional canons, may be pointed out, in Europe, as an example.

QUALIFICATION OF DEGREE IN PORTUGUESE PHARMACY FOR THE PRACTICE OF ANALYSES

HENRIQUE SANTOS SILVA

Specialist of Clinical Analysis

One who knows the History of Pharmacy cannot help being astonished at the evolution through which pharmaceutic teaching has passed up to the present day, such a great evolution that we can say to-day that its teaching includes such a large number of subjects that the word «Pharmacy» is synonymous for «Pharmaceutic Sciences», a collection of chemical-biological subjects which prepare the graduate for his various specialisations.

Portugal, as a productive country, must keep up with this evolution because, although presenting a scheme of teaching of the most up-to-date, as we may read in the book «Repertoire Mondial des Ecoles de Pharmacie», published by the World Organization of Health, it hopes, within one or two years, to present a new scheme for its teaching, within the plan of modernization of university teaching which the present Minister of National Education is engaged on.

This complexity in our teaching is proved by the fact that after graduating, and in order to carry out clinical analyses, it is necessary to specialise in Chemical Biological Analyses, after a post-graduate course and a period of training. It is only thus that the respective specialist diploma is conferred.

How is the preparation of the graduate in Portuguese pharmacy conducted, in order to practise clinical analyses?

The pharmaceutical course in Portugal comprises two cycles of study: the first, of 3 years, bestows the Pharmaceutical Diploma, and the second, of a further two years, bestows the Chemical-Pharmaceutic Degree, which corresponds to the academic title of Graduate in Pharmacy. Only graduates have access to the post graduate course, permitting preparation for the exercise of clinical analyses.

Until the acquisition of a degree the following subjects have to be taken: General Chemistry, Inorganic and Organic, Qualitative and Quantitatative Chemical Analysis, Cryptogamy and Fermentations, Bio-chemistry and Bio-chemical Analyses, Toxicology, and Toxicological Analyses, Microbiology, Physico-chemical Analyses, Hygiene, Pharmacodinamy, not to mention the other subjects in the course.

This collection of subjects gives the Portuguese pharmacist an unmatched preparation, which allows them to frequent a post-

graduate course for a year, a theoretical-practical course which gives them the opportunity of devoting their attention to chemical-biological analysis. After this course, the graduates complete their training in state laboratories or private ones recognised as fit for the respective Faculty to give a certificate of progress. In possession of this document, the graduate will request the Corporative Organisation (organised body) of Pharmacist — National Syndicate of Pharmacists, in the terms of Art. 14 and 15 of their Statutes (Decree-Law N.° 46 997 of 7-5-1966) to grant him the diploma of specialist in chemical-biological analyses.

This specialisation is undoubtedly polyvalent, that is, during the course, he will be given instruction in Applied Bio-chemistry (Clinical Chemistry), Hematology, Bacteriology, Parasitology, with special emphasis on laboratory data. This is what we in Portugal call Clinical Analyses, an expression which in other countries is translated in a different way. However, in the hospitals in Portuguese University cities, this practice is carried out only for each one of the subjects of the post-graduate course and not with a polyvalent character, while in all private laboratories this subject is polyvalent.

According to Portuguese law, various enactments grant to the graduate in pharmacy the practice of clinical analysis:

1. Decree N.° 21 853 of 8-11-1932 establishing the plan of studies of the Faculties of Pharmacy.

2. Decree-Law N.° 46 997 of 7-5-1966 granting the title of specialist.

3. Decree-Law N.° 19 073 of 21-6-1969 which requires the rank of specialist for the exercise of clinical analysis in the Portuguese overseas possessions.

4. Decree-Law N.° 48 547 of 27-8-1968 which establishes the law of exercising the Pharmaceutical profession which includes the Deontologic Code.

5. Decree-Law N.° 42 254 of 7-5-1959 which concedes the classification of analysts for the recruitment of senior staff when the services require special scientific preparation.

In the face of these facts, we see today graduates in pharmacy and specialists in clinical analysis exercising their profession in state laboratories and in private laboratories.

In the laboratories of the «Hospitais Civis», although the graduate in pharmacy tries to make his contribution, his activity has encountered difficulties vis-à-vis his fellows in medicine. The new organic law of the Ministry of Health and Assistance and Professional Careers (Decree-Law N.° 413 and 414 of 27-9-1971) mark a difference in level in relation to graduates in pharmacy in the position of Service Chief, the same thing happening in our overseas possessions. However, they collaborate in the «Hospitais Civis», Misericórdia Hospitals, Maternity Hospitals, Health Centres, Military hospitals, etc.

Meanwhile the Pharmaceutic work in the periphery is done at the cost of the graduate in pharmacy, seeing that almost all our medical

colleagues work in the cities of Lisbon and Oporto, together with other state employments. This laboratory coverage of the country, important as auxiliary sanitary coverage, is a problem which we hope the National Authorities of Health will modify principally with regard to the situation of the «hospitais civis». The graduates in pharmacy who work for the Security Health (Previdência) in the Ministry of Guilds in the cities of Lisbon and Oporto, suffer the same abuse.

From the scientific point of view, graduates in pharmacy and specialists in clinical analysis have taken part in the Portuguese pharmaceutical meetings with the presentation of scientific or professional subjects, the collaboration of University Professors of Pharmacy with the professional men being distinguished. On a par with this manifestation there are the groups on a district level for the discussion of practical matters, there having taken place last year a national meeting for the discussion and improvement of methods. For the present year the first programme of control of quality in clinical chemistry is being planned. Together with the National Syndicate of Pharmacists works a committe of chemical-biological analyses which collaborates scientifically whith all colleagues. These have the Portuguese Pharmacy Journals (Revista Portuguesa de Farmácia) and Pharmaceutical News (Notícias Farmacêuticas), two journals which publish articles on patent medicines.

PHARMACY AT THE SERVICE OF FORENSIC TOXICOLOGY

ANTÓNIO CARLOS DA SILVA SANTOS

Pharmaceutic Specialist of the Laboratory of Criminal Police

The first fact which occurs to us to justify the title of this paper is that of the very present problem of drugs. In the fight against this world-wide scourge, the pharmacist finds a field of action favourable for the application of his knowledge. His botanical knowledge allows him rapidly to identify hemp. His experience in microscopy enables him not only to diagnose, but also to isolate the characteristic elements which he may find in an «innocent» sample of tobacco. But his physico-chemical knowledge leads him to a thorough examination through an identification based on his chromatographical experience, a technique which will also permit him to identify opium or purify the respective extract which, later, will confirm its identity through the absorption spectra in ultra-violet and infra-red. But the pharmacist's knowledge is put to the proof at once at the beginning of a toxicologic analysis. The choice of method for the destruction of organic matter or the purification and isolation scheme of the possible toxic drug existing in a testsample as diversified as those afforded to the toxicologist — viscera, remains of food (prepared or not), medicines, insecticides, cosmetics, industrial products, drinks, vegetable mixtures, etc., etc., demand from the outset an experience and a profound knowledge of pharmaceutic technology, of bromatologic analyses, of physico-chemical phenomena, wide analytical experience; that is to say, a combination of attainments which are concentrated in a pharmaceutic degree.

What academic degree is necessary to be able to interpret an analysis of an injection labelled poison on verifying only the presence of benzoic acid and chlorate of soda? In the same way we include the problem of analyses and interpretation of cases of doping of greyhounds in which the presence of caffeine is easily detected, but the same does not happen when the Analyst comes across the presence of sulphur or chloropropamide drugs which by their pharmacologic actions function as negative doping.

Only someone with a perfect knowledge of the field of bromatology, in the presence of a sample of food, usually decomposed, is able to interpret data resulting from the natural presence or from disintegration of multiple organic compounds. It is clear that the analyti-

cal aspects, which are found connected with the presence of a pure product or of a mixture or even with the result of human metabolism need a previous knowledge of the phemomena of disintegration. Only Biochemical and Toxicological studies permit an amount of knowledge which, resting on a diversified analytical preparation permits the schematization and execution of a well programmed analysis.

Our physico-chemical preparation is also shown in detecting by tests of chromatographic paper or by TLC, the type of colouring matter used in counterfeit whiskey, previously discovered by liquid--gas chromatography. The obligation of knowing the charateristics of colouring matter, as also of the processes of detecting them, besides the faculty of knowing the legislation in force lead the professional pharmacist to collaborate in the food industry, more and more directed to the enrichment of the presentation of their products, whether by the incorporation of colours, whether by synthetic sweetening, so well known to the pharmacist by its galenic properties as well as for its presumably cancerigenic activities.

Pharmaceutic intervention, within the scope of forensic bromatology, may also be solicited for the detection of methylic alcohol, a poison which, unfortunately, may give rise to real catastrophes among a population which had the bad luck to enjoy a strong drink prepared with methanol, either involuntarily or malevolently by manufacturers lacking in any human sentiment whatever.

The function of the Pharmacist is also important in the execution and control of cosmetic formulas, a class of products not exempt from alergic reactions which, generally speaking, is not more than slight cutaneous poisoning. The simultaneous knowledge of physiology of the skin and of the numerous chemical agents used in emulsions, the basis of nearly all cosmetics, together whith mastery of the physico--chemical and pharmacologic characteristics and of the degrees of toxicity of the active principles of non-systemic action to be incorporated allow products to be prescribed which clean and beautify the skin without, however, altering the hydrolipidic balance, which, together with the pH, form the basic characteristics for a good healthy skin.

So far we have considered the subject *Pharmacy at the Service of Forensic Toxicology* — only in an analytical sense, but another aspect of great interest to be considered is that of information connected with prophylaxis and the treatment of accidental poisoning. The knowledge of the chemical and pharmaceutical properties of the majority of the components which enter into insecticide formulas and the greater part of hygiene and cleansing products, which constitute a necessary evil in our home consumption, permits the Pharmacy, in the person of its responsible technician, to reply to many requests to furnish, not only data as to the composition of certain commercial formulas, but also to help by suggesting prophylactic or therapeutic measures at a non-clinical level.

Thus, explanations as to the degree of toxicity may be given either by the use or abuse of medicine, as may be seen in the indiscriminate application of insecticides, in the sanitary field of drains,

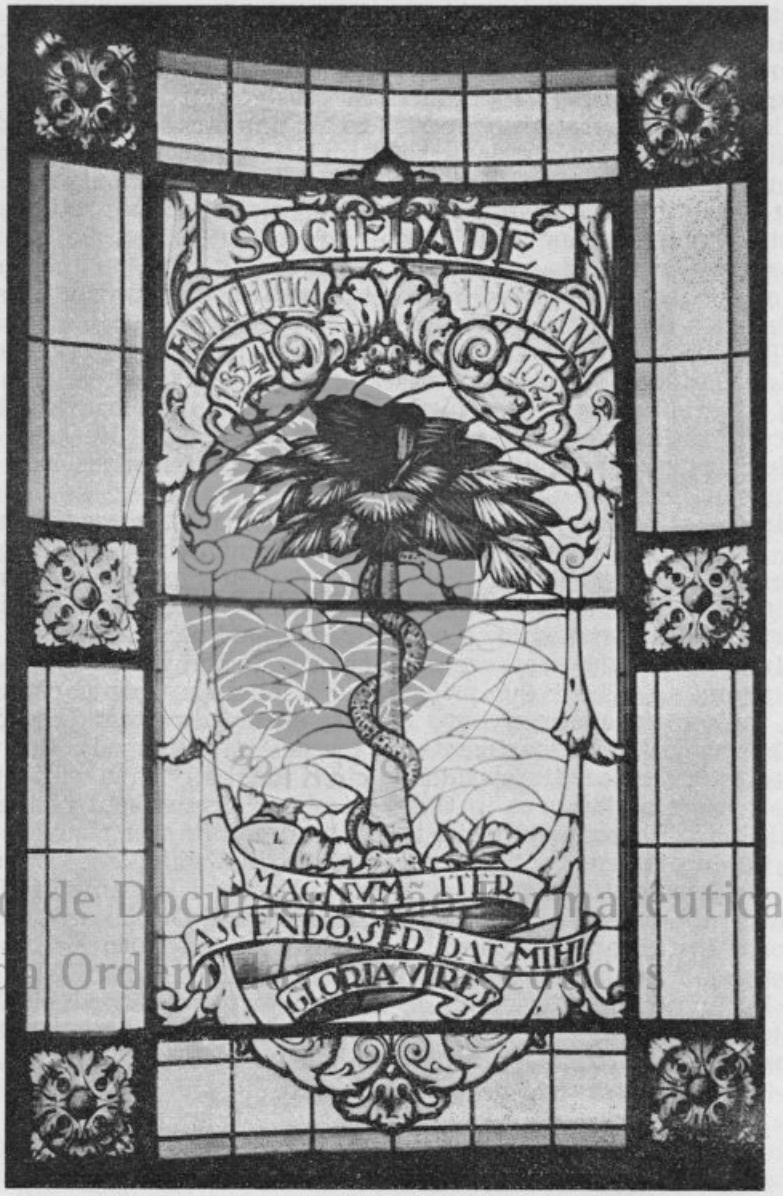
whether considered as sources of potable water or as a means of eliminating manufacturing residua.

In this latter domain knowledge acquired of Hydrology and micro-biology predominate, which, associated, for example, with mastery of the principal products of tensive-active nature, a class hostile to self-depuration, give rise to an unmatched university preparation to solve such a dangerous toxicologic problem. A count of bacteria, the determination of the biochemical need of oxigen (CBO), a test of acute toxicity with fish of the species «Lebistes reticulatus», are these not tests inherent in water polution? Of course, it might deal simply with a case of salubrity, but the diagnosis of the botanic species «Oenanthe Crocata», so wide-spread for killing fish, does this not fall into the forensic domain?

The collaboration of the analytical pharmacist is also relevant in helping the doctor in dubious cases of polyneuritis, where the diagnosis of certain values of asenic in the «faneras» may lead to the discovery of an intoxication, generally of a criminal nature. The same conclusion may be drawn when he detects thallium in the hair or in the urine.

In the same way, the presence of a pharmacist is needed in hospital laboratories with a Casualty Department, where gastric juice, urine or a tablet stubbornly held in the patient's hand, may in a few hours serve to lead to a therapeutic antidote to a desperate act or unfortunate carelessness or a cowardly planned vengeance.

In Portugal the presence of pharmacy in the field of toxicology is outstanding. Thus, the principal official departments connected with toxicologic analyses have as responsible directors Licenciates in Pharmacy. The departments of forensic chemistry in the three Institutes of Medical Jurisprudence in Portugal are managed by pharmacists, such as happens in the Toxicologic Department of the Criminal Police Laboratory. In its turn, the presence of a pharmacist in analytic departments or State organised bodies which deal with specific problems of toxicology, such as the National Institute of Health Dr. Ricardo Jorge (Instituto Nacional de Saúde Dr. Ricardo Jorge), National Institute of Industrial Investigation (Instituto Nacional de Investigação Industrial) Portuguese Institute of Tinned Fish (Instituto Português de Conservas de Peixe), National Board of Wines (Junta Nacional dos Vinhos), etc., etc., confirms the acceptance and the capacity in Toxicology of Degree-holders in Pharmacy.



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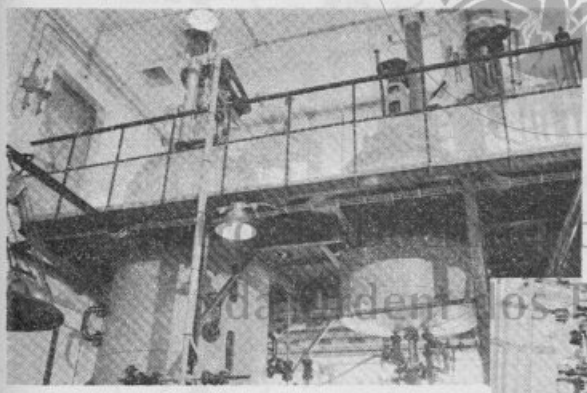


BETAMETHASONE

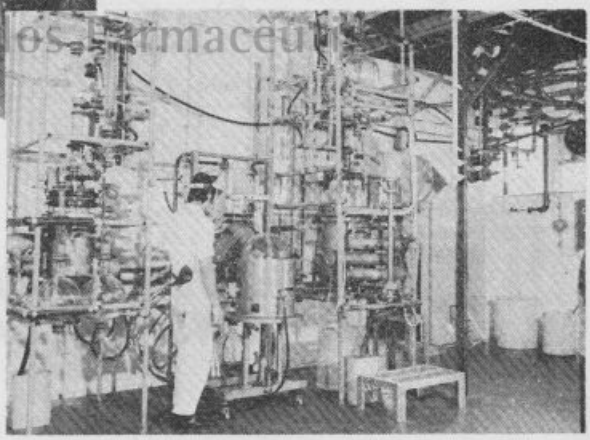
— FREE ALCOHOL

— 21 - ACETATE

— 21 - PHOSPHATE SODIUM

— 21 - PHOSPHATE BENZATHINE (*)

— 17 - ACYLATES



DOXYCYCLINE

— HYCLATE

— MONOHYDRATE

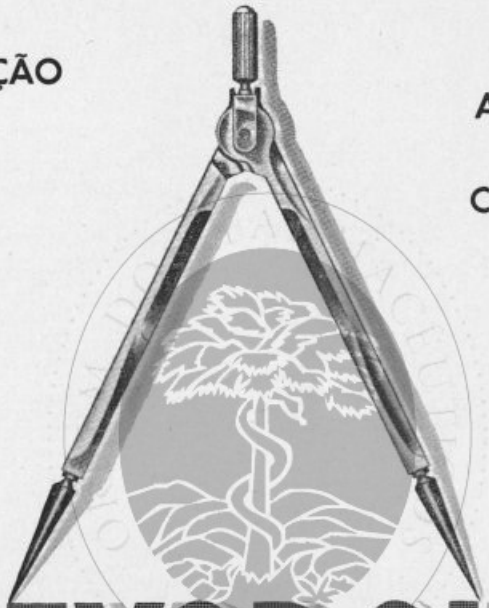
— POLYPHOSPHATE COMPLEX (*)

(*) NEW DERIVATIVES OF OUR DEVELOPMENT.

PRODUCED BY OWN INDEPENDENT PATENTED PROCESSES

NA

OBSTIPAÇÃO



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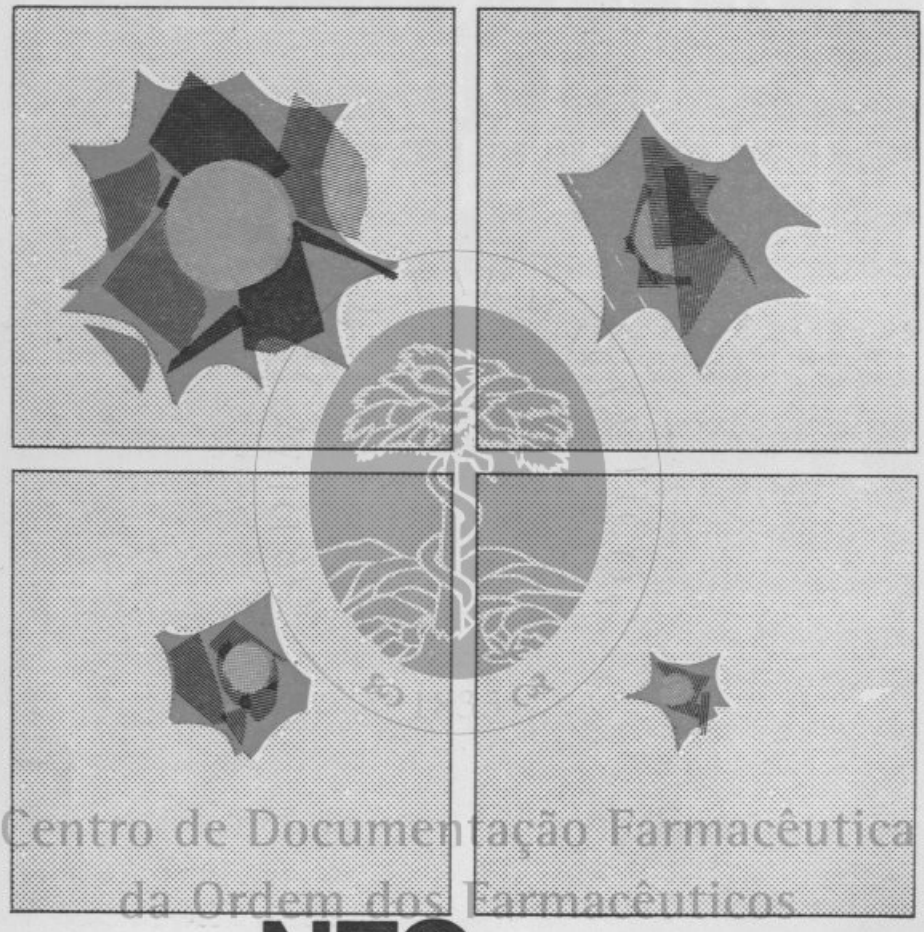

NEOZIMEMA

Apresentação: caixas de 1 empola de 5 c.c., de 3 empolas de 5 c.c. e de 4 empolas de 2 c.c.

intravenoso
intramuscular
supositórios (adultos) (infantil)

NEOZIMEMA K

Apresentação: caixas de 1 empola de 5 c.c., de 3 empolas de 5 c.c. e de 4 empolas de 2 c.c.
caixas de 5 supositórios (adultos) e de 5 supositorios (infantil)

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Associação de cloranfenicol com acção antibacteriana polivalente, sulfadiazina e canfocarbonato de bismuto

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EDITORIAL

«FARMÁCIA E TOXICOLOGIA» (1)

O primeiro facto que nos ocorre para justificar o título deste texto é o do actualíssimo problema da droga. Na luta contra este flagelo mundial o Farmacêutico encontra um campo de acção propício para aplicação dos seus conhecimentos. A sua preparação botânica permiti-lhe a identificação rápida de um cânhamo. A experiência microscópica facilita-lhe não só o diagnóstico, como o isolamento de elementos característicos que eventualmente se possam encontrar numa «inocente» amostra de tabaco. Mas a sua bagagem físico-química leva-o a um perfeito exame através de uma identificação baseada na sua experiência cromatográfica, técnica que lhe permitirá também identificar um ópio ou purificar o respectivo extrato que, posteriormente, confirmará a identidade através da execução de espectros de absorção no ultra-violeta e de infra-vermelho. Mas, os conhecimentos do Farmacêutico são logo postos à prova no início de uma análise toxicológica. A escolha do método de destruição da matéria orgânica ou o esquema de purificação e isolamento do possível tóxico, presente numa amostra tão diversificada como as que se deparam ao toxicolo-

(1) Versão em língua portuguesa do artigo «PHARMACY AT THE SERVICE OF FORENSIC TOXICOLOY», incluído no N.º 2 da Revista Portuguesa de Farmácia, de 1972.

gista — vísceras, restos de alimentos (confeccionados ou não), medicamentos, pesticidas, cosméticos, produtos industriais, bebidas, misturas vegetais, etc., etc., exigem, desde logo, uma experiência e um conhecimento profundo da tecnologia farmacêutica, de análises bromatológicas, dos fenómenos físico-químicos, diversificada experiência analítica ou seja um conjunto de exigências que se encontram condensadas numa licenciatura Farmacêutica.

Que formatura académica poderia interpretar uma análise de um injectável rotulado de veneno ao verificar-se apenas a presença de ácido benzóico e cloreto de sódio? Na mesma ideia incluímos o problema da análise e interpretação de casos «doping» em galgos em que a presença de cafeína é fàcilmente compreendida, mas já outro tanto nao sucede ao deparar-se ao Analista a presença de enxofre ou de cloropropamida, drogas que pelas suas acções farmacológicas funcionam como «doping» negativo.

Igualmente temos de considerar um domínio perfeito do campo bromatológico para, em presença de uma amostra de alimentos, a maior parte das vezes putrefactos, poder interpretar dados resultantes da presença natural ou da degradação de múltiplos compostos orgânicos. É evidente que os aspectos analíticos que se encontram relacionados com a presença de um produto puro ou de uma mistura ou ainda com o resultado do metabolismo humano levam ao prévio conhecimento de fenómenos de degradação que só estudos Bioquímicos e Toxicológicos podem permitir um somatório de fundamentos que, apoiados a uma diversificada preparação analítica permitem a esquematização e execução de uma análise bem programada.

Também a nossa preparação físico-química é posta em evidência ao detectar por meio de ensaios cromatográficos de papel ou placa o tipo de corante usado num falso whisky, prèviamente desmascarado pela cromatografia gás-líquido. A obrigatoriedade de dominar as características dos corantes, assim como os processos de os detectar, além da faculdade de conhecer a legislação vigente levam o profissional de Farmácia a colaborar na Indústria Alimentar, cada vez mais orientada no sentido de enriquecer a apresentação dos seus produtos, quer pela incorporação de cores, quer pela de edulcorantes sintéticos tão do conhecimento farmacêutico pelas suas propriedades galénicas e também pelas presumíveis actividades cancerigénicas.

A interferência farmacêutica, dentro do âmbito bromatológico forense, poderá também ser solicitada para a detecção de álcool metílico tóxico que, infelizmente, pode provocar verdadeiras catástrofes entre uma população que teve a pouca sorte de saborear uma bebida espirituosa confeccionada, involuntàriamente, com metanol ou, malèvolamente por fabricantes destituídos de qualquer valor humano.

Relevante é também a função do Farmacêutico na execução e controlo de formulários cosméticos, classe de produtos não isenta de manifestações alérgicas que não passam, na maior parte das vezes, de ligeiras intoxicações cutâneas. O conhecimento simultâneo da fisiologia da pele e dos numerosos agentes químicos usados nas emulsões, base da quase totalidade dos cosméticos, juntamente com o domínio das características físico-químicas, farmacológicas e dos graus de toxi-

cidade dos princípios activos de acção não sistémica a incorporar, permitem formular produtos que limpam e embelezam a pele sem que, todavia, se altere o equilíbrio hidrolipídico que, juntamente com o pH formam as características básicas para uma boa saúde cutânea.

Até este momento encarámos o tema — Farmácia e Toxicologia — sòmente dentro de um âmbito analítico mas outro aspecto de grande interesse é o da informação relacionada com a profilaxia e o tratamento das intoxicações acidentais. Os conhecimentos das propriedades químicas e farmacológicas da maioria dos constituintes que entram nas formulações pesticidas e de grande parte dos produtos de higiene e limpeza, que constituem um mal necessário desta nossa sociedade de consumo, permitem à Farmácia, através do seu Técnico responsável, responder a muitas solicitações no sentido de fornecer não só dados quanto à composição de determinadas formulações comerciais, como concorrer com sugestões de medidas profiláticas ou terapêuticas de nível não clínico.

Assim, a acção esclarecedora dos graus de toxicidade tanto pode ser realizada no âmbito do uso ou abuso do medicamento como se poderá fazer sentir no campo de aplicação indiscriminada dos pesticidas, como ainda abranger o campo sanitário dos afluentes, quer se considerem como fontes de água potável, ou como meio de eliminação de resíduos fabris.

Neste último domínio prevalecem os conhecimentos adquiridos na Hidrologia e na Microbiologia que associados, por exemplo com o domínio dos principais produtos de natureza tensivactiva, classe inimiga da auto-depuração, originam uma preparação universitária ímpar para resolver tão perigoso aspecto toxicológico. Uma contagem de bactérias, uma determinação de carência bioquímica de oxigénio (CBO), um ensaio de toxicidade aguda com peixes da espécie «Lebistes reticulatus» não são testes inerentes a uma inquinação de água? Poderá, evidentemente, tratar-se apenas de um caso da salubridade, mas o diagnóstico da espécie botânica «Oenanthe crocata» (embude), tão divulgada na pesca criminosa, não cairá já no domínio forense?

Relevante é também a colaboração do Farmacêutico Analista na ajuda ao Clínico em caso dúbios de polinevrites, onde o diagnóstico de determinados valores de arsénio nas faneras poderá levar à descoberta de uma intoxicação geralmente de índole criminosa. Igual conclusão poder-se-á tirar quando Ele detecta tálio no cabelo ou na urina.

Paralelamente faz-se sentir a presença farmacêutica em laboratórios hospitalares dotados de serviços de urgência onde um suco gástrico, uma urina ou um comprimido, teimosamente preso à mão do doente, podem em poucas horas servir para orientar uma terapêutica antídota de um acto desesperado, de uma infeliz imprevidência ou de uma vingança cobardemente planeada.

Em Portugal a presença farmacêutica no campo toxicológico faz-se sentir intensamente. Assim, os principais departamentos oficiais ligados a análises toxicológicas têm como responsáveis directos Licenciados em Farmácia. As secções de química forense dos três Institutos de Medicina Legal do continente são dirigidas por Far-

macêuticos, tal como acontece no Departamento Toxicológico do Laboratório da Polícia Judiciária. Por seu turno, a presença farmacêutica em departamentos analíticos de organismos Estatais que se preocupam com problemas específicos de toxicologia, como sejam o Instituto Nacional de Saúde Dr. Ricardo Jorge, Instituto Nacional de Investigação Industrial, Instituto Português de Conservas de Peixe, Junta Nacional dos Vinhos, etc., etc., comprova bem a aceitação e a capacidade dos licenciados em Farmácia dentro da Toxicologia.

A. SILVA SANTOS

TRABALHOS ORIGINAIS

MÉTODO GERAL DE DOSAGENS DO ARSÉNIO DA F. P. IV — 2.ª Edição

I — ESTUDO DE ACTUALIZAÇÃO

J. L. LOBATO DA FONSECA

Licenciado em Farmácia

Tendo surgido a necessidade de fazer uma determinação de arsénio numa matéria-prima não citada nas Farmacopeias, procurou-se fazer com o intuito de resolver o problema, um estudo geral dos métodos usuais citados nos códigos mais correntes.

À medida que a documentação foi sendo consultada, mais sentimos que o método descrito na F. P. IV — 2.ª edição necessitava de ser revisto.

Constatou-se que, de um modo geral, o arsénio se doseia pelo método de Gutzeit modificado. Alguns códigos recorrem ainda às reacções de Bougault e de Bettendorff quando a técnica de Gutzeit apresenta dificuldades. Por outro lado, o National Formulary, XIII edição, recorre ao método colorimétrico do dietiltiocarbamato de prata, o qual é mais preciso mas apresenta mais dificuldades técnicas, sem vantagens especiais.

O nosso trabalho indicará sobre o método de Gutzeit, por nos parecer suficientemente exacto. Nele faremos um estudo do aparelho, da técnica geral e do modo de obter o arsénio na forma doseável por preparação prévia da amostra.

Para a sua realização, baseamo-nos nos seguintes princípios:

— simplicidade técnica

— precisão suficiente dos resultados obtidos

— aproveitamento dos pormenores mais relevantes das técnicas estudadas.

Como se sabe, o arsénio, quer sob a forma de anidrido arsenioso, quer sob a forma de arseniato, reage com o hidrogénio nascente dando a arsina. Esta arsina, actuando sobre o papel impregnado de nitrato de prata, produz uma mancha escura permitindo, senão dosear perfeitamente, pelo menos avaliar o arsénio presente. Este é o primitivo método de Gutzeit.

Porém, o nitrato de prata tem o inconveniente de ser fàcilmente reduzido, quer pela luz, quer pelo hidrogénio e como tal não teve

sucesso. A partir daí o método sofreu diversas modificações, dando origem a um sem número de trabalhos em que muitos pormenores foram discutidos e nem sempre conduzindo a opiniões concordantes. Para um conhecimento detalhado sobre a evolução do método de Gutzeit aconselha-se a leitura do trabalho de CROSSLEY [1].

Modernamente, o método de Gutzeit consiste:

— na preparação prévia da amostra de modo a obter o arsénio numa forma doseável.
— na transformação do arsénio em arsina.
— na obtenção de uma mancha, comparável com um padrão, resultante da reacção da arsina com cloreto mercúrio ou brometo mercúrio impregnado um papel que serve de suporte.

Estabelecidas as bases, comecemos por analisar o método.

A primeira dificuldade surgida foi estabelecer qual deveria ser o modo de obter a mancha de arsénio:

— se transversalmente em relação à corrente de hidrogénio-arsina — **métodos de disco.**
— se paralelamente à corrente de hidrogénio-arsina — **métodos de tira.**

Verificou-se serem apologistas do disco as Farmacopeias Britânica, Internacional, Europeia, do Brasil, da Suissa e o Analar Standards e da tira as Farmacopeias Portuguesa, Francesa, Americana (*) e o AOAC.

Aprofundemos o assunto.

Nas técnicas que utilizam o disco, o papel actua como uma diafrágma e, portanto, toda a arsina é obrigada a passar através dele. Nas outras, a corrente gasosa passa paralelamente às faces da tira que deve estar centrada com o eixo do tubo.

No primeiro caso, obtemos uma mancha com dimensão, constante para cada aparelho, igual ao diâmetro interno do tubo, sendo variável a intensidade da cor.

No segundo caso, obtemos uma mancha variável quer na dimensão, quer na intensidade da cor.

Por outro lado, para que os resultados sejam comparáveis, as dimensões das tiras deverão ser rigorosamente iguais, condição que não nos parece muito fácil de obter, se atendermos aos seguintes pontos:

— cortar tiras com uma largura rigorosamente igual em toda a sua dimensão. Note-se que a largura das tiras está compreendida entre 2,5 e 5 mm, conforme os métodos.

(*) Já depois de terminado o nosso trabalho, constatámos que a U. S. P. XVIII, adoptou também o método do dietiltiocarbamato de prata.

— manter a tira perfeitamente centrada com o eixo do tubo, sem lhe tocar as paredes.

— evitar que a tira encurve os bordos.

Consequentemente, parece-nos que, sendo o método de Gutzeit um micrométodo, o disco assegura quer teórica, quer pràticamente, melhores resultados. Concluimos, portanto, que deve adoptar-se um método de disco.

Estabelecido o modo de obter a mancha, há que proceder à escolha do papel indicador, não só quanto à qualidade, mas também quanto ao reagente.

Na escolha do papel verifica-se, aliás como é lógico, a relutância de indicar uma marca comercial (*); portanto há que definir as suas características:

— ausência de arsénio, ferro e metais pesados.

— textura uniforme.

— porosidade adequada.

— normalização das características.

Na escolha do reagente há a considerar duas hipóteses:

— a utilização do cloreto mercúrio, proposto por MERCERON e BERGERET [2] que dá manchas desde o amarelo até ao castanho, é adoptado pelas Farmacopeias Portuguesa, Francesa, Britânica, Internacional, do Brasil e Analar Standards.

— a utilização do brometo mercúrio, proposto por GOODE e PERKINS [3], que dá manchas castanhas é adoptada pelas Farmacopeias Americana, Europeia, Suissa e pelo AOAC.

O brometo mercúrio foi escolhido por dar manchas mais intensas, mas a bibliografia mostra-nos que a sua utilização não apresenta qualquer vantagem conforme a opinião de LERRIGO [4], SANGER e BLACK [5]. Pessoalmente, inclinamo-nos para o cloreto mercúrio por nos parecer que os tons amarelos ou alaranjados permitem uma melhor comparação do que os acastanhados.

Tanto a Farmacopeia Portuguesa como a Francesa aconselham que após a obtenção tanto da mancha-padrão como da mancha-problema, se faça a fixação com iodeto de potássio segundo a técnica de CRIBIER [6]. Não vemos qualquer vantagem nisso, não só porque a instabilidade da cor não é tão grande que o justifique, mas também porque se vai escurecer a cor, saindo dos tons de amarelo-alaranjado que, como já dissemos, são mais fáceis de comparar. Não consideramos ainda boa técnica conservar padrões e, salvo melhor opinião, em cada amostra deve proceder-se de modo a obter uma mancha-padrão e uma mancha-problema em ensaios simultâneos.

(*) CROSSELEY aconselha, no entanto, o Wathman n.º 1.

Outro pormenor do método de Gutzeit é a fixação do ácido sulfídrico resultante da redução dos compostos de enxofre. Todas as técnicas utilizam para esse fim o acetato de chumbo, variando apenas o suporte, que pode ser algodão hidrófilo, papel de filtro, algodão de vidro ou areia lavada. Estes dois últimos, adoptados pelos Americanos, exigem que o aparelho tenha um scrubber (*). O papel em tiras enroladas, embora seja mais fácil de impregar, é a mais difícil de meter e tirar do tubo, pelo que nos inclinamos para o algodão hidrófilo.

Iniciemos, então o estudo do aparelho em si.

Pode considerar-se um aparelho de arsénio constituído pelas seguintes partes:

— Vaso de reacção
— Tubo condutor da corrente gasosa
— Suporte do papel indicador.

Nos vasos de reacção encontramos duas modalidades: os convencionais, que utilizam um frasco com rolha de borracha e os esmerilados, que utilizam matrases de Erlenmeyer, (a Farmacopeia Francesa emprega um frasco esmerilado). No estudo que fizémos nada vimos que desse razões de preferência aos frascos ou matrases de Erlenmeyer; apenas CROSSLEY [1] indica que para os resultados serem reproduzíveis, os geradores de hidrogénio devem ser idênticos. A capacidade média dos vasos utilizados nos métodos estudados é de 120 ml (sendo o mínimo 100 ml e o máximo 200 ml). Por outro lado, a experiência diz-nos que é sempre um problema seleccionar um frasco para o aparelho de arsénio porque, se a capacidade é boa, o bocal é largo ou estreito; o frasco parte-se e o problema repete-se. Consequentemente, sugerimos a utilização de um matrás de Erlenmeyer de 100 ml que tem as seguintes vantagens:

— vidro de borossilicato, isento de arsénio, de metais pesados e quìmicamente neutro.
— normalização das dimensões.
— facilidade de obtenção.

Quanto aos aparelhos esmerilados, poderão, na realidade, ser mais académicos, mais práticos mas também mais dispendiosos. Consequentemente a sua utilização frequente e o risco de se quebrarem são causas a ponderar na sua escolha para a rotina de laboratório.

O aparelho tem o tubo condutor que atravessam uma rolha de borracha. Este tubo é afilado numa das extremidades tendo dois orifícios, um central e outro lateral. Este último constitue a modificação de CRIBIER [6], destinando-se a melhorar as condições da cor-

(*) A designação de SCRUBBER começa a divulgar-se na literatura química como um dispositivo de lavagem. Como não se identifica com as torres nem com os frascos, resolvemos adoptá-lo.

rente hidrogénio-arsina. Na realidade, a corrente gasosa tem tendência a arrastar gotículas de líquido que condensando-se voltam ao recipiente pelo orifício central. O orifício lateral facilita a passagem do gás.

Para melhor compreensão do aparelho observe-se a figura n.º 1.

Antes de estruturar o método a propôr, convém estudar os seguintes pormenores:

— mancha-padrão
— solução-padrão
— exigências do método.

Quanto às manchas-padrão verificamos que a tendência é utilizar manchas correspondentes a 0,010 mg de arsénio (ou seja, para determinar 1 ppm a amostra deve ser de 10 g). Este critério resulta do facto de a tonalidade obtida ser a mais equilibrada. Normalmente, as técnicas referem uma só mancha-padrão, variando a amostra de acordo com o limite de arsénio. Achamos útil a inclusão de uma tabela adaptada de outra da Farmacopeia Brasileira que poderá servir não só de controlo na preparação das amostras, mas também para facilitar os cálculos nos casos omissos.

A mancha-padrão obtém-se geralmente submetendo 1 ml da solução-padrão de arsénio à técnica geral. Em alguns casos, certos códigos como a Farmacopeia Francesa e a Americana submetem a

TABELA I

relação ppm de As/amostra

(Xppm × A = 10)

ppm	amostra	ppm	amostra	ppm	amostra
1	10	6	1,667	20	0,5
2	5	7	1,43	30	0,333
3	3,333	8	1,25	40	0,25
4	2,5	9	1,111	50	0,2
5	2	10	1	100	0,1

legenda: Xppm: cardinal do limite em ppm
A: peso da amostra expressa em gramas
10: 0.010mg de As correspondente à mancha-padrão.

solução-padrão ao mesmo tratamento que a amostra, obtendo assim a mancha-padrão por ensaio a branco.

Quanto à solução-padrão, há que definir a sua forma de expressão. As Farmacopeias Portuguesa, Americana e Internacional expressam em As_2O_3; a Francesa, Inglesa, Europeia e do Brasil, em As. Embora não haja critério definido para a escolha, inclinamo-nos para a expressão em arsénico, por nos parecer mais lógica.

Escolhida a mancha-padrão correspondente a 0,010 mg e a expressão em As, a solução-padrão terá portanto uma concentração de 0,132 g de As_2O_3 por 100 ml.

Analisemos agora as exigências do método:

— é necessário que os reagentes sejam isentos ou pelo menos que tenham uma quantidade de arsénio que não influenciem os resultados.
— é necessário assegurar que todo o arsénio presente na amostra seja doseado.
— é necessário assegurar que a mancha obtida exclusivamente de arsénio e que não foi influenciada por outros elementos perturbadores.

A primeira exigência não tem dificuldades de maior e o ensaio prévio dos reagentes permite imediatamente a detecção dos casos anómalos.

A última, conhecidos os elementos perturbadores — antimónio, sulfuretos, sulfitos, hipossulfitos e hipofosfitos — também não é de resolução difícil se houver uma conveniente preparação prévia da amostra. Algumas Farmacopeias preferem nestes casos recorrer às reacções de Bougaut ou de Bettendorff.

A segunda exigência é a que requere normalmente mais cuidados, que mais estudos tem originado sobre o doseamento do arsénio e a que afinal deu origem ao nosso trabalho.

Um dos artigos de maior interesse que encontramos, é sem dúvida, o de DAVIS e MALTBY [7]. Vejamos as suas conclusões:

— Quando o arsénio se encontrar sob a forma de arseniato ou quando a amostra for submetida a tratamentos de oxidação que possam ter transformado o anidrido arsenioso em ácido arsénico, corre-se o risco de não dosear a totalidade do arsénio.
— Este facto é devido à maior dificuldade de redução do arsénio a arsina, quando este se encontra na forma de maior valência. Muitas vezes o zinco, quando dissolvido em ácido clorídrico, mesmo quando estanoso, ou na presença de algumas gotas de cloreto estanoso, falha na completa redução do arsénio dos arseniatos. O facto verifica-se mesmo que a reacção se passe entre 40 e 60° C.
— Para assegurar uma completa redução, é necessário um tratamento prévio. É considerado eficiente o proposto por BLOXAM (com ácido sulfuroso, semelhante ao da USP XVII) ou o sugerido pelo AOAC com iodeto de potássio e cloreto estanoso.

— A temperatura ideal para o ensaio está compreendida entre 40-60° C., devendo assegurar-se uma franca libertação de gás, mas não violenta.

Devem ainda ter-se em conta as seguintes considerações:

— A presença de sais de cobre, embora acelere a formação da arsina, conduz a uma incompleta volatilização do arsénio, conforme conclue GAUTIER [8].
— Deve assegurar-se, tanto quanto possível, um débito uniforme da corrente hidrogénio-arsina, crendo-se que a melhor forma de o conseguir será usar um zinco com granulometria definida, como procedem a USP XVII e o AOAC.
— O ensaio deve processar-se ao abrigo da luz solar directa.
— Deve preservar-se da humidade o papel indicador.
— O tempo de reacção não tem vantagem em ir além de 1 hora.

Estabelecidas as linhas gerais do método, citemos os pontos fracos da actual técnica da FP IV:

— A rolha de cortiça parafinada não nos parece adequada.
— A utilização de tira, em vez de disco, exige condições difíceis de executar na prática. Além disso, introduz na apreciação da mancha duas variáveis — comprimento e intensidade de cor — enquanto que com o disco há apenas uma variável — a intensidade de cor — visto que a área é constante.
— A quantidade de zinco a empregar está compreendida entre 8 e 10 gramas, sem mais qualquer exigência sobre o zinco.
— Não é conveniente o emprego do $CuSO_4$ e as técnicas que ainda utilizam o cobre como catalizador empregam quantidades muitíssimo inferiores (da ordem dos microgramas).
— Manda que o gerador de arsina esteja mergulhado em água fria, quando a temperatura mais conveniente é a compreendida entre 40-60°.
— Indica como termo de ensaio «o cessar do desenvolvimento gasoso que, em regra, não vai além de 6 horas»; quando está definido que 40 minutos é tempo suficiente. (Algumas técnicas impõem que a reacção se processe durante 1 ou 2 horas; cremos, no entanto, que esse alongamento será apenas uma questão de segurança).
— Faz uma fixação da mancha com KI, segundo a técnica de CRIBIER, que não nos parece necessária, nem aconselhável pois vai-se perder a tonalidade óptima para a apreciação.
— Não especifica perfeitamente o papel para indicador.
— Oxida com $KMnO_4$ o As_2O_3 quando prepara a solução-padrão (principio esse adoptado apenas pela FP) o que não tem qualquer vantagem e apenas inconvenientes.
— O modo de preparar as amostras conduz sempre o arsénio à forma arseniato o que está contra-indicado, de acordo com as conclusões de DAVIS e MALTBY.

Depois de pormenorizar as condições que julgamos ideais, cremos poder propôr a técnica que se segue:

MÉTODO GERAL DE DOSAGENS DO ARSÉNIO

APARELHO: O aparelho para as dosagens do arsénio é constituído por um matrás de Erlenmeyer, de 100 ml, fechado por uma rolha de borracha atravessada por um tubo de vidro afilado na extremidade que entra no matrás.

O tubo é obtido a partir de vidro fusível e deve ter, um comprimento total de 200 mm. O diâmetro interno deve ser exactamente 6,5 mm e o externo 7,5 ± 0,5 mm.

Numa das extremidades é estirado de modo que desde o ombro à ponta, tenha cerca de 30 mm e termine por um orifício lateral com 1,5 ± 0,5 mm. A extremidade oposta deve ser cortada na normal do eixo do tubo, devendo ser boleada a fogo ou esmerilada para não ferir o papel indicador. Nesta extremidade é metida uma rolha de borracha furada segundo o seu eixo de revolução, tendo o cuidado de colocar a face de maior diâmetro no mesmo plano que a boca do tubo. Sobre esta rolha, inverta-se outra igual, também furada.

Estas rolhas destinam-se a intercalar o papel de cloreto mercúrio, tendo o cuidado de que o furo da rolha superior fique em continuidade com a alma do tubo. As suas posições são mantidas por uma mola de aço, por elásticos ou por qualquer outro dispositivo conveniente.

Todas as rolhas serão furadas com um vasador apropriado, de modo a que o furo tenha um diâmetro de 6,5 mm, e deverão ter 25 mm no maior diâmetro e 25 mm de altura.

O tubo é carregado com algodão de acetato de chumbo, não o calcando demasiado e fazendo o enchimento desde a face inferior da rolha que entra no matrás até à face inferior da rolha oposta.

Para pormenores de montagem do aparelho, consulte-se o desenho (Fig. 1).

REAGENTES: Todos os reagentes devem ser submetidos aos seguintes ensaios e devem ser preparados como se indica:

Ácido azótico: deve submeter-se ao seguinte ensaio:

Numa cápsula de porcelana, aqueça 20 ml do ácido com 2 ml de ácido sulfúrico até que cessem os fumos brancos. Arrefeça. Junte 2 ml de água e aqueça novamente até que cessem os fumos brancos. Arrefeça, junte 50 ml de água e 10 ml de ácido cloridrico estanoso. Submeta a solução à técnica geral. Não deve observar-se mancha perceptível.

Ácido cítrico: Dissolva 10 g em 50 ml de água, junte 10 ml de ácido clorídrico estanoso e determine o arsénio pela técnica geral. Não deve formar-se mancha perceptível.

Ácido clorídrico: deve submeter-se aos seguintes ensaios:

a) Dilua 10 ml com água quanta baste para 50 ml. Junte 5 ml de solução de sulfocianato de amónio, agitando logo. Não deve observar-se qualquer coloração.

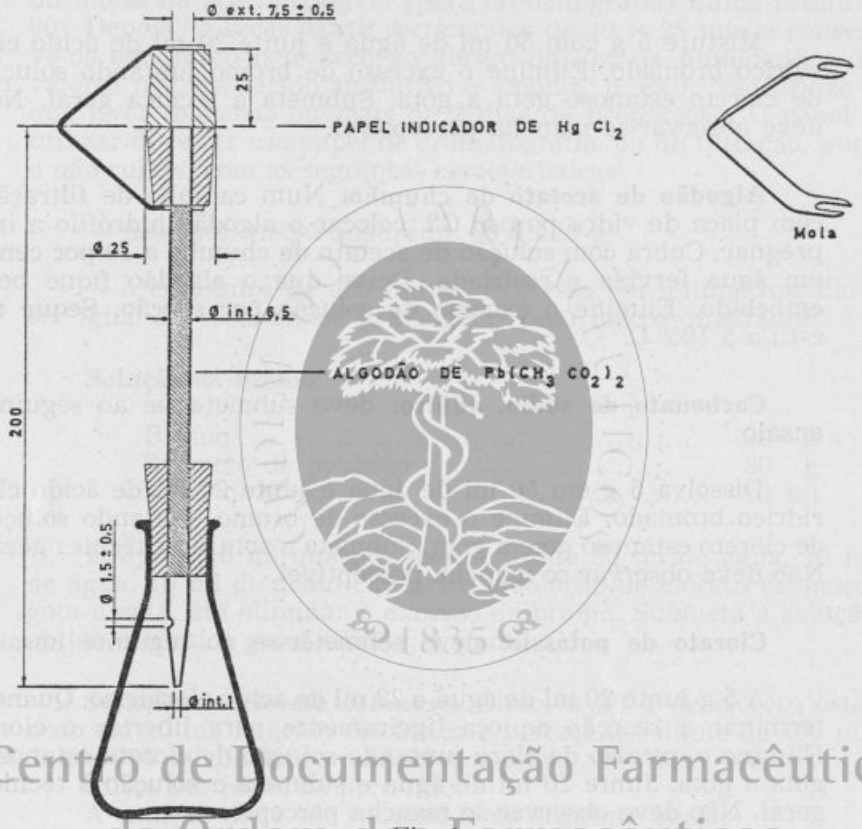

Fig. 1

b) A 50 ml junte 0,2 ml de solução de bromo e evapore a banho de água até reduzir o volume a cerca de 16 ml. Junte mais solução de bromo, se for necessário, de modo a manter a coloração amarela durante a evaporação. Junte 50 ml de água e V gotas de solução de ácido clorídrico estanoso. Submeta a solução obtida à técnica geral. Prepare uma mancha-padrão a partir de 0,2 ml de solução-padrão de arsénio (limite: 0,05 ppm).

Ácido clorídrico bromado:

Solução de bromo	1 ml
Ácido clorídrico q. b. p.	100 ml

Ácido clorídrico estanoso:

Solução de cloreto estanoso	1 ml
Ácido clorídrico q. b. p.	100 ml

Ácido sulfúrico: deve submeter-se ao seguinte ensaio:

Misture 5 g com 50 ml de água e junte 20 ml de ácido clorídrico bromado. Elimine o excesso de bromo juntando solução de cloreto estanoso gota a gota. Submeta à técnica geral. Não deve observar-se mancha perceptível.

Algodão de acetato de chumbo: Num cadinho de filtração, com placa de vidro poroso G3, colocar o algodão hidrófilo a impregnar. Cubra com solução de acetato de chumbo a 10 por cento em água fervida e resfriada. Deixe que o algodão fique bem embebido. Elimine o excesso de solução por sucção. Seque na estufa a 105° C.

Carbonato de sódio, anidro: deve submeter-se ao seguinte ensaio:

Dissolva 5 g em 50 ml de água e junte 20 ml de ácido clorídrico bromado. Elimine o excesso de bromo, juntando solução de cloreto estanoso gota a gota. Submeta a solução à técnica geral. Não deve observar-se mancha perceptível.

Clorato de potássio: deve sebmeter-se ao seguinte ensaio:

A 5 g junte 20 ml de água e 22 ml de ácido clorídrico. Quando terminar a reacção aqueça ligeiramente para libertar o cloro. Elimine o excesso de cloro juntando solução de cloreto estanoso, gota a gota. Junte 20 ml de água e submeta a solução à técnica geral. Não deve observar-se mancha perceptível.

Iodeto de potássio: deve ser submetido ao seguinte ensaio:

Dissolva 10 g em 25 ml de ácido clorídrico adicionado de 35 ml de água. Junte II gotas de solução de cloreto estanoso. Submeta a solução à técnica geral. Não deve observar-se mancha perceptível.

Oxalato de amónio: deve ser submetido ao seguinte ensaio:

Num matrás de Kjeldahl junte a 5 g, 15 ml de água. 15 ml de ácido azótico e 10 ml de ácido sulfúrico. Aqueça até que não haja espuma. Arrefeça. Submeta a solução à técnica geral. Não deve observar-se mancha perceptível.

Papel de cloreto mercúrio: Mergulhe tiras de papel com 25 mm de largura numa solução de cloreto mercúrio a 5 por cento, recentemente preparada e filtrada, tendo o cuidado de evitar bolhas de ar sobre as faces das tiras para que haja uma boa impregnação. Elimine o excesso de líquido premindo-as entre folhas de papel de filtro. Seque-as penduradas de varetas de vidro ou molas de aço inoxidável (para cromatografia) numa estufa a 60°. Depois de secas, corte rectângulos de 40 × 25 mm e conserve-os em frasco bem seco ao abrigo da luz, da humidade e de valores nocivos (ácido sulfídrico e amónia, p. ex.). Não utilize o que tiver manchas ou mais de 2 dias de preparação. O papel a utilizar deve ser um papel de cromatografia, ou de filtração, puro e não rugoso com as seguintes características:

— peso por metro quadrado: 65 a 120 g.

— a espessura de 400 folhas, expressa em milímetros, deve ser igual ao cardinal da gramagem (peso/metro quadrado).

Solução de bromo:

Bromo	30 g
Brometo de potássio	30 g
Água q. b. p.	10 ml

Evapore 10 ml quase à secura. Junte 50 ml de água, 10 ml de água, 10 ml de ácido clorídrico e solução de cloreto estanoso, gota a gota, até eliminar o excesso de bromo. Submeta a solução obtida à técnica geral (limite: 1 ppm).

Solução de cloreto estanoso: Dissolva 33 g de cloreto estanoso em 10 ml de ácido clorídrico e perfaça o volume de 100 ml. Junte 100 ml de ácido clorídrico e ferva até obter 100 ml.

Filtre por papel de poro fino.

A solução deve ser submetida ao seguinte ensaio:

A 10 ml junte 6 ml de água e 10 ml de ácido clorídrico. Destile recolhendo 16 ml do destilado. Ao destilado junte 50 ml de água, II gotas de solução de cloreto estanoso. Submeta a solução à técnica geral (limite 1 ppm).

Solução-padrão de arsénio: Pese 0,132 g de anidrido arsenioso, finamente pulverizado e prèviamente seco em excicador, sobre ácido sulfúrico e passe para um matrás volumétrico de 100 ml. Junte 50 ml de ácido clorídrico e agite até dissolver. Junte água quanta baste para perfazer o volume e agite bem.

Desta solução meça 1,0 ml para um matrás volumétrico de 100 ml e complete com água o volume.

A diluição final deve ser feita na ocasião do emprego e cada mililitro corresponde a 0,01 mg de arsénio.

A solução concentrada deve ser conservada em frasco de vidro, com rolha esmerilada, não devendo utilizar-se quando tiver mais do que 1 mês de preparação.

Zinco: Zinco granulado, calibrado por tamis n.º 4 (9 malhas/cm² — abertura da malha 0,700 mm).

O reagente deve ser submetido ao seguinte ensaio:

A 10 ml de ácido clorídrico estanoso, junte 50 ml de água. Proceda à técnica geral, utilizando o zinco em ensaio e deixando que a reacção se processe durante 1 hora. Não deve observar-se mancha perceptível (*limite de arsénio*). Repita o ensaio juntando 0,1 ml de solução padrão de Arsénio. Observa-se uma mancha amarela nítida (*limite de sensibilidade*).

TÉCNICA GERAL: No matrás do aparelho prèviamente preparado como atrás foi indicado, deita-se a solução da amostra, ou a solução do padrão e junta-se-lhe 1 g de iodeto de potássio. Deixa-se em contacto durante 10 mi. Ao fim desse tempo juntam-se, de uma só vez, 10 g de zinco, monta-se ràpidamente o aparelho e deixa-se que a reacção se processe durante 60 mi, a uma temperatura compreendida entre 40 e 60° C. (a libertação gasosa deve ser abundante, mas não tumultuosa).

MANCHA-PADRÃO: A mancha-padrão é obtida a partir da solução-padrão. A solução-padrão é constituída por 1 ml de solução-padrão de arsénio adicionada de 50 ml de água e 10 ml de ácido clorídrico estanoso.

Esta mancha corresponde a 1 ppm se a amostra corresponder a 10 gramas.

APRECIAÇÃO DOS RESULTADOS — PORMENORES

— Por princípio, devem fazer-se ensaios simultâneos para obtenção da mancha-problema e de mancha-padrão.

— Todo o material deve, entre dois ensaios sucessivos, ser lavado com ácido clorídrico isento de arsénio e depois passado com água e seco.

— Os resultados observam-se por comparação entre a mancha-problema e a mancha-padrão, sob luz natural, após o termo do doseamento.

PREPARAÇÃO DAS AMOSTRAS: Cada substância a ser submetida ao Método Geral de Dosagem do Arsénio, deve ser objecto do tratamento prévio que a seguir se indica.

Ácido Acético Limite ..... 5 ppm

A 2 g junte 50 ml de água, 10 ml de ácido clorídrico estanoso e submeta a solução à técnica geral.

Fosfo-Glutiron

Ácido glutâmico **(sal sódico)**

Fósforo orgânico

Complexo vitamínico B

AMPOLAS: caixa de 24

COMPRIMIDOS: frascos de 100, 250, 500 e 1000

GRANULADO: frasco de 100 g.

LABORATÓRIO SAÚDE, LDA.

RUA DE SANTO ANTONIO À ESTRELA, 44 — LISBOA

Laboratoire Lyocentre

Pela primeira vez

fermentos lácticos vivos, liofilizados, resistentes, às concentrações mais elevadas de antibióticos que se encontrem no aparelho digestivo, nomeadamente de

penicilina, estreptomicina, neomicina, cloranfenicol, tetraciclina, bacitracina e eritromicina

Prevenção e tratamento dos acidentes da antibioterapia

antibiophilus

Caixa de 10 ampolas com 1,50 g. de pó, para solução bebível, titulando um bilião de germes por grama

Registo N.º 786 na Direcção-Geral de Saúde (Decreto N.º 41 448)

CENTRO DE LIOFILIZAÇÃO FARMACÊUTICA
MALAKOFF (FRANÇA)

REPRESENTANTES:
GIMENEZ-SALINAS & C.ª
Av. dos Estados Unidos da América, 10
LISBOA-5

Ácido Azótico Limite ..... 5 ppm

Numa cápsula de porcelana aqueça 2 g com 2 ml de ácido sulfúrico até que cessem os fumos brancos. Deixe arrefecer. Junte 2 ml de água e aqueça até que cessem os fumos brancos. Deixe arrefecer, junte 50 ml de água, 10 ml de ácido clorídrico estanoso e submeta à técnica geral.

Ácido Cítrico Limite ..... 1 ppm

Dissolva 10 g em 50 ml de água, junte 10 ml de ácido clorídrico estanoso e submeta à técnica geral.

Ácido Clorídrico Limite ..... 5 ppm

A 2 g junte 50 ml de água, 10 ml de ácido clorídrico estanoso e submeta à técnica geral.

Ádico Láctico Limite ..... 5 ppm

Proceda como está descrito para o Ácido Clorídrico.

Ácido Sulfúrico Limite ..... 5 ppm

Misture 2 g com 50 ml de água e junte 20 ml de ácido clorídrico bromado. Elimine o excesso de bromo juntando solução de cloreto estanoso, gota a gota. Submeta a solução à técnica geral.

Ácido Tartárico Limite ..... 1 ppm

Proceda como está descrito para o Ácido Cítrico.

Azul de Metileno Limite ..... 10 ppm

Num matrás de Kjeldahl misture 1 g com 200 ml de água, junte 15 ml de ácido azótico e aqueça lentamente até à ebulição. Continue o aquecimento até que o volume fique reduzido a cerca de 20 ml. Deixe arrefecer e junte 10 ml de ácido sulfúrico, agitando cuidadosamente. Aqueça à ebulição. Arrefeça novamente e junte 3 ml de ácido azótico e aqueça até que o líquido fique incolor. Se tal não acontecr, repita o tratamento juntando mais 3 ml de ácido azótico, arrefecendo antes da adição do ácido. Pode-se, se for necessário, juntar mais ácido sulfúrico para se conseguir a destruição da matéria orgânica. Obtida a descoloração do líquido, aquecer até fumos brancos. Se o líquido porém voltar a escurecer, repetir o tratamento com ácido azótico. Aquecer novamente até fumos brancos. Deixe arrefecer e se o líquido estiver incolor, junte 25 ml de solução saturada de oxalato de amónio e ferva até ligeira espuma permanente. Arrefeça e complete com água o volume de 40 ml. Junte 10 ml de ácido corídrico

estanoso e destile 40 ml. Junte ao destilado III gotas de solução de cloreto estanoso e 20 ml de água. Submeta à técnica geral.

Brometo de Amónio Limite ..... 2 ppm

Dissolva 5 g em 50 ml de água, junte 12 ml de ácido clorídrico estanoso e submeta à técnica geral.

Brometo de Cálcio Limite ..... 2 ppm

Proceda como está descrito para o Brometo de Amónio.

Brometo de Estrôncio Limite ..... 2 ppm

Proceda como está descrito para o Brometo de Amónio.

Brometo de Potássio Limite ..... 2 ppm

Proceda como está descrito para o Brometo de Amónio.

Brometo de Sódio Limite ..... 2 ppm

Proceda como está descrito para o Brometo de Amónio.

Carbonato de Amónio Limite ..... 2 ppm

Dissolver 5 g em 30 ml de ácido clorídrico bromado e 30 ml de água. Elimine o excesso de bromo juntando solução de cloreto estanoso gota a gota. Submeta a solução final à técnica geral.

Citrato de Potássio Limite ..... 2 ppm

Dissolva 5 g em 50 ml de água, junte 15 ml de ácido clorídrico estanoso e submeta à técnica geral.

Citrato de Sódio Limite ..... 2 ppm

Proceda como está indicado para o Citrato de Potássio.

Cloreto de Cálcio Limite ..... 5 ppm

Dissolva 2 g em 50 ml de água, junte 10 ml de ácido clorídrico estanoso e submeta à técnica geral.

Cloreto de Sódio Limite ..... 1 ppm

Proceda como está indicado para o Ácido Cítrico.