## OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

## DISCLAIMER



## FAIR USE POLICY



## CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

D00262

Distr.
LIMITED

ID/WG.37/13*
17 April 1970

ORIGINAL: ENGLISH

United Nations Industrial Development Organization

Expert Working Group Meeting on the Establishment of Pharmaceutical Industries in Developing Countries

Budapest, 4 - 10 May 1969

# THE ESTABLISHMENT OF A PHARMACEUTICAL INDUSTRY IN A DEVELOPING COUNTRY - A CASE HISTORY 1/

by

JOEL AMIRAN
National Council for
Research and Development
Prime Minister's Office, Jerusalem
Israel

1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

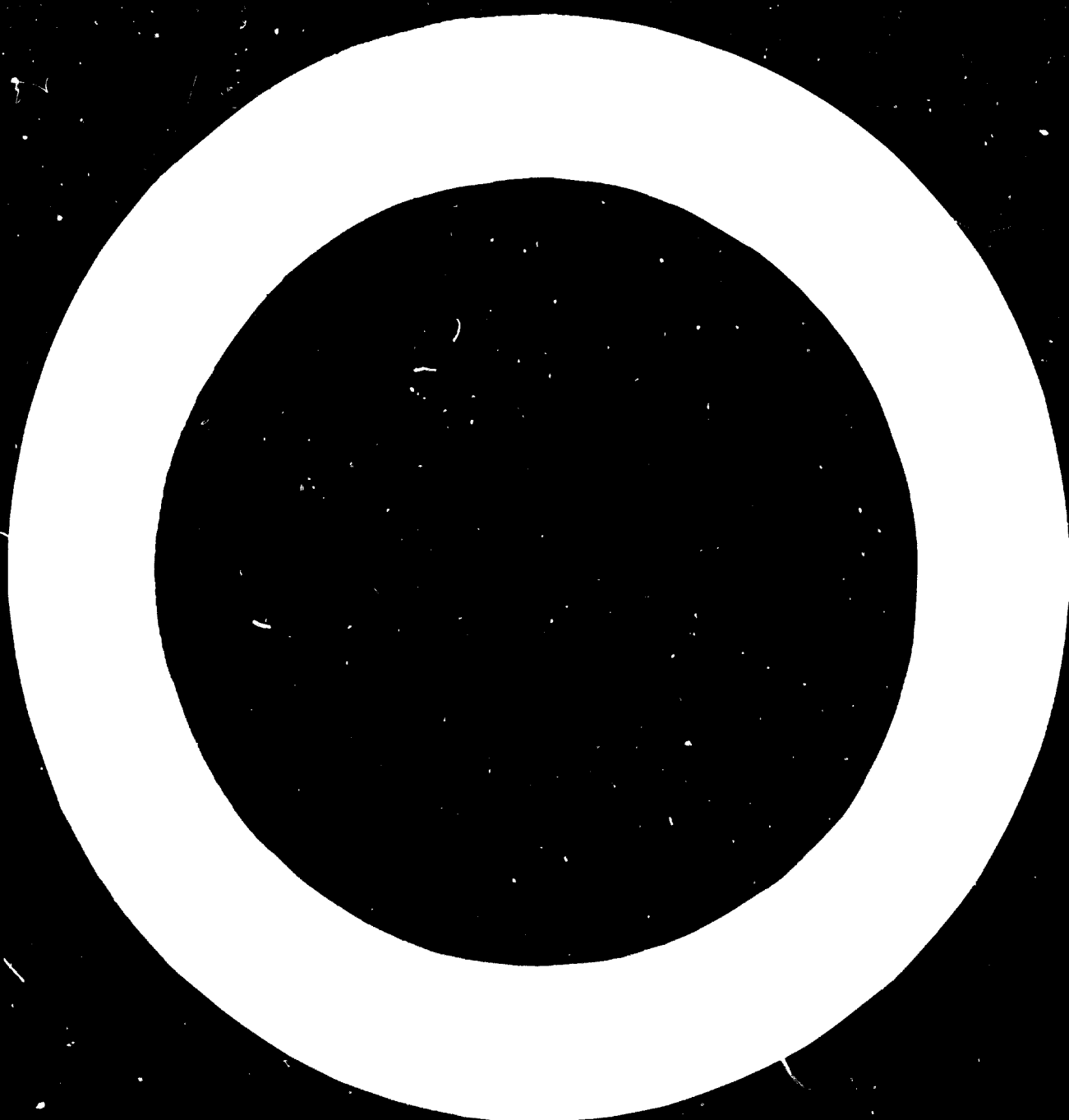
* This document supersedes and replaces ID/WG.37/13, issued 15 January 1970.

# TABLE OF CONTENTS

# TABLE OF CONTENTS (Cont.)



-x-x-x-x-x-x-x-



## THE PLANNING OF THE BURMA PHARMACEUTICAL INDUSTRY (B.P.I.) LTD.

In the early fifties, the Government of Burma implemented a joint venture policy to facilitate cooperation between foreign firms and the Burmese Government.

As a result, up to 1963, the Burma Economic Development Corporation - B.E.D.C. - established 39 subsidiary firms. These firms accounted for a large portion of the country's economy, and were active in the following areas: Fisheries, Transport, Teak and Plywood Trading, Beverages, Merchant Marine, Brewery-Distillery, Hotels, etc...

Two main objectives motivated the B.E.D.C. to establish its Pharmaceutical Industry in 1953; namely, profitability and public welfare. A joint venture project was initiated with a manufacturer of Biological Fine Chemicals and Pharmaceuticals, that in the case in question, happened to be a British firm.

Let us take a look at the situation that prevailed in Burma at that time.

The medical facilities available were as follows:

For a population of about 22 millim people, there were only 1500 physicians. The majority of these physicians practised either in Rangoon, the Capital (Pop. 700,000) or Mandalay, second largest city (Pop. 200,000).

The Hospital situation was similar. Apart from the Rangoon General Hospital, the Seventh Day Adventists Mission operated a Hospital in Rangoon. There were some private clinics, and a Government Nursing School. There existed a Government Hospital in Mandalay.

Other serious limitations existed:-

1. The Chemistry Department of the Rangoon University could only grant Bachelors' degrees in Chemistry. For advanced degrees, students had to travel abroad. As experience has shown in other countries, many of these students did not return.

2. There was no School of Pharmacy and no duly trained Pharmacists in the country.

3. There was no Pharmacy Ordinance. The pharmacies were really shops selling foreign drugs to the public without restriction. Some of the bigger pharmacies sold home made preparations, made by amateurs. These preparations included powders, liquids, ointments, for the treatment of all ailments. There was no governmental control over the alleged efficacy of these local drugs or of their safety.

As far as imported drugs were concerned, over 75% were mere household remedies. (This figure does not include imported antibiotics).

Let us now take a look at the diseases that were prevalent in the country at the time.

The most serious diseases were as follows:

1. Protozoal diseases, specially Amoebiasis and Malaria.

2. Helminthiasis.

3. Tuberculosis.

This rather gloomy situation challenged the Burmese Government at that time.

The B.E.D.C. decided to deal with this challenge by producing drugs that would cure first of all the endemic diseases, but also household drugs, including Vitamins and Iron preperations. These drugs would be either directly packed from powders in bulk, or formulated into tablets, liquids, injections, ointments, etc..., as produced by the foreign firm, according to official standards.

Several practical problems had to be dealt with in order to implement the B.E.D.C. decision.

The factory had to be built to suit the tropical conditions prevalent in Burma: as part of the Monsoon region of Asia, there is a rainy season from June to October, a cool season from October to February, and a hot rainless season from March to May.

A fully air-conditioning system had to be installed in the manufacturing building, which would house the different departments as separate units, necessary in a completely integrated pharmaceutical production factory.

A separate building was erected to serve as a Biological Testing Laboratory. Another building was to house the Administration, and facilities for a Veterinary entity were also set up.

The rather large compound contained a Maintenance and Engineering department including a Boiler House, a petrol filling station and garage for the factory's cars and trucks.

Large macadam lanes permitted easy access to the factory and its different buildings by foot, bus or by car.

It was decided to call the company the - Burma Pharmaceutical Industry, Ltd. - B.P.I.

The terms of the agreement drawn between the Burmese Government and the foreign firm stipulated that the firm would run the Company through a General Manager furnished by it. Foreign Managers would run the different departments and be responsible to the General Manager. Local counterparts would be appointed to the foreign managers.

However, the agreement stipulated that the company would be bound to buy all its equipment and starting materials through the foreign firm.

At the time the company was being set up, there existed in Burma no Central Statistics Department for collecting and registering figures for foreign drugs imported by Governmental bodies like the Central Medical Stores, the Army Medical Stores, or the private importers.

What information did exist at that time led to the establish-

ment of large facilities for big percolators, pumps, and other suitable equipment for the production of a whole line of Extracts, Tinctures, and Infusions.

A Fermentation Unit was set up in order to produce Vitamin B rich Yeast powder, that would then be processed into tablets and distributed on a Nationwide basis free of charge. This was done as part of the Government's fight against the Vitamin B deficient diet of the Burmese people whose main food is decorticated polished rice.

The daily intake of yeast tablets would supplement the above mentioned deficiency.

Manpower:-

Once the agreement was signed with the foreign firm, the Government started a crash program to cope with the manpower situation. A number of young chemistry graduates were sent abroad to study pharmacy. Upon the successful completion of their course, they were trained at the foreign firm, and then returned to Burma in order to be posted at the different departments as counterparts to the foreign managers, appointed by the foreign firm.

One young chemist was sent to study Yeast Fermentation in order to run the future Yeast Fermentation Unit.

One chemist was trained in Quality Control.

Mechanical engineers and technicians were easily available and unskilled labour was recruited from nearby villages. There was easy access to the factory by bus for the workers, and a railroad station was some 200 meters away.

## REVIEW OF THE DIFFERENT DEPARTMENTS

### I - THE TABLET DEPARTMENT

This department was equipped with 22 modern rotating-type tablet presses from the start of production. Their minimum estimated monthly production for a single shift was 40 million tablets while operating at their lowest speed. The presses included two dry-coaters, and heavy-duty rotating presses of 41 punches each which had been specially ordered for the compression of Yeast tablets.

Further facilities housed modern granulating machines for wet and dry granulations, and horizontal and vertical mixers for the production of the wet mass for tablet production. Mechanical sieves and mixing drums for granules were also present. Separate compartments housed drying ovens and coating pans for the sugar coating of tablets.

The tablet presses were purchased from two manufacturers, so that punches and dies were easily interchangeable. The same principle applied to other equipment, and spare parts problems were kept to a minimum. Regular maintenance was effected by the Engineering Department, which also kept an accurate history of every machine.

In the first year of operation in 1955, 38 distinct items were produced. The monthly average production was only 2.6 million tablets, far below the estimated minimum production of 40 million tablets a month.

The production consisted of a wide range of drugs, including Sulfonamides, Quinine salts, Isoniazid, Chloroquine phosphate, Diiodoquine, Santonin, Vitamins - single and in combination, Aspirin, Sodium Salicylate, Ferrous Sulphate, Cough tablets, Laxative tablets, antacid tablets, etc...

In 1959, the number of items rose to 58, with the addition of Antihistaminics, Scuill Compound, Barbiturates, Hexamine, Digoxin, Dapsone, Saccharine, etc., with a monthly average production of 10.1 million tablets (not including yeast).

The production of tablets during the succeeding years gradually increased. It was only in 1963, 8 years after the opening of the factory, that the estimated minimum monthly production of 40 million tablets was reached, for one shift.

## II - THE YEAST PLANT

On the return of the Chemist trained for this purpose, Yeast Powder B.P.C. was successfully produced. The powder was compressed on the 4 tablet presses. The Yeast Distribution Campaign started, but soon after, a psychological factor thwarted the excellent intentions of the Government. The people refused to consume yeast tablets on the assumption that what was offered freely was worthless. The campaign unfortunately failed. The production of yeast was economical when the factory was run for a minimum of 3 months a year, and since there was no demand for such a production, the Yeast Plant was closed down. All efforts to find a foreign market for the locally

produced Yeast powder B.P.C. or yeast tablets, also failed. To meet specific demands for yeast tablets and for yeast tablets fortified with Vitamin B Complex, necessary amounts of raw material were ultimately imported.

The problem of the four heavy duty machines was only partly solved by compressing peppermint tablets with the same punches, as well as yeast tablets from imported yeast powder.

## III - THE GALENICALS DEPARTMENT

This department was originally planned to produce the whole range of Extracts, tinctures and infusions official in the British Pharmacopeia and its Codex.

When production started, it soon became apparent that the actual consumption of this type of preparation did not justify the big lay-out of the department nor the heavy equipment that was only partly used, even less so in succeeding years. Efforts to export the local production of tinctures and extracts did not succeed.

Household remedies like Vitamin combinations were produced in different forms. These included cough syrups, calcium syrup, Antiseptic ointments and solutions, insect repellent creams, digestive mixtures for babies, etc...

Insecticides formulation was also started in prefebricated facilities outside of the production building in an attempt to use available equipment and manpower of the department and to answer the need of the country for a variety of insecticides. A household spray

in time against flies, mosquitoes, cockroaches was first produced and marketed. Gamma Benzene Hexachloride Powder (B.H.C.) was also produced. At the same time an industry official was sent abroad to be trained in insecticides formulation.

The formulations were performed under primitive conditions in poorly ventilated facilities. The workers were subsequently provided with suitable masks, gloves and clothes, but these precautions only made the workers more uncomfortable.

As a result of the high cost of imported Kaolin powder, used as a filler for the insecticidal formulation, the formulations were not competitive with the imported products.

The Administration looked into the economical feasibility of building a modern insecticide plant with the help of foreign firms; this step was delayed when in 1963 a total Nationalization of all Commerce was effected, which finally led, a year later, to the end of all foreign private investments in Burma.

A detergent powder as well as a scouring powder was also produced in the department.

Imported quartz powder made up more than 90% of the inactive ingredient (filler) of the scouring powder, and the spirally wound container was also imported. The final product was not competitive with imported products.

The same problems arose with the detergent powder - In addition there was no equipment for spray-drying.

The scouring powder and detergent powder production was

eventually stoped. All the above could have been prevented if careful survey had been performed before the production of these products.

## IV - THE STERILE PRODUCTS DEPARTMENT

The estimated monthly output of the seven filling and sealing machines was 1.5 million ampoules for one shift.

In the first year of production, 32 items were produced with an average monthly production of 84,000 ampoules. The first drugs produced were single vitamins, and Vitamin B Complex, Morphine, Pethidine, distilled water. Saline, Dextrose and Dextran solutions for intravenous infusions were also produced.

The department was equipped with large autoclaves, filter-presses, semi-automatic ampoule washing machines and modern filling and sealing machines as well as printing and label sticking machines.

In 1959, 56 items were produced, with an average monthly production of 332,000 ampoules, which included Morphine Sulphate, Pethidine HCL, Atropine Sulphate, Carbachol, Digoxin, Emetine HCL, Trimetrine Maleate, Procaine HCL, Vitamins, Intravenous Infusions, etc...

By 1962, the estimated monthly production was exceeded, and the department worked overtime occasionally to meet the demand.

## V - PRODUCTION PLANNING DEPARTMENT

It operated under a modern system whereby production requirements were determined from sales forecast.

Routing and Scheduling were done through the use of master sheets and cards. Dispatching and follow up were also performed regularly.

## VI - THE QUALITY CONTROL DEPARTMENT

All starting materials were quarantined and checked by this department as they were received at the factory, and their conformity to official standards evaluated.

All processed drugs were checked, whereby samples were taken from the different manufacturing departments on the spot. Packing instructions were delivered by the Production Planning Department only for those quarantined drugs for which clearance was given by this department.

## VII - BIOLOGICAL TESTING LABORATORY

This laboratory started production in 1957 with

1) Bacterial Vaccines: Cholera and Plague;

2) Viral Vaccines: Rabies and Small Pox;

3) Bacterial Toxoids: Tetanus and Diphteria;

4) Mixed Vaccines:

   a) Typhoid - paratyphoid A and B and Cholera;

   b) Typhoid - paratyphoid A and B (T.A.B.);

   c) Typhoid - paratyphoid A, B and C (T.A.B.C.);

The labnratory also performed routine Pyrogenicity Tests for all the Sterile production of theSterile Products Department, produced liquid media for general use, and tested, before release,

all batches of vaccines.

5) Anti-Snake Venom Serum

The laboratory received from the Veterinary Department horse blood collected from horses previously immunized against venoms of cobra and viper. The poly-valent anti-snake venom serum was effective against cobra and viper bites only.

## VIII - THE VETERINARY DEPARTMENT

The high incidence of deaths in the country due to snake bites, which also happened to be the highest in the world, made the production of local anti-venoms against the snakes present in Burma a life saving necessity.

It kept, for this purpose, a sufficient amount of cobras and vipers in an appropriate snake pit. The snakes were milked at regular intervals and the collected venom (after proper evaporation and dilution in saline solution) was injected into horses. The latter were bled at the correct time and their blood sent to the Biological Testing Laboratory, for the preparation of the anti-snake venom serum.

Its other function was to serve the Biological Testing Laboratory. It kept horses, cows, sheep, rats, mice, guinea pigs, rabbits.

## IX - THE FILLING DEPARTMENT

This Department was under the direct control of the Pro-

duction Planning Department and received from it Packaging Instructions. It filled the different drugs received from the Production Department in appropriate containers.

The Department's equipment consisted of semi automatic bottle filling machines for liquids, semi automatic label sticking machines and semi automatic tablet counters. Ointments were filled with a semi automatic machine, and the tube crimping done separately.

-x-x-x-x-x-x-x-

## S E L F - M A N A G E M E N T

In February 1959 the contract between the B.E.D.C. and the foreign firm was terminated, and the foreign staff was released.

From that date on, the Burmese Senior Staff took over and managed the company.

The Burmese Government turned to a smaller country, namely Israel, to furnish them with the advisors they needed.

From 1959 to 1961, three Israeli advisors served the company, and the last advisor, your humble servant, served from 1962 to 1964.

During the first period of self management, the Burmese staff braced themselves for the difficult transition period encountered with the withdrawal of the foreign personnel from the company. Periodic staff meetings were held in which the promotion of the company was discussed. The initial policy of making the company profitable and self supporting was maintained.

Prior to 1959, the lack of Import Statistics in Burma hindered the proper planning of the production of Drugs by the Company. Imports of essential drugs according to the requirements of the country were not properly planned.

### THE RANGOON DRUG HOUSE - R.D.H.

This Drug House was established in 1959 by the B.P.I. in order to secure the steady imports of drugs to Burma.

The Pharmaceutical Director of the B.P.I., a qualified pharmacist trained in England and the United States, was transferred to the post of General Manager of the Rangoon Drug House.

Import figures of drugs and their value for the years 1955 to 1959 were compiled from Army and Central Medical Services, as well as from private importers.

These statistics, while enabling the R.D.H. to better plan the import of drugs, furnished the B.P.I. with invaluable information about consumer demand for household and non-proprietary drugs, as well as the medical profession's trends for proprietary drugs.

This enabled B.P.I. to make future plans for the introduction of New Ethical Drugs.

In 1963, after a total nationalization of all commerce, all drugstores and pharmacies were converted to People's Drug Stores (P.D.S.) and put under the management of the R.D.H. In addition, the R.D.H. was given the task to open up People Drug Stores all over the country and appoint managers in every one of them.

## STARTING MATERIAL PURCHASES

Initially the foreign company supplied all the starting materials to B.P.I. The new local management now introduced a system of free bidding for most of the starting materials purchased. Still, the company dealt only with reliable firms from both Eastern and Western Europe, and Asia. In extreme cases a particular starting material would be purchased from only one supplier if the excellence of

the starting material was the key to the production of a high quality product.

EQUIPMENT

Although additional equipment was not required during the first years following self management, the Senior Staff continually kept abreast with the newest technological improvements in the field of equipment and instrumentation for the Pharmaceutical Industry by carefully reading the technical journals.

In 1962, when the need for additional drying oven arose, a modern quick-drying oven was ordered instead of a conventional one.

At that time special equipment was also ordered for the production of pressurized packages (Aerosols), after a careful survey showed the need for such articles, specially for insecticide formulation and air refresheners.

An automatic filling and crimping machine for ointments was also ordered.

Plans were made to order automatic machines for the filling and closing of sterile antibiotic vials, and ampoule printing machines.

The Development Laboratories were further equipped with the instruments they needed, like viscometers, pH meter, bench-type emulsifiers, etc...

KNOW HOW AGREEMENTS WITH FOREIGN FIRMS

1 - Agreements which were terminated quickly or did not materialize.

a) Production of Chloramphenicol tablets and syrup, involving purchase of raw materials exclusively from a foreign firm.

After two years the B.P.I. reconsidered the advantage of the agreement against offers from other firms to sell Chloramphenicol powder B.P. and Chloramphenicol palmitate powder at lower prices and decided to terminate the agreement.

b) The sterile filling of streptomycin and penicillin in vials, involved an agreement with another firm. This agreement suffered the same fate as the former one.

Long and sometimes very tedious negotiations were held with different firms for the production of different drugs, and also a citric acid plant by fermentation; but did not materialize.

II - Agreements which were maintained.

a) Repacking of Monosodium Glutamate powder in heat-sealed envelopes and tins of different sizes, using the brand name of the foreign firm and exclusive rights of sale in Burma for B.P.I.

Although the royalties paid were high, so were the profits made by B.P.I. from this very popular household item which found its way to all kitchens. - Hence its name "Taste Powder"

b) Repacking of a famous foreign brand of enriched Baby Milk, using special equipment with the advice of a foreign firm.

c) Production of Codeine from raw opium.

A local chemist underwent specific training at the foreign firm, and equipment was bought with the advice of a foreign firm.

The codeine phosphate ultimately produced was to be used for local consumption only.

ADMINISTRATIVE PROTECTION OF B.P.I DRUGS

A Drug Advisory Council was formed by the Directorate of Health. It met once a year and sanctioned for import those foreign drugs they decided were beneficial for the welfare of the country. They also advised banning foreign drugs which were already imported from a few other firms or which could be produced by B.P.I. in sufficient number and be of the same quality as the foreign product.

The Council consisted of physicians representing the Directory of Health, Army Hospitals, Governmental Hospitals, B.P.I. and Rangoon Drug House - R.D.H.

The strong ties between the Rangoon Drug House and the B.P.I helped the latter to receive first-hand information from the Statistical Department of the R.D.H. about changing trends in consumer demand for a number of years. Such information helped start Development Laboratories in the different production departments:

Tablet Department

Intensive efforts were made to improve the existing products and make them withstand the heat and humidity of the tropics by:

a) New Coating Techniques for tablets;

b) New Coating compositions for tablets;

c) New Enteric coatings for tablets;

d) Production of chewable tablets;

e) Production of film coated tablets;

f) New colour dyes, new tablet binders and disintegrating agents;

g) Production of capsules;

were but a few of the many experiments done.

Since the International Patent Law did not apply in Burma, new drug formulations were experimented, after the raw material was obtained. Examples of some were: Oral Diuretics, Hypotensives, Tranquillizers, Long acting Sulfonamides, etc..., as well as Geriatric Capsules, Enzyme Capsules, Antibiotic Capsules, etc...

Galenical Department

Household medicines like tonics, laxatives, balms , cough syrups were produced in the development laboratory and brought forward for approval to the Medical Committee prior to being manufactured.

Factors affecting administrative protection of a new local preparation were the lower cost to the public and identity of composition to the foreign product.

In 1963 the B.P.I. could already inform the Rangoon Drug House that it could supply the country's demand for several preparations, including sterile antibictic preparations. On the strength of other such claims for different drugs and household products, administrative protection was granted.

Cosmetics were developed in the laboratory and the following produced:

a) Lipsticks in different shades and sizes;

b) Haircream;

c) Hair Oil;

d) Liquid Shampoo in different sizes;

e) Toothpaste;

f) Toothpaste with Stannous fluoride.

Different other beauty products like eye lining, face powder, after-shave lotion, were under experiment.

No administrative protection was given for cosmetics.

The Problem of a Second Shift in the Production Departments

The question of introducing a second shift in the Production Departments was often brought up. By 1964 the sterile products department was working under full capacity, and certain unforseen shortages in drugs from other departments warranted the implementation of a second shift, even for a brief period (Starting materials failed to arrive on time from a foreign country because of strikes in foreign ports). Transportation problems, political unrest and the high proportion of female workers in the filling department who could not work at night, prevented the implementation of a second shift in the factory. Instead, overtime was introduced when necessary, that did not exceed two hours.

## PACKAGE DESIGN

Starting from 1962 all labels were redesigned to keep in line with the high standard of the imported drugs. Elegant bottles were introduced, as well as secondary containers for most of the drugs produced. The quality of the paper used for labels was greatly improved and different colours introduced. A standard design was retained for labels and secondary containers. Bold, easy to read letters were printed.

Top quality art work and painstaking efforts greatly increased the prestige of the B.P.I products with the consumer.

## PUBLICITY

Up to 1960, publicity was limited to the lay press, magazines and periodicals. In succeeding years the management progressively increased the publicity budget exploiting such advertising media as posters, pamphlets, calenders, local cinemas (film slides, cartoons, films), neon sign boards, radio commercials, etc...

From 1962, stalls were set up by B.P.I. at National Exhibitions in different parts of the country. In certain instances, such as 1st of May Celebrations, prefabricated constructions were set up, which included air conditioning and electrical power supply. Demonstrations to the visitors from all over the country were performed. These included tablet manufacture, sugar coating, electronic tablet counter in operation, moulding and filling of lipsticks, snake milking, etc...

Regular tours to the B.P.I. were arranged for Primary and

Secondery schools, the Army, different Institutions, etc...

The visitors were shown around the production departments, where appropriate explanations were offered by a Company Officer.

MEDICAL DETAILING

The Medical Division was headed by a physician who had had a post graduate course in Pharmacolog, abroad.

Doctors were kept informed about the products through direct mailing of Medical Bulletins, letters and a Therapeutic Index. In 1963 active medical detailing started with a group of young chemistry graduates who had been previously trained at the Company. They combed the country and distributed samples to the Doctors personally. Shortly afterwards their presence was required to manage newly opened Drug Stores by B.P.I. and private calls on doctors were stopped.

SALES DEPARTMENT

Advanced planning and periodical evaluation of budgeted sales figures resulted in annual sales figures which conformed with estimated sales figures. In 1959 the break-even point was reached and past, so that this year was the first profiteble one for the Company. Till 1963 sales were made through indirect Channels of ditribution (wholesalers - retailers - customers).

After the Nationalization of 1963, drugs were sold directly through the People Drug Stores.

The Army and Governmental Hospitals as well as institutions

received their supplies directly from B.F.I.

Better penetration of the products was also achieved by introducing warehouses at different points in the country.

THE DIFFERENT COMMITTEES

I - The Administration Committee

It was headed by the Chairman of the B.E.D.C. Its main function was to formulate policies, negotiate and sign agreements with foreign bodies. The members were appointed from the Health Directorate and other Governmental bodies. It met once a month.

II - The Executive Committee

It carried out the policies formulated by the Administration Committee. It was headed by the General Manager and its members were the Directors of the different units of the Company (Biological, Pharmaceutical, Medical, Sales, Advertisement, etc.). It met once a week.

III - The Production Coordination Committee

It was headed by the Pharmaceutical Director, and its members were the different department managers. It met once a week. Manufacturing problems were brought up and solutions sought.

IV - The Medical Committee

It was headed by a surgeon and its members were composed of

several physicians and representatives of B.P.I.

Its main functions were:

1. To decide on the introduction and manufacture of new medicinal drugs.
2. To decide on the elimination of existing old drugs manufactured at B.P.I.
3. To consider proposals made by foreign firms based on cooperation between those firms and B.P.I. for the manufacture of certain drugs, or for the purchase of raw materials.

V - Production Planning Committee

It was headed by the Deputy General Manager and its members were the Pharmaceutical Director, Production Planning Manager, Sales Manager and Purchasing Manager.

Sales estimates were reviewed, a list of drugs short in the Finished-Goods Store as compared with the minimum level handed out, and immediate steps taken by the Production Planning Manager to issue either Production Orders or Packaging Instructions to the Production Departments.

Minutes were taken at all the meetings and copies distributed to all members.

INTERDEPARTMENTAL RELATIONSHIP

Collaboration and cooperation between the different department managers were greatly encouraged. Weekly lunches were organized outside

the factory where managers could discuss informally, away from the tension and pressures of work.

A Social Club was opened at the Company housing compound, and workers, from foremen to managers could read, relax, or play indoor games.

Seminars outside of the factory were arranged at a pleasant picnic site, and different topics were discussed.

Monthly reports of the activities of the departments were submitted by each manager to the General Manager. After compilation, these reports were circulated among all managers and kept everyone informed.

## TRAINING

In the first years of self management, managers or deputy managers were sent abroad to train in sterile antibiotic filling, production control, production planning, cosmetics, insecticides formulation, synthesis of codeine from raw opium, etc...

A two-year course of Management Administration was given in Rangoon to managers and Deputy Managers.

In 1962 a training officer was appointed to coordinate in-factory training. A training committee was formed to lay down policies concerning training at different levels.

In 1963 an intensive 6 months course was given to Sales Assistants who were to be given jobs at the Rangoon Drug House and B.P.I. pharmacies. Management and technical training classes were held for Company officers under training. The candidates were

chemistry graduates eligible for various positions at B.P.I. Job rotation in the different departments for 6 months was compulsory.

The successful completion of training programs, which included a written examination, was a pre-requisite for promotion at different levels.

## EXTERNAL RELATIONSHIPS WITH SCIENTIFIC INSTITUTIONS

### I - Collaboration with the Union of Burma Agricultural Research Institute (U.B.A.R.I.)

#### THE RAW MATERIALS PROJECT

This joint project between the Agricultural Research Division of U.B.A.R.I. and B.P.I. started in 1958. A United Nations Adviser to B.P.I. served in Burma from 1957 to 1959, and again in 1960.

Seeds of different tropical plants were received from a Foreign Pharmaceutical Company and test-cultivated in a temperate dry zone, North of Mandalay.

a) Pyrethium

The flowers harvested were tested at B.P.I. for total pyrethrins and a year later assayed in England. The local flower compared satisfactorily with the Kenya flower (1.3% total pyrethrins for local flowers, and good insecticidal properties in the bioassay).

Lack of funds limited the total area cultiveted, and interest shown in the cultivation of the plant, apart from B.P.I. and U.B.A.R.I. circles, was small. Drainage in foreign exchange for foreign Pyrethrum was considerable.

b) Digitalis Purpurea and Digitalis Lanata

These plants, containing the well known cardiac glycosides Digitoxin and Digoxin, were also test-cultivated. Crude drugs obtained from the plants were assayed at B.P.I. and Bio-assays performed abroad. Leaves of both plants fulfilled the official requirements.

The same difficulties were encountered for the cultivation of these plants as for Pyrethrum.

c) Atropa Belladonna

Test cultivation showed that alkaloidal contents were above official requirements. But the B.P.I. continued to import herbs, leaves and roots of this plant.

d) Linum usitatissimum (Linseed)

Although successfully cultivated and tested, space and economicel reasons prevented large scale cultivation. This plant is of a great commercial value to Burma since linseed oil is imported in very large amounts, specially for the paint industry. It was also stressed by U.B.A.R.I. officials that the introduction

of medicinal plants and their economic cultivation involved intensive research work in development of the variety, selection of seeds (as in linseed) and their distribution for cultivation. The farmer himself was an important link for the success of such an enterprise.

## II - Collaboration with the Veterinary Institute

### VETERINARY DRUGS AND FEED SUPPLEMENTS

All veterinary products were imported into the country by the Rangoon Drug House, according to the specific requirements of the Army and of Burma Farms Ltd. (B.E.D.C. Subsidiary).

Frequent meetings were held between officials of the Veterinary Institute, their Food and Agricultural Organization (F.A.O.) Consultants and B.P.I. representatives in view of the production by B.P.I. of Veterinary Drugs and Feed supplements.

#### a) Feed Supplements

The imported brands contained different combinations of Vitamins, Antibiotics, Minerals; the majority of which were used for pigs and poultry. The demands and preferences of the Army and civilian users (Burma Farms Ltd.) were different, thus giving rise to the multiplicity of the foreign brands. B.P.I., in agreement with the different parties and the F.A.O. Consultants, decided that the interested parties submit their specific needs, from which a selected formula would be submitted for approval to the Directorate of Veterinary Services.

In 1963 numerous breeding and demonstration stations were considered for erection by the Government; for the education of the farmers.

Availability of feed supplements to distant places in Burma was paramount, but transportation problems had still to be solved.

The interested governmental bodies were of the opinion that the first step in the education of the Burmese farmers was to convince them to use one feed supplement instead of the broken rice for pigs, lactating sows and other animals. The second step was to be the introduction of specialized feed supplements on the lines of the imported preparations.

b) Veterinary Drugs

The drugs which were imported in big quantities were the antibiotics Oxytetracycline and Chlortetracycline in powder, liquid, sterile solution and ointment forms. The B.P.I. did not produce any drugs for human use from these two antibiotics, and their production solely for veterinary use was not considered economically feasible. A multitude of other imported drugs consisted of small quantities of de-wormers, antiseptic preparations, Nitrofurans, Sulfanilamide preparations; all of which were not considered of economic importance. The only exception was sterile solution of Sulfamethazine 33%, which B.P.I. decided to produce and for which it obtained administrative protection.

## III - Collaboration with Burma Farms Ltd.

Outbreak of epidemics among domesticated animals was the cause of great losses to the livestock industry in Burma.

The foreign vaccines imported had several drawbacks:

a) High price;

b) Time factor;

c) Expiry date.

The B.P.I. was approached by Burma Farms Ltd. who requested it to produce quality vaccines in adequate quantities for the country.

The most common diseases of livestock were:

Cattle, sheep, goats:

1. Rinderpest;
2. Haemorrhagic septicemia;
3. Anthrax;
4. Foot and mouth disease.

Pigs:

1. Swine erysipelas;
2. Swine Pox;
3. Hog Cholera.

Poultry:

1. Newcastle disease;
2. Avian Pasteurellosis;
3. Fowl Pox;
4. Coccidiosis;
5. Intestinal parasites.

It was recommended that B.P.I. starts with the following vaccines:

A. Poultry Vaccines:

1. Newcastle disease;
2. Avian Pasteurellosis;
3. Fowl Pox.

B. Swine Vaccines:

1. Swine Erysipelas;
2. Hog Cholera;
3. Swine Pox.

It was suggested that two scholars be sent abroad to be trained in the techniques of preparation of the different vaccines.

## IV - Collaboration with the Rangoon University

### PLANS FOR A SCHOOL OF PHARMACY

In 1963 the Rangoon University considered opening a School of Pharmacy in order to provide the pharmacists needed by the country.

The United Nations Technical Assistance Program was approached, and an Advisor, who was a Physician and Pharmacologist, was sent to Burma.

The Advisor interviewed Managers at B.P.I. as well as physicians, and gave his recommendations.

The choice of the Advisor was made by physicians of the Rangoon Faculty of Medicine. As a result, the advisor was a physician

and not a pharmacist. A better understanding of the need for qualified pharmacists in Burma and how to provide them would have resulted if a staff member of a School of Pharmacy had been chosen instead.

## THE WORKER

Unskilled workers were trained at the Company. They were appointed trainees and rotated to each department of the production building. When a vacancy occurred in a department, an efficient worker was appointed to fill it.

By their own attitudes, managers of the different departments got their subordinates and workers motivated to do their jobs with enthusiasm.

Other measures taken to increase the participation of the worker in the general effort were:

1. Ceremonies were organized, every 6 months, at the Company, where Certificates and Awards for practical suggestions and early attendance were granted to workers.

2. A free dispensary was available to all workers and their families. It was headed by a physician, aided by nurses. All medicines prescribed were given free.

3. A nursery for children of working mothers was built in 1963.

4. B.P.I. household and over the counter drugs were made

available to all workers at special rates.

5. A Sports-Day was organized once a year and all departments participated in the numerous events. Cups and medals were awarded at the end of the ceremony.

6. A Beauty Contest was organized once a year among all lady workers, and the winner was crowned Miss B.P.I.

7. A House Journal - illustrated, was published every month, and kept workers informed of all activities - social and technical, at B.P.I.

## THE ADVISOR

The advisor's role in a developing country is a very delicate one, and one often hears about recriminations from both discontented advisors and advised.

An Advisor is expected to give advice. His role is to advise on all matters in his area of competence. He should expect that his advice may be either accepted or rejected. He should remember that the local authorities are better acquainted with their own problems and needs, and that it is almost impossible for him to put himself in their position.

The information and service that he can offer will most often have to be adapted by his local colleagues and counterparts to their specific needs.

It happens occasionally that sound advice is rejected by

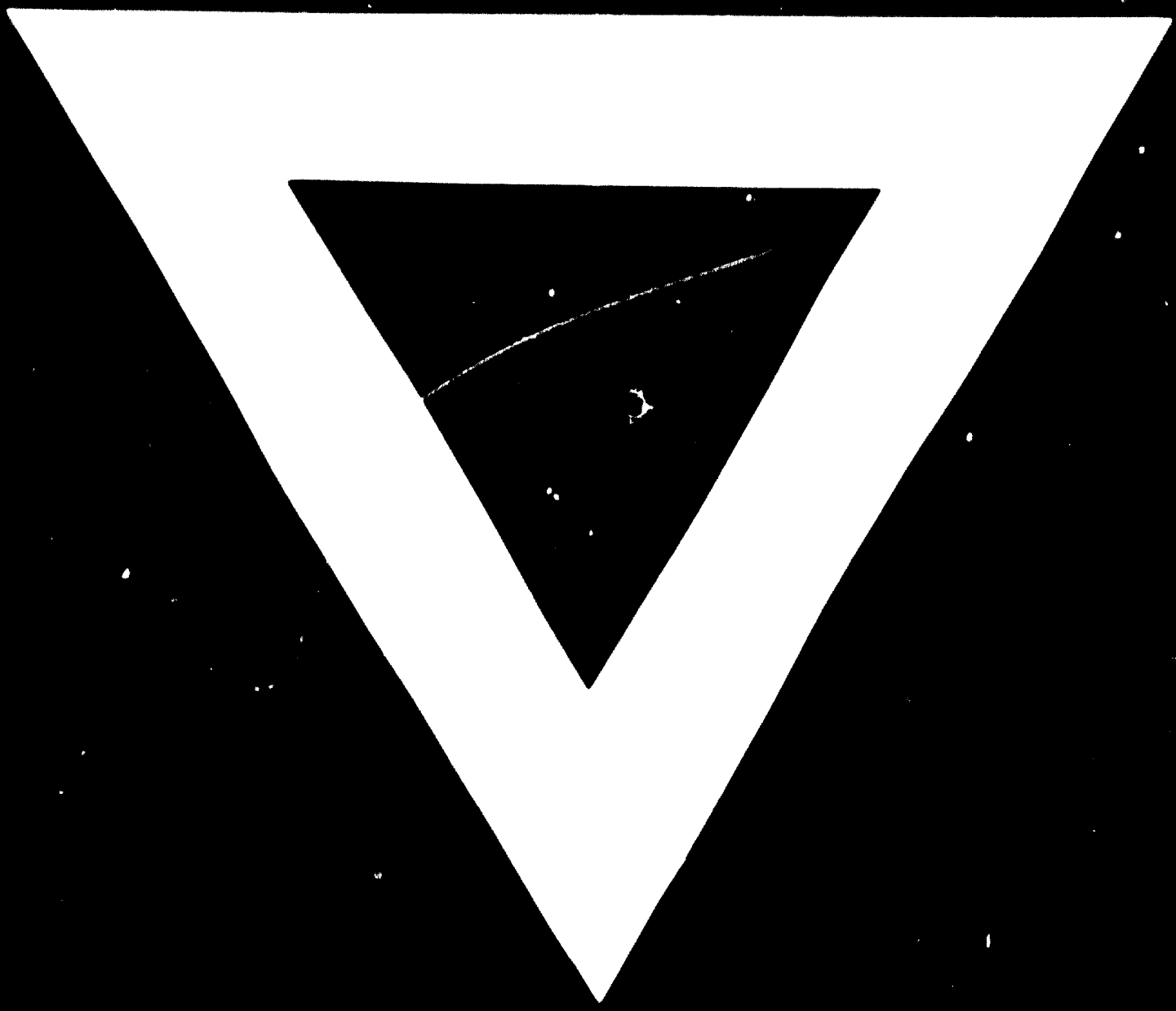
local authorities because the Advisor is weak in human relations and does not understand the traditions of the country or its customs.

The employer, on the other hand (Government or private) should keep frictions and misunderstanding to a minimum by taking the following steps:

1) Describe the Advisor's task clearly, preferably by a joint consultation with the Advisor;

2) Make sure that an appropriate local counterpart trainee is attached to the Advisor, so as to take over when the latter leaves the country. This should be elementary, but is too often neglected.

-x-x-x-x- -x-x-x-



G . 4 . 72