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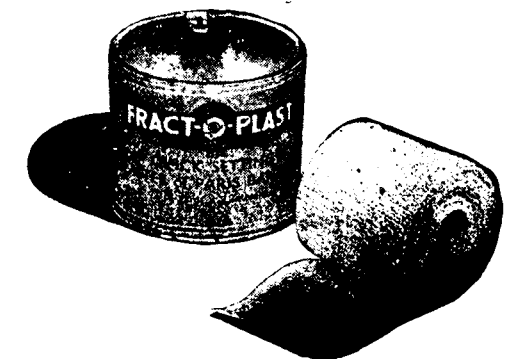
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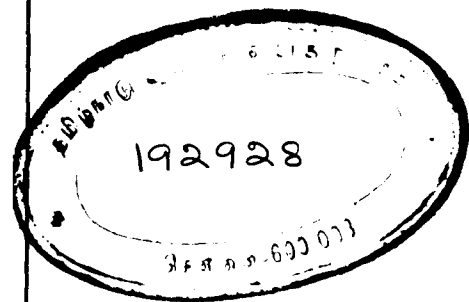
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PROPRIETARY DRUGS AND THE DOCTOR

"**KITTIKON** is very good for such cases of muscle weakness" said the physician addressing his students and pointing at the flaccid feet of a paraplegic patient. The physician was also a lecturer in therapeutics at a big teaching hospital. "*Kittikon* is put up as tablets for oral ingestion as well as in ampoules for intra-venous use. It is made by Satya Pharmaceuticals. It is easily available at the high road pharmacy in the city. It is very cheap. Personally I find the drug most reliable to use, delicious to taste, absolutely non-toxic and all my cases without a single exception have miraculously recovered." The more gullible of his students wrote these pearls of wisdom down partly to please their teacher and also to pass their examinations! They may not have learnt to discover the cause of paresis in a patient but they will undoubtedly remember *Kittikon* the wonder drug! The more critical of students laughed up their sleeve and one even made an uncharitable suggestion "Perhaps he has shares in Satya Pharmaceuticals..."

A very small minority of unscrupulous teachers take advantage of their position to advertise patent proprietary drugs. Some are even prone for a small consideration to write to the less exacting among medical journals. "I have tried Rubbishfog (made by Fisticuff & Co. Ltd.) on a case of severe asthma and obtained a miraculous cure. I think you can't choose anything more effective than Rubbishfog for all types and cases of asthma. It is wonderfully effective and remarkably non-toxic. I have no hesitation whatever to recommend this wonder drug and I thank Fisticuffs for putting out such a fine medicine". Do you suppose such a glowing testimonial has any vestige of science in it? Does it not stink of a peculiar and unethical attempt at cheap advertising? Should "Rubbishfog" be a widely known and used drug and Fisticuffs a reputable pharmaceutical firm, the doctor stands little to lose. He may even get a crate of Rubbishfog for use in his own practice as a reward. It is unlikely that reputable manufacturers would solicit or use such testimonials. However writing out testimonials for obscure drugs put out by firms of questionable repute could offer unscrupulous physicians a very tidy income.

The lecturer who eulogised "*Kittikon*" to his students was a sincere man. It is true he was besieged everyday by several drug salesman who were liberal with their physician's samples and even more generous with literature extolling the virtues of the firm's drugs but he kept a level head. In the case of *Kittikon* it was with a sincere belief of its great value that he recommended it for use to his students.

Yet, was it proper for him, however much faith he may have in a drug, to extoll its virtues to medical students? I believe most emphatically that it was very wrong.

Medical students should be taught the principles of diagnosis first. It is far more important for them to be able to discover, by careful history taking and detailed examination, including the proper eliciting of physical signs, the nature of the disease and its aetiology. For a particular disease they should master the principles of treatment. Once a correct diagnosis is made it is not difficult for a newly qualified doctor to discover the drugs which are needed. When discussing treatment using drugs only pharmacopeal names should be mentioned. They should be taught the way in which the drug acts and how its action is of benefit, either to arrest the disease process, or to make the patient



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feel better. In England, in the teaching of medical students proprietary names of drugs are never used and should any student inadvertently name one, it would be frowned upon by his teacher if it does not incur the gravest displeasure of his examiners.

If this is the attitude towards drugs which have definitely proved themselves to be of benefit, how much more important is it that we do not eulogise a particular drug, and that too with a little or in many cases no adequate scientific basis whatsoever. It is deplorable that drugs should be recommended merely on clinical whims or intuitions without substantial scientific proof of their benefit.

Today the science of herbs, extraction and sometimes the synthesis of drugs, the evaluation of its properties, its assay and clinical tests on human beings to determine not only its benefits but also its toxic side reactions – has become a very complicated but fairly precise study. We know a great deal about the majority of the drugs we use in clinical practice. In most cases doses have become standardized. The practice of writing out illegibly, complicated prescriptions for complex mixtures in obscure Latin has become obsolete. It is of the greatest importance therefore, that the newly graduated doctor possess a sound knowledge first of the principles of diagnosis and second of therapeutics—a study of the exact nature of the drugs he plans to use and their properties. There is little place in modern medical education for him to remember “*Kitikon*” because his teacher had the feeling that it was useful on some of his patients. The lecturer has every right to recommend his favourite drug to other practising doctors but never to students during their formative years in a medical college.

The day a student qualifies he is besieged by a hoarde of representatives. They bewilder him with innumerable samples and explanatory literature about the drugs produced by the firms which employ them. What is it which guides a doctor in his practice in the choice of drugs? To a great extent it is common sense. Next it is a scientific background which he should have acquired at the medical college. Lastly he relies on what is widely used by his colleagues in the profession or by his distinguished teachers in the medical college.

Obviously, the general practitioner is not in a position to evaluate the benefits of the drugs he chooses. He hasn't the time; he may not have the aptitude, the interest or the facilities to carry out clinical experiments with an acceptable standard of controls. Yet some one has to do it. The manufacturers themselves cannot do it because if they do it will savour of prejudice. The persons who should have the facilities and the time are the teachers in big training institutions. If in big hospitals eminent teachers don't care a scrap about scientific controls or the objective assessment of drugs, and are willing to be influenced by vague clinical impressions which they receive by treating patients at random with a particular drug, it is a sad day for medicine in our land. If the leaders of the profession are themselves willing to throw overboard a scientific attitude towards therapeutics, the prospects for the future are indeed very grim.

Ideally there should be an authoritative board comprising eminent physicians with a scientific bent of mind towards medicine, pharmacutists and other scientists under whose ægis the clinical benefit or harm of all proprietary medicines could be evaluated. For this

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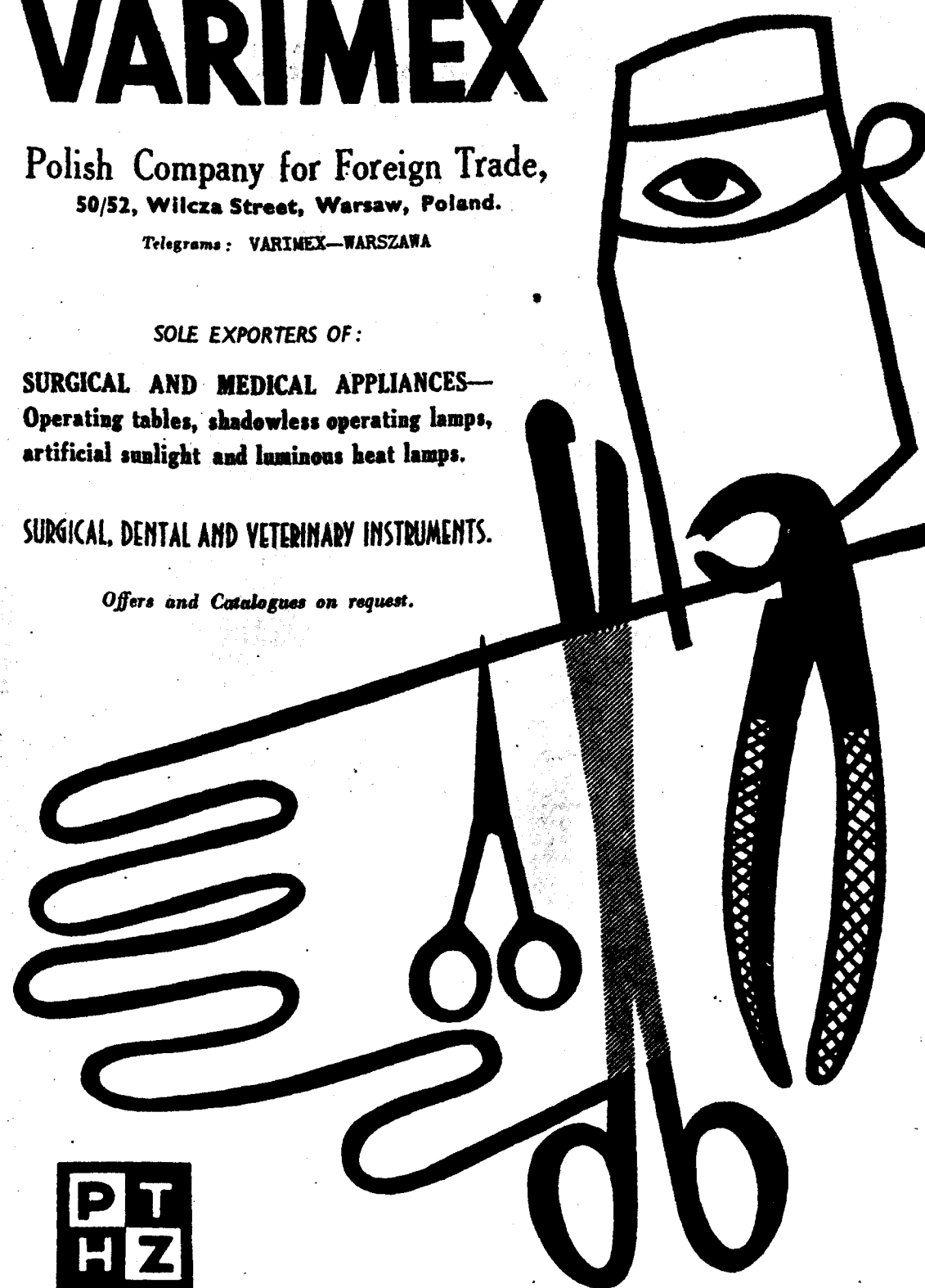
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purpose they could take advantage of learned organizations such as the Medical Research Council. Furthermore regional studies could be undertaken. Such a board should endeavour to classify all proprietary preparations into three groups:

- (A) Those which have been proved to be of definite value,
- (B) Those which are of doubtful value,
- (C) Those which are useless as well as the ones which have not as yet been established as being of any use.

While the practical difficulties of arriving at such a classification might be quite formidable, successful classification will undoubtedly be of immense value.

Preparations which come under the first group should be made readily available and at low cost to the public. Preparations of the second type may be prescribed but with reservations. Preparations of the last group should be available to those members of the public who wish to buy them. They would include many favourite tonics and other medicines of doubtful value.

Essential pharmaceutical preparations should be made available, at as low a cost as possible (with only a reasonable margin of profit for its manufacturers) to the general public, because we in India cannot afford expensive drugs.

The manufacture of essential drugs, exploiting as far as possible, the natural resources of our country, is an important step towards the provision of medicines at low cost. The penicillin production centre at Pimpri is a shining example of the success of such a venture. The quality of the anti-biotic manufactured there is equal to if not better than corresponding makes of imported penicillin. Soon Pimpri is going to turn to Streptomycin production also. Again, in the chinchona factory in the Nilgiris we have another excellent example of a national endeavour to produce an essential drug.

The prohibition of proprietary preparations would be an undesirable step as such drugs have a definite role to play. The import of drugs has been considerably restricted, but a means should be devised to prevent unnecessary waste of money. Several reputable firms put out almost identical preparations and engage in a fierce out-throat competition. Surely, some method could be devised by which all the energy, technical skill, and money spent on fruitless rivalry could be diverted to a more useful purpose of national benefit.

A real start may be made by introducing into our medical teaching a sense of perspective. Good, nourishing food, exercises and other health-giving habits do more good than the mere ingestion of expensive medicines which often merely depletes the patient's slender financial resources. Improper nutrition makes for increased susceptibility to infection. Drugs to combat infections without any corresponding advice about what to eat how much and when, is to offer mere palliation without striking at the root of the problem.

Let us start by prescribing only such drugs which are absolutely essential for the welfare of the patient. Let us make every effort to see that a truly welfare State will soon come about bringing medical treatment within the reach of all the citizens of our Republic.

HYPERTHYROIDISM IN OLD AGE

By G. GOTTSEGEN, M. D.

Senior Physician, Istvan Hospital, Budapest (Hungary)

Exclusive to "Surgical & Medical News"

ACTIVITY and function of the thyroid gland, even in normal senescence, have not been entirely elucidated as yet. Blood iodine and cholesterol estimations performed by Bonati, Salvi and Rancati following the introduction of thyrothropic hormones have confirmed the long professed opinion about the physiological existence of a mild form of hypothyreosis. Klein on the other hand has found the organic iodine level of the blood to be independent of age, though he admits that the iodine uptake of the thyroid gland in aged subjects is decidedly diminished. As concerns pathology, morbid processes incident to insufficient glandular function, with various intermediate forms from mild hypothyroidism to marked myxedema, are frequent concomitants of senescence; less is known in literature as well as in practice of thyrotoxicosis in old age. The incidence of the disease is generally believed to fall into the period from post-pubescent years to the climacterics and even comprehensive monographs fail to touch, unless in a few lines, upon its puerile or senile forms. There are still fewer reports pointing out the difference in symptoms between the clinical aspects of the disease in elderly persons and those typical of the juvenile or post-climacteric age. This will probably explain why senile hyperthyroidism, fairly frequent as it is, has been identified but sporadically. During ten years of practice we have been able to record 34 indisputable cases in which the first symptoms manifested themselves past the age of sixty. It must be emphasized in advance that the clinical picture of the disease is determined far more by the data of the appearance of the first symptoms than by the actual age of the patient. Morbid processes, lingering over from the climacteric period into the seventh decade or developing as late reappearances of juvenile hyperthyroidism, show scarcely any difference to those manifested by young persons; while the clinical features of the disease when developing for the first time in advanced age, contrast in more than one point.

It is general knowledge that men afflicted with hyperthyroidism are many times outnumbered by women. The ratio of sexes show a notable constancy, irrespective of the epoch or country whence the patients have issued. Buschan in Germany in the eighties of the

past century recorded 4.6 to 1, Williams' American and Deak's Hungarian records from 1946 and 1953, respectively, show 4 to 1. As opposed to this, according to the testimony of Table No. 1, out of our 34 patients 22 only were women and 12 men. This gives a ratio of 1.8 to 1, eloquent proof that, subsequently to the extinction of sexual functions, the characteristic feminine prevalence of the disease fades to a great extent.

As to subjective symptoms, up to a certain degree senile hyperthyroidism resembles juvenile (see Table II). Emaciation, the most obvious symptom, was traceable with each patient but one, with loss of weight amounting to 3—30 kg. during a period of from a few weeks to six months. Palpitation accompanied by dyspnoea, showing correlation with increased physical effort such as walk, climbing stairs, or manual work occurred in 50 per cent of the cases, while in the other half presented itself even during complete rest or on the slightest excitement. There were, however, many complaints quite unusual among younger people. Firstly acute pain in the cardiac region which has prompted one third of the patients to call on the hospital; the symptom subsisted during the state of rest with no aggravation upon exertion. Secondly, gastro-intestinal disorders of a nature delusively apt to render the clinical aspect unidentifiable.

It has often been observed that young people suffering from hyperthyroidism lose flesh in spite of ravenous appetite and abundant nutrition; sometimes their hyperphagia even overcompensates hypermetabolism, resulting in an increase in weight during the disease. Old people, on the contrary, suffer from anorexia, as the presenting symptom, accompanied by dyspepsia, nausea, abdominal pain, emesis and diarrhoea. The ensuing rapid emaciation, appearing as it does both to patient and physician as an obvious after-effect, fails to draw attention to the thyroid gland as the source of the morbid phenomena.

Objective signs (see Table III) of young and old, though showing diversities in more than one respect, are alike as far as hypermetabolism is concerned. Our own experiences have not confirmed that oxygen consumption in senile thyrotoxicosis would only slightly increase, as asserted by Trucco and collaborators. Determination of

basal metabolism, liable to be influenced—as generally known—by numerous sources of error, calls for utmost circumspection. Having availed ourselves of the ASPIS metabolimeter, we have contested the authenticity of the results unless the extreme values of four tests taken on two consecutive days have shown no divergence in excess of 15 per cent. With the lowest test results considered invariably competent, only such patients have been included into the records whose hypermetabolism exceeded 35 per cent. Admittedly, several lighter cases have had to be disregarded in the light of this criterion,—less serious exophthalmic goiter with only a moderate rise in metabolism is not infrequent even among younger people—yet we decided to take this risk so as to safeguard the homogeneity of our records. Hypermetabolism was not attributable to circulatory disorders. Contrary to most authors *Iversen, Joffe, Trucco* and coll., *Lefkovits*—who emphasize the prevalence of cardiac symptoms in senile hyperthyroidism, we have been able to trace heart failure—Oedema, congestion of the liver, etc.—in not more than 20 per cent of the cases and even tachycardia, typical almost without exception as it is for juniors, presented itself in only 50 per cent of all cases even though the line has been drawn as low as 80 pulses per min. Distressingly vehement palpitation as dominant complaint was more than once met with, though neither tachycardia nor arrhythmia were evincible. Unlike in young, it frequently occurs in advanced age that, when the increased oxygen demand of the periphery exacts an intensified performance, the heart cannot raise the frequency together with the stroke volume. However, after the accustomed bradycardia, an increase—no matter how slight—of the pulse rate, even within the statistically set margins, is able to provoke an uneasy, almost painful sensation. Hypertension which has been experienced in 20 per cent of the cases (with diastolic pressures of or above 100 mm. Hg taken as criterion) is of no consideration either in the development of hypermetabolism, as confirmed by *Schill's* reports dealing with the age group in issue.

As concerns the thyroid gland itself, in one out of five nodous goiter cases the toxic signs and symptoms have been produced by thyroid carcinoma. Since these cases have amounted to not more than 20 per cent, we disagree with *Means, Trucco* and coll. and *Williams* in that hyperthyroidism of the elderly can mostly be traced back to toxic adenoma. Nodous struma in *William's* promiscuous group of patients, assembled in majority of younger persons, has occurred in 29 per cent, a ratio exceeding that of our aged group. Moreover, diffuse thyroid enlargement of moderate degree, a lesion hardly

ever absent among younger patients, has been recognized by us in three cases only. Still rarer has been exophthalmos, occurring in a single case alone, while the other opthalmic signs (Grafe, Moebius) have been traceable with nearly three quarters of the patients.

While, as can be stated, one third to one half of juvenile hyperthyroids, exhibiting the triple sign of struma, exophthalmos and tachycardia known as the "Merseburg triad", fall under the category of classic Graves' disease, with the rest, in absence of one or the other cardinal feature, classed under "formes frustes", matters are quite different in the case of elderly subjects. The classic exophthalmic type has not occurred at all; 20 per cent of the patients had toxic adenoma; one half of the rest fell under "formes frustes", the other half showed neither struma nor exophthalmos nor tachycardia. Thirteen out of twenty-eight aged patients with marked thyrotoxicosis were characterized by entire absence of the classical symptoms. Distinctive for senile thyrotoxicosis are the exclusive prevalence of disguised forms and a scarceness of symptoms, compared even with oligosymptomatic juvenile processes in which exophthalmos and thyroid enlargement are not always evincible as necessary concomitants while absence of tachycardia points already to a disorder of sclerotic nature in the blood supply of the sinus node. The proof for hyperthyroidism as the correct diagnosis of our oligosymptomatic patients has been furnished by the clinical course—each has been under observation for more than one if not for several years—as well as by the therapeutic result; in cases operated or deceased, the lesions have proved to be typical of thyroid hyperfunction on evidence of histologic tests.

Far-reaching diversities from the usual symptomatology of thyrotoxicosis certainly hinder proper diagnosis; this is why most of our patients had been treated for a long time, even for years, upon false assumptions. Whenever a person of advanced age enters, without a traceable reason, upon rapid loss of weight, supposition of a malignant tumour is nearest at hand. This has been the case with many of our patients even when the comparatively long progress of the disease as well as negative test results might have aroused well-founded doubts about the diagnosis. Anorexia and indistinct gastric complaints suggested a carcinomatous process in the digestive system while obstinate diarrhoea defying all therapy seemed indicative of colitis. Cases with the predominance of circulatory disorders have been taken either for coronary insufficiency or for hypertensive heart disease with the diagnoses founded on

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pains in the thoracic and cardiac regions or on frequent increase of the systolic pressure respectively. In establishing the proper diagnosis all these probabilities must be precluded. Consistently negative results in the laboratory and radiologic tests of the gastric and intestinal tract must induce us to dismiss the first hypothesis, although certain tumours, especially those residing in the body and cauda of the pancreas cannot safely be precluded. Independence of cardiac pains of physical effort and their denial to cease on administration of nitroglycerine disprove of coronary insufficiency, whether of sclerotic or emphysematous origin. Diastolic pressure, normal or almost normal in most cases, refutes the supposition of a hypertensive heart failure.

With all these negative findings duly considered, scrupulous care must be taken in recognizing symptoms and signs suggestive of hyperthyroidism. Hypermetabolism, fundamental symptom as it is, should not be regarded sufficient for the diagnosis to rely upon entirely. Old people, usually gap-toothed, tremulous and respiring irregularly for fear or suffocation, present much difficulty in examination and in the evaluation of the result. Mere transportation into the examination room is apt to bring about a violently anxious response; excellent service has been rendered in such cases by the ASPIS metabolimeter which permits the test to be performed by the side of the sick-bed without the least inconvenience by vexatious displacement of the patient. However, it must be emphasized that determination of the metabolic level is only qualified to complete conclusions drawn from the clinical examinations: what must be considered foremost is the possibility of the disease. Its existence should be inferred upon, first of all anamnestic findings by loss of weight. Rapid emaciation whenever experienced in old age must raise the suggestion of thyrotoxicosis, unless plausible explanation is furnished by some other organic lesion. In the course of the clinical examination, the state of the skin betrays much of the pathological process: instead of showing the usual regressive lesions conformable to age, as rugosity, aridity and atrophy, it has retained its warmth, humidity, elasticity and turgor. Old people, with a skin resembling that of young, exhibiting symptoms suggestive of serious illness, may almost surely be supposed to suffer from hyperthyroidism. The diagnosis is usually confirmed by the Graefe and moebius signs prevailing in about 70 per cent of the cases. Finger tremor in advanced age is less susceptible of estimation, though coarse-waved senile motility disorders of extrapyramidal nature are often discernible from fine incrustated tremor. Patients have more than once been found to display a vivacity, alertness and

OCTOBER 1956

briskness of spirits not only contrasting with the gloominess of old people subject to serious illness but even surpassing their healthy coevals. Worth of particular attention are cases, like six of our's, characterized by marked asthenia, muscular atrophy and advancing mental apathy, suggestive of rapidly progressive sclerosis spreading mainly over the cerebral arteries (*Lahey* has coined the term "apathetic hyperthyroidism" for the process.) Shortly before, these patients had exhibited eager activity, impressibility and agility: seemingly the hyperfunction of the thyroid gland has temporarily rejuvenated them. But their systems, deprived of a good deal of former reserves and accumulative faculties, were no more able to cover the expenses of increased activity, corporal as well as mental. Senile decrease of ergotrop functions is closely connected with the confinement of the assimilative power, hence overexertion of the former, with the hyperfunction of the thyroid gland not even very excessive, may involve a complete decay of the organism. Therefore, when applying a therapy aimed at influencing senescence, no isolated increasing of the energy expenditure must be allowed as the vital balance of anabolism and catabolism settling in each age on a new level, unstable as it is, may irreversibly be overthrown.

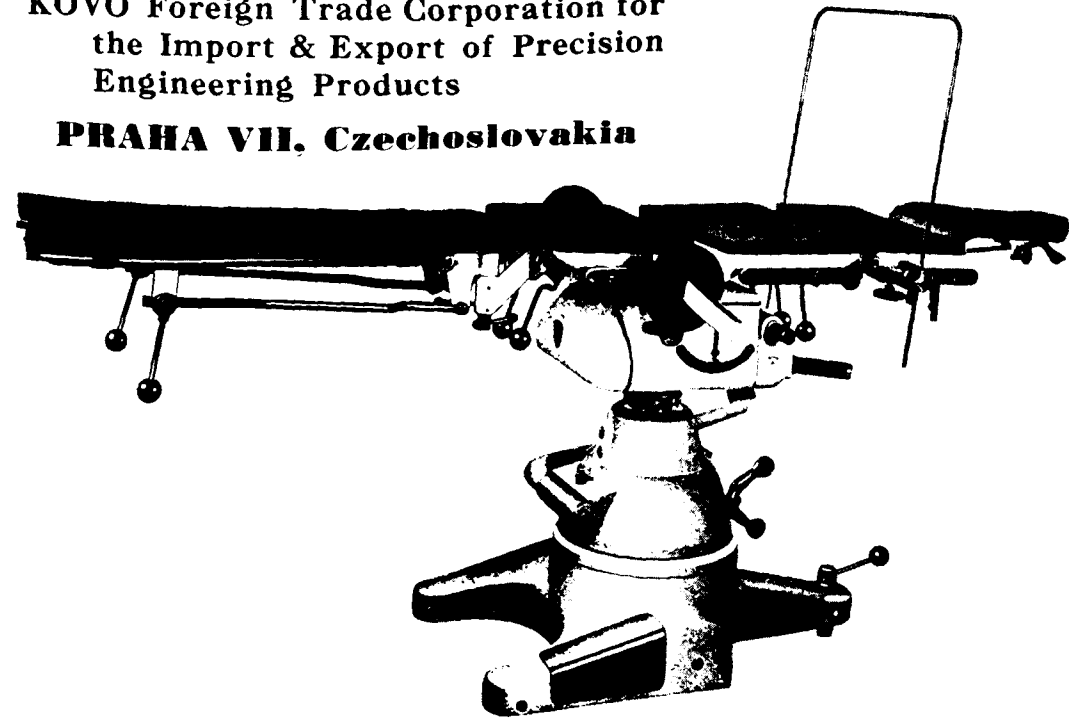
As concerns therapy, there is no difference between the senile and juvenile disease either in the manner of treatment or in its results. One part of our patients has responded positively to the influencing of cortical factors so decisive in etiology, to the disentangling of environmental conflicts liable to assume grave forms with old people dependent on their relatives, as well as to verbal and pharmaceutical sedation. As for the relevant sedatives, it must be emphasized that barbituric acid derivatives are apt to provoke intense excitation in advanced age. In former years more severe cases have been treated with diiodo-thyrosine and later with thiouracyl preparations; results have been satisfactory in about 50 per cent of the cases. Administration of thiouracyl in maximum daily dosages of 0.20 g. has been performed under frequent control of leucocyte formation particularly vulnerable in old age, with no harm experienced. In six cases we were compelled to take recourse to operation in spite of advanced age. Five patients have excellently tolerated the intervention, showing prompt cessation of grave circulatory disorders, one deceased a few days later.

SUMMARY

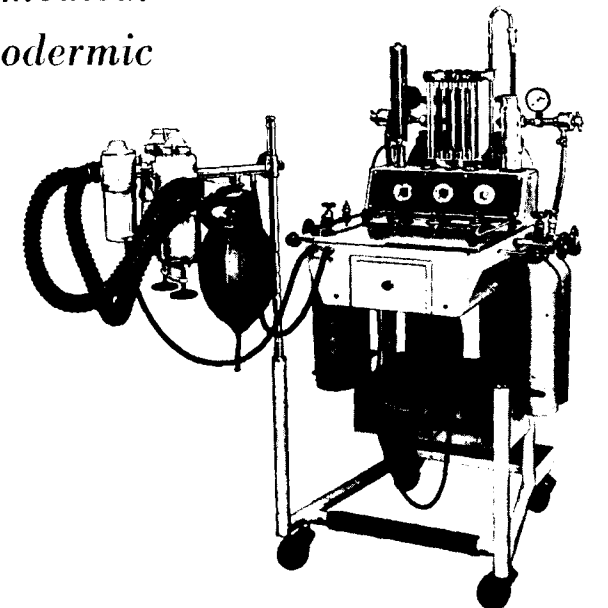
Out of thirty-four cases observed in the course of 10 years, twenty-eight showed the first symptoms of

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hyperthyroidism after the 60th, six after the 70th year of their lives. The usual predominance of the female sex has not been confirmed unless to a very slight degree. Incidence of toxic adenoma was found to differ scarcely from that of younger age groups. Classic Graves' disease has not occurred at all; one or the other of the 3 cardinal signs manifested themselves in one half, none in the rest of the cases, an appreciable difficulty in identifying the disease. In anamnesis the loss of weight, in clinical examination the remarkable youthfulness of the skin texture and the Grafe and Moebius signs, combined with metabolic indices of 35 to 106 per cent, have been the main features leading to the proper diagnosis, as discernible from malignant tumour, coronary sclerosis and hypertensive hearth failure the usual misinterpretations. Marked asthenia has frequently been observed. One-sided increase of catabolism, physiologically regressive in advanced age, involves an acceleration in the progress of senescence.

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TABLE I
Distribution according to age and sex:

Age	Man	Woman	Total
61-65	6	9	15
66-70	5	8	13
71-75	1	3	4
76-80	—	2	2
	12	22	34

TABLE II
Anamnestic findings:

	Cases	Per cent
Loss of weight	33	97
1—5 kg	9	
5—10 kg	7	
10—30 kg	8	
weight unknown	9	
Dyspnœa	18	53
Palpitation	14	40
Cardiac pain	11	32
Gastric complaints	8	23
Oedema	7	20
Cough	6	18
Asthenia	6	18
Diarrhœa	4	12
Vertigo	4	12
Nervosity	3	9
Headache	2	6

TABLE III
Objective symptoms:

	Cases	Per cent
Hypermetabolism	34	100
35 — 50 per cent	20	
51 — 75 per cent	6	
above 75 per cent	8	
Grafe sign	24	71
Mœbius sign	24	71
Tachycardia	17	50
Struma	9	27
nodous	5	
malignant	1	
diffuse	3	
Exophthalmus	1	3
Absence of all three symptoms	13	38
Hypertension	7	20
Circulatory failure	7	20
Auricular fibrillation	3	9

THE USE OF PLASTICS MATERIALS IN SURGERY

By DR. JOHN T. SCALES, M.R.C.S., L.R.C.P.

Department of Biomechanics and Surgical Materials, Institute of Orthopaedics (University of London),
Royal National Orthopaedic Hospital

Exclusive to "Surgical & Medical News", Bombay.

THE practice of surgery more, often than not demands materials which may have to remain in contact with the tissues of the body under a variety of conditions for short or long periods. Owing to the relatively small demand, commercial materials must be used, and among them plastics. Many of these resins contain additives in order to facilitate their synthesis or to impart certain desirable physical properties. The majority of additives do not form part of the basic molecular structure of the resin and are liable, in time, to diffuse out into the tissues resulting in a change of the physical characteristics of the polymer and damage to the tissues in contact with it.

To some extent the suitability of a resin can be predicted from a knowledge of its chemical composition and it is, therefore, incumbent on those who wish to use a material for surgical purposes to seek from the

manufacturers a complete analysis. A further indication of the toxicity of apparently suitable resins can be obtained by implanting the material in animals, although often it is not possible to simulate the conditions met in man and hence the response of the animal to the plastic may be misleading.

LARGEST USE

The largest use of plastics is in dental surgery. Acrylic denture base material (made from polymethyl methacrylate) is now used for practically all dentures; the world demand for this purpose is approximately 900 tons per annum.

In ophthalmology, acrylic eyes are less fragile and cheaper than glass, they are not etched and discoloured by tears and can be accurately moulded to fit the defect.

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The colour of the remaining eye can also be faithfully copied. Another important application is the contact lens, now widely used and rarely noticed.

Because of the ease of manipulation, suitable mechanical properties, and tolerance by the tissues, polymethyl methacrylate has been employed with considerable success, too, for the repair of defects of the skull, replacement of the jaw hinge, and certain portions of the long bones of the limbs. In other reconstructive procedures where the implant has been exposed to weight-bearing for example in the hip joint, or has been implanted just below the surface of the skin, the long-term results have been disappointing.

Polythene, being obtainable as a pure chemical substance, in a variety of forms from a fine flexible filament to semi-rigid block, has been used for many internal and external purposes. Providing it is used internally in situations where it is not exposed to abrasion with the formation of particulate material—as may occur in a weight-bearing joint—it is well tolerated by the tissues.

REPLACEMENT

In vascular surgery, its use, in the form of a flexible porous fabric, for the replacement of portions of large blood vessels, destroyed by injury or disease, is most promising. Blood does not clot in contact with it, nor do deposits form in tubes used either for blood transfusion or drainage purposes. Experimental work has shown that it may be possible to replace parts of the windpipe or the gullet by means of prefabricated tubes similar to those used in vascular surgery. The use of polythene, internally and in contact with wounds, has been limited because of sterilisation problems owing to its low softening temperature. Newer types of polythene, for example, Ziegler polythene with a higher softening point, open up many possibilities.

In chest surgery, polythene ribbon, in the form of a sponge, has been implanted to aid the collapse of the lung or to prevent a shift of the remaining contents of the chest cavity when one lung has been removed. The sponge is light in weight and readily cut to shape. It is stabilised by the ingrowth of repair tissues. Since it is relatively soft, local pressure effects are not produced. There is a tendency, however, for the volume of the implant to decrease over the years and a more resilient material might be advantageous.

In orthopaedics, polythene has been used with considerable success. Illustration No. 1 shows a

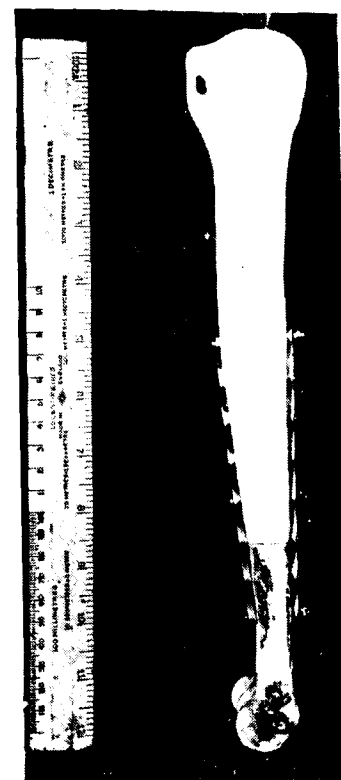


Fig. 1 Model showing polythene prosthesis attached to remaining portion of patient's humerus.

polythene implant used to replace the upper two thirds of the bone of the upper arm in a patient suffering from a condition in which there was gross destruction of bone. This prosthesis was inserted in 1950, enabling the patient not only to retain her arm but also to carry out her normal household duties. While this implant has only been in situ for approximately six years, the results of this and similar operations show considerable promise.

FOR DRESSINGS

Polythene splints and appliances are lighter in weight, more durable, easier to keep clean, more simply and quickly made than the traditional moulded leather or cellulose acetate splints reinforced with metal. The recent introduction of isocyanate foams fused to the polythene during heating of the sheet, prior to moulding, now allows polythene to be moulded directly on the skin, since these foams have an extremely low thermal conductivity. Because of the porosity of these foams, padded, ventilated, and washable splints can now be made.

Polyvinyl chloride has been little used internally. Plasticised film is used for first-aid dressings, but unfortunately being practically impermeable to water vapour, soggy skin with increased growth of bacteria in the wound and on the surrounding skin often results. A new water vapour permeable dressing film of high porosity has recently been evolved. Clinical trials show that it has a number of advantages over existing types of dressings.

SHEET FORM

Vinyl Chloride and vinylidene chloride and vinyl chloride acetate co-polymers in sheet form are suitable for semi-rigid splints. The latter material forms the cuirass mouldings of the new British portable respirator used in the treatment of respiratory paralysis.

Suitably tinted polyvinyl chloride pastes can be gelled to form flexible and durable external prostheses. Defects of the ears and nose due to injury or disease can be rendered less noticeable by such devices. Coloured radio-opaque solutions of polyvinyl chloride have been used extensively to demonstrate the vascular structure of tissues and organs.

Formalised polyvinyl alcohol sponge has been employed in chest surgery and for the repair of defects of the abdominal wall. When wet it is an elastic sponge, not easily torn by sutures. The porous structure becomes invaded by blood vessels and fibrous tissue and appears to be well tolerated. It has also been used experimentally to reinforce grafted blood vessels.



Fig. 2 Polyvinyl chloride acetate co-polymer sheet used for cuirass moulding of portable respirator.

Nylon in the form of monofilament is extensively used for non-absorbable surgical sutures. Experience has shown that it is well tolerated by the tissues. Having a high softening point, it can be sterilised by most of the usual methods. Moulded components should not be used in a situation where they are liable to be abraded, for example, as a cup in the treatment of osteoarthritis of the hip. Wear occurs and the particulate material formed induces an undesirable tissue reaction. Being hygroscopic, it cannot be used for any purpose where dimensional stability is a primary consideration.

ARTIFICIAL LIMBS

The internal applications of polyester resins have been limited to experimental work in animals in which sections of bone have been replaced. Used as a laminating agent with cotton, glass or nylon, they have been employed for the construction of artificial limbs. Recent developments, particularly in Britain, show considerable promise and may result in the eventual replacement of the present wood and sheet metal appliances.

With the exception of phenol formaldehyde resin treated asbestos felt, used for the fabrication of temporary artificial limbs and melamine resin-impregnated plaster of paris bandages, these phenol, melamine and urea resins have found practically no use in surgery because of their reputed lack of tolerance by the tissues and the alteration in their physical properties when in contact with tissue fluids.

Silicone-rubber is flexible, easily manipulated, and water repellent. It appears to be tolerated by the tissues. It has been used in man, in the form of tubes, for certain neurosurgical procedures. Various silicone compounds implanted subcutaneously in animals have been tolerated and no tumour formation has resulted.

SILICONES

In plastic surgery, there is a need for a material that can be injected into the tissues to fill defects and for this purpose it may be that silicones will be found suitable. Lotions and creams containing silicone fluids have been used to prevent soggy skin and inflammation of the skin by tissue fluids and excreta, either in infancy or following certain surgical procedures.



Fig. 3 A wrist splint of polythene-isocyanate foam laminate.

It has only been possible to mention very briefly a few of the applications of certain plastics. Many other accessories of modern man, such as spectacle frames, hearing aids, and arch supports, utilise plastic materials. For the treatment of gastric ulcers, ion exchange resins find their place, and for the restoration of blood volume, following hæmorrhage, polyvinyl pyrrolidene is being increasingly used.

The use of plastics in surgery is now an established practice, but new materials should not be used until their properties have been fully investigated in the laboratory and their behaviour studied in animals. Even then, their use in man should be carefully observed. Close collaboration between those in medicine and the plastics

industry will not only prevent the misapplication of materials but will result in improved methods of treatment of injury and disease.—*The Financial Times*, London.

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"What is that?", asked the visiting boy.

"Oh, that," said the doctor's son, "that's dad's first patient".

MEDICAL WORK ON RHEUMATISM

Italian Prize Offer

By A Staff Reporter

An international competition for a medical work dealing with the physiopathology, the clinic or the therapeutics of rheumatism and arthritis is announced by the Health and Tourist Board Office of Acqui, Piedmont District, Italy, according to a notice issued by the Italian Consulate in Bombay.

Sponsored by the "Società Italiana di Reumatologia," the competition is free to all Italian and foreign doctors and will close on December 31. Contestants are required to submit original, unpublished work on these subjects.

A cash prize of a million liras (approximately Rs. 7,500) will be awarded to the best work. For further particulars candidates should contact the Enit-Italian State Tourist Office, Vashani Mansions, Dinsha Wachha Road, Churchgate.

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Vitamin B ₂	3 mg.
Vitamin B ₆	2 mg.
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Nicotinic Acid amide	60 mg.
Choline Chloride	300 mg.
Methionine	300 mg.
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PROTEIN FOR PARENTERAL THERAPY

By J. M. SOM,

(Bengal Immunity Research Institute, Calcutta-16)

PARENTERAL protein nutrition has an important place in the practice of medicine and surgery.

Generally parenteral nutrition is confined to water, saline, glucose and vitamin solutions, the value of which is strictly limited because of the absence of protein. More recently various protein preparations have been used parenterally. It makes the parenteral nutrition more nearly complete.

SOURCE

Protein as a source of parenteral administration can be supplied by (1) whole blood and plasma (2) amino acid mixtures or (3) protein hydrolysates.

Whole blood and plasma have the advantage of supplying protein immediately and are of particular value where protein deficit must be overcome rapidly as in hæmorrhage, burns or other acute diseases. But when plasma proteins have been depleted because of malnutrition, the use of transfusions has been disappointing largely because the injected protein fails to remain in the circulating blood but leaves very rapidly. Moreover, as noted by Elman, as a sole source of protein, these transfusions are expensive and inconvenient since one litre of plasma contains only 60 gms. of protein and requires four donors plus processing before it can be used.

By using amino acid mixtures protein nourishment can be achieved in its simplest form. In contrast to plasma, they are more physiological, since amino acid mixtures supply the building materials in a form needed to correct protein deficits throughout the body. But the greatest drawback to this is the cost. The large amount of protein nourishment needed makes the use of crystalline amino acids unpractical at the present time, although it may be that in the future chemical methods will be devised whereby crystalline amino acids may be cheap enough to permit their general use. Another objection to crystalline amino acids is the fact that in preparing some of them, recemic mixtures are obtained containing both the natural and unnatural isomers which are difficult to separate, some of the unnatural isomers are not fully utilized biologically.

PROTEIN HYDROLYSATES

By means of an adequate digestion in vitro of natural proteins a mixture of amino acids may be obtained. These procedures are essentially similar to those by which the body produces amino acids from protein food and are both practical and cheap. Such methods of preparing amino acids however involve the possibility of losing some of the essential amino acids depending upon the raw material, nature of digestion and processing adopted. A possible criticism is the presence of non-utilisable peptides in the final amino acid mixture. But according to later reports it seems no danger arises from the presence of peptides provided they are not too large, on the other hand, it may prove advantageous to provide some peptides in that one step in the process of building of body protein may be saved.

PRODUCTION

Protein hydrolysates designed for parenteral administration must obviously meet some specifications. These requirements include the following:

- (1) Identity of protein source
- (2) Method of hydrolysis
- (3) Degree of hydrolysis
- (4) Percentages of individual amino acids
- (5) Presence of any added substances
- (6) Sodium & potassium content
- (7) Assurance that the hydrolysate has no pyrogenic, antigenic or toxic properties
- (8) Assurance that the product is biologically efficient.

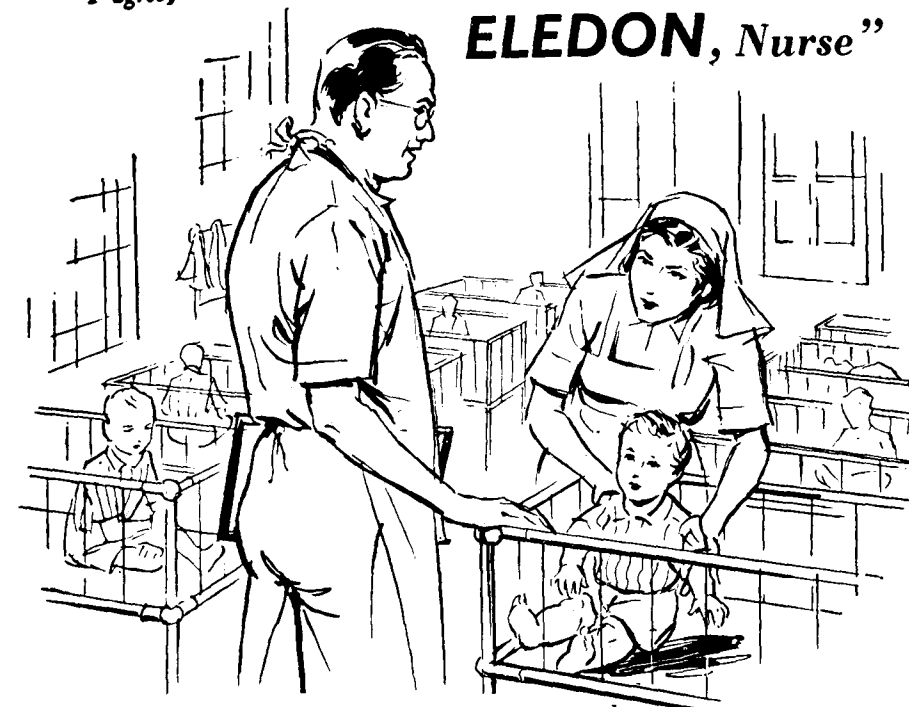
(a) Raw material

The choice of raw material is largely governed by two factors:

- (1) the presence of a suitable distribution of essential amino acids
- (2) the availability of the material in quantity at reasonable cost

The first factor is of primary importance. The complete absence of an essential amino acid in the raw

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material and hence in the hydrolysate would mean that protein synthesis cannot take place and the remaining amino acids would merely be burnt for calories. Partial deficiency of such an amino acid would lead to a proportionate loss of synthetic potential. It appears that the amino acid distribution of animal proteins alone is comparable with the distribution desirable for the formation of human protein. This narrows the choice of available raw material mainly to (1) Casein, (2) Lactoalbumin, (3) Meat protein and (4) Blood protein.

Their amino acid compositions are given below :
Calculated to 16 gms. of nitrogen.
(Practical Physiological chemistry by Hawk,
Oser and Summerson)

	Casein	Lacto- albumin	Meat protein	Serum Globulin	Serum Albumin	Fibrin & fibrinogen
Methionine	3.5	2.6	3.2	1.0	1.2	2.6
Isoleucine	6.5	7.5	3.4	2.7	3.0	4.8
Leucine	12.1	12.1	12.1	9.3	12.0	7.1
Lysine	8.2	10.5	7.6	8.1	12.7	9.2
Phenylalanine	5.2	5.0	4.5	5.9	7.0	5.8
Threonine	4.9	6.0	5.3	8.3	7.1	7.1
Tryptophan	1.2	2.5	1.2	2.8	1.0	3.3
Valine	7.0	6.6	3.4	9.7	6.0	4.1
Cystine	0.3	4.0	1.1	2.0	6.5	2.7
Arginine	4.1	4.0	7.2	4.8	6.0	7.8
Histidine	2.5	2.3	2.1	2.5	4.0	2.6

Amongst them, casein is largely used as it is available in quantity and is subject to minimal bacterial contamination. The possibility of developing useful hydrolysates from vegetable proteins has been inadequately investigated.

(b) Hydrolysis

The next important point is the mode of hydrolysis. The choice lies between acid, alkaline and enzymic processes. Acid hydrolysis destroys some of the amino acids and the missing amino acids must be replaced from some other sources. In alkaline process most of the amino acids undergo racemization and some of the amino acids are destroyed and is of no practical use. Hydrolysis by enzymic process offers the unique advantage of providing hydrolysates in which little or no destruction of amino acid occur. Degree of hydrolysis also is an important factor. It should be at least 50-55% to minimise the

reaction and urinary loss due to large polypeptide aggregates. The acid hydrolysates, however, are more completely hydrolysed than enzymic digest.

(c) Main problems of large scale production are :

- (1) Removal of acid in case of acid hydrolysis
- (2) To obtain a sufficient conversion of protein to amino acids in case of enzymic digests
- (3) To prevent the formation of pressor or depressor substances
- (4) To eliminate pyrogen and
- (5) To prevent tyrosine deposition.

All these problems have not been solved fully though apparently the difficulties may be avoided by carefully conducted procedures.

(d) Standardisation

After actual process of manufacture the product is subject to the following chemical and biological tests :

- (1) The total nitrogen and free amino acid nitrogen and hence the degree of hydrolysis, freedom from reaction for peptones and proteoses, the pH, sodium and potassium content are measured
- (2) The test for sterility is carried out
- (3) Pyrogenic activity is assayed on rabbits
- (4) Pressor or depressor substances are tested for on the blood pressure of an anesthetized cat
- (5) Anaphylactic tests are carried out on guinea pigs
- (6) Essential amino acids are analysed chemically, microbiologically or by paper partition chromatography
- (7) Feeding tests on rats are carried out to see the adequacy of the product as a source of tissue protein.

It is desirable that these preparations should be capable of inducing a positive nitrogen balance when used as the exclusive source of nitrogen and an absolute increase of circulating plasma protein in depleted patient.

Some of the preparations are often adjuvated with glucose or some other energy giving substances for their protein sparing capacity. In this case proper care should be taken so that none of the amino acids are lost particularly on storage owing to the formation of certain nitrogen complexes.

It has been demonstrated clinically that whenever there is protein deficiency, protein hydrolysates containing amino acids and peptides when given in adequate amounts, can maintain nitrogen balance effectively and cause regeneration of serum proteins.

PROTEIN DEFICIENCY STATES

Protein deficiency may occur from a variety of causes :

- (1) as a result of deficient intake due to poor or restricted diet
- (2) inadequate absorption due to gastrointestinal diseases
- (3) increased demand as in pregnancy & lactation
- (4) Defective synthesis as in liver diseases, and
- (5) abnormal loss or destruction from the body as in burns or nephrosis.

It can occur in acute or subacute form as in burns, hæmorrhage or as a chronic disease.

Diagnosis of this protein deficiency will depend somewhat on the cause of the deficiency, mainly in respect to the evidence contributed by the history and physical & chemical findings.

INDICATIONS

The parenteral use of protein is generally indicated in (1) when the patient is unable to take food by mouth (2) when complete rest of the alimentary tract is desired and (3) when parenteral supplementation of oral food intake is required.

Clinically, parenteral administration of an appropriate source of amino acids has been proved successful in the following cases :

- Before and after major surgical operations
- In extensive and severe burns and injuries
- In gastrointestinal diseases
- In chronic ulcers and infected wounds
- In Nephritis and other infectious diseases
- In cirrhosis and other diseases of liver
- In anæmia and protein depletion

REQUIREMENTS

Before undertaking the administration of protein hydrolysates by injection it is of considerable value to distinguish between acute deficits and amounts required for maintenance. Recommended allowances of protein are tabulated below :

(from recommended Dietary allowances, revised, 1953, Nat. Acad. Sci.—Nat. Res. Council Publication 302)

	Age (Years)	Weight (Kg.)	Protein (Gm.)
Men	25-65	65	65
Women	25-65	55	55
		Pregnant	— 80
		Lactating	— 100
Infants	0- 1	6-10	kg×3.5
Children	1- 3	12	40
	4- 6	18	50
	7- 9	27	60
Boys	10-12	35	70
	13-15	49	85
	16-20	63	100
Girls	10-12	36	70
	13-15	49	80
	16-20	54	75

Increased amount of protein appears to be needed in protein depletion due to diseased condition.

The most convenient method for the restoration of both soft tissues and plasma protein is the administration of adequate quantity of protein together with sufficient vitamins, minerals and calories. This is an important consideration because each substance requires the presence of others in order to be most completely effective. Water balance is often disturbed in protein deficiency, B-complex are associated with carbohydrate metabolism and are therefore important when glucose is also given parenterally. The importance of vitamin C in surgical patients is also well established. Important role played by potassium in protein utilization has also been suggested. Particular attention should be paid regarding calorie requirements, because protein therapy cannot serve its purpose unless the calorie demands are also met. Moreover, calorie requirements are much more higher when protein hydrolysates are fed than when

intact protein is fed. On the other hand there is evidence to show that tissue synthesis also may occur at lower calorie levels; for short period of time the glucose intake can be limited to 100 gm., the rest of the energy being met from the adipose tissue. An authoritative statement reads, "Available evidence indicates that approximately 1000 calories plus adequate biologically utilizable nitrogen per day is adequate to produce nitrogen balance." It seems permissible but when body stores are lacking as is usually the case in chronic wasting

disease calorie needs may not be adequately met by the parenteral preparations now available. Invert sugar, fructose and alcohol are also tried recently as possible sources for parenteral calories but are not so promising. Fat emulsions plainly offer the only practical solution to this problem but at present cannot be used. The problem in parenteral protein nutrition then is not only of finding better amino acid preparation; but also of administering calorogenic materials in quantities sufficient to guarantee effective utilization of the amino acids.

His wife's mother needed a transfusion, but all day they had searched the hospital's file of blood donors for one of suitable type. They failed.

The wife was lamenting to the husband "It seems strange we can't find the true type blood for mother."

The husband edged toward the door as he commented "Have you tried a tiger?"

Into another consultation room down the corridor of this same office, the nurse ushered a tall, cadaverous man. She draped a towel over his chest, preparatory to the otolaryngic examination.

The patient looked searchingly at the nurse. "Do you want me to unbutton anything?"

"Not unless you're in the wrong pew," she said sweetly; "The doctor merely wants to look down your throat."

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PARENTERAL THERAPY OF IRON

BY SURESH CHANDRA BANERJEE

THE use of iron in therapy for regeneration of blood is being practised for a very long time. Iron therapy is indicated in hypochromic (microcytic) anæmia as in the anæmia following blood loss, in a plastic anæmia of pregnancy and anæmia of infants. The response to iron therapy in hypochromic anæmia may be sometimes as dramatic as the response of pernicious anæmia to liver therapy. There had been much controversy regarding the form in which iron was to be administered but as regards the mode of administration, oral route was accepted by all.

Most patients with iron deficiency anæmia respond satisfactorily to adequate doses of iron preparation by mouth, but some do not respond to large doses of both ferrous and ferric iron by mouth even when the iron is well tolerated. It is impossible to be certain with our present knowledge of iron metabolism that failure to absorb from the intestinal tract was the essential cause. With the increase of our knowledge in biochemistry and histopathology it has been revealed that slow absorption dependent on various factors naturally make steady rapid increase in hæmoglobin percentage doubtful in urgent cases.

Parenteral therapy of iron was thought necessary as a considerable and variable proportion of iron salts remains unabsorbed probably being precipitated in the intestine as phosphate, sulphide and other insoluble salts when administered orally. There have been many attempts to find a satisfactory iron preparation suitable for parenteral administration. Ionised iron compounds such as ferric ammonium citrate, ferrous gluconate, ferrous ascorbate and ferric hydroxide have often been given in small doses. In all the cases intramuscular route proved too painful and does not provide facility for long continued use. The variation of response in patients to the oral administration of iron salts and painfulness of the then intramuscular injection led to a search for a preparation which could be given intramuscularly. Of the compounds tried, none was obtained which while containing sufficient retainable iron to be of value therapeutically was safe enough for administration by intravenous route. The toxic effects of colloidal ferric hydroxide or colloidal iron oxide were severe enough to preclude its use for therapeutic purposes except under most unusual circumstances.

With the advent of modern research in biochemistry it has been revealed that most of the body-fluids are colloidal in nature and negatively charged and the active principles of drug are better absorbed if they be in the colloidal state. In the form generally administered, iron is in the action and the particles in the body fluids which are negatively charged may be precipitated causing pain and toxicity.

Subsequent attempt by Nissim in 1947 to produce a less toxic preparation met with greater success and a complex salt saccharated iron, which was a negatively charged colloidal solution of iron oxy-hydrate stabilised by absorption of alkali and sugar, was prepared. It is an alkaline solution having a pH 10.5. It was noted that with a lowering of pH the colloid reverted from sol to gel phase. From a long series of experiments it was concluded that, 1) the pH was a critical factor, 2) the reaction time was equally important in that the time temperature factor controlled the extent and rate of fall of pH resulting from the acidic thermal breakdown products of sucrose and 3) some Sodium Carbonate was essential, possibly the colloid could only be formed from ferric subcarbonate. Attempts to obtain a stable negatively charged colloid from ferric hydroxide failed.

Slack and Wilkinson (1949) showed that saccharated iron oxide was much effective in chronic resistant cases of iron deficiency anæmia. Since then several reliable preparation of iron for intravenous administration have been marketed and much more had been learnt about these anæmia. In most cases the "resistance" is due to a combination of poor absorption across the intestinal mucous membrane and gradual exhaustion of the body's iron stores. Once these iron stores are depleted any absorbed iron remains in store and is not released to the red cells until the store is full; and not enough iron passes across the gastro-intestinal barrier to replenish the stores. By intravenous administration the limitations of alimentary tract absorption are avoided and altogether up to 1.5 to 2.5 g. of iron can be given by this route divided into doses of 200-500 mg.

Intravenous iron therapy has been widely used, and is most useful in patients refractory to oral iron, owing to either malabsorption (Badenoch and Callender, 1954) or other factors, such as rheumatoid, arthritis (Sinclair and

Duthie, 1949). Patients who are intolerant to oral iron usually respond well to intravenous iron. The calculated iron deficit given in this manner is utilised almost quantitatively and does not appear to require addition of trace elements, ascorbic acid, folic acid, etc. which are considered essential for the proper assimilation of iron. Utilisation is however seriously interfered with in presence of chronic infection. It seems that in chronic infection there is a greatly increased demand for iron by the cell systems of the body and that very large amounts of iron must be provided to enable the bone marrow to obtain sufficient for its purposes and to maintain a normal plasma iron level.

Occasionally however there are difficulties in intravenous administration. The patient, usually an obese woman, may have no visible or palpable veins suitable for giving the injection of 10 ml. or more that is needed. Again the solution of saccharated iron is very dark and therefore not too easy to give; since it is alkaline, if a little gets outside the vein into the tissues an unpleasant local reaction may result. So it is necessary to use well-fitting syringes, preferably all glass or of glass except for the metal nozzle, and the injection must be given slowly. In some patients iron cannot be given intravenously, because it causes unpleasant reactions. One of the commonest is pain over the kidneys in the back; another an allergic type of dyspnoea, and a few deaths due to allergic reaction have been reported. There is evidence from histological studies in animals injected with two to three year old solutions of saccharated iron oxide that the character of the compound undergoes slow alteration in solution with the increase in diffusibility and its uptake by fibrous tissue element becomes marked. This change may be associated with increase in toxicity or allergy inducing properties in man and may be prevented by keeping the compound and ampoules in powder form just as practised with intravenous barbiturates. On the whole intravenous iron has been very successful, and obstetricians in particular have found it useful in treating the iron deficiency anaemia of pregnancy when time is short iron by mouth is useless because of gastro-intestinal disturbances. It was clear that some of the difficulties of intravenous administration would be avoided if instead the iron could be given intramuscularly.

Brownlee et al (1942) administered various iron preparations into the muscles of rabbits and found that the degree of muscle necrosis varied inversely with the degree of absorption—i.e., the better the preparation was absorbed the less necrosis followed. These workers

found that the best absorption was obtained with injections of iron triethanol-amine. Later workers—e.g., Slack and Wilkinson (1949) could not confirm this and found that similar intramuscular preparations were effective but too painful for routine use. Eventually a dextran-iron solution has been prepared which, so far at least, seems safe and effective. This dextran-iron is isotonic with tissue fluids and has a pH 6.0—7.0. It is more concentrated than the intravenous iron solutions, containing 5% of iron, compared with 2%. This is just as well, since few people comfortably tolerate large intramuscular injections, and the dose of intramuscular iron is larger than that of intravenous iron.

This carbohydrate-iron preparation has been shown to be effective and non-toxic in the treatment of iron deficiency anaemia. The rate of increase of haemoglobin varied in different cases, but, in general, was greater in young severely anaemic patients than in those beyond middle age with only moderate anaemia. In some patients clinical improvement became obvious within a week of the starting of treatment, while in others it was delayed for two to three weeks, but eventually all patients developed a vigorous sense of well being, which contrasted very strikingly with their previous chronic ill health. There were no early or late reactions in the intramuscular therapy but a high proportion of the patients given the same preparation intravenously in a dosage of 4 or 5 ml. experienced moderate late reactions (headache, backache, shivering attacks) an hour or more after the intravenous injection.

Klopper (1951) postulated that toxic effects following intravenous iron therapy occurred when the iron binding capacity of the plasma was exceeded, the total iron that can be bound to the B-globulin fraction of whole of the plasma being about 16 mg. Nissim (1954) pointed out that with iron saccharate this value was vastly exceeded without reaction, and that, therefore the B-globulin could not be concerned with the transport of iron saccharated in the plasma. The occurrence of the high serum iron levels in intramuscular cases without toxic effects suggests that the present dextran-iron complex is also not transported by the B-globulin fraction or siderophilin. The higher concentration of the present preparation allows a given iron deficit to be remedied by fewer injections than are needed with other iron preparations. Nissim (1949) states that 25 mg. of intravenous iron could increase the Hb by 1%, which is a greater increase in Hb in proportion to the injected iron than is obtained with the intramuscular preparation. Compared

with the intravenous iron preparations the new compound has the great advantages of easier administration and lower toxicity while its therapeutic effect is similar. The only minor drawback was a tendency to staining of the skin in the area of the injection. So the intramuscular iron must be given carefully; otherwise the patient will have notable discomforts at the injection site. Even when the injection is given with a $2\frac{1}{2}$ in. needle inserted on a Z shaped track the skin may be stained for several weeks, so the injection should be made into the gluteal muscles.

The introduction of a satisfactory preparation of iron for intramuscular injection should make it possible for iron deficient patient to be effectively treated. The indications for the use of this new preparation are strictly limited and are the same as those for intravenous iron—that is, intolerance of or refractoriness to oral iron or circumstances such as pregnancy or preoperative preparation in which a more rapid response than can be obtained with oral iron, is desired. Since this carbohydrate iron compound is much more easy and safe to inject than saccharated iron oxide, parenteral iron therapy may become more popular, especially in general practice, for it ensures that the necessary quantity of iron is made

available for haemoglobin synthesis and eliminates the uncertainties inherent in oral administration.

The long term effects of parenteral iron overdosage in humans are not yet fully understood, but it is undesirable to administer this or any other parenteral remedy when it is not required. Accurate diagnosis and a proper trial of oral iron should therefore precede the use of intramuscular iron. The provision of an effective, non-toxic and easily administered intramuscular iron preparation should not be made an excuse for the indiscriminate use of parenteral iron therapy. Intramuscular iron is at present essentially a therapeutic weapon to be kept in reserve.

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SCHOOLS OF TROPICAL MEDICINE IN BRITAIN

BY DR. CHARLES WILCOCKS,

Director of the Bureau of Hygiene and Tropical Diseases.

CENTRES OF INTENSE RESEARCH AND POST-GRADUATE STUDIES

IT seems odd that two of the greatest schools of tropical medicine in the world should be in England, where tropical diseases do not naturally occur. Yet when their history is followed the reason why these two schools have been instituted — at Liverpool and London — is easily understood. For many centuries Britain has been connected by sea trade with tropical countries in every part of the world, and British sailors, soldiers, administrators, merchants, and missionaries have returned from service abroad infected by such diseases as malaria, dysentery, sleeping sickness, and leprosy, and have sought treatment at home. Still more have been affected by the more acute diseases while still abroad, and have needed immediate treatment on the spot — cholera, plague, typhus, typhoid, yellow fever, and other dangerous fevers.

It has been necessary, therefore, to pay special attention to the medical education of the doctors called upon to treat these patients, both at home and abroad, by

instituting special courses of instruction in these tropical diseases so foreign to Britain, and it has for obvious reasons been found appropriate to start these schools of tropical medicine in large seaports with extensive tropical connections. Here the patients arriving by sea can be studied and treated in conditions where all the most modern facilities are at hand, in centres of intense medical activity and research. And because the teachers have been men whose experience of tropical medicine has been acquired in Africa, Asia, Australia, and the Americas the training given to students has possessed the great virtue of universality.

But the schools are of comparatively recent date. The Liverpool school was opened in April, 1899, and the London school some six months later. Before then, although certain hospitals in Britain had for long been treating these tropical diseases, there had been no systematic courses of special post-graduate training for doctors, and only very slight instruction for undergraduates.

CREATION OF LONDON SCHOOL

The creation of the School of Tropical Medicine in London takes its origin from the work and inspiration of Patrick Manson, a Scottish doctor who spent many years from 1866 onwards in Formosa, southern China, and Hong Kong, and who made revolutionary discoveries which have altered our whole conceptions of certain diseases. Manson was the first man to prove that the agents of certain diseases are taken up from the blood of man by blood-sucking insects, and that in these insects they undergo a definite cycle of development taking several days to complete; and he therefore deduced what we now know to be true — that for these diseases this cycle of development is essential before they can be transmitted to a new person when the insect bites again.

Manson proved the case by his observations on mosquitoes which had bitten men in whom the tiny embryos of a filarial worm were present in the blood, and he described the developmental forms of these embryos in the tissues of the mosquito. From this pioneer discovery there have flowed the proofs of the transmission of malaria, dengue, yellow fever, and

other diseases by mosquitoes, and of many other diseases by other biting insects.

When Manson returned to London after his long experience in the East he was filled with the conviction that special instruction in all these important and imperfectly understood diseases was essential, and that the centre for such instruction should be in London. He found support in Government quarters, but only after a long period of persuasion, and with the help of the Seamen's Hospital Society the London School of Tropical Medicine was created at the Albert Dock Hospital in 1899.

Manson was a pioneer, an original thinker of strong personality and enquiring mind, and he attracted to his school a band of brilliant young workers who themselves made very notable contributions to medical research, and whose names are now known throughout the world. Students who took the courses at Manson's school have, indeed, themselves founded or taught in similar schools in India, China, Australia, Africa, and America, and it is not too much to say that the British schools of tropical medicine have set the pattern for much of the rest of the world.

STUDY OF TRANSMISSION

The study of tropical medicine is complicated. As I have said, some of the most important and widespread diseases are caused by minute living organisms which are transmitted from man to man, or from animal to man, by biting insects. The cure of these diseases has depended largely on the use of drugs, many of which must be given by injection; and the even more important prevention of these diseases entails knowledge of the minute organisms themselves, and of the nature and habits of the biting insects which convey them.

Other diseases are due to bacteria or worms, some of which are spread by insects, but others of which are spread through food or water, or by contact between patients and healthy persons.

Malaria is due to a parasite present in the blood of man, and is transmitted from man to man by Anopheles mosquitoes. It is therefore necessary to study the various kinds of malaria parasites — of benign tertian, malignant tertian, and quartan fevers — and the breeding and biting habits of the mosquitoes; for one of the main



Prof. B. G. Mægraith, Dean of the Liverpool School of Tropical Medicine. The Liverpool School of Tropical Medicine was founded in 1898 by Sir Alfred Jones, a British shipowner. In 1954 the American Society of Tropical Medicine and Hygiene presented the Joseph Augustin Le Prince Medal and Award to Prof. Mægraith for outstanding accomplishment in the field of Malariology.



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lines of attack on malaria lies in the destruction of these mosquitoes.

Filariasis, and its disabling sequel elephantiasis, is due to a hair-like worm whose embryos are present in the blood and are spread by mosquitoes — largely by mosquitoes of different kinds from those which carry malaria. Plague is chiefly a disease of rats and other rodents, and is due to bacteria which are carried from rat to rat, or from rat to man, by rat fleas. It is necessary to study these bacteria and these fleas and rats.

African sleeping sickness is due to a minute parasite present in the blood of man (and sometimes of certain animals) and is spread by tsetse flies of several kinds, and the incidence and distribution of the disease depend on the habits of these flies, some of which live in the sparse African bush and others in the thicker vegetation along rivers and lake shores. Prevention has been achieved largely by intense study of these flies and their elimination from human communities.

Hookworm disease is spread by indiscriminate fouling of the soil by human excrement; cholera and typhoid fever by similar fouling of water and foodstuffs. Schistosomiasis (sometimes known as bilharzia) is due to a worm which lives in the veins of the bladder or intestine of man, and whose embryos are derived from eggs passed out in human excreta, and undergo a cycle of development in fresh-water snails and from there penetrate the skin of man. The attack on this disease is partly by treatment and partly by snail control, and by improved sanitation.

I have quoted these examples to illustrate that the study of tropical medicine is complicated. You can see that the study involves not only the diagnosis and treatment of the disease in individual patients but also the wider comprehension of such subjects as entomology, the science of insects; helminthology, the science of worms; protozoology, the science of minute parasitic animals like malaria parasite; and bacteriology, the science of minute parasitic organisms like the plague and leprosy bacilli, the cholera vibrio, and the viruses of yellow fever, dengue, and encephalitis.

FUNDAMENTAL RESEARCH

All these subjects are studied and taught at all schools of tropical medicine, including the London school. But our knowledge of these diseases, although it has advanced

(Continued on page 31)



Very large numbers of students from all over the world take courses in Tropical Medicine and Public Health at the London School of Hygiene and Tropical Medicine. Two students examining mosquito larvæ, which are bred at the London School under tropical conditions of heat and humidity.

at an astonishing pace in the past 60 years, is still very incomplete, and research must go on. One of the main functions of a school like the London school is to conduct, or stimulate others to conduct, fundamental research into the outstanding problems.

In the past few years, since the war, the existence of a stage in the development of malaria parasites in the human body, long suspected, has been clarified. Originally it was not known what happened to the parasites after they had been injected by the biting mosquito until they appeared in the blood a week or so later. Now, thanks to careful research work on volunteers at the London school, we know that the parasites undergo development in the liver. This discovery will, we hope, help in the development of better drugs to

Mortality from Cancer of Digestive Organs

NEXT to heart diseases, cancer is the largest cause of death in the majority of highly developed countries. Highest on the list of cancer deaths — from 39 to 73 per cent of the total, according to countries — are those caused by cancer of the digestive organs (œsophagus, stomach, small intestine including duodenum, large intestine, rectum, biliary passages, liver, pancreas and peritoneum).

Important factors concerning cancer in these various sites are to found in the statistical publication made by the World Health Organization (WHO) on mortality from malignant neoplasms of digestive organs and peritoneum in 26 countries since the beginning of the century.

Mortality from cancer of the digestive organs is higher in men than in women. Stomach cancer is responsible for the majority of cancer deaths in both sexes, immediately followed by cancer of the large intestine and the rectum.

IN THE MORTALITY FROM ALL CANCERS OF DIGESTIVE ORGANS

Countries	Stomach cancer represents		Large intestine cancer represents		Rectum cancer represents	
	M.	F.	M.	F.	M.	F.
	per cent.		per cent.		per cent.	
Canada	39.9	28.2	21.2	34.1	13.1	10.1
United States	31.5	22.6	23.2	34.4	13.0	12.1
Japan	70.3	66.0	2.0	4.2	4.2	5.0

Countries	Stomach cancer represents		Large intestine cancer represents		Rectum cancer represents	
	M.	F.	M.	F.	M.	F.
	per cent.		per cent.		per cent.	
Germany, Fed. Republic	54.6	46.3	7.9	8.9	10.2	7.2
Italy	57.4	50.2	7.9	12.0	5.9	5.8
Netherlands	53.0	42.1	12.7	19.1	11.0	8.7
Scotland	39.0	33.9	25.3	31.7	13.7	10.6
United Kingdom	40.0	34.2	20.6	29.9	17.0	13.5
Australia	42.0	34.0	22.3	34.3	11.3	8.7

The WHO study further shows that mortality from these malignant neoplasms increases from the age of 40 onward and becomes very important after 60.

Cancers of the digestive organs kill more people than all other cancers.

According to the WHO study, in England in 1953, 44.6 per cent of all cancer deaths were caused by cancer of the digestive organs; in Scotland 46.5%, in Denmark 48.4%, in Spain 48.9%, in Finland 56.2%, in France 50.1%, in Ireland 51.7%, in Italy 54.6%, in Norway 51%, in the Netherlands 50.5%, in Sweden 52.7%, in Switzerland 50.6%, in the Union of South-Africa 45.7%, in Canada 46.7%, in Chile 62.6%, in the United States of America 39%, in Uruguay 54.6%, in Japan 73.9%, in Australia 45.3%, in New Zealand 46.3%.

(Continued from page 30)

act on that stage, and it will advance our understanding of malaria and possibly other diseases.

Other researches are related to the fundamental processes involved in the development, by insects, of resistance to DDT, to the fundamental processes by which trypanosomes live at the expense of their hosts, to the fundamental processes involved in human protein absorptions, and to a wide range of other subjects both at home and in Africa and the Far East. It is appropriate that a school of London University should

conduct these enquiries into fundamental problems which so often form the basis of fruitful developments in treatment and prevention.

The various departments of the School are active and enquiring, not satisfied with present knowledge but constantly seeking new understanding, and interested as much in prevention as in treatment. The students—several hundreds each year—pass through a strenuous and exacting course, and incidentally more than half of them are from overseas.

More people live long enough to get cancer

A remarkable increase in cancer deaths since the beginning of the Twentieth Century is clearly shown in the statistical tables of the WHO report. Among the many possible causes of this rise the aging of the population should be mentioned. Because cancer starts mainly around middle age, the fact that people live longer means that more of them may be struck by this disease. Furthermore, in the past 50 years other causes of death such as the infectious diseases have lost much of their importance, thus increasing the proportion of some other conditions, as cancer for instance, as cause of death.

In England in 1901 mortality from all cancers represented 4.4 per cent of all deaths, in 1920, 9.4 per cent, in 1947, 15.1 per cent and in 1953, 16.9 per cent:

in	1901	1920	1947	1953
	%	%	%	%
Scotland	5.6	8.5	13.7	16.7
Denmark		10.5	16.2	19.6
Spain	1.5	2.5	5.9	8.6
Finland		4.5	10.1	14.9
France	3.5	4.7	11.9	13.4
Ireland	3.4	5.7	9.0	12.5
Italy	2.4	3.7	8.5	11.5
Norway	6.4	8.6	15.3	17.6
Netherlands	5.4	9.4	16.4	18.9
Sweden	7.6	8.6	13.0	15.6
Switzerland	7.1	9.3	15.7	17.9
Union of South Africa	4.5	5.3	12.5	14.5
Canada		7.1	13.3	14.5
Chile	1.0	1.3	4.8	6.6
U. S. A.	4.1	6.4	13.1	14.6
Uruguay	4.0	5.2	14.8	17.5
Japan	2.4	2.9	4.7	8.9
Australia	5.2	8.0	12.9	13.6
New Zealand	6.8	8.5	14.6	15.5

Better Diagnosis

Finally, diagnosis has improved considerably during the past 50 years. Thus the proportion of deaths attributed to "senility" or to "unknown cause" has

greatly decreased in most countries, resulting in an increase of the number of deaths from well-diagnosed causes.

Countries		Population over 65 in per cent	Deaths in per cent :			
			from senility and un- known cause	of malignant all sites	neoplasms digestive organs and peritoneum	
France	1901	7.6				
	1953	9.5	21.1	13.1		7.5
Italy	1901	6.1	22.6	3.3		
	1951	7.6	14.2	10.3		6.8
Norway	1901	10.2	41.8	11.2		8.0
	1953	13.1	8.6	17.5		10.8
Netherlands	1903	5.6	29.5	11.5		8.7
	1953	7.8	5.9	18.6		11.0
England &						
Wales	1901	4.2	21.7	6.9		4.4
	1953	9.5	1.7	15.1		7.8
Scotland	1902	4.1	19.1	6.4		3.9
	1953	8.8	3.3	15.5		8.4
Sweden	1901	7.6	.	.		.
	1953	9.9	6.7	14.6		8.8
Switzerland	1901	8.7	15.4	12.4		9.8
	1953	12.7	1.9	19.6		11.6
FEMALE						
France	1901	8.7	.	.		.
	1953	14.1	23.4	11.8		6.7
Italy	1901	6.1	26.3	3.5		.
	1951	8.7	16.4	9.3		5.8
Norway	1901	11.2	49.3	9.3		5.6
	1953	15.4	9.9	13.9		8.5
Netherlands	1903	6.4	32.9	10.1		7.4
	1953	8.5	5.9	15.9		9.9
England &						
Wales	1901	5.1	24.5	8.4		4.6
	1953	13.0	2.7	12.9		7.1
Scotland	1902	5.6	24.5	7.5		4.3
	1953	11.3	3.8	13.1		7.7
Sweden	1901	19.1	.	.		.
	1953	11.3	7.9	13.0		7.4
Switzerland	1901	9.9	16.8	10.7		7.2
	1953	15.5	2.8	16.2		9.0

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THE STELLAR FILTER FOR LABORATORY USE

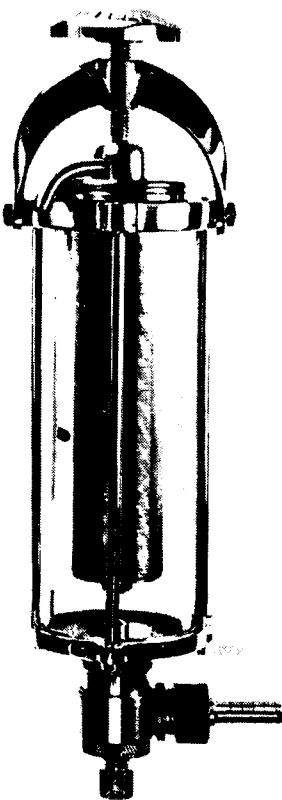
THE Stellar Filter of the Paterson Engineering Company of London, has been specially developed for medical and laboratory use where a very fine filtration is required.

It is extensively employed in the production of fine chemicals, insulin, liver and similar animal extracts and other injection solutions all of which must of course, be completely free from any suspended matter.

The filter consists essentially of a cylindrical shell and outlet manifold constructed to take Stellar patented wire-wound elements or candles which are fine strainers and are employed as the foundation for a deposited filter bed of filtering powder known as "Stellafilt" which may be Kieselguhr graded for the particular purpose or an admixture of Kieselguhr with other materials.

The elements consist of a tube with equally-spaced longitudinal ribs having a screw thread cut along the entire length providing on each rib a series of grooves in which the consecutive turns of wire wound on the ribs is firmly located. The openings over the whole area of the element are of regular size and the result is a rigid element with the shortest possible flow and the minimum gap, and the regularity of the openings ensures an even coating of filter aid with no break which would permit unfiltered liquids to by-pass, thus ensuring absolutely uniform filtration.

As regards materials of construction, filter shells for general purposes with aqueous liquids are made of mild steel and lined when necessary with a hard plastic enamel. For foodstuffs, and corrosive conditions stainless steel is used. The filter elements for water, oils and non-corrosive liquids are made with extruded brass tubular elements. Where it is imperative that the filter be completely leak-proof, special arrangements can be made. To the nature of the application—siphon type elements, a reversible filter on trunnions or



a separate small filter for dealing with the contents of the main filter.

The filtration of liquids containing other than a small amount of suspended matter, is usually facilitated by the use of filter aid as a continuous addition throughout filtration. This addition of filter aid inhibits the formation of a skin of dirt on the pre-coat and by the deposition of further porous material continuously maintains an open filter bed throughout the run. The Stellar Jet Filtraider enables this filter aid to be introduced proportionately into the stream of liquid immediately before the filter and the abrasive diatomite does not pass through the pump.

Mrs. Jones had great difficulty collecting from the Workmen's Compensation Commission for the accidental death of her husband. She wrote to them: "You make matters so difficult for me in collecting the money that I sometimes wish Oscar hadn't been killed".

Observations of an Orthopaedic Surgeon in a Mental Retardation Center*

By HERBERT G. COHEN, M.D., F.A.C.S., F.I.C.S.
Exclusive to "Surgical & Medical News", Bombay.

IN March 1950, the author, an Orthopaedic Surgeon, returned from Cockeysville, Maryland; where he studied as a New York State Fellow in Cerebral Palsy under Dr. Winthrop M. Phelps. Shortly afterwards he was invited by the Professor of Pediatrics and Director of the Children's Retardation Center of New York Medical College to be their Consulting Orthopaedic Surgeon. This center was established to care for mentally retarded children, with or without cerebral palsy.

The Children's Center at the New York Medical College has an unique distinction in that it is the first clinic attempting to treat and rehabilitate mentally retarded children with cerebral palsy. However, this group comprises only one aspect that comes under the general heading of mental retardates. This clinic is a comprehensive one which endeavors to treat and study the total child, i. e. physically, mentally, emotionally and spiritually.

Pulstein and Barnett (1) in a study of one thousand consecutive cases of Cerebral Palsy in the Children's Neurology Clinic at Cook County Hospital, Chicago, Illinois; and in private practice, found over thirty-five per cent of all children with cerebral palsy have an appreciable amount of mental retardation i. e., an intelligence quotient below 70. Mc Intire (2) (1938), who mentally tested one hundred and forty-six (146) cerebral palsied children, physically examined by Dr. Winthrop M. Phelps, found approximately one in four (1:4) was mentally retarded. Recently, some studies have shown that as many as seventy per cent of cerebral palsied children have an intelligence quotient of less than seventy. The author believes the percentage to be in the neighborhood of thirty-five to fifty per cent.

Patients are referred to our Center from various sources; (1) Schools; (2) Physicians; (3) Other

hospitals; (4) Other agencies; such as United Cerebral Palsy Society, The National Society for Crippled Children and the Association for the Help of Retarded Children; (5) The Various Visiting Nurse Services and (6) Parents.

TEAM APPROACH

In order to study the "total child", our approach has been that of a well integrated team; with each member working as a complement or supplement to the others. The Orthopaedic Surgeon, of course, is a very necessary part of this team; especially among the cerebral palsied retarded group.

However, a thorough preparatory pediatric, psychological, educational examination; orientation and evaluation is necessary before the Orthopaedic Surgeon sees the retardate. Only then can the Orthopaedic Surgeon treat the motor disabilities and handicaps of the child.

Figure 2: The Number of Children seen at the Clinic since 1950.

Year	New cases	Revisits	Total cases
1950	154	242	396
1951	207	689	896
1952	462	1067	1529
1953	163	1162	1325
1954	183	1450	1533
Total Visits			—5,679
Total Cases			—1,169

The vast majority of the retardates at our clinic fall into Mongoloid and Cerebral Palsy Classification. At our Clinic The Phelps Classification of Cerebral Palsy is used.

* From Children's Retardation Center, Dr. Lawrence B. Slobody; Director of Pediatrics; and Orthopaedic Surgery Department, Dr. Milton J. Wilson, Director.

PULMONARY DISEASE IN GENERAL PRACTICE

BY K. N. RAMAN, M.B., B.S.

Anaimalai P. O., South India.

A revolution, though not as dramatic as in heart disease, has occurred in our knowledge and management of pulmonary disease during the last decade. This has led to a completely new approach on the part of the general practitioner to diseases of the chest. Among the recent advances, the following are note-worthy.

1. Use of antibiotics in pulmonary infections.
2. A. C. T. H. and cortisone in bronchial asthma.
3. More accurate knowledge of pulmonary physiology and pathology.
4. Advances in surgery of the lung.

Pulmonary disease commonly seen by the general practitioner may be arranged in the following clinical groups:

- | | |
|-----------------------|--|
| A. Children : | <ol style="list-style-type: none"> 1. Bronchopneumonia 2. Asthma 3. Whooping cough |
| B. Adults : | <ol style="list-style-type: none"> 1. Tuberculosis 2. Pleurisy 3. Pneumonia 4. Lung abscess 5. Bronchiectasis 6. Empyema 7. Asthma 8. Tumours of lung. |
| C. Elderly patients : | <ol style="list-style-type: none"> 1. Chronic bronchitis 2. Emphysema 3. "Cardiac" lung 4. Tumours. |

BRONCHOPNEUMONIA IN CHILDREN

Fever and cough are the commonest complaints for which babies are brought to the general practitioner. In a majority of cases, an upper respiratory tract infection is responsible. Bronchitis and bronchopneumonia are diagnosed when there are definite physical signs in the chest. They may occur as a complication of measles or pertussis, or more commonly follow an upper respiratory tract infection. Clinically the child is ill,

does not feed well, does not sleep well, and has a varying degree of dyspnoea.

Sulfonamides and antibiotics have revolutionised the outlook in this disease. Penicillin is effective when given orally in younger babies. I million units may be given as a single dose treatment. Sulfonamides may also be given as a single dose of $1\frac{1}{2}$ grams (3 tablets), but it is preferable in practice to give the drug in divided doses every four hours. For older children, penicillin is given parenterally.

The babies have to be watched carefully as they may suddenly get worse with an attack of severe dyspnoea.

ASTHMA IN CHILDREN

Asthma is fairly common among the older children, but rare in babies under one year. It may occur as a "stress" reaction following exposure to heat and cold, or allergens, or be induced by emotional tensions or by infections. The attacks come on suddenly, and surprisingly, stop suddenly sometimes. The children suffer from paroxysmal cough, worse at night, which may simulate pertussis, especially when vomiting occurs.

Treatment : Ephedrine $\frac{1}{4}$ grain for infants and $\frac{1}{2}$ grain for babies over a year, given along with equal doses of phenobarbitone, relieves the condition. If the attack is severe, and the chest is held in inspiration, 1 to 2 minims of adrenaline may be given hypodermically and repeated every hour till relief is obtained.

PERTUSSIS (WHOOING COUGH)

The newer antibiotics have not given consistently good results. Administered early in the disease, chloramphenicol and tetracycline group of drugs modify the attack considerably and provide relief. Streptomycin may be given daily for 5 days—0.5 gram for a child of 15 to 20 lbs. None of these drugs, however, appear, to be specific.

For symptomatic relief, oxygen is one of the most valuable agents, and phenobarbitone and belladonna, valuable drugs.

General treatment and a calm and confident mother are as important as drug treatment.

Immunization with pertussis vaccine begun at the 3rd month and given in 3 doses at four weeks' interval gives a high degree of protection.

PULMONARY TUBERCULOSIS IN ADULTS

Current therapy of this disease is reviewed elsewhere in this issue. * The introduction of patent antibacterial drugs has brightened the outlook for the patient, but has not simplified therapy for the general practitioner. A combination of Streptomycin, isoniazid and P. A. S. given for long periods, with surgical procedures (where required) undertaken at the optimum time—these sum up the treatment. A general practitioner undertaking treatment needs to have a good radiograph taken, and formulate a scheme of treatment for each patient, with the help of the specialist. Importance of general measures like adequate rest and diet is likely to be overlooked in the modern hurry to commence specific therapy. In view of the improved outlook, early diagnosis takes on added importance :

Hints for early diagnosis of pulmonary tuberculosis :

1. Careful history for "contact".
2. Symptoms of toxæmia—lassitude, loss of appetite, dyspepsia, algomenorrhœa, loss of weight, abnormal sweating.
3. Symptoms of pulmonary disease—Stained sputum, "Cold" followed by *productive persistent* cough, "Chest pains", huskiness, wheezing dyspnoea on exertion.
4. Signs: Pallor of palate, clubbing of fingers, diminished air entry, post-tussive rales, *unilateral* wheezing.
5. Raised Erythrocyte Sedimentation Rate.
6. Culture of sputum, laryngeal swab or gastric contents is the most delicate test for "active" disease.
7. A good radiograph.

Pleurisy : The commonest cause of pleurisy in our country, especially in young adults is tuberculosis. The usual history is of general ill health for some weeks with low fever, and then sudden onset of pain in the chest, which is relieved by the appearance of an effusion. A good radiograph is taken, and a diagnostic aspiration is done to exclude purulent effusion. Treatment is given as for tuberculosis, using preferably P. A. S. 12 grams and Isoniazid 200 mgm. daily for two to three

* These signs and symptoms, when appearing in individuals who have previously been free from them are significant.

months. Subsequently the patient is observed for two to three years.

The indications for therapeutic aspiration are (i) failure to absorb in about four weeks (ii) massive effusion causing respiratory distress.

Pleural effusion may occur also secondary to pneumonia bronchial carcinoma and metastatic malignant disease of lung. Pleural effusion may occur as a result of amœbic infection or abscess of the liver. The effusion is usually small, and there may be collapse of a part or whole of the lower lobe of lung; and there is no mediastinal shift to the opposite side. In all cases of right sided pleural effusion, it is wise to enquire carefully into the history and examine for evidence of abdominal disease (amœbic hepatitis.)

PNEUMONIA

The classification of "lobar pneumonia" and "bronchopneumonia" of the previous decade has given place to a bewildering list of "pneumonias". For practical purposes, we may recognise the following :—

1. Pneumonia caused by pneumococcus, Staphylococcus and Streptococcus.
2. Pneumonia caused by gramnegative bacilli eg. H. Pertussis, S. typhosum, B. friedlander
3. Tuberculous pneumonia
4. Virus pneumonia eg. Influenza, measles, chickenpox, "Primary a typical pneumonia".

It is not possible to differentiate these without bacteriological examination of sputum. Routine examination of sputum, and a radiograph when in doubt will prevent a diagnosis of tuberculous pneumonia being missed.

Staphylococcal pneumonia is not common but can be recognised when it occurs in a child with a furuncle or carbuncle or sore throat. Toxæmia and prostration are marked. Streptococcal pneumonia is rare and occurs in marasmic children. Empyema and pericarditis are common complications.

Typical lobar pneumonia of textbooks is uncommon in these days, perhaps because most patients with high fever are treated with penicillin and signs of pneumonia are prevented from appearing. Penicillin in adequate dosage with sulfa drugs will dramatically clear up pneumonia caused by the cocci (group 1.)

HEART DISEASE AND PREGNANCY

BY DR. VISHNU SARMA, M.A. (Cantab.) M.B., B.Chir., M.R.C.S. (Eng.), L.R.C.P. (Lond.)
Civil Assistant Surgeon, The Government Women & Children's Hospital, Egmore, MADRAS.

INTRODUCTION

DR. WILLIAM HARVEY of Caius College, Cambridge, and St. Bartholomew's Hospital, London, made a most profound discovery in 1616. He proved that blood circulated in the body and that the heart was merely a pump although a very remarkable one at that. As Harvey had considerable personal experience in obstetrics as well which his chapter on labour (de partu) in his great work "de Generatione Animalium" amply testifies, obstetricians might as well accept the truth of his great discovery when dealing with pregnant women with heart disease.

The heart is only a pump. To work efficiently certain conditions need to be fulfilled. The heart needs oxygen. Blood which courses through the coronary vessels supplies oxygen to heart muscle. The red cells in the blood contain pigment. It is the quantity and quality of this pigment that gives blood its oxygen carrying power. Iron is necessary for the production of this pigment. If enough iron is not ingested in the diet the red cells are small (microcytic) and lack pigment (hypochromia). Such a condition is the most important type of anæmia met with in pregnancy.

When red cells are normal and contain enough pigment it is necessary that they should come into contact within the lung alveoli, with air containing plenty of oxygen. Respiratory and other diseases which prevent entry of oxygen into the lungs, also give rise to anoxia.

In organic valvular disease, the heart is working against great odds and if the oxygen supply to the heart is impaired in any way, be it from oxygen lack in the lung alveoli or to anæmia, the heart fails. If failure is already present it is aggravated. Given an uninterrupted access to an abundant oxygen supply as well as to nutriment, the heart can put up with quite a lot in the way of pathological assaults.

THE PHYSIOLOGY OF CIRCULATORY AND HEART CHANGES IN PREGNANCY

In pregnancy hormones are secreted. Hormonal action leads to water retention. The volume of circulating plasma is increased. This dilutes the red cells.



William Harvey,
c. 1655, aet. 78

(Courtesy—Hunterian Collection University of Glasgow)

The number of red cells is usually more or less constant and the cells become more widely dispersed in the increased volume of plasma. This hæmodilution gives rise to a relative anæmia. The anæmia is not a real but an apparent one, because the actual number of red cells is not reduced. If there is more circulating fluid the heart has to work harder to pump it round. Therefore cardiac output rises.

This phenomenon becomes evident at about the 12th week of pregnancy. The cardiac output rises steadily so that the heart works hardest at about the 32nd week. Although there is slight diminution, the load persists till the 36th week. In the last four weeks there is a steep decline and the burden on the heart is considerably eased (Figure 1).

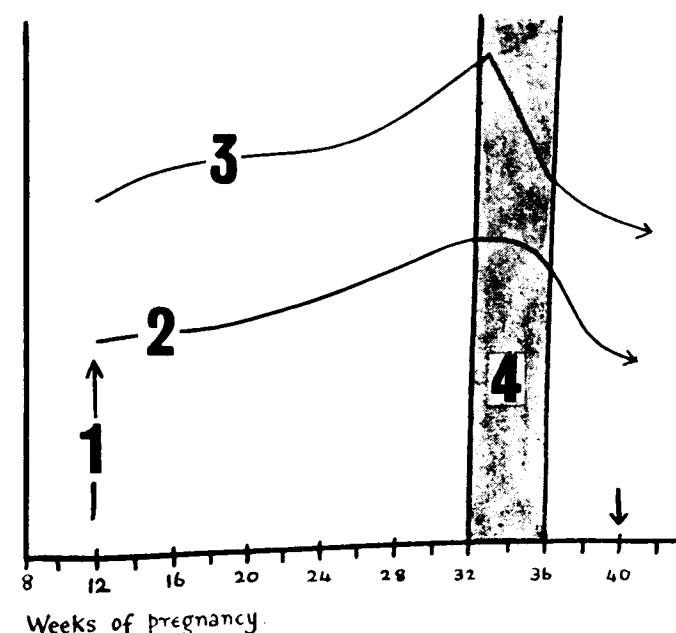


Fig. 1.

The period during pregnancy when the incidence of heart failure (3) is highest, corresponds closely to increase in heart output (2). The circulation begins to feel the burden of pregnancy at the 12th week (1). The maximum load on the heart occurs at about the 32nd week and remains at a high level until the 36th week. After this there is a fall. The critical period is indicated (4).

If heart failure occurs it is during the critical period between the 32nd and the 36th week. Once this period is passed the outlook becomes brighter.

There is another factor, which although relatively unimportant, has to be taken into account. The growth of the vascular uterus with consequent increase in the pelvic vascular bed does add to the circulatory burden.

All these changes occur in normal pregnancies. So they may be considered normal physiological changes characteristic of the pregnant state. These changes may be summarized as follows:

- (1) The blood volume increases up to the 36th week of pregnancy when it is 45% above normal. In the last four weeks of pregnancy it drops to 30%. As already explained the increase in volume is due to excess retention of plasma. The number of red cells remain constant and an "apparent" anæmia is observed.
- (2) The heart beats faster and its stroke volume is increased.

- (3) The increase in maternal metabolism and the growth processes of the embryo developing in utero, increase oxygen demand.
- (4) The growing foetus, the enlarging uterus and retention of fluid by the mother all increase maternal body weight.

Although the growing uterus pushes up the diaphragm and displaces the normal heart, making it appear enlarged, there is no evidence that either the vital capacity or heart action is detrimentally affected.

ÆTIOLOGY

Pregnancy makes little difference to the working of a normal heart; but in a heart that is severely diseased failure may be precipitated.

Rheumatic disease which damages the myocardium and scars and distorts the heart valves, is responsible for 90% of heart lesions. The rest are made of a variety of heart lesions which includes congenital malformation (4%).

Other factors which precipitate heart failure either by making excess demands on it or by diminishing its oxygen supply are: anæmia and other blood disorders, respiratory disease, hypertension, gross obesity and certain diseases peculiar to pregnancy such as pre-eclampsia and hydramnios.

More often it is not the disease of the heart as much as the evil sequelæ to which they give rise, which endangers the patient. In rheumatic endocarditis for instance although an acute exacerbation of myocarditis may occur, usually it is the complications such as mitral stenosis, bacterial endocarditis or acute pulmonary oedema which prove disastrous to the patient.

DIAGNOSIS

Heart disease is diagnosed by discovering the presence of the relevant symptoms and signs. It must be remembered that the interpretation of these may be more difficult than usual in the pregnant patient. Eastman states "Several of our standard criteria of heart disease become invalid during pregnancy. Apparent cardiac enlargement, systolic murmurs, edema, accenuation of the pulmonic second sound, shortness of breath on exertion and even crepitant rales at the base of the lungs may be present in pregnant women, who have perfectly normal heart. It is therefore essential that we establish as definitely as possible those signs of cardiac disease which are not stimulated by

gestational changes and which may be depended upon at all times for a diagnosis of heart disease in pregnant women."

HISTORY

One should always try and find out if there has been a history in the past of rheumatic fever. The patient may report having had an illness which followed acute sore throat or pharyngitis which is suggestive. Sometimes there may be an account of skin rashes, joint pains or of chorea. With such a positive history the symptoms and signs acquire greater significance.

Rheumatic fever usually affects young persons. The presence of acute myocarditis in a pregnant patient is a bad sign. Heart changes in acute rheumatism are transient. Almost all cases of rheumatic heart disease in pregnancy present with evidence of valvular damage, the late result of rheumatic endocarditis. The mitral valve is the one usually affected. (Figure 2.) Its orifice



Fig. 2.

Rheumatic endocarditis which damages the valves is the commonest cause for heart disease in pregnancy.

The numbers in this figure indicate the stenosed, funnel like mitral valve (1), shortening and hypertrophy of the papillary muscles (2), shortening and thickening of the chordae tendineae (3), a mural thrombus within the right auricle (4), and the enlarged hypertrophied left atrium (5).

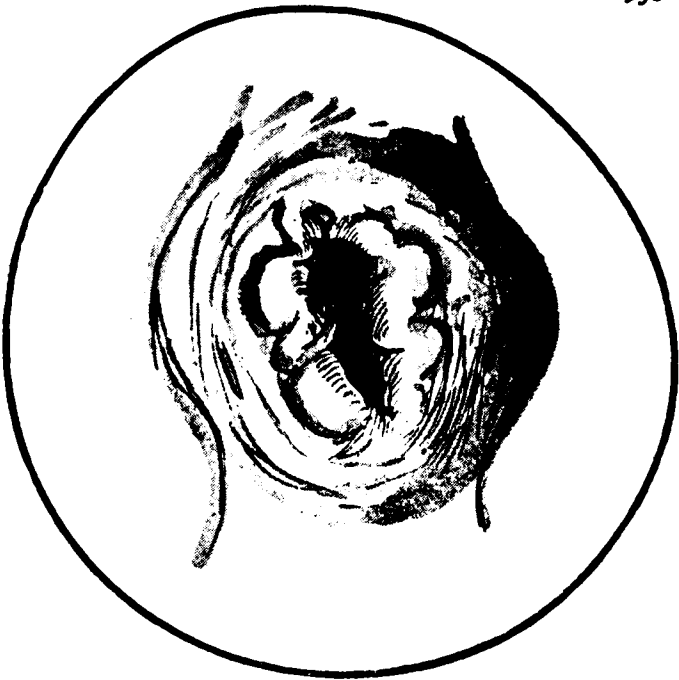


Fig. 3. A stenosed mitral valve seen from above.

is narrowed and may take the shape of a button hole, fish mouth or a funnel. (Figure 3.)

When symptoms and signs in heart failure are present, the picture may be one of failure of the left or right side.

Left heart failure is characterized by pulmonary congestion with bilateral basal rales. The hilar vessels of the lungs are congested.

Right heart failure is characterized by systemic congestion. The neck veins are engorged. The spleen may be enlarged and palpable. The liver may be enlarged and tender and may be a cause of abdominal pain. The extremities may be oedematous. Ascites may be present.

The patient may be dyspnoeic and easily upset by the least exertion. Orthopnoea is a severe degree of breathlessness and the patient cannot lie down at all and has to be kept propped up in bed. She may be restless and unable to get sound sleep. If auricular fibrillation is present she may complain of palpitations or pre-cordial pain. She may have a cough with bronchial expectoration. The sputum which is coughed up is rusty or even blood-stained (haemoptysis). Pulmonary infarction also gives rise to the expectoration of blood-stained sputum.

If the valves are the seat of the vegetations of subacute bacterial endocarditis the complication of this infection such as embolic phenomena may present.

The heart shows enlargement of the left atrium and hypertrophy of the right ventricle.

Mitral stenosis murmurs are characteristic. They are loudest in the mitral area, diastolic in type, low pitched with a crescendo quality which lasts throughout the diastole. The pulmonary second sound is accenuated. It is localized and heard best at the apex. It is usually associated with a loud short or long systolic murmur, which has a higher pitch and a harsher tone.

When eliciting heart sounds it is best done with the patient lying on her left side after the performance of physical exercise. There may be fine variations in the murmurs heard. Anæmia itself is responsible for certain murmurs.

The accurate interpretation of heart sounds as well as the evaluation of the condition of the heart, requires considerable knowledge and experience of cardiology. The obstetrician would do well, therefore, to seek the aid of the cardiologist in the management of his pregnant patients afflicted with heart disease.

Radiological methods and other special methods of investigation such as electro-cardiography are useful in enhancing the accuracy of diagnosis.

THE ASSESSMENT OF RISK

For all practical purposes the most important factor is of course "exercise tolerance". This is of more significance than all the symptoms and signs which may be present.

For the majority of patients with heart disease pregnancy is a relatively safe undertaking. Provided exercise tolerance was satisfactory before pregnancy, the risks are not great. However if the exercise tolerance is considerably limited, or if heart failure is actually present, the risk of pregnancy is great.

It would appear that the risk to the patient with heart disease embarking on pregnancy has been greatly exaggerated in the past. Controlled studies have shown that factors such as the number of valve lesions and the actual size of the heart, do not greatly affect the degree of risk. Age appears to be of relevance only in as much as the older patient has a more advanced degree of the disease and hence more limitation to her functional capacity.

The American Heart Association classification of heart patients according to their functional capacity is a useful one, and has been widely accepted and is shown in the following table :

Classification of pregnant heart patients according to functional capacity.

Class I	Patients with organic heart disease who can carry on ordinary physical activity without discomfort. Usually picked up on routine examination.	Prognosis good
	* (No dyspnoea during ordinary activity before pregnancy. Radiological evidence of cardiac enlargement minimal).	
Class II	Patients with organic heart disease who cannot carry out ordinary physical activity without discomfort.	Prognosis good
	* (Radiological evidence of moderate cardiac enlargement and slight pulmonary congestion. No right heart failure or paroxysmal tachycardia at any time).	
(A)	Activity slightly limited.	Prognosis guarded
(B)	Activity greatly limited.	
Class III	Patients with organic heart disease showing definite symptoms of heart failure when at rest.	Prognosis bad
	* (Paroxysmal dyspnoea, recurrent hæmoptysis, radiological evidence of severe pulmonary congestion, history or actual presence of right heart failure, auricular fibrillation etc.	

* Clinical criteria

THE MANAGEMENT OF PREGNANCY

When recognised early, heart failure responds well to treatment. As a rule there is no place whatever for terminating pregnancy in heart disease. The cardiac condition must be adequately treated. The load on the heart which pregnancy imposes is not a progressive one. Beginning at the 12th week it reaches a maximum at about the 32nd week at which level it remains until

SURGICAL & MEDICAL NEWS

after the 36th week, when there is a steep decline. In the last four weeks the load on the circulation gets less and less, and certainly under such circumstances there is no necessity to interfere by performing obstetric procedures such as premature induction of labour or a Cæsarian section.

A great deal can be done by way of general care for the heart patient. She should be advised to take plenty of rest and to avoid unnecessary exertion. Sedatives may be prescribed to ensure sound sleep. Fluid and salt intake should be restricted. Dietary deficiencies and anæmia should be corrected. Unless tachycardia or auricular fibrillation is present, digitalis is not advised.

Infection may precipitate heart failure and should be prevented. If they still occur they require prompt treatment. Bronchitis and other respiratory infections should be taken seriously.

Sub-acute bacterial endocarditis is an important and serious complication. It should always be diagnosed early and treated with massive doses of antibiotics. Treatment should be continued for several weeks and a relapse should not be allowed to occur.

Congestive heart failure is usually insidious in its onset. Diuretics are valuable in reducing œdema.

Auricular fibrillation is often a precursor of heart failure and although it adds to the risk it is not a contraindication for the continuance of pregnancy if the patient is under observation and receives treatment.

Acute pulmonary œdema is a serious and sometimes fatal complication of heart failure. It is also spoken of as cardiac asthma or paroxysmal nocturnal cardiac dyspnoea. Although the exact ætiology is in doubt, certain factors may precipitate acute pulmonary œdema. They are:

1. Increased capillary permeability. This may be due to reflex vasodilation or to a sudden increase in the venous blood which returns to the heart.
2. Direct stimuli to the heart. This may occur in conditions such as myocardial infarction and sudden pressure changes within the heart chambers and the great vessels.
3. Indirect stimuli such as those which pulmonary infections and irritants, central nervous activity such as fear, and trauma may excite.

OCTOBER 1956

Patients who complain of increasing cardiac dyspnoea and orthopnoea are prone to develop acute pulmonary œdema. This complication strikes with little or no warning. The patient develops an intense dyspnoea which terrifies her. She sits up in bed or tries to get out and struggles for breath. There is a bout of coughing at the onset of the attack which increases the dyspnoea still further. The patient is anxious, cyanosed and she sweats. She complains of tightness within the chest and suffocation. Soon gross pulmonary œdema develops. The patient brings up frothy blood stained sputum.

There are very few physical signs in the lungs at the beginning of the attack. Sometimes rales may be heard in the midzones of both lungs. Soon they become coarse. The breath sounds are obscured by the presence of added sounds.

Left ventricular hypertrophy is present. The pulmonary second sound is accenuated. Frequently there is a pre-systolic triple rhythm or a gallop rhythm at the apex. The blood pressure is usually raised but falls at the end of an attack. When the blood pressure is being measured, quite often pulsus alternans may be detected.

The attack generally ends as suddenly as it came. After the attack the patient goes into a state of shock. She is cyanosed or dusky grey in colour. Her pulse is barely perceptible and the blood pressure is very low.

Characteristic X-ray findings are obtained in acute pulmonary œdema. There are symmetrical areas of increased density which spread out from both hila to give a "butterfly wing" appearance. (Figure 4.) The periphery of the lung fields and particularly the lung bases may appear unduly clear. The areas of increased density show diffuse haziness obliterating the lung markings unlike changes in chronic congestion. Lung markings are increased and hilar vessels are clearly seen. These X-ray appearances vanish within 4-6 hours of the attack unless massive pulmonary œdema develops in which case the areas of haziness spread to involved all areas of both lungs.

An attack of acute pulmonary œdema is a medical emergency and deserves urgent treatment. The attack may be aborted by prompt treatment in the early stages. Once the condition develops effective treatment is much more difficult.

SURGICAL & MEDICAL NEWS

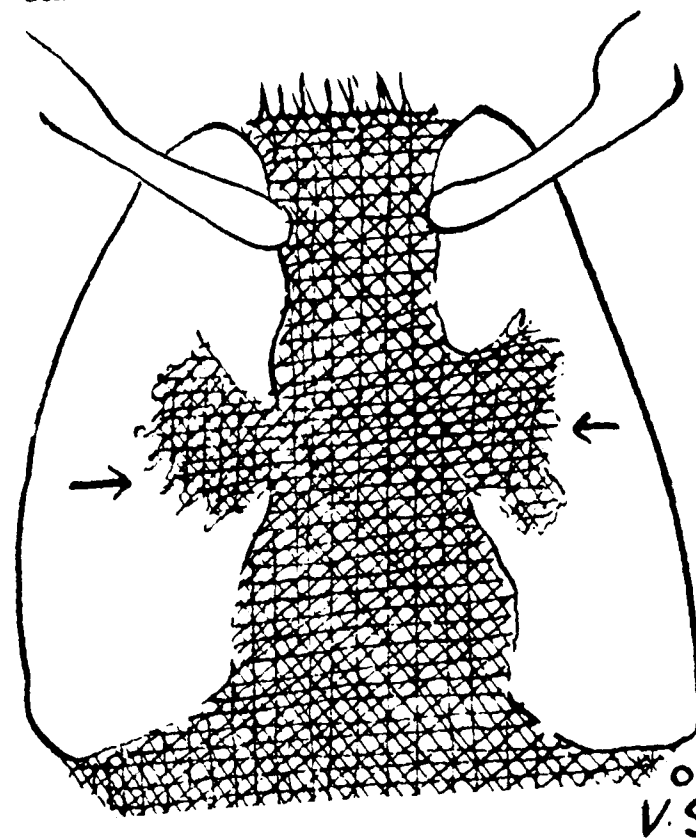


Fig. 4.

A line drawing made from a skiagram taken during an attack of acute pulmonary œdema. Symmetrical areas of irregular density spread out from both hila to give a "butterfly" appearance.

Oxygen should be given and its effective administration needs a B. L. B. mask and an oxygen cylinder properly fitted out with a flowmeter which regulates oxygen flow at 5-8 litres per minute. An ideal sedative to depress the reflex action is Morphia. Certain procedures are employed which probably do good by lowering the venous pressure. Venous pressure may be lowered partly by bleeding the patient rapidly of 600 cc. of blood as well as by tying tourniquets to both thighs to impede the return of venous blood to the heart. Theophylline with Ethylene-di-amine given intravenously (0.24 to 0.48 G diluted in 10 ml. distilled water) does good by causing a fall in pressure both in the veins as well as the right atrium. It relieves bronchospasm as well. The value of digitalis is uncertain but may be given if paroxysmal auricular fibrillation is present.

When the heart is compensated the temptation to terminate pregnancy much be resisted. Heart patients often go into premature labour and have easy deliveries. The premature child has a difficult time and its prospects of survival are not as good as one which has almost reached full term. In a mother with heart disease the

great danger to the foetus when developing in the uterus, is that of anoxia.

MITRAL VALVOTOMY

When the heart is compensated and the mitral stenosis is severe, the operation of mitral valvotomy in certain selected cases, performed even during pregnancy, gives good results which are sometimes quite dramatic. The narrowed mitral opening is enlarged using a special instrument called a valvulotome. With this instrument the stenosed valve is incised and the orifice is then dilated with a finger. For the successful performance of this operation, in addition to having a surgeon skilled in performing it, meticulous and detailed pre-operative investigation and assessment are necessary.

COARCTATION OF THE AORTA

A congenital malformation for which advances in modern cardiac surgery offers a cure is the rare condition of coarctation of the aorta. In this abnormality the aorta is narrowed at the level of its junction with the ductus arteriosus just beyond where the left subclavian artery branches off. (Figure 5.) Collateral circulation develops proximal to the aortic obstruction. The



Fig. 5.

In the rare congenital malformation of Coarctation of the aorta, there is a risk that the aorta might rupture during labour. Some authorities advise Cæsarean delivery at term.

superficial arteries of the chest are enlarged. The blood pressure is high. Hypertension produces arteriosclerotic changes in the blood vessels.

This condition may give rise to various complications such as cerebral hæmorrhage, coronary occlusion, heart failure, bacterial endocarditis or rupture of the aorta. Of these complications, it is believed that the risk of aortic rupture is increased by labour and so many authorities advise a Cæsarean delivery. A carefully supervised vaginal delivery is thought to be equally safe by some.

PATENT DUCTUS ARTERIOSUS

The volume of blood which flows through a patent ductus depends on its size. A large ductus puts an extra load on the heart because it is an arteriovenous shunt and leads to hypertrophy of all chambers of the heart particularly the left ventricle. A ductus provides a nidus for infection and is a favourite location for the growth of vegetations in that serious complication of bacterial endocarditis.

ATRIAL SEPTAL DEFECTS

Patients with this type of malformation tolerate pregnancy quite well. If the malformation produces excessive filling of the right cavities of the heart during pregnancy, the arterio-venous shunt may get reversed and cause cyanosis and death.

MANAGEMENT OF LABOUR

While a premature delivery is usually common making for an easy labour, sometimes obstetric complications may be present which might make normal vaginal delivery difficult if not impossible. It is important therefore not to neglect this aspect. The obstetric position should be carefully reviewed. In the presence of conditions such as severe cephalo-pelvic disproportion there may be no alternative to a Cæsarean section.

When the patient goes into labour she must be supervised. An adequate intake of fluids for her needs, but not in excess, a nourishing diet, and rest should all be ensured. The best sedative is morphia which relieves pain and allays apprehension in the first stage of labour. During delivery, when on those rare occasions there is delay, it should be overcome speedily either by an episiotomy or the application of "low

forceps". The patient should not be allowed to exert herself without necessity. At all times anoxia should be prevented, and the prophylactic administration of oxygen is an added safety measure. The third stage should be conducted as usual. Some loss of blood, if it is not severe, is believed to be physiologically beneficial to the heart patient and ergometrine may be withheld. However, severe hæmorrhage which may arise from mismanagement of the third stage gives rise to dangerous shock.

OBSTETRIC OPERATIONS

Maternal mortality due to operative procedures to secure delivery far exceeds that due to the heart disease itself. Yet, under certain circumstances one is forced to choose the former. When a difficult and prolonged labour seems inevitable due to some obstetric cause (cephalo-pelvic disproportion, a severe degree of placenta prævia or other insuperable obstructions to normal childbirth) it may be safer to perform Cæsarean section rather than to attempt a most difficult and shocking vaginal delivery. There is little place for "trial of labour" in the obstetric management of a heart patient.

ANÆSTHESIA IN CARDIAC DISEASE

When operative delivery is indicated, either by the vaginal route (forceps) or by the abdominal route (Cæsarean section) the use of some form of anæsthesia is necessary.

The principles upon which the choice of anæsthetic drugs and their administration depend are:

1. Anoxia should be avoided at all cost. An abundant supply of oxygen should be ensured for the patient. For this purpose even intubation to secure a reliable airway may be worthwhile doing.
2. The blood pressure should not be allowed to fall.
3. Premedication may be employed but should not be in excess lest it unduly depress respiration. It should be remembered that the circulation is slow and that drugs injected into veins take longer to reach the brain and other parts of the body. The drugs take more time to get eliminated.

To the anæsthetist cardiac function matters more than all the lesions and murmurs which are present. However he should know the degree of disability from which the patient suffers, the size of the heart, whether auricular fibrillation is present or not, whether there has been a previous history of right sided or left sided heart failure, whether pleural effusion and ascites are present and whether the bronchial tree is partially obstructed by fluid or by bronchospasm.

When shock occurs in operation due to sudden loss of blood it is generally a safe rule to replace that loss by the same volume of blood given slowly by transfusion. In rheumatic heart failure and pre-pulmonary states he should be aware of the danger of overloading the circulation. Occasionally he may have to perform emergency treatment for cardiac arrest.

Cardiac arrest is due to ventricular fibrillation. When it occurs 100% oxygen should be given as well as artificial respiration so that the oxygen supply to the vital centres — the brain and the heart is not impaired. Cardiac massage is necessary. Occasionally, in certain units arterial transfusion of blood straight into the aorta is practised. If the heart does not start beating again, 7-10 ml of a 10% calcium chloride solution should be injected into it to increase ventricular contraction. $\frac{1}{2}$ -1 ml of a 1:1000 adrenaline may also be tried.

Relaxants are of great value when giving anæsthetics to heart patients because they lessen the amount of anæsthetic drugs which need to be used. However by assisted or controlled respiration an abundant supply of oxygen must be ensured.

In cases of severe heart disease with failure spinal anæsthesia or even local anæsthesia may be chosen. Even here it is a safety precaution to administer oxygen to the patient. A careful watch should be maintained on the blood pressure which should never be allowed to drop.

The puerperium should not be neglected. A careful watch should be kept to detect infection at the earliest stage so that it may be treated promptly. Indeed the prophylactic administration of chemotherapeutic and antibiotic drugs is advisable.

Puerperal infection is a serious complication as the infecting organism gains entry and may give rise to

subacute bacterial endocarditis. Another sight of infection is the lung. This is particularly so after abdominal operations done under inhalational anæsthesia.

Heart patients are more prone to thrombopnebitis. Compatible with the condition of the patient early ambulation should be encouraged.

In almost all patients breast feeding of their offspring may be encouraged.

SOCIAL REHABILITATION

The social rehabilitation of the patient should receive attention. There is little purpose, if after the heart disease is controlled in the hospital, the patient returns home to perform strenuous domestic duties without aid merely to relapse into an advanced class of heart failure. The help of relatives or others interested in the patient should be sought and some arrangement made. This aspect of medicine deserves great emphasis.

STERILIZATION, CONTRACEPTION AND MARRIAGE

The pros and cons of sterilization should be discussed with the patient and the choice left entirely to her. That sterilization may be easily carried out is never a criterion in selecting the abdominal route for delivery, although it is true that at an abdominal operation a sterilization can easily be carried out.

In those who are willing to abide by it contraception may be advised.

It is high handed on the part of the obstetric physician to decide whether a young heart patient should marry or not. The decision should be left to the patient. In this connection it is difficult to resist the temptation to quote the case of a young unmarried lady who sought antenatal advice for her sixth pregnancy. When the obstetrician tried to find out discreetly why she had never married but had successfully borne five children, he was horrified to learn that the patient was advised by a doctor at her first visit to an antenatal clinic that she had heart disease and should therefore never marry—an advice which she very faithfully carried out!

CONCLUSION

With the significant advances which have been made in recent years in our understanding of the physiology of the heart and circulation during pregnancy, the approach to childbearing in a patient with heart disease is essentially a conservative one. At all times every endeavour should be made towards terminating the heart disease rather than the pregnancy. Sound ante-natal care and good obstetrics makes pregnancy and parturition, even for the patient with severe heart disease, a relatively safe experience considering the many hazards which lie in the way.

The pregnant patient with heart disease demands of her physician knowledge of cardiology and obstetrics and an ability to temper all advice with sound common sense.

This was an official report as published in a Los Angeles paper: "Police can find no reason for suicide. The man was unmarried!"

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OCTOBER 1956

MYASTHENIA GRAVIS

By T. V. VENKATESAN, M.B., B.S., F.C.C.P., F.D.S.,
Fellow of Academy International of Medicine, New Street, Madurai.

THE MYONEURAL JUNCTION

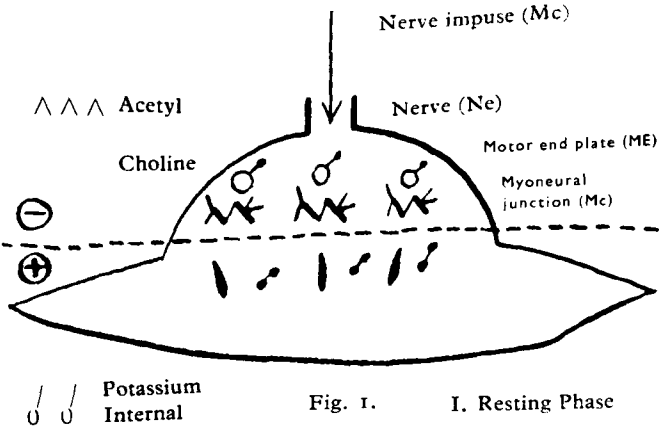


Fig. 1. I. Resting Phase
K internal and Na is external.

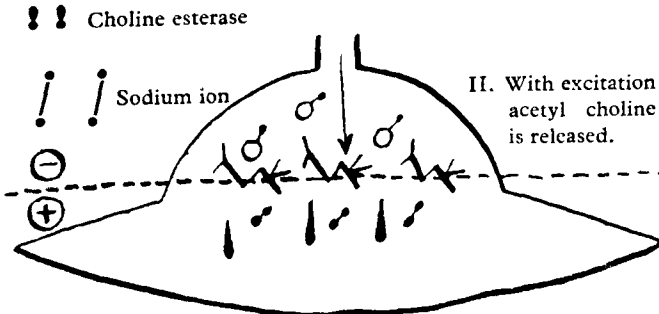


Fig. 2. II. With excitation
acetyl choline is released.

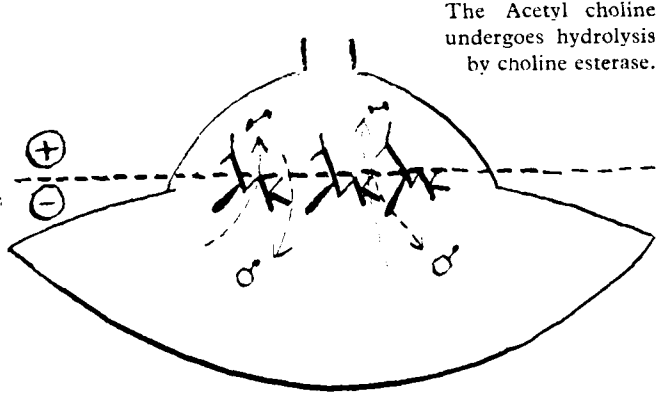
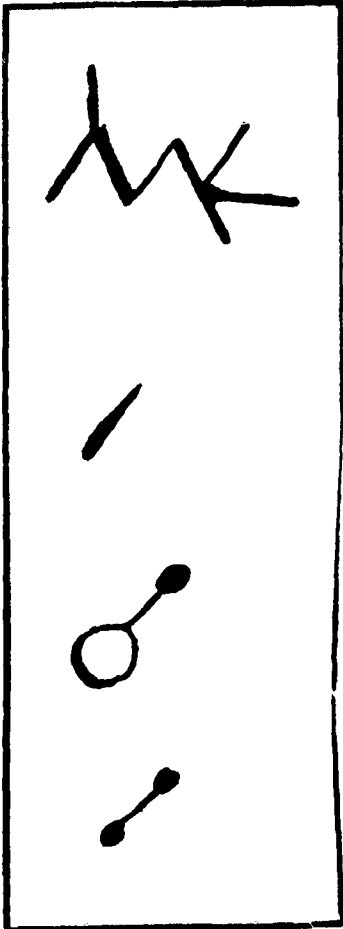


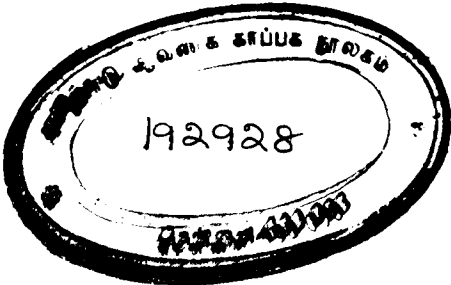
Fig. 3.



KEY

III. The membrane becomes permeable to Sodium and Potassium with reversal of the electrical potential.

The Acetyl choline undergoes hydrolysis by choline esterase.



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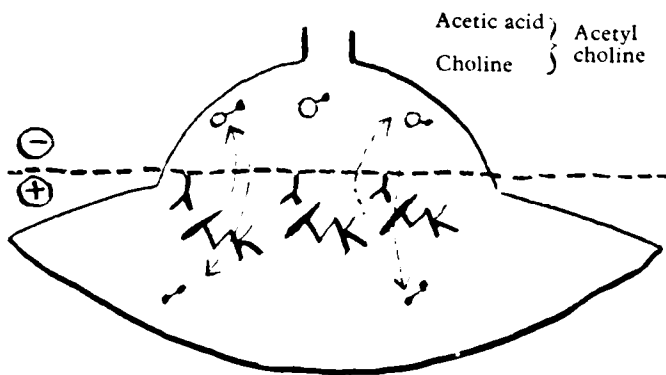


Fig. 4.

This process is helped by

1. Choline Acetylase
2. Acetyl Co A
3. Pantothenic Acid
4. Potassium.

MYASTHENIA GRAVIS

Incidence:—Age: Between 20 and 30 years. It is more common in females than in males. The onset is insidious. Two types of symptoms of paralysis may be noted. (1) Fatigue paralysis (2) Permanent paralysis.

Muscular Fatiguability and weakness:—The fatigue paralysis is well seen in the commercial traveller dragging his legs and the lecturer's voice falling into a whisper at the end of the discourse. The fatigue paralysis disappears after a night's rest, but reappears again after fatigue.

Permanent paralysis is found in the ocular and facial muscles. The permanent paralysis are ophthalmoplegia and ptosis. The pupils however react normally. The weakness of the facial muscles produces a characteristic myasthenic smile, the angle of the mouth is drawn and produces a kind of nasal snarl.

Pathogenesis:—(1) Insufficient release of acetyl choline at the myoneural junction (2) Excessive destruction of acetyl choline by choline-esterase, (3) the presence of abnormal curare like substances which hampers the access of the muscle fibres to the normally released acetyl choline.

Morbid anatomy:—The individual muscle fibres remain normal but in 50% of cases there are collections of lymphoid cells in the muscle fibres called lymphorrhages. The thymus gland is enlarged. Thymomas are present in 50% of cases.

(Continued on page 53)

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Diagnostic tests:—(1) Jolly's myasthenic reaction. (2) Prostigmine test. (1) Jolly's myasthenic reaction. There is rapid tiring with maintenance of the faradic stimulus or on quick repetition of individual shocks.

Prostigmine test:—The administration of 4 cc. (2 Mgm.) of prostigmine with Atropine 1/100 grain time. Dr. Tether used intravenous Neostigmine without Atropine producing a result in one or two minutes and with no untoward results.

Myasthenic crisis:—The inability to maintain pulmonary ventilation despite increasingly large doses of neostigmine due to weakness of the respiratory muscles and also weakness of the Pharyngeal and laryngeal muscles. This state may be precipitated by an over dosage of neostigmine which produces a directly opposite result. The patients not responding to repeated dose of neostigmine and showing inability to maintain proper ventilation may be withdrawn from neostigmine and placed in a respirator after an effective tracheotomy is done. The rationale of therapy are four fold. They are:— (1) Neostigmine is incapable of maintaining vital respiration (2) The drug may produce further neuromuscular block (3) The parasympathomimetic action enhances the secretions of pharynx, trachea and bronchi (4) The minimal response may produce breathing out of phase. The treatment is palliative and symptomatic.

Mental and physical rest are sine-qua-non. The use of massage, exercises and electrical treatment are useless and may do positive harm.

The attention to feeding without much chewing and swallowing needs care.

Medicinal treatment:—(1) Dr. Miss Edgeworth, who herself suffered from the disease, took $\frac{3}{4}$ grain of Ephedrine daily for 3 years with benefit. The side effects are sleeplessness anxiety, palpitation and disturbances of micturition.

(2) Guanidine in doses of 0.5 to 1 gram produces symptomatic relief. It has no anti-choline esterase action.

(3) **Anti-choline-esterase drugs:**—(a) Neostigmine 15 mgm. tablets and Neostigmine methylsulphate 0.5 mgm. ampoule. The average dose per day is 10 tablets spaced and at intervals. The side effects are cramps, excessive salivation, pressure behind the eyes, nausea and vomiting, diarrhoea and twitching of the muscles. The antidote is Belladonna 5 mgm thrice daily.

Amoebic Liver Abscess With Two Case Reports

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THE incidence of amoebic infestation is very prevalent in this state. The incidence of hook worm infection among the hospital cases studied in the Assam Medical College Hospital is 20.14 p.c. (1). In the year 1954 and 1955 under the Department of Clinical Medicine of the Assam Medical College 410 females and 1550 males were admitted, and treated; out of which 46 females and 170 males were diagnosed as a case of chronic amoebiasis, and hence the incidence become near about 10.97 p.c. in case of male and 11.2 p.c. in case of female. "The females are perhaps, less liable to amoebic dysentery" (2) but in this hospital the male and the female suffer almost equally. These data are not the true data for the whole of the state as many of the cases are treated from out patient department of the hospital. Though the incidence of intestinal amoebiasis is quite high the incidence of amoebic liver abscess—excluding the pre-suppurative stage, the amoebic hepatitis—is not very common. During these two years only 2 females and 6 males were treated as a case of amoebic liver abscess. In America the amoebic infection of liver studied in from the necropsy of 1529 ranges from 22—59 p.c., the average being near about 40 p.c. and in the non-fatal group the amoebic liver abscess varies between 15 to 21 p.c. In general in America the incidence of amoebic liver abscess varies between 2 to 20 p.c. in the living and 15 to 59 p.c. in the dead. Brown and Hodgson's observed the incidence of liver abscess only to be 2 to 3 p.c. whereas Ochner and De Bakey found 4.8 p.c. of hepatic abscess

from 9696 published cases of clinical amoebiasis. (3). The percentage of liver abscess in male is as high as 97.3 among the Indian males. (2). The high preponderance among the males is explained by the fact that the males take more alcohol. The intake of alcohol may one of the predisposing causes of the amoebic liver abscess but not the only cause; and the more reliable explanation for this high incidence might be that the male works more in the out door and thus gets the more chance of amoebic infection. Ludlow has observed the incidence of liver abscess in the female to be 9.16 p.c. in Korea where the female also works equally with the male outside, and thus gets the more infection of amoebiasis. Our data in this hospital is rather low in comparison to others. In case of male the incidence comes to 2.8 p.c. and in case of female it is .93 p.c. from the total cases of amoebiasis. The amoebic hepatitis has not been included in this series of liver abscess.

The mortality due to amoebic liver abscess was 0.6 p.c. in 1894 among the Indian army and 7.4 p.c. among the British army. (4). After the improvement of general medicinal care the mortality rate must have come down and none among these 8 cases during the two years period expired in our hospital.

The Ent, *Histolytica* may reach the liver in 3 different routes, viz:—

(a) Through the portal vein—perhaps the commonest route. The abscess originates in the

(Continued from page 52)

In an emergency the intramuscular administration of Neostigmine methyl sulphate is useful.

(b) *Di-isopropyl fluorophosphate* :—(D.F.P.) Intramuscular injections of D. F. P. of 2 to 3 mgm. produces effects for 24 hours. Daily 0.5 to 2 mgm. may be given in myasthenia gravis.

(c) *Hexaethyltetraphosphate* (H. E. T. P.) The dose 0.86 mgm. per kilo of body weight at 3 day interval. The toxic effect of D. F. P. and H. E. T. P. included muscarinic acid, nicotinic acid and central nervous effects.

(d) T. E. P. P. or Tetraethylphosphosphate. The effects are as good as Neostigmine. After an initial dose of 10 mgm. parenteral give a maintenance dose of 4.8 mgm. parenteral or 16 mgm. orally.

Surgical measures in myasthenia gravis:—The opinion is divided regarding the beneficial results of thymectomy in myasthenia gravis. The same opinion hold good regarding beneficial results of X-ray therapy over thymus gland in cases of myasthenia gravis.

REFERENCE

Pfizer Spectrum.

portal areas. The branch of portal vein becomes thrombosed and infarction takes place due to intrahepatic portal thrombosis and thus a large amœbic abscess occurs. Section of the wall of the liver abscess shows some "suppurating points that are formed by the inflammatory process spreading along the veins from the main cavity" and thus the liver substance are broken down and the abscess is formed and enlarged. A fibrous wall is gradually formed due to the inflammatory reaction and no further destruction of the liver substance takes place though the abscess may contain 6-8 pints of pus. (2)

(b) Through the bowel wall, peritoneal cavity, and the capsule of the liver.

(c) Through the lymphatic route which is still a doubtful route. (3)

As the incidence of the amœbic infection is mostly on the right half of the abdomen [caecum—87.3 p.c., appendix 33.3 p.c., ascending colon—57.1 p.c., hepatic flexure—4.7 p.c., splenic flexure—12.6 p.c., transverse colon—6.3 p.c., sigmoid colon and rectum 33.3 p.c., rectum 39.6 p.c. (5)], the liver abscess is more common in the right lobe of the liver. 70 p.c. of Roger's cases of amœbic liver abscess was single and out of these only 16 p.c. were in the left lobe. (2)

The patient may come with the complaints of pain in the right upper quadrant of the abdomen with history of diarrhoea, others with the complaint of pain in the right lower half of the chest. The diarrhoea may or may not be present in all the cases, and some patients may forget all about the past history of diarrhoea. In 20 p.c. of cases of liver abscess there is no associated history of diarrhoea. (2)

Case 1: B.D., 25 yrs., H.M., admitted on 21-1-56 with the complaints of pain in the right lower part of the chest, fever, and cough with expectoration for 3 weeks period. Fever came towards the evening and lasted the whole night without much perspiration. The cough increased at night, no hæmoptysis. Expectoration—not profuse, not foul smelling.

Bowel	regular, no history of dysentery in the past.
Appetite	poor, no marked loss of body weight.
Past and Family History	Nothing particular.

On Examination—Anæmic, Jaundice—nil.

Right half of the Chest

Bulged as a whole and intercostal spaces were full with restricted movement. Tenderness—nil, V. F.—diminished in the lower half, dull on percussion from the 2nd space downwards, breath sound inaudible in the lower part.

Circulatory System

Apex beat—about $\frac{1}{2}$ inches away from the midclavicular line, B.P.—96/60 m.m. Hg.

Other Systems—N. A. D.

Liver and spleen—not palpable.

Laboratory Findings

Hb.—45%, Total R.B.C.—2.8 mill. c.m., total W.B.C.—9,000/c.m. Poly—62%, Lympho—34%, Mono—3%, Eosino—1%, E.S.R.—145 m.m. at the end of first hour by Westergren, Blood Urea—40 mgm%.

Urine —N.A.D.

Sputum —No A.F.B. on repeated examinations.

Stool —Scanty R.W. ova,

Culture —No growth of pathogenic organism.

TREATMENT

24-1-56:—Aspiration done in the 7th space in the right midaxillary line and 200 c. c. of cream coloured thick pus with a greenish tinge was withdrawn and taking it to be case of empyema of pneumococcal origin 25,000 units of crystalline penicillin dissolved in 10 c. c. of distilled water pushed into the pleural cavity and penicillin was given intramuscularly.

The aspirated pus was sterile on culture and in spite of the administration of the penicillin the patient ran the temperature as before.

4-2-56:—Aspiration done again in the same space and about 250 c.c. of light yellow coloured fluid aspirated out and then 1 gram of Dihydrostreptomycin dissolved in 10 c.c. of distilled water pushed into the pleural cavity and the case was treated in the line of primary pleurisy with effusion with Dihydrostreptomycin and Isoniazide.

Culture of the fluid was sterile.

Patient's condition remained same.

24-2-56:—Aspiration done and 500 c.c. of light yellow coloured fluid aspirated out and 1 gram of Dihydrostreptomycin was pushed into the pleural cavity in the same manner.

Culture—sterile.

The analysis of the fluid showed—Protein—35 gram per litre, pus cells—plenty (90 p.c. Lymphocytes), A. F. D. — nil, Pyogenic organism — nil.

Patient's condition remained same except that the percussion note over the chest became slightly resonant.

27-2-56:—220 c.c. of same type of fluid was drawn out and the treatment was done in the same manner as before.

Culture — sterile.

Patient's condition remained same. From 13-3-56 the patient developed an irritating cough and on deep palpation the patient got the tenderness over the liver area but the liver still not palpable. The patient also brought out the chocolate coloured sputum in profuse amount.

14-3-56:—190 c.c. of hæmorrhagic purulent fluid aspirated out and this time no penicillin no dihydrostreptomycin was injected into the pleural cavity.

The sputum was examined for A.F.B. by concentrated method for several occasions, and also for Ent. Histolytica cyst in vein.

After aspiration the temp. came down to normal and varied between 98 to 100 F but after few days the temp. again rose upto 102 F in the evening and 99 F in the morning. The lung condition remained same.

18-3-56:—315 c.c. of light yellow coloured fluid aspirated out from the pleural cavity and again 1 gram of Dihydrostreptomycin was pushed into the pleural cavity as before.

Culture — sterile.

Patient's condition remained same.

21-3-56:—260 c.c. of purulent hæmorrhagic fluid was drawn from the pleural cavity and 1 lac of Crystalline penicillin dissolved in 10 c.c. distilled water pushed into the cavity.

Culture — sterile

Patient's condition remained same.

30-3-56:—All the previous medicines i.e. Dihydrostreptomycin, Isoniazide were stopped and Chloroquine Sulphate (Nivaquine) started with the idea that the case might be a case of amœbic liver abscess with pulmonary complications.

After the administration of the Nivaquine the temp. gradually came down and remained normal.

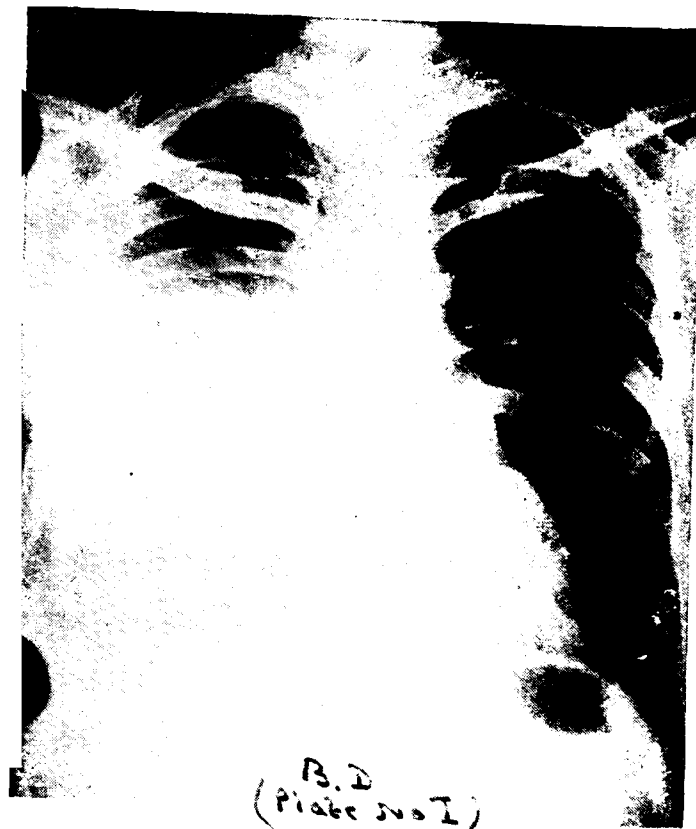
3-4-56:—Aspiration of the liver done and 20 ozes. of chocolate coloured pus aspirated out and then 1 amp. of Nivaquine was pushed into the abscess cavity.

10-4-56: Aspiration of the liver done and 6 ozes. of chocolate coloured pus aspirated out.

18-4-56:—Aspiration of the liver done and nothing came out.

The patient was discharged on 2-5-56.

The case is rather an unusual case of amœbic liver abscess. The patient did not complain of any trouble with the digestive system, and all the signs and symptoms including the X-ray of the chest were in favour of Pleurisy with effusion. There was no leucocytosis though leucocytosis is one of the main features of amœbic liver abscess for diagnosis; but "in a large single abscess the leucocytosis is not marked." (6). The patient was treated for empyema and also for primary pleurisy with effusion but with no results. The temp. ran as before and the accumulation of fluid in the pleural cavity was also very rapid inspite of all the treatment. After the administration of the Nivaquine the temp. came down and remained normal. Anti-tubercular drug stopped, no aspiration done but the lung gradually cleared up without further accumulation of the fluid in the pleural cavity. The E.S.R. has come down. In any case of amœbic liver abscess the lower part of the right chest may be dull on percussion note, the breath sound may be diminished or may be almost inaudible and some moist sounds may be heard in the right base due to compression of and often spread of inflammation to the right base (7); but there is no pleurisy with effusion. When the abscess burst into the pleural cavity there might be pleurisy with effusion and the aspirated fluid is yellow in colour resembling the fluid of primary effusion (4). Whenever the



The effusion in the right half of the chest seen.

amoebic infection spreads into the lung the sequences that may take place are—(a) pleurisy with the hazy diaphragm and clouding of the costo-diaphragmatic sinus on the right, (b) penetration into the lung with clouding of the base of the lungs resembling that of basal pneumonia, (c) pulmonary abscess with cavity that may be mistaken with the pulmonary tuberculosis (8). Marshall and Perry have described that pleural effusion may be the only presenting feature of sub-diaphragmatic abscess or in hepatitis (with or without abscess) and this type of pleural effusion has been termed as sympathetic effusion (9). The cytological examination of such fluid will be same as that of tubercular effusion (9).

The case towards the later part brought out chocolate coloured sputum due to involvement of the lung proper by the amoebic infection.

Case 2:—S. M. 40 years, H. M., referred to this hospital from the local Railways Hospital on 29-4-56 with the complaints of fever, cough with expectoration and pain in the right lower part of the chest for 3 months. The patient developed jaundice for 15 days.

The patient was in little delirious condition and so the detail history could not be elicited. In the Railway Hospital the pleural cavity was aspirated and about 1/4 sr. of thick pus drawn out.

On Examination:—Patient was in toxic condition, dehydrated, and with marked jaundice and emaciation. Skin showed subicteric tinge, clubbing of finger—tendency, B. P. 86/56 m. m. Hg.

Abdomen:—Right upper half—slightly bulging with restricted movement, muscular guard present, tenderness—present, dull on percussion, the dull note was continuous with the liver dullness.

Liver:—2½ fingers palpable below the costal margin, tender, regular, smooth, and firm.

Spleen:—not palpable.

Chest:—Right lower half—slightly bulging, the inter-costal spaces were full, movement—restricted, trachea—deviated to the left, apex beat—about ½ inch lateral to the midclavicular line, dull on percussion from 2nd space downwards, breath sound inaudible from 3rd space downwards.



The abscess cavity of the liver is shown with arrow marked after aspiration and filling the cavity with air.

On admission N.A.D.

Lab. findings:—Hb. 60%, T.C.—7,500/c.m., Polymorpho—15%, Mono—2%, Eosino—4%, Urine—no abnormality detected, Stool—N.A.D.

Treatment

(a) 5% dextrose saline I.V. started.

(b) Nivaquine in usual dose.

(c) Quinambicide—2 tabs. T.D.S.

(d) Liver Extract—2 c.c. I.M. on alternate date.

(e) Aspiration done in the 4th space in the right side and 600 c.c. of chocolate coloured pus aspirated out.

Pus—sterile on culture.

The patient expired on 3-5-56.

POST-MORTEM EXAMINATION

Right pleural cavity:—Parietal pleura was very much adherent with the chest wall, thickened, Visceral pleura very much thickened. About 2 pints of chocolate coloured purulent fluid present.

Left side:—No adhesion, no cavity, no fluid.

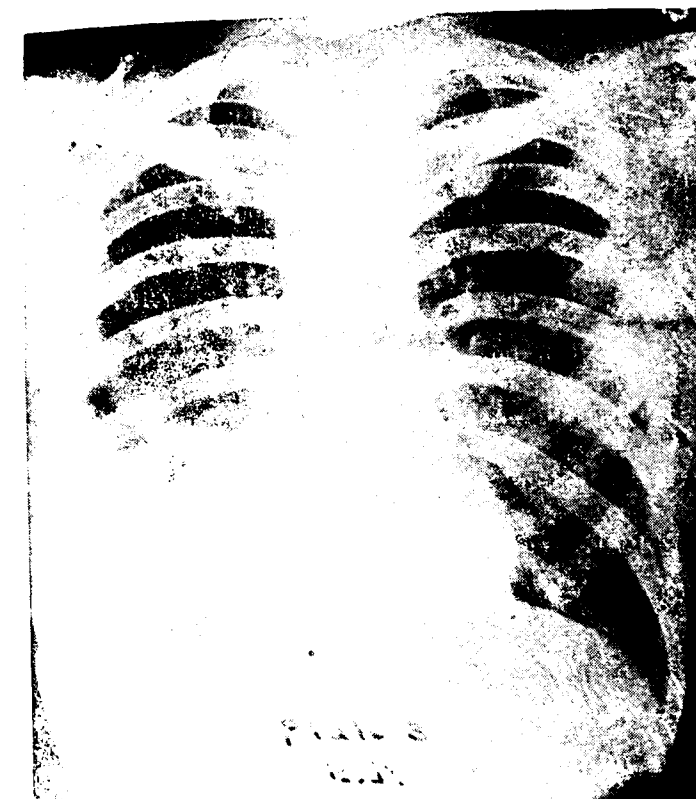
Lungs:—Right lung collapsed with an abscess cavity at the base. The abscess was ragged in appearance and was in continuity with the bursting abscess of liver.

Diaphragm:—There was a rent at the dome of the right diaphragm through which the abscess in the liver is in continuity with the right pleural cavity and abscess at the base of the right lung.

Colon:—There was small ulceration in the lower part of the colon—sigmoid colon—the ulcers looked flash shaped.

Liver:—There was a big abscess at the right lobe of the liver, occupying almost the whole of the right lobe about the size of No. 1 football. The abscess gave away at the superior part which was in contact with the dome of the diaphragm. The abscess was ragged in appearance. There were two other abscesses one at the left lobe, another at the caudate lobe, smaller in size than the abscess in the right lobe.

Spleen:—Soft, no abscess.



The abscess cavity is still seen but much reduced. The lung field is clear. No fluid in the pleural cavity, no thickening of pleura.

The clinical diagnosis—right sided empyema due to bursting of the amoebic liver abscess was confirmed.

The marked feature of the case was its well marked jaundice. Though the authors (6), (10) described that jaundice never occurs in amoebic liver abscess and frank jaundice is rare (7) but in actual practice clinical jaundice is seen in 15 p. c. of cases, "Jaundice is present but not intense in 35 p. c. of cases." The icteric index though not determined in this case but it may be as high as 70 also (3). The deep jaundice in the amoebic liver abscess is caused by the pressure of an abscess in the caudate lobe on the common bile duct (4) and in the 2nd case there was an abscess in the caudate lobe.

SUMMARY

- (1) The percentage of amoebiasis studied from the hospital cases is as high as 10.97 and 11.2 in case of male and female respectively. The incidence is little high in case of female unlike the observation of the other authors. The incidence of amoebic liver abscess is 2.8 p. c., and 0.93 p. c. in male and female respectively.

Tuberculosis and The Socio-Economic Set-Up in India

By DR. B. B. RAI, M. B., B. S., O. B. (St. J.)

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INTRODUCTION

RENASCENT and resurgent India today is facing many tasks of National reconstruction, but hardly any of them is more urgent or more vital to her future and present well-being than an effective control over Tuberculosis havoc.

Tuberculosis is a baffling problem, which is responsible for heavy mortality and morbidity in our country. Luckily, it is receiving active consideration of the Government, which is always trying to find ways and means effectively to control this scourge. The research workers are also out to discover or invent such specifics as may control this disease. The economic and social conditions in our country besides other factors, are heavily responsible for the high incidence of this dreaded disease. It thus becomes necessary for us to deal with the socio-economic conditions in their relation to Tuberculosis.

Tuberculosis formerly used to be regarded as second to malaria in its terrible ravages, but now, in spite of modern researches, Tuberculosis is responsible for heavier mortality than Malaria which is supposed to have been brought under full control by modern scientific specifics. Tuberculosis is no more a problem of individual disease but has become one of public health. In our country 50,00,000 people die annually of Tuberculosis, and 25,00,000 people are suffering from this disease at any time, and of these sufferers about 90% are mixing freely with other healthy persons and thus facilitating the spread of the disease. However, a majority of villagers, it has been noticed, suffer from the disease insidiously, and neither come under observation nor are diagnosed as cases of T. B. in the later stages. Indigenous medical practitioners carry on treatment under the identity of ordinary type of fever, not knowing that the disease is burrowing fast and the patient will soon perish.

We can study the disease under the following heads:—

EARLY DIAGNOSIS

It is essential that certain measures be taken either on Government level or on semi official level, for out line

examination of school children and of the general public, either by mass X-ray examination, or by tuberculin test, or by allied methods, to spot out the early cases. Facilities should be provided for suspected cases to get themselves diagnosed at the cheaper rates. As clinical and X-ray examinations in our country are not cheap, most patients avoid proper diagnosis because of financial difficulties. It will not be out of the way to state that early signs and symptoms of the disease are very vague, viz., feeling out of sorts in the evenings, loss of appetite, lack of interest in work, or slight persistent cough or low temperature. Any of these states require regular and thorough examination.

CAUSES OF THE DISSEMINATION OF THE DISEASE

In our country, it has been noticed, patients suffering from the disease or other persons sneeze and cough with out covering their noses or mouths, or spit on the road or in public places indiscriminately, and thus disseminate the disease. If these social offenders could be so educated as to spit only in a proper spittoon or other proper place or receptacle, it is expected that the chances of infection could be brought down to a considerable extent.

SOCIAL CAUSES

Among many social causes, early marriages, excessive sexual indulgence, lack of birth control, general poverty and insufficient nourishment, the prevalence of and apathy towards dust and flies, lack of sufficient parks, play-grounds, airy and sunny houses, too late diagnosis, lack of proper segregation of those affected by T. B. are heavily responsible for lowering the vitality of our people, since these tax the physical capacity and limit the aspirations and mental development of people, in general, and particularly the mothers. A basketful of children cannot get sufficient nourishment or even attention of parents. They therefore grow weak, incapable of resisting any infection, and as a result fall easy victim to many diseases like tuberculosis.

The joint family system is also to some extent responsible for the spread of the disease since it gives more domestic worries to the members of the family,

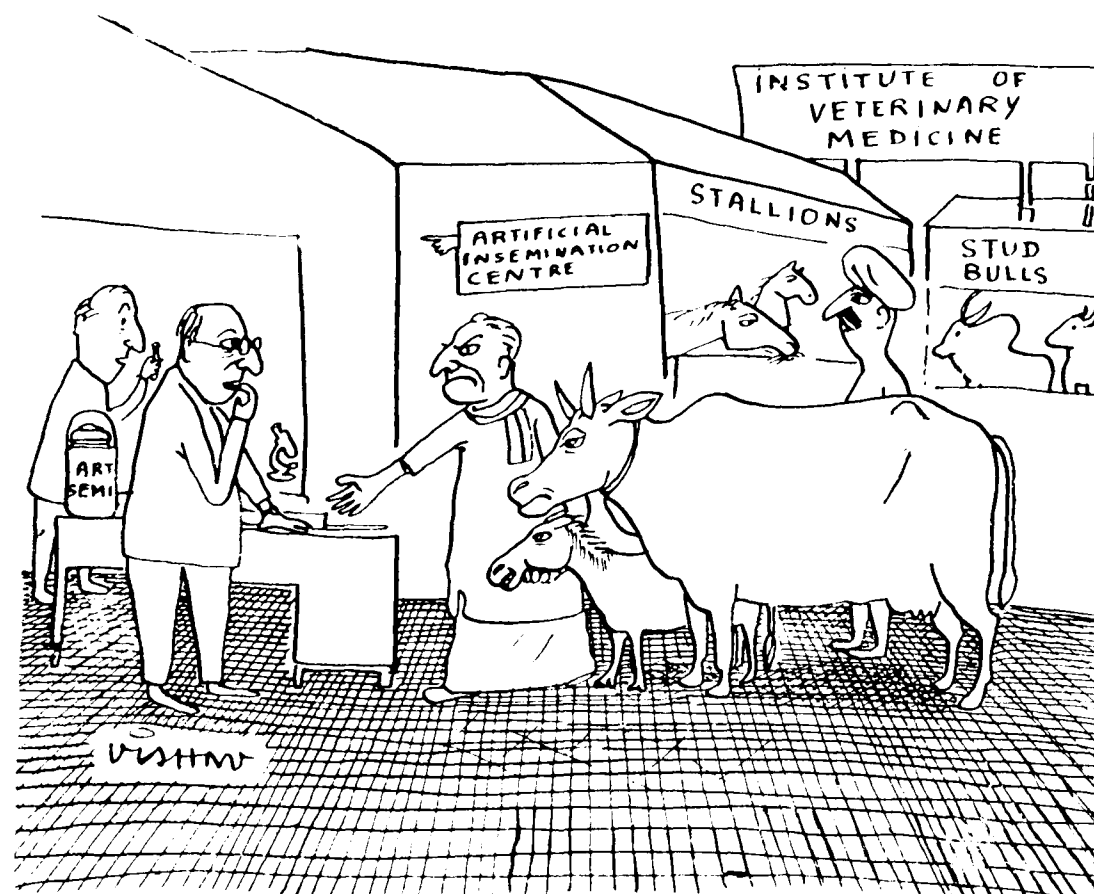
(ii) The two cases presented here are rather not very common. The first case had amoebic liver abscess with pleurisy with effusion, the effusion is a sympathetic effusion. The 2nd case had liver abscess that burst into the lung and pleural cavity. The patient had well marked jaundice which is not a very common feature. The jaundice was due to pressure of the abscess present in the caudate lobe over the common bile duct.

Acknowledgement:—My thanks to Dr. P. C. Nambiar, F. R. C. S., the supdt. of the A. M. C. Hospital for the kind permission to publish the case records. I am also grateful to Dr. M. N. Bhattacharyya, M. R. C. P. etc., the Professor of Clinical Medicine for his guidance and encouragement in the preparation of this paper.

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"I suppose we got the containers all mixed up..."

especially when they have to live in over crowded and unhygienic dwellings.

SOME COMMON CAUSES WHICH PREDISPOSES A PERSON TO THE DISEASE

Over work or strain under difficult circumstances, when a person works continuously on semi-starvation diet, or under unhygienic conditions, also predisposes him to the infection. The Great White Plague attacks the underfed and those ignorant of the spread of the infection.

DIET

Leaving aside the other causes responsible for the increased incidence of the disease, it is desirable that the important items of inadequacy of a suitable diet be discussed. In our country it is very difficult to find a cheap and well-balanced diet, which naturally should consist of proteins, fats, and other constituents. For this milk occupies an important position, especially for vegetarians. For the situation becomes still more difficult when reliable milk in adequate quantity is not available. Our cows are not tested, and milk and its products, like other food articles, when sold in the market, are not protected from outside infection.

It is unfortunate that the milk supply in India is not adequate in comparison to the teeming population, though ours happens to be an agricultural country and it becomes obligatory for us to own good livestock which can make us self-sufficient in the days of famine. It is also desirable to aim at the improvement of the breeds of livestock. Since the State Government is giving serious consideration to this problem, it is hoped that the situation will steadily become more favourable on this account.

Sir William Osler has emphasised that curing tuberculosis is simply a question of nutrition. Observations show that deficient nutrition is mainly responsible for the causation of Tuberculosis in our country. The feel disease is a deficiency disease attacking lowered vitality.

TUBERCULOSIS IN RURAL AREAS

Advanced countries like Denmark have considerably controlled the incidents of T. B. since their social set-up

and civilization have much improved. It is encouraging to note that there is a much needed awakening in the industrial sector of the country. In our country these industrial factories attract persons from villages in view of the better wages they pay. These villagers in the city live in over-crowded slums with unhygienic surroundings, and their diet is unwholesome and inadequate. These persons, further, have to work hard under difficult conditions which undermine resistance. Ultimately they succumb to the infection of T. B. and they die soon as compared to the persons who have been living in the cities since birth, as these immigrants have not developed immunity, and the infection in their case is more virulent.

Some of these villagers go back to their villages ailing with virulent type of infection, and in the absence of any preventive or curative measures become so many centres for spreading the disease among village folks.

T.B. AMONG SCHOOL CHILDREN

The Union Government is already very anxious that our children should be protected from this scourge. In our country the majority of children live in unhygienic surroundings from five to six hours a day in their educational institutions, while subsisting on an ill-balanced, poor and inadequate diet.

In order to control the disease among children, it is necessary that the children should be put to systematic routine examination at least twice a year. Suspected cases should be X-rayed and put to other tests to find out the presence or otherwise of the disease.

The present system of education needs a thorough change so that it may not put over much strain on our growing children and certain useful schemes like supplying nutritive diet, e.g. the supply of skimmed milk during the course of the school day, will certainly add to the resistance in the children against the infection of T. B. The children are made to cram up daily for some five to six hours in unhygienic surroundings, and naturally it would be useful to insist on compulsory out-door games and physical exercise in the open. Such items have been included in the curriculum, but children in the majority of cases avoid these. It should be remedied by adopting measures which can attract the children to come to the open fields to play games.

PLANNED T. B. CONTROL PROGRAMME

As stated already the inter-relationship of poverty, ignorance and disease is in no way more clearly demonstrated than in prevalence of tuberculosis. The disease works its greatest havoc among the persons who have low income. Despite higher wages in some occupations, the economic stratification of the country has not changed. Unfortunately, our country is at the bottom of the economic ladder. Ordinary home of a middle class man is miserable, ill-ventilated and is surrounded in the unhygienic atmosphere of the congested cities. Their daily diet most out of balance, inadequate and their ability to purchase health services and other necessities of life is least. No plan to rid Indian Life of tuberculosis can overlook this close alliance of poverty and disease.

Sufferers of tuberculosis in the country cannot receive treatment at the sanatorium at the state expense, because they are not enough. Arrested cases who are asked to leave the sanatorium to give room for more emergent cases, who relapse and become a problem for the community and for the public health. Consequently, we in a joint enterprise, should direct all valuable resources in a determined, systematic and continuous drive against this scourge until we have attained a final victory.

A modern concept of "Tuberculosis Control" problem is a simple as it is sensible. Cases should be detected early and patient be treated on modern technique continuously and competently. Underlying both is education. The success in this mission can only be achieved if Government and public agencies work side by side with extreme co-operation in a joint enterprise utilising joint resources. Full time medical officers to conduct an efficient and basic programme of finding out cases and follow them up. Well equipped clinics, hospitals and allied institutions and facilities for the follow-up of ambulatory patients are urgently needed in greater numbers.

More research is needed in Chemotherapy in tuberculosis and to find out a specific cure for tuberculosis;

and, finally, Epidemiological research on a world wide basis is essential. If we are to conquer tuberculosis, ultimately state need creating facilities for the care of the tubercular cases, hospitals, sanatoria, work colonies for the arrested cases and older patients with chronic diseases and the financial aid for the tuberculous bread-winners. Some system should be developed to protect the healthy population.

The importance of team work among all responsible groups, as accentuated by the shortage of sanatoria and clinic facilities and there is an acute shortage of medical and nursing staff and other personnel in hospital.

SUGGESTED PROGRAMME TO ERADICATE T. B.

1. X-Ray examination on general scale concentrating first on highly infected and their family contacts; suitable cases for B. C. G. vaccination be selected.
2. Follow up cases with infection for proper diagnosis and for proper treatment. This will include advice in clinic, hospitalisation, treatment in sanatoria, a protective supervision after discharge, and rehabilitation and, finally, proper financial aid to these tuberculous bread-winners.
3. Periodical examination of the arrested cases.
4. Prompt and early treatment of active cases which have chances of good recovery.
5. Strict isolation of open cases to prevent further spread.
6. Intensified health education activities among general population, patients and their families.
7. Extensive research on tuberculosis and control methods.

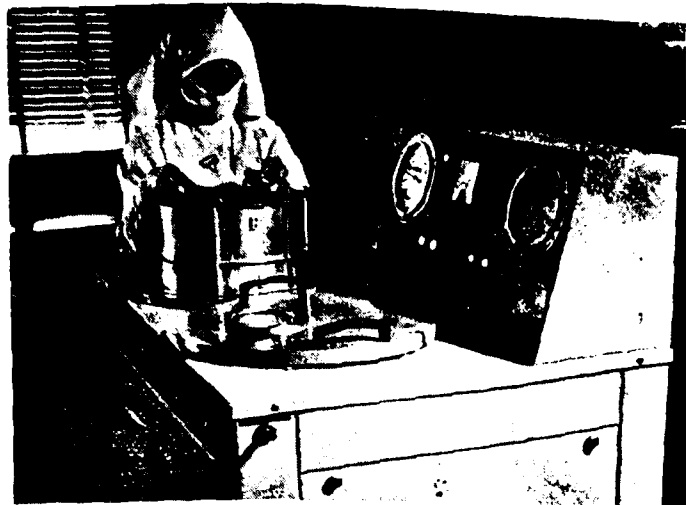
Britain Mass-Produces Freeze-Dried B.C.G. Vaccine

(FROM A SPECIAL CORRESPONDENT)

IN a new £400,000 biological research and production laboratory suite at its headquarters at Greenford, Middlesex, Glaxo Laboratories have started to produce freeze-dried B. C. G. vaccine. This is the only pharmaceutical house in Europe to make the vaccine on a mass-production scale.

The advantage of freeze-dried B. C. G. vaccine is that it can be tested for biological efficacy before it is issued for use. This had not been possible with the fluid vaccine that had hitherto been in use in many parts of the world. There is the additional advantage that the freeze-dried vaccine can be stored for at least 12 months and still maintain full activity. The fluid B. C. G. vaccine which has been in special use hitherto remained stable for only a fortnight.

B. C. G.—*Bacillus Calmette-Guerin*—takes its name from the two Frenchmen who produced the vaccine. It is a type of bovine tubercle bacillus which has lost its virulence, and which is specially bred in the



This picture taken at Glaxo Laboratories' B. C. G. Unit, Greenford, Middlesex shows: loading a primary freeze-drying apparatus with carrier containing ampoules of the vaccine.

laboratories. The vaccine now being manufactured by Glaxo Laboratories is in fact produced from sub-cultures of Calmette and Guérin's original strain.

FIGHT AGAINST T. B.

One of the significant features of tuberculosis is that its course in a human being depends largely on the degree of allergy and immunity that the patient possesses. If the immunity is low the disease can run a rapid course and terminate fatally. If immunity is high the infection can be hardly noticeable and symptoms may be entirely absent. It is known that nearly all Europeans are infected during their life-time by this symptomless tuberculosis which can be detected only by a Mantoux test. Before infection this test is negative but after infection it becomes positive. B. C. G. vaccine, which gives a similar immunity to the symptomless tuberculosis, is given only to tuberculin-negative persons.

Over 40 million people (30 million in Japan alone) have been vaccinated with B. C. G. vaccine. In Scandinavia, where tuberculosis has been a particularly acute problem, B. C. G. vaccination has long been accepted and practised and gradually the incidence and mortality of the disease has been reduced.

The manufacture of B. C. G. vaccine calls for special skills. Because the vaccine consists of living attenuated



This picture taken at Glaxo Laboratories' B. C. G. Production Unit, Greenford, Middlesex, shows: a laboratory worker cutting off the ampoules of B. C. G. vaccine from the secondary freeze-drier during the last stage of production.

(Continued on page 63)

IMPORTANCE OF BIOLOGICAL RESEARCH IN INDUSTRIAL MEDICINE

BY DR. PAUL GROSS, M. D., DR. HELMUTH H. SCHRENK, Ph. D.,
and

DR. C. RICHARD WALMER, M. D., Pittsburgh.

THE general practitioner is frequently confronted with disease entities that are characteristic of those encountered in the general population but may be of occupational origin. Unfortunately, the differentiation of occupational diseases from those that are nonindustrial is a difficult clinical problem owing to the fact that the signs, symptoms, and physical findings resulting from industrial poisons so closely imitate commonly occurring illnesses. Fortunately there are available biological laboratory procedures that can be of invaluable assistance in arriving at a final diagnosis. The tests may be used to determine (a) specific toxic substances in biological specimens, (b) metabolic or conjugated products of the toxic agent, and (c) changes in normal constituents of body tissues and fluids. The findings of tests (a) and (b) are specific, whereas the

findings of test (c) may be specific in some instances but in general are nonspecific.

The problem that confronts the general practitioner is not a simple one. If he considers all diseases as non-occupational, there may be an unnecessary delay in final diagnosis and proper therapy. Conversely, there may be a tendency for some physicians to associate too many illnesses with occupations, again delaying proper diagnosis. If there is a question regarding diagnosis, the use of laboratory tests may provide the data needed in conjunction with a careful occupational and medical history to make a sound decision. Thus the biological laboratory becomes a valuable partner of the general practitioner. It can be anticipated that there will be greater dependence upon the laboratory in the future owing

(Continued from page 62)

tubercle bacilli it is self-evident that contamination of a culture during the manufacturing process could produce very serious consequences. For that reason its manufacture has to be in the hands of those expert in vaccine production techniques, it has to be confined to separate air-conditioned laboratories and extreme precautions have to be taken to ensure that contamination cannot take place.

SURVEY OF RESULTS

What is the degree and duration of the protection given by the vaccine? Until recently no statistically perfect results had been published on the value of B. C. G. vaccine. Some criticism had been levelled at published accounts of the various trials on the grounds of inadequate control and poor recording of results. It was these doubts that may have led the Medical Research Council, in Britain, to investigate the effectiveness of the vaccine in the actual circumstances of Britain before advocating mass immunisation. Meanwhile the British Ministry of Health, pending publication of the M. R. C. trials of B. C. G. vaccination on 50,000 school-leavers

(the results expected next year) introduced a scheme for 14-year-old children who were 'tuberculin-negative' (i.e. negative to initial tests for tuberculosis). An elaborate B. C. G. vaccination trial was staged in which more than 56,000 children in the 14½-15 age group took part. A detailed check on them has so far extended to two-and-a-half years, and, in some cases, to four years. The follow-up has revealed a reduction in the total incidence of tuberculosis in the vaccinated in the course of the two-and-a-half years of something like 55 per cent compared with the unvaccinated control group.

At the same time the Ministry of Health has made B. C. G. vaccination available to such special groups as nurses, medical students, hospital workers, persons in contact with patients suffering from respiratory tuberculosis and young children of tuberculous mothers.

The duration of any acquired immunity produced by B. C. G. vaccination has still to be assessed but what is certain is that the vaccine is another powerful ally in the long fight against tuberculosis, still one of mankind's most dreaded enemies.

Pathologist (Dr. Gross), Research Director (Dr. Schrenk), and Managing Director (Dr. Walmer), Industrial Hygiene Foundation of America, Mellon Institute.

Symptoms, Signs, or Systems Affected and Diagnostic Laboratory Tests Relating to Some Commonly Used Toxic Substances

SUBSTANCE	SYMPTOMS	SIGNS	ORGAN OR SYSTEM AFFECTED	INDICATED BIOLOGICAL TESTS
Lead	Metallic taste Anorexia Weakness Weight loss Abdominal discomfort Constipation Pains in muscles and joints Irritability	Pallor Blue line on gums Muscle weakness Tremors Abdominal tenderness	Gastrointestinal Hemopoietic Nervous	Lead in blood or urine Porphyrins Blood cell counts, including stippled cells and reticulo-cytes
Mercury	Metallic taste Anorexia Salivation Sore gums Irritability Tremors Abdominal discomfort Insomnia	Stomatitis Gingivitis Fetid breath Tremors Erethism Dermatographia Pallor Psychic disturbances	Mucous membrane of oral cavity Gastrointestinal Nervous Renal	Urinalysis Mercury in urine Renal function
Chromium	Irritation of upper respiratory tract Ulcers of the skin	Characteristic skin ulcers Perforation of nasal septum Dermatitis Conjunctivitis	Skin Mucous membrane	(Environmental analyses)
Cadmium	Dryness and soreness of throat Metallic taste Cough Substernal pain Headache Dizziness Dyspnea	Pulmonary edema Tachycardia Tachypnea (Rales may not be noted until near death)	Respiratory	Blood cell count (leukocytosis, lymphocytosis)
Carbon tetrachloride	Headache Nausea Vomiting Anorexia Fatigue	Halogenated Hydrocarbons		Routine urinalysis Liver function tests Renal function tests Blood nonprotein nitrogen Blood creatinine
		Jaundice Edema of face and ankles Hepatomegaly Oliguria	Gastrointestinal Renal Hepatic	
Trichloroethylene	Dyspnea Headache Dizziness Disturbed gait Fatigue Anorexia Nausea Somnolence Numerous other subjective complaints	Tremors Abdominal tenderness Dermatitis Sluggish response to questions Diminished vision Cardiac arrhythmia (Objective physical findings scant)	Nervous Cardiac	Analysis of urine for trichloroacetic acid
Benzol	Headache Dizziness Anorexia Insomnia Weakness Fatigue Muscle cramps	Aromatic Hydrocarbons		Complete blood cell count (anemia, leukopenia) Urine sulfate ratio
		Purpura Bleeding from gums	Hemopoietic	
Aniline	Headache Vertigo Weakness Unsteady gait	Cyanosis Weak pulse Muscular tremors Brown discoloration of urine	Blood	Methemoglobin Blood cell count
Carbon monoxide	Headache Dizziness Nausea Vomiting Blurred vision	Gases		Determination of carboxy-hemoglobin
		Tachycardia Peripheral vasodilation Cherry-red color of mucous membranes Weak, thready pulse	Blood (asphyxial phenomenon)	
Hydrogen sulfide	Irritation of eyes and respiratory tract Photophobia Vertigo Headache	Reddened eyes Hyperpnea	Respiratory	(Environmental analysis for hydrogen sulfide)
Nitrogen dioxide	Cough Dyspnea Pains in chest	Pulmonary edema Peripheral vasodilation Respiratory paralysis Unconsciousness	Respiratory	Methemoglobin Chest x-ray

SUBSTANCE	SYMPTOMS	SIGNS	ORGAN OR SYSTEM AFFECTED	INDICATED BIOLOGICAL TESTS
Chlorophenothane (DDT)	Muscle tremors Tonic and clonic convulsions Hyperexcitability Anorexia	Twitching of eyelids Tremors Muscular weakness	Hepatic Nervous	Blood cell count Analysis of urine for organic chlorides Liver function tests
Organic phosphorus compounds	Tachypnea Ataxia Tremors Anorexia Nausea Vomiting Blurring of vision	Lacrimation Slurring speech Salivation Cyanosis Miosis Hypertension Tonic and clonic convulsions Hyperhidrosis	Nervous	Serum cholinesterase
Silica	Dyspnea Cough Anorexia Fatigue	Dusts Cyanosis Reduction in vital capacity Clubbing of fingers	Respiratory-cardiac	X-ray
Silicates (feldspar, talc clay)	If present, similar to silica but much milder; may result from silica contamination	Generally very few—reduction in vital capacity in advanced cases only	Respiratory-cardiac	X-ray
Coal	As for silicates (above)	Radioactive Materials Capillary fragility Petechiae Ecchymoses Hematomas Ulcers of gastrointestinal tract Anemia Loss of hair Cataracts Neoplasia	Hematopoietic Reproductive	Complete blood cell counts (anemia, leukopenia, lymphopenia) Bone marrow studies Biopsy, ionization chamber

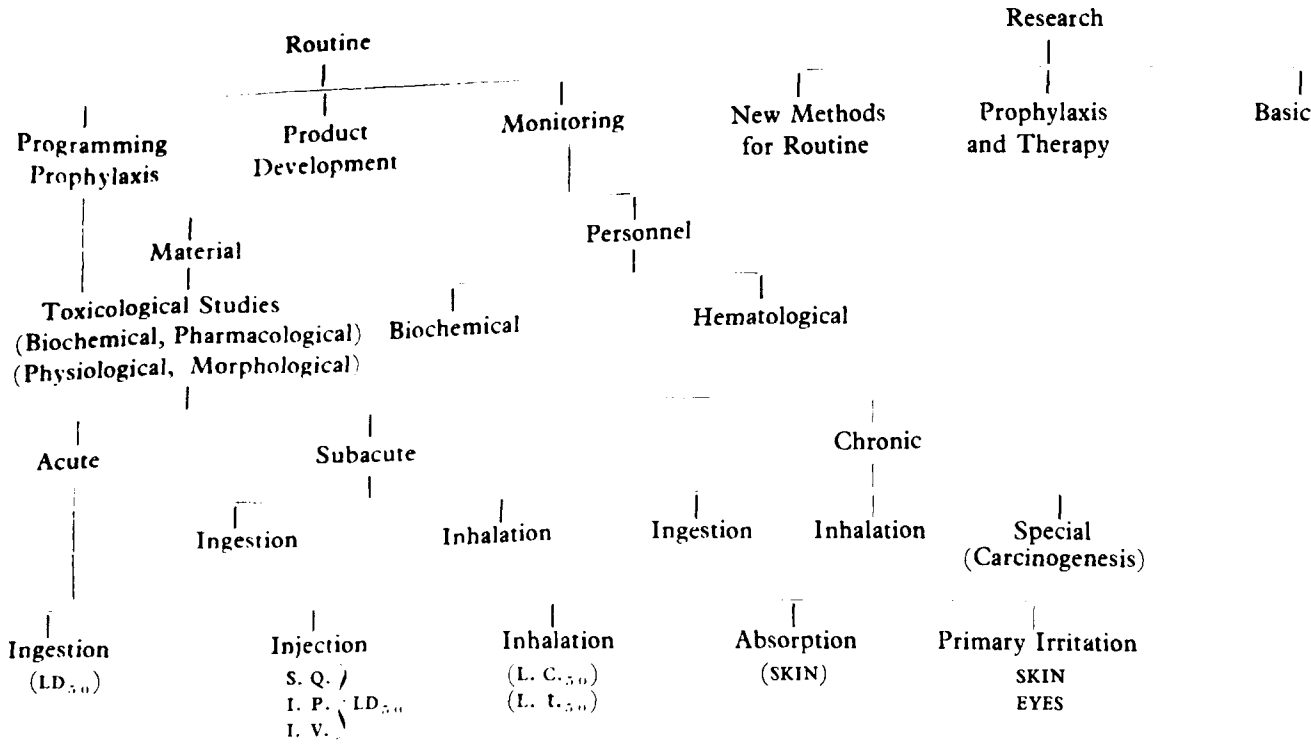
SURGICAL & MEDICAL NEWS

to the marked increase in potential contacts of the industrial worker and the general public with the myriad of new chemicals that are becoming a part of our everyday life. The table, which shows symptoms, signs, organs, or systems affected, and indicated biological tests relating to some commonly used toxic substances, presents some representative examples of

tests that are currently available.

FUNCTIONS OF A BIOLOGICAL RESEARCH LABORATORY

Most of the laboratory procedures listed in the table have originated in research laboratories. Because new



Functions of a biological laboratory as a teammate in industrial hygiene. (S.Q., subcutaneous.)

substances are materials possessing potential health hazards are coming into use (for instance, insecticides and radioactive materials), continuing research is necessary. The foregoing may serve as an offhand explanation for the existence of biological laboratories in industrial medicine. But the functions of such a laboratory outlined in the accompanying diagram indicate a scope of activities that render this explanation quite inadequate.

Virtually all the functions of the laboratory may be considered research, in that new information is made available. However, the work of the laboratory falls into two categories: one consisting mainly of routine acute toxicity and range-finding tests and the other comprising more complex investigations dealing with the metabolism of toxic agents, mechanism of biological

response, and organic and functional changes that require utilization of the most up-to-date research tools.

TYPES OF TOXICOLOGIC STUDIES

A toxicologic study, to be complete, considers three phases: the acute, the subacute, and the chronic.

Acute Toxicity.—The immediate toxicity of a single exposure or dose is determined by administration through the various routes by which a substance can gain entrance into the body. These determinations will usually categorize the substance, since there is available in the literature a considerable storehouse of data on a wide variety of compounds with which the data on a new substance can be compared. A convenient measure of acute toxicity and standard of comparison is the

LD_{50} , the dose that kills one-half of the animals and is expressed as milligrams per kilogram of body weight. Differences in the LD_{50} for the various routes are due to differences in rates of absorption, which allow for some detoxification and excretion. The differences give some indication of the pharmacological or biochemical behavior of the substance.

In a determination of toxicity by inhalation, a standard of comparison is the concentration of the gas or vapor that will kill one-half of the animals in a given time, the LC_{50} , or the Lt_{50} , the time required to kill one-half of the animals by a given concentration of a gas or vapor. Also, information on skin absorption, primary skin irritation, and irritation of the eyes can be obtained concurrently with that on acute toxicity.

Subacute Toxicity.—The subacute toxicity is represented by the reaction to multiple doses of sublethal magnitude, providing preliminary data on potential chronic effects in a relatively short period. This period is usually three to six months.

Chronic Toxicity.—In chronic toxicity, on the other hand, the study is designed to determine the subtler biochemical, physiological, and morphological changes. It is a long-term investigation generally requiring two or more years. Exposure levels may be purposely exaggerated but are sufficiently close to those likely to be encountered in the "field" or in public use to yield results simulating those that might be expected under the worst possible conditions of practical use. Chronic toxicity studies are exceedingly useful investigational procedures for another reason, since they afford an opportunity to study the mechanism by which a substance exerts its deleterious biological action and thus may provide a basis for early diagnosis of injury or a measure of excessive absorption before injury occurs.

Because diverse animal species may exhibit important differences in ability to absorb, metabolize, and excrete given substances, it is advisable to use more than one species in order to circumvent pitfalls owing to species peculiarities or anomalies. In studying chronic toxicity it is customary to use a homogeneous group of young animals of approximately the same age and weight. The chemical to be tested is mixed in a predetermined percentage with the food. The daily food intake, and hence the daily ingestion of the test chemical, is determined and recorded. Any deviation of the growth curve of the experimental group from that of an identical control group is a sensitive indication of toxicity.

The examination of blood and urine for the toxic agent or its metabolic products and the determination of biological changes of normal body constituents such as protein nitrogen and enzymes may provide early indications of toxic action. Morphological examinations of the blood of the animals may reveal the presence of anemia or granulocytopenia. Quantitative analysis of aliquot portions of various organs will yield information on the distribution and storage of the ingested chemical throughout the body. Changes in weight of organs, as liver and kidneys, in relation to body weight provide another measure of early response. Various intracellular enzymes, such as ribonuclease, lipase, phosphatase, certain proteases, and others, may be visualized by newer histochemical techniques. The demonstrated diminution or absence of certain of the intracellular enzymes could be evidence of functional cellular disturbance caused by the ingested chemical. The cumulative, deleterious effects of long-continued ingestion of a toxic chemical are often demonstrable at autopsy in gross or microscopic structural changes in one or more organs or tissues.

PULMONARY RESPONSE TO PARTICULATE MATTER

Structural pulmonary changes resulting from the inhalation of various dusts, while not strictly speaking a "toxic" manifestation, are the reaction of pulmonary parenchyma to chronic irritation by the foreign material. The potential long-term pulmonary hazard of a respirable dust may be determined in two ways, and both are usually advisable: by intratracheal injection of aqueous suspensions and by inhalation-chamber technique. The former requires no specialized equipment provided the dust to be tested is available in the proper particle size. Generally a single maximal dose is injected, but there is no valid objection to the injection of multiple doses at spaced intervals. This technique quickly overwhelms the clearance mechanism of the lungs and brings about a rapid development of the lesions that, by the inhalation-chamber technique, would arise more slowly. The inhalation-chamber technique requires specially constructed equipment for producing the desired concentration of dust of the proper particle size.

Both techniques necessitate the use of comparable control groups parallel with the group receiving the experimental dust. A positive control group is exposed to quartz dust, which produces typical silicosis, while a negative control group is exposed to a dust generally

considered harmless, such as limestone. The particle size and dust concentrations of the control dusts should also be comparable. The evolution of pulmonary lesions can be studied by killing of animals at spaced intervals. Portions of the lungs may be analyzed quantitatively for their content of the inhaled or injected dust. Sections of the lungs can be incinerated, and the distribution of the ash (inclusive of the inhaled dust) can then be determined in relation to the lesions.

RESEARCH ON HALOPHOSPHORS

A toxicologic study of several new formulations of halophosphors used in fluorescent tubes is illustrative of a typical problem. The phosphors were composed largely of materials commonly recognized to be biologically inert, but they also contained antimony trioxide, about which toxicologic information was fragmentary and inadequate. The purpose of the investigation was to evaluate the hazard, if any, of the halophosphors in their entirety and of the antimony component, in particular, to the plant personnel and to the consuming public. This investigation followed closely the pattern outlined. The results¹ provided basic information that indicated the degree of hazard that might be associated with handling the material and the type and extent of control measures needed. The report gave management the assurance that the products could be used without harm to the plant personnel or the consumer.

CARCINOGENESIS

The study of the carcinogenic potential of a substance is also not an investigation of "toxicity" but one of chronic irritation. The conventional technique consists of the repeated application, over a prolonged period, of the suspected material to the skin of susceptible mice. The tissue response may be one of hyperplasia, hyperkeratosis, papilloma formation, or the development of a frank carcinoma. The limitations of present techniques are well recognized. There is much need for research to develop additional procedures that will permit more meaningful appraisal of carcinogenicity.

PRODUCT DEVELOPMENT

Participation in product development is another important function of the biological laboratory. Many

compounds may be synthesized that represent more or less minor variations of a basically new structure. Toxicologic studies may serve to eliminate the more toxic ones, so that research activities can be directed toward the less toxic compounds. For this reason it is customary to utilize a skeletonized series of acute toxicity tests that can be completed in a relatively short time and in which a reduced number of animals is used. This technique, termed "range-finding,"² has been useful for toxicologic classification of a large list of compounds.³

BASIC RESEARCH

Basic research in industrial toxicology is just as essential as it is in any other field. Progress in toxicologic knowledge is dependent in a large measure on the new facts that come from such fundamental investigations. New and improved laboratory techniques enhance the quality and quantity of work. Newer information on the subtler functional changes provides a basis for earlier and more reliable diagnostic procedures, and hence better prophylactic and therapeutic measures can be made available. Such scientific progress is exemplified by better range-finding techniques, use of chelating agents in heavy metal poisoning, and treatment of nuclear radiation damage by certain serums or tissue extracts.

Some years ago, during a toxicologic investigation, rabbits were killed with but a few milligrams of a particular form of finely divided silica injected intravenously. Although death was recognized to be caused by pulmonary embolism (anaphylactoid phenomenon), the minuteness of the dose could not be reconciled with the extensive embolization necessary for a fatal outcome. Studies⁴ showed that a few milligrams of finely divided particulate matter could absorb up to nine times its weight of plasma protein and thereby be converted into rather bulky, sticky, aggregates. The mechanism of pulmonary embolism thus was no longer a mystery.

Another example of the problem involving the basic mechanism of occupational disease was encountered during the investigation of the previously mentioned halophosphors. When 10 mg. of an aqueous suspension of extremely fine (0.04 μ) insoluble antimony trioxide was injected intratracheally into rats, fulminating death occurred regularly even though no casualties resulted with the intratracheal injection of 7.5 times this amount of

the same material in a larger particle size. The mechanism of such deaths is not completely understood. Judging from the massive pulmonary edema that precedes and accompanies death, there is a hitherto undescribed, but basic biological phenomenon involved. We believe that this phenomenon is probably caused by an explosive change of pulmonary capillary semipermeability to permeability, due to contact of capillary endothelium with an enormous number of extremely fine particles.

COMMENT

A generalization of the role that biological research plays in industrial medicine may be stated in algebraic terms. This generalization is based on the premise that industrial hygiene is basically concerned with a special case of the general equation:

$$X \text{ Man} + Y \text{ Environment} = Z \text{ Reaction}$$

The initial objective is to evaluate the variables X and Y so that Z can be predicted. The ultimate goal is to control X and Y so that the value of Z approaches zero, and the effectiveness of the industrial hygiene team is measured by its ability to approximate this goal. The value of X can be defined in terms of present health and well-being based on a careful occupational and clinical history and a thorough preplacement physical examination. This scouting should embrace the psychic as well as the physical make-up of the worker. The value of Y can be defined in terms of the quality and quantity of the chemical or physical agent present in the environment. This value takes into account the potential organic and functional response to the agent based on past experience or on the results of laboratory investigation.

In the biological laboratory more precise values can be obtained by substituting homogeneous animal groups

An oriental ruler asked his philosopher to write him the story of the life of man. In twenty years the philosopher came back with twenty volumes. The ruler asked him to boil it down. Five years later he came back with five volumes. The ruler asked him to condense it still further. After ten years the philosopher came back with one sentence. "He is born; he loves; he dies."

for heterogeneous man and by carefully controlling the environment. The type and magnitude of reaction, Z, is studied with all resources available (biochemical, pharmacological, physiological, and morphological) to arrive at a thorough understanding of the mechanism of the reaction and its quantitative relation to X and Y.

CONCLUSIONS

A brief review of the functions of a biological laboratory shows the significant contributions that can be made to industrial medicine. Such a laboratory not only supplies the basic information on which to build adequate engineering control but it also supplies the medical profession with knowledge that is essential for continuing progress in the diagnosis, treatment, and prevention of occupational diseases.

4400 Fifth Ave. (13) (Dr. Walmer).

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(Courtesy: The Journal of the American Medical Association & Mellon Institute, Pittsburgh.)

PERSONALIA

HE FOUND VITAMIN B-1, SAVED MEN



Dr. Robert Williams.

Dr. Robert Williams, who has devoted his lifetime to research aimed at eliminating diseases caused by dietary deficiencies, was honoured recently by his associates on the 20th anniversary of his discovery of artificial thiamine (Vitamin B-1). This was also the 15th anniversary of the year thiamine was first used to enrich bread.

At the banquet in his honour attended by 136 businessmen, scientists, and members of the American Institute of Baking, Dr. Williams received a book of letters from prominent world scientists dedicated as

follows: "In tribute to him for his magnificent achievement in science and in gratitude to him for his service to mankind, these letters are offered to Dr. Robert R. Williams".

Robert Rampatnam Williams was born on February 16, 1886, in Nellore, Andhra Desa, of American missionary parents. At the age of 10 he was brought to America, where he completed his schooling. In 1908 he received a master of science degree in chemistry, and went to the Philippine Islands to work. After a brief period of teaching, he did chemical analysis and research with the Bureau of Science in Manila. It was there that he became concerned with the many cases of beriberi among people whose diet consisted mainly of polished rice. He found that by administering a small quantity of rice bran concentrate to victims of the disease he was able to cure them. Something in the unpolished rice was proving beneficial, and the long research for this substance eventually led to his discovery of Vitamin B-1.

Back in the United States in 1915, Dr. Williams resumed his research to isolate the pure vitamin, first through his own efforts, and later with the assistance of such scientists as Robert Waterman and E. R. Buchman. By 1933, he succeeded in identifying Vitamin B-1, and three years later he determined its structure and made the synthetic product.

Eager to have his research benefit mankind, Dr. Williams established the Williams-Waterman Fund for the Combat of Dietary Diseases, and set aside most of the royalties from his discovery for additional research.

In a further effort to make the benefits of his discovery available to mankind, Dr. Williams promoted, through the Food and Nutrition Board of the U. S. National Research Council, the use of thiamine in wheat flour.

After additional years of research, he finally began an experiment on 70,000 people in the Philippines. Called the "Bataan Experiment," it was the largest ever conducted on human beings. He supplied these people with enriched rice for two years, and at the end of that period noted a 90 per cent. drop in the occurrence of beriberi.

With this success to his credit, Dr. Williams felt that even more people should be permitted to benefit from his discovery. In 1950 he made a six-month tour of Far and Near Eastern countries in an effort to persuade governments to adopt his vitamin-fortified rice programme. He visited India, Burma, Malaya, Indonesia, Japan, Pakistan, and Thailand.

* * * * *

INDIAN SCHOLAR JOINS CANCER RESEARCH TEAM

Dr. R. N. Prasad, research chemist, arrived in Las Vegas recently to begin work on the cancer research programme at the Highlands University campus.



New Member in Highlands University's chemistry department faculty and researcher on the important cancer investigation team is Dr. R. N. Prasad, right, with his Ph. D. degree from Emory University. With him is Dr. Roland Robbins who directs the activities of the \$40,000 a year cancer research operation that receives its funds from such organizations as The American Cancer Society, Sloan-Kettering Cancer Foundation, Parke-Davis Company, The National Institute of Health, and The Damon Runyon Cancer Foundation.

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Dr. Prasad, who received his Ph. D. from Emory University in 1955, came to the United States in 1951 from India, where he taught in Patna University.

The addition of Dr. Prasad to the cancer research project provides a team that includes Dr. Roland Robbins, director of the project, Dr. C. C. Cheng, a native of China, as well as six graduate assistants. Included in the latter group is Miss Sabiha Thannoun, who came to the United States from Iraq to continue her graduate work.

The project, which has already secured encouraging results in the war against tumour growth, is financed by grants from the American Cancer Society, the Damon Runyon Foundation for Cancer Research, the Parke-Davis Company, the Sloan-Kettering Institute, and the National Institute of Health. Additional help has come from the state organization of the Order of Eastern Star for the purchase of equipment. Approximately \$30,000 will be available for the project this year, Dr. E. Gerald Meyer, head of the department of chemistry, has announced.

The modestly quiet Dr. Prasad first became interested in chemistry during his high school days when he and his classmates were invited to attend lectures on the subject. Later, he was to receive his B.S. and M.S. degrees from Patna University.

Dr. Prasad expressed delight at being at Highlands University and thinks that the team he will work with is made up of one of the finest groups of people that he has ever known. He also said that he was going to have to get accustomed to the dry, arid Southwest, a country, far different than what he had known in India.

* * * * *

DOCTOR ENVISIONS AN ACADEMY TO COMBAT EYE DISEASES

An American ophthalmologist is acting on his own initiative to interest fellow workers of his profession in India and other Asian countries in the formation of a regional Asia-Pacific Academy of Ophthalmology for a united fight against eye diseases.

Dr. William J. Holmes, a practising ophthalmologist in Honolulu since 1938, has long been active in helping to reduce the incidence of eye diseases in Asia as he



Dr. William J. Holmes.

travelled through India, Ceylon, Japan, Thailand, Malaya, Australia, and New Zealand.

In 1952, he was a visiting professor of ophthalmology at the Christian Medical College in Vellore, Madras. Later the same year, he made a lecture tour which included visits to medical schools, hospitals and medical societies in the principal cities and many villages in India and in a large section of Southeast Asia.

The Watumull Foundation of Honolulu, which sponsored his trip, has donated four beta-ray applicators, equipment developed as a part of the peaceful uses of atomic energy programme, to medical teaching centres in Calcutta, Bombay, Madras and Bilaspur. All qualified oculists in these localities are given access to the applicators that are especially valuable for the treatment of eye diseases in India where the number of blind is estimated at 2,000,000.

Already, he has written to ophthalmologists in India, Indonesia, Australia, Japan and the Philippines about the

formation of a regional Academy of Ophthalmology. Leading ophthalmologists have indicated interest in such an organization that would meet once a year in different Asian countries.

TEN-WEEK TOUR OF ASIA

Dr. Holmes made a ten-week tour this summer under the sponsorship of the Civil Affairs and Military Government of the U. S. Army to consult members of his profession in a number of Asian countries. His itinerary included Japan, Korea, Okinawa, Formosa, and later he will go to Brisbane, Australia, to speak at the invitation of the Australian Ophthalmological Society.

Dr. Holmes envisions the formation of an institute as part of the academy in one of the Asian countries where trained workers could teach and conduct research for all the member countries. It would serve as a training station for prevention, treatment and dissemination on matters that transcend national boundaries.

"For example, ophthalmologists from Japan can share their information as to how they have reached success in their treatment of trachoma with other members, while Indian physicians could report on their advancement in their skilful battle against cataracts," Dr. Holmes explained.

With regard to research for the proposed academy, Dr. Holmes cited as an example that there are still many important questions that remain unanswered about trachoma. Some of these are whether or not children are more susceptible than adults, to what degree are infectivity, clinical development and duration of the disease affected by ocular traumatism or by superimposed infection, and are there persons who are partly or entirely resistant to the disease?

Among the many recommendations made by the World Health Organization's Expert Committee on Trachoma, a part of a United Nations specialized agency, was the establishment of an ophthalmological centre for trachoma control. Dr. Holmes pointed out that such a centre could become the training station for the prevention, treatment, research and dissemination of information on trachoma.

A MECCA FOR PHYSICIANS

"It is not too far-fetched to assume that eventually such a centre might become the focal point for the prevention and treatment of other than infectious eye diseases and might evolve into an Asia-Pacific Institute

(Continued on page 74)

MEDICAL NOTES & NEWS

MODERN WATER TREATMENT—
LABORATORY AND EXPERIMENTAL FILTERS

BRITISH Berkefeld Filters Ltd., (Sardinia House, Kingsway, London, England) are manufacturers of water treatment and filtration equipment suitable for every type of chemical and industrial requirement, including medical and experimental filters.

Essentially the filtering medium of the 'Berkefeld' filters is in the form of hollow candles of various sizes made of Kieselguhr, which on account of its enormous porosity is an ideal filtering medium. The candles are completely closed at one end, and the other end is fitted into a metal or porcelain mount. The water passes through the walls from outside to the inside leaving all

impurities on the external surface and then out through the small aperture of the mount.

One of the firm's latest developments is a self-sterilising candle, the 'Sterasyl' which is a great advance on all former types of Kieselguhr candle.

It is well known that with the standard filter candles frequent boiling is essential if the germicidal qualities are to be maintained. The new candle not only acts as an efficient filter, but sterilises as it filters, thus providing a complete safeguard against waterborne contamination. Germs are both trapped and destroyed on the exterior surface of the candle, and filtered water can therefore be stored and will remain pure for lengthy periods. The candles too will last for a long time without renewal and for cleaning purposes all that is necessary is to wash

(Continued from page 73)

and Academy of Ophthalmology," Dr. Holmes states. "It could serve as a mecca for post-graduate instruction to eye physicians from countries bordering the Pacific and Indian Oceans and perhaps for physicians from all over the world."

Early this year, the All-India Ophthalmological Society representing eye physicians throughout India officially endorsed and requested that the Health Minister of the country take steps for the establishment of an eye institute in India that might serve for practical application throughout Asia of present-day medical discoveries and newly gained knowledge.

In a resolution adopted by the Society, it was pointed out that eye diseases with consequent blindness are extremely prevalent throughout Asia and especially so in India where they rank second among all diseases affecting the population.

It was resolved that the United States Government through its various departments and agencies be asked to help in the formation of an Asian eye institute with technical and financial support.

Another project that Dr. Holmes plans to weld together Asian ophthalmologists is compilation of a book

on tropical eye diseases. During his tour this summer, he plans to ask leading eye physicians to contribute material and he is asking ophthalmologists in other countries to co-operate.

Dr. Holmes, who has established an outstanding reputation in his field, was graduated from the University of Chicago and from Rush Medical College in Chicago, Illinois. He served as a resident physician with Chicago hospitals from 1933 to 1937 when he went to Honolulu to take up private practice. He is also attending eye surgeon at a number of hospitals and institutions in Honolulu and is civilian consultant in ophthalmology at Tripler Army Hospital. In previous years, he has served as a consultant to the 14th United States Naval District and to the U. S. Surgeon General with an assignment to the Far Eastern Command in the Tokyo General Hospital.

In 1950, he was delegate from Hawaii to the 16th International Congress of Ophthalmology in London and four years later was in charge of overseas visitors from Asia at the 17th International Congress of Ophthalmology in New York City. He has written about his work for many medical publications and also served as news editor from Hawaii of the *Journal of the American Medical Association* and as associate editor of the *Hawaii Medical Journal*.

them occasionally with a soft brush in clean water. No soap or detergent should be used.

Filters are available for sterilising liquids and are specially suitable for those containing bacteria. They yield a clear sterile blood serum, and from fresh milk give a perfectly clean colourless milk serum free from fat. These laboratory filters are available in four sizes, with capacities of 100, 200, 250 and 750 c.c. respectively. The length of the candles being 4", 8", 10½" and 11", and the diameter 1¼", 1½", 1½" and 2¾".

REHABILITATION OF THE DISABLED
IN INDIA—BRITISH EXPERT TO ADVISE

Mr. Albert Whiffing, chief technical officer of the Limb Fitting Centre at Rotherhampton, in Britain, has accepted an appointment from the UN Technical Assistance Administration as an expert to advise on the rehabilitation of the physically handicapped in India.

The appointment, made at the request of the Government of India, is part of the programme of the UN and its Specialized Agencies for raising living standards,

promoting better health, and solving development problems. Mr. Whiffing is expected to take up his duties about October 15. His appointment is for one year.

During his stay in India, Mr. Whiffing will be a member of a team working in Bombay in connexion with a demonstration project sponsored by the Central Government, the State Government, and the Corporation authorities, with assistance from the UN and the World Veterans Federation. He will help in organizing and supervising the production and fitting of braces and orthopaedic appliances, assist in training local people, and advise on the improvement of prosthetic services.

Two other British experts, Dr. Kurt Billig and Mr. Harry R. Rodgers, have accepted appointments from the UN Technical Assistance Administration to advise on the development of water resources in Pakistan.

WORK OF BRITAIN'S COASTAL RADIO
MEDICAL SERVICE

Big ships carry doctors, but small vessels do not, and these small vessels are the great majority. When

Body Building through Nutrition

Where selective, adequate nourishment is indicated for overcoming low vitality, debility and malnutrition, Alembic SHARKOFERROL is the rational choice.

COMPOSITION

Each 30 c.c. (fl. oz. 1) of sharkoferrol represents:-

Vitamin A (from 2.4 c.c. of Shark Liver Oil approx.)	25,000 I.U.
Vitamin D	5,000 I.U.
Saccharated Oxide of Iron N.F.	3.55 G. (55 gr.)
Hypophosphites of Lime, Sodium & Potassium B.P.C.	0.8 G. (12½ gr.)
Vitamin B ₁ B.P.	3 mg.
Vitamin B ₂ B.P.	2 mg.
Niacinamide B.P.	40 mg.
Copper & Manganese	Traces
Palatable base enriched with flavoured Malt Extract	q.s.

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YOU CAN PUT YOUR CONFIDENCE IN ALEMBIC

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someone aboard one of these smaller ships falls ill, or has an accident, it is an added anxiety for the Master.

If he is a British captain, he has a medicine chest designed by experts, and a simple Medical Guide, supplied by the Ministry of Transport, and he often has considerable experience, but all this falls far short of having a doctor available.

Today, any ship, however small, that has radio, can call on expert medical advice instantly if it is within 300 miles of the British coastline, thanks to a remarkable service provided free of charge by the British Post Office, in collaboration with the Ministry of Health.

CONSTANT LISTENING WATCH

A dozen Post Office radio stations around the shores of Britain maintain a constant listening watch, 24 hours a day, for requests for medical advice from ships within this range, and one station at Potishead, in Somerset, can cope with appeals from much farther afield; it often receives calls from ships away out in the Atlantic, or in the Mediterranean.

The code word for this service is "Medico", and every station has a regular medical "contact"—a local hospital or a doctor in private practice—with alternative contacts in case the first is not immediately available.

If the ship has a radio telephone, the operator asks if the master would like to talk directly to the doctor, in which case he is connected through the local telephone exchange like any caller ashore.

If the ship has only wireless telegraphy, the coast station operator notes down the morse message and telephones it to the doctor. If the doctor wants further information, the operator radios the questions to the Master at sea, and telephones the answers to the doctor. Finally, the doctor gives his advice about treatment.

Where the case is grave or diagnosis at long distance especially difficult, the doctor will advise the Master to put into port as soon as possible. But in the majority of cases the doctor is able to give advice at once.

INFINITE VARIETY OF CASES

I visited one of these coast stations to see the "Medico" system at work, and there and at Post Office Headquarters in London, I studied the files of hundreds of cases.

Their variety was infinite. One seaman could not stop the bleeding after a tooth extraction at the last port

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of call. Another had swallowed a nail. Another had severe stomach pains. A fireman had fallen 20 ft. on to an iron deck. A child had developed an ominous-looking rash that turned out to be chicken-pox. A seaman appeared to the captain to be "willing himself to die". Under the doctor's advice he was induced to eat and take medicine, and he quickly recovered both his health and his morale. A ship's captain, obeying the instructions of a doctor hundreds of miles away, safely delivered a baby.

Time is often vital. One Master reported to the coast station at Stonehaven that seaman had had a foot severed by a wire hawser. He was making for port at full speed, but wanted advice in the meantime.

"What have you done?" asked the doctor.

"Put the injured leg in a bag of floor," came the reply.

"You have saved him," said the doctor.

BROADCAST TO SHIPS

One station in Northern England received an urgent call from a trawler master. A fireman had been badly injured; both carotid arteries at the back of the head were severed, and they could not stop the bleeding. As well as getting instant advice from the doctor, the radio station broadcast the news in the hope that a ship with a doctor might be near the trawler. The message was picked up by Cromer Coastguard, and at once a fast launch was got ready for sea. The ship was asked to send her position, direction and speed, the launch rushed to meet her, a doctor went aboard, and the man's life was saved.

Ships of foreign nationality can ask for advice in an international code which includes a special section of medical terms, but in fact almost all their radio operators, as well as many of their Masters, know English.

"Medico" provides comedy as well as drama. A "patient" on an Israeli ship in the Mediterranean proved to be an Arab stallion. The advice of a veterinary surgeon was radioed to the ship, and next morning the Arab was himself again.

Thousands of sailors owe their recovery from ills and injuries to "Medico"; a considerable number owe their lives to it.

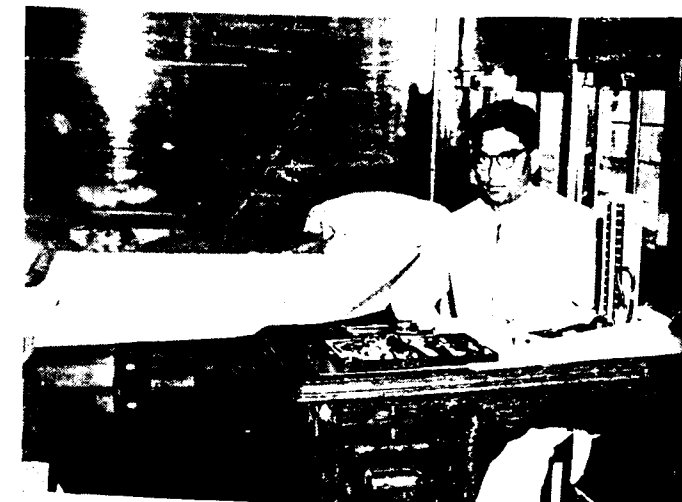
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OCTOBER 1956

MEDICAL RELIEF AT DOOR-STEP OF RAILWAY STAFF—MOBILE DISPENSARY ON RAILS

A mobile dispensary on rails for the purpose of rendering medical aid to the staff and their families residing at roadside stations was opened by Shri Mohanlal Sukhadia, Chief Minister, Rajasthan State, on 15th August 1956 at Kotah. The dispensary car will operate in Kotah Division on this Railway. This dispensary is the first of its kind to be used on the Indian Railways and it is hoped to prove a great boon to the Railway staff. After the experience gained of its functioning on this division, it is proposed to provide such mobile dispensaries on rails in other divisions of this Railway.

The dispensary car has been designed by the Mechanical and Medical Departments of the Western Railway and built at the Carriage Workshops, Lower Parel. The car is equipped with modern medical equipment, drugs, and dressings to deal with day-to-day ailments amongst Railway Staff and their families. The internal arrangements in the car provide for a doctor's consulting room, a waiting room for the patients, a dispensary room and a surgical dressing room. There is also arrangement for transporting two cases on stretchers in case of acute illness or accident to the nearest Divisional hospital of the Railway.



Interior view of the doctor's consulting and examination room.

The cost of the Dispensary car with the equipment is approximately Rs. 1½ lakhs.

The mobile dispensary van is provided with one doctor, one dispenser, a dresser and a dispensary peon who are permanently attached to this unit.



Exterior view of the Mobile Dispensary Van.

The mobile dispensary van will run from station to station on a scheduled programme for six days in a week on the section on which it operates, so that Railway employees and their families residing in roadside stations, where no medical aid of any kind is available, could be attended to on the spot and also can be followed up in the treatment without any hardship to the staff. By bringing medical relief to their door-step, railway authorities hope to increase the over-all efficiency of their staff and also ease pressure on railway hospitals and dispensaries which at present have to serve surrounding stations as well.

* * * * *

NUFFIELD GRANTS FOR PIONEER COMMONWEALTH PROJECTS—£18,000 FOR RURAL HEALTH UNIT IN INDIA

The 11th annual report of the Nuffield Foundation, published in London on September 27, draws attention to the aid given to several Commonwealth countries—India, Australia, the British West Indies, Canada, Pakistan, South Africa, and Uganda. The Foundation's resources consist of the Nuffield Fund, a capital fund of £12,000,000 provided by Lord Nuffield.

The policy of the Foundation has always been to pioneer new projects and, having proved their worth, to hand them over to appropriate public, industrial, or scientific bodies as going concerns. It believes, moreover, that an authority, an industry, or a scientific body ought to be prepared to pay for a project of proved value to it once the pioneering risks have been removed.

The report states that in the case of India, how to provide the hundreds of millions of people living in the villages with the medical care they need is a formidable task and problem. The Christian Medical College and Hospital at Vellore, which is affiliated to the University of Madras, has given much thought to the question, and is ready to launch a pilot experiment to provide comprehensive care for a rural community of about 30,000 people, living in 40 hamlets, by using a "primary health unit".

FOUNDATION'S CONTRIBUTION

The unit—a hospital and health centre—is now being built by the college. The Foundation has given £18,000 towards the capital costs, and the governing body will pay for maintenance. Part of the unit should be ready for use later this year.

The unit will enable medical students, house surgeons, and nurses to acquire experience in rural medicine through regular contact with village families. It will also afford an opportunity for research into the best ways of providing comprehensive medical care in a rural area with facilities which are consistent with the economy of that area—a most important factor.

The committee in charge of the experiment was convened by the orthopaedic surgeon Dr. Paul Brand, and includes the foundress of the college, Dr. Ida S. Scudder, and the principal Dr. O. Kutumbiah.

The Foundation's report also draws attention to the work of Dr. S. Chaudhuri, a distinguished Indian woman doctor and former vice-principal of the Lady Hardinge Medical College, New Delhi, now running a clinic for women and children in a village on the outskirts of New Delhi. Dr. Chaudhuri and her medical assistants are endeavouring to help the poor and under-nourished people of this village to improve their conditions of life. The Foundation has made a grant of £ 500 to assist Dr. Chaudhuri in her work.

In the case of Pakistan, the report says, there is a great need for the advancement of dental education and dental services. The Foundation has offered to take to the United Kingdom for a year's post-graduate experience the senior most member of the staff of the country's only college of dentistry—the De Montmorency College, in Lahore.

HEART PUNCTURE MENDED— SURGICAL FEAT AT MAYO CLINIC

Surgeons at the famed Mayo Clinic mended a puncture in the heart of a British infant, blue-eyed John Christopher Gold. The operation took four hours.

Doctors who performed the last-chance surgery said the 18-month-old child's condition was "satisfactory", but added that the next 48 to 72 hours would be critical. In that period, they said it would become apparent whether the operation was successful.

A team of 12 doctors, nurses and technicians joined in the surgery at St. Mary's Hospital. Afterwards, the baby was placed in a room where he will be given special attention.

The infant has been treated for most of his life for the ailing heart and bronchial pneumonia.

MECHANICAL DEVICE

The Mayo Clinic operating team used a mechanical heart-lung device to purify the baby's blood during the surgery. John's blood was pumped into the machine, where it was oxygenised and returned to the patient through another circuit. The infant's heart was "tied off," permitting the surgeons to work in a "dry field."

John's mother and father, a building surveyor at Northwood Mills, Middlesex, England, were told by London doctors last spring that major surgery of the type Mayo Clinic doctors helped pioneer could save the baby. At the time John was very ill with bronchial pneumonia induced by the heart condition.

BLOOD FLOW TO HEART PLUGGED—MAN IS SAVED

The life of a man has been saved by an operation which involved his blood flow being plugged at the heart, the first such operation on a human being.

Surgeons at the National Heart Institute disclosed that a spongy plastic plug, shaped like a golf tee, but bigger, was used to close a small tunnel which had developed in the heart of 28-year-old Mr. Norman Hickey.

The tunnel had developed between the base of his aorta, the big blood artery from the heart, and one of the heart's main chambers. Blood flow to the heart was closed off for four and a half minutes.

KEY ROLE OF WARD SISTER IN NURSING SERVICES—CONCLUSIONS OF S. E. ASIAN REGIONAL SEMINAR

Far-reaching recommendations aimed at upgrading and improving nursing services in countries of South East Asia have been made by the WHO-sponsored Nursing Seminar which met in New Delhi from August 6th to 25th.

The Seminar, which was attended by nursing leaders from Burma, Ceylon, India, Indonesia and Thailand, took up four major aspects of the nursing problem in South East Asian countries: (a) Selection and preparation of ward sisters, with special emphasis on in-service education; (b) Role of ward sisters in development of team work in hospital nursing services; (c) Categories and functions of the auxiliary; (d) Integration of public health aspects into the basic nursing curriculum.

The 33 participants in the Seminar split into four groups to exchange information and experience on these topics and formulated recommendations to help solve nursing problems most of which are common to South East Asian countries.

LEADERSHIP TRAINING

An important conclusion reached by the Seminar was that all nurses need to have some preparation for supervision as they need to be prepared for leadership

of the nursing team. It was recommended that instruction in principles of supervision and experience in team work be included in the basic nursing curriculum.

It was felt that the practice generally prevailing of allocating some functions to ward sisters which could be safely delegated to non-nursing personnel, should be modified so that the ward sister might have more time for nursing duties.

In order to improve procedures currently in use for selection of ward sisters, it was suggested that selection boards should have adequate representation of nurses.

TRAINING OF AUXILIARIES

The Seminar agreed that institutions employing auxiliaries who have not had prior training, provide appropriate pre-service and in-service education programmes as busy ward sisters could not be expected to give adequate training to these workers.

In the development of team work in nursing services the ward sister was regarded to be a key person—as a leader of the ward nursing team, as a member of the nursing education team and as a member of the wider health team. In order to play her part effectively in this regard she must be convinced of the value of team work and learn the special skills of team leadership. It was pointed out at the same time that the effectiveness of her role depended upon the co-operation and understanding of other members of the health team, both medical and nursing.

The Seminar was of the view that since development of team work was essential to the building up of health services in South East Asia, more attention should be given to planned programmes to develop team work in hospitals and other community health services.

AUXILIARY NURSE MIDWIFE

The Seminar recognized the need in this part of the world for the use of less intensively prepared personnel to carry out the routine and less skilled aspects of nursing care. Anxiety was expressed over the increasing number and variety of auxiliary nursing personnel and it was suggested that a single category be created which should be designated "Auxiliary Nurse Midwife". Her functions were visualized to be those of a health teacher, midwife and nursing assistant carried out under the

direct supervision of a professional nurse and as a permanent member of the nursing team.

It was suggested that a study be made to determine the specific functions of the auxiliary nursing worker and to determine the organization necessary for this worker to safely carry out these functions.

PUBLIC HEALTH ASPECTS

The question of integrating public health aspects of nursing into the basic curriculum was considered as in keeping with the U. N. ideal of human rights and WHO's definition of health as a fundamental human right of all people.

The objectives of this integration were seen to include development of an awareness and understanding of the socio-economic background of the patients which may affect their health and preparation of the type of nurse who is able to carry out essential nursing functions and take an active part in the health services of her country.

The Seminar agreed that public health nursing be made an integral part of nursing education and that an attempt be made to integrate public health nursing in all schools of nursing.

* * * * *

INDIAN CHEMICAL AND PHARMACEUTICAL INDUSTRY SPECIALISTS IN USSR

A delegation of workers of the Indian chemical-pharmaceutical industry has spent several days in Riga. They studied the manufacture of antibiotics at the Riga Medical Preparations Plant. The personnel of the enterprise presented the Indian friends with the drawings of an apparatus for the manufacture of penicillin.

Bidding farewell to the Soviet specialists, Dr. Dogra said: at all factories we have visited in your country the personnel have treated us as the best of friends and readily shared their experience with us.

BRITAIN. An official handbook. 1956. Edition. Prepared by the central office of Information, London. 477 pages including index. Illustrated. Price Rs. 5/10 (Excluding postage).

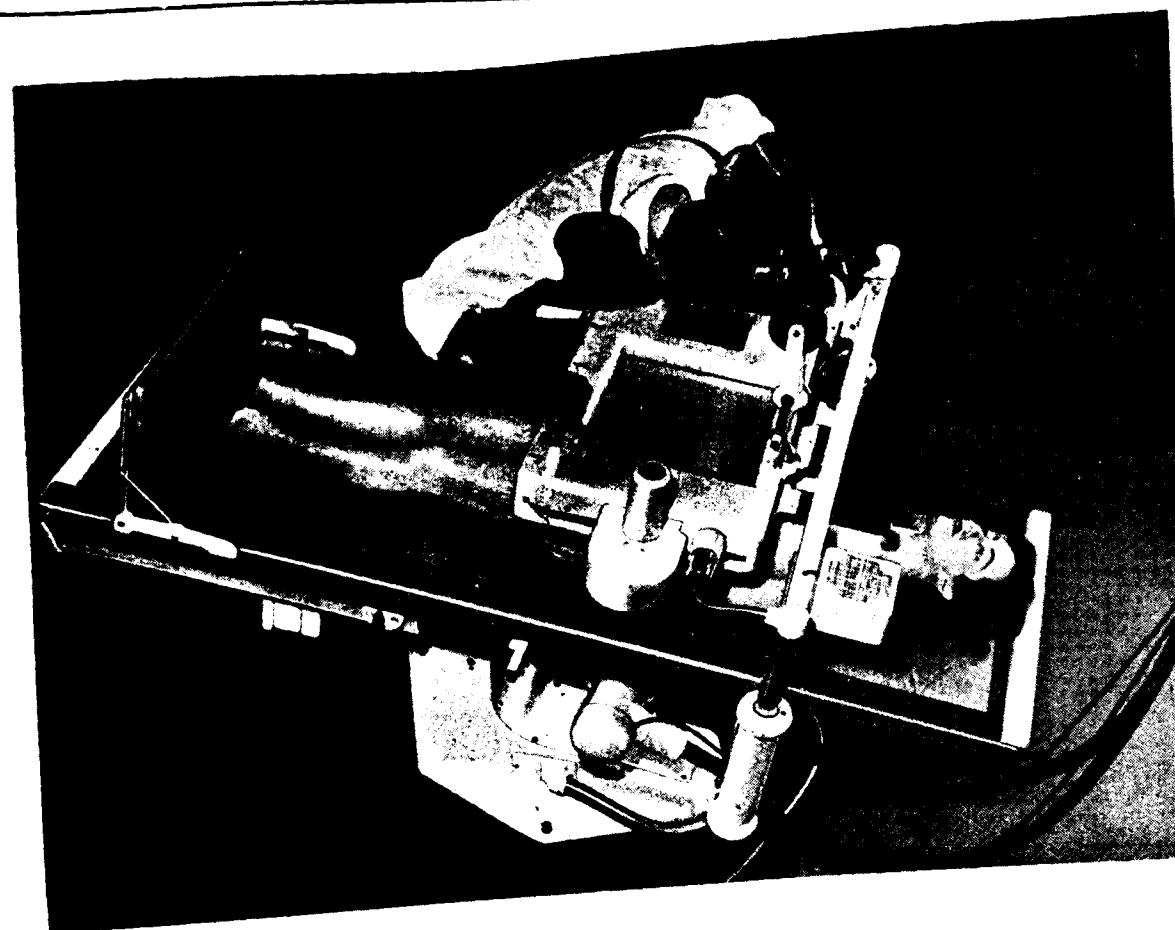
This invaluable reference book is divided into fifteen sections as follows: The British Isles, Government and Administration, Defence, The National Economy, Industry, Transport and Communications, Labour, Finance, Trade, Social welfare, Housing and Planning, Religion Science and the Arts, Sound and Television broadcasting, and the Press.

The section on Health gives a concise account of the National Health Service, its structure finances and working, and will be found of special interest to medical practitioners.

There is an appendix of British currency, weights and measures, and conversion tables as well as a detailed bibliography which informs the reader where he may seek further information on a particular aspect of Britain should he need to. After an excellent index, there is a coloured map of the British Isles.

To anyone who at any time requires a handy and authoritative reference book about Britain this is undoubtedly a most valuable acquisition to his book-shelf.

This publication is available for sale from British Information Services, Eastern House, Mansingh Road, Post Box No. 110, New Delhi-2.



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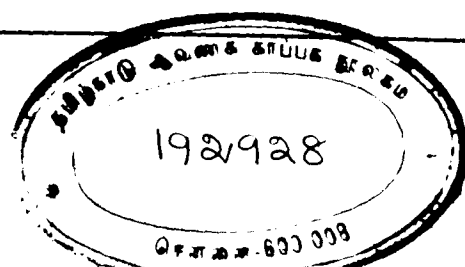
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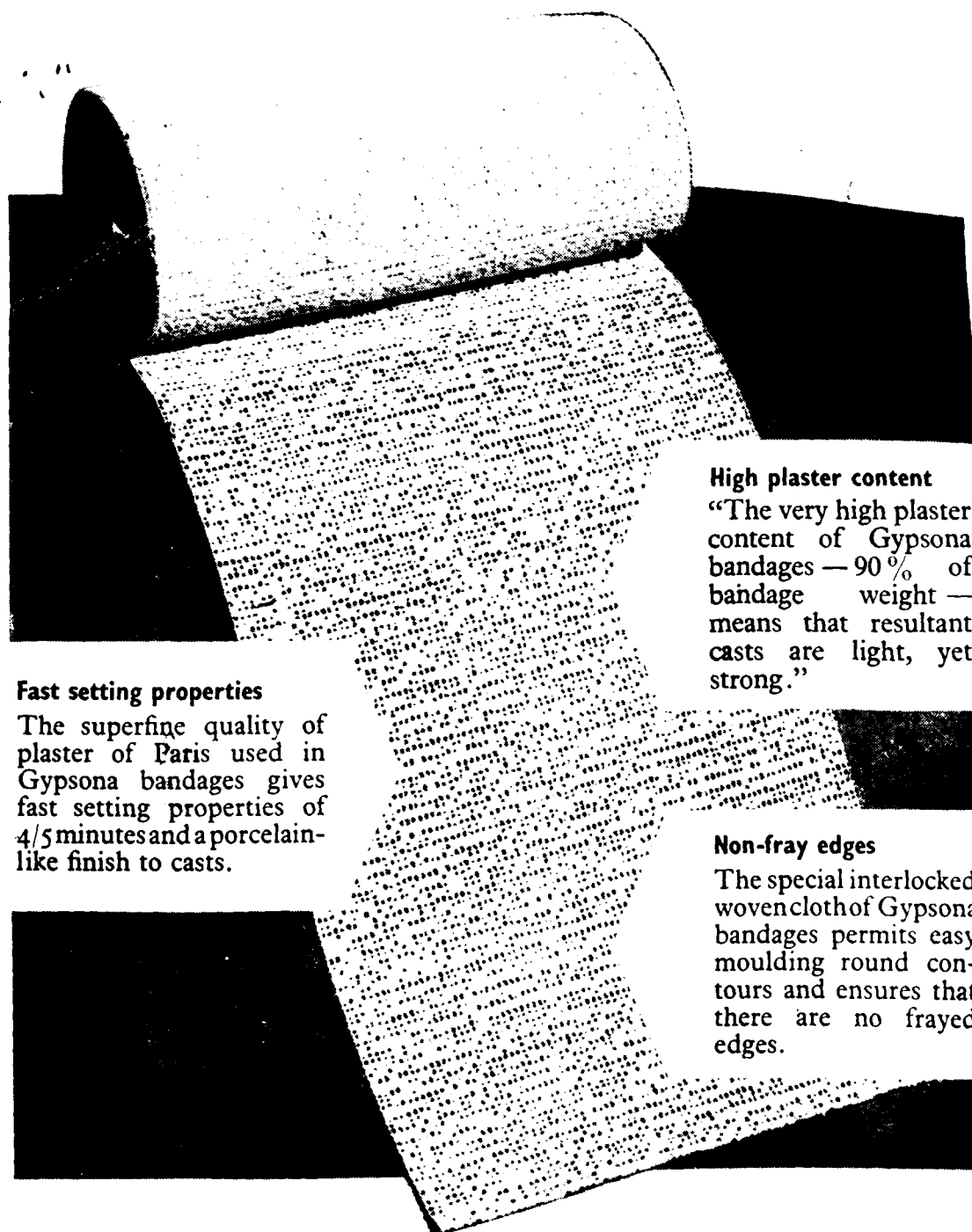
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