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ON CERTAIN FEATURES OF ARTIFICIAL
PNEUMOTHORAX THERAPY IN AN INDIAN
HOSPITAL WITH AN ANALYSIS OF 182 CASES.

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The introduction of artificial Pneumothorax in cases of pulmonary Tuberculosis in the Indian Hospitals has been giving as encouraging results as in other parts of the world. Anti-tuberculosis measures being yet in their infancy and early detection of infection being practically unknown there is abundant material for the application of Pneumothorax therapy in every part of the country. In fact it is comparatively rare to see an early case of pulmonary tuberculosis in the outpatients' clinics of the Indian Hospitals, many of the cases that present themselves for treatment being in Stage II and most in Stage III, so that a large majority of the cases are too far advanced for any treatment. The Sanatoria which this vast country possesses are far too few in number. There are probably about 1000 beds altogether in these Sanatoria and perhaps an equal number in the Tuberculosis hospitals situated usually at the provincial headquarter centres. Taking the incidence of tuberculosis at a minimum of 10,000,000 for the whole country, one can imagine how highly inadequate this provision of 1 bed for 5000 cases is for the treatment of tuberculosis and why such a large number of advanced cases throng at the out-patient clinics, for many of whom even a radical



600 decisive measure like Artificial Pneumothorax is often quite inapplicable. In fact the 182 cases forming the subject of this paper were treated during the short space of 2 years in a hospital of about 60 beds. With a larger accommodation a much larger number could easily have been treated with benefit as a good many have to be refused admission for want of beds.

With such a large number of advanced cases coming up for treatment in different stages of tuberculosis of the lungs the choice of cases suitable for pneumothorax therapy is by no means difficult, though it must be said that if the orthodox rules regarding the type of cases to which the treatment is to be applied, are adhered to, the selection cannot be said to be so easy as it might at first sight appear. Thus if one considers cases of bilateral implication of any degree to be quite unsuitable, it will not be possible to apply the treatment even to 1% of the total cases. If, on the other hand, these rules be relaxed and such cases be included in which less than $\frac{1}{3}$ of the healthier lung is affected or those in which healing has sufficiently taken place in the collateral lung though the latter happens to be affected to a greater extent than $\frac{1}{3}$, the range for selection becomes much wider. In fact in my work during the last 2 years I have had enough material to justify the conclusion that pneumothorax therapy is applicable to a comparatively large percentage of advanced cases, probably between 5 and 10%. Whilst it brings about arrest in the less advanced cases, it certainly effects improvement and gives definite relief in such of the more advanced cases as would grow rapidly worse, if not dealt with by collapse therapy.

In the work comprising the subject of this paper the rigid rules originally prescribed by workers in pneumothorax therapy were relaxed and such cases as showed healing lesions in the collateral lung although involving

more than $\frac{1}{3}$ of it were given the benefit of the treatment but such cases as showed an acute process on the healthier side were as far as possible avoided.

Lillingstone and Pearson's pneumothorax apparatus was used throughout, the Riviere Trocar and canula for the initial inflation and the Saugmann needle for the refills. The fifth intercostal space was usually chosen for the puncture but it was found by experience that any interspace from the 3rd to the 7th which gave the most resonant note on *light* percussion was the best, being apparently more likely to be free from pleural thickening and adhesion than the less resonant spaces. Though Forlanini's method of judging the presence or absence of adhesions by the degree of respiratory excursion is a valuable one, I have found in my work that *light* percussion over the intercostal spaces in the axillary line gives sufficiently precise information on the point, to decide the question of pneumothorax therapy and select the spot for pleural puncture.

The Indian chest being less capacious than the European it was found that 500 to 600 c.c. of air was about the maximum that could be put in at any time but occasionally a chest took in 700 to 800 c.c. Absorption of air by the pleura though fairly quick at the commencement was found to be slower in the later stages, but when the patient was put on physical exercises, absorption was found to go on quicker and the refills had to be given more frequently. Three weeks were found in practice to be about the longest time that could be allowed to elapse between the maximum refills though cases have been found to have a patent pleura even 3 months after the last refill.

The condition of the lungs and pleurae was watched during the course of the treatment by frequent physical examination and skiagrams.

Extensive secondary complications like peritonitis and intestinal ulceration, and marked cachexia as a result of highly toxic infection were treated as contra-indications, but laryngitis was found to be benefitted sometimes by the treatment. Diabetes ⁸ per se was not found to be prejudicial to the treatment but the advanced and progressive tuberculous condition and other organic complications characteristic of the disease prevented its application. In a case with a large dilated heart moderate refills of about 300 c.c. gave excellent results.

Three pregnant women ¹⁴ responded very well to the treatment, but in one of these the puerperium brought on a 'galloping' condition and the collapse therapy had to be given up. The second patient, a Stage III case with cavity, made an excellent progress till about 2 months after confinement when she relapsed and developed peritoneal complications from which she is still suffering and the pneumothorax had to be stopped. The third is approaching full term and is doing very well.

The results of pneumothorax therapy in the 182 cases in which it was attempted or carried out during the 2 years ending 30th September 1926, are set out in the subjoined tables. In a number of these cases the treatment could not be followed up as the patients left the hospital too early in its course and could not be persuaded to persevere with it. This is no doubt one of the greatest drawbacks of conducting any prolonged treatment in this country and the pneumothorax is handicapped by the general lack of intelligence and education amongst the mass of the patients many of whom cannot be persuaded to follow up the treatment. The results in Table II comprise such of the cases only as underwent a minimum of 3 months of pneumothorax treatment and therefore eliminate such cases as could be said to have not been given a fair chance. The results compare

very favourably with those of workers in other parts of the world with more favourable climatic conditions. (*vide* Table III).

The hospital in which the treatment was conducted is situated in the busiest part of a tropical city amidst sanitary conditions which are far from ideal. The maximum daily temperature of Madras varies between 75° F. in the shade in the cooler months to 110° F. in the hottest part of the year and being situated by the seaside the amount of moisture in the air during the greater part of the year makes the atmospheric temperature by no means pleasant or agreeable. The climatic conditions may in fact be considered to be very detrimental to a tuberculous condition of the lungs. The results obtained therefore speak definitely well of the efficacy of the treatment.

In stage II 86% were either arrested or showed marked improvement when adhesions were absent and the pneumothorax was good. In Stage III 75% of the good pneumothorax cases and 56% of the partial pneumothorax cases showed similar arrest or marked benefit. These latter figures have to be compared with Saugmann's 1913 figures which give 75% successes in the III stage. A comparison of the results of pneumothorax therapy with those of ordinary hospital treatment (*vide* Table IV) gives absolutely definite evidence of the curative value of the treatment. In fact the results especially in the earlier stages are most decisive if not dramatic in effect. Many of the cases with marked hectic became afebrile or almost so in a few weeks and 53% of the cases became bacillus negative as compared with 17·4% by ordinary treatment.

A few points in the complications and results of pneumothorax therapy in a hospital in the tropics, like the one in Madras, may be of interest to workers in other

parts of the world. Such points might be of a slightly different nature or may vary in degree as compared with the experience of men in other countries and might be accounted for partly by climatic conditions and partly by the fact that the generality of cases that present themselves for the first time for treatment here are of a much more advanced type. The fact that in 15% the pleura was absolutely adherent and that in another 61% there were marked adhesions allowing either partial or very imperfect pneumothorax making up a total of 76% cases of adherent pleura is evidence of the advanced nature of the cases that come under observation for the first time. Of the 24% cases in which a good pneumothorax could be induced the adhesions were either absent or comparatively slight, being mostly at the apex and inner half of the base at the diaphragm.

Pleural effusion,^{12, 13} as perhaps the most common complication of artificial pneumothorax, has been put down by various observers as occurring in from 20 to 60% of all the cases in which the treatment is continued for fairly long periods. Effusion was noticed in 21 cases only of my series *i.e.* 14% but, eliminating all such cases in which the treatment had to be stopped in less than 3 months the percentage of effusion works out to 22. I originally attributed this comparatively low percentage of pleural effusions to the intrapleural injection of adrenalin solution which is made both during the initial operation and at the refills, of all such cases in combination with novocaine for purposes of local anaesthetization of the track of the pneumothorax needle. I am now however inclined to think that the low percentage of pleurisy is due to climatic causes and to the temperature of the air used for inflation being approximately that of the body temperature and often even higher. Whilst some cases do not develop the effusion even after several months

of pneumothorax inflations, others get it comparatively early in the treatment. It has invariably been serous in character extending in level from the 10th to the 5th rib posteriorly. When small in quantity such effusions were left undisturbed, but when profuse causing a certain amount of cardiac dyspnoea simultaneous aspiration and air inflation was adopted, with gratifying results. In one case simultaneous auto-serotherapy by weekly subcutaneous injections of 10 c.c. of the pleural fluid has been adopted along with pneumothorax refills and the effusion is rapidly getting absorbed.

Obliterative pleurisy^{5, 6} has occurred frequently in the series especially in the partial pneumothorax cases due to persisting adhesions. In 6 it was complete and the refills could not be continued with the result that the pulmonary trouble showed a relapse. In a number of other cases the obliteration did not proceed beyond a certain stage and the refills though in diminishing quantity could be continued. 'Obliterations' were sometimes proceeded by 're-actions' which consisted of a smart rise of temperature usually following an inflation and continuing one to 3 weeks and occasionally longer and ending either in effusion or in thickening with obliteration, partial or complete.

Selective collapse^{2, 7, 9} was observed in a good number of cases and the comparatively large percentage of successes in the partial pneumothorax cases was due to such collapse.

Antero-posterior Collapse was noticed in 3 cases, the lung being completely adherent to the anterior thoracic wall and the air being admitted posteriorly in the usual maximum quantities. The skiagrams of these cases taken by an antero-posterior exposure showed no signs of pneumothorax whilst a lateral exposure revealed the presence of air behind the lung which was compressed

into a flat cake against the anterior chest wall. The results of the pneumothorax treatment were good in all these 3 cases.

Simultaneous bilateral pneumothorax was practised in two cases with bilateral involvement without cavitation. In both the cases slight improvement was temporarily noticed but as the condition was active and neither of the patients remained in the hospital for prolonged treatment the pneumothorax could not be followed up.

Successive bilateral pneumothorax has however been successfully practised in one case. It was a young woman who presented herself for treatment for active disease of the left side with a few stray deposits at the right apex. After about 9 months of collapse therapy on the left lung she stayed away, in spite of advice, under the false impression that since the sputum became bacillus negative and her condition became afebrile, she had recovered from the disease. She returned four months later with a temperature of normal to 100° F. extensive peribronchial infiltration of the right lung and numerous bacilli in the sputum. Skiagrams showed that the left pleura had become adherent for the greater part and would not take in more than 300 c.c. of air. Deflation of the left pleura was performed and the right lung was collapsed. The patient is still under treatment and is progressing favourably.

Subcutaneous emphysema of some extent was not uncommon but *deep surgical emphysema* due to puncture of the lung occurred in one case, the air burrowing through the mediastinum to the deeper tissues of the neck causing dysphagia and making its way subcutaneously over the greater part of the abdomen and limbs on the side of the pneumothorax. The patient recovered from the condition but the pneumothorax had to be stopped

on account of advanced disease.

Simultaneous Chemo-therapy with Sanocrysin and pneumothorax has been practised on a few cases, where the lung with advanced disease was subjected to the collapse and the Sanocrysin was administered for the absorption of the deposit in the collateral lung. The cases are still under treatment and are showing signs of improvement.

Thoracoplasty was performed on two of the cases at my request by Major Pandalai, I.M.S., Second Surgeon of the Government General Hospital, Madras. In one of the cases there was dense fibro-caseous disease of the whole of the right lung with complete adhesion. Pneumothorax was attempted but could be induced very partially. As a result of the thoracoplasty the patient showed considerable improvement in his general condition, the temperature coming down to normal to 99.5° F. Due partly to hilus implication on the collateral side and partly perhaps to the thoracoplasty not being a complete one the patient's condition was not completely arrested at the time of discharge. The other developed abdominal complications and is still running a hectic temperature.

The usual complications met with by other workers have been experienced. *Rupture of the lungs*¹⁰ occurred in three cases with fatal results in two. In all the three cases the rupture occurred not directly as a result of the pneumothorax puncture but some hours or days after an inflation, apparently due to a weak caseating point at the pleural surface giving way.

Hernia of the inflated right pleura into the left chest across the anterior mediastinum without cardiac displacement took place in one case without any discomfort. The case got on favourably to arrest.

Severe haemoptysis from an imperfectly collapsed

lung occurred in 5 cases and had to be controlled by the usual medicinal measures. Two of the cases made a good recovery but in the other three the treatment had to be stopped on account of advancing disease. Severe haemoptysis from the collateral lung occurred in two cases necessitating stoppage of treatment.

Laryngitis in an advanced stage was present in 5 cases, but was not found to be prejudicial to the treatment. On the other hand in 3 of the cases the laryngeal condition improved considerably along with the general improvement of the patient.

Air embolism ^{4, 11} occurred in one case. It was a young man of 27 with extensive soft deposits in the right lung and a few deposits around the left hilum. A partial pneumothorax was induced with excellent results, though the lung was adherent at the apex and at the inner half of the base to the diaphragm. The temperature came down to normal very early and bacilli disappeared from the sputum and the patient was allowed to move about. After a dozen refills signs of pleural obliteration were apparent and the skiagram showed a pocket of air outside the upper lobe. During the next refill the initial pressure was observed to be -3 -1 c.c. and the air was let into the chest. There appeared to be some obstruction to the entry of air and the manometer began to show +2 +10 by the time 50 c.c. of air had got in. In the meanwhile as the patient felt dizzy and out of sorts the operation was stopped. He soon became drowsy and semi-conscious and the mental condition gradually passed into coma. The eyes became deviated to the right. Convulsions of the most violent character followed a few hours later and the left arm and left leg became paralysed. Pyrexia, restlessness and general convulsions continued off and on during the succeeding three days and the patient was in a precarious

condition, with low pulse and shallow respiration. The lungs showed severe hypostatic congestion but no pneumonic condition. Feeding had to be given per rectum. The convulsions then gradually abated, consciousness returned and in a week the patient regained complete consciousness with hemiplegia of the left side. Three months later he recovered from the hemiplegia and now over 1 year from the time I first saw him he is in apparently perfect health doing his ordinary work. This case is of great interest first as an instance of air embolism occurring late in the course of the pneumothorax treatment and secondly as a rare case of recovery from this serious complication.

Relapses occurred in three cases originally classed as arrested, after the lapse of two months or more from the last pneumothorax refill. In one the patient having become pregnant developed pulmonary and peritoneal complications three months after confinement and is now in a bad condition. The second had a mild relapse but is again quite well after a second series of refills. The third developed peritonitis about a year and a half from the commencement of pneumothorax treatment cough being practically absent and the sputum continuing bacillus negative.

Whilst cases of good pneumothorax with a free pleura gave invariably good results in the ordinary type of pulmonary tuberculosis, the effect of hilus tuberculosis *i.e.* involvement of the root of the lung around the hilus glands was usually very disappointing. This can be explained by the fact that collapse of the lung effects the peripheral portions only of the organ ³ and not the roots around which the surrounding lung tissues collapse and probably also as a result of the cardiac movements preventing this part of the lung from having the same rest as the peripheral portions.

TABLE I.
Synopsis of 182 cases in which Artificial Pneumothorax was done or attempted.

	Good Pneumothorax.					Partia Pneumothorax.					Failures.				
	Arrested.	Much improved.	Improved.	No effect.	Total.	Arrested.	Much improved.	Improved.	No effect.	Total.	Arrested.	Much improved.	Improved.	No effect.	Total.
Stage I	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Stage II	6	0	2	0	8	5	3	3	2	13	0	0	0	0	0
	75%		25%			38%	23%	23%	16%						
Stage III	7	8	3	3	21	16	18	33	45	112	0	5	11	11	27
	33%	38%	14%	14%		14%	16%	29%	41%		0	18	41	41	
Total	13	8	5	4	30	21	21	36	47	125	0	5	11	11	27
	43%	27%	17%	13%		17%	17%	29%	37%		0	18	41	41	

TABLE II.
*Result of Artificial Pneumothorax treatment in Pulmonary Tuberculosis.
(Cases which took at least 3 months' treatment.)*

	Good Pneumothorax.					Partial Pneumothorax.				
	Arrested.	Much Improved.	Improved.	No effect.	Total.	Arrested.	Much Improved.	Improved.	No effect.	Total.
Stage I	0	0	0	1	1	0	0	0	0	0
				100%						
Stage II	6	0	1	0	7	5	3	1	0	9
	86%		14%			55%	33%	12%		
Stage III	7	8	3	2	20	16	16	13	12	57
	35%	40%	15%	10%		28%	28%	23	21%	
Total	13	8	4	3	28	21	19	14	12	66
	46%	29%	14%	11%		32%	29%	21%	18%	

TABLE III.

Saugman's results in the Vejlefjord Sanatorium.

	Result of 64 cases treated by A. P. and Sanatorium methods 1913.	Results of 30 cases treated by Sanatorium methods alone 1913.	Result of 172, III stage cases treated by A.P. and Sanatorium methods 1921.	Result of 85, III stage cases treated by Sanatorium methods alone 1921.
Able to work	50%	22.2%	32%	10.6%
Unable to work....	28.1%	33.3%	2.9%	3.5%
Dead	18.7%	38.8%	63.4%	83.5%
Free from T. B.	50%	8.6%	39%	12%

TABLE IV.

Comparative results of Artificial Pneumothorax treatment and of ordinary treatment in stages II and III of pulmonary tuberculosis.

	Total No. of cases treated.	Percentage of cases that benefited in Stage II.	Percentage of benefit-cases that benefited in Stage III.	Cases in which bacilli disappeared.
Pneumothorax treatment	93	100%	82%	53%
Ordinary treatment	344	77.8%	30.5%	17.4%

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VITAMINS THEIR PAST, PRESENT AND FUTURE, AND THEIR RELATION TO DEFICIENCY DISEASES.

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Writings on the subject of dietetics date from the earliest times, but they cannot be said to have assumed a scientific character until the development of chemistry enabled the subject to be treated in a truly qualitative and quantitative manner.

Liebig, who is generally recognised as the real founder of organic chemistry, published in 1837 the results of his work on the analysis of organic bodies, this research being based on the use of the combustion furnace, of which he was the founder. By this method of analysis the elementary composition of natural food stuffs could be accurately determined, and attention became directed towards their composition as regards carbon, nitrogen and hydrogen content, and the balance of intake with excretion. The composition of a dietary was judged by the amount of protein, carbohydrate and fat present, and insufficient importance was attached to the capacity for assimilation of these proximate constituents by the human body. Attention was directed later to the importance of the digestibility and assimilative

properties of the foods; for example, it was found that the vegetable proteins of the leguminose plants, though of high nitrogen value, were not so readily assimilated as certain animal proteins, and their food value did not therefore depend entirely on their chemical composition as regards nitrogen content.

The importance of inorganic constituents of the dietary, such as Sodium, Potassium, Calcium, Phosphorous and Iodine, received attention. Much work was done on the energy value and heat-producing capacity of food stuffs during the latter part of the last century, and American investigators did valuable work on human calorimetry in relation to diet. The most valuable information as regards diet is obtained by a consideration of standpoint of health obtaining in different countries where economical conditions determine a great variation in the national dietary. In tropical countries the climate emphasizes these variations, because effects of deficient dietary become more rapidly manifest. The study of the influence of diet in various parts of India is of the greatest value and deserves the closest consideration.

Diet is the fuel of the human furnace, and unless an adequate draught, *i.e.*, oxygen supply, is obtained, its combustion and utilisation will be imperfect. The experiments in Vienna, a few years ago, showed that with identical dietaries children in open air maintained good health, while others, kept indoors, developed rickets. Sun-light, of which I shall tell you more hereafter, also was an important factor in these experiments.

The preparation of food in civilised countries undoubtedly leads in many instances to the deprivation of some of the most important constituents. Bread, for example, is made from flour, of which the wheat grain has been almost entirely deprived of its aleurone coat (pericarp) and germ. The millers are not to be blamed

for this. The public demand a loaf of special character as regards whiteness and physical texture which can be obtained only by the present process of milling.

Tinned foods are prepared most carefully, but the care in their preparation and necessary sterilisation involves destruction of some of the valuable constituents. The modern custom of cooking almost every article of diet involves much loss of important elements in the consumed food.

Fresh raw foods appear in many instances to have an antibacterial action. Thus, recently, Fleming has shown that fresh raw egg white has powerful bacterial properties, and it is probable that other fresh foods have a similar action.

The rarity of appendicitis, cholecystitis, and intestinal toxæmia among native races living on natural foods deserves close consideration, and there is also evidence to show that cancer is rare among such people.

Acute rheumatism is almost unknown amongst the people of India. Is this the result of climatic conditions, or due to the native dietary? Care of food as regards contamination with pathogenic organisms is essential, but here again public opinion in this country sadly needs education. Foods such as bread, meat, vegetables etc., are openly exposed for sale, and the risks of infection are obvious. The possible contamination of milk from its origin to its consumption in our centres of population is too well-known to need interpretation. Then, again, the addition of preservatives to food is in many cases detrimental to its food value, and in some cases actually injurious to health.

The food supply of the nation and the delivery of sound, wholesome food to every individual, is of the utmost national importance. It is essential that the public should be educated so as to realise this, and also that

legal regulations should be made whereby this may be ensured. Legal regulations cannot go in advance of public opinion. A pressing need at the present time is the education of the public, so that they may realise the true requirements of a dietary and that they may insist on a supply of food, pure and wholesome, and free from external contamination.

It is one of the greatest safeguards of the national health that a dietary satisfying true scientific requirements should be economically within the reach of all.

As I have told you once before, until a few years ago, food was regarded as consisting of five essential constituents, carbohydrate, fat, protein, mineral salts and water, which provided all the material for growth, heat and energy. Fats and carbohydrates were valued solely as providers of heat and energy. The fats were studied chemically and much was learned concerning their conversion into fatty acids and their saponification in the process of digestion; the carbohydrates were examined and their inversion into simpler sugars was also learned by chemistry. Thus a clear insight as to how they were prepared for assimilation was acquired. Protein was known to be essential for growth and for replacing loss by "wear and tear." The value of protein was estimated in terms of Nitrogen, and one kind of protein was considered as good as another. But the proteins, however, were soon found to be more complex in structure and the progress made with them was not so rapid as expected. In any event the consistent presence of these substances in the tissues of animals and plants established them as fundamental factors in the diet of animals and the proportions in which they should be present in food became the subject of deep study and wide discussion by students of nutrition. Moreover, they formed the foundation of the entire subject. Various articles ordinarily used by man

as food were diligently analysed as sources of these nutritional elements and a vast amount of information was collected. Long lists of food-stuffs were compiled and classified, but it seems that none of these investigators ventured beyond chemistry in their efforts to determine the value of these articles of food.

The needs of the mineral salts was recognised; iron for haemoglobin, lime and phosphates for bone and teeth. Attention was chiefly directed to the energy requirements of the body. Calorimetry became an exact science; indeed, certain schools of physiology made it the be-all and end-all of nutrition. This obsession with calories still blinds many reputed authorities to the advances which have been made in the study of nutrition during the last 15 years. During the war, dietaries for the fighting forces, for prisoners-of-war, and for civilian populations were planned on the calorie system. In many instances nutritional disaster followed, causing much ill-health, incapacity for work and loss of life which would have been avoided if those responsible for devising the diets had applied the results of modern scientific work. The failure of pure calorie system in practice necessitated the adoption of recent discoveries with results that were entirely beneficial. So long as the study was confined to the utilisation of chemistry to elicit information, the progress was necessarily slow and limited and modern students of nutrition regard it as remarkable that the chemical results were not checked by feeding experiments on animals, especially, when evidence existed in the literature of the day that a diet which was chemically correct was often found to be unsatisfactory for the nutrition of man.

After chemistry had failed to penetrate the veil of mystery which surrounds the unknown quantities which later came to be known as vitamins animal experimentation was utilised and the revelations have more than justified

the change in the angle of vision from which the study was approached.

Modern work upon food and nutrition clearly demonstrated that in addition to the above mentioned food constituents, some more quite distinct accessory food factors or vitamins must be present to make the diet satisfactory and health giving.

For convenience, since the chemical nature of the vitamins is not known, they are called A. B. and C. There is also some evidence that other unknowns are necessary, and these have been called D. E. etc. Many people are still sceptical of the existence of vitamins because they have not been isolated. Those who have found it difficult to accept the existence of vitamins have assigned to salts, organic and inorganic, an exalted significance in nutrition. They have, in fact, invested salts with all the properties of all the vitamins. There can, however, be no question that vitamins are not salts. The vitamins are unstable compounds destroyed by processes which have no effect on salts. For example, tinned or dried fruits and vegetables have lost their special nutritive value, vitamin—C, and cannot prevent scurvy though the salts contained in them are unaltered by the processes of tinning or drying. Very active preparations of each of the three vitamins have been made, and there can be as little doubt of their existence as there is of an active principle in the Thyroid gland or of the pancreas. The chemical constitution of Thyroxin and of insulin have yet to be determined. It will be remembered that Adrenalin was only isolated long after the activity of the Suprarenal Gland was discovered. The existence of enzymes, toxins, and anti-toxins is not disputed, although their chemical nature is yet unknown. In the same way the A. B. C. D. and E. vitamins must be accepted as five distinct chemical entities.

The inclusion of the vitamins does not alter the calorie requirements of the body under different conditions. Calories, proteins, and vitamins are all wanted. Man cannot live on calories alone.

VITAMINS.

It is not possible to write the complete history of the vitamins at this time because although their existence is generally recognised their true nature, like electricity, is still imperfectly understood. For generations it has been known that when these accessory food-factors were absent from the dietary of man, pathologic states of a specific type would soon appear. The most striking example of these states was the regular occurrence of scurvy among soldiers and prisoners who were fed on diets that were deficient in an unknown substance that it was found could be supplied by lime-juice. As a result of this finding vessels embarking on long voyages were required to include an adequate supply of lime juice in their stores before leaving. It is said that this requirement still remains in the regulations of the British Board of Trade and is the origin of sobriquet, Limey, which has applied to British sailors and soldiers.

Beri-beri is another and the Japanese demonstrated beyond a doubt that it was due to a dietary deficiency by noting the incidence of the diseases aboard a ship that embarked on an eight month cruise under Admiral Takaki as compared to another ship which was sent on a similar cruise with an improved diet furnished to the men.

Notwithstanding the acquisition of this information little, if anything, was known concerning accessory food-factors. This was largely due to the fact that the problem was approached only from the chemical side for the reason that all existing knowledge of nutrition was based on the chemistry of living tissues.

It was in 1897 that Professor C. Eijkman, of the

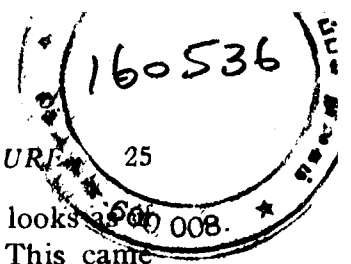
Department of Hygiene of the University of Utrecht, undertook to determine whether or not the diet of polished rice, so universally used in the East, was the specific cause of beri-beri. He fed pigeons and chickens on a diet of polished rice and in a few weeks produced a type of paralysis that, in almost every way, simulated beri-beri in man, and thus earned the credit of being the first investigator to produce a dietary deficiency disease experimentally. As a result of his studies the first knowledge that the rice bran, which was removed in the process of polishing, contains a protective substance was revealed and this led to the introduction of the term "Vitamin." Funk, who confirmed the experiments, suggested the name for this important essential element.

Although Funk, as mentioned, is credited with first suggesting the name vitamin for the protective substances, Stepp was the first to establish the necessity of certain alcohol-ether soluble substances in the diet which he called "Lipins." Hopkins later called them "accessory" food substances and Bottomley spoke of them as "auximones." Then even before the vitamin hypothesis was conceived, Wildiers observed that when a synthetic medium containing only well defined substances was inoculated with yeast no growth occurred unless the inoculation was a large one. He explained the phenomenon by supposing that the yeast required some unknown substance for its development which was not present in a synthetic medium but was found in beer wort and in all growing cultures of yeast. He gave the name "BIOS" to this substance. The oldest name to designate the anti-neuritic substance is X-Saure which was originated by Hulshoff-pol. Susuki and Shimamura called the curative substance for beri-beri "Aberi-saure." Numerous names were later used by commercial concerns to designate protective substance.

However, from this state of indecision it looks as if a more orderly nomenclature has emerged. This came about when it became apparent that there were two unidentified dietary factors necessary in the nutrition of the rat, one soluble in fats, the other never associated with fats but easily dissolved out of the natural foods with water or dilute alcohol. The necessity of differentiating them with names naturally arose. It was then that McCollum and Kennedy suggested the algebraic term fat-soluble A and water-soluble B to designate them and their suggestion has now been quite universally accepted.

When the existence of an antiscorbutic substance was established by Drummond it was called water-soluble C and it was Drummond who later suggested that spelling of vitamin be changed to vitamin. Gradually the terms "Vitamin A", "Vitamin B" and "Vitamin C" have come into general use and are regarded as the best designations by the most eminent investigators. These will, in all probability, become the final standard. The demonstration of still other nutrient elements belonging to this class makes it necessary that such a system of nomenclature be adopted. For example, a substance which seems necessary for bone development has been shown to exist and has been named Vitamin D. Evans and Bishop studied a substance which appeared to be essential to reproduction which they called Vitamin X but when they later confirmed their findings it took its place in the sequence as Vitamin E. So it will probably continue to the end of the alphabet, in which there are 26 letters.

Following these announcements the popularity of vitamins knew no bounds and the observations of these early modern students opened up a new field of investigation which is now replete with many spectacular achievements in animal experimentation; the latter has revealed the means of ameliorating and curing many defi-



ency diseases. From time to time different phases of the study of these food-factors have come to our notice and a correlation of what is generally accepted concerning them will now be attempted.

The existence of five vitamins has been recognised and quite definitely classified from a biologic standpoint. They are Vitamin A, antiophthalmic vitamin; Vitamin B, the antineuritic vitamin; Vitamin C, the antiscorbutic vitamin; Vitamin D the antirachitic; and Vitamin E, some times referred to as Vitamin X, the antisterility vitamin. Future investigations may reveal the identity of additional vitamins.

Now to the consideration of the individual vitamins, and taking Vitamin A as the first in the sequence, we find that the total absence of this vitamin has been found to cause a cessation of growth, wasting, anæmia, lowered resistance to infection and consequently to disease. Experimental animals, such as, dogs, rabbits, mice and poultry and even children, if fed for some time on a diet constantly deficient in Vitamin A, will develop the characteristic softening and cloudiness of the cornea known as Keratomalacia or Xerophthalmia. It is said to be analogous to the condition "night blindness" observed among the Eskimos and Japanese coolies, which can be cured by the administration of cod-liver oil which is rich in vitamin A. As a rule vitamin A is more important to the growing animal than it is to the fully developed animal. Its chief function in adult life appears to be the strengthening of the body resistance to disease. On the other hand any shortage of vitamin A in the young animal invariably results in the development of rickets. The deposition in the bones of Calcium derived from the food depends largely on an adequate supply of this vitamin. It, however, cannot be relied on entirely to prevent rickets for the reason that in study of rickets producing diets a lack

of balance in other respects will usually be found. There will also be deficiency of vitamin B and D and generally a preponderance of carbohydrate in the food. Of course, the recognised specific curative effect of cod-liver oil as the richest source of vitamin A cannot be doubted, but if the diet is properly adjusted in other respects far less will be required to protect or cure a young animal. There is enough vitamin in the food to produce growth at a normal rate, but the bones and teeth are improperly calcified. The deposition in the bones of lime salts derived from the food depends upon an adequate supply of this vitamin. Sun-light or ultra-violet irradiation is another accessory in the treatment and prevention which diminishes the infant's requirements for this vitamin. Moreover, ultra-violet irradiation will impart antirachitic power to many foods particularly fats which ordinarily are devoid of vitamin A. The particular constituent in such foods which becomes activated is now considered to be cholesterol. I shall tell you more about this subject of irradiation at the time of the consideration of vitamin D.

Vitamin A is often referred to as the fat-soluble principle and is often associated with fats, particularly animal fats. Vegetable fats contain little if any of this factor although their cholesterol content can be activated by ultra-violet irradiation.

Cod-liver oil is unquestionably the principal source of this vitamin. By a modern extraction process applied to carefully selected cod-livers obtained at the proper seasons an oil can be obtained which will contain 250 times as much vitamin A as butter fat, weight by weight. The liver of other fish has been found to contain it in no small quantities. Sardine oil for example which is extracted on the west-coast of this presidency is a very good example and is a very good source of this vitamin. Other foods containing vitamin A are butter fat, cream, egg-

yolk, green vegetables, liver, beef-fat, heart, mutton-fat, milk and fish, such as herring and mackerel. Oleomargarine which is now so often used in the place of butter cannot be depended upon to supply this vitamin.

Most animals have the capacity of storing vitamin A in some of the vital organs such as the liver, heart, or kidneys. It is not definitely known whether this storage is simply for the purpose of building up a reserve or whether the presence of this vitamin is necessary for the function of these vital organs. From some evidence adduced it would seem that the vitamin is necessary for the correct function of the vital organs, and when the dietary of individuals suffering from diseases of these organs is closely analysed, one is struck with the fact that there has been avitaminosis over short periods of time and a sub-minimal requirement over the remainder of the time, not alone of vitamin A but other vitamins as well.

Milk as a source of vitamin A is so frequently used that attention cannot but be called to the fact that cows fed upon a green pasture secrete milk much richer in vitamin A than the stall fed cow. In feeding babies in the winter months particular care should be taken that a supplemental source vitamin A be supplied. Evaporated, condensed and dried milks retain their vitamin content to a large extent.

While it is still conceded, as previously mentioned, that vitamins, like electricity, are known to exist and that they cannot be isolated, there is one most notable exception. About two years ago K. Takahashi reported the results of a study he had made in which he claimed to have isolated from cod-liver oil and spinach, by fractional distillation under a low pressure an unsaturated alcohol which he regarded as the vitamin A. This, he and co-workers, were able to concentrate one hundred times and a daily dose of 0.01—0.005 mg. was sufficient for the needs of

a growing albino. To this substance Takahashi gave the name of "Biosterin" and he found that when photographic plates were exposed to it in perfect darkness it made an impression which appeared when the plates were developed. Others have undertaken to isolate this vitamin according to Takahashi's method but have been unsuccessful. Unfortunately Takahashi died short while after he made this discovery, but his co-worker, Hamano, has taken up the work and his findings are awaited.

The work of McCarrison and the experiments of Cramer have shown that a diet may contain a sufficient amount of vitamins to prevent the occurrence of the so-called deficiency diseases, but, may nevertheless, be so poor in its vitamin content as to prevent an animal from maintaining its health. A study of the mode of action of the vitamins has led them to conclude that vitamins have a specific stimulating action on certain tissues and organs in the body of the living animal. If this stimulus is not supplied in the food in adequate amounts the functional activity of the cells or tissues is impaired. The degree of impairment varies with the degree of inadequacy in the supply of the stimulus and with the length of the time over which it is allowed to act. In this manner all degrees of deviation from health are produced by diets inadequate in their vitamin content. The mode of action of vitamins resembles in many respects that of hormones, and the term "food hormones" enables one to form a mental conception of the manner in which the disturbance of health can result from diets showing varying degrees of inadequacy in their vitamin content.

In order to study these conditions it is necessary to work over long periods and on a population of animals bred in the laboratory from a known stock and kept under controlled conditions. It is thus possible to show that rats kept on a natural diet poor in vitamins, such as white

bread, maize, and rice, will grow and breed and present an apparently normal appearance. But when compared with another population in which an ample supply of vitamins has been added to this diet, it will be found that on the poor diet they do not grow as well as on the rich diet, nor are able to rear their young one as well. Perhaps the most striking difference is that on the poor diet the older animals develop almost without exception an infection of the lung (septic broncho-pneumonia), while on the rich diet this is a rare occurrence. Mellanby has recently confirmed this observation in experiments on dogs. The literature contains ample evidence that similar conditions obtain in the human subject. In industrial schools apparent epidemics of pneumonia have occurred and recurred before we knew the existence of vitamins, in spite of the greatest attention given to housing. A revision of the knowledge in the light of our knowledge of dietetics showed that in these schools the diet contained an inadequate supply of vitamin A and when this error was corrected these apparent epidemics ceased. It is not unreasonable to suggest that the frequency with which broncho-pneumonia occurs in the children of the poorer classes is due to this dietetic error, namely deficiency of vitamin A.

A study of the mode of action of vitamin A has afforded an explanation of this remarkable fact. Vitamin A has a special stimulating action on the mucous membranes especially those of the respiratory and digestive tracts. These are always in contact with bacteria, but in perfect health these bacteria are not enabled to infect these mucous membranes, because the secretion of mucus acts as a mechanical and possibly also as a chemical defence against the bacteria. If the supply of vitamin A is inadequate the activity of the mucus secreting cells is impaired; they become atrophic and then the bacteria

are enabled to penetrate into the mucous membranes, and produce varying degrees of infection of these tissues. These infections may become localised for long time in the affected mucous membranes or lungs and produce apart from the local disease a general toxæmia. If sufficiently prolonged bacteria pass into the blood stream, exhaust the defensive humoral mechanism and set up an infection elsewhere or even a mild septicaemia. These effects are accompanied by changes in the blood, a thrombopenia and an anaemia. The importance of these findings lies in the fact that the mucous membranes of the respiratory and digestive tracts are the portals through which most bacterial infections to which we are prone enter. It is, therefore, in our power to increase by dietetic measures our resistance to such infections. These findings have been confirmed and extended recently by Koessler, Maurer, and McLoughlin, who have successfully applied the experimental results to the treatment of anaemias in man.

VITAMIN—B.

In contradistinction to vitamin A, this vitamin is never associated with fats or oils, of either animal or vegetable origin. It is the most widely distributed of all the vitamins and is soluble in water or alcohol. Its absence in the diet causes Beri-beri in man and polyneuritis in poultry. Before the symptoms of Beri-beri appear there is a period of ill-health in which other common symptoms met with every day in medical practice predominate. The first signs are loss of appetite, or there is depraved appetite in which experimental animals are observed to eat their faeces, and in the case of birds, their feathers and eggs. Weakness, loss of weight, lack of vigour follow, together with anaemia, a tendency to oedema, sub-normal temperature, and cardio-vascular depression. Later gastro-intestinal derangements appear

indigestion, constipation, colitis ; finally, there are symptoms due to the malnutrition of the nervous system. The on-set of these symptoms varies according to the degree of shortage of vitamin B. The greater the shortage the sooner they appear. If the shortage is slight the nervous symptoms may not appear and the organism only suffers from dyspepsia, constipation and other intestinal troubles. The body is thus weakened and offers no resistance to invading micro-organisms, or to large parasites like worms. A deficiency of vitamin B produces a marked loss of appetite, a disturbance of the growth rate, serious functional disturbance of the motor, secretory, assimilative and protective function of the intestinal tracts which culminates in death. Diarrhoea and mucus colitis are almost constant precursors or concomitants of "War-oedema" or popularly known as "Epidemic Dropsy", a disease which is partly due to a deficiency of vitamin B. Whether Epidemic Dropsy is purely an infectious disease brought on by the toxin of the rice bacillus, or it is purely an avitaminosis of Vitamin B is a still disputed point, and we shall leave it to the research workers to decide. The average person suffering from mucus colitis usually subsists on sterilised milk, cereals, white bread, polished rice, butter, overcooked vegetables and large quantities of sugar, a diet notably deficient in vitamin B, calcium, phosphorous and iodine. The analysis of the dietetic habits of the average constipated individual in most instance shows a vitamin B deficiency, and this explains the value of the yeast in treating these cases. In this connection, I would like to say a word about "*Roughage and Vitamin B*".—Foodstuffs, especially those of vegetable origin, contain, in addition to the five essential constituents, different amounts of cellulose, or fibre, commonly termed roughage. The fibre not being digestible is generally considered to play no direct part in

nutrition, (scouring) but is believed to aid peristalsis and evacuation of the bowel. It is for this reason that filter appear, or agar, is added to the food in many animal experiments. The material thus acts as bulk, and mainly forms the muck. Plimmer and Rosedale have kept birds and also rats for long periods, in some cases for over two years, in which time they had reproduced, on diets containing a minimum of cellulose. The long maintenance and reproduction were only possible if the diet contained sufficient vitamin B. Other birds on similar diets, but with too little vitamin B, were observed to suffer from the early symptoms of poly-neuritis, such as constipation, and were cured by doses of yeast extract. It was noticed that these animals emptied their bowels after the dosage with vitamin B before the cure took place. Cellulose in the ordinary diet of man is derived chiefly from the bran of the grain. Bran contains vitamin B. The assumption may, therefore, be made that one of the effects of roughage is the introduction in the food of vitamin B, which aids peristalsis.

This is not likely to be the only explanation of the action of roughage. In the absence of vitamin B, birds suffer from stagnation of food in the gut. Putrefaction then occurs, with the production of various toxins. It is suggested that beri-beri is due to the absorption over long periods of small quantities of a toxin, derived from the decomposing protein of the food in the stagnant gut, or even from damaged intestinal wall. Cellulose is a good absorbent for dyes and other chemical substances, so that it may serve as an absorbent of the toxins produced during the time of constipation, and thus prevent their harmful effect. China clay and charcoal, as used therapeutically, probably act in this way ; paraffin may be a solvent of the toxins. In all cases, the toxin is removed and prevented from being absorbed into the blood.

Roughage would thus appear to be unnecessary in a diet with sufficient vitamin B, but, in a diet containing a shortage, it may act as an absorber of toxins arising from constipation and prevent their introduction into the circulation.

The same explanation may be given for the beneficial action of charcoal and chalk which are so often used in the rearing of pigs. We also use charcoal therapeutically in fermentative gastric catarrhal conditions. Roughage could serve further by forming a layer of impermeable material along the wall of the intestine preventing the absorption of toxin.

This vitamin is absolutely necessary for the maintenance of life and health at all ages, and is found in all green vegetable plant tissues, tomatoes, roots, tubers, fruits, nuts, brewer's yeast and in cereals and seeds which have not been robbed of their germ or bran covering. It is to be found in meat, especially in heart, liver and kidney tissues—another example of the storage of a vitamin in the vital organs. The flesh of turkey, chicken, guinea fowl and duck is deficient in this vitamin.

It is difficult to understand how any one could suffer from a deficiency of vitamin B because of its almost universal distribution in natural foodstuffs; however it is a fact that many do, notably sailors, soldiers, explorers and artificially fed infants who have manifested clinically this deficiency time after time. The most classical manifestation of vitamin B deficiency is beri-beri in man. It is cured by administering food or solution containing the vitamin. The removal of bran coatings and the germ of cereals and seeds practically removes all their vitamin and mineral content. Therefore, such devitamised and demineralised products as polished rice, white flour, degerminated corn meal and most breakfast cereals should be avoided as far as possible, or, if eaten should

be eaten in combination with substances containing sufficient quantities of vitamins and minerals to offset the injury which occurs during the "Processing" or milling or polishing deemed necessary by millers for economical and commercial reasons.

Prof. W. Susuki claims to have isolated the vitamin B and at the present time his preparation is marketed in Japan under the trade name of "oryzanin" for the cure and treatment of beri-beri in infants and adults, nutritional disturbances in the artificially fed infant, beri-beri like symptoms, malnutrition, epidemic dropsy and oedema incidental to typhoid fever and other protracted illnesses. Talking of vitamin B and before finally leaving the subject of its consideration, I wish to say a few words about the disease call "Pellagra". Fortunately this disease is not to be seen in India or in England, but was present in France and Spain, and the prevention of which has been an acute problem in the Southern United States, in Italy, and other parts of the world, where little animal protein is eaten by the poorer classes. It prevails extensively among the poorer classes particularly in the country districts, and appears to be associated in some way or other with the use of maize which is fermented or diseased, and in these people maize seems to be the only form of supplying vegetable proteins. These proteins being of plant tissues are very poor, because they contain necessarily large amounts of some amino acids and little or none of others. The biological value of protein cannot be reckoned in terms of nitrogen, but according to its amino-acid content. There are some twenty amino-acids in the protein of the animal body. Good proteins for food are those which supply all the essential amino-acids in suitable proportions. The best proteins are derived from the animal tissues, such as meat, milk, cheese, eggs, fish etc. A small quantity of animal protein daily is all

that is needed ; an excess as is well-known, is harmful. A diet lacking some essential amino-acids is associated with the development of the disease called *Pellagra*.

This is a nutritional disturbance due to the use of altered maize. But whether it is due to want of amino acids or due to want of vitamin B, one thing is certain that it is cured by the administration of 'Yeast', which is rich in vitamin B. Incidentally this has led to the all important discovery of the *Dual Nature* of vitamin B. Although several research workers are responsible for this discovery, it has remained, however for Roscoe to place the duality of vitamin B beyond doubt.

G. A. Hartwell discovered a quantitative relation between the amount of protein and the amount of vitamin B which favour normal nutrition. The workers at University College, London, have confirmed this; they find that when the amount of protein in the diet is as high as 70%, yeast extract to the extent of 16% is required to obtain normal growth, whereas if the protein is only about 20% of the diet, 4% of yeast extract will suffice. Funk and some of the earlier workers held that there was a quantitative connection between the amount of vitamin B in the diet and the amount of carbohydrate which could be tolerated, but it now seems that the connection is with the protein rather than with the carbohydrate of the diet. Vitamins continue to multiply and evidence has been obtained that vitamin B, as found in yeast extract, is dual in nature, one part being stable and the other unstable to heat in the presence of an alkali; it is the stable fraction which negates the detrimental effects of the excess protein. M. H. Roscoe working at the Lister Institute found that young rats, fed on a diet deficient in vitamin B collapsed with neuritic symptoms about the twentyfourth day; the collapse could be cured with alcoholic extract of yeast. If the rats continued on

the same diet, together with the addition of the alcoholic extract, a fresh and very severe syndrome of "Pellagrous" symptoms made its appearance. These symptoms which consisted of loss of hair and oedema, yielded to the administration of yeast autoclaved at 120°C, for five hours, which had no effect at all on the neuritic symptoms, because the unstable fraction of vitamin B which is present in the alcoholic extract of yeast, was destroyed by the 120°C of temperature during the process of autoclaving.

The pellagrous symptoms in rats were first described by Goldberger who also made the observation that human pellagra is cured by administration of autoclaved yeast, but it was solely left to Roscoe to identify the dual nature of vitamin B.

GOITRE—ENDEMIC.

In his researches on deficiency diseases Lt.-Col. McCarrison has produced a variety of goitre which appears to be closely allied to that in Grave's disease and is unrelated to iodine metabolism. Goitre is exceedingly prevalent among civilised people whose diet consists largely of white flour. In view of the fact that much prominence has been given to iodine deficiency as its cause, experiments were made to discover whether a diet consisting largely of white flour and lacking in green vegetable and fruit could produce or favour the development of goitre in experimental animals that were receiving iodine in adequate amounts and living under proper hygienic conditions. The results reported showed that in the type of goitre produced the fundamental cause was a dietetic one and not a lack of iodine. In McCarrison's opinion the experimental evidence makes it probable that in western countries this new type of goitre will be encountered in its progressive stage in childhood and in young women of the working classes whose food contains much carbohydrate, deficient in vitamins, very little suit-

able proteins, and still less green vegetables and fruits. This type of goitre will be encountered in its retrogressive stage in older subjects whose food has similar faults. Others factors which may contribute to the formation of goitre are excessive ingestion of lime or fat and insanitary conditions of life.

McCarrison points out that the pathological features of the "Endemic Goitres" will be influenced by the food habits of residents in endemic zones where white flour is the staple article of diet, and milk and green vegetable foods are scarce.

The goitre arising from vitamin deficiency is characterised by intense secretory hypertrophy which ultimately leads to exhaustion of more or less of the epithelia and its replacement by non-secretory elements and fibrous tissue. The changes may be present without marked increase in the size of the gland.

It seems likely that this type of goitre will be found to occur sporadically among white flour eating people; that the subjects of its progressive stage will be found to develop Grave's disease following such influences as fright, mental worry, pregnancy, lactation and attacks of acute infectious disease; and that the subjects of its retrogressive phase will exhibit greater or lesser degrees of myxoedema.

If this type of goitre be found to prevail sporadically in white flour eating people the additional provision of iodine in the food will not prevent it, but a well balanced vitamin diet will. This statement of Col. McCarrison condemning white flour as the sole cause of endemic goitre, backed up by Plimmer, who loudly proclaims that the use of white flour in preference to the whole meal, is the sole cause of appendicitis, cholecystitis, cancer etc., has given rise to heated controversy, which appears in the correspondence columns of the 'Lancet' for the last

three months. The wordy warfare is consequent on a lecture by Sir Thomas Horder. The whole quibble is about vitamin B in white bread. Sir Thomas Horder is the Physician-in-ordinary to H. R. H. The Prince of Wales. In July last he delivered the 'MacAlister lectures' before the London Clinical Society. Drummond, Plimmer and others have worked out the case against white flour, and speak in favour of whole-meal flour. These are of opinion that unless the whole-meal bread is substituted for white bread in the national diet, there can't be material improvement in the national health and physique.

Sir Thomas Horder refuses to subscribe to the views of the above workers.

Sir Thomas Horder in his MacAlister lecture and in a subsequent manifesto issued by him, along with five other signatories, condemns in strong deprecatory terms all extreme or personal views in attempting to educate the layman in matters of health. Sir Thomas Horder's influence with the public is very great. In a recent rejoinder dated September 28th, he gave free expression to his views and his conception of the way of health. He says, "Health is a broad and well-paved road; nature is both an excellent road maker and an excellent road-mender. Not only does it require very little skill, but a modicum of good fortune, to keep to it; the wayfaring man must be a fool indeed if he errs therein. Now and again there are bends which call for good care; there are cross roads; there is a goodly sprinkling of fools travelling; and pace carries risks of a special kind. But apart from these things the amount of negotiation needed is very little provided we keep control of the car." Of course, his critics are many. Two gentlemen call him a liar, and one of them insistently invites him to debate this point on the platform. He says, he has been challenged to live on white bread alone, and the challenger offers to

write an Epitaph on his tomb in case he dies of vitamin B deficiency.

Another critic of his, S. Henning Belgrave thinks "that whole-meal bread is a novelty in human experience. It is the white bread that is the innovation. If the cellulose of the whole cereals is so disastrous in its effects, it is surely remarkable that men and his ancestors survived the machineless past. He contradicts Sir Thomas Horder's statement that, "There are few established facts as to the connection between diet and disease", Belfrage says, "It would be nearer the truth to admit that there are few better established facts in our knowledge of the causation of disease. The public will continue to form its own ideas as to the wholesomeness of their diet until it is educated as to the real meaning of the word. Scoffing at the extremist will only serve to encourage ignorance and self indulgence".

Of all the critics Col. H. Hallilay's criticism is worth hearing. He speaks in glowing terms of the toughness and vitality of the Punjabi peasant in the North of India, and reluctantly confesses that their physique compares very favourably with that of the inhabitants of the British Isles. He has taken the trouble to work out figures for the last 17 years for the two armies in India and is struck with the remarkable feature, that the Indian soldier differs from his British comrade, in his strikingly smaller liability for appendicitis. Space and time does not permit me to speak at more length about all he says about the Punjabis, but to sum up—Hallilay sums up—"We find that the nation which subsists on a diet of pulse and whole-meal bread enjoys a striking immunity from the very diseases and disabilities from which our people suffer so grievously, albeit they are nourished on that wholesome white bread which arouses the admiration of our food specialists. On the other hand we have a C 3

race with a dentition so debased and decayed that they are unable even to masticate the emasculated paste which masquerades under the title of bread in this country, mothers who are unable to suckle their own children, widespread stunting and deformity from infantile rickets, an appalling high percentage of rejections for physical unfitness amongst those recruits who present themselves for the army and navy, and finally a cancer mortality of one death in ten as certified in our bills of mortality returned by the Registrar-General."

(To be continued.)

A CASE OF ANEURYSM.

By DR. K. N. PISHAROTY, M.B., B.S.

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Ponnusamy, Christian, male aged 30 years, ryot by occupation, was admitted into the Headquarter Hospital, Tanjore, on 14th May 1925 for pain in the chest and back of seven month's duration. The pain was constant. He had slight cough with scanty expectoration. The patient gave a history of mild fever coming on at times.

Previous history of gonorrhœa two years back. Scars present in the groins, said to be due to operation for bubo. No history of syphilis. The patient was addicted to alcohol.

Condition on admission:—Patient was a fairly well built and well nourished individual. No anaemia nor enlargement of glands. *Lungs:*—Slight diminution of movement over the left apex, vocal fremitus increased; diminished resonance on percussion in the region; breath-sounds bronchial in character; vocal resonance increased; no adventitious sounds. Heart normal. Other systems normal. Sputum scanty, did not contain tubercle bacilli. The patient was observed to be having a slight rise of temperature in the evenings.

From the signs of consolidation over the apex of one lung the case was thought to be one of tuberculosis of the lung, where the symptoms were few, but the signs marked. The patient was discharged 'Relieved' on 29th May 1925.

On 7th October 1925 the patient sought readmission into the hospital for pain in the chest, and dyspnoea. He said that since leaving the hospital his condition had been gradually getting worse. The pain had increased. It was now constant, and felt in the chest, back and upper limbs, particularly on the left side. He had irritant cough, with scanty expectoration and continuous dyspnoea increased on exertion with pain while swallowing. His voice was hoarse. He had sleeplessness on account of the pain.

Physical examination:—General health good. The left eye looked smaller due to drooping of the upper eyelid. The pupil of the left eye is contracted. Circulatory system. Slight localised bulging extending from just below the inner end of the left clavicle to the lower part of the left third intercostal space, and transversely from the midsternal line to the left parasternal line. Visible pulsation over the swelling, but the pulsation is not expansile. The apex beat is seen in the sixth left intercostal space half an inch external to the nipple line. The superficial veins over the upper part of the left side of chest, the left side of neck and the left arm are distended. Tenderness is present over the swelling and all over the praecordial region. No thrills. The percussion note over the swelling is dull, and it is continuous with that of the heart. Dullness is also present over the manubrium sterni and throughout the first and second left intercostal spaces. The left border of the heart is just internal to the left nipple line, the right border over the right lateral sternal line. Heart sounds normal in

all the four areas. No murmur is heard over the swelling; but a soft systolic murmur is heard in the interscapular region on the left side upto the level of the lower angle of the scapula. An almost continuous humming bruit is heard in the left axilla.

The radial pulse on the left side is not felt. On the right side it is regular, of fair volume and low tension. Pulsation is felt over the left Carotid. There is absence of pulsation in the abdominal aorta and the femoral arteries. Tracheal tugging is present.

Respiratory system:—Diminished movement in the left supra and infraclavicular fossae; vocal fremitus same on either side; dullness in the infraclavicular region and the suprascapular and interscapular regions on the left side; no adventitious sounds. Sputum blood stained, negative for tubercle bacilli.

The patient is not having fever. The pain and cough are gradually getting worse. A few moist sounds are now heard over the base of the left lung.

The case was diagnosed as one of aneurysm of the arch of the aorta (the transverse and the descending portion). The interest of the case lies in the fact that it was thought to be a case of tuberculosis of the lung (left apex) when the patient was first admitted into the hospital four months previously. The signs of consolidation then observed must have been due to the aneurysm causing pressure on the bronchus and the lung. There was then no visible swelling or pulsation, no displacement of the apex beat, bruit, or any other signs to suspect aneurysm.

ASSOCIATION NOTES.

Minutes of an Emergency meeting of the Executive Committee held on 30th September 1927 at the residence of the President, Sri Nivas, Harris Road.

PRESENT:—Dr. M. Kesava Pai, *President*; Drs. K. Madhava Menon; H. S. Hensman; A. S. Mannady Nayar; A. Lakshmanaswami Mudaliar; K. Koman Nair and P. Venkatagiri.

1. The draft memorandum drawn up by Dr. A. Lakshmanaswami Mudaliar and the President was read out and approved.

2. Read Government Memorandum No. 30711-P.H. of 23rd September 1927 forwarded by the Surgeon-General with his Ref. No. 2521-I.E. of 27th September 1927 on the subject of recognition of the Association by Government, in the absence of which Government refuse to consider the representations of the Association regarding study leave rules.

Resolved that an application be made at once to Government through the Surgeon-General for the recognition of the Association. Draft application approved.

Minutes of the Annual General Meeting held on Saturday the 15th October 1927 at 5-30 p.m. at the Medical College, Madras, with Dr. M. Kesava Pai, the President in the chair.

There were about 25 members present including Rao Bahadur Dr. K. Madhava Menon and Rao Saheb Dr. T. S. Tirumurthi, two of the 3 guests of the evening social. Rao Bahadur Dr. P. Krishnaswami and Dr. S. Padmanabha Sarma from Vizag were also present.

1. After tea and light refreshments the President welcomed the three guests of the evening namely Rao Bahadur Dr. K. Madhava Menon, Rao Saheb Dr. T. S. Tirumurthi and Dr. K. D. Mugaseth, M.B.E. of Calicut, (the last not being present at the meeting) congratulating them on the distinctions conferred on them by Government on King's Birthday last June. In doing so he referred to the long and distinguished career of Dr.

ASSOCIATION NOTES.

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Madhava Menon, his great popularity in the districts where he served as District Medical Officer, his modest and unassuming ways, the marked sobriety of judgment he displayed in his official capacity as the Personal Assistant to the Surgeon-General and the sincerity and earnestness with which he worked as the Vice-President of the Association in promoting its interests and helping it with his considered advice.

Dr. Tirumurthi, he said, had made his name in the service quite early in his career, had distinguished himself in his capacity as Professor of Pathology and Physician at the General Hospital, had attained marked success in his D. T. M. & H. course at the London School of Tropical Medicine and was now holding a high position in the service. Though away from Madras he had, as a member of the Executive Committee continued to work for the Association as steadfastly and earnestly as he did when he was in Madras.

Dr. Mugaseth though a private practitioner now has made a name in Calicut as the leading doctor of the place his services being sought after by Europeans and Indians alike. Besides his popularity as a doctor he was one of the best social workers of the station. The welcome of the Association would be communicated to him by post.

2. The annual audited statement was taken as read and adopted.

3. Rao Bahadur Dr. P. Krishnaswami then moved the resolution sent by the Vizag members through him viz. A. That articles 8, 9 and 10 of the Association be modified as shown below:—

I. Article 8.—The following shall be office-bearers of the Association (a) one President, (b) three Vice-Presidents and (c) twelve members of the Executive Committee of whom one shall be the Treasurer and two Joint Secretaries.

II. Article 9.—The President shall be elected from among members resident in Madras. Of the three Vice-Presidents one shall be from among the resident members, one from the members resident at Vizagapatam and one from the other moffusil stations. The President and Vice-Presidents shall be ex-officio members of the Executive Committee.

III. *Article 10.*—Of the Executive Committee members five shall be from among members residing in Madras of whom one shall be the Treasurer and one Secretary. Seven members shall be from the moffusil of whom the other Joint Secretary and two members on the Executive Committee shall be resident in Vizagapatam and four members from other moffusil stations.

B. That a branch of the Association be constituted at Vizagapatam with one of the Vice-Presidents, Joint Secretary and two members on the Executive Committee.

In support of these resolutions Dr. Krishnaswami referred to the increasing importance of Vizagapatam as a centre where there was a Medical College and a large number of members of the Provincial Medical Service either as members of the Association or as non-members. The latter had apparently seceded from the Association or refused to join it on the ground that the Association was run by Madras members alone as members of the Executive Committee to the exclusion of moffusil members and they had no opportunity to have their voice in the shaping of the policy of the Association. His resolutions, if passed, would make the Association more popular and bring back these dissatisfied members of the service into the membership of the Association.

Dr. T. S. Tirumurthi seconded the resolutions.

A discussion followed in which Dr. A. S. Mannady Nayar doubted the wisdom of bifurcation of the Association which he said might lead to a clashing of work.

Dr. P. F. Mathias sympathised with the grievances of moffusil members and said he himself had suffered from similar disabilities when in the moffusil the inner working of the Association not having been made known to him or others in the moffusil. He proposed an amendment to the resolution that Vizagapatam may be made the headquarters of the Association and that the members there may be given the chance of conducting the Association. This was disallowed as being a new proposition rather than an amendment.

Dr. V. C. Govinda Menon considered that branches may be constituted in different moffusil centres where a large number of members reside and that the Central Committee in Madras may

draw up regulations for the working of these branches.

Dr. A. Lakshmanaswami Mudaliar then explained that the wish of the Vizag members as expressed in resolutions moved by Dr. P. Krishnaswami, was quite a reasonable one considering the importance of that station but that the resolutions in their present shape would be difficult of being carried into practical effect as the frequent transfers of members to and from Madras and Vizag would necessarily interfere with the membership of the Committee in the respective stations and difficulties might arise in obtaining the quorum for the committee meetings in Madras. He therefore proposed the following amended resolutions which were carried.

A. That articles 8, 9 & 10 of the Association be modified as shown below :—

I. *Article 8.*—The following shall be office-bearers of the Association (a) one President, (b) three Vice-Presidents and (c) fifteen members of the Executive Committee of whom one shall be the Treasurer and two Joint Secretaries.

II. *Article 9.*—The President shall be elected from among members resident in Madras. Of the three Vice-Presidents one shall be from among resident members, one from the members resident in Vizagapatam and one from other moffusil stations. The President and Vice-Presidents shall be ex-officio members of the Executive Committee.

III. *Article 10.*—Of the Executive Committee members seven shall be from among members residing in Madras, of whom one shall be Treasurer and one Secretary. Eight members shall be from the moffusil of whom the other Joint Secretary and two members of the Executive Committee shall be resident in Vizagapatam and 5 members from other moffusil stations.

Resolution B of Dr. Krishnaswami to be deleted.

The amendment was seconded and adopted.

4. Dr. P. Krishnaswami then moved the following modifications in articles 11, 12, 13, & 22 of the Associations.

(1) That articles 11, 12, 13 and 22 of the Association be modified as shown below :—

Article 11.—The election of office-bearers shall be annual and conducted as follows :—

Nomination for offices shall be called for by a circular letter to all the members on the 15th of July every year. Each member shall have the right to nominate as many persons as there are offices under the respective heads of President, Vice-Presidents and Executive Committee members. Every nomination shall be in writing, and the written consent of the nominee shall be enclosed. The nominations shall reach the Secretary by the 15th August following. If the number of nominees exceed the number of offices, the Secretary shall forward to each member voting papers containing their names along with an up-to-date list of members of the Association by the 1st September. The voting paper shall be returned by each member to the Secretary with the names of office-bearers for the succeeding year clearly marked out, so as to reach him before the 1st October following. The President shall nominate three members, who are not among the nominated office-bearers, to scrutinize the voting papers and announce the results at the Annual General meeting. The Executive Committee shall elect the Joint Secretaries from among the above-mentioned members.

Article 12.—Add at the end of the sentence after "vacancy" "by appointing the member next in rank in the number of votes secured at the general election for the respective office that has fallen vacant."

Article 13.—Add after "year" in the first sentence "*in October.*"

Article 22.—Add at the end:—In the case of non-resident members, they may send their votes on all subjects by post.

(2) Proceedings of the Annual General meeting, Executive Committee meetings of the Associations shall generally be published in the Association Journal.

After some discussion the modifications in articles 11 and 13 alone were adopted and those in articles 12 and 22 were withdrawn by the mover.

Item 2 of the modified resolution regarding the publication of proceedings of meetings in the journal was adopted.

5. The President then read to the meeting the memorandum submitted by the Executive Committee on behalf of the Association to Government through the Surgeon-General regard-

ing the recruitment of Honorary Physicians and Surgeons and the application to the Government for recognition of the Association.

6. The result of the voting for office-bearers, the scrutiny of voting papers having been made by Drs. N. Seshadrinathan, H. Krishnan and K. Venugopal Naidu at the request of the President, was then announced by the President. It was as follows:—

President—Dr. M. Kesava Pai, *Vice-President*—Drs. M. K. Verghese, Vizag; K. Madhava Menon, Madras; *Members of the Executive Committee*:—Drs. G. R. Dinkar Rao, Vizagapatam; G. Srinivasamurthi, Madras; T. S. Tirumurthi, Vizagapatam; A. Lakshmanaswami Mudaliar, Madras; K. Koman Nair, Madras; P. Krishnaswami, Vizagapatam; S. Swaminathan, Vizagapatam; M. R. Guruswami Mudaliar and P. V. Cherian, Madras.

Proceedings of the meeting of the Executive Committee held on 19th October 1927 at the President's House at 5-30 p.m.

PRESENT:—Dr. M. Kesava Pai, *President*; K. Madhava Menon, *Vice-President*; Drs. Lakshmanaswami Mudaliar, T. S. Tirumurthi, P. Krishnaswami and P. V. Cherian.

1. Read letter from Dr. G. Srinivasamurthi, Hon. Secretary, tendering his resignation of the office of the Hon. Secretary. Resolved that the Executive Committee do place on record its very high appreciation of the invaluable services rendered by Dr. G. Srinivasamurthi as the Honorary Secretary of the Association for several years, and whilst regretting the circumstances which necessitated his resignation of the Hon. Secretaryship, the Committee is glad that his ripe experience and judicious advice will still be available as one of its members.

2. That a copy of the above resolution be communicated to Dr. G. Srinivasamurthi.

3. That Rao Bahadur Dr. P. Krishnaswami Iyer and Dr. Koman Nair be elected as Hon. Secretaries and Dr. P. V. Cherian as Hon. Treasurer for the year. That Rao Bahadur Dr. P. Krishnaswami and Dr. P. V. Cherian be appointed as Hon. Editors of the Magazine of the Association.

4. That the journal be issued as a quarterly publication.

*Minutes of an Executive Committee Meeting held on
2nd November 1927 at 5-30 p. m. at the
President's House.*

PRESENT :—Dr. M. Kesava Pai, *President*; Dr. K. Madhava Menon, *Vice-President*; Drs. G. Srinivasamurthi, K. Koman Nair, and P. V. Cherian.

Subject :—Letter from the Secretary of the Committee for entertaining the delegates of the Far Eastern Congress of Tropical Medicine visiting Madras regarding a dinner to be held in their honour.

Decisions :—Resolved (1) that this dinner is to be a function separate from the annual medical services dinner, and (2) that, as a feeling was expressed by some members that the Association was not represented on the Entertainment Committee when it was constituted, the President be requested to interview the Secretary of the Committee to know the details about the arrangements for the dinner, before a decision was arrived at.

*Minutes of an Executive Committee Meeting convened on 8th
November 1927 and adjourned for want of a quorum
to the 11th November 1927 at 5-30 p.m. at
the President's House.*

PRESENT :—Dr. M. Kesava Pai, *President*; Drs. G. Srinivasamurthi, K. Koman Nayar, P. V. Cherian and A. Lakshmanaswami Mudaliar.

1. Read G. O. No. 1068 Mis. (public) dated the 3rd November 1927, according official recognition to the Madras Medical Association and requesting the Surgeon-General to instruct his Personal Assistant to resign his office in the Association, as it was contrary to the instructions laid down by the Government of India.

Read also letter P. No. 246 E., dated 5th November 1927 from Rao Bahadur Dr. K. Madhava Menon resigning his office as Vice-President of the Association.

Resolved that the Executive Committee, whilst accepting with regret the resignation, which Rao Bahadur Dr. K. Madhava

Menon has been obliged under the orders of the Government to tender, of the office of Vice-President of the Association, do place on record their very high and grateful appreciation of the valuable services he has rendered these many years. They feel sure that, even out of office, his services will always be available to the Association and wish and express the hope that, when he is free again to take up office, they will have the pleasure and the benefit of his advice and help in an official capacity.

2. Resolved that a copy of the above resolution be communicated to Rao Bahadur Dr. K. Madhava Menon.

3. *Subject* :—Letter from the Secretary of the Madras Branch of the Social Hygiene Council enquiring whether the Association would be willing to assist in the work of the Council and if so would send a member to represent the Association on its General Council.

Decision :—Resolved that the Association would be pleased the co-operate in the work of the Council and that Dr. M. Subba Rao, M.B., & B.S., be elected as the representative of the Association to the Madras Branch of the Social Hygiene Council.

4. *Subject* :—Letter from the Secretary of the Entertainments Committee of the Far Eastern Congress delegates regarding the proposed dinner.

Decision :—Resolved that the Secretary be addressed that the Executive Committee of the Association is agreeable to the proposal and is willing to advise the members of the Association to participate in the same.



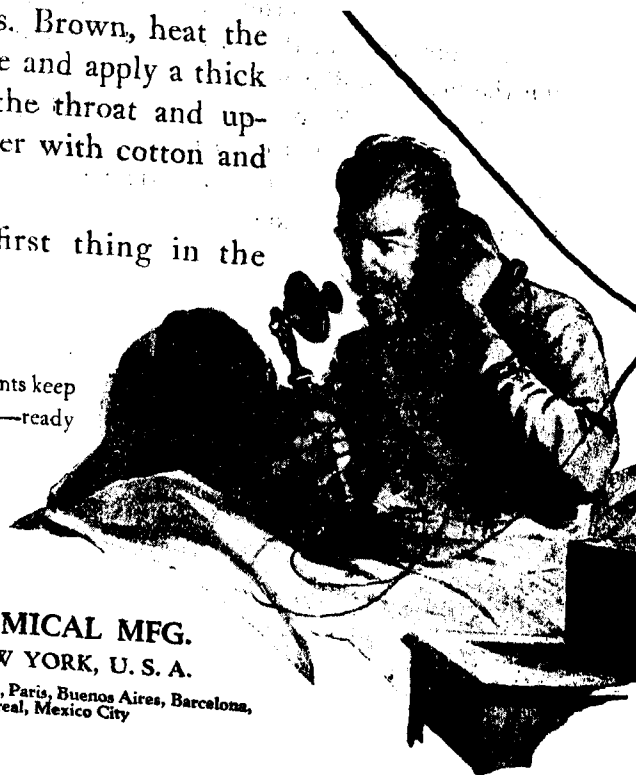
On a
Night
like this!

Yes, Doctor, we have Antiphlogistine
in the house, thank goodness!

All right, Mrs. Brown, heat the
Antiphlogistine and apply a thick
poultice over the throat and up-
per chest. Cover with cotton and
gauze.

I'll call the first thing in the
morning.

DOCTOR, have your patients keep
Antiphlogistine in the home—ready
for emergencies.



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